Description of a new subspecies of *Bakeronymus typicus* ROHWER parasitic on the social wasp *Parapolybia varia* FABRICIUS in Taiwan (Hymenoptera: Trigonalidae)

Seiki YAMANE* and Mamoru TERAYAMA**

Abstract

A new subspecies of *Bakeronymus typicus* (Trigonalidae, Nomadininae) is described from four female specimens reared from a nest of the social wasp *Parapolybia varia* in Taiwan (Formosa). Its mature larva is described and compared with that of another Oriental nomadinine, *Pseudonomadina biceps*. A brief note on its host wasp is given.

Introduction

In 1922 ROHWER described the first Oriental species of the trigonalid subfamily Nomadininae from the Philippines (Surigao, Mindanao) and erected a new genus for it. This species, *Bakeronymus typicus*, was originally based on only two male specimens, and up to now its female has not been known. Recently M. T. reared four female wasps of a trigonalid from a nest of *Parapolybia varia* FABRICIUS in Taiwan (Formosa). A close examination of them showed that this trigonalid belongs to the genus *Bakeronymus* and that the specimens might represent the female of *B. typicus*. In this short paper we describe the Taiwanese form as a new subspecies of *B. typicus* and give brief notes on its mature larval morphology and host wasp.

BAKERONYMUS TYPICUS SEIDAKKA SUBSP. NOV.

Female. Structure—. Length 8.5–9.5 mm. Occipital carina complete; occiput with short golden hairs. Posterior ocelli slightly larger than anterior ocellus; distance between eye and nearest ocellus twice as long as that between the posterior ocelli. Mandible with fine golden hairs. Eye very large, but in profile only slightly wider than gena (Fig. 1). Antenna 14- or 15-jointed, with several apical segments bead-like in shape (Fig. 2). Each antennal socket with a shallow depression above. Thorax slightly narrower than head, rather thick, with numerous hairs. Scutellum large, elongate, slightly convex dorsally. Legs slender. Gaster depressed, seen from above posteriorly widened, bent between 4th and 5th segments. Segment I somewhat slender but distinctly widened apically (not petiolate); segment II gradually widened apically (Fig. 3); segments III

*Department of Biology, Faculty of Science, Kagoshima University, Kagoshima, 890 Japan.
**Laboratory of Applied Entomology, Faculty of Agriculture, Utsunomiya University, Utsunomiya, 321 Japan.

and IV nearly parallel-sided; segments V and VI narrowed apically. Tergites finely shagreened, with numerous fine hairs; tergite I emarginate apically, with a vertical furrow which runs the whole length of the tergite (Fig. 3). Sternites rather shining (hairs longer but much sparser than in the tergites); sternite I medially emarginate apically; sternite II medially with a pair of small apical denticles; sternite III with a median projection which is bifid apically; projection of sternite IV not observable.

Colour—. General colour black and dark brown, with the following parts yellowish: mandible largely, scape largely, a pair of spots on clypeus, a wide vertical band along inner eye margin, a spot between the vertical band and each posterior ocellus, a wide band which extends from upper margin of antennal socket to anterior ocellus, anterior two-thirds of gena, vertex irregularly, posterior corners of pronotum, a pair of spots on pronotum anteriorly, a pair of elongate markings on mesoscutum anteriorly, a median elongate marking (anteriorly acute) on mesoscutum, scutellum almost entirely (with a pair of small dark blotches), axilla largely, a large marking on mesepisternum, three transverse markings on metanotum, a wide transverse band (deeply incised on each side) on propodeum, sides of gastral segment I apically, narrow apical bands on tergites II-V (the posteriormost somewhat wide), a median marking on tergite VI, narrow apical bands on sternites II-IV, outer faces of coxae, apical parts of fore and mid-femur, fore tibia, bases of mid- and hind tibia. Tarsi of all legs also more or less yellowish.

Holotype: ♀, Nanfeng, Jen'ai, Nantou County, Taiwan, 14-16 viii, 1980, reared from a nest of *Parapolybia varia* by M. TERAYAMA. (Deposited in the collection of Entomological Institute, Hokkaido University.) Other specimens examined: 3 ♀♀, data as above. All the paratypes are more or less deformed (especially in head) due to failure in eclosion.

Etymology: Seidakka is one of the most courageous tribes in central Taiwan.

