Standardised inventories of spiders (Arachnida, Araneae) of Macaronesia II: The native forests and dry habitats of Madeira archipelago (Madeira and Porto Santo islands)

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Abstract

Background

Here we present the data obtained from the samples collected as part of a large research project (MACDIV) which aims at understanding the drivers of spider (Araneae) community assembly in Macaronesian islands. To obtain the data, we applied the sampling protocol COBRA (Conservation Oriented Biodiversity Rapid Assessment), in twelve 50 m x 50 m native forest plots and five dry habitat plots on the island of Madeira and in 5 dry habitat plots on the island of Porto Santo. Through this publication, we contribute to the knowledge of the arachnofauna of the Madeiran archipelago.

New information

From the samples that we collected, we obtained a total of 14,902 specimens, of which 49% were adults (7,263). We identified these specimens to 87 species and 18 morphospecies (undescribed), belonging to 26 families. Species of the family Linyphiidae dominated the samples, with 24 (morpho)species. Out of the 105 recorded (morpho)species, 34 were endemic, 26 native non-endemic, 22 introduced and 23 species of unknown origin. We report seven new records of possibly recently introduced species in the Madeiran archipelago. We also present 21 new records for Madeira island and 32 for Porto Santo (33 for the whole archipelago).

Keywords

Arthropoda, Araneae, Madeira, Porto Santo, native forest, dry habitat, exotic species, standardised sampling

Introduction

The north Atlantic archipelago of Madeira is composed of the volcanic islands of Madeira, Porto Santo and the Desertas, as well several islets. At approximately 700 km from the African coast and at more than 400 km from the Canary Islands, it is the second most isolated Macaronesian archipelago, after the Azores. This intermediate distance, combined with an geological age of 5-27 My, has allowed frequent colonisation rates and enough diversification time to generate diverse species communities (Fernández-Palacios 2010, Fernández-Palacios et al. 2011). Since its settlement in the XV Century by the Portuguese, the archipelago has gone through a profound environmental transformation. Nevertheless, the main island of the archipelago, i.e. Madeira, still preserves a considerable area of unique native laurel forest (laurisilva), covering 20% of the island (Boieiro et al. 2015, Boieiro et al. 2018).
The laurisilva is indeed a unique and iconic ecosystem, that is often seen as representative of the Macaronesian archipelagos as a whole and contains a great deal of endemic species (Boieiro et al. 2010, Boieiro et al. 2013, Borges et al. 2008). However, the archipelago is also the home of more open habitats, such as scrublands and thermophilous grasslands, present in drier conditions than those where laurisilva is found. Although these often overlooked dry habitats may not be as species-rich as forests, they do contribute to the endemic fauna of the archipelago, which represent 20% of all the species (Borges et al. 2008). Moreover, Madeiran dry habitats may also contain a substantial number of unknown species that have eluded recent taxonomic, conservation and faunistic research, including IUCN Red List assessments (Martín et al. 2008, Martín et al. 2010, Silva et al. 2008, Cardoso et al. 2017), as well as unrecorded exotic species (Silva et al. 2008).

The need for an update in many taxa is exemplified by spiders. Although, according to the last available checklist (Cardoso and Crespo 2008), the spider fauna of Madeira archipelago is composed of 183 species (including 58 endemic species), new taxa have been discovered since then (e.g. Crespo et al. 2009, Crespo et al. 2014).

This publication is the second of a series on Macaronesian spider fauna (see Malumbres-Olarte et al. 2019) and provides habitat, biogeographic and colonisation information on the species collected in 12 native forest plots and 10 native dry habitat plots on the islands of Madeira and Porto Santo through the project MACDIV.

### Sampling methods

**Study extent:** We established twenty-two 50 m × 50 m plots, grouped according to habitat and between-plot distances. Twelve plots were located in areas covered with laurisilva and grouped in two sets of six. Within each set, plots were placed at increasing distances from a first, reference plot (Table 1): 0.1, 1, 5, 10 and 20 km (Fig. 1). The remaining 10 plots were located in areas of open dry habitat, five on Madeira island and five on Porto Santo, also at increasing distances from a reference plot (0.1, 1, 5 and 10 km). This design allowed for testing of distance decay patterns on beta diversity on a log scale. We set up the forest plots in well-preserved native forest areas, where native tree species, such as *Clethra arborea*, *Laurus novocanariensis*, *Ocotea foetens* and *Persea indica*, were dominant (Neves et al. 1996, Menezes et al. 2005) (Fig. 2). We set the dry plots in grasslands at low-altitude, where the vegetation cover was dominated by herbaceous species and several shrubs, like *Echium* spp, *Euphorbia piscatoria* and *Globularia salicina* (Medeiros et al. 2010) (Fig. 3).

| Plot name (island) | Habitat | Longitude   | Latitude  |
|--------------------|---------|-------------|-----------|
| Madeira d1         | Dry     | -16.70261   | 32.74633  |
| Madeira d2         | Dry     | -16.70307   | 32.74691  |

Table 1. Coordinates and habitat type of sampling plots.
| Plot name (island) | Habitat  | Longitude  | Latitude  |
|-------------------|----------|------------|-----------|
| Madeira d3        | Dry      | -16.71886  | 32.74618  |
| Madeira d4        | Dry      | -16.75788  | 32.72623  |
| Madeira d5        | Dry      | -16.8138   | 32.66138  |
| Madeira f1        | Forest   | -16.9371   | 32.79582  |
| Madeira f2        | Forest   | -16.93654  | 32.79801  |
| Madeira f3        | Forest   | -16.9347   | 32.80462  |
| Madeira f4        | Forest   | -16.90233  | 32.78108  |
| Madeira f5        | Forest   | -16.88654  | 32.73302  |
| Madeira f6        | Forest   | -17.15781  | 32.82816  |
| Madeira f7        | Forest   | -17.15871  | 32.82706  |
| Madeira f8        | Forest   | -17.15336  | 32.82306  |
| Madeira f9        | Forest   | -17.11369  | 32.79154  |
| Madeira f10       | Forest   | -17.05499  | 32.7746   |
| Porto_Santo 1     | Dry      | -16.30453  | 33.09135  |
| Porto_Santo 2     | Dry      | -16.30536  | 33.0921   |
| Porto_Santo 3     | Dry      | -16.32426  | 33.09041  |
| Porto_Santo 4     | Dry      | -16.36452  | 33.07376  |
| Porto_Santo 5     | Dry      | -16.38267  | 33.03804  |

**Sampling description:** We applied two versions of the optimised and standardised COBRA protocol (Conservation Oriented Biodiversity Rapid Assessment) (Cardoso 2009): the protocol for temperate forests (which we applied in forest plots) and the protocol for open habitats (applied to dry habitat plots). The COBRA protocols have been proposed as part of standard inventorying and monitoring programmes on island and continental ecosystems and have already been used for a number of studies on spiders and beetles (Cardoso 2009, Borges et al. 2018, Malumbres-Olarte et al. 2017, Malumbres-Olarte et al. 2018, Crespo et al. 2018). The forest COBRA protocol consisted of: four night aerial samples (1 hour / sample), two day sweeping samples and two night sweeping samples (1 hour / sample), two day beating samples and two night beating samples (1 hour / sample) and 12 pitfall samples (4 traps / sample). In addition, we collected the following samples to also cover beetle diversity (beetle data will be included in future publications): two diurnal active aerial searching under bark, lichens and bryophytes (ABS) (1 hour / sample) and two diurnal active aerial searching in decaying trunks, dead wood on the ground and under stones (GWS) (1 hour / sample). The protocol for dry open areas was composed of: four night ground samples (1 hour / sample) and four day sweeping samples and four night sweeping samples (1 hour / sample). Sampling occurred in August 2016 (forest habitat plots of Madeira) and April 2017 (dry habitat plots of Madeira and Porto Santo).
Figure 1.
Location of plots on Madeira and Porto Santo islands. MF: Madeira forest habitat plots. MD: Madeira dry habitat plots. PSD: Porto Santo dry habitat plots. Numbers correspond to plot numbers.

a: Madeira and Porto Santo Islands  
b: Archipelago of Madeira  
c: Madeira forest habitat plots 6-12  
d: Madeira forest habitat plots 1-6  
e: Madeira dry habitat plots 1-5  
f: Porto Santo dry habitat plots 1-5
Figure 2. [doi]
Forest habitat Plot 3 of Madeira island (Credit: Jagoba Malumbres-Olarte).

