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Last instar larvae and pupae of *Ourocnemis archytas* and *Anteros formosus* (Lepidoptera: Riodinidae), with a summary of known host plants for the tribe Helicopini

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Abstract

Last instar larvae and pupae of *Ourocnemis archytas* (Lepidoptera: Riodinidae) are described for the first time and compared with those of *Anteros formosus*, which are also described in detail. Last instars of both species present body covered with long white plumose setae, a row of orange balloon setae on the prothoracic shield, and clusters of perforated cupola organs (PCOs) near the spiracles; differences are the black cephalic capsule, the placement and format of balloon setae cluster, and the presence of enlarged black tips on some plumose setae. Pupae of *O. archytas* resemble that of *Anteros*, covered with the last instar setae and with no balloon setae. Characteristics of the immature stages of these two genera could be useful to establish the still unresolved relationship between them. A summary of the host plants of Helicopini is presented, showing a polyphagous pattern for *Anteros,* recorded in 21 host plant families, which contrasts with the specialized diet observed in *Helicopis* and *Sarota*.

Key words: Morphology, larvae, scanning electron microscopy, diet breadth, balloon setae

Introduction

The butterfly family Riodinidae is a group of about 1,300 species, with more than 90% of its diversity found in the neotropics (Callaghan & Lamas 2004). Historically, this is the least studied family of butterflies, and the immature stages are known for a minority of its species (Hall *et al*. 2004, Beccaloni *et al.* 2008). However, based on available data, immature stages of Riodinidae are extremely diverse in terms of morphology and ecology, showing a large diet breadth which includes live and dead leaves, flower buds, fungus, extrafloral nectar and with known entomophagous species (DeVries *et al*. 1994, DeVries 1997, DeVries & Penz 2000). Additionally, the family includes a great number of species engaged in symbiotic interactions with ants (myrmecophily) (e.g. DeVries 1991, 1997, Campbell & Pierce 2003, Kaminski *et al*. 2013).

The tribe Helicopini comprises four genera and about 40 species of small Neotropical butterflies, recognized by their spatulate scales surrounding the female ovipositor lobes, noticeable metallic spots on the underside of wings, and habit of resting with the wings shut and rubbing it in a manner analogue to that of the lycaenids (Robbins 1985, DeVries 1997, Hall 1998, Greeney *et al*. 2010). Their typical non-myrmecophilous larvae resemble moth caterpillars, with the body densely covered with long setae and a cluster of white or orange balloon setae on the prothorax, resembling those found in the Nymphidiini, although different in color and ultrastructure (see DeVries 1988, Hall 1998, Hall *et al*. 2004, Kaminski *et al*. 2013). These setae are also found in the pupae of the genus *Helicopis* Fabricius (Harvey 1987), while the other Helicopini lack such structures in this stage.

Ourocnemis Bethune-Baker, is the smallest genus in the tribe, with only two described species: *Ourocnemis boulleti* Le Cerf, restricted to South America, and *Ourocnemis archytas* (Stoll), occurring from South America to Panama. It is the only genus in the tribe whose immature stages were unknown. Hall (1998) pointed out *Ourocnemis* as a monophyletic group, distinguished by the brown antennae and clubbed palpi. However, in the

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While myrmecophilous lycaenids and riodinids tend to have a rather smooth body, the Helicopini larval body pattern, entirely covered with long setae, is consistent with the current ideas about larval morphology of non-myrmecophilous riodinids (DeVries 1991, Pierce *et al*. 2002, Kaminski 2008, but see Brévignon 1992). DeVries (1988) has shown that, when a *Sarota gyas* (Cramer) larva was contacted by an ant, its setae would move towards the area of contact, and the ant would spend some time grooming its antennae and then avoid the caterpillar. He proposed that these setae may function as defense against natural enemies, breaking off upon contact and adhering to parts of their bodies. Indeed, a similar movement of the setae was observed in both *A. formosus* and *O. archytas* when the larva was touched by a pin, and has probably the same function. It is interesting to note that the enlarged tips of some setae found in *O. archytas* could lead to a defensive advantage.

Host plant use in Helicopini

Species in the genus *Anteros* have been recorded on 21 host plant families to-date (see Table 1), and some species seem to be highly polyphagous, as *Anteros carausius* Westwood, recorded on 12 host plant families, and *A. renaldus,* recorded on 11 families. The main host plant families cited as hosts to the genus are Melastomataceae (used by 6 species), Fabaceae (used by 3 species) and Vochysiaceae (used by 2 species). This polyphagous pattern contrasts with the apparent specialization seen in the genus *Helicopis* on Araceae, and with the remarkable specialization of *Sarota* spp. on bryophytes growing as epiphylls in other leaves (DeVries 1988). It is interesting to note that other species of *Sarota* have been recorded on various different host plant families, and some even appear to be polyphagous (Table 1). However, these registers are probably erroneous, resulting from *Sarota* females laying on bryophytes growing on different plant species. Thus, whether the whole genus or only some species are specialized in this kind of food is still in need of confirmation. Considering the presumable close relationship between *Anteros* and *Ourocnemis*, it is important to emphasize that our findings of *Ourocnemis* larvae feeding on *Bauhinia rufa* is the first and only record for the genus, and it is very likely that the species could use other Fabaceae and even other host plant families as well.

Conclusions

Larvae of *Ourocnemis archytas* are distinct from those known for the genus *Anteros*, a fact that is congruent with the remarkable differences found between adults of these two genera. Larval characters of more species and molecular analysis may shed light to the still unresolved generic relationships in Helicopini.

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