A NEW XANTHID CRAB (DECAPODA, BRACHYURA) FROM A SUBMARINE CAVE IN THE PHILIPPINES

BY

MASATSUNE TAKEDA[1,3]) and HIRONORI KOMATSU[2])

[1]) Faculty of Modern Life, Teikyo Heisei University, 2-51-4 Higashi-Ikebukuro, Toshima-ku, Tokyo, 170-8445 Japan

[2]) Department of Zoology, National Museum of Nature and Science, 3-23-1 Hyakunincho, Shinjuku-ku, Tokyo, 169-0073 Japan

ABSTRACT

A new species of the family Xanthidae, *Gaillardiellus holthuisi*, is described based on a single male from a submarine cave in Cebu, the Philippines. *Gaillardiellus holthuisi* sp. nov. differs from its congeners in having thickened and peculiarly curved cheliped fingers, with each immovable finger armed with a large triangular tooth.

RÉSUMÉ

Les nouvelles espèces de la famille que Xanthidae, *Gaillardiellus holthuisi*, est décrit ont basé sur un mâle simple de la caverne submersible à Cebu, les Philippines. *Gaillardiellus holthuisi* sp. nov. diffère de ses congeners en s'étant épaissi et des doigts cheliped singulièrement incurvés, avec chaque doigt immeuble armé avec une grande dent triangulaire.

INTRODUCTION

Under the financial support of the Japanese Government, several field collections in submarine caves were made in the West and South Pacific by Dr. Tomoki Kase of the National Museum of Nature and Science, Tokyo (NSMT), and his colleagues. Specimens have been caught by scuba divers using hand nets, and also by the use of cage traps. Collections have been tentatively identified and kept in the collections of the NSMT. Not all are true cavernicolous species, but some, such as the portunids *Carupa ohashii* Takeda,

[3]) e-mail: takeda-m@thu.ac.jp

1993, *Charybdis paucidentata* (A. Milne-Edwards, 1861) and *Laleonectes nipponensis* (Sakai, 1938), show adaptations to dark environments as reported by Takeda (1998) for submarine cave crabs in the Palau Islands.

In this paper a new species of the genus *Gaillardiellus* Guinot, 1976, of the family Xanthidae is described. Though caught in a cave, it shows none of the usual adaptations to a cavernicolous way of life, e.g. reduction of eyes or coloration and elongation of pereopods, and thus is unlikely to be an obligate member of the cave fauna.

The specimen examined is preserved in the collection of NSMT. The size of the specimen is indicated by cb (breadth of carapace) and cl (length of carapace). The abbreviated terminology used for carapace regions is that used by Serène (1984) following Dana (1852).

TAXONOMY

Family XANTHIDAE MacLeay, 1838

Genus *Gaillardiellus* Guinot, 1976

Gaillardiellus holthuisi sp. nov.
(figs. 1, 2)

Material examined. — Holotype, male (cb 14.4 × cl 10.8 mm), NSMT-Cr 20958, Marigondon cave, Cebu, Philippines, 25 m deep, coll. T. Kase, 28 Feb. 1997.

Description. — Carapace (fig. 1A). Ovoid, ca. 1.3 times broader than long; convex anteriorly, and almost flat from side to side. Dorsal surface evenly covered with rounded granules except for smooth inter-regional furrows; minute, stiff, brown setae, about height of granules, less distinct on branchial regions; sparsely scattering of long, stiff, erect, brown setae. Regions distinct; separated by shallow furrows; 1F and 2F confluent, not separated from frontal margin; 1M distinct; 2M longitudinally divided, outer part longer; 3M entire, anterior projection narrow; 4M not separated; 1P (cardiac) well separated; 2P (intestinal) divided into 3 parts by pair of shallow longitudinal furrows, median part without granules; 1L not defined; 2L and 3L distinct; 4L not defined; 5L defined, convex on anterolateral angle, scarcely separated from 6L; 6L posterolaterally confluent with mildly excavated postero-branchial regions. Anterolateral margin regularly convex; consisting of 4 low, but distinct, evenly separated, granular, rounded lobes behind blunt exorbital angle. Front (fig. 1B) strongly deflexed, ca. 0.3 times carapace width; with markedly projecting, triangular, median lobes; laterally with deep V-shaped notch; subacute lateral