Figure 3. [doi]
Dry habitat Plot 1 of the island of Porto Santo (Credit: Jagoba Malumbres-Olarte).
Geographic coverage

Description: Madeira and Porto Santo islands, Madeira, Macaronesia, Portugal

Coordinates: 32.66138 and 33.0921 Latitude; -17.15871 and -16.30453 Longitude.

Taxonomic coverage

Taxa included:

| Rank | Scientific Name | Common Name |
|------|-----------------|-------------|
| order | Araneae         | Spiders     |

Temporal coverage

Data range: 2016-8-01 - 2017-4-30.

Notes: Sampling in the native forest occurred in August 2016. Sampling in dry habitats occurred in April 2017.

Collection data

Collection name: Dalberto Teixeira Pombo insect collection at the University of Azores

Collection identifier: DTP

Specimen preservation method: All specimens were preserved in 96% ethanol

Curatorial unit: Dalberto Teixeira Pombo insect collection at the University of Azores (Curator: Paulo A. V. Borges)

Usage rights

Use license: Open Data Commons Attribution License

Data resources

Data package title: MACDIV_COBRA_Madeira_Forest_and_Dry

Resource link: http://ipt.gbif.pt/ipt/resource?r=spiders_madeira

Alternative identifiers: http://islandlab.uac.pt/software/ver.php?id=38

Number of data sets: 1
Data set name: MACDIV_COBRA_Madeira_Forest_and_Dry

Download URL: http://ipt.gbif.pt/ipt/resource?r=spiders_madeira

Data format: Darwin Core Archive

Data format version: version 1

Description: The following data table includes all the records for which a taxonomic identification of the species was possible. The dataset submitted to GBIF is structured as a sample event dataset, with two tables: event (as core) and occurrences. The data in this sampling event resource have been published as a Darwin Core Archive (DwCA), which is a standardised format for sharing biodiversity data as a set of one or more data tables. The core data table contains 562 records (eventID). One extension data table also exists with 3281 occurrences. An extension record supplies extra information about a core record. The number of records in each extension data table is illustrated in the IPT link. This IPT archives the data and thus serves as the data repository. The data and resource metadata are available for downloading in the downloads section.

| Column label               | Column description                                                      |
|----------------------------|------------------------------------------------------------------------|
| Table of Sampling Events   | Table with sampling events data (beginning of table)                   |
| id                        | Unique identification code for sampling event data                     |
| eventID                   | Identifier of the events, unique for the dataset                       |
| samplingProtocol          | The sampling protocol used to capture the species                      |
| sampleSizeValue           | The numeric amount of time spent in each sampling                      |
| sampleSizeUnit            | The unit of the sample size value                                      |
| samplingEffort            | The amount of time of each sampling                                   |
| eventDate                 | Date or date range the record was collected                            |
| eventTime                 | Time of the day the record was collected                               |
| startDayOfYear            | The earliest ordinal day of the year on which the event occurred       |
| endDayOfYear              | The latest ordinal day of the year on which the event occurred         |
| year                      | Year of the event                                                      |
| month                     | Month of the event                                                     |
| day                       | Day of the event                                                       |
| habitat                   | The surveyed habitat                                                   |
| fieldNumber               | The code given to each sample                                          |
| locationID                | Identifier of the location                                             |
| islandGroup               | Name of archipelago                                                    |
| island                  | Name of the island                      |
|------------------------|-----------------------------------------|
| country                | Country of the sampling site            |
| countryCode            | ISO code of the country of the sampling site |
| stateProvince          | Name of the region of the sampling site |
| locationRemarks        | Details on the locality site            |
| decimalLatitude        | Approximate centre point decimal latitude of the field site in GPS coordinates |
| decimalLongitude       | Details on the locality site            |
| Details on the locality site | The reference point for the various coordinate systems used in mapping the earth |
| coordinateUncertaintyInMetres | Uncertainty of the coordinates of the centre of the sampling plot |
| coordinatePrecision    | Precision of the coordinates            |
| georeferenceSources    | A list (concatenated and separated) of maps, gazetteers or other resources used to georeference the Location, described specifically enough to allow anyone in the future to use the same resources. |

| Table of Species Occurrence | Table with species abundance data (beginning of new table) |
|-----------------------------|----------------------------------------------------------|
| id                          | Unique identification code for species abundance data |
| type                        | Type of the record, as defined by the Public Core standard |
| licence                     | Reference to the licence under which the record is published |
| institutionID               | The identity of the institution publishing the data |
| collectionID                | The identity of the collection publishing the data |
| institutionCode             | The code of the institution publishing the data |
| collectionCode              | The code of the collection where the specimens are conserved |
| datasetName                 | Name of the dataset |
| basisOfRecord               | The nature of the data record |
| dynamicProperties           | The name of the scientific project funding the sampling |
| occurrenceID                | Identifier of the record, coded as a global unique identifier |
| catalogNumber               | Record number of the specimen in the collection |
| recordedBy                  | Name of the person who performed the sampling of the specimens |
| individualCount             | Total number of individuals captured |
| organismQuantityType        | The unit of the identification of the organisms |
| sex                         | The sex and quantity of the individuals captured |
| lifeStage                   | The life stage of the organisms captured |
| establishmentMeans | The process of establishment of the species in the location, using a controlled vocabulary: 'naturalised', 'introduced', 'endemic', "unknown" |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------|
| occurrenceStatus    | Information about the presence/absence of the species                                                                                                                                     |
| eventID             | A unique identifier of an occurrence                                                                                                                                                      |
| identifiedBy        | Name of the person who made the identification                                                                                                                                            |
| dateIdentified      | Date on which the record was identified                                                                                                                                                   |
| scientificName      | Complete scientific name including author and year                                                                                                                                          |
| kingdom             | Kingdom name                                                                                                                                                                               |
| phylum              | Phylum name                                                                                                                                                                                |
| class               | Class name                                                                                                                                                                                 |
| order               | Order name                                                                                                                                                                                 |
| family              | Family name                                                                                                                                                                                 |
| genus               | Genus name                                                                                                                                                                                  |
| specificEpithet     | Specific epithet                                                                                                                                                                            |
| taxonRank           | Lowest taxonomic rank of the record                                                                                                                                                         |
| scientificNameAuthorship | Name of the author of the lowest taxon rank included in the record                                                                         |

### Additional information

**Results**

We collected a total of 14,902 specimens – of which 49% were adults (7,263) - belonging to 105 (morpho) species and 26 families (Tables 2, 3, 4) - 87 species and 18 morphospecies (undescribed) (Malumbres-Olarte et al. 2019b). The number of species per plot oscillated between 19-32, with the minimum in the dry Plot 4 of Porto Santo (PS4) and the maximum number in Plot 3 of Madeiran forest (MF3). Out of the recorded (morpho)species, 34 were endemic, 26 native non-endemic, 22 introduced and 23 species of unknown origin. We report seven new records of introduced species in the Madeiran archipelago. On Madeira island, we recorded 88 (morpho)species, of which 26 were endemic, 26 native non-endemic, 19 introduced and 17 species of unknown origin. On Porto Santo island, we recorded 48 (morpho)species, of which 12 were endemic species, 7 native non-endemic species, 14 introduced species and 15 species of unknown origin. We present 21 new records for Madeira island and 32 for Porto Santo (33 for the whole archipelago).
Table 2.
Abundance, biogeographic category and previous records of (morpho)species in six of the forest plots on Madeira island. Abbreviations: Plot names: Madeira forest (MF); Madeira dry habitat (MD); Porto Santo dry habitat (PSD). Biogeographic category (Biog. cat): Endemic (END); Introduced (INT); Macaronesian (MAC); Native non-endemic (NAT); Unknown (UK). Previous records (Prev. Rec.): Madeira (M), Porto Santo (PS), Not recorded (No). Reference for previous records: List of Madeiran Fauna (LMF) (Borges et al. 2008), World Spider Catalogue (WSC) (Natural History Museum Bern 2019).

