

## New Record of a Gonodactylid Species, *Gonodactylaceus falcatus* (Crustacea: Stomatopoda: Gonodactylidae) from Korea

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### ABSTRACT

A gonodactylid stomatopod, *Gonodactylaceus falcatus* (Forskål, 1775), collected from Jeju Island is reported for the first time in the Korean fauna. The genus *Gonodactylaceus*, which is also new to Korea, differs from other genera by the presence of a subglobular cornea, five longitudinal dorsal carinae on the telson, and the absence of a movable proximal spine on the propodus of the raptorial claw. Within genus *Gonodactylaceus*, *G. falcatus* can be easily distinguished from other congeners by the presence of a bilobed knob on the telson, a rounded anterolateral margin of rostral plate, and a lobe between terminal spines of uropodal protopod. In this paper, detailed descriptions and illustrations of *G. falcatus* are provided. As a result of this study, seven species of stomatopods including this species are now recorded in the Korean fauna. A key to the species of Korean mantis shrimp is also presented.

**Keywords:** taxonomy, mantis shrimp, Korean fauna, *Gonodactylaceus falcatus*, Korean waters

### INTRODUCTION

Mantis shrimps or stomatopods, have large and powerful raptorial appendages which can be used for 'smashing' or 'spearing' (Caldwell and Dingle, 1976). All gonodactylids have a smashing type of raptorial claw and are most abundant on coral reefs in the tropical and subtropical regions (Ahyong, 2001). Its members are readily distinguished from those of other families by a couple of characteristics in the uropodal exopod: the subterminal articulation of the distal segment and straight, or not strongly recurved distal spine on the outer margin. Although more than 65 species of nine genera have been described worldwide, a gonodactylid species, *Gonodactylaceus falcatus* (Forskål, 1775) has now been recorded in Korea for the first time. The genus *Gonodactylaceus* Manning, 1995 is also the first record. Photographs of this species are provided with detailed descriptions and illustrations.

The specimens were collected from the subtidal zone of Jeju Island by SCUBA diving, and were preserved in 95%

ethyl alcohol. A stereomicroscope (MZ8; Leica, Wetzlar, Germany) was used for observation and sorting. Images of the specimen were recorded using a digital camera (Model D7000; Nikon, Tokyo, Japan). All the measurements are given in millimeters (mm). The body length, or total length (TL), was measured along the dorsal midline from the apex of the rostral plate to the apex of the submedian tooth of the telson. The morphological terminology follows Ahyong (2001). The abbreviation "CL" refer to carapace length which is measured along the midline excluding the rostral plate. Specimens examined herein were deposited in the Marine Arthropod Depository Bank of Korea (MADBK), Seoul National University and the National Institute of Biological Resources (NIBR).

### SYSTEMATIC ACCOUNTS

Order Stomatopoda Latreille, 1817

Superfamily Gonodactyloidea Giesbrecht, 1910

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<sup>1\*</sup>Family Gonodactylidae Giesbrecht, 1910

<sup>2\*</sup>Genus *Gonodactylaceus* Manning, 1995

<sup>3\*</sup>*Gonodactylaceus falcatus* (Forskål, 1775) (Figs. 1, 2)

*Cancer falcatus* Forskål, 1775: 96.

*Gonodactylus mutatus*: Manning, 1978: 7, figs. 4, 5, 11.

*Gonodactylaceus gravieri*: Manning, 1995: 42, fig. 13.

*Gonodactylaceus falcatus*: Manning, 1995: 19; Ah Yong, 2001: 35, fig. 17.

**Material examined.** Korea: Jeju Island, Seogwipo-si, Seogwipo-dong, near Munseom Island, by SCUBA diving: 1♂,



**Fig. 1.** *Gonodactylaceus falcatus* (Forskål, 1775), male (MADBK 600103001). Whole animal, 32 mm. Scale bar = 10 mm.

TL 32 mm, 21 Jul 1993 (MADBK600103001), no further data; 1♂, TL 61.5 mm, 11 Mar 2009 (NIBRIV0000316631), coll., Park T, Kil HJ.

**Description.** Eye (Figs. 1, 2A) subcylindrical, overreaching proximal margin of third segment of antennular peduncle. Cornea narrower than stalk dorsally.

Rostral plate (Figs. 1, 2A) not sharply trispinous; median spine slender, not reaching to proximal margin of cornea; basal part reverse trapezoidal in shape; anterolateral corner rounded and not angular.

Carapace (Figs. 1, 2A) with anterior margin of lateral plate convex, extending beyond base of rostral plate.

Antennular peduncle 0.54–0.56 CL. Antennal protopod (Figs. 1, 2B) produced into one rounded apex. The region between antennal protopod and antennal scale produced into three-branch projection; apices of innermost and outermost branches acute; apex of middle one blunt. Antennal scale 0.53–0.54 CL.

Raptorial claw (Fig. 2C) robust; occlusal margin of propodus infinitesimally pectinated, without movable spine. Dactylus without basal notch; outer proximal margin strongly inflated; inner distal margin without tooth.

Thoracic somites 6–8 (Fig. 2D) with lateral margins rounded, bearing ridges.