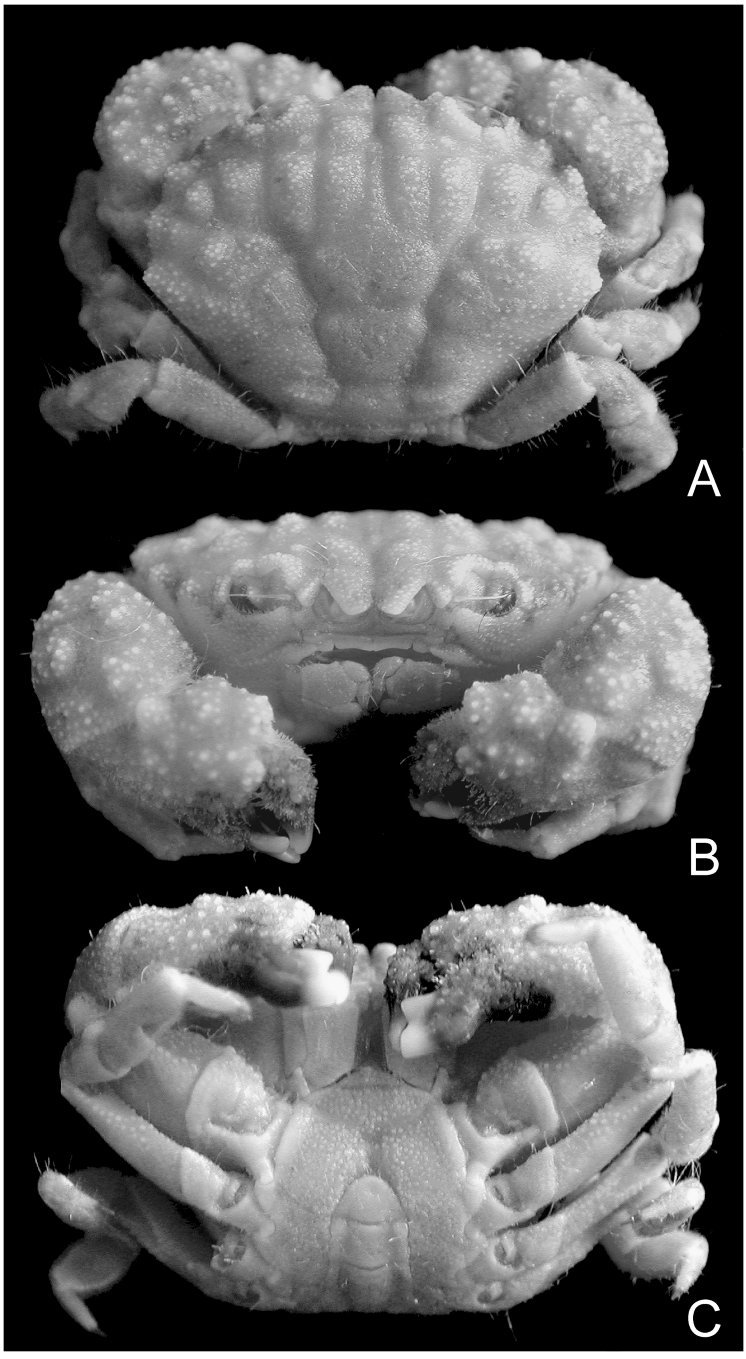

Fig. 1. *Gaillardiellus holthuisi* sp. nov., holotype, male (cb 14.4 × cl 10.8 mm), NSMT-Cr 20958. A, dorsal view; B, frontal view; C, ventral view.

angle well separated from orbit. Upper orbital border granular, evenly concave; median and lateral fissures vestigial, but sulci noticeable. Lower orbital border evenly concave, with small triangular inner lobe; vestigial lateral fissure, but sulci noticeable. Basal antennal segment touching front, granular, robust; flagellum length equal to orbital width. Basal segment of antennule swollen, crested on anterior margin, with short, low ridge on lateral part; flagellum folding obliquely.

Third maxilliped (fig. 2A). Length of merus ca. 0.8 times width; ca. 0.5 times length of ischium; surface granular, setiferous, with sparse, long, plumose setae. Ischium rectangular, ca. 1.3 times longer than wide; granular along lateral margin, otherwise smooth; with stout setae along mesial margin.

Chelipeds (figs. 1A, 2B). Subequal, robust, moderately large; palm height ca. 0.6 times length of palm including fixed finger. Merus short, broad; with posterior border granulated, armed with rounded distal and subdistal lobes. Carpus granular, with inner angle not produced into a tooth; upper surface covered with clearly separated, granulate tubercles. Outer surface of palm coarsely granular, covered, like carapace, with minute, stiff, brown setae; dorsal surface divided into 3 granulate lobes by shallow furrows; inner surface smooth, but granular around proximal margin. Ventral border of chela deeply concave at base of fixed finger. Dactylus curved, with rounded tooth on midlength of cutting edge. Fixed finger peculiarly curved downward, with large, triangular, subdistal tooth. Tips of both fingers hollowed internally, spoon-shaped. Fingers dark-brown with white tip; color of fixed finger of male rising up behind gape and extending obliquely backward for about half of length; similarly on inner face.

