

Journal of Melittology

Bee Biology, Ecology, Evolution, & Systematics

The latest buzz in bee biology

No. 72, pp. 1–9

16 October 2017

BRIEF COMMUNICATION

New records of bees (Hymenoptera: Apoidea) from the Maltese Islands

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Abstract. A total of 95 bee species have been recorded from the Maltese Islands (central Mediterranean Sea). The aim of the present note is to report newly recorded species within the study area. A total of nine new species belonging to four families are recorded here: Andrenidae (1 species), Apidae (1 species), Halictidae (5 species), and Megachilidae (2 species).

Bees constitute an important monophyletic group that contributes significantly to animal pollination of crops and wild plants. In Europe, this group is threatened by habitat loss resulting from agricultural intensification, urban development, and changing climate. A total of 9.2% of the species are threatened with extinction and a further 5.2% considered as Near Threatened in the IUCN European Red List of Bees (Nieto *et al.*, 2014). For the majority of the species (56.7%) there was insufficient scientific information to determine their status, and they have been classified as Data Deficient (Nieto *et al.*, 2014). The knowledge gap is particularly high in southern European countries. Consequently, the development of a clear understanding of the distribution, population trends, and ecology of these species are considered critical for an effective conservation of the bee diversity and the wider benefits associated with pollination as an ecosystem service.

This study lists new records of bees from the Maltese Islands and includes notes on the distribution of each species. A total of 95 bees species, belonging to the five families Andrenidae (17 species), Apidae (34 species), Colletidae (6 species), Halictidae

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doi: <http://dx.doi.org/10.17161/jom.v0i72.6626>

(15 species), and Megachilidae (23 species) were recorded from the Maltese Islands in a recently published review (Balzan *et al.*, 2016). However, three species are considered as dubious in this checklist: *Lasioglossum aff. nitidiusculum* (Kirby), *Osmia tricornis* Latreille, and *Megachile argentata* (Fabricius). The earliest documented records of bees from Malta are those of Alfken (1929) who published a list of the Hymenoptera, which included 20 bee species. More recent records of the bees of Malta were by Valletta (1971, 1979), who recorded 50 species, and Schembri (1982), who listed 40 species of which 16 had not been previously recorded.

MATERIALS AND METHODS

Study Area

The Maltese Archipelago is located in the central Mediterranean Sea, and is situated around 96 km south of Sicily. Malta is made up of three inhabited islands and a number of other uninhabited islets, and has a total terrestrial surface area of 316 Km². Agricultural land cover makes up around 50% while urban and built-up areas occupy more than 30% of the land surface (MEPA, 2010). The study area has a Mediterranean climate, characterized by mild and wet winters and dry and hot summers, and had an average rainfall of 553.12 mm in the 30 year climate period 1961–1990 (Galdies, 2011).

Methods

The personal collections of the authors were used to develop this work and additionally, specimens from the collection at the National Museum of Natural History (NMNH) at Mdina, Malta, were also studied. Full details of the examined specimens are published here. The name of the species is given first followed by the locality, date of capture, and collector. Notes on the distribution of each species are included. Reference was made to the taxonomic catalogue of the Palaearctic bees of the tribe Osmiini by Ungricht *et al.* (2008) and the online check-list of Western Palearctic Bees (Hymenoptera: Apoidea: Anthophila) by Kuhlmann *et al.* (2015). The nomenclature used in this paper follows Michener (2007) for supra-specific taxa and Nieto *et al.* (2014) for species names.

RESULTS AND DISCUSSION

The present work records nine species new to the Maltese Islands, increasing the total number of known species to 101, when species listed as dubious by Balzan *et al.* (2016) are excluded. The new records belong to four families: Andrenidae (1 species), Apidae (1 species), Halictidae (5 species), and Megachilidae (2 species). The genera *Sphcodes* Latreille (Halictidae) and *Hoplitis* Klug (Megachilidae) are recorded for the first time from Malta. The newly recorded bee species and their distribution within the Mediterranean Region are listed below:

Family Andrenidae Latreille

Andrena distinguenda Schenck

EXAMINED SPECIMENS: 1♀, Qrendi, 03-iv-2016, D. Michez and M.V. Balzan; 19♀♀, Sannat, 05-iv-2016, collected by D. Michez and M.V. Balzan, determined by D. Genoud.

DISTRIBUTION: Continental Europe, Sicily, and the Balearic Islands.

Family Apidae Latreille

Anthophora atroalba Lepeletier

EXAMINED SPECIMENS: 1♀, Ghajnsielem, 05-iv-2016, collected by D. Michez and M.V. Balzan, determined by P. Rasmont.

