A contribution to the arachnofauna (Arachnida: Araneae, Opiliones) of the Maltese Islands, with two new records for Europe

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Abstract. The arachnid fauna of the Maltese Islands has not yet been adequately investigated. In the present work, from a total of 117 species sampled, 36 taxa represent newly recorded spider species (Araneae) for Malta, with an additional new record of a harvestman (Opiliones). These new records include three new spider families and one new harvestman family for the Maltese archipelago: Anyphaenidae Bertkau, 1878, Mimetidae Simon, 1881, Oxyopidae Thorell, 1869 and Sclerosomatidae Simon, 1879; as well as two species which are recorded from Europe for the first time: *Acartauchenius insigniceps* (Simon, 1894) and *Zelotes poecilochroaeformis* Denis, 1937. Ecological, distributional, biogeographical and taxonomic notes are provided for the newly recorded species.

Key words: Comino, Europe, Gozo, harvestmen, Malta, Mediterranean, new records, spiders

Zusammenfassung. Ein Beitrag zur Arachnofauna (Arachnida: Araneae, Opiliones) der maltesischen Inseln, mit zwei Neunachweisen für Europa. Die Spinnentierfauna der Maltesischen Inseln ist bisher vergleichsweise wenig untersucht. In der vorliegenden Arbeit konnten während dreier Aufenthalte auf den Inseln aus insgesamt 117 gesammelten Arten 36 Erstnachweise von Spinnenarten (Araneae) und der Erstnachweis einer Weberknechtart (Opiliones) erbracht werden. Bei den Spinnennachweisen sind drei für die Inseln neue Familien sowie bei den Weberknechten eine neue Familie enthalten. Zwei Arten sind neu für Europa. Zu einigen der neu nachgewiesenen Arten werden biologische und taxonomische Hinweise gegeben.

Astratt. Kontribuzzjoni għall-araknofawna (Arachnida: Araneae, Opiliones) tal-Gżejjer Maltin, b'żewġ speċi ġodda għall-Ewropa. Il-fawna araknida tal-Gżejjer Maltin għadha ma ġietx investigata adegwatament. Fix-xogħol preżenti, minn total ta' 117 speċi li nġabru, 37 speċi huma ġodda għal Malta – 36 brimb (Araneae) kif ukoll speċi waħda ta' busaqajn (Opiliones). Dawn l-ispeċi jinkludu tliet familji ta' brimb u familja waħda ta' busaqajn ġodda għall-arċipelagu Malti: Anyphaenidae Bertkau, 1878; Mimetidae Simon, 1881; Oxyopidae Thorell, 1869 u Sclerosomatidae Simon, 1879; kif ukoll żewġ speċi li huma ġodda għall-Ewropa: *Acartauchenius insigniceps* (Simon, 1894) u *Zelotes poecilochroaeformis* Denis, 1937. Noti ekoloġiċi, distribuzzjonali, bijoġeografiċi u tassonomiċi huma pprovduti għall-ispeċi rrekordjati.

With a total area of 316 km², the Maltese archipelago consists of a collection of small, low islands and islets in the central Mediterranean. The three main islands - Malta, Gozo and Comino - are all inhabited, and are accompanied by a number of small rocks and islets along their coast such as St Paul's Islands, Fungus Rock, Filfla and Cominotto. The islands' position, some 96 km south of Sicily and 350 km north of Libya, make them of great zoogeographical interest, as the local fauna has elements which are both South European and North African. Despite their small size, the islands also feature a great diversity in habitats in a comparatively small area - though in most cases, anthropogenic disturbance has significantly reduced their quality; with a population of just over 540000 people, Malta has the fifth-highest population density of any country in the world at 1715 persons per square kilometre (National Statistics Office 2024).

Unlike many other Euro-Mediterranean countries, however, the arachnid fauna of Malta remains rather understudied, though the arachnofauna has been given more attention in recent decades. Currently, the spider fauna of the Maltese Islands stands at 150 species from 31 families; harvestmen species are much fewer in number, with five species recorded from three families (Pfliegler et al. 2017, Dentici 2018, Cassar & Řezáč 2021, Cassar et al. 2022).

In the present work, newly recorded species for the Maltese territory are presented along with new distributional data

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for previously recorded species (Fig. 1, Tabs 3-4). Notes on biology and distribution are provided, accompanied by photographs of live specimens (Figs 39-44) and their genital regions (Figs 3-38).

Material and methods

The sampling period for the present study lasted between spring 2015 (30. Mar. - 4. Apr.) and spring 2018 (27.-31. Mar.). Arachnids were collected by the first author from 27 different locations around the main island of Malta, the second largest island of Gozo, as well as Comino (Fig. 1, Tab. 1, Appendix Tab. S1, Tab. S2). Some additional material collected by the second author (2019-2020) is also included. The habitats present at the sites varied considerably (Fig. 2). Overall, the Maltese Islands are characterized by exposed rock and shallow soils, and coralline limestone and karstic formations predominate, such as extensive coastal rocky plateaus. Numerous narrow rock valleys (widien) also occur, at times with temporary bodies of water which dry out and return seasonally. Steppe and scrubland areas are often bordered by agricultural areas and artificially irrigated land. In addition, an urban park and one of the only semi-natural woodlands in the Maltese Islands were also sampled for arachnids.

Most arachnids were collected directly by hand. A beating sheet, sweep net and pitfall traps with concentrated saline as a preservative were employed for sampling arachnids at location L7 in spring 2018. All material was preserved in 75% ethanol and has been deposited in Stefan Rehfeldt's collection, with the exception of those specimens collected by Thomas Cassar which are retained within his collection. When dissecting genitalia, lactic acid was used to clear up the vulval structures. Identification of material was carried out using a Zeiss Stemi 2000-C stereomicroscope; literature used for this purpose is indicated in the results section for each respective

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Fig. 1: Map of the Maltese Islands, showing sampling locations mentioned in the present study; refer to Tab. 1 for the significance of each numbered location

Tab. 1: Detailed information for each of the collection sites mentioned in Fig. 1; L = Location number

L	Location name	Island	Coordinates (°N, °E)	Elevation (m a.s.l.)	Description
1	Jubilee Grove (Floriana)	Malta	35.8906, 14.5009	28	Tree-planted artificial 'park' with ruderal, herbaceous vegetation.
2	Triq Marsamxett (Valletta)	Malta	35.9021, 14.5132	10	Tarmacked, coastal urban road with ornamental vegetation.
3	St. George's Bay (Saint Julian's)	Malta	35.9273, 14.4892	14	Same as above.
4	Pembroke	Malta	35.9300, 14.4872	12	Coastal garigue with sparse trees.
5	Pembroke	Malta	35.9290, 14.4886	12	Same as above.
6	Wied Mejxu (Saint Julian's)	Malta	35.9264, 14.4858	26	Somewhat disturbed, sloping garigue valley bed, fringed by urban development and ornamental trees.
7	Wied id-Dis (Swieqi)	Malta	35.9281, 14.4608	78	Fringe area between maquis and agricultural land.
8	Near Bajda Ridge (Mellieħa)	Malta	35.9458, 14.3716	55	Sloping garigue with low-growing, aromatic shrubs and sclerophyllous vegetation, including <i>Pistacia lentiscus</i> .
9	Near Simar NR (Xemxija)	Malta	35.9454, 14.3801	5	Area just outside an artificial wetland.
10	Mellieħa	Malta	35.9502, 14.3482	102	Exposed, rocky garigue.
11	Ghajn Tuffieha	Malta	35.9295, 14.3464	45	Steppe consisting of coastal clay slopes carpeted by <i>Lygeum spartum</i> .
12	Tarġa Gap (Mosta)	Malta	35.9165, 14.4117	82	Rocky, grassy area.
13	Near Dwejra Lines (Rabat)	Malta	35.9025, 14.3849	183	Agricultural area with terraced fields and rural roads.
14	Chadwick Lakes (Rabat)	Malta	35.8999, 14.4013	97	Valley watercourse with multiple dams and tall herbaceous vegetation.
15	Chadwick Lakes (Rabat)	Malta	35.8982, 14.3980	101	Same as above.
16	Tal-Wej (Mosta)	Malta	35.9156, 14.4321	91	Garigue with sparse tufts of tall grasses and scattered, small fields, surrounded by urban development.
17	Mdina	Malta	35.8850, 14.4038	197	Fortified city with planted trees and ornamental vegetation.
18	Buskett (limits of Dingli/ Siģģiewi)	Malta	35.8562, 14.3991	195	Semi-natural woodland with citrus tree plantations and native trees such as <i>Quercus</i> , <i>Rhamnus</i> and <i>Laurus</i> .
19	Siģģiewi	Malta	35.8621, 14.4089	179	Rural road among agricultural fields with <i>Morus</i> trees and <i>Opuntia</i> .



