

New records of mites (Acari) and harvestmen (Opiliones) from Malta with a preliminary checklist of Maltese Arachnida

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Abstract

We present new faunistic records of mites and harvestmen from the Maltese Archipelago and reviewed available data on the faunistics of the class Arachnida of the Archipelago. Literature records of Arachnids are rather scarce and uncomprehensive and up to date, checklists dealing with them have not been published except for spiders and gall mites. Along with newly recorded families, genera and species, we compiled a preliminary checklist and review of Maltese Arachnida to facilitate faunistic research on these groups. In regard to mites, *Geckobia sarahae* Bertrand, Pfliegler & Sciberras, 2012 is established as a *lapsus calami* that refers to *G. estherae* Bertrand, Pfliegler & Sciberras, 2012.

Keywords Mediterranean | endemic | soil fauna | faunistics | distribution | anthropogenic habitat

1. Introduction

The fauna of the Maltese Islands is peculiar due to its geographical setting (the archipelago is located in the centre of the Mediterranean, just 96 km south of Sicily, 290 km from North Africa), the small, yet diverse habitats and last, but not least, to the threatened state of wildlife and natural habitats in the country (Schembri 2003, Sciberras & Sciberras 2010, Sciberras et al. 2012, Salvi et al. 2014). The Maltese Archipelago consists of three major inhabited islands, Malta, Gozo and Comino, and additional other scattered uninhabited islets and rocks. The main islets are Filfolia Island, Fungus Rock,

Selmunett Island, Manoel Island, Ta' Fra Ben Islet and Cominotto. Smaller other islets and rocks are listed with English and Maltese names in Sciberras et al. (2012). The total surface area of the Maltese Archipelago is 316 km² (Schembri 1993, 1997, Sciberras et al. 2012). The main geomorphological features of the islands are karstic limestone plateaus, hillsides covered with clay taluses, limestone plains, valleys, steep sea-cliffs and gently sloping rocky shores without mountains, streams or lakes and only small springs (Schembri 1993, 1997). Limestone caves are also present. Three main types of soil are known in the archipelago: 1) terra soils, red clayed soils derived from coralline limestone, formed during

the Pleistocene, with high iron oxide and low calcium carbonate content; 2) xerorendzinas, whitish to red marly soils derived from Globigerina limestone with a high calcium carbonate content; 3) carbonate raw soil, a grey soil with high calcium carbonate content derived from weathered quaternary sandstones, Greensand, Blue Clay, Globigerina Limestone or Upper Coralline Limestone (Schembri 1997). Maltese soil types are all characterized by low humus content and are generally xeric habitats for soil-inhabiting fauna. The main vegetational assemblages on the islands (apart from the approximately 38% of land area in agricultural use and the 15% occupied by towns and villages) are garrigue (natural or resulting from the degradation of maquis), maquis (semi-natural habitat) and steppic grasslands. Minor patches are occupied by relict woodland characterized by Holm Oak (*Quercus ilex*) and Aleppo Pine (*Pinus halepensis*), coastal wetlands, sand dunes, rupestral (on cliff faces and high walls; with a large number of endemic plants) and freshwater communities (transient pools and watercourses) (Schembri 1993, 1997).

The Maltese arthropod groups considered in this article have been examined by several previous researchers, although only a limited number of taxa have been studied and general knowledge of Maltese Arachnida, except for spiders and gall mites, is also restricted (Schembri 2003). Above all, soil fauna has received very limited attention. A few endemic species have been described from the islands in the class Collembola (reviewed by Pfliegler & Janssens 2016). It has to be noted that the Archipelago faced recurrent transient connections to the European mainland during Glacial Maximum periods that probably contributed to the high number of shared species and relatively low number of known island endemics (Pedley et al. 2002, Salvi et al. 2014).

2. Materials and methods

Sampling. Species recorded in our study represent various collections made by several collectors over decades. Arthropods were extracted by Berlese funnel from soil samples collected at various locations. Mites from anthropogenic habitats (e.g. farms) and substrates (e.g. flour) were manually collected from a variety of materials, e.g. straw, silo, flour. Ectoparasites of domestic animals were collected directly from the hosts with a pincer. Specimens were stored in 70% ethanol. Mites were mounted into Hoyer's Medium or Berlese Fluid for identification. Specimens are deposited in the collection of Jochen Martens, Mainz, Germany (Opiliones), or in the Institute of Agriculture of the University of Malta (UM) (Acari), and in some cases, in collections of the authors.

Historical overview of Maltese Arachnida. To evaluate the new faunistic data recorded during this survey, faunistic, taxonomic and conservation biology literature published before 03.2017 was surveyed for all groups of Arachnids in relation to the country of Malta.

Taxonomy. The system of families in Zhang (2011) was followed. In the case of synonymy of *Psoroptes* spp., Zahler et al. (2000) and in the case of the name of *Tyrophagus putrescentiae* (Schrank, 1781), the work of Klimov & OConnor (2010) was followed. The nomenclature and systematics of spiders is based on the World Spider Catalog (2017).

3. Results

3.1 Historical overview of the Maltese Arachnida.

Acari: the mite fauna of Malta is very poorly known. Schembri (2003) lists three species of ticks and a small number of other mites based on the works of Caruana Gatto (1926), Saliba (1963), Sultana & Gauci (1977-1978), Stern¹, Dandria (1996) and Savona Ventura (2002). In 2003 Vella² recorded several Mesostigmata, Trombidiformes and Astigmatina mites from anthropogenous habitats in his thesis. There are only a handful of other publications about Maltese acarofauna: biocontrol mites were reviewed by Mifsud (1997); Kontschán (2003) recorded two Uropodina species (describing a previously unknown one) from Malta as well as Porcelli et al. (2009) who reported additional two species from the red palm weevil; a preliminary checklist of Maltese gall mites was published by Mifsud et al. (2006); the pest species *Tyrophagus communis* Fan & Zhang, 2007 was mentioned from Malta by Fan & Zhang (2007); some Diptilomiopid and Eriophyid mites were recorded by Mifsud et al. (2012); and Bertrand et al. (2012) have described gecko mite species from the islands (one previously undescribed). These were *Geckobia estherae* Bertrand, Pfliegler & Sciberras, 2012, a new species closely related to *G. loricata* Berlese, 1892 (both with scale-like ventral setae) and *G. latastei* Megnin, 1878 (a mite without scale-like setae) (note that in the abstract of the article describing the new species, *G. loricata* was erroneously mentioned instead of *G. latastei* as a species recorded from Malta). Stekolnikov et al. (2014) recorded *Ericotrombidium caucasicum* (Schluger, 1967), a lizard chigger (Trombiculidae) from the Archipelago. Several, otherwise species-rich groups (e.g. the Oribatida) have not been studied so far on the islands of Malta. As noted by Vella², there are occasional reports of diseases and damages caused by mites in

Malta, in the fields of agriculture, veterinary and medical science, but these generally do not describe species of mites in particular. Most recently, the brown dog tick, *Rhipicephalus sanguineus* s.l. (Latreille, 1806) has been recorded from Malta with molecular data indicating that the so-called species II. of this group inhabits the islands (Licari et al. 2017).

Nomenclatural notes for the Maltese gecko mites. In their article describing *Geckobia estherae*, one of the figures of Bertrand et al. (2012) referred to their new species as *G. sarahae* by mistake, a *lapsus calami*.

Araneae: The spiders of the Maltese Islands are relatively well-known compared to the other arthropod groups discussed in this work, but still far less than in most other mediterranean countries. Since the end of the 19th century, only scattered scientific articles and a few semi-scientific publications and conservation reports have been published on the spider fauna of Malta. The earliest mentions were made by Gulia (1889-1890, 1914), but his species records are impossible to evaluate. Pocock (1903) described the first endemic species of the islands, the trapdoor spider *Nemesia arboricola* Pocock, 1903 that was not recorded again for a century, when it was rediscovered by Kritscher (1994). Later, additional observations and distribution data on this species was published by Dandria (2001). A similar species known from Sicily, *N. macrocephala* Ausserer, 1871 was recorded by Baldacchino et al. (1993), but after re-examination of the specimens the material was assigned to *N. arboricola* (Dandria 2001). However, the erroneous distribution data reappeared in Decae (2012). In 1966, a short list of Maltese spiders appeared in an unpublished manuscript by A. Cremona about Maltese scientific and technological termini - these species records are again impossible to evaluate. A decade later, P. J. Schembri published short popular articles about Maltese spiders. Interesting is the mentioning of *Argyroneta aquatica* (Clerck, 1757) and *Cteniza* species, that were also noted by Cremona. Further research would help to clarify if these spiders are actually found on the islands. In the mid-1900s only Brignoli (1969, 1979, 1982) reported on Maltese spiders in his works considering Mediterranean taxa. Much later, jumping spiders (Salticidae) of the islands were recorded by Cantarella (1982), who described *Aelurillus schembrii* Cantarella, 1982 from the islands with additional material from Sicily. Schembri (1983) recorded some spiders from the St. Paul's Island (Selmunett). Zammit Maempel (1985) recorded two species as new to the Maltese fauna from Ghar Dalam Cave. The Red Data Book of the Maltese Islands (Schembri 1989) included one previously unrecorded species, *Tetragnatha extensa* (Linnaeus, 1758). Further species were recorded by Baldacchino et al. (1993) with a review and checklist of published species

