Journal *of* Melittology
Bee Biology, Ecology, Evolution, & Systematics
No. 154, 1–8 29 September 2026

First record of *Andrena melaleuca* (Hymenoptera: Andrenidae) in Europe, with notes on Sicily's role as a gateway to Europe

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Abstract. *Andrena melaleuca* Pérez is reported for the first time from Italy (Sicily), representing the first record of this species in Europe. We discuss its known distribution and potential route of entry and designate a lectotype. The *Andrena* Fabricius of Sicily are discussed as a melting pot of North African and south-eastern European faunal elements.

INTRODUCTION

Knowledge of the European bee fauna has increased significantly in the last decade, but continued new records demonstrate that this remains a work in progress. The first checklist of European bees (Nieto *et al.*, 2014), together with its first revision in 2017 (Rasmont *et al.*, 2017), listed 2,051 species. A major revision in 2023 (Ghisbain *et al.*, 2023), with an update in 2025 (Ghisbain *et al.*, 2025), increased the number to 2,187 bee species currently known from Europe. This represents a 6.7% faunal increase in less than a decade in the best-studied part of the world for bees. While many of the newly listed species resulted from taxonomic changes, 40 species known from elsewhere were reported for the first time in Europe between 2017 and 2023 (Ghisbain *et al.*, 2023). Twelve species in this category were added in 2025 alone (Ghisbain *et al.*, 2025). Such newly recorded species may represent previously overlooked populations resulting from limited regional data coverage or taxonomic difficulties, or they may indicate recent distributional changes caused by human-mediated introductions or natural range dynamics. Although the 2023 and 2025 revisions were dominated by new records from the less-documented eastern and south-eastern parts of Europe,

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ISSN 2325-4467

they also included new species from the Mediterranean islands of Sicily and Malta. The European records of both *Apis florea* Fabricius (Uzunov *et al.*, 2024) and *Xylocopa aestuans* (Linnaeus) (Flaminio *et al.*, 2023a) are well outside their native ranges in Asia, and the species were likely transported by humans because of their cavity-nesting behaviour. However, in addition to the Strait of Gibraltar, Europe and North Africa are particularly close at the Strait of Sicily, making Sicily an especially likely location for the first colonization and earliest records of exotic species. Recent examples of species suspected to have actively migrated across the Strait of Sicily include *Melitta schmiedeknechti* Friese (Flaminio *et al.*, 2023b) and *Halictus consobrinus* Pérez (Brau *et al.*, 2025).

In this paper, we report the first observations of *Andrena* (incertae sedis) *melaleuca* Pérez in Europe, from Sicily. The species was formerly assigned to the subgenus *Poliandrena* Warncke, which proved strongly polyphyletic in the revision by Pisanty *et al.* (2022). Until further revisions are carried out, the group containing *A. melaleuca* is best referred to as the *relata*-group (see Pisanty *et al.*, 2022; Wood, 2023). The species has been recorded in North African coastal regions (Warncke, 1974; Warncke, 1980). It was also reported from Morocco by Wood *et al.* (2020) and Lhomme *et al.* (2020), but Wood (2023) later corrected these records as misidentifications of the very similar *Andrena macroptera* Warncke. The morphology is well described in the original publication (Pérez, 1895) and in the checklist of *Andrena* Fabricius species by Gusenleitner & Schwarz (2002). Here, a female lectotype is designated from the Pérez collection in the Muséum national d'Histoire naturelle (MNHN), Paris, France.

MATERIAL AND METHODS

Specimens were collected by hand netting during a collecting trip in March–April 2025. The female was photographed alive against a white background using a Sony Alpha 6000 and a Sony G Macro OSS lens equipped with a flash and a diffuser. Pinned specimens were photographed with a digital photography system (LK Imaging System, Dun, Inc., equipped with a Canon EOS 5DSR and a Canon MP-E 65 mm f/2.8 1–5× Macro) and subsequently processed with Helicon Focus Pro, Adobe Lightroom, GIMP, and Adobe Photoshop 2026. The lectotype of *A. melaleuca* was photographed using an Olympus E-M1 Mark II with a 60 mm macro lens. Photographs were stacked using Helicon Focus B (HeliconSoft, Ukraine).

