

Revision of the genus *Perthiola* (Hymenoptera: Eulophidae: Anselmellini) with the description of a new species

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Abstract. The genus *Perthiola* Bouček, 1988 (Hymenoptera: Eulophidae) is reviewed and a key is provided to the three known species: *P. mazaneci* Bouček, 1988, *P. bouceki* sp. nov., and *P. moringae* (Narendran, 2003) comb. nov. from *Manipurella* Narendran, 2003. The genus *Manipurella* is synonymised with *Perthiola* syn. nov. The first biological records are given for *Perthiola*, which is associated with galls, as well as the first description of a male of the genus.

Taxonomy, new species, new combination, synonymy, distribution, key, Hymenoptera, Chalcidoidea, Eulophidae, Anselmellini, *Perthiola*, Australian region, Oriental region

INTRODUCTION

The group Anselmellini (Hymenoptera: Eulophidae), erected as a tribe by Bouček (1988), includes two genera: *Anselmella* and *Perthiola* (Bouček 1988, Gauthier et al. 2000, Noyes 2003). This tribe is easily recognized by having: radicle long (at least twice as long as broad) (Figs 3, 7), 9-segmented flagellum (Figs 3, 7), notauli complete to posterior margin of mesoscutum (Fig. 2), marginal vein thickened along length and usually shorter (or sometimes slightly longer) than stigmal vein (Figs 5, 6), toruli distinctly above middle of head (Figs 1, 8), and tentorial pits distinct and deep (Figs 1, 8). Bouček (1988) placed the Anselmellini in the subfamily Eulophinae; however, Gauthier et al. (2000) found placement of this tribe to be ambiguous within the 4 subfamilies currently recognized in the Eulophidae, and they left it as an unplaced tribe. *Anselmella* Girault, 1926 (as *Eugeniana* Narayanan, Subba Rao et Patel, 1958) was classified in the family Pteromalidae (Hymenoptera: Chalcidoidea) (Narayanan et al. 1958), and only subsequently transferred to Eulophidae by Bouček et al. (1979), because individuals have 4 instead of 5 tarsal segments.

Anselmellini appears closely related to Ophelimini [another unplaced tribe of Eulophidae, according to Gauthier et al. (2000)]. Members of both these tribes have, in particular, a widened marginal vein, and also more antennal segments than is usual for eulophids. They are also mainly phytophagous, and seem to be predominantly native to the Australasian Region (Bouček 1988). Possibly, they are related, perhaps as a monophyletic assemblage or as a grade between Euderinae and Entedoninae (Eulophidae) (Gauthier et al. 2000, La Salle in press). However, Ophelimini may be distinguished from Anselmellini by having antenna with less than 9 distinct flagellar segments, radicle short (less than twice as long as broad), and marginal vein distinctly longer than stigmal vein (Bouček 1988).

In this paper, a review of the genus *Perthiola* is presented, as well as a key to females of the three known species: *P. mazaneci*, *P. bouceki* sp. nov., and *P. moringae*. The genus *Manipurella* is synonymised with *Perthiola*. New distributional and host notes for *Perthiola* are presented, as well as the first record and description of males for the genus.

MATERIAL AND METHODS

The following codes identify the collections housing the material examined:

ANIC – Australian National Insect Collection, CSIRO Entomology, Canberra, Australia;
BMNH – The Natural History Museum, London, United Kingdom;
NZSI – National Zoological Collection, Zoological Survey of India, Calcutta, West Bengal, India;
QM – Queensland Museum, Brisbane, Queensland, Australia;
SAM – South Australian Museum, Adelaide, South Australia, Australia;
USNM – National Museum of Natural History, Washington D.C., USA;
WAMP – Western Australian Museum, Perth, Western Australia, Australia.

Specimens of the newly described species “*Perthiola bouceki* Reina & La Salle” are provided with one red label for the holotype; yellow labels are provided for the paratypes, with the sex specified. Exact label data are also cited.

TAXONOMY

Genus *Perthiola* Bouček, 1988

Perthiola Bouček, 1988: 602; type species: *Perthiola mazaneci* Bouček, 1988 (by original designation).

Manipurella Narendran in Narendran, Singh et Prasad, 2003: 23; type species: *Manipurella moringae* Narendran in Narendran, Singh et Prasad, 2003 (by original designation); **syn. nov.**

DIAGNOSIS. Flagellum 9-segmented; flagellar segment 1 subequal or shorter than segment 2. Radicle at least twice as long as broad. Head with scrobes shallow and divided only ventrally. Marginal vein thickened and distinctly shorter than postmarginal vein (0.3–0.4 times as long as postmarginal vein). Notauli deep and complete to posterior margin of mesoscutum. Scutellum without longitudinal lines and with 2–5 pairs of short setae. Petiole short.

