

## Research article

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# Revisions to the *Andrena* fauna of Italy, with the description of a new species (Hymenoptera: Andrenidae)

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## Abstract

Italy lies at the centre of the Mediterranean basin and has a large bee fauna due to its mixture of Mediterranean and temperate habitats, and influences from all cardinal directions. This is true also for the genus *Andrena*; however, studies to date have been fragmentary, and there has been no focused critical revision of the entire fauna. Here the Italian *Andrena* fauna is critically revised, taking into account, recent taxonomic advances, literature records, and newly and historically collected material. *Andrena* (*Cordandrena*) *cordialis* Morawitz, 1877, *A.* (*Notandrena*) *bellidis* Pérez, 1895, *A.* (*Notandrena*) *foeniculae* Wood, 2020, and *A.* (*Notandrena*) *fulvicornis* Schenck, 1853 are newly reported from Italy. A lectotype is designated for *A.* (*Pallandrena*) *braunsiana* Friese, 1887 which is both confirmed as present in Italy and as the senior synonym of *A.* (*Pallandrena*) *oblita* Warncke, 1967 **syn. nov.** A lectotype is designated for *A.* (*Orandrena*) *sisymbrii* Friese, 1887 which is a junior synonym of *A.* (*Orandrena*) *oralis* Morawitz, 1876; this species is confirmed as present in southern Italy. A lectotype is also designated for *A.* *schlettereri* Friese, 1896; this species is provisionally excluded from the Italian fauna. *Andrena* (*Micrandrena*) *puella* Alfken, 1938 **stat. rev.** is recognised as a distinct species endemic to Sardinia and Corsica. Some 27 *Andrena* taxa suggested as occurring in Italy are excluded or have their synonymic status clarified. One new species is described, *A.* (*Euandrena*) *sesmae* Wood, Cornalba & Praz, **sp. nov.** from northern and central Italy. A final faunal richness of 218 species is produced, confirming that Italy supports one of the largest *Andrena* faunas globally.

**Key words:** endemic species; Mediterranean; solitary bees; taxonomy; DNA barcoding

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## Introduction

Italy sits at the heart of the Mediterranean basin, a known global hotspot for bee diversity (Orr et al. 2021). Italy currently has a rich bee fauna of around 1,000 species (Lhomme et al. 2020; Reverté & Miličić et al. 2023), but study of the Italian bee fauna has been decidedly variable throughout time, and critical revision is required for many bee groups.

This variable history of study is well-illustrated for the hyper-speciose genus *Andrena* that currently totals around 1,700 species globally (Wood 2023a; 2023b). The Italian *Andrena* fauna has been studied since the late 18<sup>th</sup>

century, with many authors describing what are currently considered to be valid species with a *locus typicus* within the contemporary political boundaries of Italy (Müller 1766; Fabricius 1781; Rossi 1790; 1792; Lepeletier 1841; Smith 1853; Giraud 1863; Morawitz 1871; Kriechbaumer 1873; Magretti 1883; De Stefani 1889; Pérez 1895; 1903; Morice 1899; Alfken 1938; Warncke 1966; 1967; 1973; Schwenninger 2007; Praz et al. 2022). Altogether, these works describe 26 currently valid *Andrena* species from Italy. Remarkably, of these 26 species, only a single publication (Morawitz 1871) described as many as three currently valid species (including *Colletes parvula* Morawitz,

1871 nec *Andrena parvula* (Kirby, 1802) which was later replaced with *Andrena colletiformis* Morawitz, 1873, see Astafurova et al. 2021). This strongly contrasts the pattern of revisionary study of other Mediterranean faunas that received dedicated revisions with the description of many new *Andrena* species by Klaus Warncke during the 20<sup>th</sup> century (e.g. Warncke 1965; 1969; 1974; 1975a; 1975b).

