

A first notice of *Acmaeopleura* Stimpson (Crustacea: Decapoda: Brachyura) from the Miocene of Japan

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Abstract

Acmaeopleura hichiro, new species, a crab of the family Varunidae (Brachyura: Grapsoidea) is described from the Middle Miocene Kakinaga Group in Tanegashima, Japan. Recognition of this species extends the geologic range for the genus back to the middle Miocene. There is a possibility that *Acmaeopleura hichiro* was a co-habitant of burrows of *Upogebia tanegashimensis* Karasawa and Inoue (Decapoda: Thalassinidea).

Key words: Decapoda, Brachyura, Grapsoidea, *Acmaeopleura*, symbiosis, Miocene, Japan

Introduction

The varunid genus *Acmaeopleura* Stimpson, 1858 (Brachyura: Grapsoidea) occurs in the Indo-West Pacific and is represented by seven species, *A. parvula* Stimpson, 1858, *A. rotunda* Rathbun, 1909, *A. balssi* Shen, 1932, *A. depressa* Sakai, 1965, *A. toriumii* Takeda, 1974, and two unnamed species reported by Itani (2002, 2004). *Acmaeopleura* sp. from the Holocene Nanyo Formation (Umemoto and Karasawa, 1998) is only known in the fossil record.

The purpose of the present paper is to describe a new species of *Acmaeopleura* from the middle Miocene of Japan. The specimen was collected from sandy siltstone of the Kawachi Formation exposed at Suigyō (Loc. KO-5 of Karasawa and Inoue, 1992), Hirayama, Minamitane-cho, Kagoshima Prefecture. According to Hayasaka (1988), the geologic age of the Kawachi Formation was early Middle Miocene based upon molluscan fossils. Karasawa and Inoue (1992) described four decapods, *Upogebia tanegashimensis*, *Scylla ozawai* (Glaessner, 1933), *Philyra hayasakai* Karasawa and Inoue, 1992, and *Helice* sp. from the locality. Among these, *U. tanegashimensis* is predominant. The decapod assemblage suggests a depositional environment within the intertidal zone of a muddy to sandy bottom (Karasawa and Inoue, 1992).

The specimen is housed in the Mizunami Fossil Museum, Yamanouchi, Akeyo, Mizunami, Gifu, Japan.

Systematics

Family Varunidae H. Milne Edwards, 1953

Subfamily Varuninae H. Milne Edwards, 1953

Genus *Acmaeopleura* Stimpson, 1858

Type species: *Acmaeopleura parvula* Stimpson, 1858, by monotypy (ICZN Direction 37).



Fig. 1. *Acmaeopleura hichiro*, new species. MFM83066 (holotype), dorsal view of carapace. Scale bar = 5 mm.

Geologic range: Middle Miocene–Recent.

Acmaeopleura hichiro, new species

(Fig. 1)

Material examined: MFM83066 (holotype).

Diagnosis: Small sized *Acmaeopleura*. Carapace quadrilateral, slightly wider than long, widest at midlength. Carapace margins smooth, rimmed. Fronto-orbital width about 70 percent maximum width. Epimeron slightly visible in dorsal view. Dorsal surface smooth, moderately convex. Regions poorly defined; intestinal region with low, transverse swelling.

Etymology: Named by an arbitrary combination of letters.

Description: Carapace small in size, quadrilateral, slightly wider than long, about 88 percent maximum carapace width, widest at midlength. Frontal margin protruded anteriorly, weakly truncated, rimmed, about 35 percent maximum width; each lateral corner angular, not separated from supraorbital angle. Orbit rather large; upper orbital margin concave, entire, rimmed. Fronto-orbital width about 70 percent

maximum width. Anterolateral and posterolateral margins confluent, smooth, entire, rimmed; posterolateral reentrant rather large, well developed; epimeron slightly visible in dorsal view. Posterior margin straight, entire, rimmed; width slightly narrower than fronto-orbital width, about 62 percent maximum width. Dorsal surface smooth, moderately convex longitudinally and transversely. Regions poorly defined; frontal region broken; gastric and branchial regions undifferentiated; cardiac region transversely hexagonal, defined by very shallow grooves; intestinal region with low, transverse swelling.

Discussion: *Acmaeopluera hichiro* possesses carapace characters most like those of the extant *Acmaeopluera toriumii*, but differs in the presence of a transverse swelling on the intestinal region. The previously known fossil of *Acmaeopluera* has been recorded from the Holocene of Japan (Umemoto and Karasawa, 1998). The discovery of the new species extends the geologic range for the genus back to the middle Miocene.