(merely 74). They also recorded some spiders determined to genus level and noted that one *Ozyptila* species may be undescribed. Bosmans & Dandria (1994) described the presumably endemic new species *Lepthyphantes melitensis* (Bosmans, 1994), later transferred to *Palliduphantes* (Saaristo & Tanasevitch 2001). Kritscher (1996) described four presumably endemic new species: *Dipoenata cana* Kritscher, 1996; *Palpimanus punctatus* Kritscher, 1996; *Poecilochroa loricata* Kritscher, 1996, *Scotina occulta* Kritscher, 1996 and *Syedra parvula* Kritscher, 1996 (along with additional faunistic records). Kritscher (1996) also reported data on the species *Ariadna insidiatrix* Audouin, 1827 and stated that the male specimen differed from the description of Denis (1934) in the spines of the femur 4 but had a matching palp bulbus. As Wunderlich (2011) considered that the status of *A. insidiatrix* is doubtful and he described new species based on non-pedipalpal characteristics, the Maltese *Ariadna* sp. is likely to represent a hitherto undescribed species. A case of poisoning by *Loxosceles rufescens* (Dufour, 1820) was also reported from Malta by Dandria & Mahoney (2002). Schembri (2003) partially reviewed the Maltese spiders among with other non-marine taxa. The first records of the recently introduced *Argiope trifasciata* (Forskål, 1775) were published in 2005 (Bonnet & Attard 2005, Falzon^{3,4}, Di Pompeo et al. 2011). Dandria et al. (2005) reported species new to the fauna and provided a checklist of Maltese spiders with altogether 141 species. One of these species, *Zelotes fuscotestaceus* (Simon, 1878) was subsequently synonymized and several others were transferred into other genera. Also, the genus-level record of *Agelena* sp. (Kritscher, 1996) was omitted. Most recently, three additional members of the Maltese spider fauna have been recorded: an unidentifiable *Zora* sp. (Dandria et al. 2011-2012), *Menemerus fagei* Berland & Millot, 1941 (Freudenschuss et al. 2013) and *Araneus angulatus* Clerck, 1758 (Sciberras et al. 2014). In Table S1, we provide an updated checklist of the Maltese spider species with current systematics [dubious species only mentioned in the works of Gulia (1889-1990, 1914) and Cremona (unpublished), and those published in non-peer-reviewed popular journals were not included].

Opiliones: Only four harvestman species have so far been recorded from the Maltese Islands, by Marcellino (1974), Schembri (1982), Thaler (1996) from the families Phalangidae and Phalangodidae.

Palpigradi: An endemic palpigrade species, *Eukoenenia christiani* Condé, 1988 was described from a subterranean habitat in Malta (Condé 1988). In addition, *E. mirabilis* (Grassi & Calandruccio, 1885) has been recently recorded (Harvey 2003, 2011). This species is known to be synanthropic (Harvey et al. 2006) and probably non-native on Malta.

Pseudoscorpiones: Three presumably endemic species of pseudoscorpions are known from Malta. Mahnert (1975, 1982) described *Chthonius (Ephippiochthonius) maltensis* Mahnert, 1975 and the cavernicolous *C. (E.) girgentiensis* Mahnert, 1982 and also recorded several other species. Gardini & Rizzerio (1987) described *Roncus melitensis* Gardini & Rizzerio, 1987, also a cavernicolous species. We followed the listing of Harvey (2011), in which the record of *Acanthocreagris italica italica* (Beier, 1958) originating from Mahnert (1975) was revised and replaced by the species *A. ruffoi* (Lazzeroni, 1969).

Scorpiones: The Maltese occurrence of scorpions was first reported in the 1990s. Kritscher (1992) identified the specimens as *Euscorpius (Euscorpius) carpathicus candiota*, which later turned out to be a misidentification of *E. (E.) carpathicus sicanius* (C.-L. Koch, 1837), a subspecies first described from Sicily (Schembri 2003). Fet et al. (2003) elevated this subspecies to species rank as *E. (E.) sicanius* (C.-L. Koch, 1837).

3.2 New distribution records.

New distribution records for the Maltese fauna are listed below (‘?’ indicates that sex of the specimen was not determined). Most of these records represent taxa that are new for the country. Coordinates are given in decimal degrees format.

Ixodida: Ixodidae

Hyalomma marginatum Koch, 1844
1?, Malta, unspecified date, coll. V. Vassalo.

Notes: On rabbit. New record for the country. Specimen deposited in UM.

Mesostigmata: Ameroseiidae

Kleemannia plumigera Oudemans, 1930
Several specimens, Malta, Marsa (35.53N, 14.30E), 6.8.1999, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.29E), 14.8.2001, coll. AV.

Notes: In silo and flourmill. New record for the country. Specimens deposited in UM.

Kleemannia plumosus Oudemans, 1902
Several specimens, Malta, Għammieri (35.52N, 14.28E), 21.12.2002, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Mesostigmata: Ascidae

Blattisocius keegani Fox, 1947
Several specimens, Malta, Marsa (35.53N, 14.30E), unspecified date, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Blattisocius tarsalis (Berlese, 1918)
Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, 14.8.2001, 28.8.2002, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 3.9.2002, coll. AV.

Notes: In flourmill and silo. New record for the country. Specimens deposited in UM.

Lasioseius penicilliger Berlese, 1916
Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, 30.1.2003, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Melichares agilis Hering, 1838
Several specimens, Malta, Għammieri (35.52N, 14.28E), 28.8.2001, coll. AV.

Notes: In straw. New record for the country. Specimens deposited in UM.

Mesostigmata: Dermanyssidae

Dermanyssus gallinae (De Geer, 1778)
Several specimens, Malta, Marsa (35.53N, 14.30E), 6.8.1999, 11.4.2002, 19.7.2002, coll. AV.

Notes: In silo. New record for the country. Specimens deposited in UM.

Mesostigmata: Digamasellidae

Digamasellus presepum Berlese, 1918
Several specimens, Malta, Għammieri (35.52N, 14.28E), 28.8.2001, 11.4.2002, 3.9.2002, coll. AV.

Notes: New record for the country. Specimen deposited in UM.

Mesostigmata: Laelapidae

Hypoascis lubrica Voigts & Oudemans, 1904
Several specimens, Malta, Għammieri (35.52N, 14.28E), unspecified date, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Mesostigmata: Macrochelidae*Macrocheles matrius* (Hull, 1925)

Several specimens, Malta, Marsa (35.53N, 14.30E), 6.8.1999, 14.8.2001, coll. AV.

Notes: In silo. New record for the country.
Specimens deposited in UM.

Macrocheles merdarius (Berlese, 1889)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, 30.1.2003, coll. AV. Several specimens, Malta, Mosta (35.91N, 14.42E), 7.2.2003, coll. AV. Malta, Mgarr (35.92N, 14.36E), 13.2.2003, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Macrocheles muscaedomesticae (Scopoli, 1772)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 28.8.2001, 12.4.2002, 3.9.2002, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 14.6.2001, coll. AV.

Notes: In feedmill and in straw. New record for the country.
Specimens deposited in UM.

Mesostigmata: Parasitidae*Parasitidae* sp.

1?, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, coll. AV.

Notes: New family record for the country.
Specimen deposited in UM.

Mesostigmata: Podocinidae*Podocinum pacificum* Berlese, 1896

1?, Malta, Il-Ballut tal-Wardija (35.938N, 14.385E), 8.2.2013, coll. PV.

Notes: In soil. Few records are known of this species but it is recorded from the nearby Italy (Stoch 2003). New record for the country. Specimen deposited in the collection of the Hungarian Natural History Museum.

Mesostigmata: Sejidae*Sejidae* sp.

Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, 30.1.2003, coll. AV. Several specimens, Malta, Mosta (35.91N, 14.42E), 7.2.2003, coll. AV.

Notes: New family record for the country. Specimens deposited in UM.

Mesostigmata: Varroidae*Varroa destructor* Anderson & Trueman, 2000

Several specimens, Malta, unspecified date, coll. M. Mifsud.

Notes: In bee hive. Specimens deposited in UM.

Sarcoptiformes: Acaridae*Acarus farris* (Oudemans, 1905)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 28.8.2001, coll. AV.

Notes: In straw. New record for the country. Specimens deposited in UM.

