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SCIENTIFIC NOTE

Conopid Flies (Diptera: Conopidae) Parasitizing Centris (Heterocentris) analis (Fabricius) (Hymenoptera: Apidae, Centridini)

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Conopídeos (Diptera: Conopidae) Parasitando Centris (Heterocentris) analis (Fabricius) (Hymenoptera: Apidae, Centridini)

RESUMO - Parasitas de abelhas adultas são quase exclusivamente moscas e dentre os mais importantes estão os conopídeos. Nesta comunicação relata-se pela primeira vez a associação de espécies de Physocephala (Diptera: Conopidae) com Centris (Heterocentris) analis (Fabricius). De uma amostra de 26 fêmeas e nove machos da espécie hospedeira encontrados mortos em ninhos-armadilha vazios, no campus da Universidade de São Paulo, Ribeirão Preto, SP, emergiram 35 parasitóides pertencentes a nove espécies de Physocephala. Os dados mostram que C. analis é hospedeiro para várias espécies de conopídeos e sugerem que tais parasitóides podem desempenhar um papel importante na regulação populacional dessa espécie de abelha.

PALAVRAS-CHAVE: Parasitismo, associação parasita-hospedeiro, abelha, ninhos-armadilha

ABSTRACT - Parasites of adult bees are almost exclusively flies and the most important of them are conopids. This note registers for the first time the association of species of Physocephala (Diptera: Conopidae) with Centris (Heterocentris) analis (Fabricius). From 26 females and nine males of the host species found dead inside trap-nests on the campus of the University of São Paulo, Ribeirão Preto, Brazil, 35 parasitoids were obtained belonging to nine species of Physocephala. The data show that C. analis is a host to several conopid flies, and suggest that such parasitoids can play an important role in population control of this bee species.

KEY WORDS: Parasitism, parasite-host association, bee, trap-nest
females, and the outermost cells produce males. Nests are parasitized by the wasp *Leucospis cayennensis* Westwood, the most frequent parasite, and by the bees *Coelioxys* sp. (Megachilidae) and *Mesocheira bicolor* Fabricius (Apidae) (Gazola & Garófalo 2003). Nesting activities occur with higher frequency in the hot and wet season (September-April), and several generations per year can be produced. The goal of this note is to register for the first time the association of *Physocephala* with *C. analis*.

While monitoring the nesting activities of *C. analis* females on the campus of the University of São Paulo – Ribeirão Preto (between 21°05´- 21°15´S and 47°50´- 47°55´W), state of São Paulo, Brazil, the trap-nests, tubes made with black cardboard, with one of the end closed with the same material, were inspected daily with an otoscope and those occupied by females were recorded. The tubes were inserted into horizontal holes drilled into eight wooden plates (28 x 24 x 4 cm) and they were 5.8 cm in length and 0.6 cm in internal diameter. The plates were placed along shelves in a shelter built near the laboratory. The shelves were 1.2 and 1.5 m above the ground. During the inspections of trap-nests, several females and some males that utilized the trap-nests as a place to rest during the night were found dead within empty trap-nests. These individuals were immediately collected, transferred to small glass vials and taken to the laboratory. In the laboratory, the vials were kept at room temperature (21°C-29°C) and observed daily to verify the occurrence of parasitoids emerging from such bees. When a parasitoid emerged, it was left in the same vial for 24h. Thereafter, it was killed with ethyl acetate. Voucher specimens were deposited at the Entomological Collection of the Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, USP, and duplicates of some specimens are deposited in the Entomological Collection of the Museu Nacional, Universidade Federal do Rio de Janeiro, RJ.