| Family      | Species                          | Biog.Cat. | Prev. Rec. | MF1 | MF2 | MF3 | MF4 | MF5 | MF6 |
|-------------|----------------------------------|-----------|------------|-----|-----|-----|-----|-----|-----|
| Agelenidae  | *Eratigena feminea* (Simon, 1870) | UK        | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Agelenidae  | *Synaphris saphrynis* Lopardo, Hormiga & Melic, 2007 | UK | No | 0   | 0   | 0   | 0   | 0   | 0   |
| Agelenidae  | *Tegenaria domestica* (Clerck, 1757) | I         | M          | 0   | 0   | 1   | 0   | 0   | 1   |
| Araneidae   | *Agalenatea redii* (Scopoli, 1763) | I         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Araneidae   | *Araniella maderiana* (Kulczyński, 1905) | N         | M, PS      | 0   | 0   | 0   | 2   | 0   | 0   |
| Araneidae   | *Argiope trifasciata* (Forskål, 1775) | UK        | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Araneidae   | *Cyclosa maderiana* Kulczyński, 1899 | N          | M          | 0   | 0   | 0   | 0   | 1   | 0   |
| Araneidae   | *Cyrtophora citricola* (Forskål, 1775) | I         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Araneidae   | *Mangora acalypha* (Walckenaer, 1802) | I         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Araneidae   | *Neoscona crucifera* (Lucas, 1838) | I         | M, PS      | 1   | 1   | 5   | 3   | 7   | 2   |
| Araneidae   | *Zygiella x-notata* (Clerck, 1757) | I         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Cheiracanthiidae | *Cheiracanthium albidulum* (Blackwall, 1859) | E     | M, PS      | 15  | 5   | 28  | 2   | 8   | 12  |
| Clubionidae | *Porholclubiona decora* (Blackwall, 1859) | N         | M, PS      | 1   | 0   | 0   | 2   | 0   | 3   |
| Dictynidae  | *Lathyis affinis* (Blackwall, 1862) | E         | M, PS      | 0   | 1   | 8   | 0   | 11  | 0   |
| Dictynidae  | *Nigma puella* (Simon, 1870)      | UK        | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Dysderidae  | *Dysdera coiffalti* Denis, 1962   | E         | M          | 0   | 1   | 1   | 0   | 0   | 0   |
| Dysderidae  | *Dysdera crocata* C.L.Koch, 1838  | I         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae | *Drassodes lutescens* (C.L.Koch, 1839) | UK       | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae | *Haplodrassus* sp. 158            | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae | *Haplodrassus* sp. 164            | UK        | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae | *Haplodrassus ommissus* (O. Pickard-Cambridge, 1872) | N | No | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae | *Heser hispanus* Senglet, 2012    | UK        | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Family       | Species                                | Biog.Cat. | Prev. Rec. | MF1 | MF2 | MF3 | MF4 | MF5 | MF6 |
|--------------|----------------------------------------|-----------|------------|-----|-----|-----|-----|-----|-----|
| Gnaphosidae  | *Macarophaeus cultior* (Kulczyński, 1899) | E         | No         | 0   | 0   | 2   | 0   | 0   | 0   |
| Gnaphosidae  | *Micaria pallipes* (Lucas, 1846)        | UK        | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae  | *Setaphis carmeli* (O.P.-Cambridge, 1872) | UK        | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae  | *Trachyzelotes holosericeus* (Simon, 1878) | UK        | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae  | *Trachyzelotes lyonneti* (Audouin, 1826) | UK        | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae  | *Zelotes aeneus* (Simon, 1878)          | I         | No (LMF), M (WSC) | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae  | *Zelotes tenuis* (L.Koch, 1866)         | I         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Gnaphosidae  | *Zimirina lepida* (Blackwall, 1859)     | E         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Agyneta canariensis* Wunderlich, 1987  | N         | No (LMF), M (WSC) | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Agyneta fuscipalpa* (C.L.Koch, 1836)   | I         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Canariellanum* sp. 21                  | E         | No         | 0   | 0   | 0   | 0   | 0   | 10  |
| Linyphiidae  | *Centromerus variegatus* Denis, 1962     | E         | M          | 0   | 0   | 0   | 2   | 0   | 0   |
| Linyphiidae  | *Ceratinopsis* sp. 111                  | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Ceratinopsis acripes* (Denis, 1962)    | N         | M          | 3   | 1   | 2   | 2   | 4   | 2   |
| Linyphiidae  | *Ceratinopsis infuscata* (Denis, 1962)  | E         | M          | 0   | 0   | 0   | 1   | 2   | 0   |
| Linyphiidae  | *Ceratinopsis* sp. 233                  | E         | No         | 0   | 0   | 1   | 0   | 0   | 0   |
| Linyphiidae  | *Ceratinopsis* sp. 58                   | E         | No         | 0   | 0   | 1   | 0   | 0   | 0   |
| Linyphiidae  | *Diplocephalus graecus* (O.P.-Cambridge, 1873) | I         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Entelecara schmitzi* Kulczyński, 1905  | UK        | M          | 2   | 5   | 5   | 0   | 5   | 0   |
| Linyphiidae  | *Frontinellina dearmata* (Kulczyński, 1899) | E         | M          | 6   | 4   | 3   | 7   | 62  | 0   |
| Linyphiidae  | *Frontiphantes fulgurenotatus* (Schenkel, 1938) | E         | M          | 0   | 0   | 1   | 0   | 3   | 4   |
| Linyphiidae  | *Leptlyphantes mauli* Wunderlich, 1992   | E         | M          | 0   | 0   | 1   | 0   | 0   | 0   |
| Linyphiidae  | *Microctenonyx subitaneus* (O.P.-Cambridge, 1875) | UK        | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Microlinyphia johnsoni* (Blackwall, 1859) | N         | M, PS      | 3   | 6   | 7   | 12  | 21  | 8   |
| Linyphiidae  | *Ostearius melanopygius* (O.P.-Cambridge, 1880) | I         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Family       | Species                                      | Biog.Cat. | Prev. Rec. | MF1 | MF2 | MF3 | MF4 | MF5 | MF6 |
|--------------|----------------------------------------------|-----------|------------|-----|-----|-----|-----|-----|-----|
| Linyphiidae  | *Palliduphantes schmitzi* (Kulczyński, 1899) | N         | M          | 5   | 0   | 1   | 10  | 0   | 17  |
| Linyphiidae  | *Parapelecopsis nemoralioides* (O. Pickard-Cambridge, 1884) | I         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Pelecopsis inedita* (O.P.-Cambridge, 1875) | I         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Tenuiphantes sp. 259*                      | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Linyphiidae  | *Tenuiphantes tenebricoloides* (Schenkel, 1938) | E         | M          | 0   | 0   | 0   | 1   | 1   | 0   |
| Linyphiidae  | *Tenuiphantes tenuis* (Blackwall, 1852)     | I         | M, PS      | 50  | 35  | 53  | 43  | 34  | 66  |
| Linyphiidae  | *Turinyphia madeirana* (Schenkel, 1938)     | E         | M          | 0   | 0   | 0   | 5   | 1   |     |
| Liocranidae  | *Mesiotelus cf. grancanariensis* Wunderlich, 1992 | N         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Lycosidae    | *Hogna insularum* (Kulczyński, 1899)        | E         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Lycosidae    | *Hogna schmitzi* Wunderlich, 1992           | E         | PS         | 0   | 0   | 0   | 0   | 0   | 0   |
| Lycosidae    | *Pardosa proxima* (C.L.Koch, 1847)          | N         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Mimetidae    | *Ero aphan* (Walckenaer, 1802)              | N         | M, PS      | 0   | 0   | 1   | 0   | 0   | 1   |
| Mysmenidae   | *Trogloneta meideirensis* Wunderlich, 1987  | E         | M          | 0   | 2   | 3   | 4   | 1   | 13  |
| Nesticidae   | *Eidmannella pallida* (Emerton, 1875)       | I         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Oecobiidae   | *Oecobius similis* Kulczyński, 1909         | N         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Oonopidae    | *Gamasomorpha insularis* Simon, 1907        | UK        | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Oonopidae    | *Oonops cf. pulcher* Templeton, 1835        | UK        | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Oonopidae    | *Opopaea concolor* (Blackwall, 1859)        | N         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Oonopidae    | *Orchestina sp. 160*                       | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Oxyopidae    | *Oxyopes sp. 80*                            | UK        | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Philodromidae| *Philodromus insulanus* Kulczyński, 1905    | E         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Philodromidae| *Philodromus MAD266*                        | UK        | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Philodromidae| *Thanatus vulgaris* Simon, 1870             | UK        | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Pholcidae    | *Pholcus madeirensis* Wunderlich, 1987      | E         | M          | 3   | 1   | 7   | 0   | 0   | 0   |
| Salticidae   | *Chalcocirus sublestus* (Blackwall, 1867)   | N         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Family      | Species                                      | Biog.Cat. | Prev. Rec. | MF1 | MF2 | MF3 | MF4 | MF5 | MF6 |
|------------|----------------------------------------------|-----------|------------|-----|-----|-----|-----|-----|-----|
| Salticidae | *Macaroeris cf. desertensis* Wunderlich, 1992 | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Salticidae | *Macaroeris cf. diligens* (Blackwall, 1867)  | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Salticidae | *Macaroeris diligens* (Blackwall, 1867)      | N         | M, PS      | 3   | 0   | 1   | 1   | 2   | 0   |
| Salticidae | *Macaroeris* sp. 8                          | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Salticidae | *Pellenes maderianus* Kulczyński, 1905       | N         | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Scytodidae | *Scytodes velutina* Heineken & Lowe, 1832    | UK        | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Segestriidae | *Ariadna maderiana* Warburton, 1892       | E         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Segestriidae | *Segestria florentina* (Rossi, 1790)       | I         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Tetragnathidae | *Meta stridulans* Wunderlich, 1987 | E         | M          | 8   | 7   | 9   | 1   | 2   | 15  |
| Theridiidae | *Cryptachaea blatta* (Urquhart, 1886)      | I         | No         | 3   | 0   | 13  | 9   | 3   | 0   |
| Theridiidae | *Dipoena longitarsis* (Denis, 1962)        | E         | M          | 0   | 0   | 0   | 1   | 0   | 0   |
| Theridiidae | *Echinotheridion gibberosum* (Kulczyński, 1899) | N         | M          | 37  | 28  | 63  | 4   | 32  | 7   |
| Theridiidae | *Enoplognatha diversa* (Blackwall, 1859)   | I         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Theridiidae | *Enoplognatha sattleri* Bösenberg, 1895    | N         | M          | 0   | 0   | 0   | 0   | 1   | 0   |
| Theridiidae | *Episinus maderianus* Kulczyński, 1905     | N         | M          | 182 | 59  | 160 | 42  | 33  | 84  |
| Theridiidae | *Kochiura aulica* (C.L.Koch, 1838)        | N         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Theridiidae | *Laseola* sp. 268                          | E         | No         | 0   | 0   | 0   | 0   | 0   | 0   |
| Theridiidae | *Macaridion barreti* (Kulczyński, 1899)   | N         | M          | 55  | 63  | 112 | 1   | 60  | 15  |
| Theridiidae | *Paidiscra orotavensis* (Schmidt, 1968)    | N         | M          | 0   | 13  | 1   | 2   | 0   | 0   |
| Theridiidae | *Rhomphaea nasica* (Simon, 1873)           | I         | M          | 0   | 1   | 2   | 0   | 0   | 1   |
| Theridiidae | *Rugathodes madeirensis* Wunderlich, 1987 | E         | M          | 48  | 2   | 2   | 156 | 8   | 96  |
| Theridiidae | *Steatoda grossa* (C.L.Koch, 1838)         | I         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Theridiidae | *Steatoda nobilis* (Thorell, 1875)        | N         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Theridiidae | *Theridion hannoniae* Denis, 1945          | UK        | M          | 0   | 0   | 0   | 0   | 0   | 0   |
| Theridiidae | *Theridion musivivum* Schmidt, 1966       | N         | M, PS      | 0   | 0   | 0   | 0   | 0   | 0   |
| Theridiidae | *Theridion* sp. 89                        | E         | No         | 4   | 2   | 2   | 2   | 11  | 1   |
### Table 3.
Abundance, biogeographic category and previous records of (morpho)species in five of the forest plots and two of the dry habitat plots on Madeira island. Abbreviations: Madeira forest plot (MF), Madeira dry plot (MD).

