New Records and Updated Checklist of Bees (Hymenoptera: Apoidea) from the Maltese Islands

Mario V Balzan,* Leticia De Santis,* Sophie Kratschmer,** and Denis Michez***
Corresponding Author: Mario.Balzan@mcast.edu.mt

*Institute of Applied Sciences, MCAST
* Department of Integrative Biology and Biodiversity Research, Institute of Zoology, University of Natural Resources and Life Sciences, Vienna
***Laboratory of Zoology, Research Institute of Biosciences, University of Mons, Mons

Abstract: Between 2016 and 2021, several habitat sites in Malta were surveyed for wild bees by sweep netting patches with insect-pollinated flowering plants. These surveys have led to an updated checklist of the bees of the Maltese Islands, which is provided in this article. The species *Andrena flavilabris* Schenck 1874, *Andrena florentina* Magretti 1883, and *Ceratina dentiventris* Gerstaecker 1869 are recorded for the first time in the Maltese Islands (Central Mediterranean), and notes on the distribution of each species are also included. With the new additions to this checklist, the total number of species recorded in Malta is 105 species belonging to five families, namely Andrenidae (20 species), Apidae (35 species), Colletidae (6 species), Halictidae (19 species), and Megachilidae (25 species).

Keywords: *Andrena flavilabris*; *Andrena florentina*; *Ceratina dentiventris*; Malta; Mediterranean; pollinators

Introduction

The earliest documented records of bees from Malta are those by Alfken (1929) who published a list of the Hymenoptera that included 20 bee species. After this first record, subsequent additions to the bees of Malta were made by Valletta (1979; 1971), who recorded 50 species in total, and Schembri (1982) who recorded another additional 16 species for the first time. Balzan et al. (2016) reviewed the bees of Malta and added one species to the list. In this checklist, a total of 95 species are included but 3 previously recorded species were considered dubious. Subsequently, Balzan et al. (2017) added 9 newly recorded species whilst Cassar and Mifsud (2020) added another species, bringing the total known bee species from Malta to 105.

This article reports 3 newly recorded species, includes notes on the distribution of each species and updates the checklist of the bees of the Maltese Islands.

Materials and Methods

The Maltese Islands (35° 53’ N, 14° 27’ E; Central Mediterranean) have a total terrestrial surface area of 316 km² and consist of 3 inhabited islands (Malta, Gozo, and Comino) and several uninhabited islets. The archipelago has a resident human population density of 1,595 person per km² in 2019 (Eurostat 2021), whilst there were a total of 2.8 million tourist trips in 2019 (NSO 2020). The study area has a Mediterranean climate, characterised by mild and wet winters and dry and hot summers (Galdies et al. 2011). The personal collection
of the first author were used to develop this work, which collections are based on the data obtained during field excursions carried out between March 2016 and June 2021 to update the existing species lists of the Maltese Islands (Balzan et al. 2016; 2017). Full details of the examined specimens are published here. The name of each species is given first followed by the locality, date of capture, and collector.

Results and Discussion

Newly recorded bee species that have not been included in the most recent bee checklist (Balzan et al. 2017) are included below together with a description of their distribution:

**Family Andrenidae Latreille**

*Andrena (Holandrena) flavilabris* Schenck, 1874
Examined specimens: 2♀; Siġġiewi, 03-iv-2016, D. Michez and M.V. Balzan, determined by D. Genoud. Distribution: Spain, France, Switzerland, Germany, Greece, Cyprus, Ukraine, Turkey.

*Andrena (Hyperandrena) florentina* Magretti, 1883
Examined specimens: 1♀; Rabat, 07-iii-2018, S. Kratschmer, determined by F. Gusenleitner. 1♀; Marsa, 09-iv-2019, L. De Santis, determined by T.J. Wood. Distribution: Portugal, Spain, France, Italy, Morocco, Algeria, Tunisia.

**Family Apidae Latreille**

*Ceratina (Euceratina) dentiventris* Gerstaecker, 1869
Examined specimens: 1♀; Marsaxlokk; 18-v-2017, M.V. Balzan, determined by A. Dorchin. Distribution: Portugal, Spain, France, Italy, Slovenia, Croatia, Greece, Corsica, Crete, Bulgaria, Romania, Turkey, Israel, Georgia, Morocco, Tunisia.

In line with previous observations about the distribution of the wild bees of Malta (Balzan et al. 2017, 2016), the new records presented here are relatively widespread Palearctic species, recorded from Europe and the Mediterranean region. The mining bee *Andrena florentina* is recorded from the West Mediterranean Basin, with plant visitation data indicating that this species is highly polylectic (Benarfa et al. 2013; Louadi et al. 2007). The sand bee *A. flavilabris* is distributed in continental Europe and is also considered as being polylectic. *A. flavilabris* has for long been considered the spring-time generation of *Andrena decipiens* Schenck 1861 but, more recently, it has been recently shown that *A. flavilabris* and *A. decipiens* are two separate species arising from recent speciation (Mandery et al. 2008). The two specimens recorded from Malta have both been recorded visiting *Fumaria* sp. flowers in an agricultural field.

