

LIST OF APHIDIINES (HYMENOPTERA: BRACONIDAE, APHIDIINAE) OF MADEIRA ARCHIPELAGO*

Arminda Cecílio¹, Margarida T. Pita^{1,2} & F. A. Ilharco¹

¹Instituto Nacional dos Recursos Biológicos, I.P., L-INIA,
Unidade de Investigação de Protecção de Plantas, Entomologia,
Av. da República, Nova Oeiras, 2784-505 Oeiras, Portugal. E-mail: a.cecilio@mail.telepac.pt

²Centro de Estudos da Macaronésia (CEM), Universidade da Madeira,
Campus Universitário da Penteada - Bloco C - Piso 1, 9000-399 Funchal, Madeira, Portugal.
E-mail: maggie@uma.pt

ABSTRACT

The present work analyses the available information on the diversity of aphid parasitoids in Madeira Archipelago, lists the species known for Madeira and Porto Santo Islands, and adds some information issued from samplings performed by one of the authors in both islands. It also makes comparisons with the aphidiine fauna of Macaronesia and presents an alphabetically sorted list of species. A total of 18 aphidiine species are reported for Madeira Archipelago, including a new record from Porto Santo, the aphid parasitoid *Aphidius transcaspicus* Telenga.

Aphid fauna of Madeira Archipelago may be regarded as an extension of the western Mediterranean, and aphidiine fauna may be interpreted in the same sense. However, adding to the resemblance with Mediterranean biodiversity, some similarities with Ethiopian biodiversity were apparent in Porto Santo, suggesting adaptation to the edaphoclimatic differences this island presents when compared to Madeira Island.

Key words: *Aphidius transcaspicus*, Aphidiinae, Madeira, Porto Santo.

RESUMEN

Este trabajo analiza la información existente sobre la biodiversidad de los parasitoides de áfidos del archipiélago de Madeira, enumera las especies conocidas en las islas de Madeira y Porto Santo, y añade información resultante del muestreo realizado por uno de los autores en ambas islas. A su vez se compara con la fauna de afidiinos de la Macaronesia y se presenta una lista ordenada alfabéticamente. Se registran un total de 18 especies de afidiinos del archipiélago de Madeira, incluyendo una nueva cita para Porto Santo, el parasitoides de áfidos *Aphidius transcaspicus* Telenga.

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La fauna de áfidos del archipiélago de Madeira se puede considerar una extensión de la del Mediterráneo occidental, y la fauna de afidiinos también puede ser caracterizada de la misma manera. Sin embargo, para la isla de Porto Santo, además de las semejanzas con la diversidad biológica del Mediterráneo, se han observado similitudes con la etiópica, debido probablemente a sus adaptaciones a las diferencias edafoclimáticas de esta isla en comparación con la de Madeira.

Palabras clave: *Aphidius transcaspicus*, Aphidiinae, Madeira, Porto Santo.

1. INTRODUCTION

Aphidiines are aphid parasitoids which may play an important role in aphid pest control. The knowledge of their biodiversity over different ecosystems is essential for the development of environmentally friendly methodologies of plant protection. Data on plant hosts of parasitoids are important to implement ecological structures that favour their multiplication in the ecosystem.

The present work (i) analyses the available information on the diversity of these organisms in Madeira Archipelago (GRAHAM [8]; STARÝ *et al.* [15]; CECÍLIO *et al.* [6]; VAN ACHTERBERG & AGUIAR [17]), (ii) lists the species known for Madeira and Porto Santo Islands, (iii) adds some information issued from samplings performed by one of the authors in both islands, (iv) relates the results with the aphidiine distribution in Macaronesia (GUERRERO & KOPONEN [9]; BÁEZ *et al.* [2]; BÁEZ *et al.* [1]; BORGES *et al.* [3]; SIMÕES *et al.* [12]).