BIOLOGY. Bouček (1988) had no host information for *P. mazaneci*, although he suspected that it was phytophagous. *P. moringae* was reared from leaf galls on *Morinda angustifolia* (Rubiaceae) and *Perthiola bouceki* sp. nov. was reared from stem galls on ?*Baeckea* sp. (Myrtaceae). It is uncertain whether *Perthiola* is actually a phytophagous gall inducer, an inquiline, or a parasitoid of a gall inducer.

DISTRIBUTION. Known from Western Australia and India.

DISCUSSION. *Perthiola* is one of two genera in the Anselmellini. Bouček (1988) gave features for separating these genera, and these are repeated in our key to *Perthiola* species below.

In his revision of the Australasian Chalcidoidea genera, Bouček (1988) described the tribe Keryini and placed it within Eulophidae mainly because it had 4 tarsal segments. He noted, however, that certain features, as the 12-segmented antenna and the unusual long wing veins, were uncharacteristic of eulophids. The Keryini was removed from the Eulophidae by Gauthier et al. (2000) based on molecular evidence. Narendran et al. (2003) placed *Manipurella* in Keryini, mainly because the antenna was apparently counted 12-segmented (excluding radicle) as in Keryini. Antennal features can be difficult to count in this group (see below), and our examination of the holotype of the type species, *Manipurella moringae*, showed that it agrees in every way with the diagnostic features for *Perthiola*, and has an 11-segmented (not 12-segmented) antenna. Therefore we consider *Manipurella* as a new synonym of *Perthiola*.

MORPHOLOGICAL CONSIDERATIONS. As stated above, the number of antennal segments can be difficult to interpret in the Anselmellini. The radicle (Figs 3, 4, 7) is quite long, sometimes as long as the scape itself, which is quite rare in Chalcidoidea and may therefore be counted inadvertently as a segment. Also, the flagellum in Eulophidae is usually divided into anelli (although they can sometimes be absent), funicle and club (Gibson 1997); this is not the case for the Anselmellini. The first flagellar segment(s), although lacking sensilla, are elongate and not anelliform, and can grade into

the following segments. The club can also be difficult to distinguish from the funicle. For these reasons, we treat all the antennal segments beyond the pedicel as the flagellum, and do not try to assign them to anelli, funicle or club.

The term spectral vein is used in the key and description for lines extending distally from the apex of the stigmal vein (Mason 1986). These lines are not tubular veins, but appear as slightly folded areas in the forewing that are slightly darkened and more densely setose than the surrounding areas (Fig. 5).

Key to the female species of *Perthiola*

1. Postmarginal vein shorter than marginal vein (Fig. 6); scrobes deep and divided for entire length by median est (Fig. 8); flagellar segment 1 longer than segment 2 (Fig. 7). *Anselmella* Girault
- Postmarginal vein longer than marginal vein (Fig. 5); scrobes shallow, divided only just above level of toruli (Fig. 1); flagellar segment 1 subequal or shorter than segment 2 (Fig. 3). *Perthiola* Bouček 2
2. Forewing without spectral veins radiating from stigmal vein. Scape equal in length to radicle. Protibial spur slightly longer than tarsomere 1. *P. moringae* (Narendran)
- Forewing with at least one spectral vein radiating from stigmal vein (Fig. 5). Scape longer than radicle (Fig. 3). Protibial spur shorter than tarsomere 1. 3
3. Forewing with 1 spectral vein radiating from stigmal vein. Radicle twice as long as broad, about 0.4 times as long as scape, and half as long as pedicel. *P. mazaneci* Bouček
- Forewing with 2 spectral veins radiating from stigmal vein (Fig. 5). Radicle 4.0 times as long as broad, about 0.7 times as long as scape, and subequal in length with pedicel (Fig. 3). *P. bouceki* sp. nov.

Perthiola bouceki sp. nov.

(Figs 1–5)

DIAGNOSIS. Body mainly black with antenna, tibiae and tarsomeres 1–3 brown. Forewing with two spectral veins extending from stigmal vein to distal margin of wing. Radicle about 4.0 times as long as broad, about 0.7 times as long as scape and subequal in length with pedicel. Flagellar segment 1 about 0.7 times as long as flagellar segment 2. Scape not extending above top of vertex. Protibial spur half as long as tarsomere 1. Postmarginal vein about 3.0 times as long as marginal vein.