*Ceratina dentiventris* is a Holomediterranean species. It is considered as being univoltine with a peak of abundance of both sexes in July. The small carpenter bee *Ceratina dentiventris* is polylectic and nests mainly in the stems of *Rubus* sp. (Terzo and Rasmont 2011). The specimen recorded from Marsaxlokk, Malta, was collected from *Convolvolus elegantissimus* flowers located within a road verge.

The updated bee checklist of the Maltese Islands (Appendix 1) consists of a total of 105 species belonging to five families: Andrenidae (20 species), Apidae (35 species), Colletidae (6 species), Halictidae (19 species), and Megachilidae (25 species). Given that the presence of three species in the Maltese Islands was considered as dubious by Balzan et al. (2016), these are excluded from the updated checklist.
This research contributes to the development of an understanding of the wild bee diversity in the Maltese Islands and is in line with the work promoted by the 2018 European Union Pollinators Initiative and the European Commission’s proposal for a regulation on nature restoration which set a commitment to reverse the decline of pollinators by 2030. However, in order to better understand pollinator decline, further research is needed to model the distribution of pollinator species within the Maltese Islands, and their biotic and abiotic interactions. Recent research by the authors has shown that wild bee distribution is influenced by habitat variables at the local and landscape scale, and that this effect varies according to the bee functional characteristics (Balzan and De Santis 2023). Additionally, in line with research from other Mediterranean countries (Herrera 2020), impacts of honeybee visitation have been recorded on wild bee abundance (Balzan and De Santis 2023). While these studies have provided a first analysis of the impact of habitat characteristics on wild bee abundance and diversity, the systematic monitoring of wild bee species in Malta is considered as being critical to develop a more comprehensive understanding of the distribution and ecology of this pollinator group and to identify conservation strategies that tackle the causes of pollinator decline. Such strategies need to include a diversity of approaches including the development of a robust monitoring strategy for wild bees and other pollinators, which is also in line with the requirement set by the EU Nature Restoration Law, and the analysis of the impact of drivers and habitat characteristics on pollinators, including through an improved understanding of the floral and nesting resources used by these species and species distribution modelling approaches. Such results can play a significant role in the development of nature restoration actions which also benefit bees and other pollinator groups. Finally, the engagement of citizens and society, for example, through citizen science activities, can be contribute to the collection of data about pollinators while also creating awareness and can positively contribute to the well-being of communities (Palma et al. 2019).

Conclusions

This article has added 3 new species to the bee checklist of the Maltese Islands, with a total of 105 species now being recorded from the study area. Our research contributes to the development of an improved knowledge about the wild bees of Malta. Here, we discuss the need for more systematic monitoring of the wild bees of the Maltese Islands to develop an improved understanding of their ecology, as well as pollinator decline and its causes and consequences.

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References


Appendix 1 - An updated checklist of the bees of the Maltese Islands. Species shown in bold represent new records whilst a total of 3 records considered as dubious by Balzan et al. (2016) are excluded from this checklist.

Andrenidae

Subfamily Andreninae

Tribe Andrenini

1. Andrena agilissima (Scopoli, 1770)
2. Andrena miegiella (Dours, 1873)
3. Andrena aff. leucophaea (Lepeletier, 1841)
4. Andrena binominata (Smith, 1853)
5. Andrena nigroolivacea (Dours, 1873)
6. Andrena bicolor (Fabricius, 1775)
7. Andrena impunctata (Pérez, 1895)
8. Andrena decipiens (Schenck, 1861)
9. Andrena bimaculata (Kirby, 1802)
10. Andrena pilipes (Fabricius, 1781)
11. Andrena tibialis (Kirby, 1802)
12. Andrena morio Brullé, 1832
13. Andrena nigroaenea (Kirby, 1802)
14. Andrena savignyi (Spinola, 1838)
15. Andrena cyanomicans (Pérez, 1895)
16. Andrena flavipes (Panzera, 1799)
17. Andrena distinguenda (Schenck, 1871)
18. Andrena flavilabris (Schenck, 1874)
19. Andrena florentina (Magretti, 1883)

Subfamily Panurginae

Tribe Panurgini

20. Panurgus siculus (Morawitz, 1871)

Apidae

Subfamily Apinae

Tribe Anthophorini

21. Amegilla quadrifasciata (de Villers, 1789)
22. Amegilla albigena (Lepeletier, 1841)
23. Anthophora atroalba (Lepeletier, 1841)
24. Anthophora dispar (Lepeletier, 1841)
25. Anthophora plagiata (Illiger, 1806)
26. Anthophora plumipes (Pallas, 1772)
27. Anthophora retusa (L., 1758)
28. Anthophora canescens (Brullé, 1832)
29. Habropoda zonatula (Smith, 1854)
Tribe Apini

