

## **Rediscovery of the Oriental *Foenobethylus gracilis* with discussion of allied genus** (Hymenoptera: Bethylidae)

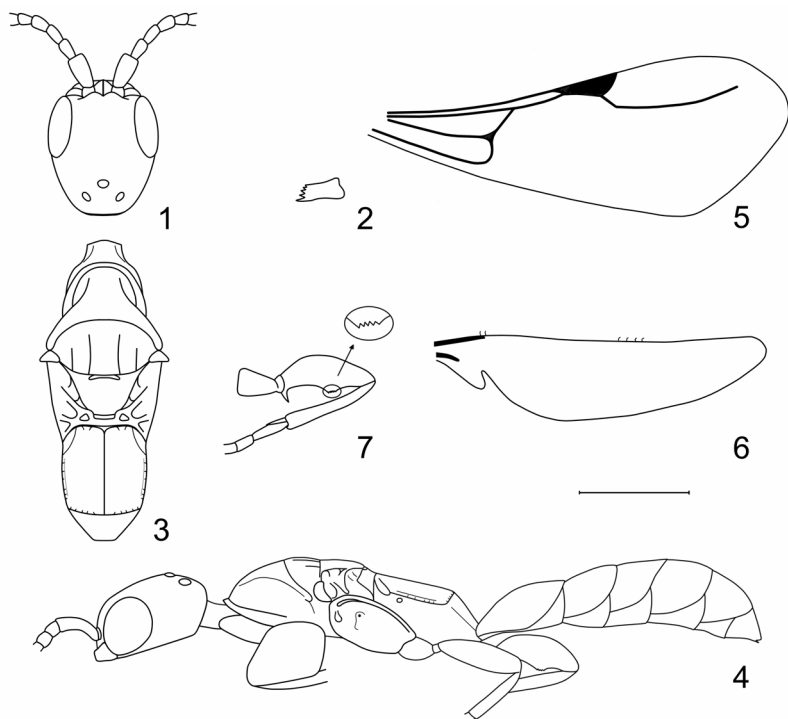
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**Abstract:** The holotype of the type species of the genus *Foenobethylus* Kieffer (Pristocerinae), *F. gracilis* Kieffer, from the Philippines is redescribed, and the diagnosis of the genus is revised. This genus has the metanotum well developed medially with median and paramedian foveae, the prosternum elongated neck-like, the basal vein is reaching the costal vein far from stigma, the fore femur being enlarged and the hind femur enlarged with one spine and denticulate line. The mandible of *F. gracilis* is bearing five apical teeth, the median clypeal lobe is subangulate, the antennal scrobe carinate, the mesopleuron with subtegular groove elongate, the hind trochanter not spinose, the hind femur with basal spine and series of close and small teeth, and the aedeagus with apex curved ventrad. A new key for *Foenobethylus* is provided.

**Key words:** Hymenoptera, Bethylidae, *Foenobethylus*, *Parascleroderma*, *Afgoiogfa*

### **Introduction**

*Foenobethylus* was originally described by KIEFFER (1913) as a monotypic genus of Bethylidae based on one specimen from the Philippines. KIEFFER (1914) established five tribes in Bethylinae (Bethylidae today) and included *Foenobethylus* in the Epyrini, which was considered by BERLAND (1928) as subfamily of Bethylidae. Curiously, GORDH and MÓCZÁR (1990) considered the placement of the genus as uncertain (*incertae sedis*) in Bethylidae.



Figures 1–7: *Foenobethylus gracilis* male. 1. Head in dorsal view; 2. Mandible in frontal view; 3. Thorax in dorsal view; 4. Body in lateral view; 5. Forewing; 6. Hind wing; 7. Hind leg. (scale bar = 0.5 mm).

The reason for the lack of data on *Foenobethylus* has undoubtedly been that the holotype of *F. gracilis*, until then the only specimen known of the genus, was supposed to be lost (GORDH & MÓCZÁR 1990) and the original description is insufficient for a modern revision of both the generic and the suprageneric status of the genus.

VÁRKONYI & POLASZEK (2007) described four new species of *Foenobethylus* from tropical Asia and correctly transferred the genus from Epyrinae to Pristocerinae. Moreover, they redescribed the genus, and provided a key to the known species. However, VÁRKONYI & POLASZEK (2007) did not analyze the holotype of *F. gracilis* because they thought it was lost. However, the first author found one specimen of *F. gracilis* from Los Banos, Philippines while visiting the collection of the

National Museum of Natural History in Washington, U.S.A. We considered this specimen as holotype although no type label is pinned with the specimen (see further remark).