Female. Length 1.7–2.1 mm. Body black; antenna, tibiae and tarsomeres 1–3 brown. *Head* (Fig. 1). Vertex slightly vaulted, about 0.2 times eye length above eye. Face slightly sculptured, with short pilosity and without sutures. Malar space about 0.5–0.6 times eye length, without fovea. Malar sulcus absent. Tentorial pits distinct and placed ventral to lower level of eye. Clypeus with anterior margin lobate, without distinct teeth. Mandible bi-dentate. Antenna (Fig. 3). Antennal insertion high on face, above level of middle of eye. Radicle about 4.0 times as long as broad, about 0.7 times as long as scape, and subequal in length with pedicel. Scape about 4.0 times as long as wide, shorter than eye height, and not extending above top of vertex. Pedicel 0.6–0.7 times as long as scape. Flagellar segments ratio: 9/13/12/10/11/13/10/12/11. *Mesosoma* (Fig. 2). Slightly sculptured. Pronotum large laterally, but very short medially: in dorsal view 0.1–0.2 times as long as mesoscutal medially. Notauli deep and complete to posterior margin of mesoscutum. Mesoscutum and scutellum subequal in length. Midlobe of mesoscutum with 2 adnotaular setae in posterior half. Scutellum about 1.2 times as long as broad; with 5 pairs of short setae. Dorsellum very short: 0.1–0.2 times as long as scutellar length. Propodeum with indistinct median carina; spiracle placed midway between anterior and posterior margins; callus with 5–6 setae. *Forewing* (Fig. 5). About 2.4 times as long as broad, and uniformly covered with short setae. Submarginal vein with 4–6 dorsal setae. Marginal vein slightly longer (1.1 times) than stigmal vein and 0.3–0.4 times as long as postmarginal vein. Two spectral veins extending from stigmal vein to distal margin of wing.

Wing slightly and evenly darkened beyond level of parastigma, and with a darker transverse brown area behind parastigma. *Legs*. Protibial spur half length of tarsomere 1; protibia with dorsoapical margin bearing two distinct spines or protruberances. *Metasoma*. Ovale, about 0.8 times as long as head and mesosoma combined. Cerci with several short and subequal setae.

Male. Length 1.7–1.8mm. Similar to female except for antenna (Fig. 4), which is long and may extend as far as the propodeum. Radicle extending to apex of vertex and equal in length with scape. Antennal segments ratio (including radicle, scape, pedicel and 9 flagellar segments): 26/26/17/5/10/11/11/11/13/11/12/11.

ETYMOLOGY. It is our pleasure to name this species in honour of Zdeněk Bouček, who has served as a father figure for an entire generation of chalcidologists.

BIOLOGY AND DISTRIBUTION. This species emerged from stem galls on ?*Baeckea* sp. (Myrtaceae) in Western Australia.

TYPE MATERIAL. Holotype ♀: Australia, 2000, Western Australia, near Frenchman's Bay, roadside 34°56.92'S 117°59.69'E, coll. by KA Davies, 5.xi.2000, ex ?*Baeckea* sp (ANIC). Paratypes 2 ♂, 25 ♀, deposited as follows: same data as holotype (5♀ ANIC, 4♀ BMNH, 4♀ QM, 5♀ SAM, 2♀ USNM, 5♀ WAMP); Australia, 2000, Western Australia, near Denbarken Nature Reserve, 34°50.18'S 117°24.30'E, coll. by KA Davies, 7.xi.2000, ex ?*Baeckea* sp (10 ANIC, 10 WAMP).

COMMENTS. No substantial variation was observed among the type series.

As suggested in the key, *Perthiola bouceki* sp. nov. is distinguished from the other two species of the genus (*P. mazaneci* and *P. moringae*, see below) by having 2 spectral veins extending from the stigmal vein (only 1 in *P. mazaneci*, absent in *P. moringae*), scape 1.4 times as long as radicle (2.5 times in *P. mazaneci*, equal in *P. moringae*), pedicel subequal in length with radicle (pedicel twice as long as radicle in *P. mazaneci* and 0.4–0.5 times as long in *P. moringae*), and protibial spur 0.5 times as long as tarsomere 1 (about 1.1 times in *P. moringae*, 0.6 times in *P. mazaneci*).