DISTRIBUTION: Mediterranean basin, Ukraine and Russia, Sicily, and the Balearic Islands.

Family Halictidae Thomson

Lasioglossum albocinctum (Lucas)

EXAMINED SPECIMENS: 2♀♀, Wied il-Qlejgħa, Rabat, 26-iv-2016, collected by M.V. Balzan, determined by A. Pauly.

DISTRIBUTION: Western Mediterranean Basin, Greece, Croatia, Hungary, Ukraine, Corsica, Sicily, and the Balearic Islands.

Lasioglossum punctatissimum (Lucas)

EXAMINED SPECIMENS: 1♀, Fiddien, Rabat, 28-iv-2016, collected by M.V. Balzan, determined by A. Pauly.

DISTRIBUTION: North-Western Africa, Continental Europe, Ireland, Israel, and the Balearic Islands.

Lasioglossum villosulum (Kirby)

EXAMINED SPECIMENS: 3♀♀, Ghajnsielem, 05-iv-2016, collected by D. Michez and M.V. Balzan; 1♀, Wied il-Qlejgħa, Rabat, 28-iv-2016, collected by M.V. Balzan, determined by A. Pauly.

DISTRIBUTION: Northern Africa, Continental Europe, Ireland, Sardinia, Crete, Cyprus, Corsica, and the Balearic Islands.

Lasioglossum nitidulum (Fabricius)

EXAMINED SPECIMENS: 2♀♀, Gudja, 29-v-2016, collected by M.V. Balzan; 1♀, Gudja, collected by M.V. Balzan, determined by A. Pauly.

DISTRIBUTION: Continental Europe, Libya, Corsica, Sardinia, Crete, Sicily, and the Balearic Islands.

Sphecodes ruficrus (Erichson)

EXAMINED SPECIMENS: 1♀, Ħal Ghaxaq, 03-iv-2016, D. Michez and M.V. Balzan; 1♀, Siġġiewi, 04-iv-2016, D. Michez and M.V. Balzan; 1♀, Paola, 06-iv-2016, collected by D. Michez and M.V. Balzan, determined by M. Schwarz.

DISTRIBUTION: Western Mediterranean Basin, Egypt, Turkey, and eastern continental Europe.

Family Megachilidae Latreille

Hoplitis adunca (Panzer)

EXAMINED SPECIMENS: 2♂♂, Wied il-Qlejgħa, Rabat, 26-iv-2016, M.V. Balzan, determined by A. Müller.

DISTRIBUTION: North Africa, continental Europe, Sicily, Sardinia, Corsica, and the Balearic Islands.

Megachile pusilla Pérez

EXAMINED SPECIMENS: 3♀♀, 1♂, Gudja, 29-v-2016, M.V. Balzan; 1♀, Cirkewwa, 16-

iv-76, Sammut, collection NMNH, determined by C. Praz.

DISTRIBUTION: Western Mediterranean Basin, Sicily, Sardinia, and Greece. See Soltani *et al.* (2017) for taxonomic and biogeographic discussion.

Results obtained here confirm previous observations that the known bee fauna is dominated by widespread Palearctic species (Balzan *et al.*, 2016), that is species recorded from Europe, Northern Africa, and the eastern Mediterranean Basin (Appendix). All of the newly recorded species are also known from southern Europe, and have been recorded from neighbouring Sicily. These observations support those by Balzan *et al.* (2016) and indicate that Quaternary marine regression events connecting the Maltese archipelago to southern Europe have likely resulted in colonization of the islands by bee species. Previous records also indicate that a number of bee species have a predominantly North African affinity, although this is weaker when compared to that of neighbouring Sicily and southern Europe. The Maltese Islands were originally colonized by species from the European and African mainland during the Messinian Salinity Event. These species became isolated when the Mediterranean Basin was inundated. During the Quaternary Period, the Maltese Islands experienced several colonization episodes from Sicily during some of the marine regressions associated with Pleistocene glaciations (Hunt & Schembri, 1999). This Quaternary colonization explains the resemblance of the Maltese biota to that of Sicily (Schembri, 2003; Thake, 1985).

ACKNOWLEDGEMENTS

M.V.B. and D.M. wish to acknowledge the support received from the COST Action FA1307 ‘Sustainable pollination in Europe—joint research on bees and other pollinators—SUPER-B’ (including STSM grant for D.M.). The work by M.V.B. on the assessment of pollinator diversity and pollination ecosystem services in Malta has received funding from the European Union’s Horizon 2020 project ESMEALDA under grant agreement No. 642007. We thank Andreas Müller, Christophe Praz, and Alain Pauly for their help in the determination of the specimens.