The first purpose of this paper is to redescribe *F. gracilis* based on the holotype. We also aim to improve the diagnosis of the genus and the key to species, and to discuss the relation of *Foenobethylus* with other genera of *Pristocerinae*.

## Material and Methods

The examined material was loaned by David FURTH, at the National Museum of Natural History in Washington, U.S.A.

The morphological terms generally follow EVANS (1964), but those related to the integument follow HARRIS (1979). The abbreviations used in this study are as follows: LH, length of head, measured dorsally; WH, width of head, measured dorsally; WF, width of frons, measured dorsally; HE, height of eye, measured laterally; OOL, ocello-ocular distance, measured latero-dorsally; WOT, width of the ocellar triangle, measured dorsally; DAO, diameter of anterior ocellus, measured dorsally; VOL, vertex-ocular distance, measured dorsally.

### *Foenobethylus* Kieffer, 1913

Type species: *Foenobethylus gracilis* Kieffer, by monotypy

Diagnosis: Body length 2.5–4.0 mm, forewing length 1.75–3.0 mm. Body flattened and slightly elongate. Clypeus apically subangulate or moderately convex, medially with strong longitudinal carina. Mandibles with five teeth. Eyes glabrous. Gena short. Malar space very reduced. Occipital carina complete. Antennae with 11 flagellomeres, with short and erect setae. Prosternum elongated neck-like, propleuron exposed in dorsal view; pronotal disc without anterior carina. Mesonotum with notaulus, parapsidal furrow and scutellar groove. Metanotum large. Propodeum elongate; propodeal disc with anterior, median, lateral and posterior carinae. Declivity without median carina. Pleurosternum with acetabular carina. Forewing with costal, median and submedian cells closed; basal vein reaching subcostal vein far from stigma; pterostigma large; metacarpus absent; base of radial vein angled. Hypopygium with three anterior stalks and posterior margin strongly concave. Genitalia with

paramere wide with distinct thick setae; aedeagus stout and cylindrical; genital ring with dorsal part usually produced basad.

***Foenobethylus gracilis* Kieffer, 1913**

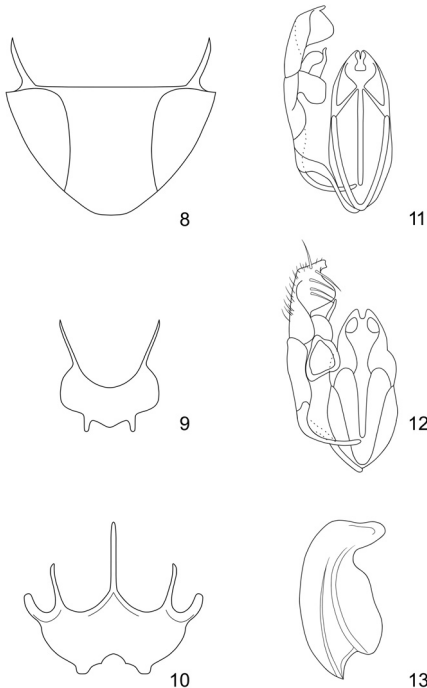
(Figs. 1–14)

Material examined: Holotype, 1 ♂, [PHILIPPINES], Los Banos, P[hilippines] I[slands], Baker col. (USNM).

Diagnosis: Mandible with five apical teeth. Clypeus with subangulate median lobe. Antennal scrobe carinate. Frontal angle of ocellar triangle right. Vertex slightly convex. Pronotal disc without anterior carina. Notaulus and parapsidal furrow present incomplete anteriorly. Mesopleuron with subtegular groove elongate. Profemur extremely enlarged. Hind femur with basal spine and series of close and small teeth. Metasoma not petiolate. Hypopygium with posterior margin strongly concave. Genitalia with cuspis short, digitus slender, basivolsella completely separated of basiparamere, aedeagus with apex curved ventrad; genital ring strongly produced basad dorsally.

Description: Body length 2.95 mm, forewing length 1.75 mm.