The present specimens differ in structure from the male of *B. typicus* from the Philippines as follows (Figs. 1, 3, 4, and YAMANE & KOJIMA, 1982, fig. 2 b): eye smaller, not occupying the entire side of head; gastral segment I not petiolate, distinctly widened apically; segment II much wider. These structural differences may suggest that the females from Taiwan belong to another species. However, it is also possible that the differences are due to sexual dimorphism because there have been found no other important differences in structure. In colour pattern the Taiwanese form is readily distinguished by having a large yellow marking on mesoscutum, by the transverse yellow band on metanotum divided into three pieces, and by the apical bands on gastral tergites II-IV much narrower. Based on all this, the present specimens are tentatively regarded as belonging to *B. typicus* and representing a geographic race different from the nominate form.

Though *B. typicus* is more melanic than *Pseudonomadina biceps* Sk. YAMANE et KOJIMA, these two Oriental nomadinine species notably resemble each other in their basic colour patterns, which do not seem to be conformable with those of their host wasps. This suggests that their resemblance in colour pattern is based on their phylogenetic relation and does not result from an ecological convergence.

Description of Mature Larva

Head (Figs. 5, 6) strongly transverse. Cranium weakly sclerotized, with no distinct markings, without conspicuous setae but with small punctures on gena. Mid-cranial sulcus almost invisible; vertex with a wide depression, which extends down to the level of antenna. Frons not defined. Antenna with a very obscure sensilla; outer margin of antennal socket nearly straight. Temporal band absent. Anterior tentorial pit small. Postoccipital sulcus weak, absent in upper half. Hypostomal sulcus weak and very short, with an upward-directed spur at the junction with the postoccipital sulcus (Fig. 7, s). Pleurostomal sulcus weak. Epistomal sulcus almost completely lacking. Labrum not separated from clypeus, without sensillae. Mandible largely hidden under the clypeo-labral complex, well sclerotized, rather wide at base, apically pointed, with two supplementary teeth near apex (Fig. 8). Pouch-like structure arising between the pleurostomal sulcus and mandibular base well developed. Maxilla small, without palpi. Prementum weakly defined, without palpi. Salivary opening inconspicuous.

Body integument weakly sclerotized, without setae and punctures, with fine granules, which are very dense on the thoracic tergites and very dense and largest on the last three abdominal tergites; sternites with smaller and sparser granules, which are often apically pointed. Spiracles 8-paired, the anteriormost the largest.

The mature larva of this species quite resembles that of *Pseudonomadina biceps*, but differs from the latter as follows (cf. YAMANE & KOJIMA, 1982): 1) cranium more strongly transverse, 2) clypeo-labral complex weakly converging below, 3) labrum without sensillae, 4) hypostomal sulcus quite short, 5) spur arising at the junction of hypostomal and postoccipital sulci directed upwards.

Since the present specimen is a prepupa (not a mature larva in the strict sense), the tentorial system of cranium could not be observed. Judging from the position where they arise from, the upward-directed spurs are likely to be the remnant of the tentorial bar, which in normal hymenopterous larvae is usually transverse. Curiously this spur is directed backwards in *Pseudonomadina biceps* (YAMANE & KOJIMA, 1982). At present it is not clear whether these abnormal conditions are peculiar to these two genera among the Trigonalidae.

Note on Host Wasp

The nest of *Parapolybia varia* from which the present specimens were reared was collected on August 12, 1980 at Nanfeng (600 m alt.), central Taiwan. It was composed of a total of 756 cells, of which 339 were old and out of use. Ninety six eggs, 136 larvae and 181 cocoons were seen in other 413 cells. The remaining 4 cells were incipient, with no immatures. Nineteen capped cells each contained a larva or a pupa of *B. typicus seidakka*. The host of the nominate subspecies of *B. typicus* in Mindanao is not known, but the supposed host *P. varia* occurs there too (VECHT, 1966).

