

PARASITOIDISM OF CHALCIDID WASPS (HYMENOPTERA, CHALCIDIDAE) ON *Philornis* sp. (DIPTERA, MUSCIDAE)

COURI, M. S.^{1,4}, TAVARES, M. T.² and STENZEL, R. R.³

¹Departamento de Entomologia, Museu Nacional, Quinta da Boa Vista, CEP 20940-040, Rio de Janeiro, RJ, Brazil

²Departamento de Ciências Biológicas, Universidade Federal do Espírito Santo, Av. Marechal Campos, 1468, Maruípe, CEP 29040-090, Vitória, ES, Brazil

³Rua Dr. Caetano de Faria Castro, 46/203, Campo Grande, CEP 23052-010, Rio de Janeiro, RJ, Brazil

⁴Research fellow of Conselho Nacional de Desenvolvimento Científico e Tecnológico, CNPq

Correspondence to: Márcia Souto Couri, Museu Nacional, Quinta da Boa Vista, CEP 20940-040, Rio de Janeiro, RJ, Brasil, e-mail: mcouri@attglobal.net

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(With 8 figures)

ABSTRACT

Philornis Meinert larvae are known as parasites of birds, with coprophagous, semi-hematophagous or hematophagous habits. Biological data of the larvae of the fifty described species are still scarcely known. Here we describe some aspects of the parasitism of a species of *Philornis* on *Thalurania glaucopis* Gmelin (Trochilidae) and record two species of Chalcididae (Hymenoptera) parasitoids, *Conura annulifera* (Walker, 1864) and *Brachymeria podagrica* (Fabricius, 1787), reared from *Philornis* puparia.

Keywords: *Thalurania glaucopis*, *Conura annulifera*, *Brachymeria podagrica*, parasitoidism, association.

RESUMO

Parasitoidismo de vespas Chalcididae (Hymenoptera, Chalcididae) sobre *Philornis* sp. (Diptera, Muscidae)

As larvas de *Philornis* Meinert são conhecidas como parasitas de aves, com hábitos coprófagos, semi-hematófagos ou hematófagos. Dados biológicos das larvas das 50 espécies descritas são ainda pouco conhecidos. Aqui são descritos alguns aspectos do parasitismo de uma espécie de *Philornis* em *Thalurania glaucopis* Gmelin (Trochilidae) e duas espécies parasitóides de Chalcididae (Hymenoptera), *Conura annulifera* (Walker, 1864) e *Brachymeria podagrica* (Fabricius, 1787) que emergiram de pupários de *Philornis* sp. são registradas.

Palavras-chave: *Thalurania glaucopis*, *Conura annulifera*, *Brachymeria podagrica*, parasitoidismo, associação.

INTRODUCTION

Philornis species are muscids known for their interesting larval habits, as they are parasites of bird nestlings in three different types of associations – free living in the nests with coprophagous habits, free living in the nest, with semi-hematophagous habits or subcutaneous bloodfeeders as the majority of the species with known larval habits.

The pupae occur in the nest, in most cases inside a frothy cocoon and the adults are free living (Couri, 1999).

Biological data of the larvae of the fifty described species are still scarcely known. The nature of the association with the bird species is known only to 28 *Philornis* species. Teixeira (1999) supplied a list of the host bird species recorded until that year.

The main aim of this paper is to record new data of Chalcididae (Hymenoptera) parasitoidism on a species of *Philornis*.

MATERIAL AND METHODS

RNS collected the material used in this study in January 2004 in an area called “arboreto” in the Botanical Gardens in Rio de Janeiro (RJ, Brazil). A hummingbird *Thalurania glaucopis* Gmelin (Trochilidae) nest with two eggs was found in *Guarea kunthiana* A Juss (Meliaceae). After a period of 15 days of incubation, the two nestlings were born (from 7 to 22 Dec, 2003). They were infested by *Philornis* intradermal larvae observed in their heads and necks (Fig. 1).

The nestlings abandoned the nest after 23 days on 14 Jan, 2004. The nest was collected, maintained in a sealed bottle, and observed daily. After seven days, a wasp 8.0 mm long emerged from

the pupa (Figs. 2 and 3). During the subsequent days, a total of 11 wasps emerged. The nest was carefully investigated and 22 other puparia were found (Fig. 4), but no more wasps and no *Philornis* adults.

The collected material was then transported to the Diptera laboratory at Museu Nacional, Rio de Janeiro, Brazil for study purposes.

Among the puparia, two entire pupae of *Philornis* were found. One of them was clarified with potassium hydroxide and dissected. In the interior of the pupa the same species of wasp was found (Fig. 5).

RESULTS AND DISCUSSION

The emerged wasps belong to *Conura annulifera* (Walker, 1864) (Chalcididae). Burks (1960) described *Spilochalcis ornitheia*, a junior synonymy of the former, and recorded it as reared



Fig. 1 — Nestlings of *Thalurania glaucopis* Gmelin, 1788 infested by *Philornis* sp larvae.



