

## A New Species of *Goniozus* from Thailand (Hymenoptera: Bethyliidae)

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**ABSTRACT.** *Goniozus thailandensis*, new species, is described as a parasite of sapodilla fruit borer, *Nephopterix* sp. in Thailand. Taxonomic affinities and characters are discussed.

### INTRODUCTION

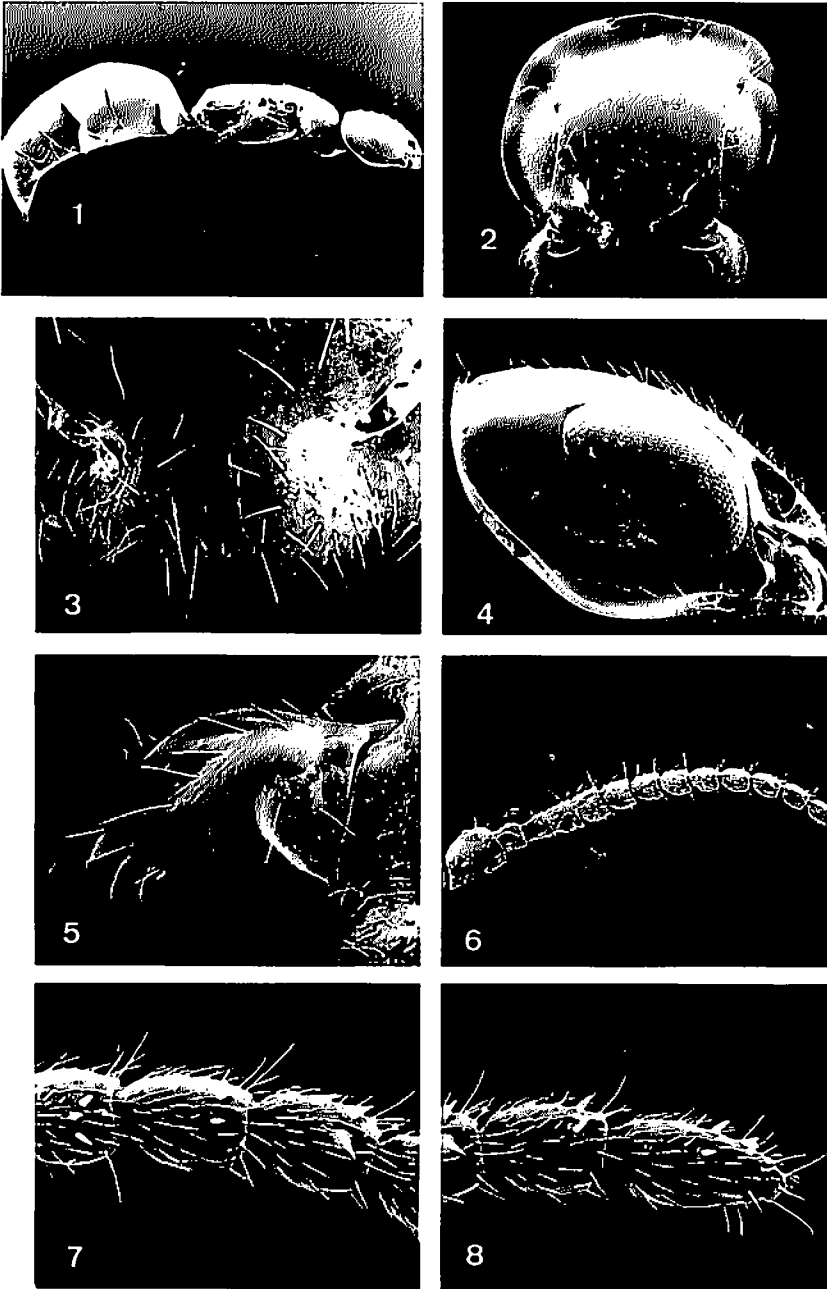
Studies on pests of sapodilla revealed a fruit-boring phycitine moth (Witethom & Silawatchananai 1991). Specimens of the moth were provisionally identified as *Mussidia pectinicornella* Hampson. Subsequently, the pest was identified as *Nephopterix* sp. (Pyralidae: Phycitinae. Michael Shaffer, *in litt.*; Marianne Horak, *in litt.*). A complex of parasitic Hymenoptera is associated with the moth. Within this complex we have discovered several new species of *Goniozus*. A name is made available for 1 species to facilitate publication of details regarding its biology. The other species will be described when better preserved material is available.

