First Description of the Males of Gonatopus lucens (Olmi) and G. asiaticus (Olmi), with Host Records from Japan (Hymenoptera: Dryinidae: Gonatopodinae)

Mita, Toshiharu
Entomological Laboratory, Faculty of Agriculture, Kyushu University

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First Description of the Males of *Gonatopus lucens* (Olmi) and *G. asiaticus* (Olmi), with Host Records from Japan (Hymenoptera: Dryinidae: Gonatopodinae)

Toshiharu Mita

Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, 812-8581 Japan

Abstract. Two species of *Gonatopus* Ljungh are newly recorded from Palaearctic Asia as follows: *G. lucens* (Olmi) from Korea and Japan, *G. asiaticus* (Olmi) from Japan, and the males are described for the first time. New host information is as follows: *G. lucens* parasitizes *Doratulina producta* (Matsumura) and *G. asiaticus* is thought to parasitize *Hosunka* sp.

Key words: taxonomy, Hymenoptera, Dryinidae, associate plant, distribution, new record.

Introduction

Many species of *Gonatopus* Ljungh are known by a single sex. This is mainly because of the remarkable sexual dimorphism and lack of host information. Additionally, the sex ratio of some species is sometimes highly biased toward one gender. For example, *G. schenklingi* Strand, 1913 is a common gonatopid species parasitizing *Psammotettix striatus* Linnaeus in Japan; however, the male has not been found for almost a century (Esaki & Hashimoto, 1931; Olmi, 1984; He & Xu, 2002).

The males of *G. lucens* (Olmi) and *G. asiaticus* (Olmi) were previously unrecorded, and host information regarding the latter species was also unknown. As a result of research on the dryinid fauna of Japan, the author found the interesting host association and the males of the two species.

Material & methods

The terms and abbreviations are those of Mita (2009), with an exception. Terms concerning wing venation follow those established by Richards (1977). Previous records of host information are those presented by Guglielmino & Olmi (1997) and He & Xu (2002). All specimens examined are deposited in the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan (ELKU), when there is no annotation.

Gonatopus lucens (Olmi, 1984)

(Figs. 1-3)

Neogonatopus lunatus (Klug): Moczar, 1979: 83; Nonnaizab, 1999: 364.

Tetrodontochelys lucens Olmi, 1984: 1461.

Epigonatopus solitarius Perkins, 1905: Yan *et al*., 1982: 5 (misdet.).

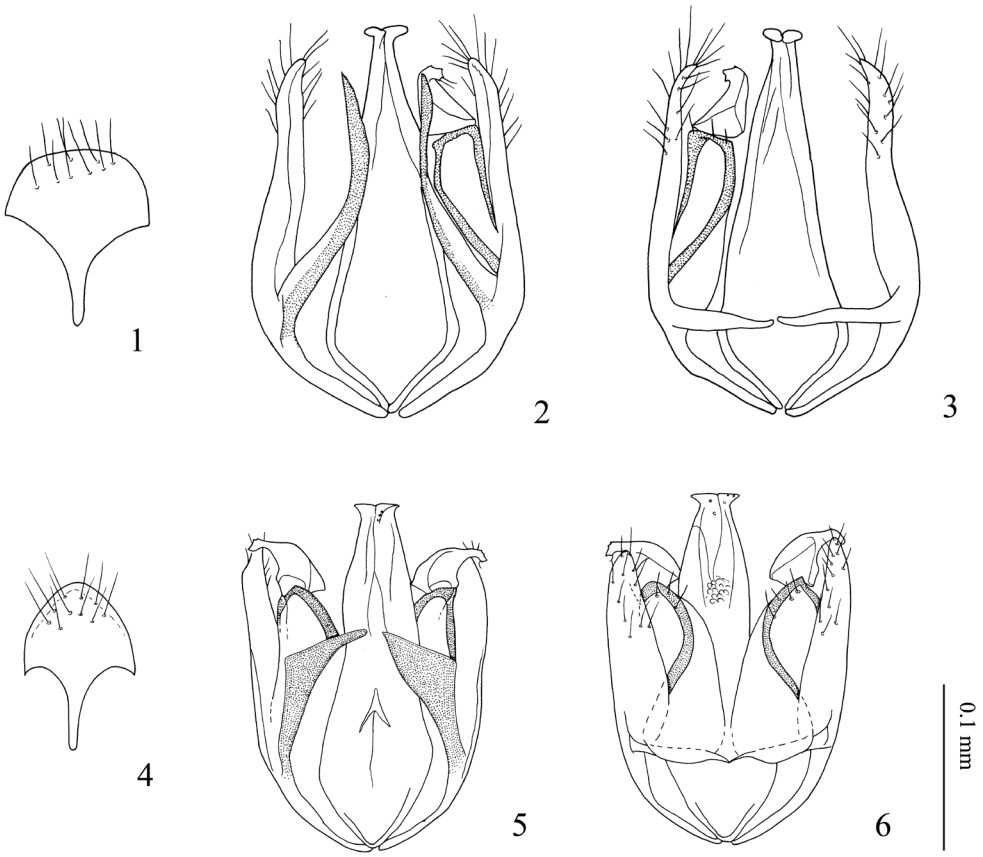
Gonatopus guangxiensis Xu & He, 1999: 86 (syn. by He & Xu, 2002).

