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# The Wasps of Madeira

# (Hymenoptera: Chrysididae, Pompilidae, Vespidae, Sphecidae)

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## Abstract

In this paper the aculeate wasps of the families Chrysididae, Pompilidae, Vespidae and Sphecidae from the Madeira archipelago are listed. Hitherto 24 species have been collected, of which 10 species are recorded for the first time from this archipelago.

## Zusammenfassung

Die aculeaten Wespen der Familien Chrysididae, Pompilidae, Vespidae und Sphecidae des Madeira-Archipels wurden zusammengestellt. 24 Arten wurden erfaßt, davon wurden 10 Arten als neu für das Untersuchungsgebiet nachgewiesen.

## Introduction

The Madeira archipelago is situated in the eastern part of the Atlantic Ocean, about 630 km from the coast of Morocco, between 33° 10' - 32° 20' N and 16° 10' - 17° 20' W. It consists of Madeira itself, Porto Santo and the Ilhas Desertas. The islands have originated from volcanic activity, during the early Tertiary period.

Madeira has an area of 728 km², the highest point is Pico Ruivo at 1862 m. Porto Santo is a smaller island, ± 50 km² with the highest point Pico do Facho (517 m.). It is situated about 57 km north east of Madeira. The three small islands of the Ilhas Desertas are situated about 24 km south east of Madeira. From north to south: Ilhéu Chão, Deserta

Grande and Deserta Bugío, with an area respectively of about 0.5 km², 10 km² and 3 km² and with highest point of nearly 100 m, 442 m and 348 m respectively.

The main part of the landscape of Madeira is dominated by a mountain-ridge, running from east to west. There are a lot of valleys, ravines and steep slopes, eroded in the basalt rocks by rivers and streams. The Madeirans have used almost every flat part of the island for building and agriculture. The less steep slopes have been made usable for agriculture by means of terraces. The high plateau of the Paúl da Serra (± 1300 m) is situated at the western part of the island. Here the farmers graze their livestock (cows, sheep, goats, horses).

Porto Santo is less rough and steep than Madeira. This island is much dryer and therefore the vegetation is less lush. On Porto Santo there is much sand, whereas at Madeira there is hardly any sand at all, only at Ponta de São Lourenço can sand be found at the surface.

Madeira is situated in the subtropical climate zone. The climate is strongly influenced by the Azores anti-cyclones, which cause trade winds from the north west instead of the north east trade winds that are usual in the northern hemisphere. Due to these trade winds, the northern part of Madeira is much more humid than the southern part. The moist climate has allowed the formation of a rich vegetation, the so called "Laurisilva". In the central and northern part of the island there are remnants of these forests. The dominant trees in these forests are *Laurus azorica*, *Ocotea foetans* and *Persia indica*. The Madeiran Laurisilva is characterised by the endemic tree *Clethra arborea*.

## Material and methods

The material that has been processed is limited to the wasps that belong to the Hymenoptera Aculeata, excluding the families Bethylidae, Dryinidae, Embolemidae and Formicidae. The examined material, collected so far from Madeira, belongs to four families: Chrysididae, Pompilidae, Vespidae and Sphecidae.

The data has been gathered in a number of ways. First of all from previous publications on the wasps of Madeira. The literature however is widely scattered, and most of it contains only a little data on wasps, much of it rather incomplete.

The wasps in the collection of the Museu Municipal do Funchal and in the private collection of A.M.F. Aguiar of Funchal have been revised by the author in 1998 and 1999.

The Wollaston material in the Hope Entomological Collections has been checked by S.P.M. Roberts. Further data has been passed by Stuart Roberts (1993) and Martin Jenner (1995). Martin Fellendorf (1994) has sent me his wasps from Madeira, among which 4 specimens from Porto Santo.

Considerable material has been provided by J.T. Smit, who has been collecting insects on the island of Madeira during the months February to June 1998, by handnet and, for some periods, by malaise-trap. He has also been collecting by means of these two methods on Porto Santo on 18, 19 and 20 April 1998. There he collected 24 specimens, belonging to three species. Two more wasps from Porto Santo were found in the collection of the Museu Municipal, collected by F. Zino, and in the collection of F. Aguiar.

No visits have been made to the Ilhas Desertas. In the collection of the Museu Municipal no material from the Desertas was present.

The author collected wasps on Madeira in July 1997 and May 1998 by handnet.

The total number of specimens that have been processed for this publication is 576.

## Species list

### Survey

In Table 1 the families are mentioned from which material has been collected from the archipelago with the number of species per family. Some species are endemic to the Madeira archipelago (M), to Madeira and the Canary Islands (MC), or to Madeira and the Cape Verde Islands (MV).

From Madeira and Porto Santo the number of collected species is given. The Ilhas Desertas have been excluded from the table, because there is no data available.

A difference has been made between data before 1980 (mostly data from references) and data from 1980 until 1998. In the years from 1980 onwards there has been an increasing amount of collecting activity by different collectors. The number of records from before 1980 is 122 and the number since 454.