This is not to say that the Italian *Andrena* fauna has not received revisionary attention. Many taxa described by various authors (e.g. Morawitz 1872; Schmiedeknecht 1884; Costa 1889; Strand 1921) have subsequently been synonymised (e.g. Warncke 1967) and are not currently recognised as valid species (Gusenleitner & Schwarz 2002). More recent study has also recognised that previous workers over-lumped distinct *Andrena* taxa that are restricted to Italy (e.g. Praz et al. 2022). However, it is clear that due to the fragmentary nature of the study of Italian *Andrena*, the lack of a domestic taxonomic expert focusing on this group during the 20<sup>th</sup> century, and the lack of attention paid to this fauna by Warncke in contrast to eastern and western Mediterranean countries, our collective knowledge of the fauna is mixed. To date, there has never been a comprehensive and critical revision of the Italian *Andrena* fauna.

However, an important contemporary starting point in producing such a list is the work of Pagliano (1994) who reviewed the literature and presented some new species and specimen records, resulting in a total of 173 *Andrena* species. However, this work predominantly compiles literature and no critical verification of specimens was performed, in some cases resulting in duplicate listings (e.g. *A. angustior fulvata* Stöckert, 1930 on p. 344 and again as *A. fulvata* on p. 351) and clear misidentifications (e.g. the continental species *A. (Nobandrena) nobilis* Morawitz, 1873 is reported from Sardinia on p. 358, when the taxon present is clearly the predominantly North African *A. (Nobandrena) compta* Lepeletier, 1841 which is also reported from Sardinia on p. 348). Subsequently, additional workers have compiled literature records and a list as long as 234 Italian *Andrena* species has been presented (Comba 2019). As the most recent work on the Italian *Andrena* fauna, Comba's list is used to inform ongoing work on this genus in Italy (e.g. Gamba & Carta 2021), and hence there is a need to ensure that the faunal total is correct at a national level. The aim of the current work is therefore to present a critical revision of the Italian *Andrena* fauna in the context of other recent faunal revisions for European countries (e.g. Wood 2021; 2023a) and taking into account ongoing changes resulting from taxonomic revisions within this hyper-diverse genus of bees (e.g. Praz et al. 2019; 2022; Wood 2023b; 2023c).

## Materials and methods

In the interests of brevity, we do not present a species by species listing for all *Andrena* species present in Italy.

Many common species are well-supported by previous literature reported by workers such as Pagliano (1994) or Warncke (various works, see also the distribution maps presented by Gusenleitner & Schwarz 2002). Instead, we aim to deal with species that have a confused or unclear status. As such, we take the list of Comba (2019) as a reference point; this work listed 234 species, each with an individual number 1–234. These are cited throughout the text where appropriate. Appendix I herein contains a full list of verified or plausible *Andrena* species for Italy, with Comba reference numbers for easy reference. In order to produce a critical revision of the Italian *Andrena* fauna, we gathered specimen information as part of ongoing revisions into European and Mediterranean *Andrena* (e.g. Praz et al. 2019; 2022; Wood et al. 2021; Wood 2021, 2023a, 2023b). As such, many of the changes reported here have recently been published in works that do not specifically focus on Italy.

For DNA barcoding, we do not present a comprehensive DNA barcode reference for all Italian *Andrena*, but rather produced barcodes for three groups of species to assist morphological species delimitation. These three groups are: i. the *A. bicolor*-group in the subgenus *Euandrena* Hedicke, 1933; ii. the *A. taraxaci*-group in the subgenus *Chlorandrena* Pérez, 1890, especially *A. taraxaci* Giraud, 1861 and *A. pastellensis* Schwenninger, 2007; and iii. a clade of the subgenus *Notandrena* Pérez, 1890, particularly *Andrena foeniculae* Wood, 2020 and closely related taxa. Most DNA barcodes were generated by the Canadian Center for DNA barcoding (CCDB) in Guelph, Canada, based on single leg removed from pinned specimens (see Wood 2023a for details). A few sequences were produced at the University of Neuchâtel, following the protocols given in Praz et al. (2019; 2023). All sequences are publicly available on the BOLD website.

