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Pseudonomadina New Genus, with a Description of a New Species from the Philippines (Hymenoptera, Trigonalidae)

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Synopsis A second Oriental species of the subfamily Nomadininae (Trigonalidae), *Pseudonomadina biceps* gen. et sp. nov., is described from the Philippines. Its mature larva is described and compared with that of *Bareogonalos jezoensis* UCHIDA (subfam. Bareogonalinae). A brief biological note is given in relation to its host wasp, *Ropalidia* (*Icarielia*) *flavobrunnea lapiniga* KOJIMA.

Up to now only one nomadinine species (Trigonalidae), *Bakeronymus typicus* ROHWER described from the Philippines, has been known from the Old World. All the remaining species of the subfamily belong to the genus *Nomadina* and are distributed in South America (BISCHOFF, 1938). Information about their biology is quite scanty, though *Nomadina cisandina* SCHULZ has been found in the nest of *Polybia dimidiata* OLIVER (Vespidae) (SCHULZ, 1907).

During his stay in the Philippines in 1978 and 1980, one of us (J.K.) has found an undescribed trigonalid to be parasitic on *Ropalidia* (*Icarielia*) *flavobrunnea lapiniga* KOJIMA (Vespidae), and collected several adults and immatures. It belongs to the subfamily Nomadininae but distinctly differs from the above two genera in several important characters. In this paper the new species is described in a new genus, with a description of the final instar larva and a brief note on its biology.

Pseudonomadina gen. nov.

Type-species: *Pseudonomadina biceps* sp. nov.

Head transverse, distinctly wider than thorax, smooth and shining. Eye small, occupying anteroventral part of head in profile; inner margins of the eyes convergent ventrally. Antenna inserted at the level of mandibular base, 14-segmented in ♂ and 13-segmented in ♀; segments short and thick in both sexes. Clypeus small and transverse, located between antennae, weakly defined dorsally. Mandibles remarkably produced, tridentate and symmetrical. Maxillary (4-segmented) and labial (2-segmented) palpi much reduced in size; segmentation often indistinct.

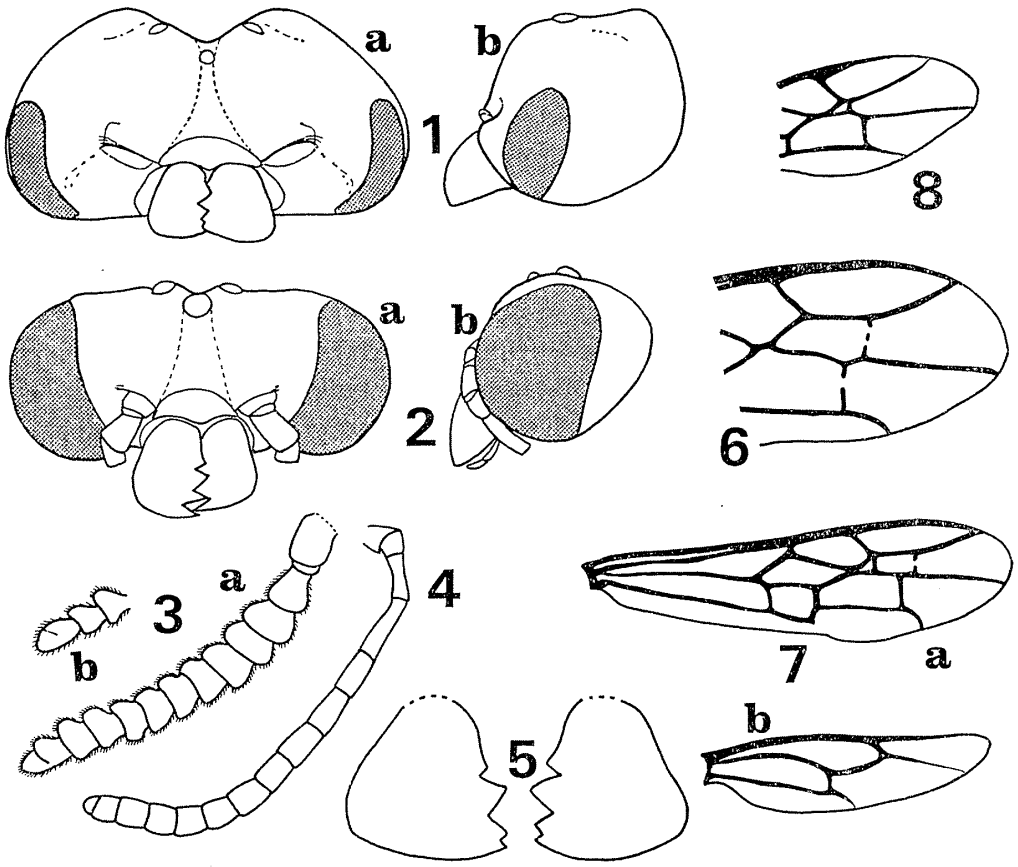
Thorax distinctly sculptured; prescutal suture complete. Mesepisternum divided by a transverse suture. Postscutellum slightly raised medially. Propodeal spiracle oval. Legs stumpy in ♂ and slender in ♀; trochanters of all legs 2-segmented; basitarsus shorter than subsequent segments combined (incl. claw). Forewing sometimes with 2r-m (Fig. 7a). Gaster flattened in ♂, rather thick and robust in ♀; sternite 2 of ♀ without median projection.