Fig. 2: Various sampling locations across the Maltese Islands representing different habitats. a. Jubilee Grove (Floriana); b. Pembroke; c. Wied id-Dis (Swieqi); d. Buskett (Dingli/Siġġiewi); e. Bajda Ridge (Mellieħa); f. Għajn Tuffieħa Bay; g. Wied Hanżira (Gozo, Xewkija); h. Triq San Anard (Gozo, Victoria); i. Comino

L	Location name	Island	Coordinates (°N, °E)	Elevation (m a.s.l.)	Description
20	Near Dwejra Tower (Dwejra)	Gozo	36.0510, 14.1904	3	Exposed, karstic scrubland by the coastline.
21	Iż-Żewwieqa (Mġarr)	Gozo	36.0295, 14.3030	80	Sloping, karstic coastal landscape with large boulders and low shrubs.
22	Near Daħlet Qorrot (Qala)	Gozo	36.0498, 14.3126	61	Same as above.
23	Triq Għajn Qasab (Nadur)	Gozo	36.0553, 14.2877	48	Agricultural land.
24	Triq San Anard (Rabat)	Gozo	36.0419, 14.2518	65	Water ditch with herbaceous vegetation and litter.
25	Wied Mġarr ix-Xini (Xewkija)	Gozo	36.0263, 14.2581	65	Rocky valley stream forming temporary pools when water subsides.
26	Wied tal-Qliegħa (Żebbuġ)	Gozo	36.0705, 14.2431	44	Same as above
27	Wied il-Għasri (Żebbuġ)	Gozo	36.0794, 14.2306	34	Gravel road bordering agricultural land.
28	Comino (western side of the island)	Com- ino	36.0104, 14.3318	42	Natural garigue with low-growing, aromatic shrubs and sclerophyllous vegetation.

species. A Sony Alpha 77V digital camera, mounted on the stereomicroscope with the aid of a photo adapter, was used for photographic documentation. For live photos, a Sigma 70 mm macro lens was used. The nomenclature used is based on the World Spider Catalog (2024). In the results the abbreviations '**PL**' and '**BL**' refer to prosoma length and body length respectively.

Results

The present study is based on material representing a total of 112 spider species from 33 families and five species of harvestmen from three families. Four species (*Ariadna* sp., *Oxyopes* sp., *Ozyptila* sp. and *Palpimanus* sp.) could only be deter-

mined to generic level and one species identification (*Pardosa* cf. *proxima*) remains to be confirmed because only females have been collected (see Appendix; Isaia et al. 2018). The following annotated list represents newly recorded species for the Maltese Islands.

Anyphaenidae Bertkau, 1878

Anyphaena sabina L. Koch, 1866 (Figs 3a-d, 39a-b)
Material examined. L18, 3. Apr. 2015: 1 &, 1 &, BL & 5.3 mm;
28. Mar. 2018: 1 &, BL 5.3 mm, PL 2.5 mm.
Determination. Urones et al. (1995).
Distribution. Circum-Mediterranean, Türkiye, Caucasus (World Spider Catalog 2024).



Fig. 3: Anyphaena sabina from Malta, female (a-b) and male (c-d). a. epigyne (not dissected); b. vulva; c. left pedipalp, prolateral view; d. left pedipalp, ventral view

Remarks. New family record for the Maltese Islands. A typically Mediterranean species, also found in nearby Sicily (Pantini & Isaia 2019). Like most of its congeners, *A. sabina* inhabits dense vegetation, though there is no preference for a particular vegetation type, and gravid females may leave foliage and reside under stones instead (Urones et al. 1995). In Malta this species was collected exclusively in a semi-natural woodland with citrus plantations and evergreen trees such as *Quercus ilex, Ceratonia siliqua* and *Laurus nobilis*.

Araneidae Clerck, 1757

Hypsosinga albovittata (Westring, 1851) (Fig. 4a-b) Material examined. L8, 4. Apr. 2015: 1 &, BL 3.1 mm. Determination. Roberts (1995).



Fig. 4: Male of Hypsosinga albovittata from Malta. a. habitus, dorsal view; b. left pedipalp, prolateral view



Distribution. Europe, North Africa, Türkiye, Caucasus, Russia, Middle East, Central Asia (World Spider Catalog 2024). **Remarks.** Although a new record for the Maltese Islands, its presence here is unsurprising as this species is extremely widespread throughout the Mediterranean and also found in nearby Sicily (World Spider Catalog 2024, Pantini & Isaia 2019). *Hypsosinga albovittata* constructs its circular webs in low vegetation relatively close to the ground in insolated habitats (Roberts 1995). This was indeed the situation in which it was found in Malta – collected by beating low-growing vegetation in an exposed, rocky karstic garigue populated by low shrubs such as *Pistacia lentiscus* and aromatic species.

Lipocrea epeiroides (O. Pickard-Cambridge, 1872) (Figs 5a-b, 39c)

Material examined. L18, 28. Mar. 2018: 2 &, 2 &, BL & 7 mm, PL & 3 mm, BL & 9.5 mm, PL & 3.2 mm; Għadira Nature Reserve, 27. Apr. 2020, 1º, leg. T. Cassar. **Determination.** Levy (1986).

Distribution. Italy (Sardinia, Sicily), Greece, Cyprus, Türkiye, Israel, Yemen, India (World Spider Catalog 2024).

Remarks. This species is of Asian origin, but has recently spread westwards towards southern Europe (Bosmans & Colombo 2015). Recent finds by Dentici (2017) and Rehfeldt (2017, unpublished) from Sicily confirm this; though there is also the possibility that it has been present for longer and simply remained undetected. This species appears to be active at night, deconstructing its web and taking shelter during the day and then re-weaving nocturnally as suggested by findings during night-searches by Bosmans & Colombo (2015). This was also the case in Malta, where this species was collected during the night in an area which had previously been searched during the day (Għadira NR); in such cases the spiders constructed orbicular webs on vegetation over a metre above the ground in grassy and shrubby field verges



Fig. 5: Male of *Lipocrea epeiroides* from Malta. **a.** left pedipalp, prolateral view; **b.** left pedipalp, apical view

or semi-urban situations. Other specimens were collected by beating reeds during the day in a semi-natural woodland area (Buskett).

Cheiracanthiidae Wagner, 1887

Cheiracanthium angulitarse Simon, 1878 (Figs 6a-c, 39e) Material examined. L26, 29. Mar. 2018: 1 9, BL 7.4 mm, PL 4 mm.

Determination. Hansen (1991).

Distribution. Spain, France (Corsica), Italy, Hungary, Romania (World Spider Catalog 2024).

Remarks. A species with a southern European distribution, *C. angulitarse* has also been recorded from nearby Sicily (Pantini & Isaia 2019). It becomes the third *Cheiracanthium* species known from Malta, following *C. mildei* L. Koch, 1864 and *C. pennyi* O. P-Cambridge, 1873 (Kritscher 1996). A single female was collected from the second-largest island of the Maltese archipelago, Gozo, in a valley with a freshwater stream and tall herbaceous vegetation, by beating reeds.

It should be noted, however, that the above identification is provisional, as female singletons of this genus are notoriously difficult to determine to the species level and *Cheir-acanthium* is in urgent need of a thorough revision. Without a male specimen, the identification should be regarded as tentative.

Clubionidae Wagner, 1887

Porrhoclubiona vegeta (Simon, 1918) (Figs 6d, 39f) Material examined. L26, 29. Mar. 2018: 1 9; L8, 30. Mar.

2018: 1 9, BL 5.2 mm, PL 2.15 mm. **Determination.** Roberts (1995), Breitling (2020).

Distribution. North Africa, Southern Europe, Canary Islands, Caucasus, Iran (World Spider Catalog 2024).

Remarks. The presence of this species in Malta conforms to its known Mediterranean distribution (World Spider Catalog 2024). In the Maltese Islands, it was collected in two very different habitats – from tall herbaceous vegetation growing near a valley stream, and in an exposed karstic garigue. Its congener *P. genevensis* (L. Koch, 1866) is a highly similar species, though females may be distinguished based on (i) the width of the copulatory openings, which are longer than wide in *P. genevensis*, (ii) the vulval copulatory ducts, which are also comparatively narrower, and (iii) the width of the epigynal atrium, which is wider in *P. vegeta* (Bosmans et al. 2017).

Dictynidae O. Pickard-Cambridge, 1871

Nigma puella (Simon, 1870) (Figs 7a-b, 40d)

Material examined. L4, 31. Mar. 2018: 1 9, BL 3.4 mm, PL 1.1 mm.

Determination. Roberts (1995), Breitling (2020).

Distribution. Europe, Azores, Madeira, Canary Islands (World Spider Catalog 2024).

Remarks. The record of this species from Malta complements its more southerly range in Europe; *N. puella* is present in nearby Sicily as well – published records from North Africa



Fig. 6: females of *Cheiracanthium angulitarse* (a-c) and *Porrhoclubiona vegeta* (d) from Malta. **a.** epigyne (not dissected); **b.** epigyne (dissected); **c.** vulva, dorsal view; **d.** epigyne (dissected)



Fig. 7: Female of *Nigma puella* from Malta. **a.** epigyne (not dissected); **b.** vulva, dorsal view

could not be found (Benfatto et al. 1992, World Spider Catalog 2024). This species creates a cribellate network of silk on the underside of leaves (Roberts 1995). The single female in the present work was collected from tall herbaceous vegetation fringing a coastal garrigue area.

Gnaphosidae Pocock, 1895

Aphantaulax trifasciata (O. Pickard-Cambridge, 1872) (Figs 8a-d, 40c)

Material examined. L7, 1. Apr. 2015: 1 δ, BL 4.8 mm; **L18**, 28. Mar. 2018: 2 δδ, BL 4.9 mm, PL 2 mm; **L8**, 30. Mar. 2018: 1 δ, 1 ♀, BL ♀ 6.8 mm, PL ♀ 2.9 mm.