Acarus immobilis Griffiths, 1964

Several specimens, Malta, Għammieri (35.52N, 14.28E), 28.8.2001, 11.4.2002, 3.9.2002, 20.12.2002, 30.1.2003, coll. AV.

Notes: In straw. New record for the country. Specimens deposited in UM.

Acarus siro Linnaeus, 1758

Several specimens, Malta, Għammieri (35.52N, 14.28E), 3.9.2002, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 14.8.2001, 11.4.2002, 3.9.2002, coll. AV.

Notes: In flourmill and silo. New record for the country.
Specimens deposited in UM.

Aleuroglyphus ovatus (Troupeau, 1878)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.8.2001, coll. AV.

Notes: In flourmill. New record for the country. Specimens deposited in UM.

Caloglyphus rhizoglyphoides (Zachvatkin, 1937)

Several specimens, Malta, Għammieri (35.52N, 14.28E), unspecified date, coll. AV.

Notes: In feeds store. New record for the country. Specimens deposited in UM.

Mycetoglyphus fungivorus Oudemans, 1932

Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, 30.1.2003, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Tyrophagus longior (Gervais, 1844)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 28.8.2001, 11.4.2002, 12.4.2002, coll. AV.

Several specimens, Malta, Marsa (35.53N, 14.29E), 28.8.2002, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 14.8.2001, coll. AV.

Notes: In flourmill and silo. New record for the country. Specimens deposited in UM.

Tyrophagus palmarum Oudemans, 1924

Several specimens, Malta, Għammieri (35.52N, 14.28E), 12.4.2002, coll. AV.

Notes: In straw. New record for the country. Specimens deposited in UM.

Tyrophagus putrescentiae (Schrank, 1781)

Several specimens, Malta, Malta (35.53N, 14.29E), 14.8.2001, 12.4.2002, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 3.9.2001, coll. AV.

Notes: In flourmill and silo. Specimens deposited in UM.

Tyrophagus similis Volgin, 1949

Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, 30.1.2003, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Sarcoptiformes: Carpoglyphidae

Carpoglyphus lactis (Linnaeus, 1758)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, 14.8.2001, coll. AV.

Notes: In flourmill. New record for the country. Specimens deposited in UM.

Sarcoptiformes: Chortoglyphidae

Chortoglyphus arcuatus (Troupeau, 1879)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 6.8.1999, 11.4.2002, 19.7.2002, coll. AV.

Notes: In flourmill and silo. New record for the country. Specimens deposited in UM.

Sarcoptiformes: Ctenobelbidae

Ctenobelba pectiniger (Berlese, 1908)

1?, Malta, Wied Qirda (N35.866, E14.450), 4.2.2013, coll. PV.

Notes: In soil. New record for the country. Specimen deposited in the collection of WN.

Sarcoptiformes: Epilohmanniidae

Epilohmannia cylindrica (Berlese, 1904)

1?, Malta, Wied Qirda (N35.866, E14.450), 4.2.2013, coll. PV.

Notes: In soil. New record for the country. Specimen deposited in the collection of WN.

Sarcoptiformes: Falculiferidae

Falculiferidae sp.

1?, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, coll. AV.

Notes: On wing feathers of a pigeon. New family record for the country. Specimen deposited in UM.

Sarcoptiformes: Glycyphagidae

Austroglycyphagus geniculatus (Vitzthum, 1919)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.8.2001, coll. AV.

Notes: In flourmill. New record for the country. Specimens deposited in UM.

Glycyphagus domesticus (De Geer, 1778)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 11.4.2002, coll. AV.

Notes: In straw. New record for the country. Specimens deposited in UM.

Lepidoglyphus destructor (Schrank, 1781)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.8.2001, 28.8.2002, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 3.9.2002, coll. AV.

Notes: In flourmill and silo. New record for the country. Specimens deposited in UM.

Sarcoptiformes: Histiostomatidae

Histiostomatidae sp.

Several specimens, Malta, Għammieri (35.52N, 14.28E), 28.8.2001, 12.4.2002, coll. AV.

Notes: In poultry litter. New family record for the country. Specimens deposited in UM.

Sarcoptiformes: Oribatulidae*Lucoppia burrowsi* (Michael, 1890)

1?, Malta, Il-Ballut tal-Wardija (35.938N, 14.385E), 8.2.2013, coll. PV. 1?, Malta, Wied il-Baruni (35.857N, 14.560E), 6.2.2013, coll. PV.

Notes: In soil. New record for the country. Specimen deposited in the collection of WN.

Zygoribatula cognata (Oudemans, 1902)

2?, Malta, Wied il-Baruni (35.857N, 14.560E), 6.2.2013, coll. PV.

Notes: In soil. New record for the country. Specimen deposited in the collection of WN.

Sarcoptiformes: Perlohmanniidae*Perlohmannia* sp.

1?, Malta: Wied Qirda (35.866N, 14.450E), 4.2.2013, coll. PV.

Notes: In soil. New genus record for the country. Specimen deposited in the collection of WN.

Sarcoptiformes: Phthiracaridae*Phthiracarus* sp.

1?, Malta: Wied Qirda (35.866N, 14.450E), 4.2.2013, coll. PV.

Notes: In soil. New genus record for the country. Specimen deposited in the collection of WN.

Sarcoptiformes: Pyroglyphidae*Dermatophagoides farinae* Bogdanov, 1864

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, 28.8.2002, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 3.9.2002, coll. AV.

Notes: In silo and flourmill. New record for the country. Specimens deposited in UM.

Dermatophagoides pteronyssinus (Trouserart, 1897)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 11.4.2002, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Euroglyphus maynei (Cooreman, 1950)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Sarcoptiformes: Sarcoptidae*Psoroptes equi* (Hering, 1838)

Several specimens, Malta, Mosta (35.91N, 14.42E), unspecified date, coll. AV.

Notes: On the ear of a rabbit. New record for the country. Specimens deposited in UM.

Sarcoptes scabiei De Geer, 1778

Several specimens, Malta, Rabat (35.52N, 14.23E), 13.2.2003, coll. T Zammit.

Notes: On horse and donkey. Specimens deposited in UM.

Sarcoptiformes: Suctobelbidae*Suctobelba* sp.

2?, Malta: Wied Qirda (35.866N, 14.450E), 4.2.2013, coll. PV.

Notes: In soil. New record for the country. Specimens deposited in the collection of WN.

Trombidiformes: Bdellidae*Bdellidae* sp.

Several specimens, Malta, Għammieri (35.52N, 14.28E), 12.4.2002, coll. AV.

Notes: In straw. New family record for the country. Specimens deposited in UM.

Trombidiformes: Cheyletidae*Acaropsellina sollers* Kuzin, 1940

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.8.2001, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 14.8.2001, coll. AV.

Notes: In silo and flourmill. New record for the country. Specimens deposited in UM.

Cheletomorpha lepidopterorum (Shaw, 1794)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, 19.7.2002, 14.8.2001, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 12.4.2002, coll. AV.

Notes: In feedmill and silo. New record for the country. Specimens deposited in UM.

Cheyletus eruditus (Schrank, 1781)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, coll. AV. Several specimens, Malta, Marsa (35.53N, 14.30E), 14.8.2001, coll. AV.

Notes: In feedmill and silo. New record for the country. Specimens deposited in UM.

Cheyletus malaccensis Oudemans, 1903

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, coll. AV. Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, 30.1.2003, coll. AV.

Notes: In flourmill. New record for the country. Specimens deposited in UM.

Cheyletus trouessarti Oudemans, 1903

Several specimens, Malta, Marsa (35.53N, 14.30E), 14.8.2001, coll. AV.

Notes: In silo. New record for the country. Specimens deposited in UM.

Grallacheles bakeri De Leon, 1962

Several specimens, Malta, Għammieri (35.52N, 14.28E), 20.12.2002, 30.1.2003, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Trombidiformes: Cocceupodidae*Linopodes* sp.

1?, Malta, Il-Ballut tal-Wardija (35.938N, 14.385E), 8.2.2013.

Notes: In soil. New genus record for the country. Specimen deposited in the collection of WP.

Trombidiformes: Cunaxidae*Cunaxidae* sp.

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, coll. AV.

Notes: New family record for the country. Specimens deposited in UM.

Trombidiformes: Demodicidae*Demodex canis* Leydig, 1859

Several specimens, Malta, Rabat (35.52N, 14.23E), 13.2.2003, coll. T. Zammit.

Notes: On dog. New record for the country. Specimens deposited in UM.

Trombidiformes: Erythraeidae*Balaustium* sp.

Several specimens (adults), Malta, Wied id-Dis (35.928N, 14.460E), 10.04.2012, coll. AS.

Notes: possibly a species without a described adult form or an undescribed species (J. Mąkol, pers. comm.). The genus is a new record for the country. Specimens deposited in the collection of WP and Joanna Mąkol (Wrocław).

Trombidiformes: Pyemotidae*Pyemotes ventricosus* (Newport, 1850)

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, coll. AV.