*Goniozus thailandensis* Gordh & Witethom, n. sp. (Figs 1–16)

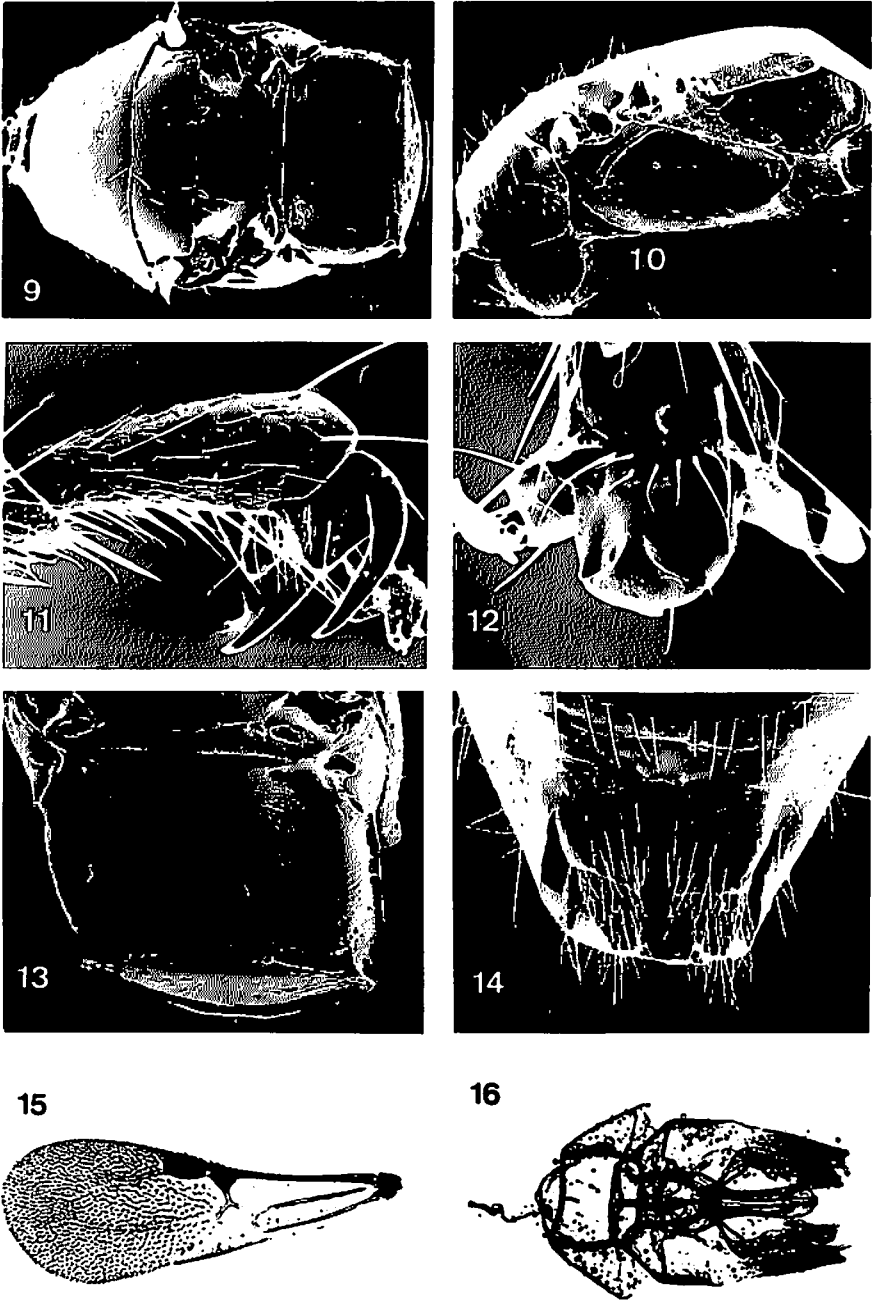
**Female:** 3.75 mm long (holotype). Body predominantly black; clypeus reddish brown, apical margin darker; metasternum reddish brown with posterior margin black. Antenna dusky yellow, apical segment very faintly infuscate in some plays of light. Mandible black, ventral tooth dark reddish brown. Coxae and femora concolorous, dark reddish brown; tibiae and tarsomeres yellowish tan, concolorous with antenna; tarsal claws (unguis) black. Forewing weakly embrowned; hindwing hyaline; forewing costal and subcostal veins reddish brown, remaining veins pale colored; pterostigma blackish.