Color: Body, mandible, coxae, trochanters, and femora castaneous, antenna castaneous, the first three antennal segments yellowish, palpi light castaneous, tibiae, and tarsi yellow, wings hyaline, veins light castaneous.



Figures 8–13: *Foenobethylus gracilis* male. 8: Epipygium; 9: Cerci; 10: Hypopygium; 11: Genitalia in dorsal view; 12: Genitalia in ventral view; 13: Aedeagus in lateral view. (scale bar = 0.25 mm).

Head (Fig. 1, 4): Mandible robust with five apical teeth, two uppermost shorter (Fig. 2). Clypeus with median lobe projected, apical margin subangulate, median carina low. Antennal scrobe carinate. First four antennal segments in ratio of about 9:4:4:3; segment III 1.33 x as long as wide. Eyes ovoid and glabrous. Malar space very reduced, eye nearly touching mandible base at upper corner. Frons coriaceous, punctures sparse and small. WH 0.85 x LH; WF 0.54 x WH; WF 1.00 x HE; VOL 0.92 x HE; OOL 1.30 x WOT. Frontal angle of ocellar triangle right; posterior ocelli distant from vertex crest 1.22 x DAO. Vertex slightly convex. Temple convex and convergent, corner slightly rounded. Occipital carina complete. Maxillary palpus with six segments. Labial palpus apparently with four segments.

Mesosoma (Fig. 3, 4): Thorax coriaceous. Pronotal collar narrow, propleuron thus exposed in dorsal view; pronotal disc with lateral faces strongly concave, anterior carina absent. Mesoscutum about as long as pronotal disc; notaulus long, absent in anterior quarter; parapsidal furrow present in posterior half. Scutellar groove narrow, ends not dilated. Metanotum large. Propodeal disc 1.25 x as long as median width, laterally low and foveolate, antero-lateral portion with a shallow depression in drop shape; anterior and posterior transverse carinae and lateral carina present, discal median carina complete, paramedian, lateral and sublateral discal carinae absent; spiracle circular, located laterally of the propodeum; declivity without median and lateral carinae. Mesopleuron weakly coriaceous; subtegular groove, postpectal carina and anterior fovea present; mesopleural fovea long, 0.41 x width of mesopleuron; central pit small and rounded (Fig. 4). Pleurosternum with acetabular carina low and little outlined.

Wings: Forewing with costal, subcostal, median, basal, anal and transverse median, forming three closed cells (costal, median and submedian), pterostigma large, metacarpo absent, radial vein long and angulated at base (Fig. 5). Hind wing with four subsequent distal hamuli, basal hamuli obsolete, present only in the form of two setae longer than the normal setae of the hind wing; jugal lobe triangular and partially fused to wing (Fig. 6).

Legs: Profemur extremely enlarged, 1.46 x as long as wide (Fig. 4). Hind trochanter without spines; hind femur with basal spine; lower margin arched in anterior half and with distal protuberance with series of close and small teeth (Fig. 7).

Metasoma: Coriaceous. Not petiolate, elongate, 1.05 x as long as mesosoma. Epipygium with anterior margin almost straight, pair of sharpened sublateral anterior stalks 0.4 x as long as plate, posterior margin convex (Fig. 8). Cercus U-shaped, pair of sharpened lateral anterior stalks slightly longer than plate, anterior margin concave, posterior margin angulate with pair of short stalks (Fig. 9). Hypopygium with three sharpened anterior stalks, median stalk slightly longer than plate, lateral stalks about 0.7 x as long as plate, anterior margin concave among stalks, anterior-lateral corner produced as stalk, posterior margin strongly concave, concavity with pair of inner calli and pair of outer rounded protuberance (Fig. 10).

Genitalia (Figs. 11–13): paramere with apex mesad, apical margin straight in ventral view, dorsal margin with large rounded membraneous protuberance, outer surface strongly setose with one distinctly thicker and longer seta at middle of apical area, inner surface with median line of four thick and long setae; basiparamere not wide both dorsally and ventrally; cuspis short, wide with apical margin rounded; digitus slender, apex sharpened; basivolsella completely separated from basiparamere; aedeagus stout, cylindrical and wide, apex lower than apex of digitus, pair of apical lobes curved ventrad; genital ring with dorsal part strongly produced basad.

#### Remarks:

It is difficult to count the number of segments in the labial palpus in the specimen studied, but it has apparently four segments. We decided not to make dissection of mouthparts in order to preserve the unique specimen of this species.