Notes: In flourmill. New record for the country. Specimens deposited in UM.

Trombidiformes: Raphignathidae*Raphignathidae* sp.

4?, Malta, Għammieri (35.52N, 14.28E), unspecified date, coll. AV.

Notes: New family record for the country. Specimens deposited in UM.

Trombidiformes: Siteroptidae*Siteroptes graminum* Reuter, 1900

2?, Malta, Għammieri (35.52N, 14.28E), unspecified date, coll. AV.

Notes: New record for the country. Specimens deposited in UM.

Trombidiformes: Tarsonemidae*Polyphagotarsonemus latus* Banks, 1904

Several specimens, Malta, Għammieri (35.52N, 14.28E), unspecified date, coll. C. Farrugia.

Notes: In tomato greenhouse. New record for the country.
Specimens deposited in UM.

Tarsonemus granarius Lindquist, 1972

Several specimens, Malta, Marsa (35.53N, 14.29E), 14.6.2001, 14.8.2001, coll. AV.

Notes: In flourmill. New record for the country. Specimens deposited in UM.

Trombidiformes: Tenuipalpidae

Brevipalpus phoenicis (Geijskes, 1936)

Several specimens, Malta, Għammieri (35.52N, 14.28E), 1992, coll. AV.

Notes: On *Myoporum* ornamental plant. New record for the country. Specimens deposited in UM.

Trombidiformes: Tetranychidae

Tetranychus urticae C.-L. Koch, 1836

Several specimens, Malta, Għammieri (35.52N, 14.28E), unspecified date, coll. AV.

Notes: On aubergine plant. Specimens deposited in UM.

Trombidiformes: Tydeidae

Tydeidae sp.

2?, Malta, Għammieri (35.52N, 14.28E), unspecified date, coll. AV.

Notes: New family record for the country. Specimens deposited in UM.

Opiliones: Dicranolasmatidae

Dicranolasma soerenseii Thorell, 1876

1♂, Malta, Wied il-Għasel (35.914N, 14.425E), 26.11.1977, coll. P. J. Schembri. 1♂, Malta, Siġġiewi (35.85N, 14.44E), 6.2.1977, 1? coll. P. J. Schembri. 1♀, Malta: Il-Maqluba Doline near Qrendi (35.830N, 14.458E), 10.9.1977, coll. P. J. Schembri. 2♂, 1♀, 2 juveniles, Malta, Wied Babu (35.823N, 14.459E), 4.11.1980, coll. P. J. Schembri.

Notes: *D. soerenseii* is a southwestern mediterranean species known also from the nearby Sicily (Stoch 2003). New record for the country, although Schembri (2003) mentioned the species based on unpublished results. Specimens deposited in the collection of Jochen Martens, Mainz.

Opiliones: Phalangiidae

Metaphalangium cirtanum (C.-L. Koch, 1839)

1?, Gozo, Ir-Ramla l-Hamra (36.06N, 14.285E), winter 2003, coll. A. Deidun. 2♂, 3♀, Malta, Bajjet l-Armier (35.992N, 14.366E), spring 2003, coll. A. Deidun. 1 juvenile, Malta, Għadira (35.97N, 14.349E), 8.5.1981, coll. A. E. Baldacchino. 1♂, Malta, Ir-Ramla tal Mixquqa (35.934N, 14.346E), winter 2003, coll. A. Deidun. 1♀, Malta, Wied il-Għasel (35.914N, 14.425E), 18.4.1975, coll. P. J. Schembri. 1♀, Malta, Sliema (35.91N, 14.50E), 5.3.1981, coll. A. E. Baldacchino. 1♀, Malta, Wied il-Kbir (35.872N, 14.477E), 10.5.1977, coll. P. J. Schembri. 1♀, Malta, Il-Buskett (35.859N, 14.398E), 30.12.1978, coll. P. J. Schembri. 2♀, 3 juveniles, Malta, Il-Buskett (35.859N, 14.398E), 7.4.1977, coll. S. P. Schembri. 1♂, Malta, Ġebel Ċiantar (35.844N, 14.399E), 17.5.1981, coll. P. J. Schembri.

Notes: Specimens deposited in the collection of Jochen Martens, Mainz.

Opilio canestrinii (Thorell, 1876)

1♂, 1♀, Gozo, Ir-Ramla l-Hamra (36.06N, 14.285E), winter 2003, coll. A. Deidun. 3♂, 2♀, Malta, Ir-Ramla tal Mixquqa (35.934N, 14.346E), winter 2003, coll. A. Deidun. 1♂, 1♀, Malta, Għadira (35.97N, 14.349E), 8.5.1981, coll. A.-E. Baldacchino.

Notes: Specimens deposited in the collection of Jochen Martens, Mainz.

Phalangium targionii (Canestrini, 1871)

2?, Comino Island (36.01N, 14.34E), 23.3.1975, coll. P. J. Schembri. 1?, Malta, Birkirkara (35.89N, 14.46E), 12.1.1979, coll. S. P. Schembri. 1?, Ir-Ramla tal Mixquqa (35.934N, 14.346E), spring 2003, coll. A. Deidun.

Notes: Specimens deposited in the collection of Jochen Martens, Mainz.

Opiliones: Phalangodidae

Ptychosoma vitellinum Sørensen, 1873

8 adults, Malta, Selmun (35.962N, 14.382E), 20.12.1979, coll. P. J. Schembri.

Notes: Specimens deposited in the collection of Jochen Martens, Mainz.

4. Checklist

We compiled all recorded species of the Maltese Arachnid fauna into a checklist with up-to-date nomenclature, including the species newly recorded by this study (Table S1) and with previous records to be deleted (Table S2).

5. Discussion

In the present work, we compiled a preliminary checklist of Maltese Arachnida. These arthropods are rather poorly known in the country of Malta apart from spiders and records are often of outdated nomenclature or difficult to track. We recorded several species of mites and one harvestmen as new to the Maltese fauna. Some of these may represent novel species that need further examination and collecting. Several new country records published here represent collections made as early as 1977 (harvestmen) and 1999 (mites). These records and the overall scarcity of publications dealing with the Maltese Arachnid fauna highlight the fact that there is still much to discover on these islands that generally represent the biota of the Central Mediterranean, but also harbour endemic species.

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Footnotes

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Table S1. Arachnida of the Maltese Archipelago.

SPECIES	NOTES	REFERENCE
ACARI		
Ixodida - Ixodidae		
<i>Hyalomma marginatum</i> Koch, 1844		This study
<i>Ixodes frontalis</i> (Panzer, 1798)	Originally recorded as <i>I. pari</i> , a junior synonym.	Sultana & Gauci 1977-1978
<i>Ixodes ricinus</i> Linnaeus, 1758	Recorded also under its junior synonym <i>I. ricinoides</i> .	Sultana & Gauci 1977-1978; Dandria 1996
<i>Rhipicephalus sanguineus</i> (Latreille, 1806) s.l.: species II.	Unnamed species II. of the species group.	Licari et al. 2017
Mesostigmata - Ameroseiidae		
<i>Kleemannia plumigera</i> Oudemans, 1930		This study
<i>Kleemannia plumosus</i> Oudemans, 1902		This study
Mesostigmata - Ascidae		
<i>Blattisocius keegani</i> Fox, 1947		This study
<i>Blattisocius tarsalis</i> (Berlese, 1918)		This study
<i>Lasioseius penicilliger</i> Berlese, 1916		This study
<i>Melichares agilis</i> Hering, 1838		This study
Mesostigmata - Cillibidae		
<i>Cilliba woelkei</i> (Hirschmann & Zirnbiegl-Nicol, 1969)	Originally recorded as <i>Uropoda woelkei</i> .	Kontschán 2003
Mesostigmata - Dermanyssidae		
<i>Dermanyssus gallinae</i> (De Geer, 1778)		This study
Mesostigmata - Digamasellidae		
<i>Digamasellus presepum</i> Berlese, 1918		This study
Mesostigmata - Laelapidae		
<i>Hypoascis lubrica</i> Voigts & Oudemans, 1904		This study
<i>Laelaps echidninus</i> Berlese, 1887		Savona Ventura 2002
Mesostigmata - Macrochelidae		
<i>Macrocheles matrius</i> (Hull, 1925)		This study
<i>Macrocheles merdarius</i> (Berlese, 1889)		This study
<i>Macrocheles muscaedomesticae</i> (Scopoli, 1772)		This study
Mesostigmata - Parasitidae		
Parasitidae sp.		This study