Body in lateral aspect (Fig. 1) somewhat compressed; head prognathous. Head in dorsal (frontal) aspect (Fig. 2) about  $1.10 \times$  longer than wide; polished, with very weak reticulate microsculpture on clypeus and area immediately dorsad; medial margins of compound eyes not straight or parallel; surface of head with sparse vestiture of shallow, setigerous punctations; setae on vertexal margin weakly recurved and not conspicuously larger than other setae on head; vertexal margin very broadly rounded, without indication of a carina; surface anterior of median ocellus developed into a narrow, elongate, very shallow sulcus evident in certain plays of light; lateral ocellus less than ocellar diameter from vertexal margin. Clypeal margin broadly rounded, nearly truncate (Fig. 3); fronto-clypeal median longitudinal carina weakly developed and restricted to clypeus (Fig. 3). Scrobal impression shallow, short with dorsal margin broadly rounded and not well defined.

Head in lateral aspect (Fig. 4) about  $1.7 \times$  longer than wide, polished, with a few setae around compound eye. Compound eye nearly asetose with minute, very sparse vestiture of setae; setae evident only at high magnification. Mandibles symmetrical, each four-toothed with uppermost tooth broadly rounded, adjacent tooth narrowly rounded, penultimate tooth conical and lowermost tooth pointed (Fig. 5); dorsomedial margin of mandible with a row of short, thickened setae; ventral margin of mandible with conspicuous vestiture of pale setae. Antenna as illustrated (Fig. 6); flagellar segments with multiporous



Figs. 1-8. *Goniozus thailandensis* females. 1. Lateral aspect. 2. Head, dorsal aspect. 3. Clypeus. 4. Head, lateral aspect. 5. Right mandible, dorsal aspect. 6. Left antenna, medial aspect. 7. Left antenna F7-9, medial aspect. 8. Left antenna F10-11, medial aspect.



Figs. 9-16. *Goniozus thailandensis*. 9. ♀ mesosoma, dorsal aspect. 10. ♀ mesosoma, lateral aspect. 11. ♀ fore pretarsus, lateral aspect. 12. ♀ fore pretarsus, ventral aspect. 13. ♀ propodeum, dorsal aspect. 14. ♂ apical sternum, ventral aspect. 15. ♀ left forewing. 16. ♂ genitalia.

plate sensilla (MPS) weakly developed on all flagellar segments (Figs. 6–8); MPS not conspicuous with LM and fiber optic illumination, not strongly elevated or well defined with SEM; chaetotaxy as illustrated (figs. 6–8). Maxillary palpus with 5 segments; labial palpus with 3 segments.

Mesosoma in dorsal aspect (Fig. 9) with pronotum moderately setose, weakly, minutely and uniformly reticulate. Mesoscutum sparsely setose, smooth, polished except weak, minute reticulate sculpture lateral of parapsidal sutures. Parapsidal sutures very weakly developed (obliterated) and evident only in certain plays of light. Scutellum with sparse vestiture of setae; polished; scutellar pits weakly developed, narrow, oblique and connected by very narrow, fine, transverse groove along transscutal suture; well-developed compound pit along extreme lateral margin. Metanotum forming a thin, transverse, polished, aetose band; transverse pit in lateral area moderately developed. Mesopleuron (Fig. 10) with moderate vestiture of long, pale setae along ventral surface; anterior, oblique (longitudinal) sulcus narrow but well defined; pleural fovea somewhat small. Metasternum with moderate vestiture of long, pale setae. Forewing (Fig. 15) very weakly curved or bent at level of pterostigma thus conforming to shape of gastral notum; basal vein short, not forming an areolet. Ventral surface of coxae and sternal elements of thorax with rather dense vestiture of pale setae. Pretarsus shagreened (Fig. 11); claws "bifid," each with a subapical, broadly truncate tine; arolium large with ventrobasal setae (Figs. 11, 12).