The newly obtained sequences were complemented with previously published sequences (Schmidt et al. 2015; Praz et al. 2019; Wood 2023a), and aligned using Mafft (Katoh & Standley 2013). Bayesian phylogenetic analyses were performed in Beast v.1.10.3 (Drummond & Rambaut 2007), dividing the dataset into two partitions (nt1 + nt2; nt3) and applying a HKY + G model to each partition (with base frequencies estimated), with the following parameters: clock type: strict clock; tree prior: speciation; Yule process; length of chain: 10,000,000 generations, sampling trees and parameters every 1000 generations. To root the trees, a suitable outgroup (based on Pisanty et al. 2022) was selected, and the clade including all ingroup taxa was constrained to be monophyletic prior to phylogenetic analysis. Outgroup taxa for the *Chlorandrena* analyses were *A. relata* Warncke, 1975, *A. rufiventris* Lepeletier, 1841, *A. minutula* (Kirby, 1802), *A. aeneiventris* Morawitz, 1872, *A. nobilis* Morawitz, 1873, and *A. oralis* Morawitz, 1876; for the *Euandrena* analyses, *A. fulvago* (Christ, 1791), *A.*

*marginata* Fabricius, 1776, *A. nitidiuscula* Schenck, 1853, *A. florea* Fabricius, 1793; for the *Notandrena* analyses *A. florea*, *A. schencki* Morawitz, 1866, *A. marginata*, *A. hesperia* Smith, 1853, *A. bicolor* Fabricius, 1775; in all three analyses, the ingroup taxa correspond to all members of the mentioned subgenus. A maximum clade credibility tree was computed, discarding 2000 (of 10,000 trees), after checking that all parameters reached convergence in Tracer v.1.7.1 (Rambaut et al. 2018). Genetic distances, based on the Kimura-two parameter distance, were computed in a test version of Paup 4.0 (Swofford 2002) kindly provided by D. Swofford.

Subgeneric concepts follow Pisanty et al. (2022b). The following abbreviations are used in the species descriptions: A = antennal segments, S = metasomal sterna, and T = metasomal terga. Morphological terminology follows Michener (2007). Specimens were measured from the centre of the clypeus at the front of the head to the apical tip of the metasoma and rounded to the nearest 0.5 mm. Photographs for most specimens were taken using an Olympus E-M1 Mark II with a 60 mm macro lens. Additional close-ups were taken with the addition of a Mitutoyo M Plan Apo 10× infinity corrected objective lens in combination with an Olympus M.Zuiko 2× teleconverter lens, a 10 mm Kenko DG extension tube, and a Meike MK-P-AF3B 10 mm extension tube. Photographs were stacked using Helicon Focus B (HeliconSoft, Ukraine) and plates were prepared in GNU Image Manipulation Program (GIMP) 2.10. Post-processing of some images was made in Photoshop Elements (Adobe Systems, USA) to improve lighting to highlight specific characters. Finally, specific photographs of *A. distinguenda* Schenck, 1871 and *A. puella* Alfken, 1938 were taken using a Keyence digital microscope VHX 1000 (Keyence International, Belgium) in order to precisely measure head morphology.

## Abbreviations

CPC = Personal collection of Christophe Praz, Neuchâtel, Switzerland  
 DEI = Deutsches Entomologisches Institut, Eberswalde, Germany  
 IEUB = Istituto di Entomologia, Università di Bologna, Bologna, Italy  
 JSCP = Research collection of Jakub Straka, Prague, Czechia  
 MCC = Personal collection of Maurizio Cornalba, Pavia, Italy  
 MNHN = Muséum national d'Histoire naturelle, Paris, France  
 MRSN = Museo Regionale di Scienze Naturali di Torino, Turin, Italy  
 MSNM = Museo di Storia Naturale di Milano, Milan, Italy  
 MSVI = Personal collection of Marco Selis, Viterbo, Italy  
 MZUR = Museo di Zoologia, Sapienza Università di Roma, Rome, Italy  
 NMW = Naturhistorisches Museum Wien, Vienna, Austria