SPECIES	NOTES	REFERENCE
Mesostigmata - Phytoseiidae		
<i>Neoseiulus californicus</i> (McGregor, 1954)		Mifsud 1997
<i>Neoseiulus cucumeris</i> (Oudemans, 1930)		Mifsud 1997
<i>Phytoseiulus persimilis</i> Athias-Henriot, 1957		Mifsud 1997
Mesostigmata - Podocinidae		
<i>Podocinum pacificum</i> Berlese, 1896		This study
Mesostigmata - Sejidae		
Sejidae spp.		This study
Mesostigmata - Uropodidae		
<i>Centrouropoda almerodai</i> Hiramatsu & Hirschmann, 1992		Porcelli et al. 2009
<i>Urobovella marginata</i> Koch, 1839		Porcelli et al. 2009
<i>Discourella maltensis</i> Kontschán, 2003	Endemic.	Kontschán 2003
Mesostigmata - Varroidae		
<i>Varroa destructor</i> Anderson & Trueman, 2000	Originally recorded as <i>Varroa jacobsoni</i> , now considered a distinct species.	Stern 1994 ³ ; This study
Sarcoptiformes - Acaridae		
<i>Acarus farris</i> (Oudemans, 1905)		This study
<i>Acarus immobilis</i> Griffiths, 1964		This study
<i>Acarus siro</i> Linnaeus, 1758		This study
<i>Aleuroglyphus ovatus</i> (Troupeau, 1878)		This study
<i>Caloglyphus rhizoglyphoides</i> (Zachvatkin, 1937)		This study
<i>Mycetoglyphus fungivorus</i> Oudemans, 1932		This study
<i>Tyrophagus longior</i> (Gervais, 1844)		This study
<i>Tyrophagus palmarum</i> Oudemans, 1924		This study
<i>Tyrophagus putrescentiae</i> (Schrank, 1781)	See Klimov & OConnor (2010) for name use.	Fan & Zhang 2007; This study
<i>Tyrophagus similis</i> Volgin, 1949		This study
Sarcoptiformes - Carpoglyphidae		
<i>Carpoglyphus lactis</i> (Linnaeus, 1758)		This study
Sarcoptiformes - Chortoglyphidae		
<i>Chortoglyphus arcuatus</i> (Troupeau 1879)		This study

SPECIES	NOTES	REFERENCE
Sarcoptiformes - Ctenobelbidae		
<i>Ctenobelba pectinigera</i> (Berlese, 1908)		This study
Sarcoptiformes - Epilohmanniidae		
<i>Epilohmannia cylindrica</i> (Berlese, 1904)		This study
Sarcoptiformes - Falculiferidae		
Falculiferidae sp.		This study
Sarcoptiformes - Glycyphagidae		
<i>Austroglycyphagus geniculatus</i> (Vitzthum, 1919)		This study
<i>Glycyphagus domesticus</i> (De Geer, 1778)		This study
<i>Lepidoglyphus destructor</i> (Schrank, 1781)		This study
Sarcoptiformes - Histiotomatidae		
Histiotomatidae sp.		This study
Sarcoptiformes - Oribatulidae		
<i>Lucoppia burrowsi</i> (Michael, 1890)		This study
<i>Zygoribatula cognata</i> (Oudemans, 1902)		This study
Sarcoptiformes - Perlohmanniidae		
<i>Perlohmannia</i> sp.		This study
Sarcoptiformes - Phthiracaridae		
<i>Phthiracarus</i> sp.		This study
Sarcoptiformes - Pyroglyphidae		
<i>Dermatophagoides farinae</i> Bogdanov, 1864		This study
<i>Dermatophagoides pteronyssinus</i> (Trouserart, 1897)		This study
<i>Euroglyphus maynei</i> (Cooreman, 1950)		This study
Sarcoptiformes - Sarcoptidae		
<i>Psoroptes equi</i> (Hering, 1838)		This study
<i>Sarcoptes scabiei</i> De Geer, 1778		Savona Ventura 2002; This study
Sarcoptiformes - Suctobelbidae		
<i>Suctobelba</i> sp.		This study
Trombidiformes - Bdellidae		
Bdellidae sp.		This study

SPECIES	NOTES	REFERENCE
Trombidiformes - Cheyletidae		
<i>Acaropsellina sollers</i> Kuzin, 1940		This study
<i>Cheletomorpha lepidopterorum</i> (Shaw, 1794)		This study
<i>Cheyletus eruditus</i> (Schrank, 1781)		This study
<i>Cheyletus malaccensis</i> Oudemans, 1903		This study
<i>Cheyletus trouessarti</i> Oudemans, 1903		This study
<i>Grallacheles bakeri</i> De Leon, 1962		This study
Trombidiformes - Cocceupodidae		
<i>Linopodes</i> sp.		This study
Trombidiformes - Cunaxidae		
Cunaxidae sp.		This study
Trombidiformes - Demodicidae		
<i>Demodex canis</i> Leydig, 1859		This study
Trombidiformes - Diptilomyopidae		
<i>Asetadiptacus emiliae</i> Carmona, 1971		Mifsud et al. 2012
<i>Rhyncaphytoptus ficifoliae</i> Keifer, 1939		Mifsud et al. 2012
Trombidiformes - Eriophyidae		
<i>Acalitus phloeocoptes</i> (Nalepa, 1890)		Mifsud et al. 2006
<i>Aceria brevipes</i> (Nalepa, 1899)		Mifsud et al. 2006
<i>Aceria carlinae</i> (Nalepa, 1905)		Mifsud et al. 2006
<i>Aceria caulobia</i> (Nalepa, 1900)		Mifsud et al. 2006
<i>Aceria granati</i> (Canestrini & Massalongo, 1894)		Mifsud et al. 2006
<i>Aceria ilicis</i> (Canestrini, 1890)		Mifsud et al. 2006
<i>Aceria massalongoi</i> (Canestrini, 1890)		Mifsud et al. 2006
<i>Aceria ononidis</i> (Canestrini, 1890)		Mifsud et al. 2006
<i>Aceria onychia</i> (Nalepa, 1915)		Mifsud et al. 2006
<i>Aceria oxalidis</i> (Trotter, 1902)		Mifsud et al. 2006
<i>Aceria rubiae</i> (Canestrini, 1897)		Mifsud et al. 2006
<i>Aceria salicina</i> (Nalepa, 1911)		Mifsud et al. 2006
<i>Aceria salviae</i> (Nalepa, 1891)		Mifsud et al. 2006

SPECIES	NOTES	REFERENCE
<i>Aceria sanguisorbae</i> (Canestrini, 1892)		Mifsud et al. 2006
<i>Aceria sheldoni</i> (Ewing, 1937)		Mifsud et al. 2006
<i>Aceria stefanii</i> (Nalepa, 1898)		Mifsud et al. 2006
<i>Aculops lycopersici</i> (Tryon, 1917)		de Lillo 2013
<i>Aculops pelekassi</i> (Keifer, 1959)		de Lillo 2013
<i>Aculus anthobius</i> (Nalepa, 1892)		Mifsud et al. 2006
<i>Aculus convolvuli</i> (Nalepa, 1891)		Mifsud et al. 2006
<i>Aculus minutus</i> (Nalepa, 1890)		Mifsud et al. 2006
<i>Aculus schmardae</i> (Nalepa, 1889)		Mifsud et al. 2006
<i>Aculus tetanothrix</i> (Nalepa, 1889)		Mifsud et al. 2006
<i>Anothopoda fici</i> Mohanasundaram, 1982		Mifsud et al. 2012
<i>Cecidophyopsis hendersoni</i> (Keifer, 1954)		Mifsud et al. 2006
<i>Colomerus vitis</i> (Pagenstecher, 1857)		Mifsud et al. 2006; de Lillo 2013
<i>Ditrymacus athiasella</i> Keifer, 1960		Mifsud et al. 2006
<i>Eriophyes pyri</i> (Pagenstecher, 1857)		de Lillo 2013
<i>Oxycenus maxwelli</i> (Keifer, 1939)		Mifsud et al. 2006
<i>Phyllocoptruta oleivora</i> (Ashmead, 1879)		Mifsud et al. 2006
<i>Tegolophus hassani</i> (Keifer, 1959)		Mifsud et al. 2006
Trombidiformes - Erythraeidae		
<i>Balaustium</i> sp.		This study
Trombidiformes - Pterygosomatidae		
<i>Geckobia estherae</i> Bertrand, Pfliegler & Sciberras, 2012	Endemic.	Bertrand et al. 2012
<i>Geckobia latastei</i> Mégnin, 1878		Bertrand et al. 2012
Trombidiformes - Pyemotidae		
<i>Pyemotes ventricosus</i> (Newport, 1850)		This study
Trombidiformes - Raphignathidae		
Raphignathidae sp.		This study
Trombidiformes - Siteroptidae		
<i>Siteroptes graminum</i> Reuter, 1900		This study