**Table 1.** Number of species of the families

| Family | species | endemic species | Madeira | Porto Santo | before 1980 | from 1980 |
|---|---|---|---|---|---|---|
| Chrysididae | 2 | 1 MC | 2 | - | 1 | 2 |
| Pompilidae | 2 | - | 2 | - | 1 | 2 |
| Vespidae | 6 | 1 M | 6 | 2 | 5 | 6 |
| Sphecidae | 14 | 2 MC, 1 MV | 14 | 1 | 8 | 13 |
| Total | 24 | 5 | 24 | 3 | 15 | 23 |

**(M) = endemic to Madeira**
**(MC) = endemic to the Canary islands and Madeira**
**(MV) = endemic to Madeira and the Cape Verde Islands**

**Table 2.** Outline of the species that have been recorded from the archipelago.

| Family | Subfamily | Genus | Species |
|---|---|---|---|
| Chrysididae | | | |
| | Chrysidinae | *Chrysis*<br>*Chrysis* | *ignita*<br>*magnidens* (MC) |
| Pompilidae | | | |
| | Pepsinae | *Priocnemis*<br>*Dipogon* | *faillae* ssp. *corax*<br>*variegatus* |
| Vespidae | | | |
| | Eumeninae | *Ancistrocerus*<br>*Ancistrocerus*<br>*Ancistrocerus*<br>*Euodynerus* | *gazella*<br>*madaera* (M)<br>*parietum*<br>*variegatus* |
| | Polistinae | *Polistes* | *dominulus* |
| | Vespinae | *Vespula* | *germanica* |
| Sphecidae | | | |
| | Sphecinae | *Sceliphron*<br>*Podalonia*<br>*Podalonia* | *caementarium*<br>*rothi*<br>*tydei* |
| | Pemphredoninae | *Psenulus*<br>*Passaloecus*<br>*Spilomena* | aff. *pallipes*<br>*gracilis*<br>*canariensis* (MC) |

| Family | Subfamily | Genus | Species |
|---|---|---|---|
| | Astatinae | *Astata* | *boops* |
| | Crabroninae | *Liris* | *atrata* |
| | | *Tachysphex* | *lindbergi* (MV) |
| | | *Trypoxylon* | aff. *clavicerum* |
| | | *Crossocerus* | *elongatulus* |
| | | *Ectemnius* | *cephalotes* |
| | | *Ectemnius* | *continuus* ssp. *rufitarsis* (MC) |
| | | *Ectemnius* | *sexcinctus* |

(M) = endemic to Madeira
(MC) = endemic to the Canary islands and Madeira
(MV) = endemic to Madeira and the Cape Verde Islands

## Explanation of the Species list

The next paragraphs give more detailed information about the species. From each species the references and the collections, from which the specimens have been seen, are reported. The months in which a species has been collected are printed in a larger, bold type. The area of distribution of the species is given. For some species, notes are included, for instance when the characteristics are different to the nominate form. When available, brief information about the biology (nest and prey) is given.

Under the heading data, the total number of reported and collected specimens is mentioned first, followed by the number of males, females, or workers. Finally, a brief list of all records is given, of which the first are often vague records which lack precise information about location.

### Abbreviations used in the list

References:

BP..... BLÜTHGEN (1940)
ES..... ERLANDSSON (1978)
GC..... GARDNER & CLASSEY (1959)
KF..... KOHL (1907)
LO..... LOMHOLDT (1975)
SE..... SAUNDERS (1903)
SI..... SICHEL (1867)

Collectors, between brackets [ ] the museum collection where these specimens are preserved. When no museum is mentioned, the material is in the collection of the collector.

AF..... A.M.F. Aguiar (Funchal, Madeira)
ED..... D. Erber [Museu Municipal do Funchal]
FA..... A. Figueira [Museu Municipal do Funchal]
FM..... M. Fellendorf (Karlsruhe, Germany) Material in collection of J. Smit.
GH..... H.B. Gray [Hope Entomological Collections, Oxford University Museum]
GR..... Gregoris [Museu Municipal do Funchal]
JM..... M. Jenner (Hooe, United Kingdom)
JT..... J.T. Smit (Velp, Holland) Material in collection of J. Smit.
MG..... G.E. Maul [Museu Municipal do Funchal]
RS..... S. Roberts (Salisbury, United Kingdom)

SJ..... J. Smit (Arnhem, Holland)
WE ..... Weinreich [Museu Municipal do Funchal]
WT ..... T.V. Wollaston [Hope Entomological Collections, Oxford University Museum]
ZF..... F. Zino (Funchal, Madeira), [Museu Municipal do Funchal]
*M..... collector unknown [Museu Municipal do Funchal]

## Chrysididae

### *Chrysis ignita* LINNAEUS 1761

New record for Madeira. First specimen collected in 1952 by G. Maul.

Collections: A.M.F. Aguiar; Museu Municipal; J. Smit.

Months: 1 - 2 - **3** - 4 - **5** - **6** - **7** - **8** - **9** - 10 - 11 - 12

Distribution: Palaearctic.

Biology: The larvae live as cleptoparasites or parasitoids in the nests of Eumenid wasps. There are several hosts known for this species (KUNZ 1994), two of them have been found on Madeira: *Ancistrocerus gazella* and *Ancistrocerus parietum*.

Data: 10 specimens; 2♂♂, 8♀♀: Boa Morte (*M 29-03-1987: 1♂), Camacha; Lab. Agricol. (AF 8-05-1989: 1♀), Camacha; Riberinha (AF 26-06-1991: 1♀, 23-08-1991: 1♀), Gaula, Levada dos Tornos (FM 29-05-1995: 1♀), João Frino (SJ 19-07-1997: 2♀♀), Ponta do Sol (AF 1-09-1984: 1♂), Santo da Serra (MG 08-1952: 1♀), (*M 1955: ♀)

### *Chrysis magnidens* PÉREZ 1895

References: LINSENMAIER (1959, op.cit.)
Collections: Museu Municipal; J. Smit.

Months: 1 - 2 - 3 - 4 - 5 - **6** - **7** - **8** - 9 - 10 - 11 - 12

Distribution: Endemic to the Canary Islands and Madeira.

Biology: The larvae live as cleptoparasites or parasitoids, probably in the nests of Eumenid wasps. So far no hosts have been reported.

Data: 11 specimens; 7♂♂, 4♀♀: Fontes (SJ 16-07-1997: 3♂♂), Funchal; Soccoridos valley (JT 7-06-1998: 2♂♂ 2♀♀), Parminho dos Tornos (MG 4-08-1957: 1♂), Rabaçal (SJ 20-07-1997: 1♂ 2♀♀)

## Pompilidae

### *Priocnemis faillae* ssp *corax* GUSSAKOWSKIJ 1930

New record for Madeira. First specimen collected in 1987, by an unknown collector.