Propodeum in dorsal aspect (Fig. 13) with a few minute setae along lateral margin; spiracle inconspicuous, obliquely slit-like, and positioned along anterolateral margin; dorsal surface lacking elevated anteromedial triangle but medial surface polished and broadly arched, remainder of dorsal surface weakly and finely reticulate; Lateral and dorsal faces delimited by fine or weakly developed transverse carina, sometimes evanescent medially; lateral face entirely reticulate. Posterior face with a few minute setae along anterior margin, surface finely, weakly reticulate.

Metasoma polished; respiratory spiracles on terga I–VII, typically concealed on anterolateral part of sclerite, tergum I spiracle exposed, largest. Tergum II with transverse line of short, pale setae about halfway between anterior and posterior margins, setae not on dorsomedial portion of tergum; terga III with similar vestiture of setae, but setae longer; tergum IV–VI with vestiture of moderately long setae along posterior half of each tergum. Sternum I with moderate vestiture of rather long setae; sterna II–IV each with a few transverse rows of setae along apical margin; apical sternum setose except bare longitudinal medial stripe. Monostylous apex conspicuously setose.

Male: 2.9 mm long (allotype). Smaller but similar to female in habitus; clypeus nearly black; mandible pale brown with teeth dark reddish brown; forecoxa concolorous with proepisternum, remaining leg segments pale yellowish brown; forewing weakly embrowned; hindwing hyaline. Head in dorsal aspect slightly wider than long; ocelli disproportionately larger than female ocelli; lateral ocellus adjacent to vertexal margin. Head in lateral aspect with compound eye disproportionately larger than female eye. Antenna similar in form to female antenna, with MPS evanescent. Subgenital shield conspicuously setose with medial notch along posterior margin (Fig. 14). Genitalia (Fig. 16) as illustrated.

The specific epithet, *thailandensis*, honors the country of Thailand where this species was discovered.

Variation: The female body length ranges from 2.95 – 5.0 mm. Several specimens in the type-series display reddish brown body coloration; body parts typically reddish brown may be yellow; the clypeus may be reddish-yellow while the remainder of the head is darker. These color differences are probably due to fixation in alcohol while the speci-

mens were teneral. Thus, some females display a head or body which is pale brown. The male body length ranges from 2.85–2.93 mm. The range is notably less in males than females. Several males in the type-series are pale brown and a few display mandibles nearly yellow. This may be an artifact of fixation of teneral specimens.

**HOLOTYPE:** Intact, card-mounted female with collection information reading: "THAILAND, Songkla, Yo Island; 27-IX-1989, Boonguea Witethom; Reared from Sapodilla fruit borer larva, *Nephopteryx* sp. (Lep., Pyralidae); *Goniozus thailandensis* Gordh & Witethom. HOLOTYPE."

**ALLOTYPE:** Intact, card-mounted male with collection information reading: "THAILAND, Songkla, Yo Island; 27-IX-1990, Boonguea Witethom; Reared from Sapodilla fruit borer larva, *Nephopteryx* sp. (Lep., Pyralidae); *Goniozus thailandensis* Gordh & Witethom. ALLOTYPE."

**PARATYPES:** 35 card-mounted females and 7 card-mounted males with the same label information as the holotype; 31 females and 1 male taken 27-IX-1989, with the same label information as the primary type. The wings and antennae of 6 females and 2 males have been dissected and mounted in Canada Balsam. Six females and 1 male been dissected and mounted on SEM stubs. Several specimens taken with the type-series have not been designated as members of the type-series because they are in poor condition.

Holotype (T13450) and allotype (T13451) deposited in Queensland Museum, Brisbane. Twenty-three female and 2 male paratypes deposited in University of Queensland Entomological Collection, Brisbane. Two female paratypes each, in the following institutions: American Museum of Natural History, New York; Australian National Insect Collection, Canberra; California Academy of Sciences, San Francisco; Canadian National Collection, Ottawa; Museum of Comparative Zoology, Harvard University, Cambridge; South African National Insect Collection, Pretoria. Remaining specimens in the collections of the authors.