SPECIES	NOTES	REFERENCE
Trombidiformes - Tarsonemidae		
<i>Polyphagotarsonemus latus</i> Banks, 1904		This study
<i>Tarsonemus granarius</i> Lindquist, 1972		This study
Trombidiformes - Tenuipalpidae		
<i>Brevipalpus phoenicis</i> (Geijskes, 1936)		This study
Trombidiformes - Tetranychidae		
<i>Tetranychus urticae</i> C. L. Koch, 1836	Also recorded under its synonym <i>T. telarius</i> .	Dandria 1996; This study
Trombidiformes - Trombiculidae		
<i>Ericotrombidium caucasicum</i> (Schluger, 1967)		Stekolnikov et al. 2014
Trombidiformes - Tydeidae		
Tydeidae sp.		This study
ARANEAE		
Agelenidae		
<i>Agelena</i> sp.		Kritscher 1996
<i>Lycosoides coarctata</i> (Dufour, 1831)		Kritscher 1996
<i>Lycosoides flavomaculata</i> (Lucas, 1846)		Kritscher 1996
<i>Tegenaria parietina</i> (Fourcroy, 1785)		Baldacchino et al. 1993; Kritscher 1996
<i>Tegenaria dalmatica</i> Kulczyński, 1906	Originally recorded as <i>Tegenaria zinzulusensis</i> Dresco, 1959, a junior synonym.	Kritscher 1996
Amaurobiidae		
<i>Amaurobius erberi</i> (Keyserling, 1863)		Kritscher 1996
Araneidae		
<i>Agelenatea redii</i> (Scopoli, 1763)		Baldacchino et al. 1993
<i>Araneus angulatus</i> Clerck, 1758		Sciberras et al. 2014
<i>Araneus quadratus</i> Clerck, 1757		Baldacchino et al. 1993
<i>Argiope bruennichi</i> (Scopoli 1772)	Probably extinct.	Schembri 1989; Baldacchino et al. 1993
<i>Argiope lobata</i> (Pallas, 1772)		Brignoli 1979; Kritscher 1996
<i>Argiope trifasciata</i> (Forsskål, 1775)	Recently introduced neozoon.	Bonnet & Attard 2005; Falzon 2005 ^{1,2} ; Dandria et al. 2005; Di Pompeo et al. 2011
<i>Cyclosa insulana</i> (Costa, 1834)		Baldacchino et al. 1993; Kritscher 1996
<i>Cyrtophora citricola</i> (Forsskål, 1775)		Baldacchino et al. 1993; Kritscher 1996

SPECIES	NOTES	REFERENCE
<i>Larinioides cornutus</i> (Clerck, 1757)		Dandria et al. 2005
<i>Larinioides patagiatus</i> (Clerck, 1757)	Originally recorded as <i>Larinioides folium</i> (Schrank, 1803), a junior synonym.	Baldacchino et al. 1993; Kritscher 1996
<i>Mangora acalypha</i> (Walckenaer, 1802)		Baldacchino et al. 1993; Kritscher 1996
<i>Neoscona subfusca</i> (C.L. Koch, 1837)		Baldacchino et al. 1993; Kritscher 1996
<i>Zygiella atrica</i> (C.L. Koch, 1845)		Baldacchino et al. (1993)
<i>Zygiella x-notata</i> (Clerck, 1757)		Baldacchino et al. 1993; Kritscher 1996
Clubionidae		
<i>Clubiona leucaspis</i> Simon, 1932		Kritscher 1996
Dictynidae		
<i>Brigittea civica</i> (Lucas, 1850)	Recorded as <i>Dictyna civica</i> .	Kritscher 1996
<i>Brigittea latens</i> (Fabricius, 1775)	Recorded as <i>Dictyna latens</i> .	Kritscher 1996
<i>Dictyna pusilla</i> Thorell, 1856		Kritscher 1996
<i>Marilynia bicolor</i> (Simon, 1870)		Kritscher 1996
Dysderidae		
<i>Dysdera crocata</i> C.L. Koch, 1839		Baldacchino et al. 1993; Kritscher 1996
<i>Harpactea corticalis</i> (Simon, 1882)		Kritscher 1996
Eutichuridae		
<i>Cheiracanthium mildei</i> L. Koch, 1864		Kritscher 1996
<i>Cheiracanthium pennyi</i> O. P-Cambridge, 1873		Kritscher 1996
Filistatidae		
<i>Filistata insidiatrix</i> (Forsskål, 1775)		Brignoli 1982; Baldacchino et al. 1993; Kritscher 1996
Gnaphosidae		
<i>Aphantaulax cincta</i> (L. Koch, 1866)	Originally recorded as <i>A. cinctus</i> [sic].	Kritscher 1996; Dandira et al. 2011-2012
<i>Drassodes cupreus</i> (Blackwall, 1834)	Originally recorded as <i>D. lapidosus macer</i> (Thorell, 1875), a junior synonym.	Kritscher 1996
<i>Drassodes lapidosus</i> (Walckenaer, 1802)		Kritscher 1996
<i>Drassylus pusillus</i> (C.L. Koch, 1833)	Originally recorded as <i>Zelotes pusillus</i> .	Kritscher 1996
<i>Gnaphosa lugubris</i> (C.L. Koch, 1839)		Kritscher 1996
<i>Haplodrassus severus</i> (C.L. Koch, 1839)		Baldacchino et al. 1993; Kritscher 1996
<i>Haplodrassus signifer</i> (C.L. Koch, 1839)		Kritscher 1996
<i>Heser nilicola</i> (O. P-Cambridge, 1874)	Originally recorded as <i>Zelotes nilicola</i> (O. P-Cambridge, 1874).	Kritscher 1996

SPECIES	NOTES	REFERENCE
<i>Kishidaia conspicua</i> (L. Koch, 1866)	Originally recorded as <i>Pocilochroa conspicua</i> .	Kritscher 1996
<i>Leptodrassus albidus</i> Simon, 1914		Kritscher 1996
<i>Micaria coarctata</i> (Lucas, 1846)	Originally recorded as <i>M. smaragdula</i> Simon, 1878, a junior synonym.	Kritscher 1996
<i>Micaria formicaria</i> (Sundevall, 1832)		Kritscher 1996
<i>Nomisia exornata</i> (C.L. Koch, 1839)		Baldacchino et al. 1993
<i>Nomisia recepta</i> (Pavesi, 1880)		Baldacchino et al. 1993; Kritscher 1996
<i>Pocilochroa loricata</i> Kritscher, 1996	Endemic.	Kritscher 1996
<i>Pterotrichina elegans</i> (Dalmás, 1921)		Kritscher 1996
<i>Scotophaeus blackwalli</i> (Thorell, 1871)		Baldacchino et al. 1993
<i>Scotophaeus scutulatus</i> (L. Koch, 1866)		Kritscher 1996
<i>Trachyzelotes barbatus</i> (L. Koch, 1866)		Kritscher 1996
<i>Zelotes tenuis</i> (O. P.-Cambridge, 1874)	Also recorded as <i>Z. fuscotestaceus</i> Simon, 1878 and <i>Z. pallidus</i> (O. P.-Cambridge, 1874), junior synonyms.	Kritscher 1996
Linyphiidae		
<i>Agyneta rurestris</i> (C.L. Koch, 1836)	Originally recorded as <i>Meioneta rurestris</i> .	Kritscher 1996
<i>Araeoncus humilis</i> (Blackwall, 1841)		Kritscher 1996
<i>Erigone longipalpis</i> (Sundevall 1830)		Dandria et al. 2005
<i>Hybocoptus corrugis</i> (O. P.-Cambridge 1875)		Dandria et al. 2005
<i>Microlinyphia pusilla</i> (Sundevall, 1830)		Bosmans & Dandria 1994; Kritscher 1996
<i>Microctenonyx subitaneus</i> (O.P.-Cambridge 1875)	Originally recorded as <i>Aulacocyba subitanea</i> .	Zammit Maempel 1985
<i>Ostearius melanopygius</i> (O. P.-Cambridge 1879)		Dandria et al. 2005
<i>Palliduphantes melitensis</i> (Bosmans, 1994)	Endemic. Originally described as <i>Lepthyphantes melitensis</i> .	Bosmans & Dandria 1994
<i>Pelecopsis inedita</i> (O.P.-Cambridge, 1875)		Kritscher 1996
<i>Silometopus curtus</i> (Simon, 1881)		Kritscher 1996
<i>Syedra parvula</i> Kritscher, 1996	Endemic.	Kritscher 1996
<i>Tenuiphantes tenuis</i> (Blackwall, 1852)	Originally recorded as <i>Lepthyphantes tenuis</i> .	Kritscher 1996
Liocranidae		
<i>Mesiotelus tenuissimus</i> (L. Koch, 1866)		Kritscher 1996
<i>Scotina occulta</i> Kritscher, 1996	Endemic.	Kritscher 1996