References: GARDNER & CLASSEY (1959).

Note: GARDNER & CLASSEY report Priocnemis sp., presumably this is a specimen of *Priocnemis faillae* ssp. *corax*, for all the specimens of this genus captured on Madeira so far belong to this species.

Collections: A.M.F. Aguiar; Museu Municipal; J. Smit; R. Wahis.

Months: 1 - **2** - **3** - **4** - **5** - 6 - **7** - 8 - 9 - 10 - 11 - **12**

Distribution: Spain, Portugal, Madeira.

Biology: So far nothing is known about the biology of this species.

Data: 12 specimens; 5♂♂, 6♀♀, 1?: Barreira (JT 19-02-1998: 1♂ 1♀), Boa Morte (*M 29-03-1987: 2♀♀), Choupana (GC 12-1957: 1), Palheiro Ferreiro (SJ 19-07-1997: 1♂), Pico Santana (FA 7-04-1998: 1♀), Ponta de São Lourenço (SJ 3-05-1998: 2♀♀), Portela (SJ 19-07-1997: 3♂♂).

*Dipogon variegatus* (LINNAEUS 1758)

New record for Madeira. First specimen collected in 1998 by J.T. Smit.

Collections: J. Smit.

Months: 1 - 2 - 3 - 4 - **5** - 6 - 7 - 8 - 9 - 10 - 11 - 12

Distribution: Europe, north Africa, Madeira.

Biology: The nest is made in all sorts of cavities; in walls, wood, in holes in the ground and in snail shells. One cavity may contain several cells. Each cell is provided with one spider of the genera *Clubiona*, *Thomisus* or *Xysticus*.

Data: 1 specimen; 1♂: Corujeira Ribeira; Santa Luzia (JT 24-05-1998: 1♂).

## Vespidae

*Ancistrocerus gazella* (PANZER 1798)

References: BLÜTHGEN (1940), GARDNER & CLASSEY (1959), ERLANDSSON (1978)

Collections: A.M.F. Aguiar; M. Jenner; Museu Municipal; J. Smit.

Months: 1 - **2 - 3 - 4 - 5 - 6 - 7 - 8 - 9** - 10 - 11 - **12**

Distribution: Europe, north west Africa, Canary Islands, Madeira, Near East to Iran.

Biology: The nest is made in cavities in stems of plants, crevices in walls and borings in wood. The cells are made in a linear series in the cavity, with thick mud partitions between them. The cells are provided with small lepidoptera larvae.

Data: 138 specimens; 68♂♂, 70♀♀: Achada do Poiso (SJ 20-07-1997: 2♂♂), Boa Morte (SJ 5-05-1998: 3♂♂), Camara de Lobos (ES 24-07-1975: ♀), Campanario (JT 23-05-1998: 4♂♂ 2♀♀), Chão de Ribeira (JT 16-04-1998: 1♂, 19-05-1998: 1♀, 23-05-1998: 1♂), Corujeira Ribeira; Santa Cruz (JT 24-05-1998: 1♂), Fontes (SJ 16-07-1997: 4♂♂ 3♀♀), Funchal (ES 2-08-1973: ♀, 19-07-1974: ♀, 22-07-1974: ♂♀♀, 24-07-1974: ♂♀, 23-08-1974: ♂), (AF 8-09-1985: 1♂), Funchal; Jardim Botanico (SJ 9-07-1997: 1♂ 1♀), Funchal; Jardim Municipal (JT 30-05-1998: 1♂, 31-05-1998: 4♂♂ 1♀), Funchal; Monte (ES 24-07-1974: ♀), Funchal; Pico dos Barcelos (SJ 7-07-1997 3♀♀, 9-07-1997: 3♂♂, 13-07-1997: 1♂), (JT 15-02-1998: 1♀, 29-03-1998: 1♂, 25-04-1998: 2♀♀, 30-04-1998: 1♀, 12-05-1998: 1♂ 4♀♀, 30-05-1998: 2♀♀), Funchal; Pico Santo Antonio (JT 1-04-1998: 3♂♂ 1♀, 22-04-1998: 1♀, 24-05-1998: 1♂, 28-05-1998: 5♀♀, 11-06-1998: 3♀♀), Funchal; Soccoridos valley (JT 11-02-1998: 2♂♂, 24-02-1998: 2♂♂, 23-05-1998: 1♂, 7-06-1998: 2♂♂ 2♀♀), (SJ 10-07-1997: 1♂), João Frino (SJ 19-07-1997: 1♂ 3♀♀), Lombo de J. Boieiro; S. Roque. (FA 25-08-1952: 1♀), Loreto (SJ 5-05-1998: 5♂♂ 3♀♀), Madalena do Mar (SJ 15-07-1997: 1♀), Palheiro Ferreiro (GC 12-1957: 1♀), (SJ 19-07-1997: 1♂ 2♀♀, 6-05-1998: 1♂ 1♀), Pico do Facho; Machico (SJ 2-05-1998: 1♀), Poço de Neve (11-07-1997: 1♀), Poiso (FM 11-09-1994: 1♂), Ponta do Pargo (SJ 5-05-1998: 2♂♂ 1♀), (JT 19-05-1998: 1♂ 2♀♀), Porto Santo; Villa Baleira (JT 18-04-1998: 3♂♂ 3♀♀, 19-04-1998: 3♀♀, 20-04-1998: 6♂♂ 1♀), Rabaçal (BP 17-07/4-08-1935: 1♀), Riba do Vasco Gil (JM 23-09-1995: 1♂), Ribeira Brava (SJ 1-05-1998: 2♀♀), Santa Quiteria (JT 31-05-1998: 2♀♀), Santo da Serra (MG 08-1952: 1♀), São Jorge (SJ 4-05-1998: 1♂), Terreiro da Luta (SJ 6-05-1998: 1♂).

