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## A New Majid Crab from the Miocene Matsuyama Group, Saitama Prefecture, Central Japan

By

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**Abstract**—In this paper is presented a description of a new majid crab from the Tsuchishio Formation of the Middle Miocene Matsuyama Group, Saitama Prefecture. The genus *Achaeus*, to which the new species is referred, is represented by more than 30 recent species from the Indo-West Pacific and East Atlantic Oceans and by one fossil species from the Miocene beds in Hungary. The new species named *A. nomurai* belongs to the short-neck type, being characterized by the convex and unarmed gastric region, the presence of two tubercles side by side on the cardiac region, and the fine spinules dispersed on the branchial regions.

### Introduction

Through Dr. Teruya UYENO of our Museum an interesting fossil crab embedded in sandy shale and its counterpart were brought to us for identification. It was found by Mr. Yukimasa NOMURA, an experienced amateur collector in Tokyo, at the river bed of Arakawa of Sukanuma, Kawamoto-machi, Saitama Prefecture, associated with fossil remains of clupeid, bothid and scombrid fishes. This locality belongs to the Tsuchishio Formation in the Middle Miocene Matsuyama Group.

The fossil crab in question was identified as a new species of the genus *Achaeus* of the family Majidae and named for Mr. Y. NOMURA, to whom our cordial thanks are extended.

The holotype and its counterpart are now preserved in the collection of Department of Paleontology, the National Science Museum, Tokyo.

### Geological Setting and Geologic Age

Neogene strata are distributed along the eastern border of the Kanto (Kwanto) Mountainland, and compose a series of hills. The Matsuyama Group (WATANABE, 1954) constitutes North Hiki Hill, and its northern extension is exposed on the river bed of lower courses of Arakawa River, from Yorii City downward to about 11 km.

On the basis of geologic maps of WATANABE *et al.* (1950) and MATSUMARU & HAYASHI (1980), we judged that the present fossil crab was obtained from the Tsuchishio Formation, the upper part of the Matsuyama Group.

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A number of minor foraminifers and several kinds of marine shells such as *Dosinia kaneharai*, *Mya cuneiformis*, *Yoldia sagittaria*, etc. are recorded from the Tsuchishio Formation (WATANABE *et al.*, 1950), they are suggestive of the Middle Miocene in age. The Kosono Formation, the lowest member of the Matsuyama Group, bears molluscan fossils such as *Vicarya*, *Vicaryella*, etc. (MATSUMARU & HAYASHI, 1980), indicating a warm and shallow water in the Lower Miocene. The Ichinokawa Formation lying between the Tsuchishio and Kosono Formations yielded some larger foraminifers, *Miogypsina kotoi kotoi*, *Operculina complanata japonica* assigned to the upper part of Lower Miocene (MATSUMARU, 1977). The Yagii Formation overlying the Tsuchishio Formation is correlated with the Itahana Formation, designated to upper part of Middle Miocene (WATANABE *et al.*, 1950; MATSUMARU & HAYASHI, 1980).

Judging from these evidences, it is reasonable to assign the Tsuchishio Formation yielded the present fossil crab to the lower part of Middle Miocene.

### Description

Family Majidae

Genus *Achaeus* LEACH, 1817

*Achaeus nomurai* sp. nov.

(Figs. 1a, 1b)

*Material examined.* One specimen embedded in the grey sandy shale and its counterpart (NSM-PA12235, holotype), from the Tsuchishio Formation in the Matsuyama Group, Middle Miocene. The locality is the bank of the River Arakawa, being administratively indicated as Suganuma, Kawamoto-machi, Osato-gun, Saitama Prefecture. Length of carapace including rostrum, ca. 10.5 mm, and breadth, ca. 9.5 mm.