Determination. Roberts (1995).

Distribution. Southern Europe, North Africa, Türkiye, Caucasus, Russia to Central Asia, Israel, Iran, China, Japan (World Spider Catalog 2024).

Remarks. A spider found in most circum-Mediterranean countries in both South Europe and North Africa, the presence of *A. trifasciata* in Malta is unsurprising, and it is also found in nearby Sicily (Pantini & Isaia 2019). It appears to be relatively widespread and euryecious in Malta, and becomes the second species of its genus known from here, after *A. cinc-ta* (L. Koch, 1866) (Kritscher 1996).

Haplodrassus dalmatensis (L. Koch, 1866) (Fig. 9a-c) Material examined. L7, 26.–31. Mar. 2018: 1 9, BL 7.8 mm, PL 2.7 mm.

Determination. Bosmans et al. (2018).

Distribution. Europe, North Africa, Türkiye, Middle East, Russia to Central Asia (World Spider Catalog 2024). **Remarks**. *Haplodrassus dalmatensis* has a very wide distributional range, Malta being one of only a handful of European countries from which it had not been recorded before; the present record fills in a gap in the knowledge of its Central Mediterranean distribution (Nentwig et al. 2024, World Spider Catalog 2024). A single female specimen was collected in a pitfall trap set in a transitional zone of maquis and agricultural land; in the Mediterranean and the Maghreb it is known to be euryecious (Bosmans et al. 2018), while in Central Europe it usually inhabits dry, open areas with sparse vegetation, like sandy grassland (Arachnologische Gesellschaft 2024).

Marinarozelotes lyonneti (Audouin, 1826) (Figs 9d-e, 40e) Material examined. L22, 23. Jul. 2016: 1 9, BL 5.1 mm, PL 2.2 mm.

Determination. Platnick & Murphy (1984).

Distribution. Macaronesia, Mediterranean region eastwards to Central Asia (native range), USA, Mexico, Peru and Brazil (introduced range) (World Spider Catalog 2024).

Remarks. A typically Mediterranean gnaphosid also present in Sicily (Di Franco 1993) and introduced into several countries of the New World (World Spider Catalog 2024). The single female recorded in the present study was collected under the remains of a collapsed rubble wall in an agricultural area.

Zelotes callidus (Simon, 1878) (Fig. 10a-c)

Material examined. L6, 21 Jul. 2016: 1 ^Q, BL 6.0 mm, PL 3.0 mm.

Determination. Bosmans & Van Keer (2012). **Distribution.** Spain, France, Italy, Bulgaria, Morocco, Algeria (World Spider Catalog 2024).



Fig. 8: Copulatory organs of Aphantaulax trifasciata from Malta, female (a-b) and male (c-d). a. epigyne (dissected); b. vulva, dorsal view; c. left pedipalp, prolateral view; d. left pedipalp, ventral view



Fig. 9: Females of *Haplodrassus dalmatensis* (a-c) and *Marinarozelotes lyonneti* (d-e) from Malta. a. habitus, dorsal view; b. epigyne (dissected); c. vulva, dorsal view; d. epigyne (not dissected); e. vulva, dorsal view



Fig. 10: Female of *Zelotes callidus* from Malta. **a.** habitus, dorsal view; **b.** epigyne (not dissected); **c.** vulva, dorsal view

Remarks. This species is already known from much of the western and central Mediterranean region, and is present in nearby Sicily as well (Bosmans & Van Keer 2012, Pantini & Isaia 2019). *Zelotes callidus* can be found in a variety of habitats, though it tends to prefer more xeric environments (Gaymard & Lecigne 2018). The only female collected from Malta in the present study occurred in an anthropogenically-disturbed karstic coastal scrubland, under stones.

Zelotes poecilochroaeformis Denis, 1937

(Figs 11a-b, 12a-c, 13a-e, 40f)

Material examined. L8, 4 Apr. 2015: 1 & BL 7 mm, 30 Mar. 2018: 1 & BL 7.2 mm, PL 2.8 mm; **L7**, 22 Jul. 2016: 1 & BL 5.3 mm, PL 2.5 mm, 26 Mar. 2018: 1 & BL 4.8 mm, PL 2.2 mm, 26–31 Mar. 2018: 2 & E, BL 7.2 mm, PL 2.8 mm; **L4**, 25 Mar. 2018: 1 & BL 4.2 mm, PL 2.1 mm; **L25**, 27 Mar. 2018:





Fig. 11: Male of *Zelotes* poecilochroaeformis from Malta. **a.** habitus, dorsal view; **b.** left pedipalp, prolateral view



Fig. 13: Copulatory organs of male (a-b) and female (c-e) Zelotes poecilochroaeformis from Malta. a. left pedipalp, dorsal view; b. left pedipalp, ventral view; c. epigyne (not dissected); d. epigyne (dissected); e. vulva, dorsal view (dissected)

1 &, BL 4.6 mm, PL 2.5 mm; **L18**, 28 Mar. 2018: 1 &, 2 \, BL & 7 mm, PL & 2.9 mm, BL \, 6.6 mm, PL \, 3.0 mm, det. A. Melic.

Determination. Denis (1937).

Distribution. So far only recorded from Algeria and Tunisia (World Spider Catalog 2024).

Remarks. First record for Europe. Denis (1937) described the species on the basis of a single male and several female specimens collected in a wooded mountainous region of Algeria ("Zouagha Forest"), under stones and organic debris. Bosmans (unpubl., cited after Nentwig et al. 2024) also presents material from Algeria, as well as Tunisia, but otherwise this species has never been collected outside of North Africa, and indeed *Zelotes poecilochroaeformis* has not even been recorded from nearby Sicily.

The presence of North African faunal elements in the Maltese Islands which are not also present in nearby European territories does not seem to have a satisfactory explanation. Exponents of the hypothesis that the Maltese Islands were connected to North Africa after tectonically emerging cannot explain why North African taxa could not also invade Sicily, an island which was indeed connected to the Maltese archipelago through a narrow land isthmus during the last glaciation (Thake 1985). A possible means of dispersion for an araneomorph spider would be ballooning individuals carried on strong Sirocco winds from North Africa; but Z. poecilochroaeformis is a ground-level gnaphosid, and is therefore expected to have very poor ballooning dispersal ability, especially on an intercontinental scale (Platnick 1976). In the absence of a reasonable biogeographic explanation for the presence of an exclusively North African ground-level gnaphosid

in the Maltese Islands, the possibility that this taxon was introduced accidentally through anthropogenic activity is not excluded.

In Malta, *Z. poecilochroaeformis* appears to be a relatively common, widespread and euryecious species, collected under rocks and using pitfall traps in garigue, agricultural areas, coastal karstic scrubland, near a freshwater valley stream and in a semi-natural woodland area near the remains of palm trees.

Linyphiidae Blackwall, 1859

Acartauchenius insigniceps (Simon, 1894) (Fig. 14a-e, 15a-d) Material examined. L8, 4. Apr. 2015: 1 ♀, BL 2.5 mm, 30 Mar. 2018: 2 ♂♂, 2 ♀; L4, 30. Mar. 2018: 1 ♂, 1 ♀, BL ♂ 1.9 mm, PL ♂ 0.82 mm, BL ♀ 2.3 mm, PL ♀ 0.8 mm.

Determination. Bosmans (2002).

Distribution. North Africa – Morocco, Algeria and Tunisia (World Spider Catalog 2024).

Remarks. First record for Europe. The species was originally described as *Trachelocamptus insigniceps* by Simon (1894) on the basis of material from Saïda Province, Algeria. It was later described as *Trechelocamptus hirticeps/T. obscurus* from Tunisia and Morocco (Denis 1964, 1967). After a detailed revision, Bosmans (2002) placed it in the genus *Acartauchenius* (Simon, 1884), also presenting material from Algeria and Morocco, where the species was found both in open habitats (maquis and meadows) as well as in the foliage of a degraded holm oak forest. In Malta, the species was found in the relatively exposed and xeric habitat of garigue. The presence of North African species, but it should be noted that for a relatively small-bodied linyphild not restricted to ground-level,





d





0.1 mm

Fig. 14: Female of *Acartauchenius insigniceps* from Malta. a.-b. habitus; c. epigyne (not dissected); d. epigyne (dissected); e. vulva, dorsal view



ballooning individuals carried by Sirocco winds may indeed be a plausible explanation for dispersal between North Africa and the Maltese archipelago.

Alioranus pauper (Simon, 1881) (Fig. 16a-e)

Material examined. L24, 23 Jul. 2016: 1 δ & 1 ♀, BL δ 1.3 mm, PL δ 0.6 mm, BL ♀ 1.3 mm, PL ♀ 0.6 mm.

Determination. Bosmans (2007).

Distribution. Mediterranean: North Africa (Algeria, Tunisia, Morocco) and Western Europe (Italy, France including Corsica, Spain and Portugal) (World Spider Catalog 2024). **Remarks**. *Alioranus pauper* is a species whose range includes the western and central Mediterranean region, and thus its presence in the Maltese Islands is not wholly surprising, although the archipelago appears to represent one of its easternmost outposts (Bosmans 2007). Specimens were collected from the damp ground of a paved water ditch on the island of Gozo. In North Africa, this species also occurs predominantly in moist habitats such as the banks of freshwater swamps and inland salt marshes (Bosmans 2007).