| Family         | Species                                         | MF7 | MF8 | MF9 | MF10 | MF11 | MF12 | MD1 | MD2 |
|----------------|------------------------------------------------|-----|-----|-----|------|------|------|-----|-----|
| Araneidae      | Eratigena feminea (Simon, 1870)                 | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Agelenidae     | Synaphris saphrynis Lopardo, Hormiga & Melic 2007 | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Araneidae      | Tegenaria domestica (Clerck, 1757)              | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Araneidae      | Agalenatea redii (Scopoli, 1763)               | 0   | 0   | 0   | 0    | 0    | 0    | 7   | 22  |
| Araneidae      | Araniella maderiana (Kulczyński, 1905)         | 3   | 0   | 3   | 0    | 0    | 1    | 0   | 0   |
| Araneidae      | Argiope trifasciata (Forskål, 1775)            | 0   | 0   | 0   | 0    | 0    | 10   | 17  |     |
| Araneidae      | Cyclosa maderiana Kulczyński, 1899             | 0   | 1   | 0   | 0    | 0    | 1    | 0   | 0   |
| Araneidae      | Cyrtophora citricola (Forskål, 1775)           | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Araneidae      | Mangora acalyphe (Walckenaer, 1802)            | 0   | 0   | 0   | 0    | 0    | 2    | 0   |     |
| Araneidae      | Neoscona crucifera (Lucas, 1838)               | 2   | 1   | 1   | 1    | 1    | 2    | 0   | 0   |
| Araneidae      | Zygiella x-notata (Clerck, 1757)               | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Cheiracanthiida| Cheiracanthium albidulum (Blackwall, 1859)     | 34  | 11  | 36  | 9    | 15   | 43   | 0   | 0   |
| Clubionidae    | Porrhoclubiona decora (Blackwall, 1859)        | 2   | 0   | 3   | 2    | 0    | 1    | 1   | 2   |
| Dictynidae     | Lathys affinis (Blackwall, 1862)               | 6   | 1   | 2   | 2    | 0    | 3    | 0   | 0   |
| Dictynidae     | Nigma puella (Simon, 1870)                     | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Dysderidae     | Dysdera coffalti Denis, 1962                    | 3   | 1   | 2   | 0    | 0    | 0    | 0   | 0   |
| Dysderidae     | Dysdera crocata C.L.Koch, 1838                 | 0   | 0   | 0   | 0    | 0    | 2    | 5   |     |
| Family      | Species                                      | MF7 | MF8 | MF9 | MF10 | MF11 | MF12 | MD1 | MD2 |
|------------|----------------------------------------------|-----|-----|-----|------|------|------|-----|-----|
| Gnaphosida | *Drassodes lutescens* (C.L.Koch, 1839)        | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Haplodrassus* sp. 158                       | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Haplodrassus* sp. 164                       | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Haplodrassus omissus* (O. Pickard-Cambridge, 1872) | 0   | 0   | 0   | 0    | 0    | 0    | 13  | 1   |
| Gnaphosida | Heser hispanus Senglet, 2012                 | 0   | 0   | 0   | 0    | 0    | 0    | 35  | 23  |
| Gnaphosida | *Macarophaeus cultor* (Kulczyński, 1899)     | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Micaria pallipes* (Lucas, 1846)             | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Setaphis carmelii* (O.P.-Cambridge, 1872)   | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Trachyzelotes holosericeus* (Simon, 1878)   | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Trachyzelotes lyonneti* (Audouin, 1826)     | 0   | 0   | 0   | 0    | 0    | 0    | 4   | 2   |
| Gnaphosida | *Zelotes aeneus* (Simon, 1878)               | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Zelotes tenuis* (L.Koch, 1866)              | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Gnaphosida | *Zimirina lepida* (Blackwall, 1859)          | 0   | 0   | 0   | 0    | 0    | 0    | 3   | 0   |
| Linyphiida | *Agyneta canariensis* Wunderlich, 1987       | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Agyneta fuscipalpa* (C.L.Koch, 1836)        | 0   | 0   | 0   | 0    | 0    | 0    | 3   | 9   |
| Linyphiida | *Canariellanum* sp. 21                       | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Centromerus variegatus* Denis, 1962         | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Ceratinopsis* sp. 111                       | 0   | 0   | 0   | 0    | 0    | 0    | 1   | 0   |
| Linyphiida | *Ceratinopsis acripes* (Denis, 1962)         | 2   | 1   | 1   | 1    | 4    | 6    | 0   | 0   |
| Linyphiida | *Ceratinopsis infuscata* (Denis, 1962)       | 0   | 2   | 8   | 0    | 1    | 0    | 0   | 0   |
| Linyphiida | *Ceratinopsis* sp. 233                      | 0   | 1   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Ceratinopsis* sp. 58                       | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Diplocephalus graecus* (O.P.-Cambridge, 1873) | 0   | 0   | 0   | 0    | 0    | 103  | 375 |     |
| Linyphiida | *Entelecara schmitzi* Kulczyński, 1905       | 1   | 0   | 2   | 5    | 2    | 7    | 0   | 0   |
| Linyphiida | *Frontinellina dearmata* (Kulczyński, 1899)  | 7   | 1   | 4   | 8    | 32   | 43   | 0   | 0   |
| Linyphiida | *Frontiphantes fulgurenatus* (Schenkel, 1938) | 14  | 0   | 1   | 0    | 2    | 1    | 0   | 0   |
| Linyphiida | *Lepthyphantes mauli* Wunderlich, 1992       | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Microctenonyx subitaneus* (O.P.-Cambridge, 1875) | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Microlinyphia johnsoni* (Blackwall, 1859)   | 2   | 3   | 4   | 8    | 8    | 27   | 0   | 0   |
| Linyphiida | *Ostearius melanopygius* (O.P.-Cambridge, 1880) | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Linyphiida | *Palliduphantes schmitzi* (Kulczyński, 1899) | 3   | 0   | 0   | 5    | 1    | 3    | 0   | 0   |
| Linyphiida | *Parapelecopsis nemoraloides* (O. Pickard-Cambridge, 1884) | 0   | 0   | 0   | 0    | 0    | 2    | 3   |     |
| Family            | Species                                                                 | MF7 | MF8 | MF9 | MF10 | MF11 | MF12 | MD1 | MD2 |
|-------------------|--------------------------------------------------------------------------|-----|-----|-----|------|------|------|-----|-----|
| Linyphiidae       | *Pelecopsis inedita* (O.P.-Cambridge, 1875)                              | 0   | 0   | 0   | 0    | 0    | 10   | 15  |
| Linyphiidae       | *Tenuiphantes* sp. 259                                                  | 0   | 0   | 0   | 0    | 0    | 0    |