2. MATERIAL AND METHODS

The analysed data concern ten parasitoid samples collected by one of us (M.T.P.), in agricultural areas and in spontaneous vegetation of Madeira Archipelago (Madeira and Porto Santo islands), between 1998 and 2000. Some samples correspond to vagrant specimens, while others emerged from aphid mummies. The samples including the plant parts supporting the living or mummified aphid colonies were kept inside plastic boxes with mesh covers until parasitoid emergence.

Aphidiines were preserved in ethanol, following the usual procedures. Sample No. 1142 belongs to the Aphidiine Collection of Estação Agronómica Nacional (CAFEAN). The other samples belong to the Aphid (or Parasitoid) Collection of the second author, and their code references start with a letter (e.g. A321 or P133). Aphid host plants, aphid mummies and parasitoids were all identified.

3. RESULTS AND DISCUSSION

Following the analysis of the collected samples, six aphidiine species were identified, belonging to the Aphidiinae subfamily of the Braconidae family: *Aphidius ervi* Haliday, 1834; *Aphidius transcaspicus* Telenga, 1958; *Binodoxys angelicae* (Haliday, 1833); *Diaeretiella rapae* (McIntosh, 1855); *Lysiphlebus fabarum* (Marshall, 1896) and

Lysiphlebus testaceipes (Cresson, 1880). One of them is a new record for Porto Santo Island and for the Archipelago: *A. transcaspicus*. The identification of three damaged specimens was not possible.

Aphidiines are alphabetically listed and the following information is given: island, associated aphid species (when known), record number, place of collection, date, host plant (when known), number of specimens per sample and sex of the specimen (within brackets). With the present contribution, the number of aphidiine species known in the Archipelago increases to 18, of which 15 are in Madeira and 7 in Porto Santo (Table I).

Material studied:

Aphidius ervi Haliday, 1834

MADEIRA: mummy of *Acyrtosiphon pisum* (Harris, 1776), A96, 19 March 1998, *Vicia sativa* L. (1 ♀).

Aphidius transcaspicus Telenga, 1958

PORTO SANTO: CAFEAN1142, Posto Agrário do Farrobo, Farrobo, 21 May 1998, vagrant on *Arundo donax* L. (1 ♀).

Binodoxys angelicae (Haliday, 1833)

MADEIRA: A345, Posto Agrário das Preces, Preces, 14 April 1999, vagrant on *Citrus limon* (L.) Burm. fil. (1 ♀).

Binodoxys sp.

MADEIRA: A310, Posto Agrário das Preces, Preces, 19 March 1999, vagrant on *Citrus limon* (L.) Burm. fil. (1 ♀); A699, 18 May 1999, vagrant on *Citrus limon* (L.) Burm. fil. (1 ♀); P108, Posto Agrário das Preces, Preces, 16 April 1999, vagrant on *Citrus sinensis* (L.) Osbeck (1 ♂)

Diaeretiella rapae (McIntosh, 1855)

MADEIRA: A1769/P133, 23 February 2000, vagrant on *Brassica oleracea* L., with *Brevicoryne brassicae* (Linnaeus) colony (1).

Lysiphlebus fabarum (Marshall, 1896)

MADEIRA: A255, Lombo de São João, Ponta do Sol, 8 February 1999, vagrant on *Citrus sinensis* (L.) Osbeck, with *Toxoptera citricidus* (Kirkaldy) colony (1 ♀, 2 ♂♂), col. M.T.Pita, A.M.F.Aguiar and J.Jesus; A593, Posto Agrário de Santana, Santana, 14 May 1999, vagrant on *Citrus sinensis* (L.) Osbeck, with *Aphis spiraecola* Patch colony (1 ♀).

Lysiphlebus testaceipes (Cresson, 1880)

MADEIRA: A321, “Vila Conceição”, Boa Nova, São Gonçalo, 13 April 1999, vagrant on *Citrus sinensis* (L.) Osbeck, with *Aphis gossypii* Glover colony (8 ♀, 8 ♂♂).

The following genera of the subfamily Aphidiinae (*Aphidius*, *Binodoxys*, *Diaeretiella*, *Ephedrus*, *Lysiphlebus*, *Pauesia*, *Praon*, *Trioxys*) are known in Madeira Archipelago (VAN ACHTERBERG & AGUIAR [17]) (Table I): eight for Madeira Island and four for Porto Santo. Three of the seven species known in Porto Santo have not been found in Madeira Island.