*Description of holotype.* The dorsal surface of the carapace is wholly exposed and roughly triangular in its contour; the carapace is strongly depressed and may not be always correctly coincident with the proportion in the living state, but definitely belongs to the short-neck type with a postocular constriction. Though the carapace is depressed as a whole, the areolation is fairly distinct as described in the following lines. The gastric region is longitudinal and evenly convex, without tubercle. The hepatic region is also convex dorsally and laterally; its outer margin is unarmed, the apex being subacute. The branchial region of each side is prominently large and unarmed except for microscopical spinules which may be rather sparse on the most part and prominent to be a linear fringe along the outer margin. The cardiac region is weakly convex and tipped with two pointed tubercles side by side, which are distinctly impressed on the counterpart like two pinholes; such armature is found in some recent species, so that it is highly probable in the present fossil species that the cardiac region with two tubercles is convex as high as the gastric region. There is a submarginal ridge along the posterior margin of the carapace except for the median third.

The supraorbital cave may be unarmed. The eyestalk seems to be stout, with the

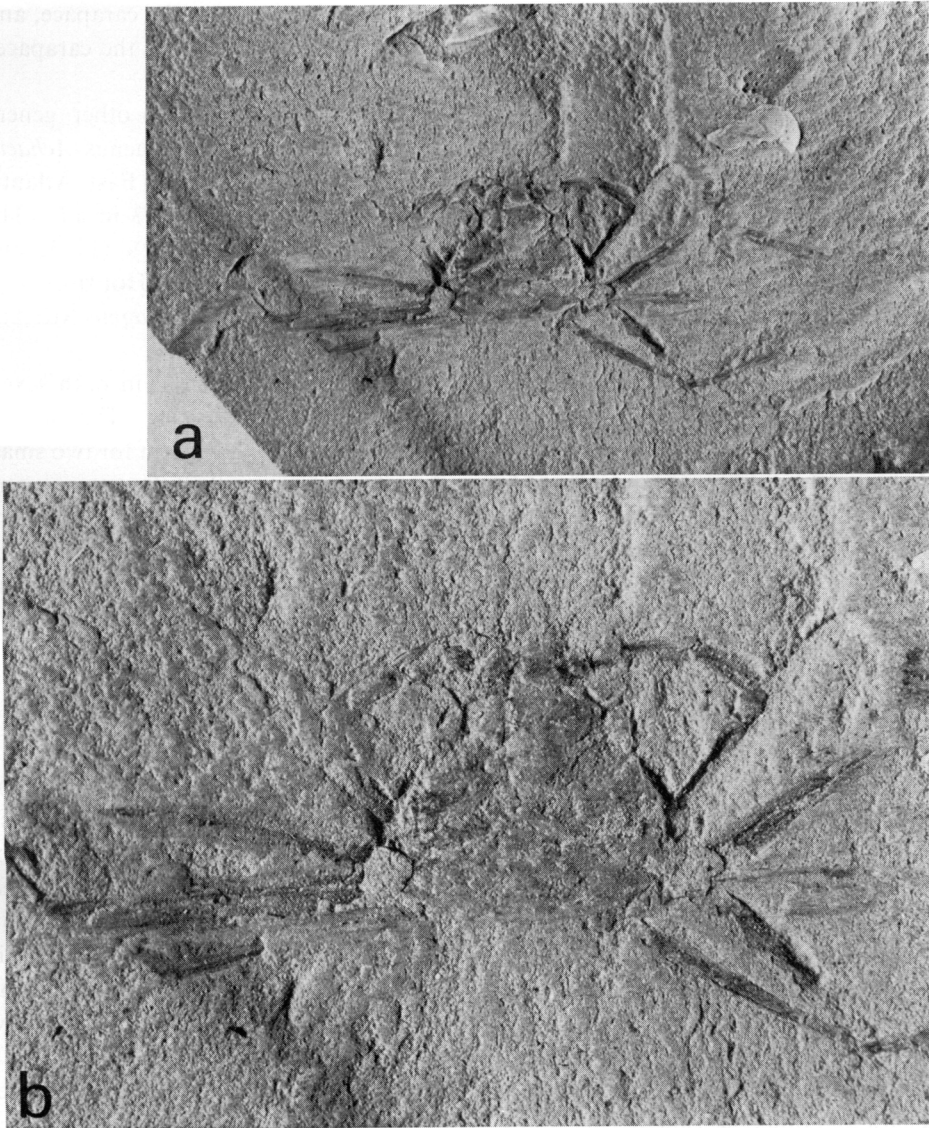


Fig. 1 a, b. *Achaeus nomurai* sp. nov., holotype (NSM-PA12235). Length and breadth of carapace, ca. 10.5 and 9.5 mm, respectively.

large cornea. The rostrum is less prominent; its details are obscure, but a median longitudinal, shallow slit-like furrow is traceable.