| Linyphiidae       | *Tenuiphantes tenebricoloides* (Schenkel, 1938)                         | 0   | 0   | 0   | 1    | 1    | 0    |
| Linyphiidae       | *Tenuiphantes tenuis* (Blackwall, 1852)                                 | 31  | 58  | 13  | 49   | 25   | 56   | 0   | 4   |
| Linyphiidae       | *Turinyphia maderiana* (Schenkel, 1938)                                | 0   | 2   | 0   | 1    | 4    | 0    | 0   |
| Liocranidae       | *Mesiotelus* cf. *grancanariensis* Wunderlich, 1992                      | 0   | 0   | 0   | 0    | 0    | 1    |
| Lycosidae         | *Hogna insularum* (Kulczyński, 1899)                                    | 0   | 0   | 0   | 0    | 0    | 60   | 49  |
| Lycosidae         | *Hogna schmitzi* Wunderlich, 1992                                       | 0   | 0   | 0   | 0    | 0    |
| Lycosidae         | *Pardosa proxima* (C.L.Koch, 1847)                                      | 0   | 0   | 3   | 0    | 0    |
| Mimetidae         | *Ero aphan* (Walckenaer, 1802)                                          | 0   | 0   | 0   | 2    | 0    |
| Mysmenidae        | *Trogloneta madeirensis* Wunderlich, 1987                               | 0   | 0   | 0   | 2    | 0    |
| Nesticidae        | *Eidmannella pallida* (Emerton, 1875)                                   | 0   | 0   | 0   | 0    | 0    |
| Oecobiidae        | *Oecobius similis* Kulczyński, 1909                                     | 0   | 0   | 0   | 0    | 0    |
| Oonopidae         | *Gamasomorpha insularis* Simon, 1907                                    | 0   | 0   | 0   | 0    | 0    |
| Oonopidae         | *Oonops* cf. *pulcher* Templeton, 1835                                  | 0   | 0   | 0   | 0    |
| Oonopidae         | *Opopaea* concolor* (Blackwall, 1859)                                   | 0   | 0   | 0   | 0    |
| Oonopidae         | *Orchestina* sp. 160                                                    | 0   | 0   | 0   | 0    |
| Oxyopidae         | *Oxyopes* sp. 80                                                        | 0   | 0   | 0   | 0    |
| Philodromidae     | *Philodromus insulanus* Kulczyński, 1905                                | 1   | 0   | 0   | 0    | 0    |
| Philodromidae     | *Philodromus MAD266*                                                    | 0   | 0   | 0   | 0    |
| Philodromidae     | *Thanatus vulgaris* Simon, 1870                                         | 0   | 0   | 0   | 0    |
| Pholcidae         | *Pholcus madeirensis* Wunderlich, 1987                                  | 0   | 0   | 0   |
| Salticidae        | *Chalcoscurts subleustus* (Blackwall, 1867)                             | 0   | 0   | 0   |
| Salticidae        | *Macaroeris* cf. *desertensis* Wunderlich, 1992                         | 0   | 0   | 0   |
| Salticidae        | *Macaroeris* cf. *diligens* (Blackwall, 1867)                           | 0   | 0   | 0   |
| Salticidae        | *Macaroeris* diligens* (Blackwall, 1867)                                | 4   | 1   | 8   |
| Salticidae        | *Macaroeris* sp. 8                                                      | 0   | 0   | 0   |
| Salticidae        | *Pellines* maderianus Kulczyński, 1905                                  | 0   | 0   |
| Scytodidae        | *Scytodes velutina* Heineken & Lowe, 1832                               | 0   | 0   |
| Segestridae        | *Anadia maderiana* Warburton, 1892                                     | 0   | 0   |
| Segestridae        | *Segestria* florentina* (Rossi, 1790)                                   | 0   |
| Tetragnathidae    | *Meta* stridulans* Wunderlich, 1987                                     | 3   |
| Theridiidae       | *Cryptachae blattea* (Urquhart, 1886)                                   | 2   |
| Theridiidae       | *Dipoenata* longitaris* (Denis, 1962)                                  | 0   |
| Family       | Species                                      | MF7 | MF8 | MF9 | MF10 | MF11 | MF12 | MD1 | MD2 |
|-------------|----------------------------------------------|-----|-----|-----|------|------|------|-----|-----|
| Theridiidae | *Echinotheridion gibberosum* (Kulczyński, 1899) | 39  | 3   | 9   | 1    | 22   | 71   | 0   | 0   |
| Theridiidae | *Enoplognatha diversa* (Blackwall, 1859)     | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Theridiidae | *Enoplognatha satleri* Bösenberg, 1895       | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Theridiidae | *Episinus maderianus* Kulczyński, 1905       | 64  | 14  | 41  | 38   | 18   | 11   | 0   | 0   |
| Theridiidae | *Kochiura aulica* (C.L.Koch, 1838)           | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Theridiidae | *Laseola sp.* 268                            | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Theridiidae | *Macaridion barreti* (Kulczyński, 1899)      | 14  | 0   | 17  | 19   | 19   | 119  | 0   | 0   |
| Theridiidae | *Paidiscura orotavensis* (Schmidt, 1968)     | 3   | 1   | 1   | 15   | 2    | 0    | 0   | 0   |
| Theridiidae | *Rhomphaea nasica* (Simon, 1873)             | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Theridiidae | *Rugathodes madeirensis* Wunderlich, 1987    | 1   | 1   | 0   | 0    | 5    | 6    | 0   | 0   |
| Theridiidae | *Steatoda grossa* (C.L.Koch, 1838)           | 0   | 0   | 0   | 0    | 0    | 0    | 2   | 4   |
| Theridiidae | *Steatoda nobilis* (Thorell, 1875)           | 6   | 7   | 2   | 0    | 2    | 0    | 0   | 0   |
| Theridiidae | *Theridion hannoniae* Denis, 1945            | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Theridiidae | *Theridion musivivum* Schmidt, 1956          | 0   | 0   | 0   | 1    | 0    | 0    | 0   | 0   |
| Theridiidae | *Theridion sp.* 89                           | 4   | 0   | 0   | 2    | 0    | 0    | 0   | 0   |
| Thomisidae  | *Misumena cf. nigromaculata* Denis, 1963     | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 1   |
| Thomisidae  | *Misumena spinifera* (Blackwall, 1862)       | 1   | 0   | 4   | 0    | 0    | 2    | 0   | 0   |
| Thomisidae  | *Thomisus onustus* Walckenaer, 1805          | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Thomisidae  | *Xysticus nubilus* Simon, 1875               | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 9   |
| Uloboridae  | *Hyptiotes flavidus* (Blackwall, 1862)       | 10  | 1   | 5   | 2    | 15   | 8    | 0   | 0   |
| Uloboridae  | *Uloborus walckenaerius* Lateille, 1806     | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |
| Zodariidae  | *Zodarion styliferum* (Simon, 1870)          | 0   | 0   | 0   | 0    | 0    | 0    | 0   | 0   |