In previous reports on Aphidiinae of Madeira Archipelago, trophic relationships host plant-aphid-parasitoid have been described for *Aphidius colemani*, *A. ervi*, *Aphidius funebris*, *B. angelicae*, *D. rapae*, *L. fabarum* and *L. testaceipes* (STARÝ *et al.* [15]; CECÍLIO *et al.* [6]). However, such relationships are not described for the other species (GRAHAM

[8]). *Aphidius transcaspicus* was observed vagrant on *Arundo donax* L., and the aphid genus *Hyalopterus* is a potential host (KAVALLIERATOS & LYKOURESSIS [10]). *Aphidius ervi* is a parasitoid of aphids that usually occur on Leguminosae and Gramineae (COSTA [7]). *Aphidius matricariae* is a very polyphagous species, both of herb aphids and of arboreal aphids, and *Aphidius rhopalosiphii* is a parasitoid of grass aphids (CECÍLIO [4]). Parasitoids of the genus *Pauesia* parasitize *Cinara* aphids which may behave as a pest on *Pinus* sp. *Trioxys pallidus* is a parasitoid of aphids belonging to the Drepanosiphidae family, and is known for its efficiency in reducing populations of *Chromaphis juglandicola* (Kaltenbach), a walnut aphid pest (CECÍLIO & ILHARCO [5]).

The aphid fauna of Madeira Archipelago may be regarded as an extension of the western Mediterranean aphid fauna, and aphidiine fauna may be interpreted in the same sense (STARÝ *et al.* [15]). However, adding to the resemblance with Mediterranean biodiversity, the presence of *Aphidius colemani* in Porto Santo reveals similarities with Ethiopian biodiversity (STARÝ & VAN HARTEN [14]; STARÝ *et al.* [16]), suggesting adaptation to the edaphoclimatic differences that this island presents, when compared to Madeira Island (CECÍLIO *et al.* [6]). Within the Macaronesian area (Table II), a similar occurrence is observed for Santiago Island (Cape Verde Islands) and Lanzarote Island (Canary Islands) concerning *A. colemani* (VAN HARTEN [18]; BÁEZ *et al.* [2]), that share some edaphoclimatic conditions with Porto Santo.

The known biodiversity of Macaronesian Aphidiinae (Table II) is reduced when compared to other insect groups such as the aphids. According to GUERRERO & KOPO-NEN [9] for the Braconidae of Canary Islands this suggests less thoroughness of study for this group of insects. Four species of aphid parasitoids are known for Azores (BORGES *et al.* [3]) and only two for Cape Verde Islands (BÁEZ *et al.* [1]). VAN HARTEN [19] previously referred the scarcity of aphidiines for this archipelago. Only the cosmopolitan species *Diaeretiella rapae* is common to four archipelagos (Azores, Canary, Cape Verde and Madeira). Two species, *Lysiphlebus fabarum* and *Lysiphlebus testaceipes* that commonly parasitize the *Aphis* genus, are present at three of them (Azores, Canary and Madeira); the former is a Palaearctic species and the second, a Nearctic one, that is also present in South Africa (MACKAUER & STARÝ [11]), currently adapted in the Mediterranean area. Another species, *Aphidius funebris*, also present in the same three archipelagos, is a parasitoid of *Uroleucon* genus, known from Europe and North of Africa (MACKAUER & STARÝ [11]).