SPECIES	NOTES	REFERENCE
Lycosidae		
<i>Alopecosa albofasciata</i> (Brullé, 1832)		Bosmans & Dandria 1994
<i>Alopecosa canaricola</i> Schmidt, 1982		Kritscher 1996
<i>Arctosa lacustris</i> (Simon 1876)		Bosmans & Dandria 1994
<i>Hogna ferox</i> (Lucas, 1838)	Orogonally recorded as <i>Lycorma ferox</i> .	Bosmans & Dandria 1994
<i>Lycosa tarantula</i> (Linnaeus, 1758)	Originally recorded as <i>Lycosa narbonensis</i> Walckenaer, 1806, a junior synonym.	Baldacchino et al. 1993
<i>Pardosa hortensis</i> (Thorell, 1872)		Bosmans & Dandria 1994
<i>Pardosa proxima</i> (C.L. Koch, 1847)		Bosmans & Dandria 1994
Miturgidae		
<i>Zora</i> sp.		Dandira et al. 2011-2012
Nemesiidae		
<i>Nemesia arboricola</i> Pocock, 1903	Endemic.	Pocock 1903; Schembri 1989; Baldacchino et al. 1993; Kritscher 1994, 1996; Dandria 2001
Nesticidae		
<i>Nesticus</i> sp.		Baldacchino et al. 1993
Oecobiidae		
<i>Oecobius maculatus</i> Simon, 1870	Originally recorded as <i>Oecobius kahmanni</i> Kritscher, 1966, a junior synonym.	Kritscher 1996
<i>Oecobius navus</i> Blackwall, 1859	Originally misidentified as <i>O. annulipes</i> Lucas, 1846	Kritscher 1996
Oonopidae		
<i>Silhouettella loricatula</i> (Roewer, 1942)	Originally recorded as <i>Gamasomorpha loricatula</i> .	Kritscher 1996
Palpimanidae		
<i>Palpimanus punctatus</i> Kritscher, 1996	Endemic.	Kritscher 1996
Araneae - Philodromidae		
<i>Pulchellodromus glaucinus</i> (Simon, 1870)	Originally recorded as <i>Philodromus glaucinus</i> Simon, 1870.	Kritscher 1996
<i>Pulchellodromus pulchellus</i> Lucas, 1846	Originally recorded as <i>Philodromus pulchellus</i> Lucas, 1846.	Baldacchino et al. 1993; Kritscher 1996
<i>Philodromus rufus</i> Walckenaer, 1820		Kritscher 1996
<i>Thanatus vulgaris</i> Simon, 1870	Also recorded as <i>Vacchellia thorellii</i> (O. P.-Cambridge, 1872), a junior synonym.	Baldacchino et al. 1993; Kritscher 1996
<i>Tibellus</i> cf. <i>oblongus</i> (Franganillo, 1926)		Baldacchino et al. 1993
Pholcidae		
<i>Holocnemus plucheii</i> (Scopoli, 1763)	Originally recorded as <i>H. pluchii</i> [sic].	Baldacchino et al. 1993; Kritscher 1996

SPECIES	NOTES	REFERENCE
<i>Pholcus opilionoides</i> (Schrank, 1781)		Kritscher 1996
<i>Pholcus phalangioides</i> (Fuesslin, 1775)	Also recorded as <i>P. phalangioidea</i> [sic].	Zammit Maempel 1986; Baldacchino et al. 1993; Kritscher 1996
<i>Spermophora senoculata</i> (Dugès, 1836)		Kritscher 1996
Pisauridae		
<i>Pisaura mirabilis</i> (Clerck, 1775)		Baldacchino et al. 1993
<i>Pisaura quadrilineata</i> (Lucas, 1838)	Originally recorded as <i>Pisaura maderiana</i> Kulczyński, 1895, a junior synonym.	Kritscher 1996
Salticidae		
<i>Aelurillus monardi</i> (Lucas, 1846)		Kritscher 1996
<i>Aelurillus schembrii</i> Cantarella, 1982	Described from Malta, Siculo-Maltese endemic.	Cantarella 1982; Schembri 1989; Baldacchino et al. 1993; Kritscher 1996
<i>Chalcoscirtus infimus</i> (Simon, 1868)		Cantarella 1982; Kritscher 1996
<i>Cyrba algerina</i> (Lucas, 1846)		Cantarella 1982; Kritscher 1996
<i>Euophrys rufibarbis</i> (Simon, 1868)		Cantarella 1982; Kritscher 1996
<i>Evarcha jucunda</i> (Lucas, 1846)		Cantarella 1982; Kritscher 1996
<i>Hasarius adansoni</i> (Audouin, 1825)		Cantarella 1982; Baldacchino et al. 1993; Kritscher 1996
<i>Heliophanus tribulosus</i> Simon, 1868		Cantarella 1982; Schembri 1983; Baldacchino et al. 1993; Kritscher 1996
<i>Icius congener</i> (Simon, 1871)	Originally recorded as <i>I. nebulosus</i> (Simon, 1868), a senior synonym.	Kritscher 1996
<i>Icius hamatus</i> (C.L. Koch, 1846)		Cantarella 1982; Baldacchino et al. 1993; Kritscher 1996
<i>Menemerus fagei</i> Berland & Millot, 1941		Freudenschuss et al. 2013
<i>Menemerus semilimbatus</i> (Hahn, 1827)		Cantarella 1982; Baldacchino et al. 1993; Kritscher 1996
<i>Menemerus taeniatus</i> (L. Koch, 1867)		Cantarella 1982; Baldacchino et al. 1993; Kritscher 1996
<i>Neaetha membrosa</i> (Simon, 1868)		Cantarella 1982; Schembri 1989; Baldacchino et al. 1993
<i>Phlegra bresnieri</i> (Lucas, 1846)		Cantarella 1982; Baldacchino et al. 1993; Kritscher 1996
<i>Phlegra fasciata</i> (Hahn, 1826)		Kritscher 1996
<i>Plexippus paykulli</i> (Audouin, 1825)		Cantarella 1982; Baldacchino et al. 1993; Kritscher 1996
<i>Salticus mutabilis</i> Lucas, 1846		Cantarella 1982; Baldacchino et al. 1993; Kritscher 1996

SPECIES	NOTES	REFERENCE
<i>Salticus unciger</i> (Simon, 1868)	Originally recorded as <i>S. simoni</i> Kulczyński, 1907, a junior synonym.	Cantarella 1982; Baldacchino et al. 1993
<i>Talavera petrensis</i> (C.L. Koch, 1837)	Originally recorded as <i>Euophrys petrensis</i> .	Kritscher 1996
Scytodidae		
<i>Scytodes bertheloti</i> Lucas, 1838		Baldacchino et al. 1993
<i>Scytodes thoracica</i> (Latreille, 1804)		Kritscher 1996
<i>Scytodes velutina</i> Heineken & Lowe, 1836	Originally recorded as <i>Scytodes velutina delicatula</i> Simon, 1873, a junior synonym.	Baldacchino et al. 1993; Kritscher 1996
Segestriidae		
<i>Ariadna</i> cf. <i>insidiatrix</i> Audouin, 1827	May be an undescribed sp. ecies, see Introduction.	Kritscher 1996
<i>Segestria senoculata</i> (Linnaeus, 1758)		Baldacchino et al. 1993; Kritscher 1996
Araneae - Sicariidae		
<i>Loxosceles rufescens</i> (Dufour, 1820)		Baldacchino et al. 1993; Kritscher 1996; Dandria & Mahoney 2002
Sparassidae		
<i>Micrommata ligurina</i> (C.L. Koch, 1845)	Recorded as <i>M. ligurinum</i> [sic].	Baldacchino et al. 1993
Tetragnathidae		
<i>Metellina merianae</i> (Scopoli, 1763)		Baldacchino et al. 1993
<i>Tetragnatha</i> cf. <i>extensa</i> (Linnaeus, 1758)		Schembri 1989; Baldacchino et al. 1993
Theridiidae		
<i>Argyrodes argyrodes</i> (Walckenaer, 1841)	Also recorded as <i>A. gibbosus</i> (Lucas, 1846), a junior synonym.	Baldacchino et al. 1993; Kritscher 1996
<i>Dipoenata cana</i> Kritscher, 1996	Endemic.	Kritscher 1996
<i>Enoplognatha macrochelis</i> (Levy & Amitai, 1981)		Baldacchino et al. 1993
<i>Enoplognatha mandibularis</i> (Lucas, 1846)		Baldacchino et al. 1993; Kritscher 1996
<i>Euryopsis episinoides</i> (Walckenaer, 1847)	Originally recorded as <i>Euryopsis acuminata</i> (Lucas, 1846), a junior synonym.	Baldacchino et al. 1993; Kritscher 1996
<i>Kochiura aulica</i> (C.L. Koch, 1838) Kochiura	Originally recorded as <i>Anelosimus aulicus</i> .	Baldacchino et al. 1993; Kritscher 1996
<i>Neottiura uncinata</i> Lucas 1846	Originally recorded as <i>Theridion uncinatum</i> .	Bosmans & Dandria 1994
<i>Nesticodes rufipes</i> Lucas 1846	Originally recorded as <i>Theridion rufipes</i> .	Bosmans & Dandria 1994
<i>Parasteatoda tepidariorum</i> (C.L. Koch, 1841)	Originally recorded as <i>Achaearanea tepidariorum</i> .	Kritscher 1996
<i>Steatoda grossa</i> (C.L. Koch, 1838)		Baldacchino et al. 1993; Kritscher 1996
<i>Steatoda paykulliana</i> (Walckenaer, 1806)		Baldacchino et al. 1993; Kritscher 1996
<i>Steatoda triangulosa</i> (Walckenaer, 1802)		Baldacchino et al. 1993; Kritscher 1996