Species richness: 26 21 24 22 22 24 22 26

**Table 4.**

Abundance of (morpho)species in three of the plots on Madeira island and in the plots on Porto Santo island. Abbreviations: Madeira dry plot (MD), Porto Santo plot (PS).
| Family            | Species                                | MD3 | MD4 | MD5 | PSD1 | PSD2 | PSD3 | PSD4 | PSD5 | Total |
|-------------------|----------------------------------------|-----|-----|-----|------|------|------|------|------|-------|
| Araneidae         | Araniella maderiana (Kulczyński, 1905) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 9     |
| Araneidae         | Argiope trifasciata (Forskål, 1775)    | 1   | 38  | 4   | 0    | 0    | 0    | 0    | 1    | 71    |
| Araneidae         | Cyclosa maderiana Kulczyński, 1899     | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 3     |
| Araneidae         | Cyrtophora citricola (Forskål, 1775)   | 0   | 0   | 1   | 0    | 0    | 0    | 0    | 0    | 1     |
| Araneidae         | Mangora acalypa (Walckenaer, 1802)     | 1   | 7   | 22  | 1    | 0    | 0    | 0    | 0    | 33    |
| Araneidae         | Neoisconia crucifera (Lucas, 1838)     | 0   | 0   | 0   | 1    | 0    | 0    | 0    | 0    | 28    |
| Araneidae         | Zygia x-notata (Clerck, 1757)          | 0   | 0   | 1   | 0    | 0    | 0    | 0    | 0    | 1     |
| Cheiracanthiidae  | Cheiracanthium albiculum (Blackwall, 1859) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 218   |
| Clubionidae       | Porthoclinobion decora (Blackwall, 1859) | 10  | 7   | 3   | 3    | 3    | 3    | 0    | 9    | 52    |
| Dictynidae        | Lathys affinis (Blackwall, 1862)       | 0   | 0   | 0   | 16   | 18   | 2    | 0    | 0    | 70    |
| Dictynidae        | Nigma puella (Simon, 1870)             | 0   | 0   | 15  | 0    | 0    | 0    | 0    | 0    | 15    |
| Dysderidae        | Dysdera coiffaiti Denis, 1962          | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 8     |
| Dysderidae        | Dysdera crocata C.L.Koch, 1838         | 5   | 8   | 18  | 2    | 0    | 3    | 0    | 0    | 43    |
| Gnaphosidae       | Drassodes lutescens (C.L.Koch, 1839)   | 0   | 0   | 0   | 0    | 0    | 1    | 0    | 1    |
| Gnaphosidae       | Haplodrassus sp. 158                   | 0   | 0   | 0   | 18   | 7    | 0    | 25   | 18   | 68    |
| Gnaphosidae       | Haplodrassus sp. 164                   | 0   | 0   | 0   | 6    | 5    | 0    | 5    | 2    | 18    |
| Gnaphosidae       | Haplodrassus omissus (O. Pickard-Cambridge, 1872) | 6   | 0   | 0   | 0    | 1    | 0    | 13   | 1    | 35    |
| Gnaphosidae       | Hesper hispanicus Senglet, 2012        | 1   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 59    |
| Gnaphosidae       | Macarophaeus cultior (Kulczyński, 1899) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 2     |
| Gnaphosidae       | Mica la pallipes (Lucas, 1846)         | 1   | 0   | 0   | 0    | 0    | 0    | 1    | 1    | 3     |
| Gnaphosidae       | Setaphis carmelii (O.P.-Cambridge, 1872) | 0   | 0   | 0   | 1    | 1    | 6    | 0    | 0    | 8     |
| Gnaphosidae       | Trachyzelotes holosericus (Simon, 1878) | 1   | 0   | 0   | 7    | 4    | 1    | 0    | 0    | 13    |
| Gnaphosidae       | Trachyzelotes lyonneti (Audouin, 1826) | 0   | 7   | 1   | 4    | 0    | 17   | 0    | 2    | 37    |
| Gnaphosidae       | Zelotes aeneus (Simon, 1878)           | 0   | 0   | 0   | 4    | 0    | 0    | 2    | 1    | 7     |
| Gnaphosidae       | Zelotes tenuis (L.Koch, 1878)          | 1   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Gnaphosidae       | Ziphiro lepad (Blackwall, 1859)        | 0   | 1   | 0   | 0    | 1    | 0    | 0    | 0    | 5     |
| Family        | Species                        | MD3 | MD4 | MD5 | PSD1 | PSD2 | PSD3 | PSD4 | PSD5 | Total |
|--------------|--------------------------------|-----|-----|-----|------|------|------|------|------|-------|
| Linyphiidae  | Agyneta canariensis           | 3   | 0   | 0   | 28   | 7    | 3    | 0    | 5    | 46    |
| Linyphiidae  | Agyneta fuscipalpa (C.L.Koch, 1836) | 2   | 66  | 15  | 8    | 1    | 23   | 10   | 13   | 150   |
| Linyphiidae  | Canariellanum sp. 21          | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 10    |
| Linyphiidae  | Centromerus variegatus Denis, 1962 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 2     |
| Linyphiidae  | Ceratinopsis sp. 111          | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Linyphiidae  | Ceratinopsis acripes (Denis, 1962) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 29    |
| Linyphiidae  | Ceratinopsis infuscata (Denis, 1962) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 14    |
| Linyphiidae  | Ceratinopsis sp. 233          | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 2     |
| Linyphiidae  | Ceratinopsis sp. 58           | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Linyphiidae  | Diplocephalus graecus (O.P.-Cambridge, 1873) | 33  | 2   | 6   | 12   | 3    | 76   | 1    | 9    | 620   |
| Linyphiidae  | Entelecara schmitzi Kulczyński, 1905 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 34    |
| Linyphiidae  | Frontinellina dearmata (Kulczyński, 1899) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 177   |
| Linyphiidae  | Frontiphanus fulgurenotatus (Schenkel, 1938) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 26    |
| Linyphiidae  | Leptophantes mauli Wunderlich, 1992 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Linyphiidae  | Microctenonyx subitaneus (O.P.-Cambridge, 1875) | 3   | 0   | 0   | 2    | 3    | 8    | 0    | 4    | 26    |
| Linyphiidae  | Microlinyphia johnsoni (Blackwall, 1859) | 0   | 1   | 0   | 0    | 0    | 0    | 0    | 0    | 110   |
| Linyphiidae  | Ostearius melanopygius (O.P.-Cambridge, 1880) | 0   | 0   | 0   | 0    | 0    | 2    | 0    | 2    |       |
| Linyphiidae  | Palliduphantes schmitzi (Kulczyński, 1899) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 45    |
| Linyphiidae  | Parapelecopsis nemoraloides (O. Pickard-Cambridge, 1884) | 4   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 9     |
| Linyphiidae  | Pelecopsis inedita (O.P.-Cambridge, 1875) | 3   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 28    |
| Linyphiidae  | Tenuiphantes sp. 259          | 0   | 0   | 0   | 0    | 1    | 0    | 0    | 0    | 1     |
| Linyphiidae  | Tenuiphantes tenebricoides (Schenkel, 1938) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 4     |
| Linyphiidae  | Tenuiphantes tenuis (Blackwall, 1852) | 5   | 0   | 14  | 0    | 1    | 2    | 0    | 1    | 540   |
| Linyphiidae  | Turinyphia maderiana (Schenkel, 1938) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 13    |
| Family       | Species                              | MD3 | MD4 | MD5 | PSD1 | PSD2 | PSD3 | PSD4 | PSD5 | Total |
|--------------|--------------------------------------|-----|-----|-----|------|------|------|------|------|-------|