The specimen has three labels. The first one is old and has the type-writing “Los Banos / P.I.Baker”. The second one is also old and has the handwriting “Foenobethylus / gracilis Kief.”. The third one is new and has the handwriting “Probably / the type / Belt. 65”.

We considered this specimen the holotype for three reasons. First the data are in accordance with those in the original description, ... “à Los Banos, par Ch. Fuller Baker, A. M., professeur à Université des Philippines” in the paper entitled “*Serphides des Iles Philippines*”. Second, there is only one specimen of this species recorded in the world literature ever. Third, the description coincides with the specimen mostly.

## Key to males of *Foenobethylus* modified from VÁRKONYI & POLASZEK (2007)

1. Hind trochanter without ventral spine ..... 2
- Hind trochanter with one ventral spine ..... 3
2. Hind femur with one basal acute spine and with one small, broad and dentate distal protuberance; acetabular carina weak; (Philippines)  
..... *F. gracilis* Kieffer
- Hind femur with two spines; acetabular carina well-defined (Brunei)  
..... *F. bidentatus* Várkonyi and Polaszek
3. Pronotum with anterior horizontal flange medially very narrow; hind trochanter with one needle-like long spine below; hind femur with ventral oblique furrow; distal segment of maxillary palpus less than 3.0 x longer than wide (Thailand)  
..... *F. emiliacasellae* Várkonyi and Polaszek
- Pronotum with anterior horizontal flange medially as broad as laterally; hind trochanter with one tooth or broad spine; hind femur ventrally flattened, without oblique furrow; distal segment of maxillary palpus more than 4.0 x longer than wide (Malaysia) ..... 4
4. Head strongly narrowing basally; propodeal disc more elongate  
..... *F. elongatus* Várkonyi and Polaszek
- Head only slightly narrowing basally; Propodeal disc less elongate  
..... *F. thomascokeri* Várkonyi and Polaszek

## Discussion

VÁRKONYI & POLASZEK (2007) transferred *Foenobethylus* from Epyrinae to Pristocerinae. They also speculated the cladistic status of the genus within Pristocerinae based on the character matrix provided by TERAYAMA (1996) rather than on a new matrix. They suggested that *Foenobethylus* is rather derived, but its exact position within Pristocerinae could not be assessed. One possible reason for the difficulty in understanding the phylogenetic position of the genus within subfamily is that TERAYAMA (1996) considered some non informative characters and did not consider genital characters, which are indispensable for the recognition of genera of Pristocerinae.

When KIEFFER (1913) described *Foenobethylus* he pointed out two features such as “*prosternum prolongé en un col aussi long que gros*” [= prosternum elongated into a neck as long as wide] and “*basale oblique et*

*distant du stigma deux fois sa longueur*” [= basal vein oblique and far from stigma two times its length]. There are also more genera of Pristocerinae with these characters, namely *Parascleroderma* Kieffer and *Afgoiogfa* Argaman. These three genera are related to one another. They also share other characters such as the malar space being reduced, the occipital carina complete, the prosternum elongated neck-like, the mesonotum with notaulus, the propodeal declivity without median carina, the forewing without metacarpo, the hypopygium with three anterior stalks, and the aedeagus stout and cylindrical.

*Afgoiogfa* was originally described by ARGAMAN (1988). He created the subfamily Afgoiogfinae to accommodate it, in which *Parascleroderma* was also included. He also created a synonym of *Ceratepyris* Kieffer under *Parascleroderma* just because the former was represented only by males and the latter only by females. However, only four of the six species described by ARGAMAN (1988) had pronotal carina, a character present in all species until then known for *Ceratepyris*. TERAYAMA (1998), XU *et al.* (2002) and TERAYAMA (2006) described some species of *Parascleroderma* based on males, and all of them have no pronotal carina. So, we suspect that species of *Ceratepyris* and *Parascleroderma* are not belonging to the same genus.

TERAYAMA (2003) synonymised Afgoiogfinae under Pristocerinae based on a phylogenetic analysis of Bethylidae subfamilies. According to him, the characters indicated by ARGAMAN (1988) to separate Afgoiogfinae from Pristocerinae are inconsistent. We verified many characters also present in the genera of Afgoiogfinae in *Foenobethylus*, which support the relatedness of these genera.

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