Centromerus cf. *cinctus* (Simon, 1884) (Fig. 17a-d) Material examined. L11, 4. Apr. 2015: 1 &, BL 1.6 mm. Determination. Bosmans (2006), Oger (2024) **Distribution.** France (including Corsica), Algeria and Tunisia (World Spider Catalog 2024).

Remarks. The identification of the above specimen, attributed to the genus Centromerus, is provisional as no males were available for study and there is a general lack of detail and variations provided in the literature for females of Centromerus cinctus. The only previous European records of this species come from mainland France and the Mediterranean island of Corsica (Bosmans 1986). Otherwise, C. cinctus (Simon, 1884) has been recorded from North Africa. Its presence in the Maltese archipelago, if confirmed with certainty, would add crucial information to the knowledge of this species' distribution, which appears to have considerable gaps. Perhaps it is also present in other central Mediterranean territories but has been overlooked; further investigation should be undertaken. In Malta, a female specimen was collected under a piece of dead wood lying on the ground on a grassy coastal slope. Bosmans (1986) also presents material from Algeria collected near the coast - in a dune habitat - as well as under stones in a meadow.

Diplocephalus graecus (O. Pickard-Cambridge, 1873) (Fig. 18a-d)

Material examined. L21, 2 Apr. 2015: 1 ^Q, BL 2.1 mm (BL 2.1 mm); **L25**, 27 Mar. 2018: 1 ^Q, BL 2.5 mm, PL 0.9 mm;



Fig. 16: Female (a-c) and male (d-e) of *Alioranus pauper* from Malta. **a.** habitus (female), dorsal view; **b.** epigyne (dissected); **c.** vulva; **d.** habitus (male); dorsal view; **e.** left palp, prolateral view





Fig. 17: Female of *Centrome*rus cf. cinctus (a-d), male pedipalp of *Neriene furtiva* (e) and vulva of female *Walckenaeria* sp. (f), all from Malta. **a.** female dorsal view; **b.** epigyne (not dissected); **c.** epigyne (dissected); **d.** vulva, dorsal view; **f.** vulva, dorsal view



L8, 4 Apr. 2015: 1 ♀, BL 1.9 mm; **L4**, 31 Mar. 2018: 1 ♂, 4 ♀♀, BL ♂ 1.5 mm, PL ♂ 0.7 mm, BL ♀ 2.5 mm, PL ♀ 0.95 mm; **L7**, 26–31 Mar. 2018: 3 ♂♂.

Determination. Bosmans (1996).

Distribution. Europe (Portugal eastwards to the Balkans, Italy northwards to the British Isles), North Africa (Morocco, Algeria, Tunisia) and Israel (World Spider Catalog 2024).

Remarks. A widespread species within the Mediterranean region (World Spider Catalog 2024). Along with *Agyneta rurestris* (C. L. Koch, 1836) and *Palliduphantes melitensis* (Bosmans, 1994), *D. graecus* was one of the most frequently-encountered linyphild species in this study, collected from a variety of habitats – karstic coastal slopes, garigue, herbaceous vegetation growing along valley freshwater pools and streams, and maquis bordering agricultural areas.



Erigone dentipalpis (Wider, 1834) Material examined. L7, 26–31 Mar. 2018: 2 ඊඊ. Determination. Roberts (1987).

Distribution. Europe, North Africa, Türkiye, Caucasus, European Russia to the Far East), Kazakhstan, Iran, Central Asia, China (native); Canada (introduced) (World Spider Catalog 2024).

Remarks. A generally common species within in its range, it has been recorded from almost the entirety of the European continent, as well as all nearby Mediterranean islands (World Spider Catalog 2024). This record from Malta, therefore, is unsurprising but closes a small gap in its known distribution within the central Mediterranean, where it is also known from Sicily (Benfatto et al. 1992). Two males were collected using a pitfall trap situated in an agricultural area bordered by maquis.

Mermessus denticulatus (Banks, 1898) (Fig. 19a-d)

Material examined. L24, 23 Jul. 2016: 1 9, BL 2.2 mm, PL 1 mm.

Determination. Millidge (1987).

Distribution. Native to the Americas, from Canada southwards to Peru (including the Caribbean); introduced to much of Western Europe, Tunisia and Türkiye (World Spider Catalog 2024).

Remarks. Non-native species; this originally North American linyphiid has spread to extensive parts of Europe and North Africa (World Spider Catalog 2024). It is a euryecious species, occurring in habitats ranging from cracks and crevices in loamy slopes in its native range (Millidge 1987) to highly artificial environments, such as parking areas for vehicles in Türkiye (Lecigne 2021). This species was likely introduced to Europe from North America through the importation of potted plants containing 'stowaway' individuals (Reiser & Neumann 2015). In the Maltese islands, *M. denticulatus* occurred together with *Alioranus pauper* (Simon, 1881) in the damp and shaded soil of a paved water ditch in Gozo.



0.2 mm

Fig. 19: Mermessus denticulatus from Malta. a. female, dorsal view; b-c. epigyne (dissected); d. vulva



Neriene furtiva (O. Pickard-Cambridge, 1871)

(Fig. 17e, 40a)

Material examined. L7, 1 Apr. 2015: 1 &, BL 5.3 mm. Determination. Roberts (1987).

Distribution. Europe, North Africa, European Russia to South Siberia (World Spider Catalog 2024).

Remarks. A widely distributed species in Europe and the Mediterranean region, although it appears not to have been recorded from Sicily (World Spider Catalog 2024). A single male specimen was beaten from the branches of a fig tree (*Ficus carica*) close to the ground in a maquis/agricultural area in Malta. The species preferentially occurs in low-lying vegetation of relatively dry areas (Roberts 1995).

Tenuiphantes herbicola (Simon, 1884) (Fig. 20a-d)

Material examined. L27, between stones, 29 Mar. 2018: 1 ♀, BL 2.7 mm, PL 1.0 mm; **L7**, pitfall trap, 26–31 Mar. 2018: 1 ♀, BL 2.6mm, PL 0.9 mm.

Determination. Van Helsdingen et al. (1977).

Distribution. Spain, France (including Corsica), Italy (including Sicily & Sardinia), Croatia, Albania, Greece, Algeria (World Spider Catalog 2024).

Remarks. *Tenuiphantes herbicola* (Simon, 1884) is widespread in the Mediterranean region. The two Maltese finds extend this species' distribution in the Central Mediterranean. Both on the main island of Malta as well as on Gozo, this species was encountered in the vicinity of agricultural areas. Van Helsdingen et al. (1977) mention, among other situations, finding this species in the moss and leaf litter of mixed and coniferous forests.

Walckenaeria sp. (Fig. 17f)

Material examined. L7, 1 Apr. 2015: 1 ♀, BL 2 mm; pitfall trap, 26.–31. March 2018: 2 ♀, BL 3 mm, PL 1.05 mm. **Determination.** Roberts (1987).

Distribution. Europe (Spain east to European Russia; Norway south to Greece), Türkiye, Caucasus, Russia (even to South Siberia), Kyrgyzstan, China, Korea, Japan (World Spider Catalog 2024).

Remarks. Though the above specimen is yet to be identified to specific level, it can be confidently assigned to the genus

Walckenaeria Blackwall, 1833, thus becoming the first record of this genus from the Maltese Islands. It is of interest to note that no species of this genus have been recorded from the Central Mediterranean before; indeed, the genus appears to be absent from Sicily (Pantini & Isaia 2019). The Maltese specimens were found in a sun-exposed area bordering agricultural land, along a collapsed rubble wall on the ground or among other debris.

Family Mimetidae Simon, 1881

Ero aphana (Walckenaer, 1802) (Figs 21a-b, 42a) Material examined. L18, 3 Apr. 2015: 1 &, BL 2.5 mm. Determination. Roberts (1995).

Distribution. Native to Europe (Portugal east to South European Russia and Germany south to Greece), Macaronesia, North Africa, Türkiye, Caucasus, Russia (extending to Central Asia), Kazakhstan, Iran. It is present as a non-native species in St. Helena, Réunion, Japan (Ryukyu Island), China, Philippines and Australia (World Spider Catalog 2024).

Remarks. Though this species is widespread outside of Europe and has been imported into many countries around the world (Thaler et al. 2004), *E. aphana* (Walckenaer, 1802) is likely an indigenous species in Malta as many southern European countries form part of its native range. In Malta, it was collected in the tree-lined semi-natural woodland of Buskett by using a beating sheet. Together with its congener



Fig. 21: *Ero aphana*, male from Malta. **a.** left pedipalp, prolateral view; **b.** left pedipalp, ventral view



Fig. 22: Ero flammeola, female from Malta. a. epigyne, ventral view (not dissected); b. epigyne, aboral view (not dissected); c vulva, aboral view; d. vulva, dorsal view

E. flammeola (see below), this represents the first record of the family Mimetidae in the Maltese Islands.

Ero flammeola Simon, 1881 (Figs 22a-d, 41a)

Material examined. L12, under a stone, 1 Apr. 2015, 1 9; L18, in a drainage pipe, 3 Apr. 2015: 1 9, BL 3.0 mm. Determination. Thaler et al. (2004).