Gonatopus lucens (Olmi, 1984): Guglielmino & Olmi, 1997: 224 (in list); He & Xu, 2002: 326.

Description.

Male, new to science. Head wide, 0.56-0.55 (mean 0.56, n = 3) x longer than wide, fully granulated; frons 0.54-0.58 (0.56) x wider than head; frontal keel absent; OL = 1.5-2.5; OOL = 2.0; POL = 4.0-6.0; maximum diameter of anterior ocellus 0.5-1.5; occipital carina absent; clypeus with apical margin flat, lateral margin rounded, 0.60 x longer than wide; antennae not distally thickened; each segment showing the following ratio: 4.0; 3.0-4.0 (3.5); 4.0-5.5 (4.8); 4.0-5.0 (4.5); 3.5-4.5 (4.0); 4.0-4.5 (4.3); 3.5-4.5 (4.0); 3.5-4.0 (3.8); 3.0-4.0 (3.5); 4.5-6.0 (5.3);

E-mail: tkp-ex@hotmail.com



Figs. 1-6: Males of *Gonatopus lucens* (1-3) and *G. asiaticus* (4-6). 1, 4: 9th sternite. 2, 5: Genitalia (left volsella of *G. lucens* removed), dorsal view. 3, 6: Ditto, ventral view.

scape slightly longer than, or same as long as pedicel, slightly shorter than, or same as long as FI; FI about 3.5 x longer than wide. Palpal formula 3/2.

Pronotum granulated. Scutum granulated, 0.53 x longer than wide; notaulix absent; scutellum granulated or smooth; prepectoria granulated or smooth. Metanotum smooth; metapleural regions largely granulated, partly smooth. Propodeum 0.67x longer than wide; weak median longitudinal furrow rarely present; a transversal keel absent; dorsal surface weakly granulated or smooth with anterior margin narrowly longitudinally striated; posterior surface weakly granulated or smooth.

Fore wings hyaline; tubular veins almost unpigmented, very weakly pigmented excluding costa, Sc+R and R1; Rs basally sinuate, not forming a distinct margin.

Metasoma weakly dorso-ventrally flattened; 9th sternite as in Fig. 1; parameres (Figs. 2-3) slender, not forming a distinct lobe; dorsal process of paramere (Fig. 2) filiform, pigmented, with narrow membranous unpigmented margin; basivolsella apically bearing three bristles, with outer margin pigmented.

Color. Head black; clypeus basally black to dark brown, apically brown; mandibles brown to testaceous with reddish teeth; antennae dark brown; mesosoma black excluding testaceous tegulae; legs testaceous excluding coxae, femora, tibiae brownish; tinged wing veins brown; metasoma dark brown.

Measurements (in mm). Head 0.28-0.30 (0.29) long, 0.50-0.55 (0.53) wide; antennae 1.00-1.24 (1.12); eyes 0.20-0.24 (0.22) in maximum, 0.16-0.24 (0.20) in minimum in lateral view; mesosoma 0.62-0.73 (0.68); scutum 0.22-0.24 (0.23) long, 0.41-0.46 (0.44) wide; scutellum 0.14-0.16 (0.15); metanotum 0.11; propodeum 0.24 in full length; fore wings 1.32-1.54 (1.43).

Specimens examined. **[KOREA]** 1F, Bullo-dong Tomb Park, Dong-gu, Daegu, 22-23. VIII. 2007, T. Mita leg. **[JAPAN]** 1F, Ôgamiyama-kôen, Chichi-jima Isl., Ogasawara Isls., 16. VI. 2007, T. Mita leg.; 3F, same as above, excluding 17. VI. 2007; 2F, Mt. Chibusa-yama, Haha-jima Isl., Ogasawara Isls., 12. VI. 2007. T. Mita leg.; 1F, Hyôgidaira, Haha-jima Isl., Ogasawara Isls., 13.

