



Biology, ecology, and taxonomy of the parasitoids of the families of Austroniidae, Peradeniidae, Proctorenyxidae, Roproniidae, and Vanhorniidae (Hymenoptera: Proctotrupoidea)

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Abstract

Proctotrupoidea are koinobiont endoparasitoids of holometabolous insect larvae. Although Proctotrupoidea can be common and readily collected by sweep netting or Malaise traps, the superfamily is poorly known biologically. Proctotrupoidea are parasitoids of Coleoptera and, to a lesser extent, Diptera larvae, with one extraordinary host record from a centipede, whereas Heloridae has been reared from Neuroptera larvae. Extralimital families attacking Coleoptera and Neuroptera (Austroniidae, Peradeniidae, Proctorenyxidae) are biologically unknown. This work studies the biology, ecology, and taxonomy of the parasitoids of the Families of Roproniidae, Vanhorniidae, Austroniidae, Proctorenyxidae and Peradeniidae (Hymenoptera: Proctotrupoidea). In terms of the type of research source, we worked with scientific articles published in national and international journals. This modality of production, in addition to being commonly the most valued in the set of bibliographic production, is the most easily accessed. Access to articles was through virtual libraries such as Scielo, the University of São Paulo, Latin American Literature, and the University of Brasília. This library has a specific section for Hymenoptera, with eight journals and texts of articles available in full. The journals included in this section are the following: Zootaxa, Canadian Journal of Zoology, Proceedings of the Entomological Society of Washington, Memoirs of the American Entomological Institute, Florida Entomologist, Canadian Entomologist, Neotropical Entomology, Cladistics, Journal of Asia-Pacific Entomology, Insect Systematics & Evolution, Journal of Hymenoptera Research. Considering only this section constitutes a limitation of the study since articles belonging to journals that integrate other sections of the aforementioned electronic library could also contribute to the discussion of the production of knowledge about the relationship between hosts and parasitoids. However, in principle, within these articles, there could not necessarily be a discussion focused on biology, ecology, and taxonomy.

Keywords: Hosts; Larva; Insecta; Parasitoids; Superfamily

1. Introduction

Proctotrupoidea is a superfamily of Hymenoptera with 30 genera in seven living families if fossil families are known. The Proctotrupoidea family is the most numerous, with 400 species. The other groups are very reduced. They are parasitoids since their larvae feed and develop inside or on the surface of the bodies of other insects. The majority are very small, black, and shiny.

Objective

This work studies the biology, ecology, and taxonomy of the parasitoids of the Families of Austroniidae, Peradeniidae, Proctorenyxidae Roproniidae and Vanhorniidae (Hymenoptera: Proctotrupoidea).

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2. Methods

In terms of the type of research source, we worked with scientific articles published in national and international journals. This modality of production, in addition to being commonly the most valued in the set of bibliographic production, is the most easily accessed. Access to articles was through virtual libraries such as SciELO, the University of São Paulo, Latin American Literature, and the University of Brasilia. This library has a specific section for Hymenoptera, with eight journals and texts of articles available in full. The journals included in this section are the following: Zootaxa, Canadian Journal of Zoology, Proceedings of the Entomological Society of Washington, Memoirs of the American Entomological Institute, Florida Entomologist, Canadian Entomologist, Neotropical Entomology, Cladistics, Journal of Asia-Pacific Entomology, Insect Systematics & Evolution, Journal of Hymenoptera Research. Considering only this section constitutes a limitation of the study since articles belonging to journals that integrate other sections of the aforementioned electronic library could also contribute to the discussion of the production of knowledge about the relationship between hosts and parasitoids. However, in principle, within these articles, there could not necessarily be a discussion focused on biology, ecology, and taxonomy.

3. Family Austroniidae

This endemic Australian family of small (4–6 mm), very rarely collected wasps is known from wet forest habitats of southern Australia and Tasmania. Only three species in the genus *Austronia* are recorded and their biology is unknown (Figure 1) [1-2].



Source: <https://twitter.com/ymilesz/status/1469031659005616129>

Figure 1 *Austronia rubrithorax* Riek, 1955, Family Austroniidae

3.1. Diagnostic characters

Metasoma strongly compressed laterally, 1st segment petiolate; ovipositor relatively long, but retracted into the metasoma; pronotum with thin carina medially, partially covering the anterior part of the mesocosts; metacoxa close to the insertion of the metasoma. They measure about 5.0 mm [3-5].

3.2. Taxonomy

The species live in moist forests. Like all related species and groups, they are parasitoids. Nothing else is known about their way of life and hosts [4-5].

Holotype: ANIC ♀, Australia.

Austronia nigricula Riek, 1955.

Austronia nitida Riek, E.F. 1955.

Austronia rubrithorax Riek, 1955.

4. Family Peradeniidae

4.1. Diagnostic characters

The eye is very large, occupying most of the head in lateral view, almost reaching the base of the jaw, 1st segment of the petiolate metasoma, as long as the rest of the segments. They measure from 6.0 to 10.0 mm and are black. The family comprises only the genus *Peradenia* with 2 species in Australia and Tasmania (Figure 2) [6-8].