Distribution. Canary Islands, Iberian Peninsula, Italy (including Sardinia), Greece (including Corfu), Ukraine, Russia (Caucasus), Türkiye and Israel (World Spider Catalog 2024). Remarks. Though the focus of this species' distribution appears to be the Mediterranean region, it seems that no records have been made in Sicily or the North African region (Ponomarev & Shmatko 2020, Thaler et al. 2004, World Spider Catalog 2024). Thus, the two Maltese records above complement the known distribution area for this species and extend it further into the Central Mediterranean. Ero flammeola (Simon, 1881) appears to be a euryecious species; Thaler et al. (2004) report several specimens of this species under stones in open areas (Canary Islands, Tenerife) as well as in a pine forest (Greece, Rhodes). However, it has also often been found in the vicinity of human dwellings and structures, such as under motorway underpasses in Türkiye (Lecigne 2021), in buildings in northern Italy (Thaler et al. 2004) or in a drainage pipe in a semi-natural woodland and under stones in rocky grassland in Malta (present work).

Family Miturgidae Simon, 1886

Zora manicata Simon, 1878 (Fig. 41d)

Material examined. L8, 4. Apr. 2015: 1 δ, BL 3.3 mm; **L15**, 26 Mar. 2018: 2 δδ, 1 ♀, BL δ 2.9 mm, PL δ 1.5 mm, BL ♀ 4.3 mm, PL ♀ 1.95 mm.

Determination. Levy (2003), Mazzoleni et al. (2016).

Distribution. Europe (Portugal east to South European Russia, Poland south to Greece), Israel and Iran (World Spider Catalog 2024).

Remarks. The presence of *Z. manicata* Simon, 1878 in Malta is unsurprising, given its widespread nature in the Euro-Mediterranean region. Older Maltese records of the genus *Zora* probably refer to this species (Dandria et al. 2012). This ground-surface species has been reported from a variety of different habitats, such as Mediterranean oak forests, mead-ows and *Eucalyptus* plantations on the Iberian Peninsula (Urones 2005). In Malta it was collected from two very structurally rich, rather open locations. The males are easily recognizable on the ground due to their high-contrast colouration (especially the dark legs).

Family Oxyopidae Thorell, 1870

Oxyopes sp. (Figs 23a-b, 24a-b, 41b-c)

Material examined. L8, 4 Apr. 2015: 1 **9**, BL 7.3 mm, 30 Mar. 2018: 1 **3**, BL 6.3mm, PL 2.5mm; **L24**, 27 Mar. 2018: 1 **3**, BL 4.15 mm, PL 1.9 mm.



Fig. 23: Oxyopes sp., male from Malta. a. left pedipalp, prolateral view; b. left pedipalp, ventral view



Fig. 24: Oxyopes sp., female from Malta. a. epigyne (not dissected); b. vulva, dorsal view

Remarks. The material presented above becomes the first record of the family Oxyopidae in the Maltese Islands. Unfortunately, the precise determination of the present species from Malta has proven to be difficult. After comparison with a male specimen of Oxyopes nigripalpis Kulczyński, 1891 from Bulgaria, it appears clear that this is not the species present in Malta (cf. Naumova et al. 2021, p. 243, Fig. 14a-b). There are clear morphological differences, especially in the shape of the deep incision of the palpal tibia and the tibial apophysis. The Maltese individuals, on the other hand, could belong to a distinct species that has probably been overlooked so far under the taxon O. lineatus occidentalis Kulczyński, 1907, a third form of O. lineatus Latreille, 1806 separated by Kulczyński. Weiss (1989) and Bauer & Höfer (2017) provide further information on this problem. A revision of the genus is urgently needed (Naumova et al. 2021).

Family Philodromidae Thorell, 1870

Philodromus lividus Simon, 1875 (Fig. 25a-b, 41f) Material examined. L8, 4 Apr. 2015: 1 d, BL 5.8 mm. Determination. Segers (1992), Gaymard & Lecigne (2018). Distribution. Circum-Mediterranean (Europe from Portugal eastward to Greece; Türkiye; North Africa from Algeria westward to Morocco) (World Spider Catalog 2024).

Remarks. This Mediterranean species was collected from an open, sunlit garigue habitat in Malta, close to the coast. This is in agreement with the observations of Muster & Thaler (2004), who state that *P lividus* (Simon, 1875) is often found near the sea, and it inhabits similar garigue habitats in southern France, for example (Gaymard & Lecigne 2018). It seems



Fig. 25: Male *Philodromus lividus* (a-b) and male *Pulchellodromus bistigma* from Malta (c-e). **a.** left pedipalp, ventral view; **b.** tibial apophysis, prolateral view; **c.** dorsal view; **d.** left pedipalp, ventral view; **e.** tibial apophysis, ventral view

that no records of this philodromid exist from Sicily, and thus this first record from Malta extends its known distribution in the Central Mediterranean (Pantini & Isaia 2019).

Pulchellodromus bistigma (Simon, 1870) (Figs 25c-e, 41e) Material examined. L7, 26 Mar. 2018: 1 Å, BL 3.6 mm, PL 1.7 mm; L4, 15 Mar. 2020: 1 subadult Å, det C. Muster. Determination. Muster et al. (2007), Crespo (2008). Distribution. Circum-Mediterranean (World Spider Catalog 2024).

Remarks. *Pulchellodromus bistigma* (Simon, 1870) is widespread in the Mediterranean region and has also been recorded from the neighboring island of Sicily (Pantini & Isaia 2019). The single male Maltese specimen was collected at the edge of a small field. The closely related species *P. pulchellus* (Lucas, 1846) appears to be much more common in the Maltese Islands.



Fig. 26: Spermophorides mediterranea, female from Malta. a. habitus, lateral view; b. epigyne (not dissected); c. epigyne (dissected); d. vulva, dorsal view

0.2 mm

Family Pholcidae C. L. Koch, 1850 Spermophorides mediterranea (Senglet, 1973)

(Figs 26a-d, 42b)

Material examined. L18, 28 Mar. 2018: 2 99, BL 2.0 mm, PL 0.7 mm.

Determination. Senglet (1973).

Distribution. Spain and France (including Corsica) (World Spider Catalog 2024).

Remarks. Spermophorides mediterranea (Senglet, 1973) has so far only been recorded from two countries in the western Mediterranean region, and thus this Maltese record represents an isolated outpost in the Central Mediterranean, and certainly its most southerly record (cf. World Spider Catalog 2024). It is possible that this spider was transported to the Maltese Islands accidentally, or that it is more widespread in the Mediterranean than previously thought and has simply been under-recorded. This small species was only found in the semi-natural woodland of Buskett, under the remains of palm trees lying on the ground. Senglet (1973) describes similar situations in which this species was found, such as under reeds by a stream (Spain, Andalusia) and under dry plant debris (France, Corsica).

Family Salticidae

Aelurillus luctuosus (Lucas, 1846) (Figs 27a-d, 43a-d)

Material examined. L7, 1 Apr. 2015: 1 ♀, BL 4.8 mm, 26 Mar. 2018: 1 ♂, 1 ♀, BL ♀ 6.0 mm, PL ♀ 2.7 mm, pitfall trap, 26–31 Mar. 2018: 1 ♂, BL 5.0 mm, PL 2.35 mm; **L8**, 4 Apr. 2015: 1 ♀, BL 6.1 mm; **L10**, on stones, 30 Mar. 2018: 1 ♀, BL 6.1 mm, PL 2.7 mm, det. G. Azarkina.

Determination. Metzner (1999).

Distribution. Circum-Mediterranean, Turkmenistan (World Spider Catalog 2024).



Fig. 27: Copulatory organs of *Aelurillus luctuosus*, male (a-b) and female (c-d) from Malta. **a.** left pedipalp, prolateral view; **b.** left pedipalp ventral view; **c.** epigyne (not dissected); **d.** vulva, dorsal view





Fig. 28: Ballus armadillo, female from Malta. a. epigyne (not dissected); b. vulva, dorsal view

Remarks. The presence of this species in the Maltese Islands is unsurprising given its widespread distribution throughout the Mediterranean; it has been recorded from nearby Sicily (Canestrini & Pavesi 1870, Azarkina & Logunov 2006). The females are very variable, especially in sexual characteristics.

Ballus armadillo (Simon, 1871) (Figs 28a-b, 42c-d)

Material examined. L18, 3 Apr. 2015: 1 ^Q, BL 4.3 mm, 28 Mar. 2018: 3 dd, BL 3.5 mm, PL 1.6 mm.

Determination. Alicata & Cantarella (1988).

Distribution. France (including Corsica), Italy (including Sardinia & Sicily) and Croatia (World Spider Catalog 2024). **Remarks.** Malta is well within the expected range of *B. arma-dillo* (Simon, 1871) as it has so far been documented mainly from the Central Mediterranean region. The species has also been reported from nearby Sicily (Alicata & Cantarella 1988). In Malta, it was collected several times by using a beating sheet under trees in Buskett. The males of this species can be identified relatively easily by the largely absent leg markings and the presence of a small dark spot on the fourth metatarsus when viewed dorsally (Alicata & Cantarella 1988).