The Nomadininae consist of three genera, one (*Nomadina*) being confined to the Neotropics and the other two (*Bakeronymus* and *Pseudonomadina*) to Southeast Asia. The biology of these wasps is largely undocumented and only a few host records are

Description of Mature Larva

Head (Figs. 5, 6) strongly transverse. Cranium weakly sclerotized, with no distinct markings, without conspicuous setae but with small punctures on gena. Mid-cranial sulcus almost invisible; vertex with a wide depression, which extends down to the level of antenna. Frons not defined. Antenna with a very obscure sensilla; outer margin of antennal socket nearly straight. Temporal band absent. Anterior tentorial pit small. Postoccipital sulcus weak, absent in upper half. Hypostomal sulcus weak and very short, with an upward-directed spur at the junction with the postoccipital sulcus (Fig. 7, *s*). Pleurostomal sulcus weak. Epistomal sulcus almost completely lacking. Labrum not separated from clypeus, without sensillae. Mandible largely hidden under the clypeo-labral complex, well sclerotized, rather wide at base, apically pointed, with two supplementary teeth near apex (Fig. 8). Pouch-like structure arising between the pleurostomal sulcus and mandibular base well developed. Maxilla small, without palpi. Prementum weakly defined, without palpi. Salivary opening inconspicuous.

Body integument weakly sclerotized, without setae and punctures, with fine granules, which are very dense on the thoracic tergites and very dense and largest on the last three abdominal tergites; sternites with smaller and sparser granules, which are often apically pointed. Spiracles 8-paired, the anteriormost the largest.

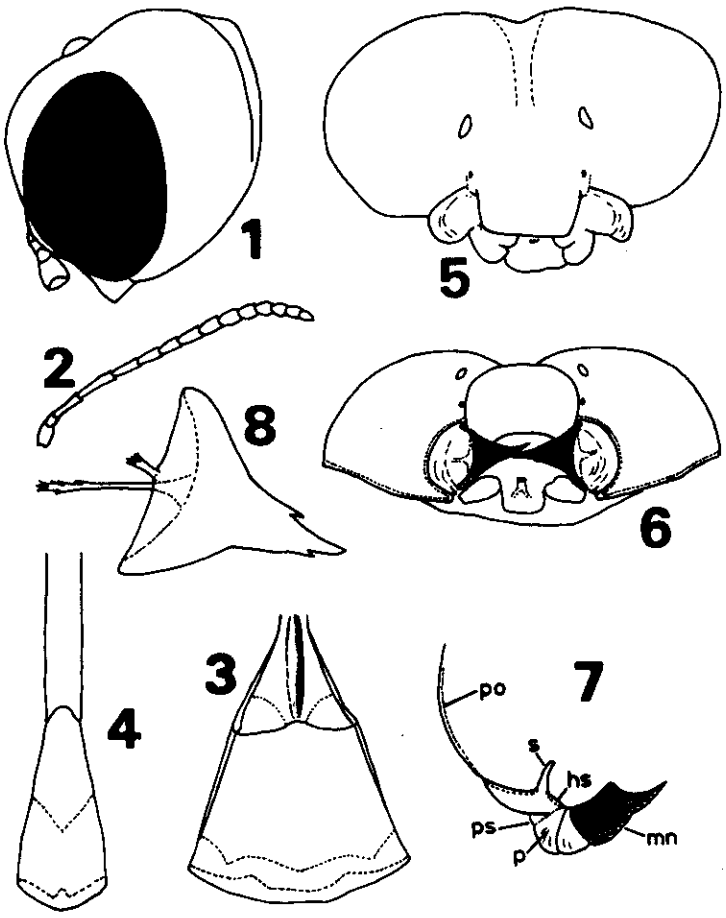
The mature larva of this species quite resembles that of *Pseudonomadina biceps*, but differs from the latter as follows (cf. YAMANE & KOJIMA, 1982): 1) cranium more strongly transverse, 2) clypeo-labral complex weakly converging below, 3) labrum without sensillae, 4) hypostomal sulcus quite short, 5) spur arising at the junction of hypostomal and postoccipital sulci directed upwards.

Since the present specimen is a prepupa (not a mature larva in the strict sense), the tentorial system of cranium could not be observed. Judging from the position where they arise from, the upward-directed spurs are likely to be the remnant of the tentorial bar, which in normal hymenopterous larvae is usually transverse. Curiously this spur is directed backwards in *Pseudonomadina biceps* (YAMANE & KOJIMA, 1982). At present it is not clear whether these abnormal conditions are peculiar to these two genera among the Trigonalidae.