The two other genera of Nomadininae differ from the new genus in the following characters. In *Bakeronymus* eye is very large, occupying the entire side of head (Fig. 2 vs. 1); maxillary and labial palpi are developed and distinctly segmented; mandible has four inner teeth; male antennal segments are more slender and not distinctly thickened apically (Fig. 4 vs. 3a); hind basitarsus is subequal in length with the subsequent segments combined (cf. ROHWER, 1922). Wing venation, see Fig. 8. In *Nomadina* head is as wide as thorax; male antenna is slender; antenna is 16-segmented in both sexes; female gaster is much flattened than in the new genus (cf. SCHULZ, 1907, fig. 92).

Pseudonomadina biceps sp. nov.

Male. Length 6 mm. Head rather thick, about half as long as wide in dorsal view, covered with sparse minute hairs, which are slightly longer on occiput and mandibles. Cranium with a wide and deep impression extending from vertex to the dorsal margin of clypeus; the impression about half as wide as head near the occipital carina, rather strongly narrowed anteriorly till the anterior ocellus which occupies the entire width of the impression, then gradually widened below and nearly as wide as clypeus at the ventral margin (Fig. 1a). Vertex strongly swollen on each side behind posterior ocellus, giving a bicephalous appearance. Distance between posterior ocelli about one-fifth the head width. Gena distinctly wider than eye in profile (Fig. 1b). Antennal socket above with a distinct ridge. Antennal segments 3–13 each thickened apically, nearly conical; segment 3 as long as 4, slightly longer than subsequent segments; last two segments fused below (Fig. 3a); segments 3–14 rather dull and covered with dense short hairs. Clypeus widest at its apical margin; basal margin round; apical margin weakly emarginate in each half, with a broad median tooth apically round. Between antennal socket and eye a protuberance. Mandible widened apically, with the apex nearly twice as wide as base; basal tooth small and apical one subdivided into two (Fig. 5). Mouthparts in width measuring about one-third the head width.

Thorax (Fig. 9) moderate in size, densely covered with short erect hairs. Pronotum steep; only hind margin visible from above; vertical part with distinct ridges long and longitudinal; ventral anterolateral angle not produced below. Mesoscutum moderately convex, rugose, about two-thirds as long as wide in dorsal view, widest at tegula, rather strongly narrowed anteriorly; medial scutal line present on at least anterior half of the scutum; prescutal suture shallow, with distinct or indistinct



Figs. 1–8. —— 1, 3, 5, 6, 7. *Pseudonomadina biceps* sp. nov.: 1, ♂, head (a, frontal & b, lateral view; 3, antenna (a, ♂; b, ♀); 5, ♂, mandible; 6 & 7, wing (6, ♀, forewing; 7a, ♂, forewing; 7b, ♂, hindwing). —— 2, 4, 8. *Bakeronymus typicus*.: 2, ♂, head (a, frontal & b, lateral view); 4, ♂, antenna; 8, ♂, forewing.

transverse ridges, terminating so as to trisect the posterior edge of scutum; lateral parts each with an indistinct longitudinal carina. Scutellum large, subcircular, rather swollen and somewhat rugose. Postscutellum distinctly lower than scutellum; central part elevated and rugose. Propodeum rugose, in dorsal view smoothly narrowed posteriorly; apical margin slightly emarginate in the middle. Legs smooth and somewhat shining; femora thick; tibiae thickened apically; fore tibia subequal in length with femur, without spur; mid-tibia slightly longer than femur, with a short spur; hind tibia longer than femur, with two short spurs. Fore wings short, not beyond the apex of gaster when closed; venation as in Fig. 7.