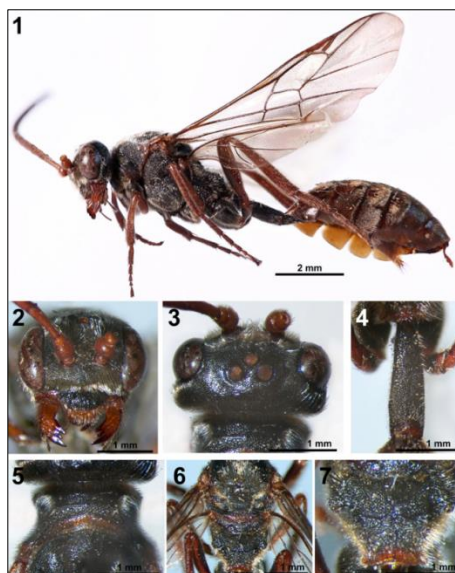
Source: <https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/34d2fe90-9921-4425-9d53-65175bfd9b58>

Figure 2 *Peradenia clavipes* Naumann & Masner, 1985

5. Family Proctorenyxidae

5.1. Diagnostic characters

Antennae with 15 articles, including one ring-shaped 1st flagellomere; rather short scape; forewing with pterostigma; metasoma with petiole, 8th tergite with 2 spiracles (Figure 3) [9-11].



Source: https://zenodo.org/record/264959#.Y_yMEnbMLIU

Figure 3 Proctorenyxidae *incredibilis* Kozlov 1994, ♀. 1. Habitus, lateral view; 2. Head, frontal view; 3. Head, dorsal view; 4. Petiole, dorsal view; 5. Pronotum, dorsal view; 6. Mesosoma, dorso-posterior view; 7. Propodeum, dorso-posterior view

The family was described based on a single species from Russia, *Proctorenyxa incredibilis* Kozlov, 1994. There is still an undescribed species in the United States [12-13].

Proctorenyxa Lelej & Kozlov, 1999 (= *Renyxa* Kozlov, 1994).

6. Family Roproniidae

Endoparasitoids of the beetle larva (Coleoptera) or less commonly fly larva (Diptera: Mycetophilidae) (Figure 4) [14].

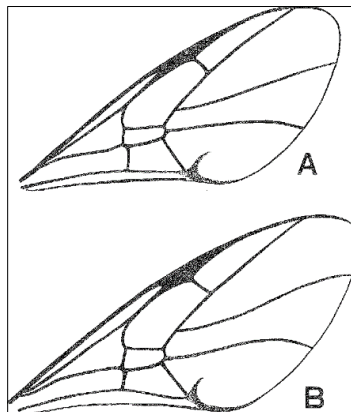


Source: <https://bugguide.net/node/view/15959>

Figure 4 Wasp-parasitized larva Proctotrupoidea – *Exallonyx* Rockingham County, New Hampshire, USA, parasitizing Coleoptera

Metasoma with long 1st petiolate segment, as long as the rest of the segments; other segments strongly laterally compressed; antenna with 14 articles [15-16].

They measure from 5.0 to 10.0 mm. (Proctotrupoidea). Palearctic, Nearctic, Oriental region. Antennae 14-segmented (without annelus). The abdomen is strongly compressed from the sides with a long petiole (Figure 5) [17-18].



Source: [https://www.semanticscholar.org/paper/Two-new-species-of-Roproniidae-\(Hymenoptera\)-Yasumatsu/bc2079c7d7c0761aa569a26a9ed48f06afb7f49e/figure/2](https://www.semanticscholar.org/paper/Two-new-species-of-Roproniidae-(Hymenoptera)-Yasumatsu/bc2079c7d7c0761aa569a26a9ed48f06afb7f49e/figure/2)

Figure 5 Fore wing of: (A) *Ropronia townesi* sp. nov. (B) *Ropronia ishiharai* sp. Nov



<https://bugguide.net/node/view/1350071>

Figure 6 *Ropronia garmani* Ashmead 1898

Found *Ropronia garmani* Ashmead 1898. in the undergrowth beside streams in temperate deciduous forests. Florida specimens came from similar habitats in riparian hardwood forests along the Suwannee River (Figure 6) [19-20].

In the northeast, *R. garmani* flies from mid-June to August; whereas, Florida records are for May, suggesting that in Florida this species avoids the heat of summer, as do most ichneumonids and other parasitic Hymenoptera. *Ropronia* may parasitize tenthredinid saw-fly larvae (Hymenoptera), but the evidence is inconclusive [20-21].

Ropronia has five species in China, two in the Holarctic genus *Ropronia* Provancher has three species in North America: *Ropronia californica* Ashmead, 1899 (California, Oregon), *Ropronia pediculata* Provancher, 1886 (New York, Ontario), and *R. garmani* Ashmead known previously in the United States from New Hampshire to northern Georgia and west to Iowa [22-24].