SPECIES	NOTES	REFERENCE
<i>Theridion mystaceum</i> L. Koch, 1870		Kritscher 1996
<i>Theridion pinastri</i> L. Koch, 1872		Kritscher 1996
Thomisidae		
<i>Ozyptila brevipes</i> (Hahn, 1826)	Originally recorded as <i>Oxyptila brevipes</i> [sic]	Baldacchino et al. 1993
<i>Ozyptila</i> sp.		Baldacchino et al. 1993
<i>Runcinia grammica</i> (C.L. Koch, 1837)	Originally recorded as <i>R. cerina</i> (C.L. Koch, 1845), and <i>R. lateralis</i> (C.L. Koch, 1838), junior synonyms.	Baldacchino et al. 1993; Kritscher 1996
<i>Synema globosum</i> (Fabricius, 1775)		Baldacchino et al. 1993; Kritscher 1996
<i>Thomisus onustus</i> Walckenaer, 1805		Baldacchino et al. 1993; Kritscher 1996
<i>Xysticus</i> cf. <i>audax</i> (Schrank, 1803)		Baldacchino et al. 1993
<i>Xysticus</i> cf. <i>bufo</i> (Dufour, 1820)		Baldacchino et al. 1993
<i>Xysticus caperatus</i> Simon, 1875		Baldacchino et al. 1993
<i>Xysticus cribratus</i> Simon, 1885		Kritscher 1996
<i>Xysticus</i> cf. <i>kochi</i> Thorell, 1872	Originally recorded as <i>X. kochii</i> [sic]	Baldacchino et al. 1993
<i>Xysticus nubilus</i> Simon, 1875		Kritscher 1996
Titanoecidae		
<i>Nurscia albomaculata</i> (Lucas, 1846)		Kritscher 1996
Uloboridae		
<i>Uloborus plumipes</i> Lucas, 1846		Kritscher 1996
<i>Uloborus walckenaerius</i> Latreille, 1806		Kritscher 1996
Zodariidae		
<i>Zodarion emarginatum</i> (Simon, 1873)		Kritscher 1996
<i>Zodarion nigriceps</i> (Simon, 1873)		Kritscher 1996
Zoropsidae		
<i>Zoropsis</i> sp. <i>inimana</i> (Dufour, 1820)	Also recorded as <i>Z. sp. inimanus</i> [sic].	Bosmans & Dandria 1994; Kritscher 1996
OPILIONES		
Dicranolasmatidae		
<i>Dicranolasma soerensenii</i> Thorell, 1876		This study
Phalangüidae		
<i>Metaphalangium cirtanum</i> (C. L. Koch, 1839)	Also recorded as <i>M. propinquum</i> , a junior synonym.	Marcellino 1974; Schembri 2003; This study

SPECIES	NOTES	REFERENCE
<i>Opilio canestrinii</i> (Thorell, 1876)	Also recorded as <i>O. aspromontanum</i> , a junior synonym.	Marcellino 1974; Schembri 2003; This study
<i>Phalangium targionii</i> (Canestrini, 1871)		Roewer 1912; Schembri 2003; This study
Phalangodidae		
<i>Ptychosoma vitellinum</i> Sørensen, 1873		Thaler 1996; Schembri 2003; This study
PALPIGRADI		
Eukoeneiidae		
<i>Eukoenia christiani</i> Condé, 1988	Endemic.	Condé 1988; Harvey 2003; Schembri 2003
<i>Eukoenia mirabilis</i> (Grassi & Calandruccio, 1885)		Harvey 2003
PSEUDOSCORPIONES		
Cheliferidae		
<i>Hysterochelifer tuberculatus tuberculatus</i> (Lucas, 1849)		Mahnert 1975; Harvey 2011
<i>Rhacochelifer maculatus</i> (L. Koch, 1873)		Mahnert 1975; Harvey 2011
Chernetidae		
<i>Allochernes siciliensis</i> (Beier, 1963)	Also recorded as <i>Chernes siciliensis</i> .	Mahnert 1975; Schembri 2003; Harvey 2011
<i>Lamprochernes nodosus nodosus</i> (Schränk, 1803)		Harvey 2011
<i>Pselaphochernes lacertosus</i> (L. Koch, 1873)		Mahnert 1975; Harvey 2011
Chthoniidae		
<i>Chthonius (Chthonius) ischnocheles ischnocheles</i> (Hermann, 1804)		Mahnert 1975; Harvey 2011
<i>Chthonius (Chthonius) jonicus</i> Beier, 1931		Harvey 2011
<i>Chthonius (Chthonius) tenuis</i> L. Koch, 1873		Mahnert 1975; Harvey 2011
<i>Chthonius (Ephippiochthonius) gibbus</i> Beier, 1953		Mahnert 1975; Harvey 2011
<i>Chthonius (Ephippiochthonius) girgentiensis</i> Mahnert, 1982	Endemic.	Mahnert 1982; Schembri 2003; Harvey 2011
<i>Chthonius (Ephippiochthonius) maltensis</i> Mahnert, 1975	Endemic.	Mahnert 1975; Schembri 2003; Harvey 2011
Garypidae		
<i>Garypus beauvoisii</i> (Audouin, 1826)		Mahnert 1975; Harvey 2011
Geogarypidae		
<i>Geogarypus minor</i> (L. Koch, 1873)		Mahnert 1975; Harvey 2011
<i>Geogarypus nigrimanus</i> (Simon, 1879)		Mahnert 1975; Harvey 2011
Neobisiidae		
<i>Acanthocreagris ruffoi</i> (Lazzeroni, 1969)	Originally recorded and misidentified as <i>A. italica italica</i> .	Mahnert 1975; Harvey 2011

SPECIES	NOTES	REFERENCE
<i>Neobisium</i> sp.		Mahnert 1975
<i>Roncus lubricus</i> L. Koch, 1873		Mahnert 1975; Harvey 2011
<i>Roncus melitensis</i> Gardini & Rizzerio, 1987	Endemic.	Gardini & Rizzerio 1987; Schembri 2003; Harvey 2011
Olpiidae		
<i>Calocheiridius libanoticus</i> Beier, 1955		Mahnert 1975; Harvey 2011
<i>Minniza algerica</i> Beier, 1931		Mahnert 1975; Schembri 2003; Harvey 2011
<i>Olpium pallipes pallipes</i> (Lucas, 1849)		Mahnert 1975; Harvey 2011
Syarinidae		
<i>Microcreagrina hispanica</i> (Ellingsen, 1910)		Harvey (2011)
Withiidae		
<i>Withius piger</i> (Simon, 1878)		Mahnert 1975; Harvey 2011
SCORPIONES		
Euscorpiidae		
<i>Euscorpius sicanus</i> (C. L. Koch, 1837)	Originally recorded as <i>E. carpathicus sicanus</i> .	Kritscher 1992; Fet et al. 2003; Schembri 2003

Table S2. Species unrecorded from the Maltese fauna.

Species	Original record	Notes	Source of unrecording
<i>Acanthocreagrismelitensis</i> (Lazzeroni, 1969)	Mahnert 1975	Misidentification.	Harvey 2011
<i>Euscorpius (Euscorpous) candiota</i> Birula, 1900	Kritscher 1992	Misidentification. Originally recorded as <i>E. (E.) carpathicus candiota</i> .	Fet 2003
<i>Geckobia loricata</i>	Betrand et al. 2012	Typing error: this sp. ecies was erroneously mentioned in the abstract of Betrand et al. 2012.	This study
<i>Geckobia sarahae</i> [<i>lapsus calami</i>]	Betrand et al. 2012	Typing error: this sp. ecies was erroneously mentioned in a figure of Betrand et al. 2012.	This study
<i>Nemesia macrocephala</i> Ausserer, 1871	Baldacchino et al. 1993; Decae 2012	Misidentification.	Dandria 2001
<i>Oecobius annulipes</i> Lucas, 1846	Kritscher 1996	Replaced by <i>O. navus</i> in the previous Maltese spider checklist based on that Kritscher considered <i>O. navus</i> a synonym of <i>O. annulipes</i> .	Dandria et al. 2005
<i>Varroa jacobsoni</i> Oudemans, 1904	Stern 1994 ¹ ; Vella 2003 ²	Taxonomic revision after publication of the record.	Anderson & Trueman 2000