Ambulatory legs (figs. 1A, 2C). Medium length, stout; first pair longest, slightly longer than second pair. Merus of third leg ca. 2.7 times longer than wide; carpus ca. 1.8 times longer than wide; propodus ca. 1.4 times longer than wide; dactylus ca. 1.1 times as long as propodus. Dactyli straight, subconical, covered with short thick setae, terminating in acute chitinous recurved tips. Superior margin and inferior border of meri and dorsal exposed faces of carpi and propodi coarsely granular, otherwise unarmed. Carpi with shallow sulcus on dorsal surface. Setation of dorsal surface of carpi and propodi as on carapace.

Abdomen (figs. 1C, 2D). Male abdomen relatively narrow; somites 3-5 fused. First somite about same width as third. Somites 3-5 slightly tapering. Sixth somite ca. 1.7 times wider than long. Telson ca. 0.9 times as long as sixth somite; ca. 1.6 times wider than long; rounded.

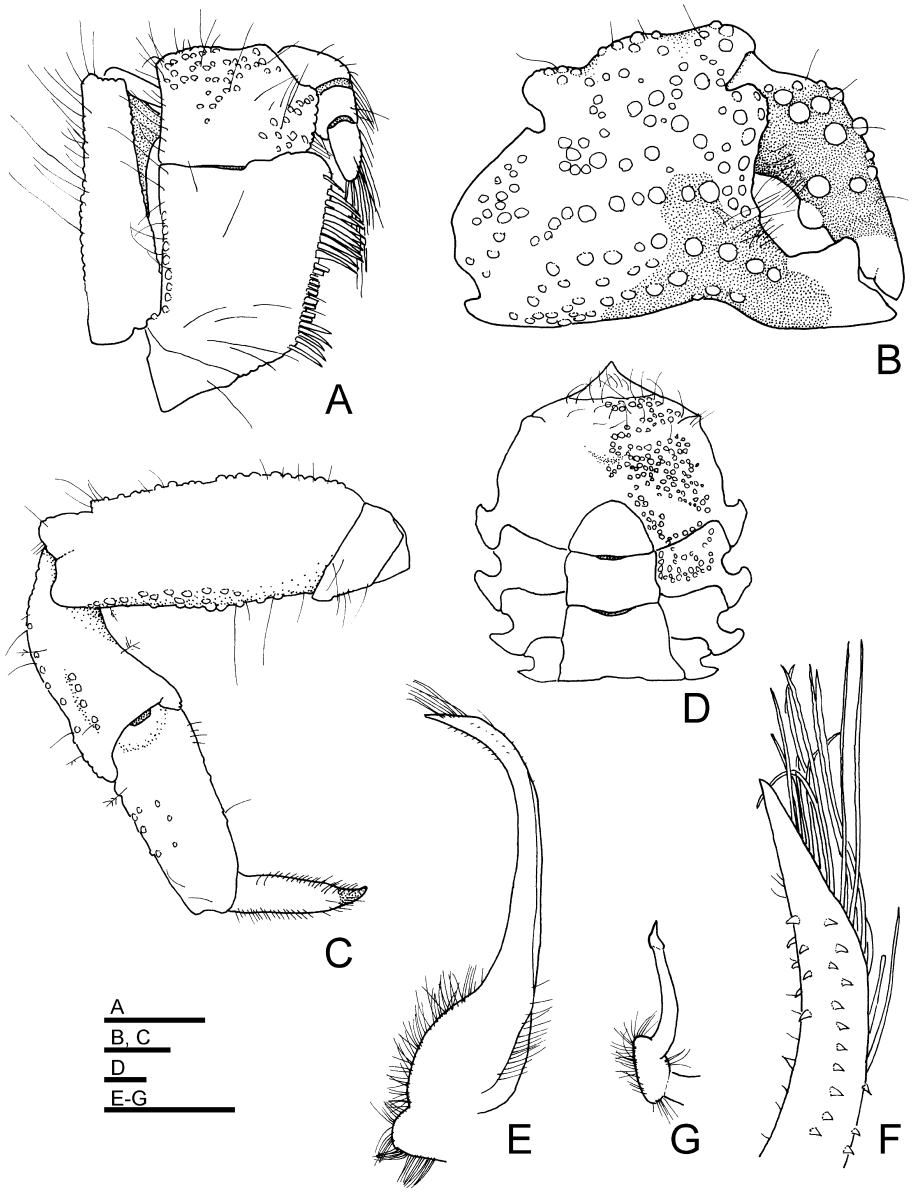

Fig. 2. *Gaillardiellus holthuisi* sp. nov., holotype, male (cb 14.4 × cl 10.8 mm), NSMT-Cr 20958. A, right third maxilliped, ventral view; B, right chela, external view; C, left third walking leg, dorsal view; D, sternum, ventral view; E, right first gonopod, ventral view; F, distal part of the same; G, right second gonpod, ventral view. Scales for A-E, G = 1 mm; F = 0.25 mm.