Aphidiine species from Madeira Archipelago	Madeira Archipelago	
	Madeira	Porto Santo
<i>Aphidius colemani</i> Viereck, 1912		PS
<i>Aphidius ervi</i> Haliday, 1834	MA	PS
<i>Aphidius funebris</i> Mackauer, 1961		PS
<i>Aphidius matricariae</i> Haliday, 1834	MA	
<i>Aphidius picipes</i> (Nees, 1811)*	MA	
<i>Aphidius rhopalosiphi</i> De Stefani-Pérez, 1902	MA	
<i>Aphidius ?ribis</i> Haliday, 1834	MA	
<i>Aphidius smithi</i> Sharma & Subba Rao, 1959	MA	
<i>Aphidius transcaspicus</i> Telenga, 1958		PS
<i>Aphidius urticae</i> Haliday, 1834	MA	
<i>Binodoxys angelicae</i> (Haliday, 1833)**	MA	PS
<i>Diaeretiella rapae</i> (McIntosh, 1855)	MA	PS
<i>Ephedrus plagiator</i> (Nees, 1811)	MA	
<i>Lysiphlebus fabarum</i> (Marshall, 1896)	MA	PS
<i>Lysiphlebus testaceipes</i> (Cresson, 1880)	MA	
<i>Pauesia picta</i> (Haliday, 1834)	MA	
<i>Praon volucre</i> (Haliday, 1833)	MA	
<i>Trioxys pallidus</i> (Haliday, 1834)	MA	
Total	15	7
TOTAL ARCHIPELAGO	18	

Table I.- List of aphidiine species recorded from Madeira Archipelago (Madeira and Porto Santo Islands).

* This species was previously reported for this Archipelago with the following synonyms: *Aphidius avenae* Haliday, 1833; *Aphidius pascuorum* Marshall, 1896 (STARÝ [13]).

** This species was previously reported for this Archipelago with the synonym *Trioxys angelicae* (Haliday, 1833).

Aphidiine species from Macaronesia	Macaronesia			
	AZ	MD	CN	CV
<i>Aphidius colemani</i> Viereck, 1912		MD	CN	CV
<i>Aphidius ervi</i> Haliday, 1834		MD	CN	
<i>Aphidius funebris</i> Mackauer, 1961	AZ	MD	CN	
<i>Aphidius hieraciorum</i> Starý, 1962			CN	
<i>Aphidius matricariae</i> Haliday, 1834		MD	CN	
<i>Aphidius picipes</i> (Nees, 1811)		MD	CN	
<i>Aphidius rhopalosiphi</i> De Stefani-Pérez, 1902		MD		
<i>Aphidius ?ribis</i> Haliday, 1834		MD		
<i>Aphidius rosae</i> Haliday, 1834			CN	
<i>Aphidius smithi</i> Sharma & Subba Rao, 1959		MD		
<i>Aphidius transcaspicus</i> Telenga, 1958		MD		
<i>Aphidius urticae</i> Haliday, 1834		MD		
<i>Aphidius</i> sp.			CN	
<i>Binodoxys angelicae</i> (Haliday, 1833)		MD	CN	
<i>Binodoxys brevicornis</i> (Haliday, 1833)			CN	
<i>Diaeretiella rapae</i> (McIntosh, 1855)	AZ	MD	CN	CV
<i>Ephedrus niger</i> Gautier, Bonnamour & Gaumont, 1929			CN	
<i>Ephedrus persicae</i> Froggatt, 1904			CN	
<i>Ephedrus plagiator</i> (Nees, 1811)		MD		
<i>Lysiphlebus confusus</i> Tremblay & Eady, 1978			CN	
<i>Lysiphlebus fabarum</i> (Marshall, 1896)	AZ	MD	CN	
<i>Lysiphlebus testaceipes</i> (Cresson, 1880)	AZ	MD	CN	
<i>Monoctonia pistaciaecola</i> Starý, 1962			CN	
<i>Pauesia picta</i> (Haliday, 1834)		MD		
<i>Praon volucre</i> (Haliday, 1833)		MD	CN	
<i>Trioxys auctus</i> (Haliday, 1833)			CN	
<i>Trioxys pallidus</i> (Haliday, 1834)		MD		
<i>Trioxys pannonicus</i> Starý, 1960			CN	
<i>Trioxys</i> sp.			CN	
Total	4	18	19	2

Table II.- Presence of aphidiine species in Macaronesia: **AZ** (Azores Archipelago), **MD** (Madeira Archipelago), **CN** (Canary Islands) and **CV** (Cape Verde Islands).

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