

Record of a Penicillate Shore Crab, *Hemigrapsus penicillatus* (de Haan),  
Having a Secondary Individual on the Carapace

Masatsune Takeda<sup>1</sup> and Sigeo Gamô<sup>2</sup>

<sup>1</sup>Department of Zoology, National Science Museum,  
3–23–1 Hyakunincho, Shinjuku-ku, Tokyo, 169–0073 Japan, and  
Department of Biological Sciences, Graduate School of Science, The University of Tokyo,  
7–3–1 Hongo, Bunkyo-ku, Tokyo, 113–0033 Japan  
<sup>2</sup>2–10–26–303 Kohinata, Bunkyo-ku, Tokyo, 112–0006 Japan

**Abstract** A male crab of *Hemigrapsus penicillatus* (de Haan) of the family Grapsidae, having a secondary individual developing on the anterior part of carapace of the primary individual, is recorded as a remarkable case of abnormality.

**Key words:** *Hemigrapsus penicillatus*, Grapsidae, abnormality.

A penicillate shore crab of the family Grapsidae, *Hemigrapsus penicillatus* (de Haan) living typically on estuarine muddy or sometimes pebbly flat, is commonly found along the entire coast of Japan from Hokkaido southwards to the Ryukyu Islands (Sakai, 1976), Korea (Kim, 1973), and China (Dai & Yang, 1991). Otherwise, Edmondson (1959) reported this species based on six specimens from Laysan Island collected in 1903 and preserved in the the Bernice P. Bishop Museum. In the Hawaiian specimens the suborbital stridulating ridge is described as consisting of six to eight coarse granules on inner portion and two lobes of unequal length and a single tubercle (outer portion), but its figure is quite schematic, so that the reconfirmation of its identification is recommended with direct comparison.

In addition to the suborbital stridulating ridge characteristic for each *Hemigrapsus* species, *H. penicillatus* is peculiar in having a cluster of soft hairs at the base of both fingers as male second sexual character, and readily distinguished from the closest congener, *H. sanguineus* (de Haan) inhabiting the rocky or stony shores, in which the mature male possesses a round fleshy pad at the base of both fingers instead of a cluster of soft hairs in *H. penicillatus*.

On 14 June, 1998, the senior author joined the party from the National Science Museum, Tokyo, as one of the leaders to observe the seashore animals at the coast of Hayama, Kanagawa Prefecture. Among the samples collected was a soft-shell crab referable to *H. penicillatus*, but surprisingly the anterior part of the carapace was seemingly sculptured in the form of an additional small crab (Fig. 1). Even the eyes were dark-colored.

In the crabs the malformation occurred in the chelipeds is not so rare in many species, being mostly referred to the formation of excess chela. Such abnormalities