Gonopods (fig. 2E-G). Male first gonopod long, curved laterally, tapering; with long simple setae on disto-dosal margin; with row of spinules on midline of ventral surface. Male second gonopod short, ca. 0.4 times as long as first gonopod.

Thoracic sternum (figs. 1C, 2D). Relatively narrow, coarsely granular, setose as on carapace; telson reaching less than half length of fused sternites 3 and 4; sternites 4 with median longitudinal fullow in abdominal cavity; median longitudinal suture extending on sternites 6 to 8; suture between sternites 3/4 vestigial, marked as broadly V-shaped, shallow fullow; suture 4/5 medially interrupted, confluent with suture 5/6 at each side; sutures 6/7 and 7/8 entire.

Etymology. — The new species is dedicated to the late Dr. Lipke B. Holthuis, a world-leading carcinologist learned not only in the study of decapod systematics, but also a remarkable scholar of historical literature. He was always kind to young researchers and generously offered his knowledge and literature. The first author must record his sincere thanks for Holthuis' kind guidance for more than 40 years.

Remarks. — *Gaillardiellus holthuisi* sp. nov. is typical of the genus in the form of the areolated, granulated and setose carapace and the condition of the male thoracic sternum, but can be easily distinguished from the five known species (Ng et al., 2008) in having thickened and peculiarly curved fingers, with a large triangular tooth on each immovable finger.

Distribution. — Known only from the submarine cave of Cebu, Philippines, at a depth of 25 m.

ACKNOWLEDGMENTS

We express our cordial thanks to Dr. Tomoki Kase (NSMT) for providing us the valuable cavernicolous crustacean specimens for this study and also to Dr. Peter K.L. Ng, Dr. Peter J.F. Davie and Mr. Jose Christopher E. Mendoza for their invaluable comments to improve our manuscript.

REFERENCES

DANA, J.D., 1852. Crustacea. United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842 under the command of Charles Wilkes, U.S.N., **13**: 1-685. Atlas (1855): 1-27, pls. 1-96. (C. Sherman, Philadelphia).

GUINOT, D., 1976. Constitution de quelques groupes naturels chez les Crustacés Décapodes Brachyoures: I. La superfamille des Bellioidea et trois sous-familles de Xanthidae (Polydectinae Dana, Trichiinae de Haan, Actaeinae Alcock). Mémoires du Muséum national d'Histoire naturelle, Paris, (new series)(A) **97**: 1-308, pls. 1-19.

MACLEAY, W.S., 1838. On the brachyurous decapod Crustacea brought from the Cape by Dr. Smith. In: A. SMITH (ed.), Illustrations of the zoology of South Africa; consisting chiefly of figures and descriptions of the objects of natural history collected during an expedition into the interior of South Africa, in the years 1834, 1835, and 1836; fitted out by 'The Cape of Good Hope Association for Exploring Central Africa': together with a summary of African zoology, and an inquiry into the geographical ranges of species in that quarter of the globe. Invertebratae: 53-71, pls. 2-3. (Smith, Elder & Co., London).

MILNE-EDWARDS, A., 1861. Historie des crustacés podophthalmaires fossiles. Monograpies des portunieens et des thalassiniens: 1-222, i-v, i-iv, pls. 1-16. (Victor Masson et Fils, Paris).

NG, P.K.L., D. GUINOT & P.J.F. DAVIE, 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. Raffles Bulletin of Zoology, (supplement) **17**: 1-286.

SAKAI, T., 1938. Studies on the crabs of Japan III. Brachygnatha, Oxyrhyncha: 193-364, pls. 20-41. (Yokendo, Tokyo).

SERÈNE, R., 1984. Crustacés décapodes brachyoures de l'océan Indien occidental et de la Mer Rouge, Xanthoidea: Xanthidae et Trapeziidae. Avec un addendum par Crosnier (A.): Carpiliidae et Menippidae. Faune Tropicale, **24**: 1-400, pls. 1-48.

TAKEDA, M., 1993. A new swimming crab of the genus *Carupa* from submarine caves in the Ryukyu Islands. Bulletin of the National Science Museum, Tokyo, (A) **19**(4):145-150.

TAKEDA, M., 1998. Crabs collected from submarine caves in the Palau Islands. Nature and Environmental Science Research, **11**: 43-47.

First received 10 October 2009.
Final version accepted 8 December 2009.