Recently, as part of an ongoing survey of Hymenoptera in Florida State Parlrs, the following new record of *R. garrnani* was obtained: Recently, as part of one on-going survey of Hymenoptera in Florida State Parlrs, following new record of *R. garrnani* was obtained: Japan), one in Burma, and two in Turkey Roproniidae thus is a Holarctic group [25-28].

The world fauna includes 6 genera including 4 fossils and about 45 species, in the Palearctic - 1 genus and 7 species. The fauna of Russia includes 1 genus and 1 species of ichneumons of this family in the Far East (Sakhalin, Kuril Islands). They are found in the Nearctic, Palearctic, and Oriental regions [29-30].

Superfamily Proctotrupoidea Latreille, 1802.

Family Roproniidae Viereck, 1916.

Genus *Paleoropronia* gen. nov.

Type species *Paleoropronia salamonei* gen. sp. nov.

Paleoropronia salamonei gen. sp. nov. Diagnosis fore wing venation only. Cell 1M is very narrow, much narrower than cell 2Cu, only 0.2 times as wide as 2Cu; pterostigma is linear, not triangular; the base of pterostigma is well distal of 1M; cell 1R1 elongate. Type material Holotype France: MNHN.F.A57266, stored in the collection of Palaeontology (Paris). Type stratum and locality France: Paleocene, sponge-diatomite maar Palaeolake, Menat, Puy-de-Dôme. Source: Garrouste R, Pouillon JM, Nel A. European Journal of Taxonomy. 2016; 239: 1–9 [29-30].

7. Family Vanhorniidae

7.1. Introduction

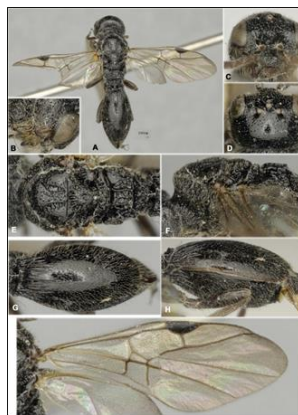
A monospecific family Vanhorniidae of the Hymenoptera in the superfamily Proctotrupoidea. Vanhorniidae is a small, uncommonly collected family of Hymenoptera (previously in the subfamily Serphidae or Proctotrupidae) [31].

7.2. Diagnostic characters

Metasoma with most segments fused, forming a carapace; exodont jaws; antennae inserted just above the clypeus. They measure from 6.0 to 7.0 mm (Figure 7) [32-33].

7.3. Biology

Some species parasitoids on Coleoptera larvae. Oviposition appears to occur through cracks in decaying wood and the structure of the ovipositor suggests that the female is incapable of drilling through solid wood This author also suggested that oviposition might occur on or into earlier stages of the Eucnemidae host, which would imply that the larva behaves as a koinobiont [34-35].



Source: <https://jhr.pensoft.net/article/56481/zoom/fig/13/>

Figure 7 *Vanhornia quizhouensis* (He & Chu, 1990) (female, holotype) A habitus, dorsal view B mandible, ventro-lateral view C head, front view D head, dorsal view E mesosoma, dorsal view F mesosoma, lateral view G metasoma, dorsal view H metasoma, lateral view I wings

7.4. Distribution

Europe, China, Japan, and North America. The family has only the genus *Vanhornia*, with 5 known species [35].

Vanhorniidae is a small, uncommonly collected family of Hymenoptera (previously in the subfamily Serphidae or Proctotrupidae) of 3 genera and 5 species: *Heloriserphus castor* Masner and *Heloriserphus pollux* Masner, 1981 in Chile, *Sinicivanhornia quizhouensis* (He & Chu 1990) in China, *Vanhornia leileri* Hedqvist, 1976 in Sweden and far eastern Russia and *Vanhornia eucnemidarum* Crawford, 1909 east of North America [35].

This parasitoid species has been reared from the larval/pupal chambers of *Sorhipis ruficornis* (Say, 1823) (Coleoptera: Eucnemidae) in the wood of dead maple. A description of the unusual abdomen of *V. eucnemidarum*. This report provides the first evidence for the natural occurrence of *V. eucnemidarum* in Florida (Figure 8) [35].



Source: <https://en.wikipedia.org/wiki/Eucnemidae>

Figure 8 *Sorhipis ruficornis* (Say, 1823) (Coleoptera: Eucnemidae) larvae (Coleoptera)

There is also a recent record of the latter species from South Korea in eastern North America, *V. eucnemidarum* has been collected during the spring from mid-May to late Jul, with their peak flight period occurring from the end of May to the end of June. This parasitoid species has been reared from the larval/pupal chambers [35].

8. Conclusion

The superfamily 'Proctotrupoidea has generally been a welcoming home to a variety of parasitoid groups and recognized as not being monophyletic the Platygastroidea and Diaprioidea were included in the Proctotrupoidea. The removal of the Diapriidae, Maamingidae, and Monomachidae to their superfamily (Diaprioidea) has recently gained acceptance. The Proctotrupoidea now comprises the Heloridae and Proctotrupidae in Britain and the extralimital families Austroniidae, Peleciniidae, Peradeniidae, Proctorenyxidae, Roproniidae, and Vanhorniidae.

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