In male, endopod of first pleopod (Fig. 2E) bearing posterior endite and lateral lobe.

Telson (Figs. 1, 2F, J) as broad as long, bearing a couple of three pairs of primary teeth (submedian, intermediate, and lateral), with 10–11 submedian denticles and two spini-form intermediate denticles. Dorsal surface bearing median carina and four pairs of longitudinal carinae (submedian interrupted, accessory median, intermediate and marginal uninterrupted). Median and accessory carinae bearing each posterior spine. Submedian, intermediate, and marginal carinae extending to posterior margin of each primary tooth. Knob present and bilobed. Ventral surface (Fig. 2G) bearing low carina on each submedian tooth and postanal carina.

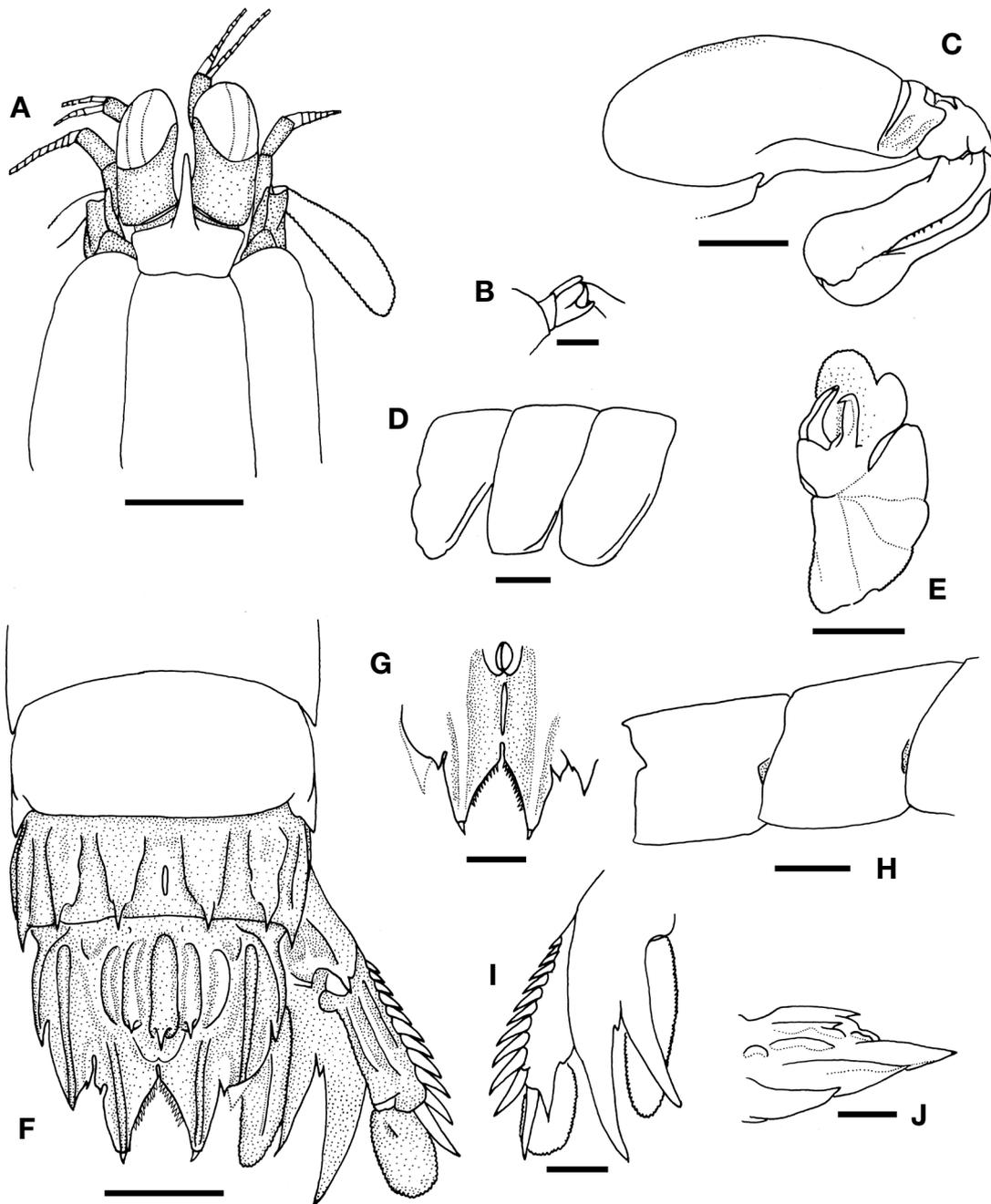
Abdominal somites 4–5 (Fig. 2H) smooth; lateral margins subacute posterodistally.

Abdominal somite 6 (Figs. 1, 2F) bearing distinct submedian, intermediate, and marginal carinae with posterior spines, respectively. Middle region between a couple of submedian carinae bearing faint median carinule.