NZMS = National Museum of Natural History, Sofia, Bulgaria  
 OÖLM = Oberösterreichs Landesmuseum, Linz, Austria  
 RMNH = Naturalis Biodiversity Center, Leiden, the Netherlands

SFCC = Personal collection of Simone Flaminio, CREA, Bologna, Italy

SMFD = Naturmuseum Senckenberg, Frankfurt am Main, Germany

TJWC = Personal collection of Thomas J. Wood, Mons, Belgium

ZISP = Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia

ZMHB = Museum für Naturkunde, Berlin, Germany

## Results

Following the revisions detailed below, a final total of 218 *Andrena* species was produced for Italy. This includes 209 species listed by Comba, eight species overlooked by this checklist or recently elevated following taxonomic revision, and one species that is here newly described for science. Twenty-seven taxa suggested as occurring in Italy are excluded or have their specific status clarified.

### Species newly recorded for the Italian fauna

#### *Andrena (Cordandrena) cordialis* Morawitz, 1877

**Remarks.** *Andrena cordialis* is a typical species of the Pannonian Basin and Eastern Europe to Central Asia. It is therefore surprising to encounter material of this species in Sicily. The specimen collected by Teunissen was provisionally identified by Warncke as *A. vaulogeri* Pérez, 1895, a species found in Spain, Morocco, Algeria, and Tunisia. However, this identification was incorrect as the tergal punctures are too sparse. Though *A. vaulogeri* could have been expected to be present in Sicily due to the known faunal links between this island and north-western Africa, a surprisingly large number of more typically eastern *Andrena* species are also present (see Results, see Discussion), and hence the detection of *A. cordialis* fits into this emerging pattern.

#### Material examined.

**ITALY:** SICILY: 3♀, 35 km N Gela, NE Piazza Armerina, 27–29 May 2002, leg. J. Halada, (OÖLM); 1♀, Pergusa, 9–10 May 1975, leg. H. Teunissen (OÖLM).

**Distribution.** Italy\*, Austria, Slovenia, Hungary, Serbia, Romania, North Macedonia, Bulgaria, Greece, Moldova, Ukraine, Russia, Turkey to the Caucasus and Iran, Central Asia and north-western China (Gusenleitner & Schwarz 2002; Astafurova et al. 2021; Wood 2021).

#### *Andrena (Notandrena) bellidis* Pérez, 1895

**Remarks.** This species is recorded from Sicily for the first time. The specimen conforms to *A. bellidis* s. str.; *A. bellidis* ssp. *acutiformis* Warncke, 1980 is found only in Iberia and may be distinct, but this must be resolved in a future revision.

**Material examined.**

**ITALY:** SICILY: 1♀, Monte S. Agata (CT), 16 May 1965, leg. M. Kocourek (OÖLM).

**Distribution** (*bellidis* s. str.): Morocco, Algeria, Tunisia, Italy\* (*bellidis* ssp. *acutiformis*): Spain and Portugal (Gusenleitner & Schwarz 2002).