Gaster longer than wide. First segment not petiolate, expanding posteriorly, short, about two-thirds as long as wide; apical part about twice as wide as basal part. Tergites smooth and shining, covered with very short hairs, except for wide and shallow median impression on tergite 1 rather rugose.

Body yellow or pale yellow; the following parts brownish (brownish markings on clypeus and median impression of head, on thorax, and on tergite 1 often darker

or even blackish): occiput nearly entirely, gena posteriorly, triangular impression of vertex partly, irregularly interrupted markings on each half of vertex, an indistinct band extending from the top of eye to posterior ocellus being narrowed dorsally, a large spot on each half of frons extending to the outer edge of antennal socket, margins of mandible, mandibular teeth (blackish), median impression from clypeus to anterior ocellus, apical margin of clypeus, antenna above except for scape largely and terminal segment yellowish, a transverse band on the vertical part of pronotum, posteroventral angle of pronotum, pronotal collar, anterior and lateral margins of mesoscutum, a band on median scutal line, posterior half of mesoscutal disc, posterior half of mesepisternum, a band along the anterior margin and a band on the transverse suture of mesepisternum, mesepimeron and metapleuron wholly, axilla partly, posterior margin of postscutellum, a broad basal band on propodeum with narrow extensions which are directed downwards, coxae basally, tibiae apically, tarsi except for the last segments, tarsal claws, gastral tergite 1 except for posterolateral corners, wide basal bands on tergites 2–5, tergite 6 with a large median spot yellow. Sternites more extensively yellowish. Wings subhyaline; fore wing infuscated in marginal cell and in anterior half of submarginal cell 4.

In the specimen from Samar Is. brown markings are rather dark; pronotum and mesepisternum are more extensively marked with brown.

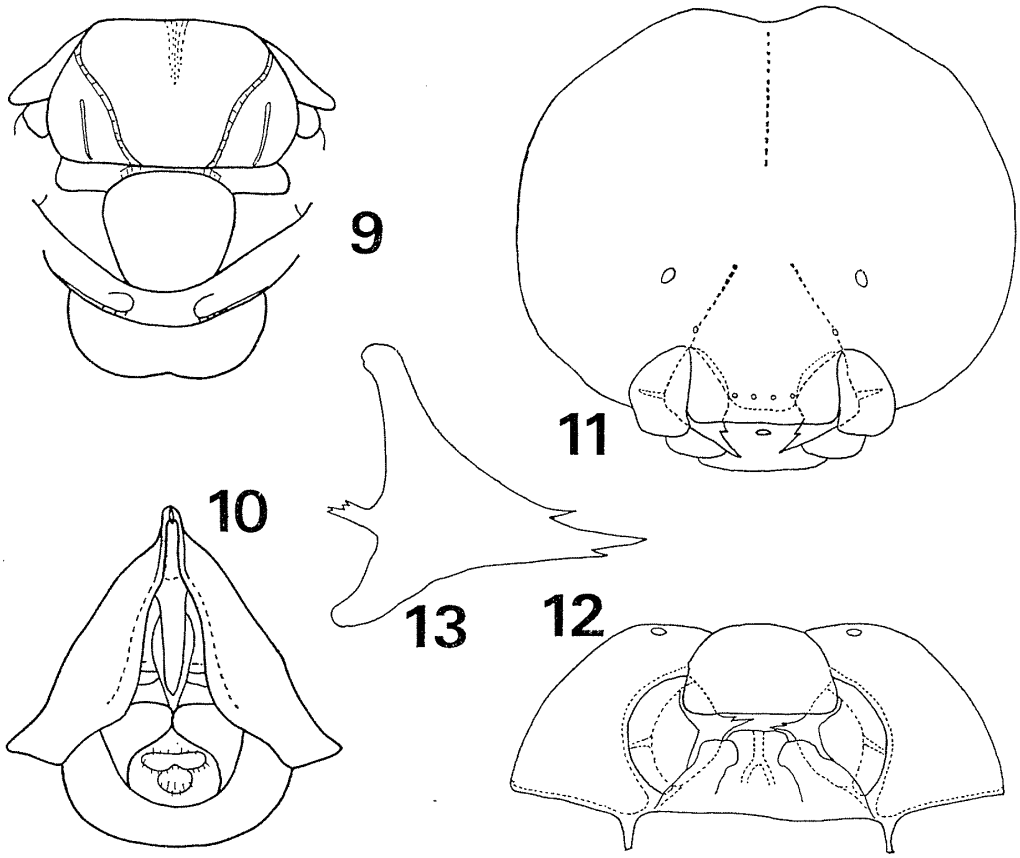
Female. Similar to ♂. Last two antennal segments not fused (Fig. 3b). Gaster bent near the 4th segment so that the terminal sternites are placed opposite the anterior sternites; sternite 3 with a median projection; sternite 4 with a similar projection which is almost hidden beneath sternite 3; sternite 7 deflexed and produced into a round process opposite the projection from sternite 3 (Fig. 10). Wings distinctly longer than in ♂, beyond the apex of gaster when closed.