Uropod (Figs. 1, 2I) with exopod having 11–12 movable spines on proximal segment. Protopod bearing one lobe be-

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Korean recorded stomatopod *Taku spinosocarinatus* (Fukuda, 1909) belonged to the family Gonodactylidae. At the time, the family Gonodactylidae was named as “Gawi-getgajae” family according to the divided shape of posterior margin of telson. The Korean word “Gawi” means scissors and “Getgajae” means mantis shrimp. But Manning (1995) erected a new family Takuidae and a new genus *Taku*. Accordingly, *Taku spinosocarinatus* does not belong to the Family Gonodactylidae and a gonodactylid species, *Gonodactylaceus falcatus* (Forskål, 1775) is newly recorded in the Korean fauna by this study. Therefore, we suggest changing the Korean name of family Gonodactylidae as “Dolgi-getgajae” family.



**Fig. 2.** *Gonodactylaceus falcatus* (Forskål, 1775), male. A, Anterior cephalon; B, Antennal protopod; C, Raptorial claw; D, Lateral margins of sixth to eighth thoracic somites; E, Endopod of first pleopod; F, Fourth to sixth abdominal somites, telson, and uropod; G, Telson, ventral view; H, Fourth to fifth abdominal somites, lateral view; I, Uropod, right ventral view; J, Telson, left lateral view. Scale bars: A-D, F-J=10 mm, E=20 mm.

tween terminal spines; outer terminal one longer than inner. Endopod bearing a row of marginal setae on outer margin.

**Distribution.** Japan, Indonesia, Australia, New Caledonia, French Polynesia, Hawaii, and Korea (Jeju Island).

**Coloration.** Color in life mostly all ivory to mottled pur-

ple. In case of a mottled purple specimen, cornea, antennal scales, antennular and antennal peduncles, rostral plate, antennal protopod, pereopods, and uropod ivory.

**Remarks.** As a result of this study, seven species of stomatopods including this species are now recorded in Ko-

rean fauna: *Oratosquilla oratoria* (De Haan, 1844), *Taku spinosocarinatus* (Fukuda, 1909), *Faughnia formosae* Manning and Chan, 1997, *Kempella mikado* (Kemp and Chopra, 1921), *Squilloides leptosquilla* (Brooks, 1886), *Chorisquilla spinosissima* (Pfeffer, 1888), and *Gonodactylaceus falcatus* (Forskål, 1775) (see Kim and Rho, 1969; The Korean Society of Systematic Zoology, 1997; Hwang et al., 2013; Kang et al., 2016).

Among them, *G. falcatus* (Forskål, 1775) has been reported from Japan, Indonesia, Australia, New Caledonia, French Polynesia, and Hawaii (Ahyong, 2001). Through the present study, its geographical distribution has been expanded northward.

Among the known species of *Gonodactylaceus*, *G. falcatus* is morphologically similar to *G. glabrous* (Brooks, 1886) in having following characteristics: (1) the absence of transverse grooves from the first to the fifth abdominal somites, (2) the presence of a lobe between terminal spines of uropodal protopod, and (3) the presence of bilobed knob on the telson. However, *G. falcatus* can be easily distinguished from its congeners by the shape of anterolateral corner of the rostral plate. The shape is rounded and blunt in *G. falcatus*, whereas it is distinctively angular in *G. glabrous*. The Korean specimens generally agree well with those characteristics. Additionally, the presence of the median carinule on the sixth abdominal somite is variable in *G. falcatus* (Ahyong, 2001). Out of the specimens examined by Ahyong (2001), the proportion of specimens that bear the median carinule was 55%. The median carinule is present in 52 out of 85 males and 60 out of 118 females. Korean two male specimens have a faint median carinule.

#### Key to species of the Korean mantis shrimps

1. Telson with at least four densely arranged intermediate denticles. Dactylus of raptorial claw with at least four teeth ..... 2
  - Telson with two intermediate denticles. Dactylus of raptorial claw with less than three teeth ..... 3
2. Lateral process of fifth thoracic somite bilobed. Rostral plate without median carina ..... *Oratosquilla oratoria*
  - Lateral process of fifth thoracic somite single. Rostral plate with median carina ..... 4
3. Protopod of uropod bearing three primary spines. Dactylus of raptorial claw with three teeth ... *Faughnia formosae*
  - Protopod of uropod bearing one or two primary spines. Dactylus of raptorial claw without teeth ..... 5
4. Median carina of carapace with anterior bifurcation. Dactylus of raptorial claw with six teeth ... *Kempella mikado*
  - Median carina of carapace without anterior bifurcation. Dactylus of raptorial claw with four teeth ..... *Squilloides leptosquilla*

5. Exopod of uropod bearing stout, anteriorly recurved distal spines on outer margin. Dorsal surface of telson with nine carinae ..... *Taku spinosocarinatus*
  - Exopod of uropod bearing slender, straight distal spines on outer margin. Dorsal surface of telson with less than five pairs of carinae or bosses ..... 6
6. Dorsal surface of telson with five pairs of longitudinal carinae. Lateral margin of telson without spine ..... *Gonodactylaceus falcatus*
  - Dorsal surface of telson with three bosses. Lateral margin of telson with 8-14 spines ..... *Chorisquilla spinosissima*

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