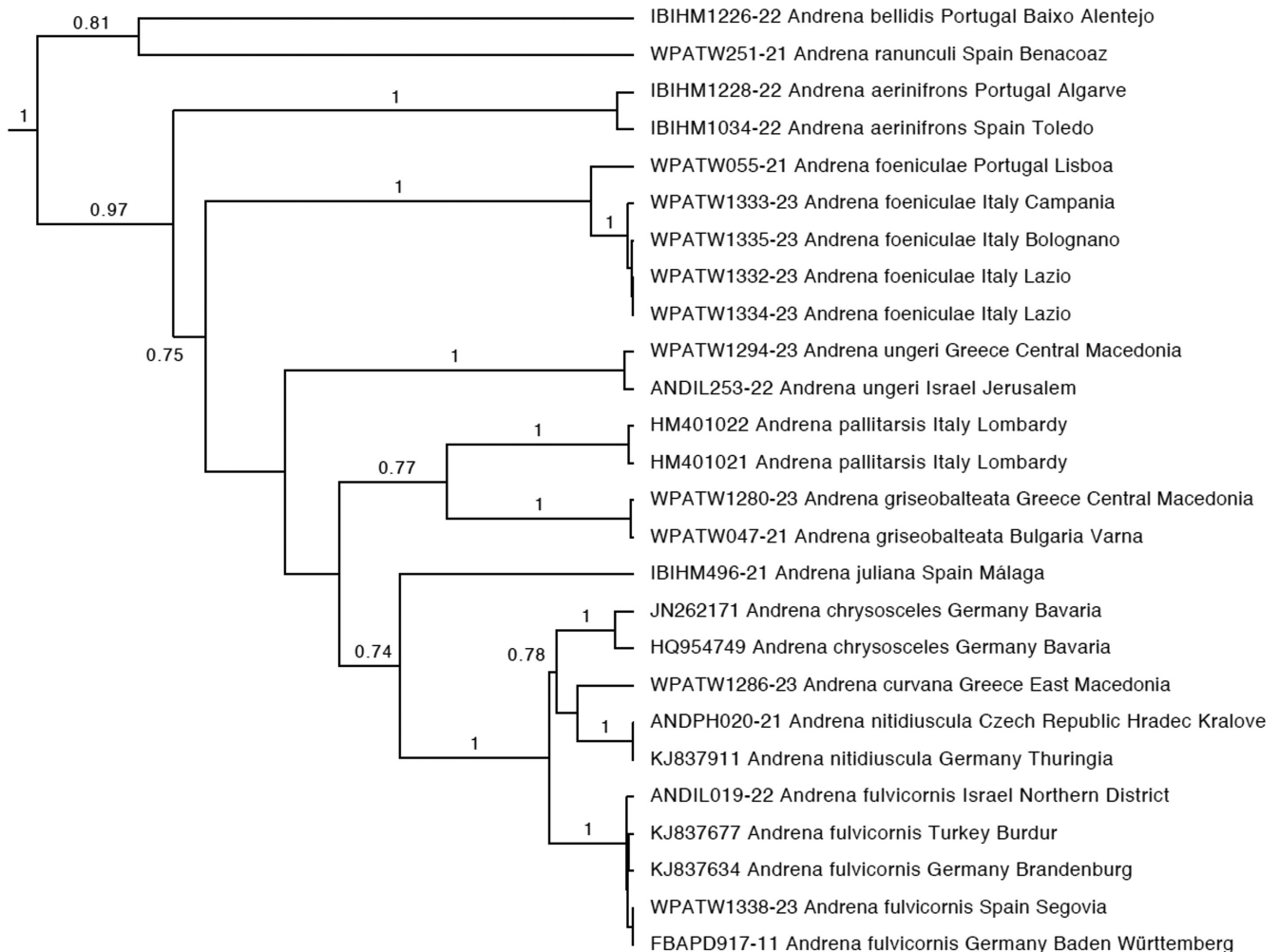
***Andrena (Notandrena) foeniculae* Wood, 2020**

**Remarks.** This species is recorded from outside of Iberia for the first time, including the first capture of the male which has not yet been described (Wood 2023a). The species can be collected abundantly at *Foeniculum vulgare* in

mid- to late-September, and has clearly been overlooked in both Iberia and Italy due to this unusual flight period. The Italian sequences are slightly divergent from the Iberian one (Fig. 1), with an average genetic distance of 4.06% (range 3.93–4.10%); the distance among the Italian specimens was 0.45% (0.15–0.75%). In the absence of clear morphological differences, the divergence between Italian and Iberian populations is attributed to isolation by distance.