| Liocranidae  | Mesiotelus cf. grancanariensis       | 0   | 0   | 0   | 20   | 5    | 0    | 1    | 2    | 29    |
| Lycosidae    | Hogna insularum (Kulczyński, 1899)   | 54  | 0   | 1   | 6    | 4    | 32   | 34   | 32   | 272   |
| Lycosidae    | Hogna schmitzi Wunderlich, 1992      | 0   | 0   | 0   | 7    | 2    | 0    | 0    | 5    | 14    |
| Lycosidae    | Pardosa proxima (C.L.Koch, 1847)     | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 3     |
| Mimetidae    | Ero aphana (Walckenaer, 1802)        | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 4     |
| Mysmenidae   | Trogloneta madeirensis Wunderlich, 1987 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 25    |
| Nesticidae   | Eidmannella pallida (Emerton, 1875)  | 0   | 0   | 0   | 1    | 0    | 0    | 0    | 0    | 3     |
| Oecobiidae   | Oecobius similis Kulczyński, 1909     | 82  | 0   | 152 | 5    | 8    | 28   | 1    | 0    | 294   |
| Oonopidae    | Gamasomorpha insularis Simon, 1907    | 1   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 2     |
| Oonopidae    | Oonops cf. pulcher Templeton, 1835   | 2   | 0   | 0   | 0    | 0    | 1    | 0    | 0    | 3     |
| Oonopidae    | Opopaea concolor (Blackwall, 1859)   | 0   | 2   | 0   | 0    | 0    | 0    | 0    | 0    | 3     |
| Oonopidae    | Orchestina sp. 160                   | 0   | 0   | 0   | 2    | 0    | 0    | 0    | 0    | 2     |
| Oxyopidae    | Oxyopes sp. 80                       | 0   | 0   | 2   | 0    | 0    | 0    | 0    | 0    | 2     |
| Philodromidae| Philodromus insulanus Kulczyński, 1905 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Philodromidae| Philodromus MAD266                    | 0   | 0   | 0   | 0    | 0    | 0    | 1    | 1    | 2     |
| Philodromidae| Thanatus vulgaris Simon, 1870         | 10  | 5   | 0   | 2    | 8    | 0    | 8    | 4    | 49    |
| Pholcidae    | Pholcus madeirensis Wunderlich, 1987 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 11    |
| Salticidae   | Chalciscirtus sublestus (Blackwall, 1867) | 2   | 1   | 20  | 3    | 3    | 1    | 1    | 1    | 34    |
| Salticidae   | Macaroeris cf. desertensis Wunderlich, 1992 | 0   | 0   | 0   | 7    | 1    | 0    | 2    | 7    | 17    |
| Salticidae   | Macaroeris cf. diligens (Blackwall, 1867) | 0   | 0   | 0   | 3    | 7    | 5    | 1    | 26   | 42    |
| Salticidae   | Macaroeris diligens (Blackwall, 1867) | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 26    |
| Salticidae   | Macaroeris sp. 8                      | 8   | 4   | 4   | 1    | 0    | 0    | 0    | 0    | 27    |
| Salticidae   | Pellenes maderianus Kulczyński, 1905  | 2   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 6     |
| Scytodidae   | Scytodes velutina Heineken & Lowe, 1832 | 0   | 0   | 3   | 0    | 0    | 0    | 0    | 0    | 3     |
| Family         | Species                                          | MD3 | MD4 | MD5 | PSD1 | PSD2 | PSD3 | PSD4 | PSD5 | Total |
|----------------|--------------------------------------------------|-----|-----|-----|------|------|------|------|------|-------|
| Segestriidae   | Ariadna maderiana Warburton, 1892                | 0   | 0   | 0   | 1    | 1    | 0    | 0    | 0    | 2     |
| Segestriidae   | Segestria florentina (Rossi, 1790)               | 0   | 3   | 6   | 0    | 0    | 1    | 0    | 0    | 10    |
| Tetragnathidae | Meta stridulans Wunderlich, 1987                | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 62    |
| Theridiidae    | Cryptachaea blattea (Urquhart, 1886)            | 0   | 1   | 0   | 0    | 1    | 0    | 0    | 0    | 53    |
| Theridiidae    | Dipoenata longitarsis (Denis, 1962)             | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Theridiidae    | Echinotheridion gibberosum (Kulczyński, 1899)   | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 316   |
| Theridiidae    | Enoplognatha diversa (Blackwall, 1859)          | 1   | 0   | 0   | 0    | 1    | 1    | 1    | 0    | 4     |
| Theridiidae    | Enoplognatha sattleri Bösenberg, 1895           | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Theridiidae    | Episinus maderianus Kulczyński, 1905             | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 746   |
| Theridiidae    | Kochiura aulica (C.L.Koch, 1838)                | 0   | 1   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Theridiidae    | Laseola sp. 268                                  | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 1    | 1     |
| Theridiidae    | Macaridion barreti (Kulczyński, 1899)           | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 494   |
| Theridiidae    | Paidiscura orotavensis (Schmidt, 1968)           | 0   | 0   | 0   | 1    | 2    | 19   | 0    | 17   | 77    |
| Theridiidae    | Rhomphaea nasica (Simon, 1873)                   | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 4     |
| Theridiidae    | Rugathodes madeirensis Wunderlich, 1987         | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 325   |
| Theridiidae    | Steatoda grossa (C.L.Koch, 1838)                 | 1   | 2   | 4   | 0    | 0    | 0    | 0    | 0    | 13    |
| Theridiidae    | Steatoda nobilis (Thorell, 1875)                 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 24    |
| Theridiidae    | Theridion hannoniae Denis, 1945                  | 0   | 0   | 0   | 1    | 0    | 0    | 0    | 0    | 1     |
| Theridiidae    | Theridion musivivum Schmidt, 1966                | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Theridiidae    | Theridion sp. 89                                 | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 28    |
| Thomisidae     | Misumena cf. nigromaculata Denis, 1963           | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 1     |
| Thomisidae     | Misumena spinifera (Blackwall, 1862)             | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 12    |
| Thomisidae     | Thomisus onustus Walckenaer, 1805                | 0   | 0   | 0   | 1    | 1    | 0    | 0    | 2    |       |
| Family          | Species                              | MD3 | MD4 | MD5 | PSD1 | PSD2 | PSD3 | PSD4 | PSD5 | Total |
|-----------------|--------------------------------------|-----|-----|-----|------|------|------|------|------|-------|
| Thomisidae      | Xysticus nubilus Simon, 1875          | 16  | 38  | 4   | 12   | 10   | 7    | 0    | 3    | 101   |
| Uloboridae      | Hyptiotes flavidus (Blackwall, 1862)  | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 111   |
| Uloboridae      | Uloborus walckenaerius Latreille, 1806 | 1   | 4   | 7   | 0    | 0    | 0    | 0    | 0    | 13    |
| Zodariidae      | Zodarion styliferum (Simon, 1870)     | 16  | 13  | 810 | 0    | 0    | 0    | 2    | 9    | 850   |
| Species richness|                                       | 30  | 21  | 24  | 31   | 27   | 22   | 19   | 26   | 7462  |