*Ancistrocerus madaera* SAUSSURE 1852

References: SICHEL (1867), SAUNDERS (1903), BLÜTHGEN (1940), GARDNER & CLASSEY (1959), ERLANDSSON (1978).

Note: SAUNDERS (1903) reports *Odynerus haematodes* (BRULLÉ, 1839) collected by T.V. Wollaston, SICHEL (1867) also reports *Odynerus haematodes*. Because all the red coloured specimens of *Ancistrocerus* captured at Madeira belong to *Ancistrocerus madaera* it is probably that these specimens also belong to this species. The specimens of *Ancistrocerus* that Wollaston collected have not been checked.

Collections: A.M.F. Aguiar; Museu Municipal; J. Smit.

Months: 1 - **2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10** - 11 - **12**

Distribution: Endemic to Madeira.

Biology: There are no references about the biology of this species. The females probably collect lepidoptera larvae as food for their larvae, like the other species of this genus.

Data: 70 specimens; 30♂♂, 40♀♀: (SE: 1♂ 2♀♀), (SI: 1♂), Camara de Lobos (GR 18-03-1997: 1♀), Chão de Ribeira (JT 19-05-1998: 1♀), Fajã de Nogueira (AF 3-06-1993: 1♀), (JT 10-03-1998: 8♀♀), Funchal; Jardim Botanico (SJ 9-07-1997: 2♂♂), Funchal; Soccoridos valley (JT 11-02-1998: 1♂, 24-02-1998: 4♀♀, 7-06-1998: 2♂♂ 1♀), João Frino (SJ 19-07-1997: 1♂), Lombada dos Marinheiros (SJ 15-7-1997: 2♂♂), Loreto (SJ 5-05-1998: 1♀), Madalena do Mar (SJ 15-07-1997: 4♂♂ 2♀♀), Palheiro Ferreiro (GC 12-1957: 2♀♀), Ponta de São Lourenço (AF 2-04-1989: 1♂), Ponta do Pargo (SJ 5-05-1998: 3♂♂), (JT 19-05-1998: 1♂ 1♀), Portela (FM 21-09-1994: 1♀), (SJ 19-07-1997: 1♂), Porto Moniz; Achadas da Cruz (AF 26-06-1989: 2♂♂), Porto Santo (ZF 24-10-1988: 1♀), (AF 12-10-1994: 1♀), Porto Santo; Villa Baleira (JT 19-04-1998: 3♂♂), Rabaçal (BP 17-07/4-08-1935: 2♂♂ 1♀), (SJ 20-07-1997: 2♂♂ 7♀♀), Ribeira São Jorge (ES 15-09-1976: ♀), Ribeiro Frio (SJ 17-07-1997: 2♀♀), Santa Quiteria (JT 31-05-1998: 1♂), Santo da Serra (*M 10-10-1939: 1♀), (*M 23-08-1954: 1♀).

*Ancistrocerus parietum* (LINNAEUS 1758)

References: BLÜTHGEN (1940)

Collections: A.M.F. Aguiar; Hope Entomological Collections (OUM); Museu Municipal; J. Smit.

Months: 1 - 2 - **3 - 4 - 5 - 6 - 7 - 8** - 9 - 10 - 11 - 12

Distribution: Europe, north west Africa, Madeira, Asia, northern America.

Biology: The nest is made in cavities in walls, rocks and borings in wood. The cells are provided with small lepidoptera larvae, as food for their larvae.

Data: 16 specimens; 7♂♂, 9♀♀: (WT: 3♂♂ 1♀), Campanario (JT 23-05-1998: 1♂), Caramujo (BP 6/14-08-1935: 2♀♀), Faial (SJ 4-05-1998: 1♂), Funchal; Jardim Botanico (SJ 9-07-1997: 2♂♂), Funchal; Pico dos Barcelos (SJ 13-07-1997: 1♀), Funchal; Pico Santo Antonio (JT 7-06-1998: 1♀), Rabaçal (BP 17-07/4-08-1935: 1♀), Ribeira Brava (JT 3-03-1998: 1♀), Camacha; Riteininha, St. Cruz (AF 9-08-1996: 1♀), Santo da Serra (MG 08-1952: 1♀).

*Euodynerus variegatus* (FABRICIUS 1793)

New record for Madeira. First specimen collected in 1997 by J. Smit.

Collections: J. Smit.

Months: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12

Distribution: southern France, Spain, Portugal, north west Africa, Madeira

Biology: No references about the biology of this species are available.

Data: 1 specimen; ♂ : Funchal, Pico dos Barcelos (SJ 13-07-1997: 1♂).

*Polistes dominulus* (CHRIST 1791)

References: SAUNDERS (1903), BLÜTHGEN (1940), GARDNER & CLASSEY (1959)

Note: All references report *Polistes gallicus* auct. nec LINNAEUS 1767, the old name for *P. dominulus*.

Collections: A.M.F. Aguiar; Hope Entomological Collections (OUM); Museu Municipal; S. Roberts; J. Smit.

Months: **1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12**

Distribution: Central and west Europe, north Africa, Madeira, palearctic Asia to Japan.

Biology: The nest consists of one comb, made of paper (masticated wood), attached to the underground chamber by a small support. The females capture larvae of all kind of insects with which they feed their own larvae.