We compiled digitized museum specimens and literature records (Pérez, 1895; Warncke, 1974; Warncke, 1980) to produce an updated distribution map. The map was produced using R (R Core Team, 2024) with the packages "sf" (Pebesma, 2018), "dplyr" (Wickham *et al.*, 2023), "ggplot2" (Wickham, 2016), "maptiles" (Giraud, 2025), "ragg" (Pedersen & Shemanarev, 2024), "rnaturalearth" (Massicotte & South, 2024), and "rnaturalearthdata" (South *et al.*, 2024).

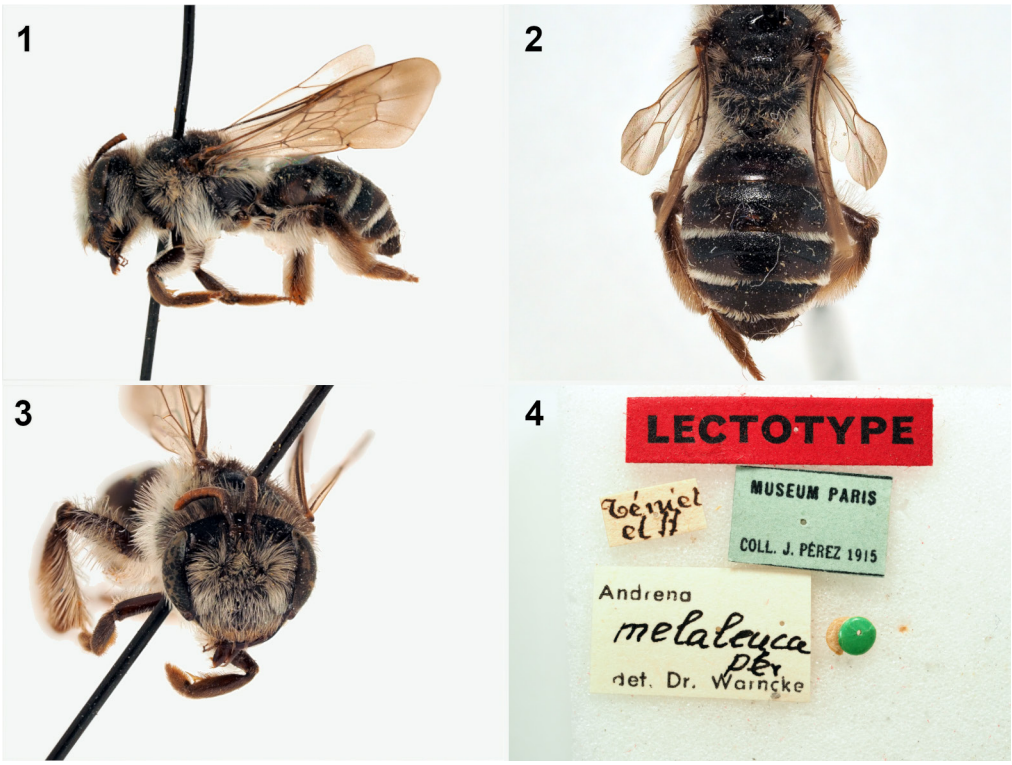
RESULTS

MATERIAL EXAMINED: Algeria. 1 ♀; Téniet el H [Theniet El Had, 35.8727°N, 2.0007°E]; [June, year unknown]; [M. Vauloger de Beaupré leg.]; MNHN (female lectotype, by present designation; Figs. 1–4).

Italy, Sicily. 1 ♂, 1 ♀; Caltanissetta Prov., 15 km east of Gela, U.S. 82nd Airborne Division Monument at Ponte Dirillo (open grassland surrounded by intensive agriculture); 37.032°N, 14.404°E; 31 March 2025; R. Zimmermann & H. Korten leg.; T.J. Wood det., R. Zimmermann coll. New species record for Italy (Sicily) and Europe (Figs. 6–8).