From December 2004 to May 2005 and from January to June 2006, when *C. analis* females were nesting, 26 females and nine males were found dead and all had been parasitized by conopid flies. Most individuals (19 females and five males) were killed before emerging from May 2004 to April 2005 (Table 1). The interval between the collection date of the dead female or male and the parasitoid emergence ranged from 19 to 53 days. The largest intervals were observed for parasitoids that emerged from males attacked in June 2006 and females that nested in May 2006 (Table 1). This result must be related with the temperature which decreases as the cold and dry season approaches. Of the 35 parasitoids emerged, 10 were *Physocephala soror* Kröber (five males, four females and one not sexed), one was *P. bipunctata* (not sexed), six were *P. inhabilis* (three males and three females), five were *Physocephala raftiorax* Kröber (four males and one female), two were *Physoosephala cayennensis* Macquart (one female and one male), one was *Physoosephala aurifrons* Walker (one male), one was *Physoosephala bennetti* Camras (not sexed), three were *Physoosephala sphenumformis* Camras (one male and two females), and six other individuals were not identified (Physocephala sp.) (four males and two females). Except for *P. aurifrons*, *P. bipunctata* and *P. bennetti*, which were represented by only one individual, specimens of all other species attacked both females and males of *C. analis*.

To date, besides the association of *P. bipunctata* with *E. bicolor* and *P. inhabilis* with *C. vittata* (Vilhena & Rocha-Filho inf. pes.) another available information indicate *P. bennetti* associated with *Xylocopa subnordax* Cockerell and *Xylocopa frontalis* Olivier, in Trinidad (Camras 1996), and *P. rufiorax* attacking *Eulaema* sp. males attracted to chemical baits, in Peru (Rasmussen & Cameron 2004). The observations reported here show that *C. analis* is a host to a large number of conopid flies and an alternative host for *P. bipunctata*, *P. inhabilis*, *P. bennetti* and *P. rufiorax*. From the relationship between

Table 1. Number of dead bees found in trap-nests, number of emerged conopid flies, and duration between the collecting of dead males and females of *C. analis* and emergence of the parasitoids.

<table>
<thead>
<tr>
<th>Months/year</th>
<th>No. of bees found dead within empty trap-nests</th>
<th>Number of emerged parasitoids</th>
<th>Duration (in days) between the collecting of dead host and the emergence of the parasitoids</th>
</tr>
</thead>
<tbody>
<tr>
<td>December/2004</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January/2005</td>
<td>7</td>
<td>4</td>
<td>22 – 25</td>
</tr>
<tr>
<td>February</td>
<td>3 (+1) *</td>
<td>6</td>
<td>23 – 28</td>
</tr>
<tr>
<td>March</td>
<td>3 (+3) **</td>
<td>3 (+2) **</td>
<td>23 – 25</td>
</tr>
<tr>
<td>April</td>
<td>4 (+1)</td>
<td>3 (+2) **</td>
<td>19 – 27</td>
</tr>
<tr>
<td>May</td>
<td>0</td>
<td>3 (+1)</td>
<td>27 – 33</td>
</tr>
<tr>
<td>January/2006</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>2 (+1)</td>
<td>4</td>
<td>26 – 30</td>
</tr>
<tr>
<td>May</td>
<td>2</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>(3)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>0</td>
<td>1 (+3)</td>
<td>44 – 53</td>
</tr>
</tbody>
</table>

* number of males found dead and parasitized; ** parasitoids emerged from males.
the period of host death and conopid fly emergence it can be concluded that all parasitoid species are multivoltine and have their phenologies synchronized with that of the host.

Conopid parasitism in natural population of bumblebees (Bombus sp.) is very common in Europe, where incidence of parasitism range between 30% and 70% (Schmid-Hempel et al. 1990). This parasitic association has been studied under several aspects and some results have shown that the parasitoid increases the worker mortality (Schmid-Hempel & Schmid-Hempel 1988, 1990), alters foraging behavior (Heinrich & Heinrich 1983, Muller & Schmid-Hempel 1993) and, consequently reduces the size of colonies (Müller & Schmid-Hempel 1992, MacFarlane et al. 1995). Work to clarify similar aspects in the C. analis-conopid interaction is currently in progress.

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References


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