Data: 48 specimens; 3♂♂, 45♀♀ (including workers): (SE: 3♀♀), Chão de Ribeira (JT 19-05-1998: 2♀♀), Curral das Freitas (ED 27-08-1983: 1♀), (RS 17-08-1993: 1☿), Faial (SJ 4-05-1998: 1♀), Feiteiras (BP 15-08-1935: 1♀ 2☿☿), Fontes (SJ 16-07-1997: 2♀♀), Funchal (GH 1901: 3♀♀), (GC 12-1957: 1☿), (AF 08-1988: 1♀), (RS 17-08-1993: 1☿), Funchal; Jardim Botanico (SJ 9-07-1997: 1♂), Funchal; Jardim Municipal (JT 31-05-1998: 1♀), Funchal; Pico de Santo Antonio (JT 1-03-1998: 3♀♀, 22-04-1998: 1♀), Funchal; Pico dos Barcelos (SJ 7-07-1997: 1♀, 13-07-1997: 2♀♀), (JT 25-04-1998: 1♀, 30-04-1998: 1♀, 12-05-1998: 1♀), Funchal; Soccoridos valley (JT 3-04-1998: 1♀), (SJ 10-07-1997: 2♀♀), João Frino (SJ 19-07-1997: 1♀), Paúl da Serra (BP 29-07-1935: 1♂), Paúl da Serra; Estanquinhas (ED 23-03-1983: 2♀♀), Poiso (RS 17-08-1993: 1☿), Ponta do Pargo (SJ 5-05-1998: 2♀♀), Rabaçal (BP 17-07-1935: 1♀), Ribeiro Frio (MG 2-09-1953: 1♀), Santana; Ach. do Garamacho (AF 6-09-1989: 1♂ 1♀), Santana; Pico (AF 22-04-1997: 1♀), Santo da Serra (*M 10-09-1939: 1♀), São Jorge (GC 12-1957: 1☿).

*Vespula germanica* (FABRICIUS 1793)

References: SAUNDERS (1903), BLÜTHGEN (1940), GARDNER & CLASSEY (1959), ERLANDSSON (1978).

Collections: A.M.F. Aguiar; Hope Entomological Collections (OUM); Museu Municipal; S. Roberts; J. Smit.

Months: **1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12**

Distribution: Europe, North Africa, Canary Islands, Madeira, palearctic Asia to northern India.

Biology: The nests are always found in dark places, for instance in the ground and in cavities in walls. It may have up to eight horizontal combs, all made of paper (masticated wood). The larvae are fed by the workers with a variety of insects.

Data: 43 specimens; 1♂, 12♀♀, 30☿☿: (SE: 2♀♀, 2☿☿ T.V.W.), Barreira (JT 19-02-1998: 1☿), Camacha; Ribeirinha (AF 11-1990: 1☿, 13-11-1996: 1☿), Caramujo (BP 6/14-08-1935: 3☿☿), Chão de Ribeira (JT 19-05-1998: 1☿), Fajã de Nogueira (AF 17-03-1995: 1♀), Funchal (SE 3-01-1901: 1☿), (ES 19-07-1975: 1♀), Funchal; Jardim Botanico (SJ 9-07-1997: 2☿☿), Funchal, Monte (SE 4-03-1902: 2ex), Funchal; Santo Amaro (JT 31-05-1998: 1♀), Funchal; Soccoridos valley (SJ 10-07-1997: 1☿), João Frino (SJ 19-07-1997: 1☿), Lombada dos Marinheiros (RS 15-08-1993: 2☿☿), (SJ 15-07-1997: 1♀), Loreto (SJ 1-05-1998: 1☿), Madalena do Mar (SJ 15-07-1997: 1☿), Montado do Barreiro (*M 24-10-1938: 1☿), (JT 15-05-1998: 1♂), Palheiro Ferreiro (GC 12-1957: 1☿), Pico do Arieiro (ED 10-03-1981: 1♀, 11-03-1981: 1♀), Poço de Neve (SJ 11-07-1997: 1☿), Portela (FM 21-09-1994: 1☿), Rabaçal (BP 17-07/4-08-1935: 3☿☿), Ribeira Brava (JT 3-03-1998:

2♂♂), Ribeira das Cales (GC 12-1957: 1♀), Ribeira Frio (ES 22-09-1976: 1♀), Ribeira São Jorge (ES 17-09-1976: 1♀), Santana (ES 17-09-1976: 1♀), São Jorge (SJ 4-05-1998: 1♂).

## Sphecidae

### *Sceliphron caementarium* (DRURY 1773)

References: ERLANDSSON (1978), SAUNDERS (1903)

Note: SAUNDERS (1903) reports *Sceliphron tubifex* (LATREILLE 1809) collected by T.V. Wollaston, LOMHOLDT (1975) examined this material and identified it as *S. caementarium*. In the collection of the Museu Municipal, a specimen identified as *S. tubifex*, also proved to be *S. caementarium* (det. J. Smit).

Collections: A.M.F. Aguiar; Hope Entomological Collections (OUM); Museu Municipal; J. Smit.

Months: 1 - 2 - 3 - 4 - **5** - **6** - **7** - **8** - 9 - **10** - 11 - 12

Distribution: North America, Mexico, Puerto Rico, the Caribbean, Peru, India, China, Japan, The Philippines, Indonesia, Micronesia, Polynesia, Australia, Mediterranean, Madeira.

Note: The species is originally an inhabitant of North America, but it has expanded its distribution over large parts of the world, as a result of deliberate and/or accidental introductions.

Biology: The nest is built of mud and is usually attached to stone walls and rocks. The nest is provisioned with web-spinning spiders.