Brown marks on head less developed than in ♂. Mesonotum dark brown except for a pair of yellow spots on anterior part of mesoscutum; mesepisternum and propodeum also more extensively marked with brown. Legs brownish, especially on coxae and femora. Yellow bands on gastral segments more sharply margined; brown often more extensive.

Holotype: ♂, Palo, Leyte, the Philippines, March 7, 1978, J. KOJIMA leg. (deposited in the collection of the Entomological Institute, Hokkaido University). Paratypes: 3♂♂7♀♀, same data as holotype; 1♂, Mondragon, Samar, the Philippines, J. KOJIMA leg. Paratypes are deposited in the collections of the Entomological Institute (Hokkaido University), Department of Biology (Ibaraki University), U.S. National Museum (Washington DC), and Leiden Museum (the Netherlands).

Description of the Mature Larva

Cranium broader than high, weakly sclerotized and transparent, without conspicuous setae (Fig. 11). Mid-cranial sulcus quite weak, almost invisible. Frons



Figs. 9–13. *Pseudonomadina biceps* sp. nov.: 9, thorax (dorsal view); 10, terminal segments of ♀ abdomen; 11–13, mature larva, 11, head, frontal view; 12, ditto, ventral view; 13, mandible.

not separated from epicranium and clypeus by distinct lines. Antenna small, without sensillae. Temporal band absent. Anterior tentorial pit small. Postoccipital sulcus moderately developed in lower half, but obscure or absent in upper half. Hypostomal sulcus developed, but quite short, with a remarkable backward-directed spur at the junction with postoccipital sulcus (Fig. 12). Pleurostomal sulcus wide, but not so developed. Epistomal sulcus almost completely lacking. Clypeo-labral complex wide; labrum with two pairs of indistinct sensillae. Mandible well sclerotized, rather wide at the base, apically pointed to a single tooth, with two sharp denticles near the apex (Fig. 13); mandible largely hidden under the clypeo-labral complex and the well-developed pouch-like structure which arises between pleurostomal sulcus and mandibular base. Maxilla relatively small, without distinct palpus and galea. Prementum not defined, without palpi. Salivary opening inconspicuous.

Body integument weakly sclerotized, without conspicuous setae, with fine granules which are dense on the first three segments, largest and densest on the last two segments. Spiracles 8-paired, the anteriormost the largest.

In general feature, the mature larva of this species resembles that of *Bareogonalos jezoensis* (Bareogonalinae) which is also a parasite of social wasps, suggesting a possible phylogenetic relationship between this species and the Bareogonalinae. However, *B. jezoensis* mature larva differs from the former in the following points (cf. YAMANE, 1973): 1) cranium more strongly depressed dorsoventrally, 2) well-defined temporal band present, 3) antenna much larger, 4) epistomal sulcus present in lower half, 5) pouch-like structure less developed, 6) mandible, in addition to the main teeth, with a row of minute denticles on inner side, 7) maxilla with palpus and galea, 8) hypostomal sulcus longer, without conspicuous backward-directed spur, 9) having nine pairs of spiracles. The spur arising at the connection of hypostomal and postoccipital sulcus is peculiar to the new species in at least trigonalids for which the larva is known.

Biological note. About 100 nests of eight species of *Ropalidia* have been examined in the Philippines by J. K. However, the parasitism of *P. biceps* was observed only in *R.* (*Icarielia*) *flavobrunnea lapiniga* (in 2 out of 8 nests examined). Fourteen adults, 17 pupae and 2 final instar larvae were obtained from Nest FP-01 (composed of ca. 3,500 cells) and 1 adult from Nest RS-02 (ca. 7,000 cells). This suggests that *P. biceps* did not seriously affect the colony productivity of the host wasp. Pupae and final instar larvae occupied nearly entire space of host's cocoon (cell), and oriented their heads toward cell opening. No cocoon formed by the parasite was observed, while *Bareogonalos jezoensis* spins a silken partition near the cell opening (YAMANE, 1973). Live adults were found within the active host colonies, suggesting that they have some ways to deceive host wasp in the nest.

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