Perthiola bouceki sp. nov. shows sexual dimorphism. As observed in many eulophids, *P. bouceki* sp. nov. male and female can be distinguished by having different antennal features. The male antenna is long and may extend as far as the propodeum, and the radicle, which is equal in length with scape, extends to apex of vertex. The female antenna does not extend to propodeum, and the radicle, which is about 0.7 times as long as scape, does not extend to apex of vertex.

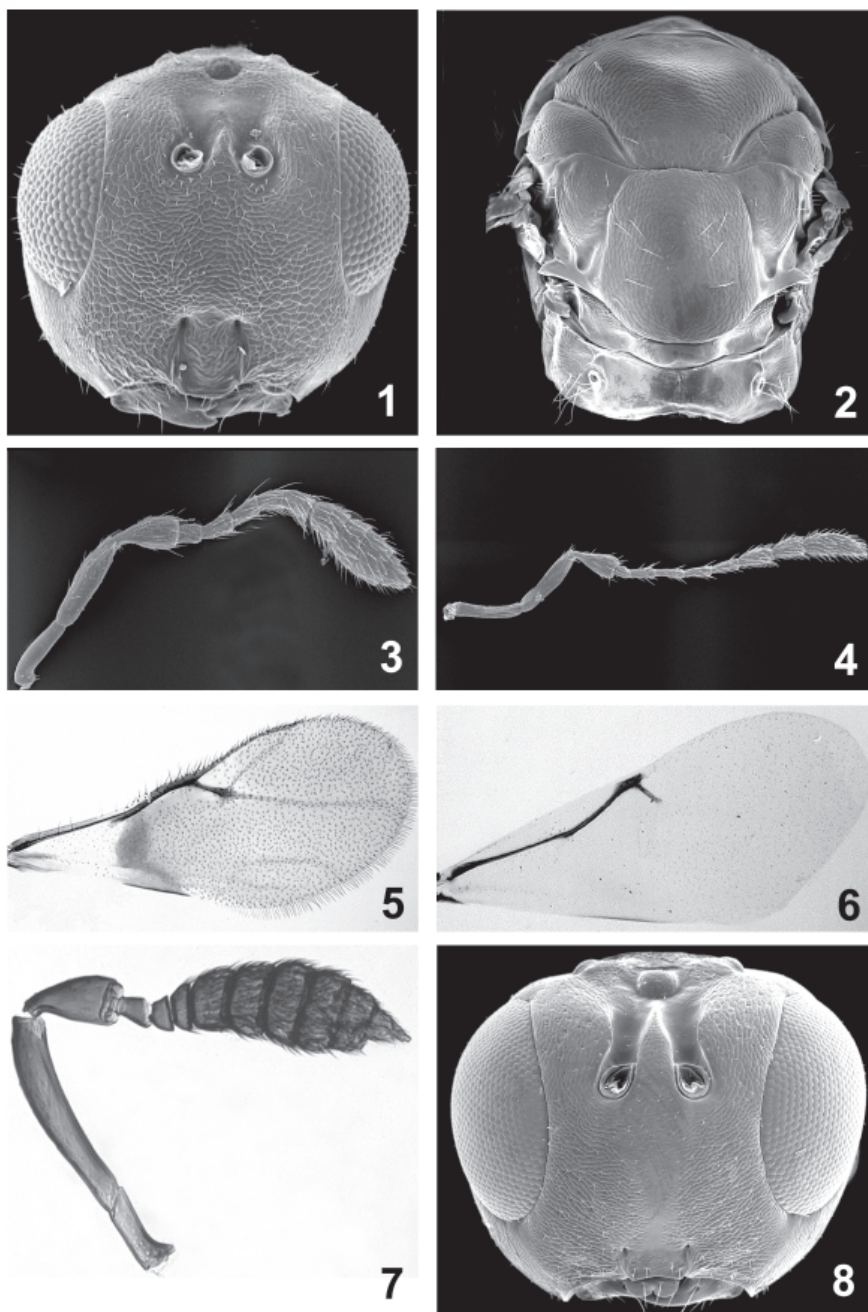
***Perthiola moringae* (Narendran in Narendran, Singh et Prasad, 2003) comb. nov.**

Manipurella moringae Narendran in Narendran, Singh et Prasad, 2003: 24 (original description).

TYPE MATERIAL EXAMINED. Holotype ♀, India, Manipur, Triblung, coll. Ranjit Singh, 14.xi.2002; ex leaf galls of *Morinda angustifolia* Roxb. (Rubiaceae) (NZSI).