Data: 55 specimens; 19♂♂, 36♀♀: (SE 1♂, 3♀♀), Camacha; Santa Cruz (AF 30-10-1996: 1♀), Camara de Lobos (ES 28-07-1975: ♀), Campanario (JT 23-05-1998: 2♂♂), Funchal (*M 27-06-1941: 1♀, 12-07-1959: 1♀, 16-07-1967: 1♀), (ES 17-07-1968: ♂, 19-07-1968: 4♂♂♀♀, 18-08-1968: ♀♀, 21-07-1972: ♂♀, 26-07-1972: ♀♀, 29-07-1972: ♂, 28-06-1973: ♀♀, 17-07-1974: ♀, 21-07-1975: ♂), (LO 2-09-1973: 3♀♀), Funchal; Boa Vista (AF 22-06-1989: 1♂), Funchal; Casino Parque (FM 26-09-1994: 2♀♀), Funchal; Jardim Municipal (JT 30-05-1998: 2♂♂, 31-05-1998: 1♂ 1♀), Funchal; Pico de Santo Antonio (JT 8-06-1998: 1♀, 11-06-1998: 1♀), Funchal; Pico dos Barcelos (SJ 7-07-1997: 1♀, 8-07-1997: 1♀, 15-07-1997: 1♀), (JT 10-06-1998: 3♀♀), Funchal; Soccoridos valley (JT 23-05-1998: 1♂, 7-06-1998: 1♂), (SJ 10-07-1997: 1♂ 1♀), Monta dos Barreiros (*M 15-08-1939: 1♂), Palheiro Ferreiro (SJ 19-07-1997: 1♀), Ribeira Brava (JT 21-05-1998: 1♀), Santa Cruz (ES 19-07-1972: ♀), (WE 30-07-1962: 1♀).

### *Podalonia rothi* (BEAUMONT 1949)

References: SAUNDERS (1903)

Note: SAUNDERS (1903) reports *Ammophila hirsuta* (SCOPOLI 1763) collected by T.V. Wollaston. LOMHOLDT (1975) has proved it to be *Podalonia rothi*.

Collections: A.M.F. Aguiar; Hope Entomological Collections (OUM); Museu Municipal; S. Roberts; J. Smit.

Months: 1 - 2 - 3 - 4 - 5 - **6** - **7** - **8** - 9 - 10 - 11 - 12

Distribution: North Africa, Madeira.

Biology: No references are available about the biology of this species. The species of this genus make their nests in the soil. The prey used for provisioning the nests consists of lepidoptera larvae. I would expect the same for this species.

Data: 30 specimens; 17♂♂, 13♀♀: (SE: 2♂♂ 2♀♀), Achada do Teixeira (MG 21-06-1987: 1♀), Chão de Lagoa (*M 30-07-1979: 1♂ 1♀), Fontes (SJ 16-07-1997: 10♂♂ 1♀), Funchal; Monte (WE 13-07-1963: 2♂♂), Paúl da Serra (AF 23-09-1989: 3♀♀), (SJ 20-07-1997: 2♀♀), Paúl da Serra; Estanquinhos (AF 1-07-1989 1♂ 1♀), Poiso (RS 17-08-1993: 1♂ 1♀), Santana; Pico das Pedras (AF 14-08-1985: 1♀).

### *Podalonia tydei* (GUILLOU 1841)

References: KOHL (1907, op.cit.), LOMHOLDT (1975)

Collections: A.M.F. Aguiar; M. Jenner; J. Smit.

Months: 1 - 2 - 3 - **4** - **5** - **6** - **7** - **8** - **9** - **10** - 11 - 12

Distribution: Central and south Europe, north Africa, Canary Islands, Madeira, central Asia, Australia.

Biology: This species makes its nests in the soil. The prey used for provisioning the nests consists of lepidoptera larvae. These are paralysed by means of stings in several places.

Data: 23 specimens; 4♂♂, 18♀♀, 1?: Camacha; city garden (FM 21-09-1994: 2♀♀), Funchal; Gorgulio (AF10-10-1993: 1♀), Funchal; Pico de Santo Antonio (JT 11-06-1998: 1♀), Funchal; Pico dos Barcelos (JT 12-05-1998: 1♀), João Frino (SJ 19-07-1997: 1♀), Ponta de São Lourenço (SJ 2-05-1998: 6♀♀, 3-05-1998: 1♀), Porto Santo; Villa Baleira (FM 19-09-1994: 3♂♂ 1♀), (JT 18-04-1998: 2♀♀, 19-04-1998: 1♀, 20-04-1998: 1♂ 1♀), São Martinho (JM 23-09-1995).

### *Psenulus* aff. *pallipes* (PANZER 1797)

New record for Madeira. First specimen collected in 1998 by J.T. Smit.

Note: The supra-clypeal area has a small dent at one third of its length. *P. pallipes* does not have such a dent. The proportion in length and width of this area is in *P. pallipes* 2.1 and in our specimens it is 1.8.

Collections: J. Smit.

Months: 1 - 2 - 3 - 4 - **5** - **6** - 7 - 8 - 9 - 10 - 11 - 12

Distribution: Only known from Madeira?

Biology: As *Psenulus pallipes* makes its nest in dead wood and stems, I would expect the same for this species. The prey of most species of this genus are aphids (Homoptera).

Data: 5 specimens; 5♀♀: Funchal; Jardim Municipal (TJ 31-05-1998: 4♀♀, 6-06-1998: 1♀).

### *Passaloecus gracilis* (CURTIS 1834)

References: ERLANDSSON (1978)

Collections: A.M.F. Aguiar; J. Smit.

Months: 1 - 2 - 3 - **4** - **5** - **6** - 7 - **8** - 9 - 10 - 11 - 12

Distribution: Holarctic.

Biology: The nests are made in stems of plants, in beetle-borings in dead wood or in galls. The prey consists of various aphids.

Data: 13 specimens; 8♂♂, 5♀♀: (AF 08-1988: 2♀♀), Camacha (SJ 19-07-1997: 5♂♂), Caniço; Garajau (JT 15-06-1998: 2♀♀), Funchal (ES 31-08-1973:♂), Funchal; Soccoridos valley (JT 3-04-1998: 1♂, 7-06-1998: 1♀), Ponta do Pargo (JT 19-05-1998: 1♂).