The most widespread (morpho)species were *Tenuiphantes tenuis* (Blackwall, 1852) (introduced), *Porrhoclubiona decora* (Blackwall, 1859) (native non-endemic), *Neoscona crucifera* (Lucas, 1838) (introduced), *Microlinyphia johnsoni* (Blackwall, 1859) (native non-endemic), *Cryptachaea blattea* (Urquhart, 1886) (introduced), *Cheiracanthium albidulum* (Blackwall, 1859) (endemic), *Ceratinopsis acripes* (Denis, 1962) (native non-endemic), *Meta stridulans* Wunderlich, 1987 (endemic), *Echinotheridion gibberosum* (Kulczyński, 1899) (native non-endemic), *Episinus maderianus* Kulczyński, 1905 (native non-endemic) and *Paidiscura orotavensis* (Schmidt, 1968) (native non-endemic). The five most abundant species were *Zodarion styliferum* (Simon, 1870) (11%, unknown origin), *Episinus maderianus* Kulczyński, 1905 (9%, native non-endemic), *Diplocephalus graecus* (O.P.-Cambridge, 1873) (8%, introduced), *Tenuiphantes tenuis* (Blackwall, 1852) (7%, introduced) and *Macaridion barreti* (Kulczyński, 1899) (7%, native non-endemic).

**Taxonomic and biogeographic classification**

In this section, we point out, explain and discuss the identification of some of the species and morphospecies found – the ones for which information is limited and ordered as in Tables 2, 3 and 4 – and their classification as endemic, native non-endemic, introduced and unknown.

**Synaphris saphrynis**

This species is known from Spain and Selvagens Islands. It is also present on Bugio island (Desertas), as one of the authors (L. Crespo) identified a specimen collected by M. Boieiro et al. in 2011/12 (unpublished record). The limited number of available records does not allow us to infer its total distribution with certainty.

**Haplodrassus omissus**

Although *Haplodrassus omissus* had not been recorded previously in Madeira, it does not come as a surprise to be present there, given its known distribution across the Mediterranean basin and the Canary Islands.
Haplodrassus sp. 164

This morphospecies is present in Porto Santo and, possibly, in other locations of the Madeira archipelago. Haplodrassus MS 164 belongs to the dalmatensis group.

Haplodrassus sp. 158

The morphospecies Haplodrassus MS158 belongs to a different group from that of Haplodrassus MS164, as its genitalia is more similar to species such as H. deserticola, which is present in the Canary Islands or H. minor, which has been recorded from Europe to Turkey, according to the World Spider Catalogue. It is possible that more species of this group are present in the Madeira archipelago.

Macarophaeus cultior

Macarophaeus cultior may be a single-island endemic from Madeira. Although the World Spider Catalog and the Banco de Datos de Biodiversidad de Canarias (based on Oromí et al. (2002)) shows records from the Canary Islands (Oromí et al. (2002), according to Wunderlich (Wunderlich 2011), there are no new records or mentions of M. cultior in this archipelago.

Zelotes aeneus

We classified this species as introduced, because of its distribution throughout Europe up to Azerbaijan.

Agyneta canariensis

We have considered this species as native non-endemic, because it is present in the Canary Islands, Selvagens and Madeira.

Canariellanum sp. 21

We considered this species as a new endemic species of a genus so far restricted to the Canary Islands.

Ceratinopsis spp.

Given the morphological mismatch of this morphospecies with other described species from the region, we have considered it as endemic to the island of Madeira.

Tenuiphantes sp. 259

This morphospecies is probably a new Tenuiphantes from the archipelago of Madeira and we, therefore, considered it endemic.

Tenuiphantes tenebricoloides

This species has been found and cited several times from the forests of Madeira island. There is a citation from the Canary Islands by Denis (Denis 1941) that was based on a
single female specimen that has not been revised since then. Furthermore, the species has not been cited again from the Canary Islands and, according to J. Wunderlich – who described a very similar species, *T. canariensis*, from the Canary Islands – Denis probably misidentified the species, given the resemblance in the female epigyne between *T. tenebricoloides* and *T. canariensis*, Therefore, we considered *T. tenebricoloides* as a Madeiran endemic (Wunderlich 1987). Future molecular phylogenetic work might resolve the relationship between these two species.

*Mesiotelus cf. grancanariensis*

The species *Mesiotelus grancanariensis* has been cited from the south west coast of Portugal and across the entire archipelago of Madeira – in treeless dry habitats and along the central mountain chain of Madeira. Hence the classification of this species as a native species.

*Oonops cf. pulcher*

Although it is possible that this species is an undescribed cryptic species native to Madeira, based on morphological characters, it is very likely to be *Oonops pulcher* and, therefore, introduced.

*Orchestina* sp. 160

We classified this morphospecies as archipelago-endemic, based on previous findings by L. Crespo in areas with dry habitats of Porto Santo and Desertas.

*Oxyopes* sp. 80

Since this morphospecies has not been described or cited before, it is very likely endemic to the Madeiran archipelago.

*Philodromus* sp. 266

This morphospecies has not been described or cited before, hence our classification as endemic.

*Macaroeris cf. desertensis*, *Macaroeris cf. diligens* and *Macaroeris* sp. 8

We considered *Macaroeris cf. desertensis*, *Macaroeris cf. diligens* and *Macaroeris* sp. 8 as most likely new undescribed species and, therefore, endemic to the Madeiran archipelago.

*Lasaeola* sp. 268

Based on the morphological features of this morphospecies, we considered it as a new species and, therefore, an archipelago endemic.
Rhomphaea nasica

*Rhomphaea nasica* is known to be present in Africa and on the remote island of St. Helena. Specimens of this species have also been identified in modified habitats such as the Funchal Botanical Garden (Madeira Island). Therefore, we considered this species as introduced.

*Theridion hannoniae*

This species has a Mediterranean distribution and, in the Madeiran archipelago, it is usually found in dry, relatively disturbed areas. We classified this species as of *unknown* biogeographic category, given the impossibility of knowing whether it arrived at the Madeiran archipelago naturally or with human intervention.

*Theridion* sp. 89

This morphospecies is most likely a new species, so we considered it to be single-island endemic, probably from laurel forest.

*Misumena cf. nigromaculata*

Here we considered this morphospecies to be a new endemic species given the little information on *Misumena nigromaculata*, whose female has been described only once and whose male is unknown.

*Xysticus nubilus*

*Xysticus nubilus* has a Mediterranean distribution and is usually found in dry habitats in the Madeiran archipelago. Therefore, as with *Theridion hannoniae*, we classified it as of *unknown* biogeographic category in Madeira.

*Hyptiotes flavidus*

Although the distribution of this species is largely Mediterranean, given that it is usually found in laurel forests, we classified it as native to Madeira.

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Author contributions

PAVB, PC and FR conceived the study design and sampling programme. JM-O, PAVB, PC, LCFC, RG, FP, RC, CR, MB, and FR performed spider sampling. PAVB and LCFC performed spider identification. JM-O analysed the data and JM-O and PAVB led the writing. All authors commented on the final version of the manuscript.

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