30. Apis mellifera (L., 1758)

Tribe Bombini

31. Bombus terrestris (L., 1758)

Tribe Eucerini

32. Eucera algira (Lepeletier, 1841)
33. Eucera eucnemidea (Dours, 1873)
34. Eucera longicornis (Linnaeus, 1758)
35. Eucera numida (Lepeletier, 1841)
36. Eucera oraniensis (Lepeletier, 1841)
37. Eucera rufa (Lepeletier, 1841)

Tribe Melectini

38. Melecta albifrons (Forster, 1771)
39. Melecta duodecimmaculata (Rossi, 1790)
40. Melecta leucorhyncha (Gribodo, 1893)
41. Melecta luctuosa (Scopoli, 1770)
42. Thyreus histrionicus (Illiger, 1806)
43. Thyreus ramosus (Lepeletier, 1841)

Subfamily Nomadinae

Tribe Ammobatoidini

44. Ammobatoides luctuosus (Friese, 1911)

Tribe Nomadini

45. Nomada bifasciata (Olivier, 1811)
46. Nomada distinguenda (Morawitz, 1874)
47. Nomada fulvicornis (Fabricius, 1793)
48. Nomada kohli (Schmiedeknecht, 1882)
49. Nomada rufa (Rossi, 1790)
50. Nomada stigma (Fabricius, 1804)

Subfamily Xylocopinae

Tribe Ceratinini

51. Ceratina cyanea (Kirby, 1802)
52. Ceratina dentiventris (Gerstaecker, 1869)
53. Ceratina dallatorreana (Friese, 1896)
54. Ceratina gravidula (Gerstäcker, 1869)

Tribe Xylocopini

55. Xylocopa violacea (L. 1758)
Colletidae

Subfamily Hylaeinae

56. *Hylaeus imparilis* (Förster, 1871)
57. *Hylaeus clypearis* (Schenck, 1853)
58. *Hylaeus taeniolatus* (Förster, 1871)
59. *Hylaeus signatus* (Panzer, 1798)
60. *Hylaeus hyperpunctatus* (Strand, 1909)
61. *Hylaeus punctatus* (Brullé, 1832)

Halictidae

Subfamily Halictinae

Tribe Halictini

63. *Halictus fulvipes* (Klug, 1817)
64. *Halictus rubicundus* (Christ, 1791)
65. *Halictus scabiosae* (Rossi 1790)
66. *Lasioglossum albocinctum* (Lucas 1849)
67. *Lasioglossum punctatissimum* (Schenck 1853)
68. *Lasioglossum villosulum* (Kirby 1802)
69. *Lasioglossum nitidulum* (Fabricius 1804)
70. *Lasioglossum malachurum* (Kirby 1802)
71. *Lasioglossum minutissimum* (Kirby, 1802)
72. *Lasioglossum limbellum* (Morawitz, 1876)
73. *Lasioglossum transitorium* (Schenck, 1868)
74. *Lasioglossum callizonium* (Pérez, 1896)
75. *Seladonia gemmea* (Dours, 1872)
76. *Seladonia smaragdula* (Vachal 1895)
77. *Sphecodes ruficrus* (Erichson 1835)

Subfamily Nomiinae

78. *Psuedapis bispinosa* (Brullé, 1832)

Subfamily Nomioidinae

79. *Ceylalictus variegatus* (Olivier, 1789)
80. *Nomioides facilis* (Smith, 1853)

Megachilidae

Subfamily Megachilinae

Tribe Anthidiini

81. *Anthidiellum strigatum* (Panzer, 1805)
82. *Anthidium florentinum* (Fabricius 1775)
83. *Anthidium manicatum* (L., 1758)
84. *Rhodanthidium septemdentatum* (Latreille 1809)
85. *Rhodanthidium siculum* (Spinola, 1838)

**Tribe Dioxyini**

86. *Dioxyx cincta* (Jurine, 1807)

**Tribe Lithurgini**

87. *Lithurgus tibialis* (Morawitz, 1875)

**Tribe Megachilini**

88. *Coelioxys afra* (Lepeltier 1841)
89. *Megachile pusilla* (Pérez 1884)
90. *Megachile sicula* (Rossi 1792)
91. *Megachile fertoni* (Pérez 1896)
92. *Megachile schmiedeknechti* (Costa, 1884)

**Tribe Osmiini**

93. *Heriades crenulata* (Nylander, 1856)
94. *Heriades rubicola* (Pérez, 1890)
95. *Heriades punctulifera* (Schletterer, 1889)
96. *Hoplitis adunca* (Panzer 1798)
97. *Osmia rufohirta* (Latreille 1811)
98. *Osmia caerulescens* (Linnaeus, 1758)
99. *Osmia frieseana* (Ducke, 1899)
100. *Osmia latreillei* (Spinola, 1806)
101. *Osmia notata* (Fabricius, 1804)
102. *Osmia tunensis* (Fabricius, 1787)
103. *Osmia kohlii* (Ducke, 1899)
104. *Osmia ferruginea* (Latreille, 1811)
105. *Osmia submicans* (Morawitz, 1870)