DIAGNOSIS. Body mainly blackish with antenna and legs (except coxae) brown. Forewing without spectral veins extending from stigmal vein. Scape extending beyond vertex. Radicle equal in length to scape, 6.0–6.5 times as long as broad, and 2.1 times as long as pedicel. Flagellar segment 1 0.6 times as long as segment 2. Protibial spur slightly longer than tarsomere 1. Postmarginal vein about 3.0 times as long as stigmal vein.

COMMENTS. The species is recorded from *Morinda angustifolia* Roxb. (Rubiaceae) [not *Moringa angustifolia* Roub (Rubiaceae) (see Narendran et al. 2003)]. The placement of the propodeal spiracles are different from that reported and illustrated in the description: they are in fact about midway between the anterior and posterior margins of the propodeum, and not adjacent to the anterior margin. Antennal segment ratio (including radicle, scape, pedicel and 9 flagellar segments): 19/19/9/3/5/5/6/6/6/5/6/5. There are 9 flagellar segments, not 10 as shown in the illustration in the original description.



Figs 1–8. *Perthiola bouceki* sp. nov. (1–5): 1 – head, frontal view; 2 – thorax, dorsal view; 3 – female antenna; 4 – male antenna; 5 – female forewing. *Anselmella miltoni* Girault (6–8): 6 – female forewing; 7 – female antenna; 8 – head, frontal view.

Perthiola mazaneci Bouček, 1988

Perthiola mazaneci Bouček, 1988: 602.

TYPE MATERIAL EXAMINED. Holotype ♀, Australia, Western Australia, "Melaleuca" Natural Park 30 km N of Perth, 18.xi.1982 (Bouček) (ANIC).

DIAGNOSIS. Body mainly dark brown, with very faint dark greenish tinge. Forewing with one spectral vein extending from stigmal vein to distal margin of wing. Radicle twice as long as broad, 0.4–0.5 times as long as scape, and about half as long as pedicel. Flagellar segment 1 subequal in length to segment 2. Scape not reaching vertex. Protibial spur 0.6 times as long as tarsomere 1. Postmarginal vein 2.5 times as long as stigmal vein.

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REFERENCES

- BOUČEK Z. 1988: *Australasian Chalcidoidea (Hymenoptera). A Biosystematic Revision of Genera of Fourteen Families, with a Reclassification of species*. Wallingford, Oxon: C.A.B International, 832 pp.
- BOUČEK Z., SUBBA RAO B. R. & FAROOQI S. I. 1979: A preliminary review of Pteromalidae (Hymenoptera) of India and adjacent countries. *Oriental Insects* **12**: 433–467.
- GAUTHIER N., LA SALLE J., QUICKE D. L. J. & GODFRAY H. C. J. 2000: Phylogeny of Eulophidae (Hymenoptera: Chalcidoidea), with a reclassification of Eulophinae and the recognition that Elasmidae are derived eulophids. *Systematic Entomology* **25**: 521–539.
- GIBSON G. A. P. 1997: Chapter 2. Morphology and terminology. Pp.: 16–44. In: GIBSON G. A. P., HUBER J. T. & WOOLLEY J. B. (eds): *Annotated Keys to the Genera of Nearctic Chalcidoidea (Hymenoptera)*. Ottawa: National Research Council Research Press, 794 pp.
- LA SALLE J. 2005: Gall-induction in the Chalcidoidea (Hymenoptera: Eulophidae, Eurytomidae, Pteromalidae, Tanaostigmatidae, Torymidae). Pp.: 507–537. In: RAMAN A., SCHAEFFER C. W. & WITHERS T. M. (eds): *Biology, ecology, and evolution of gall-inducing arthropods (2 vols)*. USA, New Hampshire, Enfield: Science Publishers, Inc., 817 pp.
- MASON W. R. M. 1986: Standard drawing conventions and definitions for venational and other features of wings of Hymenoptera. *Proceedings of the Entomological Society of Washington* **88**: 1–7.
- NARAYANAN E. S., SUBBA RAO B. R. & PATEL G. A. 1958: A new pteromalid genus from India. *Indian Journal of Entomology* **19**: 200–203.
- NARENDHAN T. C., SINGH R. & PRASAD B. 2003: A new genus of Eulophidae (Hymenoptera: Chalcidoidea) from India. *Uttar Pradesh Journal of Zoology* **23**: 23–26.
- NOYES J. S. 2003: *Universal Chalcidoidea Database*. WEB-SITE: <http://www.nhm.ac.uk/entomology/chalcidooids/>