VI. 2007, T. Mita leg.; 1F, same as above, excluding Col. 10. VI. 2007, Pup. 10. VI, Emr. 4. VII, reared from *Psammotettix striatus* Linnaeus; 1F, same as above, excluding Pup. ?. VI, Emr. 7. VII; 1F, same as above, excluding Pup. ?. VI, Emr. 4. VII; 1F, same as above, excluding Pup. ?. VI, Emr. 5. VII; 1F, same as above, excluding Pup. 11. VI, reared from *Cicadulina bipunctata* (Melichar); 1M, Makinokami-kôen, Nokono-shima Isl., Fukuoka, 21. IV. 2007, T. Mita leg.; 4F2M, same as above, excluding 26. IV. 2007; 1F, same as above, excluding Col. 21. IV. 2007, Pup. 26. IV, Emr. 20. V, reared from *Doratulina producta* (Matsumura); 1F, same as above, excluding Col. 26. IV. 2007, Pup. 29. IV; 1F, same as above, excluding Pup. 30. IV, Emr. 22. V; 1F, same as above, excluding, Pup. 30. IV, Emr. 24. V; 2F, same as above, excluding Pup. 1. V, Emr. 25. V; 1M, same as above, excluding Pup. 30. IV, Emr. 26. V; 1F, Kyûshû University, Hakozaki, Fukuoka-shi, Fukuoka, Col. 1. VII. 2007, Emr. 22. VII, T. Mita leg.; 1F, Ôtomi-rindô, Iriomote-jima Isl., Ryûkyûs, 11. IX. 2004, M. Satô leg.; 2F, same as above, excluding 7. X. 2004; 3F, same as above, excluding T. Tsuru leg.; 1F, same as above, excluding 10. X. 2004, T. Ishizaki leg.; 1F, same as above, excluding 6. IV. 2005, J. Kantô leg.

Distribution. Indonesia; Malaysia; Philippines; China; Korea (new record): Daegu; Japan (new record): Ogasawara Isls., Kyûshû, Ryûkyûs.

Host. CICADELIDAE: *Cicadulina bipunctata* (Melichar) (Japan, new host record), *Doratulina producta* (Matsumura) (Japan, new host record), *Nephotettix cincticeps* (Uhler) (China), *N. virescens* (Distant) (Malaysia), *N. nigropictus* (Stål) (Malaysia), *N. malayanus* Ishihara & Kawase (Malaysia), *Recilia dorsalis* (Motschulsky) (Malaysia, China), *Psammotettix striatus* Linnaeus (Japan, new host record); DELPHACIDAE: *Nilaparvata lugens* (Stål) (Philippines), *Sogatella furcifera* (Horváth) (Philippines).

Remarks. This is the second record of the *Gonatopus pedestris* Dalman group (formerly *Tetrodontochelys* Richards) from Japan. The female of the species is easily distinguished from the other species, *G. sakaii* (Esaki & Hashimoto), by the possession of a row of 16–18 long lamellae located on the basal to distal inner margin of fore tarsomere V, whereas *G. sakaii* has a row of 4–10 short lamellae only on the distal part. The male of *G. lucens* is distinguished from all other males of Palaearctic and Oriental *Gonatopus* by the possession of the combination of the following four characters: 1) about 3.5 times longer FI than wide, 2) absence of notaulix, 3) granulated or smooth dorsal surface of the propodeum, and 4) long and filiform dorsal process of the paramere (Fig. 2).

Gonatopus asiaticus (Olmi, 1984)

Donisthorpina asiatica Olmi, 1984: 1309.

Description.

Male, new to science. Head wide, 0.67 x longer than wide, smooth excluding malar spaces and occiput weakly coriaceous; frons 0.60 x wider than head; frontal keel absent; OL = 1.5; POL = 4.5; OOL = 5.0; maximum diameter of anterior ocellus 2.0; temples developed; occiput excavated; occipital carina absent; clypeus triangular; antennae not distally thickened; each segment showing the following ratio: 4.0; 4.5; 8.0; 6.0; 6.0; 6.5; 6.0; 6.5; 6.0; 9.0; scapes slightly longer than pedicels; FI 4.00 x longer than wide, 1.33 x longer than scape. Palpal formula 5/2.

Pronotum coriaceous. Scutum coriaceous, 0.63 x longer than wide; notaulices complete, both sides posteriorly connected with each other; scutellum smooth; prepectoria faintly coriaceous; mesepisterna faintly coriaceous. Metanotum smooth; metapleural regions obliquely striated. Propodeum 0.63 x wider than long; median longitudinal furrow present; transversal keel absent; dorsal surface smooth; posterior surface reticulate.

Fore wings hyaline, without dark transversal band; tubular veins almost hyaline, very weakly pigmented excluding costa, Sc+R, R1 and Rs; Rs weakly sinuate, nor forming a distinct corner.

Metasoma subcylindrical; 9th sternite as in Fig. 4; parameres (Figs. 5-6) slender, not forming a distinct lobe; dorsal process of paramere (Fig. 5) long, outer margin forming a dully corner, entirely pigmented; basivolsella apically bearing four bristles; outer margin pigmented.