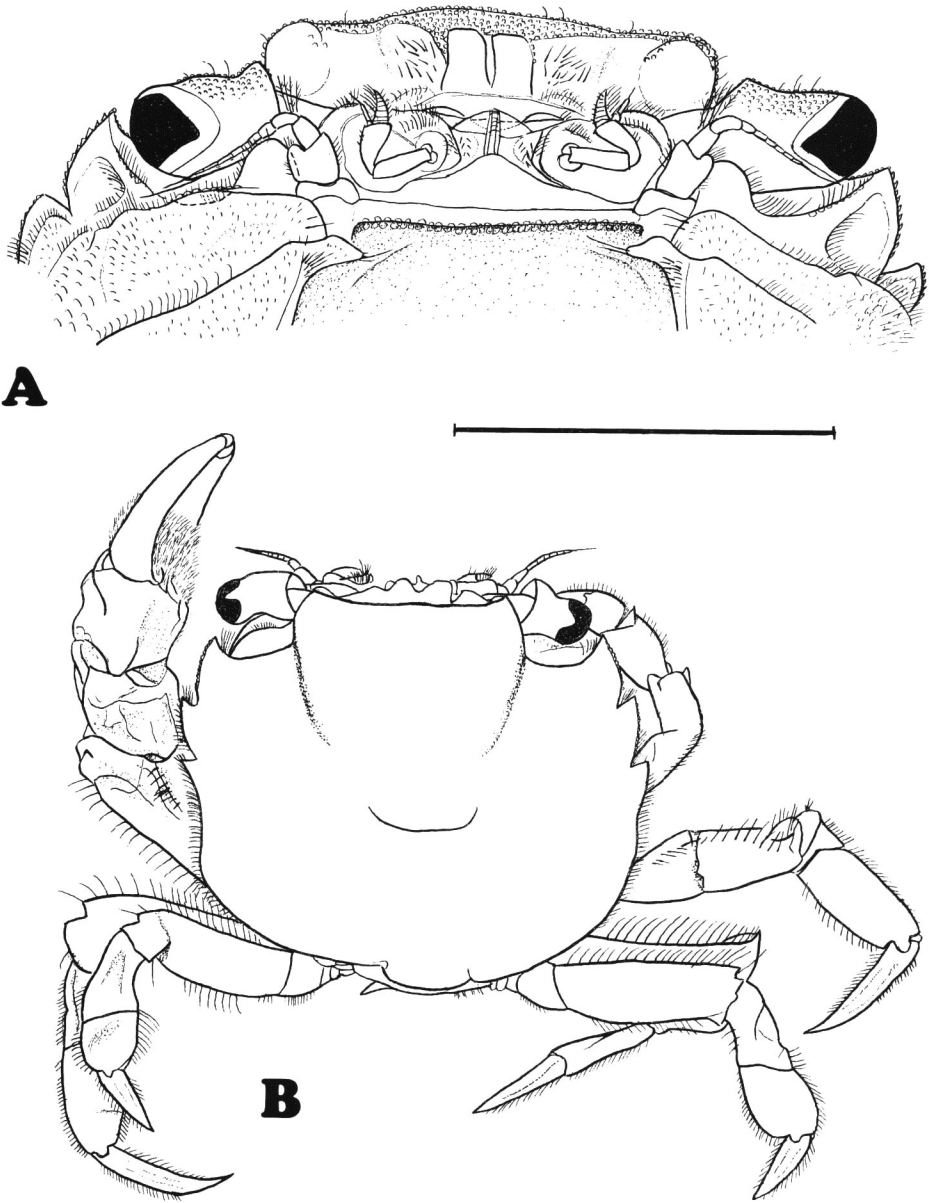


Fig. 1. *Hemigrapsus penicillatus* (de Haan), male after ecdysis (NSMT-Cr 00000). A: Front-orbital region in ventral view. B: Dorsal view. Scale bar=5 mm for A, 1 cm for B.

of the chelipeds are without doubt caused by the wrong regeneration. On the other hand, Gamô (1964) reported the abnormalities concerned with the carapace in *Gaetice depressus* (de Haan) and *Hemigrapsus penicillatus* (de Haan) of the Grapsidae, and *Charybdis miles* de Haan, *Portunus pelagicus* (Linnaeus) and *P. sanguinolentus* (Herbst) of the Portunidae. According to this paper, in these species the frontal and anterolateral teeth or the carapace were partly damaged and abnormally regenerated to be the deformed carapace, absence of teeth, etc. Also Takeda and Yasuhara (1991) recorded the malformed rostrum in Japanese giant spider crab, *Macrocheira kaempferi* (Temminck) from Suruga Bay. As they pointed out, this malformation is caused by the true rostrum being not descended during its development as a septum of the antennular fossae of both sides.

In *Hemigrapsus sanguineus* from Yokohama, Kanagawa Prefecture, just the same type of abnormality having the secondary individual on the anterior part of carapace of the primary individual had been mentioned by Sakai (1980) who figured in his popular book written in Japanese. It may be impossible to know whether the figures are accurate or not especially as to the region around the first antenna of the primary individual and for the buccal part and third maxillipeds of the secondary individual. Unfortunately, he did not record this surprising abnormality in the science journal for the detail and only briefly mentioned that the injured anterior part of the carapace was regenerated gradually to form a secondary individual following the strong ability for regeneration.

In the specimen at hand, the frontal margin of the primary individual is used by the secondary individual also as the frontal margin. The front-gastric region, or the anterior main part of the carapace of the primary individual is convex dorsally, forming the dorsal surface of the secondary individual. The inner part of the supraorbital margin of the primary individual is to be the anterolateral margin of carapace of the secondary individual, but simply convex outward without dentition. Cornea is developed at each lateral end of frontal side of the frontal margin. Frontal part of the secondary individual is almost perpendicularly truncated, but the corneal swelling is partly seen from above at each side. At median part of the frontal part of the secondary individual is a pair of smooth facets that seem to correspond to the antennal fossae, not to the buccal cavern or the third maxillipeds. The secondary individual is free from the primary individual just to the level of the orbital bottom, although it is not sure whether the secondary individual moved up and down by oneself or not.

It is difficult to specify the reason why the secondary individual was induced. It is, however, sure that the supposed regeneration was not simple like in most of the other cases with repair of an injury, but influenced by the so-called organizer or the secreted chemicals.

### Literature

- Dai, A. & S. Yang, 1991. Crabs of the China Seas. China Ocean Press, Beijing, 682 pp.
- Edmondson, C. H., 1959. Hawaiian Grapsidae. *Occ. Pap. Bernice P. Bishop Mus.*, **22**: 153–202.
- Gamô, S., 1964. Notes on the abnormalities of some brachyuran crabs. *Zool. Mag.*, Tokyo, **73**: 58–63. (In Japanese with English abstract.)
- Kim, H.S., 1973. Anomura · Brachyura. *Illustrated Encyclopedia of Fauna & Flora of Korea*, **14**: 694 pp. (In Korean, with a catalog of the species in English.)
- Sakai, T., 1976. Crabs of Japan and the Adjacent Seas. Kodansha Ltd., Tokyo, xxix+773 pp. (In English.); 461 pp. (In Japanese.); 16 pp.+251 pls. (Atlas.).
- Sakai, T., 1980. [Crabs—Their Mysterious Ecology]. Kodansha Ltd., Tokyo, 299 pp. (In Japanese.)
- Takeda, M. & T. Yasuhara, 1991. Remarkable abnormalities found in giant spider crab, *Macrocheira kaempferi* (Temminck), and spiny lobster, *Panulirus japonicus* (Von Siebold), from Japan. *Res. Crust.*, (20): 57–62. (In Japanese with English abstract.)