*Spilomena canariensis* BISCHOFF 1937

References: ERLANDSSON (1978)

Months: 1 - 2 - 3 - 4 - 5 - 6 - 7 - **8** - 9 - 10 - 11 - 12

Distribution: Endemic to the Canary Islands and Madeira.

Biology: No references are available about the biology of this species.

Data: 8 specimens; 8♀♀: Funchal (22-08-1972: ♀, 1-08-1974: 5♀♀, 17-07-1974: ♀, 25-07-1974: ♀).

*Astata boops* (SCHRANK 1781)

New record for Madeira. First specimen collected in 1989 by A.M.F. Aguiar.

Collections: A.M.F. Aguiar; S.F. Gayubo; S. Roberts; J. Smit.

Months: 1 - 2 - 3 - 4 - 5 - 6 - 7 - **8** - **9** - 10 - 11 - 12

Distribution: Europe, Asia eastwards to Korea.

Note: The specimens from Madeira are very dark, most of them have a black abdomen. In some specimens, the segments 1, 2, (3) of the abdomen are reddish, but very darkened.

Biology: This species makes its nests in the soil. The cells are provisioned with nymphal treebugs (Pentatomidae).

Data: 17 specimens; 14♂♂, 3♀♀: Funchal; Lombo da Boa Vista (AF 21-09-1991: 1♀), João Frino (SJ 19-07-1997: 6♂♂), Lombada dos Marinheiros (SJ 15-07-1997: 1♀), Poiso (RS 17-08-1993: 1♂), (FM 11-09-1994: 4♂♂ 1♀), Porto Moniz; Achada da Cruz (AF 12-07-1989: 1♂, 19-09-1989: 2♂♂).

*Liris atrata* SPINOLA 1805

References: GARDNER & CLASSEY (1959)

Note: GARDNER & CLASSEY report *Liris nigrita* (LEPELETIER 1845), this is a junior synonym of *L. atrata*.

Collections: A.M.F. Aguiar; J. Smit.

Months: 1 - 2 - 3 - 4 - **5** - 6 - 7 - 8 - 9 - 10 - 11 - **12**

Distribution: (north-west) Italy, France, Spain, Portugal, north-Africa, Canary Islands, Cape Verde Islands, Madeira.

Biology: The nest is made in the soil. They hunt Orthoptera, especially crickets (Gryllidae).

Data: 5 specimens; 2♂♂, 3♀♀: Camara de Lobos (SJ 3-05-1998: 2♂♂ 1♀), Funchal; Marina (AF 24-12-1990: 1♀), Gorgulho (GC 12-1957: 1♀).

*Tachysphex lindbergi* BEAUMONT 1956

References: ERLANDSSON (1978).

Collections: S.F. Gayubo; J. Smit.

Months: 1 - 2 - 3 - 4 - **5** - 6 - 7 - 8 - 9 - 10 - 11 - 12

Distribution: Endemic to the Cape Verde Islands, Madeira.

Biology: No references on the biology of this species are available.

Data: 8 specimens; 3♂♂, 5♀♀: Fontes (SJ 16-07-1997: 1♀), Pico de Arieiro (ES 19-07-1968: ♀), Ponta do Pargo (SJ 5-05-1998: 3♂♂ 2♀♀), (JT 19-05-1998: 1♀).

### *Trypoxylon* aff. *clavicerum* LEPELETIER & SERVILLE 1825

New record for Madeira. First specimen collected in 1988 by A.M.F. Aguiar.

Collections: A.M.F. Aguiar; J. Smit.[1]

Months: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - **9** - 10 - 11 - 12

Distribution: Only known from Madeira?

Biology: As *Trypoxylon clavicerum* hunts for small spiders, I would expect the same to be true of this species.

Data: 2 specimens; 2♂♂: Funchal (AF 09-1988: 1♂), Garajau, Caniço (JT 3/6-07-1998: 1♂).

### *Crossocerus elongatulus* (VANDER LINDEN 1829)

New record for Madeira. First specimen collected in 1996 by A.M.F. Aguiar.

Collections: A.M.F. Aguiar; J. Smit.

Months: 1 - 2 - 3 - **4** - **5** - **6** - 7 - **8** - 9 - 10 - 11 - 12

Distribution: Europe, north Africa, Madeira, central Asia, North America.

Note: This species was not collected on Madeira before 1996. There are many records (42) from the years 1996-1998, from 19 different localities that are scattered nearly all over the island.

Biology: The nests are made in the soil, but also in crevices in walls and pavements. The prey consists of flies of several families.

Data: 42 specimens; 23♂♂, 19♀♀: Camara de Lobos; Preces (AF 19-08-1996: 1♂), Chão de Ribeira (JT 19-05-1998: 1♂, 23-05-1998: 2♂♂ 2♀♀), Faial (SJ 4-05-1998: 2♂♂), Fontes (SJ 16-07-1997: 3♀♀), Funchal; Jardim Botanico (JT 11-04-1998: 1♂), Funchal; Funchal; Pico de Santo Antonio (JT 28-05-1998: 1♂), Funchal; Soccoridos valley (JT 3-04-1998: 1♀, 7-06-1998: 1♂ 1♀, 10-07-1998: 1♀), João Frino (SJ 19-07-1997: 2♀♀), Lombada dos Marinheiros (SJ 15-07-1997: 1♀), Loreto (SJ 5-05-1998: 4♂♂), Madalena do Mar (SJ 15-07-1997: 1♂ 1♀), Palheiro Ferreiro (SJ 6-05-1998: 4♂♂), Paúl da Serra (SJ 20-07-1997: 1♀), Poço de Neve (SJ 11-07-1997: 1♀), Portela (SJ 19-07-1997: 1♀), Santa Quiteria (JT 31-05-1998: 1♂), São Jorge (SJ 4-05-1998: 2♂♂), Serra da Eira (JT 5-04-1998: 1♂), Terreiro da Luta (SJ 6-05-1998: 3♂♂ 2♀♀).