Color. Head testaceous excluding posterior part of ocellar region and occiput partly dark testaceous; mandibles testaceous with reddish teeth; antennae testaceous, gradually darkened apically; mesosoma testaceous excluding tegulae, anterior part of mesepisterna and keels on propodeum dark testaceous to brown; legs testaceous metasoma dark brown.

Measurements (in mm). Head 0.37 long, 0.55 wide; antennae 1.58; eyes 0.22 long, 0.35 high in lateral view; mesosoma 0.72; scutum 0.22 long, 0.35 wide; scutellum 0.12; metanotum 0.08; propodeum 0.22 in full length; fore wings 1.50.

Specimens examined. **[MALAYSIA]** 1F, Tanah Rata, Cameron highland, Pahang, 15. III. 2005, T. Mita leg. **[JAPAN]** 1F, Araihama, Miura-shi, Kanagawa, 11. XI. 2001, K. Kubo leg. (private collection of K. Kubo); 3F1M, Fukakura-kyô (500m alt.), Mt. Hiko-san, Fukuoka, 24. VIII. 2008, collected from a bush of *Miscanthus sinensis*

Andress, T. Mita leg.; 1F, Hyûga-shi – Tsuno-chô, Miyazaki, 27. VIII. 1953, collector unknown; 3F, Mt. Nanatu-yama, Nakano-shima Isl., Tokara Isls., Ryûkyûs, collected from a bush of *Pleioblastus linearius* (Hack.) Nakai, 3. VI. 2004, T. Mita leg.; 3F, same as above, excluding 4. VI; 7F, same as above, excluding 5. VI; 2F, same as above, excluding 7. VI; 1F, Satomura, Nakano-shima Isl., Tokara Isls., Ryûkyûs, 7. VI. 2004, T. Mita leg.; 1F, Mt. Otake, Nakano-shima Isl., Tokara Isls., Ryûkyûs, 7. VI. 2004, T. Mita leg.; 5F, Mt. Imakira-dake, Takara-jima Isl., Tokara Isls., Ryûkyûs, 1. VI. 2005, T. Mita leg.; 1F, same as above, excluding J. Kantô leg.; 2F, east side of Takara-jima Isl., Tokara Isls., Ryûkyûs, 4. VI. 2005. T. Mita leg.; 1F, Mt. Yui-dake, Amami-ôshima Isl., Ryûkyûs, 26. V. 2004, T. Mita leg.; 1F, same as above, excluding 27. V; 1F, same as above, excluding 28. V; 2F, Mt. Nago-dake, Nago-shi, Okinawa-jima Isl., Ryûkyûs, 22. V. 2004, T. Mita leg.; 1F, Shiramizu, Ishigaki-jima Isl., Ryûkyûs, 15. V. 2008, T. Mita leg.; 1F, Ôtomi-rindô, Iriomote-jima Isl., Ryûkyûs, 6. IV. 2005, J. Kantô leg.; 1F, Mt. Urabu-dake, Yonaguni-jima Isl., Ryûkyûs, 1. V. 2004, T. Mita leg.; 1F, same as above, excluding 5. I. 2007, T. Ishizaki leg.

Distribution. Malaysia; Japan (new record): Honshû, Kyûshû, Ryûkyûs.

Host. *Hosunka* sp. (Japan, new host record).

Remarks. Some specimens from the Kyûshû and Ryûkyûs were collected from a bush of *Miscanthus sinensis* Andress and *Pleioblastus linearius* (Hack.) Nakai. A male and a few females were collected from the former plant species together with *Hosunka* sp. parasitized by a dryinid larva at the same time. The male attempted to mate with the female on the net. This fact indicates their valid couplet and the host association. This is the second species of the *Gonatopus pallidus* (Ceballos) species group (formerly *Donisthorpina* Richards) from Japan. However, the general shape of the female is rather more similar with *G. malesiae* Olmi than the species of the species group recorded from Japan (*G. pallidus*, s. str.) by possession of the combination of the following three characters: 1) less developed temple, 2) narrow and less inclined metanotal region, and 3) sides of metanotum forming a dully but distinct corner. Despite their similarity, the palpal formula (5/2) is a very important difference (4/2 in *G. malesiae*). The number of the segmentation is stable for specimens examined in this study. The testaceous color of FVIII (whitish in *G. malesiae*) is also informative as it allows us to distinguish it from the latter species. The male is distinguished from the males of all other members of Oriental and Palaearctic *Gonatopus* by the possession of the following five character combinations: 1) testaceous body, 2) long FI (4.0 x longer than wide), 3) complete and posteriorly conversing notaulices, 4) presence of median longitudinal furrow on the smooth dorsal surface of the propodeum, and 5) shape of the dorsal process of the paramere (Fig. 5).

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