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Appendix. An updated checklist of the bee species of the Maltese Islands, including an overview of their distribution. Species shown in bold represent new records, whilst the species considered as dubious by Balzan *et al.* (2016) have been excluded from this updated checklist. Sources: Ascher & Pickering (2015), Rasmont & Haubruge (2015), Kuhlmann *et al.* (2015), and Balzan *et al.* (2016).

Species		Northern Africa	Southern Europe	Western Mediterranean ¹	Eastern Mediterranean ²	Sicily
1.	<i>Andrena agilissima</i>	x	x	x		x
2.	<i>Andrena miegiella</i>	x	x	x	x	x
3.	<i>Andrena aff. leucophaea</i>	x	x	x		x
4.	<i>Andrena binominata</i>	x	x	x		x
5.	<i>Andrena nigroolivacea</i>	x	x	x		x
6.	<i>Andrena bicolor</i>	x	x	x	x	x
7.	<i>Andrena impunctata</i>	x	x	x	x	x
8.	<i>Andrena decipiens</i>	x	x	x	x	x
9.	<i>Andrena bimaculata</i>	x	x	x	x	x
10.	<i>Andrena carbonaria</i>	x	x	x	x	x
11.	<i>Andrena tibialis</i>		x	x	x	
12.	<i>Andrena morio</i>	x	x	x	x	x
13.	<i>Andrena nigroaenea</i>	x	x	x	x	x
14.	<i>Andrena savignyi</i>	x	x	x	x	
15.	<i>Andrena cyanomicans</i>	x	x	x	x	
16.	<i>Andrena flavipes</i>	x	x	x	x	x
17.	<i>Andrena distinguenda</i>	x	x	x	x	x
18.	<i>Panurgus siculus</i>		x	x		x
19.	<i>Amegilla quadrifasciata</i>	x	x	x	x	x
20.	<i>Amegilla albigena</i>	x	x	x	x	x
21.	<i>Ammobatoides luctuosus</i>		x	x	x	
22.	<i>Anthophora dispar</i>	x	x	x	x	x
23.	<i>Anthophora plagiata</i>	x	x	x	x	x
24.	<i>Anthophora plumipes</i>	x	x	x	x	x
25.	<i>Anthophora retusa</i>		x	x	x	x
26.	<i>Anthophora canescens</i>	x	x	x	x	x
27.	<i>Anthophora atroalba</i>	x	x	x	x	x
28.	<i>Apis mellifera</i>	x	x	x	x	x
29.	<i>Bombus terrestris</i>	x	x	x	x	x
30.	<i>Ceratina cyanea</i>	x	x	x	x	x
31.	<i>Ceratina dallatorreana</i>	x	x	x	x	x

Appendix. Continued.

Species		Northern Africa	Southern Europe	Western Mediterranean ¹	Eastern Mediterranean ²	Sicily
32.	<i>Ceratina gravidula</i>		x	x	x	
33.	<i>Dioxys cincta</i>	x	x	x	x	x
34.	<i>Eucera algira</i>	x	x	x	x	x
35.	<i>Eucera eucnemidea</i>	x	x	x		x
36.	<i>Eucera longicornis</i>		x	x	x	x
37.	<i>Eucera numida</i>	x	x	x		x
38.	<i>Eucera oraniensis</i>	x	x	x		x
39.	<i>Eucera rufa</i>	x	x	x	x	x
40.	<i>Habropoda zonatula</i>		x	x	x	x
41.	<i>Melecta albifrons</i>	x	x	x	x	x
42.	<i>Melecta duodecimmaculata</i>	x	x	x	x	
43.	<i>Melecta leucorhyncha</i>	x	x	x	x	x
44.	<i>Melecta luctuosa</i>	x	x	x	x	x
45.	<i>Nomada bifasciata</i>	x	x	x	x	x
46.	<i>Nomada distinguenda</i>	x	x	x	x	x
47.	<i>Nomada fulvicornis</i>	x	x	x	x	x
48.	<i>Nomada kohli</i>	x	x	x	x	x
49.	<i>Nomada rufa</i>		x			x
50.	<i>Nomada stigma</i>	x	x	x	x	x
51.	<i>Thyreus histrionicus</i>	x	x	x	x	x
52.	<i>Thyreus ramosus</i>	x	x	x	x	x
53.	<i>Xylocopa violacea</i>	x	x	x	x	x
54.	<i>Hylaeus imparillis</i>	x	x	x	x	x
55.	<i>Hylaeus clypearis</i>	x	x	x	x	x
56.	<i>Hylaeus taeniolatus</i>	x	x	x	x	x
57.	<i>Hylaeus signatus</i>	x	x	x	x	
58.	<i>Hylaeus hyperpunctatus</i>		x	x	x	x
59.	<i>Hylaeus punctatus</i>		x	x	x	x
60.	<i>Ceylalicthus variegatus</i>	x	x	x	x	x
61.	<i>Halictus brunnescens</i>	x	x	x	x	
62.	<i>Halictus fulvipes</i>	x	x	x		x
63.	<i>Halictus rubicundus</i>	x	x	x	x	x
64.	<i>Halictus scabiosae</i>	x	x	x	x	x
65.	<i>Lasioglossum malachurum</i>	x	x	x	x	x