### *Ectemnius cephalotes* (OLIVIER 1791)

References: ERLANDSSON (1978).

Collections: A.M.F. Aguiar; J. Smit.

Months: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - **9** - 10 - 11 - 12

Distribution: Europe, Ural, Turkey, Morocco, Madeira.

Biology: This wasp makes its nests in beetle-borings in dead wood and also in crevices in walls. The prey consists of flies of different families.

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[1] There is also a female specimen of *Trypoxylon* in the Hope Entomological Collections among the Wollaston material; this specimen has not been critically examined and has no data attached.

Data: 4 specimens; 3♂♂, 1♀: Palheiro Ferreiro (SJ 19-07-1997: 1♂), Ponta do Sol; Lugar do Baixo (AF 7-10-1991: 1♂), Ribeiro Frio (ES 22-09-1976: ♂), Santana (AF 16-10-1992: 1♀).

*Ectemnius continuus* ssp. *rufitarsis* DALLA TORRE 1897

New record for Madeira. First specimen collected in 1991 by A.M.F. Aguiar.

Collections: A.M.F. Aguiar; J. Smit.

Months: 1 - 2 - 3 - **4** - 5 - **6** - **7** - 8 - **9** - 10 - 11 - 12

Distribution: Endemic on the Canary Islands, Madeira.

Biology: The female makes the nests in beetle-borings in dead wood. The prey consists of many different species of flies.

Data: 13 specimens; 7♂♂, 6♀♀: Fontes (SJ 16-07-1997: 1♂ 1♀), João Frino (SJ 19-07-1997: 2♂♂), Lombada dos Marinheiros (SJ 15-07-1997: 1♂ 1♀), Palheiro Ferreiro (SJ 19-07-1997: 3♂♂ 1♀), Ponta do Sol; Lugar do Baixo (AF 30-09-1991: 1♀, 27-04-1992: 1♀, 17-06-1992: 1♀).

*Ectemnius sexcinctus* (FABRICIUS 1775)

New record for Madeira. First specimen collected in 1976 by A.M.F. Aguiar.

Collections: A.M.F. Aguiar; S. Roberts; J. Smit.

Months: 1 - 2 - 3 - 4 - 5 - 6 - 7 - **8** - **9** - 10 - 11 - 12

Distribution: Central and south Europe, Turkey, south Siberia, Mongolia, Pakistan, Kashmir, Afghanistan, west China.

Biology: The nests are made in rotten wood, including fences. There have even been nests found in polystyrene. As prey, they use hoverflies.

Data: 8 specimens; 4♂♂, 4♀♀: Fontes (SJ 16-07-1997: 3♂♂), São Jorge (SJ 12-07-1997: 1♀), Poiso (RS 17-08-1993: 1♀), (FM 11-09-1994: 1♀), Santana; Queimadas (AF 22-07-1976: 1♂), Serra do Fanal (AF 1-09-1984: 1♀).

## Conclusions

24 species of aculeate wasps have been collected from Madeira so far. One species has only been reported from before 1980 (*Spilomena canariensis*). Ten species are recorded for the first time from Madeira, of which 8 species have been collected new for the fauna of Madeira since 1980: *Priocnemis faillae* ssp. *corax*, *Dipogon variegatus*, *Euodynerus variegatus*, *Astata boops*, *Psenulus* aff. *pallipes*, *Trypoxylon* aff. *clavicerum*, *Crossocerus elongatulus*, *Ectemnius continuus* ssp. *rufitarsis*.

## Affinities

The average percentage of endemic species of the terrestrial fauna of Madeira, studied so far is 27% (BAEZ 1993), although the percentage varies strongly in the different groups. For the Hymenoptera it is 20%. From the aculaete wasps only 4%, one species, is endemic to the Madeira archipelago. Another 16%, four species, is endemic to Madeira in combination with the Canary Islands, or the Cape Verde Islands.

According to BAEZ (1993) the majority of the terrestrial fauna of Madeira is of Western Palearctic origin. Most of the wasps of Madeira, namely 62%, 15 species, are indeed of Western Palearctic origin.

Baez (1993) also reports that most faunistic groups of Madeira have strong affinities with the central European fauna and "slightly weaker" affinities to the Mediterranean fauna. From the Palearctic 15 species eleven species (46%) have strong affinities to the central European wasps and four species (16%) have strong affinities to the Mediterranean fauna.

## Discussion

- LOMHOLDT (1975) reports the presence of four species of Sphecidae from Madeira; *Sceliphron caementarium*, *Podalonia tydei*, *Podalonia rothi* and *Liris atrata* (= *Notogonia nigrita*). He concludes that only one of these species (*Sceliphron caementarium*) has been able to get a real "foothold" in Madeira.

Regarding the number of records now available of the other three species, it is likely that they have also colonised the island. However the number of records of *Liris atrata* is rather small.

- *Spilomena canariensis* has been reported by ERLANDSSON (1978), he mentions eight specimens captured in 1972 and 1974. After this the species has not been collected again from Maderia, in spite of the increased collecting activities since 1980. So it is doubtful whether the species is still present on the island.

- Of *Psenulus* aff. *pallipes*, 5 females have been collected, in about one week of 1998 at the same place, a city park. This park is rather close to the harbour, so it is possible that these specimens have been introduced unintentionally by means of imported wood, in which the species was nesting.

- *Crossocerus elongatulus* has shown up recently on Madeira. No records are available previous to 1996 of this species. Since 1996, 42 specimens have been collected from nearly all over the island. So it seems that this species has colonised the island rather quickly.

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