Note on Host Wasp

The nest of *Parapolybia varia* from which the present specimens were reared was collected on August 12, 1980 at Nanfeng (600 m alt.), central Taiwan. It was composed of a total of 756 cells, of which 339 were old and out of use. Ninety six eggs, 136 larvae and 181 cocoons were seen in other 413 cells. The remaining 4 cells were incipient, with no immatures. Nineteen capped cells each contained a larva or a pupa of *B. typicus seidakka*. The host of the nominate subspecies of *B. typicus* in Mindanao is not known, but the supposed host *P. varia* occurs there too (VECHT, 1966).

The Nomadininae consist of three genera, one (*Nomadina*) being confined to the Neotropics and the other two (*Bakeronymus* and *Pseudonomadina*) to Southeast Asia. The biology of these wasps is largely undocumented and only a few host records are



Figs. 1–3. *Bakeronymus typicus seidakka* subsp. nov., ♀. 1, Head, profile; 2, right antenna from above; 3, gastral tergites I & II from above.

Fig. 4. *B. typicus typicus* (paratype), ♂, gastral tergites I & II from above. Based on a colour slide taken by Mr. Jun-ichi KOJIMA.

Figs. 5–8. *B. typicus seidakka* subsp. nov., mature larva. 5, Head, frontal view; 6, head, ventral view; 7, left half of head, posterior view (hs, hypostomal sulcus; mn, mandible; p, pouch-like structure; ps, pleurostomal sulcus; po, postoccipital sulcus; s, spur = remnant of tentorial bar?); 8, mandible.

available. W. A. SCHULZ (cited by BISCHOFF, 1938) found *Nomadina cisandina* in the nest of *Polybia dimidiata* OLIVER. W. D. HAMILTON (cited by RICHARDS, 1978) bred *Nomadina* sp. from the nest of *Stelopolybia angulata* FAB. J. KOJIMA collected several *Pseudonomadina biceps* adults and larvae from nests of *Ropalidia flavobrunnea lapiniga* KOJIMA (YAMANE & KOJIMA, 1982). The present species is parasitic on *Parapolybia varia* as mentioned above.

Thus, at present the known hosts of nomadinine wasps are only among the tribes Polybiini and Ropalidiini of the subfamily Polistinae (Vespidae). In the Old World no trigonalid has been found in the nest of Polistini, while BISCHOFF (1938) listed some Neotropical *Polistes* species as the hosts of another trigonalid subfamily, Seminotinae (confined to Central and South America); no seminotine species is known to parasitize Polybiini. The available information, though quite insufficient, shows that in at least the New World there are regular host-parasite relations between Polybiini and Nomadininae and between Polistini and Seminotinae. Further, so far as is known, Bareogonalinae (another trigonalid subfamily) have been found only from nests of Vespinae (YAMANE, 1973; YAMANE & YAMANE, 1975). If, in general, the host-parasite relations between vespid and trigonalid groups are regular, then biology and phylogeny of these trigonalids will help to clarify some controversial issues on the phylogeny of the host social wasps (e. g., the position of Ropalidiini in the subfamily Polistinae).

References

BISCHOFF, H. 1938. Trigonaloidae. *Hymenopterorum Catalogus*, **5**, 18 pp.

RICHARDS, O. W. 1978. *The Social Wasps of the Americas Excluding the Vespinae*, British Museum (N. H.), London, 580 pp.

ROHWER, S. A. 1922. Philippine parasites of the family Trigonalidae. *Philip. J. Sci.*, **21**: 417–419.

VECHT, J. VAN DER, 1966. The East-Asiatic and Indo-Australian species of *Polybioides* Buysson and *Parapolybia* Saussure (Hym., Vespidae). *Zool. Verhand.*, **82**: 3–42, 3 pls.

YAMANE, Sk. 1973. Descriptions of the second to final instar larvae of *Bareogonalos jezoensis* with some notes on its biology (Hymenoptera, Trigonalidae). *Kontyû, Tokyo*, **41**: 194–202.

YAMANE, Sk. & S. YAMANE, 1975. A new trigonalid parasite (Hymenoptera, Trigonalidae) obtained from *Vespula* nests in Taiwan. *Kontyû, Tokyo*, **43**: 456–462.

YAMANE, Sk. & J. KOJIMA, 1982. *Pseudonomadina* new genus, with a description of a new species from the Philippines (Hymenoptera, Trigonalidae). *Kontyû, Tokyo*, **50**: 183–188.