The chelipeds are short and feeble, being the female-type seen in the recent species; no definitive features are exposed, but it is apparent that in the recent species the chelipeds, especially those of females, are ineffective to distinguish the species. The ambu-

latory legs are long and comparatively stout; each merus is as long as the carapace, and each pair of first three ambulatory legs may attain 2.5 times as long as the carapace; the dactyli are not exposed at all.

*Remarks.* Although some species were removed from *Achaeus* to other genera by TAKEDA & MIYAKE (1969) and MANNING & HOLTHUIS (1981), the genus *Achaeus* still contains more than 30 species from the Indo-West Pacific and East Atlantic Oceans. The Japanese species are, as enumerated by SAKAI (1976), 13 in all. The recent important contributions were made by GRIFFIN & YALDWYN (1965) and GRIFFIN (1970) on the Indo-West Pacific species, and by MANNING & HOLTHUIS (*op. cit.*) on the East Atlantic species. The only known fossil species is *A. magnus* MÜLLER described in 1978 from the Miocene beds of Budapest, Hungary.

Even if the general contour of the carapace is somewhat different in both sexes, the *Achaeus* species are divided into the long- and short-neck types. The present fossil species belongs to the latter type, the carapace being unarmed except for two small tubercles on the cardiac region. Considering these features, only the followings among the known recent species must be brought up for close comparison; *A. lacertosus* STIMPSON from the Indo-West Pacific, *A. tuberculatus* MIERS from the entire coasts of Japan, *A. robustus* YOKOYA from the Bungo and Tsushima Straits and the East China Sea, *A. brevidactylus* SAKAI from Sagami Bay, Shimoda and the Tsushima Islands, and *A. varians* TAKEDA et MIYAKE from Tosa Bay and the East China Sea.

*A. lacertosus* is characteristic in having the subtruncated rostrum with fringe of spinules, and the strongly falcated and almost looped dactyli of the last two ambulatory legs, though these features cannot be used for comparison; the carapace of *A. lacertosus* is unarmed, without tubercles or spinules. In *A. tuberculatus* the cardiac region is armed with a conical tubercle, which is very often bifurcated like in the present fossil species, but the gastric region is mounted with a distinct median tubercle, and the ambulatory legs are very slender and filiform. *A. robustus* was imperfectly characterized by the original author, and subsequently figured by TAKEDA (1973) who remarked on an *Achaeus* species from Western Australia figured by GRIFFIN (1970); *A. robustus* is unarmed on the gastric region, but wholly covered with fine spinules, and the cardiac region is convex with a subacute apex; although TAKEDA (*op. cit.*) mentioned the view that the Australian species is probably identical with the Japanese species, GRIFFIN's figure indicates the rougher spinules, the presence of a gastric tubercle, the cardiac region with two tubercles side by side, and two or three spines on the eyestalk; the present fossil species is unarmed on the gastric region, but may resemble this Australian species in having the spinulated covering and two tubercles on the cardiac region. *A. brevidactylus* is, as indicated by its scientific name, the most characteristic in having the weakly broadened dactyli of the first two ambulatory legs; the dactyli are unfortunately not exposed in the present fossil species; in *A. brevidactylus*, however, the dorsal surface of the carapace is armed with two low tubercles in the median line, one gastric and the other cardiac. Finally it is remarked that *A. varians* may be the closest kind due to having the bluntly produced apex of the gastric region and two blunt tubercles side by

side on the cardiac region; however, the carapace is smooth and covered only with curled hairs unlike the spinules in the present fossil species.

The Miocene species from Budapest, Hungary, was briefly characterized as having the sharp gastric spine, two blunt cardiac tubercles side by side, and the longish neck; it is undoubtedly distinct from the Miocene Japanese species just described.

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