Zootaxa 3779 (3): 353–367
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3779.3.3
http://zoobank.org/urn:lsid:zoobank.org:pub:1074007E-C135-43D9-B918-3A8C1B6BAE20

Neotropical species of *Meteorus* Haliday (Hymenoptera: Braconidae: Meteorinae) parasitizing Arctiinae (Lepidoptera: Noctuoidea: Erebidae)

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Abstract

Three new species of *Meteorus* parasitoids of Arctiinae are described: *Meteorus anuae* **n. sp.**, *M. juliae* **n. sp.** and *M. mirandae* **n. sp.** The first biological record for *M. cecavorum* Aguirre & Shaw as well as its cocoon description is reported. A comprehensive key for the Neotropical *Meteorus* attacking Arctiinae is provided. A total of nine *Meteorus* species have been reared from Arctiinae in the Neotropical Region. Six of them are gregarious and three solitary. The biological information about host and food plants concurs with the hypothesis of specialist parasitoids preferring "nasty" caterpillars.

Key words: Caterpillar, gregarious, solitary, generalist, specialist, host plant, Andean forest

Introduction

The Ecuadorian Andean Forest is one of the hot spots for the Arctiinae moth richness (Hilt & Fiedler 2005), and their relevance is far more than the mere number of species. They display a wide spectrum of mechanisms to avoid or defeat their natural enemies: chemical sequestration from feeding on toxic plants, dense stiff setae, aposematic colors, sudden and fast movements to curl up the body, drop to the ground or get into the dense vegetation, group warning behavior and defecating upon themselves (Wagner 2009) are just a selection of their complex defensive repertoire. Such characteristics set them up as a key group in complex trophic interactions. Parasitoid wasps utilizing these caterpillars as hosts have to deal with this arsenal of strategies. The most common parasitoids of arctiines in the Eastern Ecuador are members of the families Braconidae, Ichneumonidae, Eulophidae (Hymenoptera) and Tachinidae (Diptera) (Rab Green *et al*. 2011). Among the Braconidae the genera *Aleiodes* Wesmael*, Apanteles* Foerster and *Meteorus* Haliday are the most commonly reared (Wagner 2009).

Three hundred twenty six species of the genus *Meteorus* have been described worldwide (Yu 2012; Jones & Shaw 2012; Stigenberg & Ronquist 2011). Sixty-two are reported from the Neotropical region; biological records are available for 28, and all of them develop as koinobiont endoparasitoids of Lepidoptera. From these, six have been reared from caterpillars of the subfamily Arctiinae: *Meteorus arizonensis* Muesebeck, *M. laphygmae* Viereck, *M. margarita* Jones, *M. oreo* Jones, *M. porcatus* Jones and *M. quasifabatus* Jones. *Meteorus* species feeding on these caterpillars seem to be more prevalent at elevations above 2000 m (typical for Andean cloud forests) than in lowland and wet forest since the revisionary work of Zitani *et al*. (1998), based on a considerable percentage of samples below this elevation, mainly from Area de Conservación Guanacaste (Janzen & Hallwachs 2013), did not record any of them from Costa Rica, but Jones & Shaw (2012) described *M. margarita, M. oreo*, *M. porcatus* and *M. quasifabatus* from the Ecuadorian Andean Forest of Yanayacu, and Aguirre *et al.* (2011) described *M. cecavorum* from an Andean forests at Sierra Nevada de Santa Marta National Natural Park at the North of Colombia.

This paper describes three new species of *Meteorus*, provides the first biological record of *M. cecavorum* as well as its expanded distribution toward the Ecuadorian Andes, and presents a concise key for the Neotropical *Meteorus* species parasitoids of Arctiinae caterpillars.

Accepted by J. Jennings: 29 Jan. 2014; published: 17 Mar. 2014

Jones & Shaw (2012) provided statistical support about the bias of *Meteorus* to attack exposed hosts. Based on the tendency of day-active caterpillars to be "nasty" for many natural enemies, they found that solitary and gregarious parasitoids tend to use these hosts more than concealed ones. Unfortunately the most of the wasps were reared just once and additional rearings are necessary to draw stronger conclusions.

Acknowledgements

Harold Greeney and Andrew Townsend are thanked for providing local arrangements and hospitality while at the Yanayacu Biological Station. Wilmer Simbaña, Luis Salagaje and volunteer students assisted with caterpillar rearing. Lee Dyer provided photos of the Arctiinae hosts and access to the Caterpillars and parasitoids in the Eastern Andes of Ecuador project database. This research was supported by National Science Foundation grants BSI-03-46729, BSI-07-17458, DEB-07-17034, DEB-10-20751 (Caterpillars and parasitoids in the Eastern Andes of Ecuador, CAPEA), and NSF Research Experience for Undergraduates (REU) supplemental grants DEB-08-23094, DEB-09-13110, and DEB-10-26103. Any opinions, findings, and conclusions expressed are those of the authors and do not necessarily reflect the views of the National Science Foundation. Travel to Ecuador was also supported, in part, by grants from U.W. International Programs, U.W. Environment and Natural Resources Program, Wyoming NASA Space Consortium, and U.W. Global Perspectives Program.

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