Pseudeuophrys vafra (Blackwall, 1867) (Figs 29a-e, 42e-f)

Material examined. L18, on ground-lying rubble wall remains, 3 Apr. 2015: 1 9, BL 4.3 mm, 26 Jul. 2016: 1 3, BL 4.0 mm, PL 1.95 mm, conf. M. Schäfer.

Determination. Metzner (1999).

Distribution. Europe (Portugal eastwards to Ukraine and Central European Russia), Türkiye, Algeria (World Spider Catalog 2024).



Fig. 29: *Pseudeuophrys vafra*, male (a-c) and female from Malta (d-e) **a.** habitus of male, dorsal view; **b.** left pedipalp, prolateral view; **c.** left pedipalp, ventral view; **d.** epigyne (not dissected); **e.** vulva, dorsal view

Remarks. With an enormous distributional range over the European continent, as well as its presence in both nearby Sicily and North Africa, it comes as no surprise that *P. vafra* is also present in the Maltese Islands, and these new records complement its known distribution in the Central Mediterranean (World Spider Catalog 2024, Metzner 1999). In the present study in Malta, two individuals were collected from a shaded area on collapsed rubble wall remains in semi-natural woodland.

Family Tetragnathidae Menge, 1866 *Tetragnatha intermedia* Kulczyński, 1891 (Figs 30a-b, 39d, 44a)

Material examined. L25, 27 Mar. 2018: 3 đđ, 1 ♀, BL ♂ 4.7 mm, PL ♂ 2.05 mm, BL ♀ 6 .6 mm, PL ♀ 2.3 mm; **L26**, 29 Mar. 2018: 5 đđ, 3 ♀.



Fig. 30: *Tetragnatha intermedia*, male from Malta **a.** left pedipalp, retrolateral view; **b.** left pedipalp, prolateral view

Determination. Wunderlich (2011).

Distribution. Northern shore of the Mediterranean (Iberia eastward to Türkiye) (World Spider Catalog 2024).

Remarks. The Maltese specimens were exclusively collected from the island of Gozo, amid the tall riparian and marginal herbaceous vegetation of two valley streams. *Tetragnatha intermedia* becomes the second species of the genus known from the Maltese archipelago, the other being *T. extensa* which also occurs near freshwater. A typically South European species which is also known from Sicily (Rehfeldt 2017, unpubl.), its presence in Malta is its most southerly known outpost in the Mediterranean.

Family Theridiidae Sundevall, 1833

Enoplognatha diversa (Blackwall, 1859) (Figs 31a-d, 44c) Material examined. L1, under stone, 30 Mar. 2015: 1 ♀, BL 4.6 mm.

Determination. Bosmans & Van Keer (1999).

Distribution. Mostly Mediterranean (Portugal, Spain, France, Greece, Morocco, Tunisia, Algeria) (World Spider Catalog 2024).

Remarks. The species is particularly widespread in the western Mediterranean region, where it is the most common species of its genus (Bosmans & Van Keer 1999). So far, no records of this species have been made from the Central Mediterranean region; not even on the Italian mainland (Pantini & Isaia 2019). In the present study in Malta, a single female specimen was found under a rock in an area overgrown with herbaceous weedy plants in a natural park. According to Bosmans & Van Keer (1999), *E. diversa* is predominantly found under stones in warmer and more open habitats such as fields, gardens, steppe and dunes.

Enoplognatha franzi Wunderlich, 1995 (Fig. 32a-d) Material examined. L7, under stone, 1 Apr. 2015: 1 9, BL 4.5 mm, det. T. Bauer.

Determination. Bosmans & Van Keer (1999), Wunderlich (1995).

Distribution. Western Mediterranean – Iberian Peninsula and Morocco to Algeria (World Spider Catalog 2024).

Remarks. This species is known almost exclusively from the Western Mediterranean, and therefore this Maltese find represents the easternmost record for *E. franzi* in Europe and the Mediterranean (Bosmans & Van Keer 1999, World Spider Catalog 2024). The solitary female encountered in the present



Fig. 31: Enoplognatha diversa, female. a. habitus, dorsal view; b. epigyne (not dissected); c. epignye (dissected); d. vulva, dorsal view

study was collected from a structurally rich habitat along a collapsed rubble wall and was collected under a stone near the ground. Habitat preferences closely match those of *E. diversa* (Blackwall, 1859), the preceding species.

Episinus algiricus Lucas, 1846 (Figs 33a-b, 44b) Material examined. L8, 4 Apr. 2015: 1 Å, BL 4.2 mm. Determination. Knoflach et al. (2009).

Distribution. Portugal, Spain, France (including Corsica), Italy (including Sardinia & Sicily), Algeria and Tunisia (World Spider Catalog 2024).

Remarks. *Episinus algiricus* occurs in the western and central Mediterranean region, and thus its presence in Malta is unsurprising (Knoflach et al. 2009). Dentici (2018) recorded two subadult males of the genus *Episinus* which he attributed tentatively to *E. algiricus* on the basis of colouration; the adult male collected in the present study confirms the presence of this species with certainty as its genitalia could be





Fig. 33: Episinus algiricus, male from Malta. a. left pedipalp, ventral view; b. left pedipalp, prolateral view

examined reliably. The single adult male was collected from a xeric karstic garigue environment.

Simitidion simile (C. L. Koch, 1836)

Material examined. L8, 4 Apr. 2015: 1 Å, BL 2.6 mm; **L17**, 28 Mar. 2018: 1 Å, 1 ♀, BL Å 2.8 mm, PL Å 1.2 mm, BL ♀ 2.3 mm, PL ♀ 1.0mm.

Determination. Roberts (1995).

Distribution. Native to Europe, North Africa, Middle East/ Western Asia, Central Asia; introduced to Canada (World Spider Catalog 2024).

Remarks. A spider with an exceptionally wide distribution range, found virtually everywhere on the European continent, its confirmed presence in Malta fills a small gap in the knowledge of its Central Mediterranean range (World Spider Catalog 2024). This spider appears to be euryecious in Malta, as specimens were collected in a variety of situations by using beating sheets – shrubby vegetation in garigue and the low branches of trees in a semi-natural woodland, for example.

Family Thomisidae Sundevall, 1833

Monaeses paradoxus (Lucas, 1846) (Figs 34a-b, 44e) Material examined. L8, 4 Apr. 2015: 1 9, BL 10.4 mm; L16, 12 Apr. 2020: 4 99, leg. T. Cassar.

Determination. Levy (1973).

Distribution. Southern Europe, Caucasus (World Spider Catalog 2024).

Remarks. Monaeses paradoxus is a southern European species that has already been reported from many countries in the Mediterranean region, though in the Levant its congener *M. israeliensis* occurs (World Spider Catalog 2024). This is first record of the genus *Monaeses* in Malta. The crab spider is difficult to spot in vegetation with the naked eye but can be collected in large numbers when beating low vegetation or using a sweep net on tufts of tall grasses in karstic garigue. *Monaeses paradoxus* is largely myrmecophagic (Bauer 2021).

Ozyptila sp. (Figs 35a-e, 44d)

Material examined. L7, 22 Jul. 2016: 1 ^Q, BL 4.2 mm, PL 1.8 mm.

Remarks. Dentici (2018) presented a male *Ozyptila* specimen, tentatively attributed to *O*. cf. *leprieuri* Simon, 1875 – a species which occurs in Morocco and Algeria (World Spider Catalog 2024). However, after comparing the pedipalps shown in Dentici (2018) with private photographic material of *Ozyptila* cf. *leprieuri* (North Africa) from the collection of



Fig. 34: Monaeses paradoxus, female from Malta. a. epigyne (not dissected); b. vulva, dorsal view



R. Bosmans, they clearly do not represent the same species. A comparison with the type material would be absolutely necessary to clarify the situation in this case. The female presented in the present study may be the corresponding one for the male specimen presented by Dentici (2018). The female collected in the present study was found on the ground at the edge of an agricultural area in northern Malta.

Family Zodariidae Thorell, 1881

Zodarion elegans (Simon, 1873) (Figs 36a-e, 44f) **Material examined. L7**, 22 Jul. 2016: 1 &, BL 2.8 mm, PL 1.45 mm, pitfall trap, 26–31 Mar. 2018: 1 &, BL 3.4 mm, PL 1.5 mm; L4, 26 Jul. 2016: 1 &, BL 4.8 mm, PL 1.8 mm. **Determination.** Bosmans (1997).



Fig. 36: Zodarion elegans, male (a-c) and female (d-e) from Malta. a. habitus, dorsal view; b. left pedipalp, prolateral view; c. left pedipalp, ventral view; d. epigyne (not dissected); e. vulva, dorsal view



Fig. 37: Nelima meridionalis, male from Malta. a. habitus, dorsal view; b. habitus, lateral view; c. left chelicera; d. left pedipalp, prolateral view; e, f. penis, ventral view (f only apical part); g, h. penis lateral view (h only apical part)

Distribution. Southern Europe & North Africa (World Spider Catalog 2024).

Remarks. The species is widespread in southern Europe and has been reported from many countries in the Central Mediterranean region, recorded as well from nearby Sicily (Bosmans 1997, Pantini & Isaia 2019). The Maltese specimens come from structurally rich habitats and were found under stones or collected in pitfall traps.