Fig. 2 — *Conura annulifera* (Walker, 1864) (Chalcididae) recently emerged from *Philornis* sp. pupa.



Fig. 3 — *Conura annulifera* (Walker, 1864) (Chalcididae): dried specimen.



Fig. 4 — Puparia of *Philornis* sp found in nest of *Thalurania glaucopis*.



Fig. 5 — Puparium of *Philornis* sp and the adult wasp found in its interior.

from *Philornis* puparia collected in bird nests in Trinidad (West Indies). Delvare (1992) assembled fourteen species of *Conura* in the *discolor* group, including *C. annulifera*, and no more host records or biological data are available to them. Only this *Conura* species is known to be associated to Muscidae (Diptera).

Although it was not possible to certify the identification of the *Philornis* species, as only its puparium and pupae were available, the dissection of the pupae (Fig. 6) showed the morphology of the posterior spiracle, the “C” shaped posterior

spiracular slits (Fig. 7) and the cephalofaringeal skeleton (Fig. 8). This morphology shows that this species could be *P. insularis* Couri, 1983. Sick (1977) recorded a number of 64 adults of this species collected from one nest of *Thalurania glaucopis* and another 16 larvae collected directed from the nestlings, making a total of 80 *Philornis* specimens from only one nest. He also mentioned that *Philornis* species are severe parasites of hummingbirds.

The available data on *Philornis* species life cycle are very scarce. In *Philornis torquans*



Fig. 6 — Pupa of *Philornis* sp.

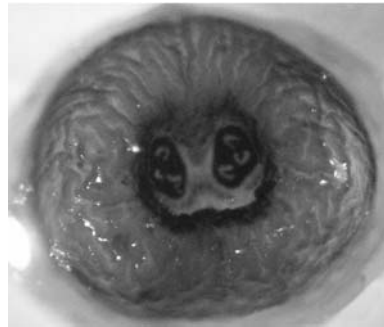


Fig. 7 — Posterior spiracle and posterior spiracular slits of the puparium of *Philornis* sp.

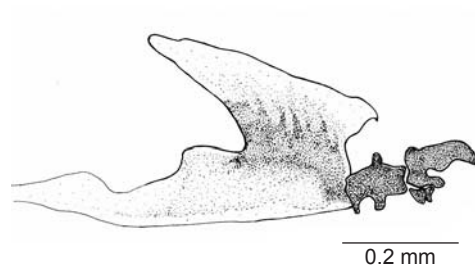


Fig. 8 — Cephalofaringeal skeleton of the puparium of *Philornis* sp.

(Nielsen, 1913) the pupa lasts 5-6 days and in *P. angustifrons* (Loew, 1861), 11 days; there are also records of a total of 15 days from the egg to the emergence of the adult (Skidmore 1985; Couri, 1991). Couri *et al.* (in press) presented biological data on *Philornis seguyi* Garcia, 1952 collected from six species of birds in Buenos Aires, Argentina. They recorded the infestation of the chicks as early as 24 h after hatching. The estimation of the larval period was five to seven days and from the pupae to the emergence, approximately 14 to 16 days. The pupae were enclosed in a cocoon.

In the present study, although we can not be precise about when *Philornis* sp. infested the nestlings, when the young birds abandoned the nest (23 days after hatching) and the pupae were already inside the nest, seven days passed until the emergence of the first wasp, which is a longer period than is known for *Philornis*.

The chalcidid parasitoids of Diptera (*e.g. Brachymeria*) attack host larvae or pupae. In this case, the parasitoid female should have attacked the larvae as they are more exposed. In the pupa stage, the *Philornis* stay at the bottom of the nest, under the nestlings, where it should be more difficult to be attacked by a parasitoid female. Delvare (1995) stated that, under optimal conditions and depending upon the size of the species, the development from egg to adult requires 16 to 30 days. This period is compatible to that of a bird egg hatching to wasps emerging (30 days).

Associations of *Philornis* species with wasps and birds, which are different from parasitoidism, were recorded and discussed (Dodge, 1968; Haverschmidt, 1957). In these cases, the wasps were predacious and captured adults of Diptera, including *Philornis* to feed their larvae, protecting, to a certain extent, the bird species from the *Philornis* parasitism.

When the second author (MTT) was studying the chalcidids deposited in the Hymenoptera collection of the United States National Museum of Natural History (USNM - Washington, USA), he found one specimen of *Brachymeria podagrica* (Fab., 1787) (Chalcididae), which was reared from *Philornis* puparia, also from Trinidad, with the following label data: "Chalcid parasite 'CC', ex: pupa #1 *Philornis* sp. 'K', ex: nest of *Synallaxis albescens*, Sangre Grande, Trinidad, N.I. 28/v/58. T. Aitken". *B. podagrica* is a cosmopolitan and

very common species that has been recorded to attack more than twenty species of cyclorrhaphous Diptera.

This is the only two parasitic Hymenoptera species known to attack *Philornis*.

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