## DISCUSSION

The bethylid fauna of southeast Asia is poorly known. *Goniozus* is cosmopolitan with about 145 nominal species, but no species has been described from Thailand or Burma. We know few reports in the primary zoological literature of *Goniozus* from these countries. Pruthi & Mani (1942) report that *Goniozus montanus* Kieffer was moved from south India to Burma and became established on defoliators. No species of Bethylinae has been reported from Thailand.

The *Goniozus* fauna of India includes 29 described species and 2 species are known from China (Gordh & Moczar 1990). Kurian (1952, 1954, 1955) described several species of *Goniozus* from India and prepared a key to species which was subsequently revised by Ram & Subba Rao (1968). Our new species runs to *G. philippinensis* Ashmead or *G. borneanus* Cameron in the key to Oriental *Goniozus* (Ram & Subba Rao 1968). Unfortunately, the coloration characters of legs and antennae used in the key are variable. Also, Ram & Subba Rao had not examined the types of these species and thus affinities are doubtful.

Ram (1969) described *G. delhiensis* based on material from Delhi, India. Samad (1973) described *G. rugosus* based on material from Karachi, Pakistan. The mandibles of both species are described as tridentate, with the mandibles of *rugosus* apically asymmetrical. We have not seen material of either species. The tridentate character is very unusual for the genus.

*Goniozus pakmanus* was described from material taken in Raiwind (Qasur), Pakistan (Gordh 1984), *G. sensorius* from material taken at Madras, India (Gordh 1988a); and *G. keralensis* from material taken at Kerala, India (Gordh 1988b). Features are provided in

Table 1 which separate *G. thailandensis* from these species. The clypeus and occipital carinae are reliable characters for separating many species of *Goniozus*. Propodeal sculpture and carinae are also important throughout the genus. The development of a median longitudinal carina and transverse carina separating the dorsal and posterior faces of the propodeum are useful at the species level. In addition, *G. thailandensis* and *G. sensorius* antennae display similar evanescent multiporous plate sensilla but the relatively small scutellar pits and weak transverse scutellar sulcus of *thailandensis* further separate the 2 species.

Table 1. Diagnostic characters for species of *Goniozus* (♀ ♀).

Species	Mandible (color, teeth)	Clypeal carina	Vertex margin	Propodeal triangle / carinae (median, posterior)
<i>delhiensis</i>	reddish brown, 3	acute	?	well developed/ ?
<i>keralensis</i>	dusky, 4	acute	nearly acute	well developed/ present; weak
<i>pakmanus</i>	amber, 4	acute	not acute	weak/absent, weak but complete
<i>rugosus</i>	dark brown, 3	?	?	?
<i>sensorius</i>	yellow, 4	acute	acute	well developed/complete, complete
<i>thailandensis</i>	black, 4	weak	broadly rounded	absent/absent, incomplete

Comparing *thailandensis* with other Oriental species is tenuous and misleading because type-specimens are not available for study, keys are flawed and many original descriptions lack adequate detail. Five oriental *Goniozus* species are known only from the male, and these males may be conspecific with named females.

The pupal cocoon of *G. sensorius* is typically brown but occasionally white cocoons are produced. We have only seen brown cocoons produced by *G. thailandensis*. The cocoon of both species is relatively tightly woven. All members of a brood construct cocoons of the same color. Each individual constructs a cocoon; the cocoons form a compact mass. Each individual contributes a few threads which bind all of the cocoons together. Each cocoon is about 2 times longer than wide. Adults emerge from the end nearest the head of the developing pupa.

Bethylids frequently display modifications on the pretarsus. These features have been used taxonomically in some bethylid studies (Evans 1978; Krombein 1987), but have been generally ignored. Future studies should analyze this character complex. Sculpture of the pretarsus is distinctive with SEM but not LM. The truncate subapical tine on the pretarsi of *G. sensorius* and *G. thailandensis* is not apparent with LM, but development is similar in the male and female. The tine develops from the unguis and not the arolium (Figs. 11, 12). The functional significance of this character state is not understood.

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Manuscript submitted: 6 Aug. 1993

Manuscript accepted: 5 Nov. 1993