Andrena melaleuca was described by Pérez (1895) from specimens collected at "Téniet el Haad" [= Theniet El Had] by Marcel Vauloger de Beaupré and at "Bou-Kanifis" [= Boukhanefis] by Maurice Pic. Warncke (1967) revised all *Andrena* species

described by Pérez but was unable to locate specimens of *A. melaleuca* in the Pérez collection ("in Paris nicht vorgefunden" [= not found in Paris]). Consequently, no lectotype was designated in Warncke (1967) or in his later works on North Africa (Warncke, 1974; Warncke, 1980). However, a female in the Pérez collection at MNHN labelled "Téniet el H" and bearing a green disc (meaning collected in June under Pérez's labelling system) is likely one of the two original syntypes because it matches the collecting information and bears a typical locality label handwritten by Pérez. Vauloger's specimens were typically poorly labelled; in Pérez's catalogue, entry 1756 for *Andrena vaulogeri* Pérez, 1895 states that numerous specimens from Téniet-el-Haad were obtained from Vauloger, but the MNHN specimens themselves bear only the small handwritten label "Téniet el H" added by Pérez. The examined specimen of *A. melaleuca* bears a determination label (as "*Andrena melaleuca* Pér") by Warncke and a lectotype label (Figs. 1–4). We suspect that Warncke examined the specimen and labelled it as a lectotype but never published the designation. To ensure nomenclatural stability, we therefore designate this specimen as lectotype.



Figures 1–4. Female lectotype of *Andrena melaleuca* Pérez. **1.** Habitus, lateral view. **2.** Metasoma, dorsal view. **3.** Face, frontal view. **4.** Specimen labels. Photographs by Thomas J. Wood.

DISCUSSION

The records of *A. melaleuca* presented here from Sicily, Italy, are the first for this species in Europe. For several reasons, we suppose that these records most likely represent a recent natural range shift rather than human-mediated displacement, and an established population rather than isolated displaced specimens. The absence of previous records from Sicily, despite good research coverage (Mazzeo *et al.*, 2007; Mazzeo *et al.*, 2019; Bella *et al.*, 2020; Turrisi *et al.*, 2021; Wood *et al.*, 2023), together with the fact that the species is rather easy to identify, suggests that it is a recent colonist rather

than a rare, long-established species that has remained undetected. Although there is no detailed information on its nesting biology, it can be safely assumed that, like all other species of *Andrena*, it nests below ground. Human-displaced species are, in most cases, above-ground nesting species moved within their nesting substrate (Ghisbain *et al.*, 2021). By contrast, the timber trade and maritime container traffic, respectively, likely constitute important dispersal pathways, as proposed for *X. aestuans* and *A. florea* (Flaminio *et al.*, 2023a; Uzunov *et al.*, 2024). The locality of the present records is only 345 km from the nearest known occurrence in Hammamet, Tunisia, on the opposite shore of the Strait of Sicily (Fig. 5). A similar migration route from northern Africa to Sicily has recently been proposed for *Halictus consobrinus* Pérez (Brau *et al.*, 2025; see also Flaminio *et al.*, 2023b). At about 11 mm, female of *A. melaleuca* are similar in size to *H. consobrinus*, supporting the possibility of active migration. Pantelleria and Lampedusa, islands in the Strait of Sicily, might have served as stepping stones for these species (see Flaminio *et al.*, 2023b). Since bee-sampling efforts on these islands have intensified recently (Lo Verde *et al.*, 2023), focused studies of already-collected material or supplementary collecting could help verify this. Studies of the bee fauna of southern mainland Italy should also pay special attention to *A. melaleuca* to monitor a possible further northward range shift. Finally, both a male and a female were found in Sicily, indicating a likely established population, although additional sampling will be needed to confirm the species' establishment.

Combining digitized museum specimens and literature records, we provide an updated distribution map for *A. melaleuca* (Fig. 5). Apart from the record in Sicily, the species is widely distributed in northern Algeria and northern Tunisia, with additional records from north-western Libya. The record from Egypt was derived from the literature (Warncke, 1974) and is more isolated. Since it was not possible for us to locate and examine the corresponding specimens, the presence of *A. melaleuca* in Egypt should be confirmed through future targeted collecting efforts, as it may derive from a mis-labelled specimen. Warncke often worked with Otto Schmiedeknecht material, not all of which was precisely or attentively labelled, and verification of historical bee data remains an ongoing challenge.