Among seven extant species of *Acmaeopluera*, five are known as the commensals of annelids, echinurans, and thalassinideans; *Acmaeopluera balssi* is reported from the burrows of annelids, echinurans, and upogebiids (Sakai, 1976; Ghani and Tirmizi, 1991; Itani et al., 2004); *Acmaeopluera depressa* and *Acmaeopluera* sp. 2 (Itani, 2004) are symbiotic with upogebiids and callianassids (Itani, 2004); *Acmaeopluera toriumii* is a co-habitant of burrows of echinurans, upogebiids, and callianassids (Davie, 1992; Itani, 2002, 2004); *Acmaeopluera* sp. 1 (Itani, 2004) is extrosymbiotic with upogebiids (Itani, 2002, 2004). The present specimen occurred in the sediments filling a fossil burrow, in association with *Upogebia tanegashimensis*. The commensalism of the extant *Acmaeopluera* spp. with upogebiids appears to indicate that *Acmaeopluera hichiro* was a co-habitant of *Upogebia tanegashimensis*-burrows. Examination of additional material will be necessary to confirm the commensalism of *A. hichiro* with *U. tanegashimensis*.

Acknowledgements

We thank K. Inoue (Nagoya University) for offering us fossil decapods, and G. Itani (Kochi University) for providing us literatures and useful information on the extant *Acmaeopluera*.

References

Davie, P. J. F. (1992), A new species and new records of intertidal crabs (Crustacea: Brachyura) from Hong Kong. In Morton, B. (ed.), *The Marine Flora and Fauna of Hong Kong and Southern China Sea III*, Hong Kong, p. 345–359.

- Ghani, N. and Tirmizi, N. M. (1991), *Acmaeopluera balssi* Shen, 1932: a grapsid genus and species hitherto unknown from the northern Arabian Sea (Decapoda, Brachyura). *Crustaceana*, 61, 93–95.
- Glaessner, M. F. (1933), New Tertiary crabs in the collection of the British Museum. *Ann. Mag. Nat. Hist.*, ser. 10, 12, 1–28.
- Hayasaka, S. (1988), Geology of Tane-ga-shima. *Modern Geology*, 12, 169–183.
- Itani, G. (2002), Two types of symbioses between grapsid crabs and a host thalassinidean shrimp. *Publ. Seto Mar. Biol. Lab.*, 39, 129–137.
- Itani, G. (2004), Host specialization in symbiotic animals associated with thalassinidean shrimps in Japan. In Tamaki, A. (ed.), *Proceedings of the Symposium on "Ecology of Large Bioturbators in Tidal Flats and Shallow Sublittoral Sediments—from Individual Behavior to Their Role as Ecosystem Engineers"*, November 1-2, 2003, Nagasaki University, Nagasaki, Japan, p. 33–43.
- Itani, G., Davie, P. J. F., and Takeda, M. (2002), Taxonomic notes of *Acmaeopluera balssi* Shen, 1932 and *A. toriumii* Takeda, 1974 (Crustacea, Brachyura, Grapsidae). *Bull. natn. Sci. Mus.*, ser. A, 28, 43–50.
- Itani, G., Izichi, M., and Ueda, H. (2005), Crab species collected from the burrows of *Urechis unicinctus* in Hiuchi-nada, the central Seto Inland Sea, Japan. *Cancer*, 14, 1–4.
- Karasawa, H. and Inoue, K. (1992), Decapod crustaceans from the Miocene Kukinaga Group, Tanegashima Island, Kyushu, Japan. *Tertiary Res.*, 14, 73–96.
- Milne Edwards, H. (1853), Mémoires sur la famille des Ocypodiens, suite. *Ann. Sci. Nat., Zool.*, sér. 3 (Zool.), 20, 163–228.
- Rathbun, M. J. (1909), New crabs from the Gulf of Siam. *Proc. Biol. Soc. Wash.*, 22, 107–114.
- Sakai, T. (1965), *The crabs of Sagami Bay*. Maruzen, Tokyo.
- Sakai, T. (1976), *Crabs of Japan and the adjacent seas*. Kodansha, Tokyo.
- Shen, C. J. (1932), The brachyuran Crustacea of North China. *Zool. Sinica*, (A), 9, 1–321.
- Stimpson, W. (1858), Prodromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducibus, observavit et descripsit W. Stimpson. Pars. V. Crustacea Ocypodoidea. *Proc. Acad. Nat. Sci. Philadelphia*, 10, 93–110.
- Takeda, M. (1974), Accounts of some crabs from Mutsu Bay, with description of a new grapsid from Onagawa Bay. *Bull. Mar. Biol. Stat. Asamushi, Tôhoku Univ.*, 15, 13–21.
- Umemoto, M. and Karasawa, H. (1998), Decapod crustaceans from the Holocene Nanyo Formation of Aichi Prefecture, Japan. *Kaseki no tomo*, 45, 10–19.

Manuscript accepted on September 25, 2005