Order Opiliones Sundevall, 1833

Family Sclerosomatidae Simon, 1879Nelima meridionalis Marcellino, 1972 (Fig. 37a-h, 38a-b)Material examined. L24, 23 Jul. 2016: 1 ♂, BL 2.5 mm; L7,22 Jul. 2016: 1 ♀, BL 4.5 mm, det. A. Schoenhofer.Determination. Marcellino (1972).

Distribution. Italy (including Sicily) (Marcellino 1972). **Remarks**. *Nelima meridionalis* has so far only been reported from Italy – the mainland, Sicily and the Aeolian Islands (Marcellino 1972). Thus, this becomes the first record of this species outside of Italian territories. The species has a penis that is significantly enlarged at the base, with a characteristic apical region, and has a trunk whose margins are not parallel. The expandable sclerites in the apical area (terminus glans) can vary in shape and volume. Harvestmen of the genus *Neli*- *ma* are difficult to identify and the genus needs revision (pers. comm. A. Schönhofer). In the Maltese Islands, *N. meridiona-lis* was collected from structurally rich, rather moist habitats on and within layers of herbaceous vegetation.

Discussion

The vast majority of the newly-recorded species presented in this work have a Holo-Mediterranean distribution. Despite



Fig. 38: Nelima meridionalis, female. a. habitus, dorsal view; b. habitus, lateral view

the Maltese Islands' close proximity to North Africa, its influence on the Maltese spider fauna can be classified as rather small overall - certainly due to the fact that the archipelago was never connected to Africa by a land bridge, as it was to Sicily and mainland Italy (Thake 1985). Indeed, "there is no completely unequivocal evidence of direct...connections" between the Maltese Islands and mainland Africa since the Messinian Salinity Crisis some 5.3 million years ago (Hunt & Schembri 1991). Nevertheless, two spider species previously only known from North Africa (Acarauchius insigniceps and Zelotes poecilochroaeformis) were recorded for the first time from Europe; possible reasons, as discussed already, may be natural dispersion through air currents or direct, accidental introduction through human activity. Many other species are shared with Sicily, and indeed species which were previously considered Italian endemics are now known to occur in the Maltese Islands, namely Harpactea sicula Alicata, 1966 (Cassar & Řezáč 2021) and Nelima meridionalis Marcellino, 1972 (present work).

As a result of the contribution of the present work, the known spider fauna of the Maltese Islands increases from 150 species (Pfliegler et al. 2017, Dentici 2018, Cassar & Rezáč 2021, Cassar et al. 2022) to 186 species. The number of species of harvestmen has also increased from five to six species. Excluded from this are a great many possibly undescribed species such as the Ozyptila taxon presented in this work, which so far could only be determined to generic level. It remains clear that the spiders of the Maltese Islands, and indeed its invertebrate fauna as whole, require much more in-depth study, and many new records, discoveries and species descriptions are expected to occur in the future. The position of the Maltese Islands, smack-bang in the middle of the Mediterranean Sea at the meeting of three continents, makes their faunistic composition incredibly interesting, allowing for exciting new biodiversity studies to reveal the true species richness of these small islands.

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Appendix Tab. S1: Data for all spider species collected in the present study, inclu-ding species recorded in previous works of the Maltese arachnofauna.

Appendix Tab. S1: Data for all spider species coll ding species recorded in provious we	ected in the present study, inclu-	Species	Material examined (see Tab. 1) L7: 1 ♀	
New records are marked with an asteris	k (*)	Haplodrassus dalmatensis (L. Koch, 1866)*		
Species	Material examined (see Tab. 1)	Haplodrassus rufipes (Lucas, 1846)	L7:1 & L12:19	
Agelenidae	(see Tab. 1)	Haplodrassus signifer (C. L. Koch,	L7: 1 ð: L8: 1 ♀	
<i>Lycosoides coarctata</i> (Dufour, 1831)	L1: 1 ♀; L4: 1 ♀; L7: 1 ♀; L20: 1 ♀	1839) Marinarozelotes barbatus	L4: 1 ð; L24: 1 ♀; L25: 1 ♀	
Lycosoides flavomaculata Lucas, 1846	L13: 1 ð; L28: 1 ð	(L. Koch, 1866) Marinarozelotes lyonneti (Audouin,	L23: 1	
Tegenaria dalmatica Kulczyński, 1906	L4: 1 \$\vee\$; L18: 1 \$\vee\$	1826)* Nomisia recepta (Pavesi, 1880)	L1: 1 º; L6: 1 ð; L7: 7 ðð;	
<i>Tegenaria parietina</i> (Fourcroy, 1785)	L18: 1 °; L22: 1 °	Scotophaeus blackwalli (Thorell,	L14: 1 ð L18: 1 ð	
Amaurobiidae		18/1) Scotonhagus scutulatus (I. Koch	11.10	
Amaurobius erberi (Keyserling, 1863)	L7: 1 ¥; L18: 1 ¥; L25: 1 ð	1866) Zelotes callidus (Simon 1878)*		
Anyphaena sabina I Koch 1866*	110 0 77 10	Zelotes cultures (Simon, 1878)	L6: 1 ¥	
Aranaidaa	L18: 2 00; 1 ¥	Zeloles lenuis (L. Koch, 1866)	L25: 1 ð	
Argiope trifasciata (Forsskål, 1775)	L5: 1 ♀	2elotes poecilochrodeformis Denis, 1937*	L4: 1 9; L7: 1 ð, 3 99; L8: 2 99; L18: 1 ð, 2 99; L25: 1 ð	
Cyclosa insulana (Costa, 1834)	L6: 1 ð, 2 ♀♀; L7: 1 ♀; L8: 1	Linyphiidae		
Cyrtophora citricola (Forsskål,	Ψ; L28: 1 Ψ L6: 2 Ψ	Acartauchenius insigniceps (Simon, 1894)*	L4: 1 ổ, 1º; L8: 2 ổổ, 3 약	
1//5) Hypsosinga albovittata (Westring, 1851)*	L8: 1 ð	Agyneta rurestris (C. L. Koch, 1836)	L4: 1 ♀; L7: 5 ♂♂, 2 ♀♀; L8: 1 ♂, 1 ♀; L24: 1 ♂; L26: 1 ♂, 4 ♀♀	
Larinioides suspicax (O. Pickard-	L19: 1 9; L25: 2 ठैठे; L26: 1 ठै	Alioranus pauper (Simon, 1881)*	L24: 1 ð; 1 ♀	
Cambridge, 1876) Lipocrea epeiroides (O. Pickard-	L18: 2 ठॅठे; 2 ♀♀	Centromerus cf. cinctus (Simon, 1884)*	L11:1 \$	
Neoscona subfusca (C. L. Koch,	L3: 1 º; L4: 1 º; L25: 1 ð	Diplocephalus graecus (O. Pickard- Cambridge, 1873)*	L4: 1ð, 499; L7: 3ðð; L8: 19; L21: 1 9; L25: 1 9	
Zvgiella x-notata (Clerck, 1757)	T 18· 1 Q	Erigone dentipalpis (Wider, 1834)*	L7: 2 ඊඊ	
Cheiracanthiidae	L10. 1 +	Mermessus denticulatus (Banks,	L24: 1	
Cheiracanthium angulitarse Simon, L26: 1 9 1878*		1898)* Microctenonyx subitaneus	L7: 1 ổ, 5 약약; L18: 1 약; L25:	
Cheiracanthium mildei L. Koch, 1864	L7: 1 ð, 1 ♀; L18: 1 ð; L25: 1 ð	(O. Pickard-Cambridge, 1875) <i>Neriene furtiva</i> (O. Pickard-Cam-	2 \$\$ L7: 1 ð	
Clubionidae		bridge, 1871)*		
Porrhoclubiona leucaspis (Simon, 1932)	L18: 2 ठॅठे	(Bosmans, 1994)	L1: 1 ð, 1 9; L6: 1 9; L7: 4 ðð; L18: 1 9; L21: 1 9; L25:	
Porrhoclubiona vegeta (Simon, 1918)*	L8: 1 9; L26: 2 99	<i>Tenuiphantes herbicola</i> (Simon,	ι ¥ L7: 1 ♀; L27: 1 ♀	
Dictynidae		1004)* Walckengerig sp *	17.200	
Marilynia bicolor (Simon, 1870)	L24: 1 ¥	Liocranidae	L/: 3 ¥¥	
Nigma puella (Simon, 1870)*	L4: 1 ¥	Mesiotelus tenuissimus (L. Koch.	1 1 8. 2 00	
Nigma walckenaeri (Roewer, 1951)	L8: 1 ð	1866)	L10. 2 ++	
Dysderidae		Lycosidae		
Dysaera crocata C. L. Koch, 1838	L1: 1 ð; L2: 1 ð; L7: 3 ðð, 1 ♀; L11: 1 ♀	Alopecosa albofasciata (Brullé, 1832)	L7: 1 ð; L28: 1 ð	
Dysdera kollari Doblika, 1853	L18: 1 ð	Arctosa lacustris (Simon, 1876)	L24: 1 ð	
Harpactea sicula Alicata, 1966	L7: 1 ở, 1 ♀; L11: 1 ở; L18: 1 ở	Pardosa cf. Proxima (C. L. Koch, 1847)	L15: 2 99	
Filistatidae		Mimetidae		
Filistata insidiatrix (Forsskål, 1775)	L6: 1 9; L7: 1 9; L17: 1 9; L18: 1 9: L 21: 1 9	Ero aphana (Walckenaer, 1802)*	L18: 1 ð	
Gnaphosidae	L10. 1 +, L21. 1 +	<i>Ero Jiammeola</i> Simon, 1881*	L12: 1 9; L18: 1 9	
Aphantaulax trifasciata (O. Pickard-Cambridge, 1872)*	L7: 1 ð; L8: 1 ð, 1 ♀; L18: 2 ðð	Miturgidae <i>Zora manicata</i> Simon, 1878*	L8: 1 ð; L17: 2 ðð, 1 ♀	
Drassodes lapidosus (Walckenaer.	 L8: 1 & L28: 1 & 1 Q	Oecobiidae		
1802)	$L_0. 10, L_20. 10, 1+$	Oecobius navus Blackwall, 1859	L18:19	