Appendix. Continued.

Species		Northern Africa	Southern Europe	Western Mediterranean ¹	Eastern Mediterranean ²	Sicily
66.	<i>Lasioglossum minutissimum</i>	x	x	x	x	x
67.	<i>Lasioglossum limbellum</i>	x	x	x	x	x
68.	<i>Lasioglossum transitorium</i>	x	x	x	x	x
69.	<i>Lasioglossum callizonium</i>	x	x	x	x	
70.	<i>Lasioglossum albocinctum</i>	x	x	x	x	x
71.	<i>Lasioglossum punctatissimum</i>	x	x	x	x	x
72.	<i>Lasioglossum villosulum</i>	x	x	x	x	
73.	<i>Lasioglossum nitidulum</i>	x	x	x	x	x
74.	<i>Sphecodes ruficrus</i>	x	x	x	x	x
75.	<i>Nomioides facilis</i>	x	x	x	x	x
76.	<i>Nomiapis bispinosa</i>	x	x	x	x	
77.	<i>Seladonia gemmea</i>	x	x	x		x
78.	<i>Seladonia smaragdula</i>	x	x	x	x	x
79.	<i>Hoplitis adunca</i>	x	x	x	x	x
80.	<i>Anthidium florentinum</i>	x	x	x	x	x
81.	<i>Anthidium manicatum</i>	x	x	x	x	x
82.	<i>Anthidiellum strigatum</i>	x	x	x	x	x
83.	<i>Heriades crenulata</i>	x	x	x	x	x
84.	<i>Heriades rubicola</i>	x	x	x	x	x
85.	<i>Heriades punctulifera</i>		x		x	x
86.	<i>Lithurgus tibialis</i>		x	x	x	
87.	<i>Megachile sicula</i>	x	x	x	x	x
88.	<i>Megachile fertoni</i>	x	x	x	x	x
89.	<i>Megachile schmiedeknechti</i>	x	x	x		
90.	<i>Megachile pusilla</i>	x	x	x	x	x
91.	<i>Osmia rufohirta</i>	x	x	x	x	x
92.	<i>Osmia caeruleascens</i>	x	x	x	x	x
93.	<i>Osmia frieseana</i>	x	x	x		
94.	<i>Osmia latreillei</i>	x	x	x	x	x
95.	<i>Osmia notata</i>	x	x	x	x	x
96.	<i>Osmia tunensis</i>	x	x	x	x	x
97.	<i>Osmia kohli</i>	x	x	x		
98.	<i>Osmia ferruginea</i>	x	x	x	x	x

Appendix. Continued.

Species		Northern Africa	Southern Europe	Western Mediterranean ¹	Eastern Mediterranean ²	Sicily
99.	<i>Osmia submicans</i>	x	x	x	x	x
100.	<i>Rhodanthidium septemdentatum</i>		x	x	x	x
101.	<i>Rhodanthidium siculum</i>	x	x	x		x
Total		88	101	99	86	86

¹ Western Mediterranean countries include Italy, France, Iberian Peninsula, Morocco, Algeria, and Tunisia.

² Eastern Mediterranean countries include Slovenia, Croatia, Bosnia and Herzegovina, Albania, Greece, Turkey, Lebanon, Jordan, Israel, Egypt, and Libya.



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A Journal of Bee Biology, Ecology, Evolution, & Systematics

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The *Journal of Melittology* was established at the University of Kansas through the efforts of Michael S. Engel, Victor H. Gonzalez, Ismael A. Hinojosa-Díaz, and Charles D. Michener in 2013 and each article is published as its own number, with issues appearing online as soon as they are ready. Papers are composed using Microsoft Word® and Adobe InDesign® in Lawrence, Kansas, USA.

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ISSN 2325-4467