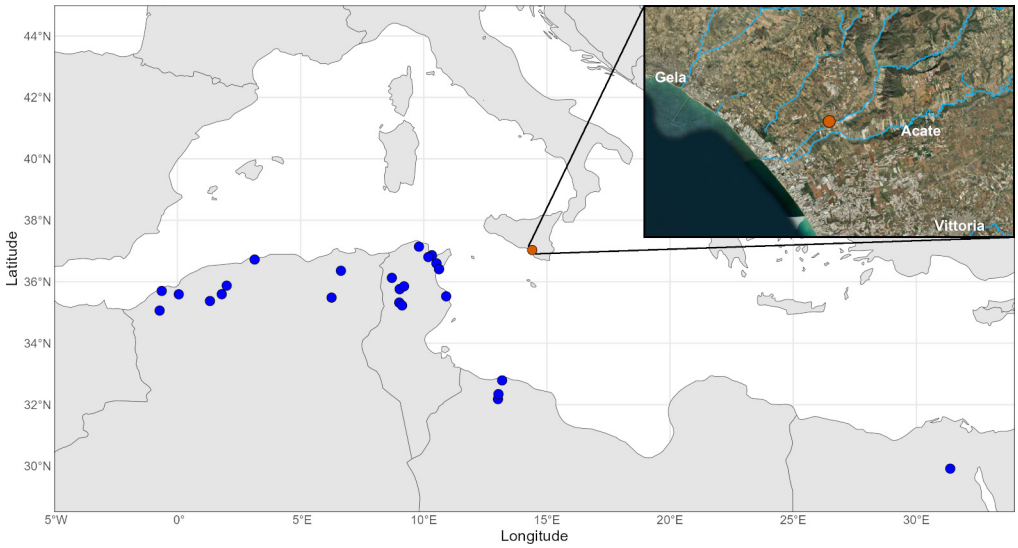


Figure 5. Distribution of *Andrena melaleuca* Pérez. Blue dots indicate digitized museum specimens and literature records cited in the text, and the orange dot indicates the new record. Base maps derived from Natural Earth (naturalearthdata.com) and Esri World Imagery (Sources: Esri, Maxar, Earthstar Geographics, and the GIS User Community).



Figures 6–8. Male and female specimens of *Andrena melaleuca* Pérez. **6.** Live female. **7.** Pinned female, dorsal view. **8.** Pinned male, dorsal view. Photographs by Robert Zimmermann.

Recent studies, in particular on the genus *Andrena*, have revealed Sicily as a melting pot where faunal elements of both north-west Africa and south-east Europe have been recorded. Just within *Andrena*, species with predominantly north-west African distributions and with a presence on Sicily include *Andrena rhypara* Pérez, *A. compta* Lepeletier, *A. obsoleta* Pérez, *A. bellidis* Pérez, *A. caligata* Warncke, *A. fumida* Pérez, and *A. rotundata* Pérez (Wood *et al.*, 2023; Wood, 2024; Wood, 2026). The fauna of south-eastern Europe is represented by *A. subglobosa* Dours, *A. cordialis* Morawitz, and *A. transitoria* Morawitz (Wood, 2023; Wood, 2026). Another example is the predominantly south-eastern European *Anthophora superans* Walker that was listed as *Anthophora ferruginea* Lepeletier in Assenza (1891) and De Stefani (1895) (Wood *et al.*, 2025).

Recent records of these south-eastern European species in Sicily have been scarce to nonexistent, perhaps suggesting a shift in the relative importance of different faunal source regions. Though extensive commentary on this pattern is challenging due to the limited degree of historical sampling on the island, a broad pattern of south-eastern European faunal elements being recorded before 1950 and seemingly new North African faunal elements being increasingly recorded after 1950 deserves highlighting. While showing low endemism in its bee fauna (with *Andrena heterodoxa* Pérez as a notable exception), Sicily therefore constitutes an important linkage between the otherwise disconnected faunas of north-western Africa and south-eastern Europe. Comprehensive revisions of other bee genera will likely confirm this pattern.

ACKNOWLEDGEMENTS

We thank Aron Bellersheim for supporting the specimen photography and two anonymous reviewers for their helpful comments that improved the manuscript. Robert Zimmermann is supported through a scholarship of the Deutsche Bundesstiftung Umwelt.

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ISSN 2325-4467