Species	Material examined (see Tab. 1)	Species	Material examined (see Tab. 1)
Oonopidae	<u> </u>	Segestriidae	
Silhouettella loricatula (Roewer,	L24: 1 ð	Ariadna sp.	L18: 1 \$
1942) Oxvonidae		Segestria senoculata (Linnaeus,	L18: 1 ♀
Oxyophiae Oxyopes sp.*	19.1 \$ 10.175.1 \$	Sicariidae	
Palnimanidae	Lo. 10, 14, L25. 10	Loxosceles rufescens (Dufour,	16.18.19.118.19.121.1
Palpimanus sp.	L8·19	1820)	Q; L23: 1 ♀
Philodromidae	20.17	Sparassidae	
Philodromus lividus Simon, 1875*	L8: 1 ð	<i>Micrommata ligurina</i> (C. L. Koch, 1845)	L6: 1 ở; L8: 1 ♀; L11: 1 ♀;
Pulchellodromus bistigma (Simon,	L7: 1 ð	104 <i>3)</i> Tetragnathidae	L26: 1 ð
1870)*		Tetragnatha intermedia Kulczyński,	1 25. 3 22 1 9. 1 26. 5 22
<i>Pulchellodromus pulchellus</i> (Lucas 1846)	L4: 2 ởở; L7: 1 ở, 2 °°; L8: 1	1891*	3 PP
(Eucus, 1010)	o; L18: 1 0; L21: 1 ¥; L25: 5 đđ: L26: 2 đđ. 4 ♀♀	Theridiidae	
Thanatus vulgaris Simon, 1870	L4: 1 °; L8: 1 ð, 2 °°; L25:	Argyrodes argyrodes (Walckenaer, 1841)	L6: 1
Pholcidae	1 +	Enoplognatha diversa (Blackwall, 1859)*	L1:1 \$
<i>Holocnemus pluchei</i> (Scopoli, 1763)	L6: 1 ♀; L7: 1 ♀; L19: 1 ♀; L22: 1 ♀; L28: 1 ♀	Enoplognatha franzi Wunderlich, 1995*	L7: 1 ¥
Pholcus phalangioides (Fuesslin, 1775)	L18: 1 \$	Enoplognatha mandibularis (Lucas, 1846)	L21: 1 Ŷ
Spermophora senoculata (Dugès,	L28: 1 ♀	Episinus algiricus Lucas, 1846*	L8: 1 ð
Spermophorides mediterranea	L18: 2 \$	<i>Euryopis episinoides</i> (Walckenaer, 1847)	L9: 1 ð; L24: 1 ð, 1 ♀; L26: 1 ð, 1 ♀
Pisauridae		Kochiura aulica (C. L. Koch, 1838)	L4: 1 ổ; L18: 2 ổổ
Pisaura mirabilis (Clerck, 1757)	L7: 4 ổổ, 2 약약; L15: 1 약; L26:	Neottiura uncinata (Lucas, 1846)	L4: 1 \$; L8: 1 \$, 1 \$, 1 j\$; L21: 1 j\$
Salticidae	10	Simitidion simile (C. L. Koch,	L8: 1 ð; L18: 1 ð, 1 ♀
Aelurillus luctuosus (Lucas, 1846)*	L7·2	1836)*	
D II I'II (G. 1071)*	19	Steatoda paykulliana (Walckenaer, 1805)	L4: 1 \$ L20: 1 \$ L21: 1 \$
Ballus armaalilo (Simon, 1871)*	L18: 3 ởở; 1 ¥	Steatoda triangulosa (Walckenaer,	L4: 1 Q
Cyrba algerina (Lucas, 1846)	L7: 1 \$; L8: 1 j\$; L12: 1 j\$; L22: 1 jð	Thomisidae	
Euophrys rufibarbis (Simon, 1868)	L6: 1 9; L7: 1 9; L8: 1 9	Bassaniodes bufo (Dufour, 1820)	L4: 1 ở; L6: 1 ở; L23: 1 ở
Evarcha jucunda (Lucas, 1846)	L1: 1 ð, 1 ♀; L6: 1 ð; L7: 1 ð, 1 ♀: L18: 1 ð, 1 ♀	Monaeses paradoxus (Lucas, 1846)*	L8: 1 \$
Heliophanus tribulosus Simon,	14.1 & 18.1 & 299.112.1	<i>Ozyptila</i> sp. ^(see text)	L7:19
1868	δ; L18: 1 δ; L21: 1 ♀; L25: 1 ♀; L26: 1 δ	Runcinia grammica (C. L. Koch, 1837)	L18: 1 Q
Icius hamatus (C. L. Koch, 1846)	L18: 1 ð; 1 ♀	Synema globosum (Fabricius, 1775)	L8: 1 9; L18: 2 đờ, 1 9; L21: 1 ở; L25: 1 9; L26: 1 ở, 1 9
Menemerus semilimbatus (Hahn, 1829)	L4: 1 ð; L13: 1 ♀	Thomisus onustus Walckenaer, 1805	L6: 1 º; L25: 1 ð, 1 º
Phlegra bresnieri (Lucas, 1846)	L7: 10 ổở, 3 ♀♀, 1 j♀; L8: 1 ở; L12: 1 ở; L26: 1ở	<i>Xysticus nubilus</i> Simon, 1875	L7: 1 ♀; L8: 1 ♀; L18: 1 ♂; L25: 1 ♀: L26: 1 ♂: L28: 1 ♂
Plexippus paykulli (Audouin, 1826)	L10: 1 \$	Titanoecidae	
Pseudeuophrys vafra (Blackwall, 1867)*	L18: 1 ठै; 1 ♀	1846)	L/: I ¥
Salticus mutabilis Lucas, 1846	L8: 1 ð; L18: 2 ðð, 1 ♀	Uloborus plumines Lucas. 1846	1 18. 1 9. 1 28. 1 9
Scytodidae		Zodariidae	L10. 1 +, L20. 1 +
Scytodes thoracica (Latreille 1802)	L7: 1 ð	Zodarion elegans (Simon, 1873)*	L4: 1 ¥; L7: 2 ठैठै
Scytodes velutina Heineken & Lowe, 1832	L6: 1 °; L8: 1 °; L28: 1 °	Zoropsidae Zoropsis spinimana (Dufour, 1820)	L18: 1 ¥; L23: 1 ð; L24: 1 ¥

Species	Material examined (refer to Tab. 1)		
Phalangiidae			
Metaphalangium cirtanum (C. L. Koch, 1839)	L8: 1 ð		
<i>Opilio canestrinii</i> (Thorell, 1876)	L4: 1 ዩ; L8: 1 ዩ; L15: 1 ð; L26: 1 ð		
<i>Phalangium targionii</i> (Canestrini, 1871)	L1: 2 ởở, 1 ♀; L6: 1 ở; L7: 4 ởở, 1 ♀; L13: 1 ở, 1 ♀		
Phalangodidae			
Ptychosoma vitellinum Sørensen, 1873	L11:1 \$		
Sclerosomatidae			
<i>Nelima meridionalis</i> Marcellino, 1972*	L7: 1 9; L24: 1 ð		

Tab. S2: Data for all harvestman species collected in the present study, including species recorded in previous works of the Maltese arachnofauna. New records are marked with an asterisk (*).

Fig. 39: Various spider records from Malta in vivo. a-b. Anyphaena sabina, a. male; b. female; c. Lipocrea epeiroides, male; d. Tetragnatha intermedia, male; e. Cheiracanthium angulitarse, female; f. Porrhoclubiona vegeta, female



Fig. 40: Various spider records from Malta in vivo. a. Neriene furtiva, male; b. Dysdera kollari, male; c. Aphantaulax trifasciata, male; d. Nigma puella, female; e. Marinarozelotes lyonneti, female; f. Zelotes poecilochroaeformis, female



Fig. 41: Various spider records from Malta in vivo. a. Ero flammeola, female; b-c. Oxyopes sp. b. female; c. male; d. Zora manicata, female; e. Pulchellodromus bistigma, male; f. Philodromus lividus, male



Fig. 42: Various spider records from Malta in vivo. a. Ero aphana, male; b. Spermophorides mediterranea, female; c-d: Ballus armadillo, female; e-f: Pseudeuophrys vafra, female





Fig. 44: Various spider records from Malta in vivo. a. Tetragnatha intermedia, female; b. Episinus algiricus, male; c. Enoplognatha diversa, female; d. Ozyptila sp. female; e. Monaeses paradoxus, female; f. Zodarion elegans, female

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