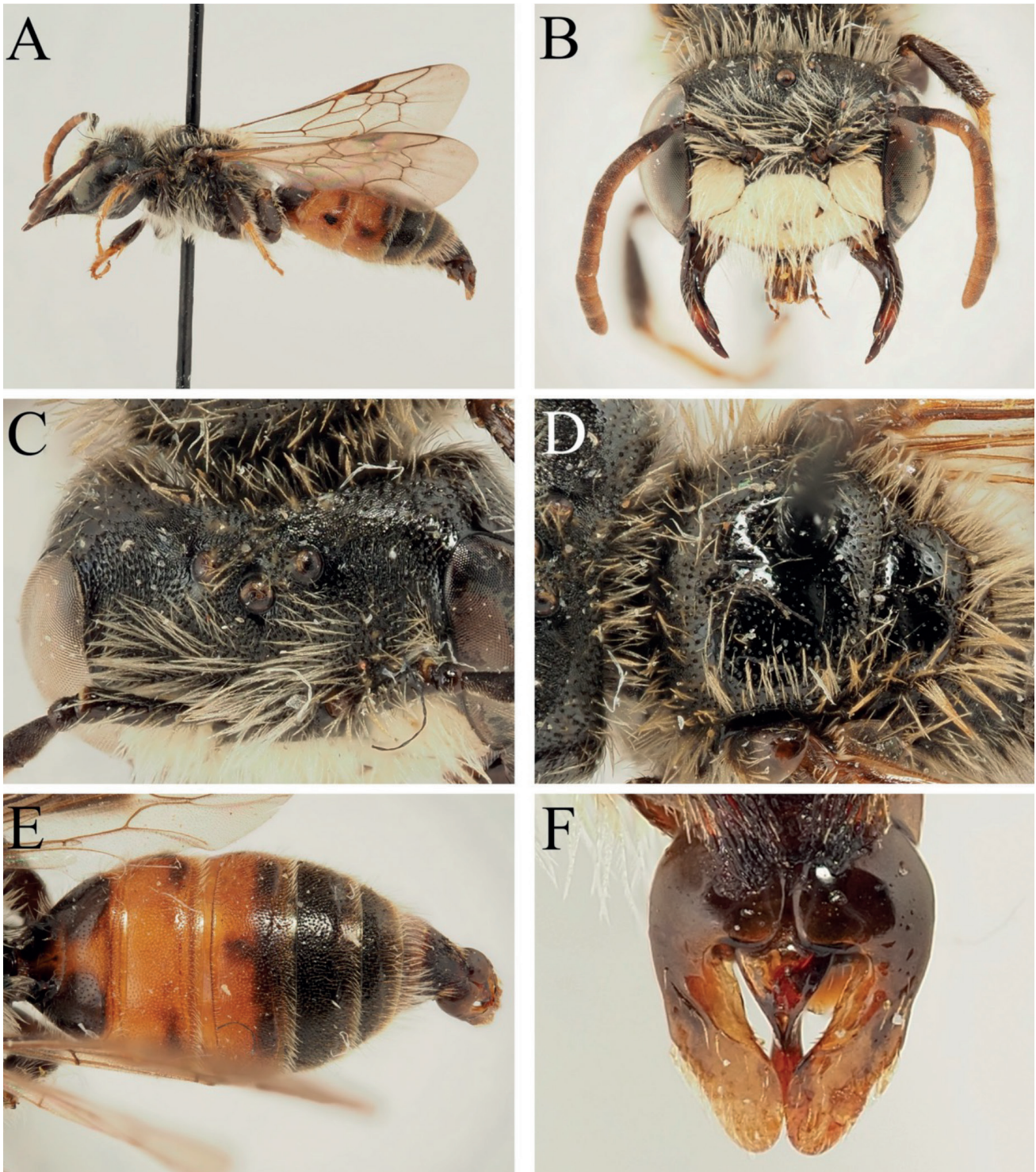
We suspect that *A. foeniculae* is the true identity of the specimen reported as *A. (Notandrena) pallitarsis* Pérez, 1903 from Sardinia (26 Aug 2017) by Nobile et al. (2020), due to the very late flight period and because we have seen photographs of *Andrena* closely resembling *A. foeniculae* taken on Sardinia, from which *A. pallitarsis* (a species of warm but humid summer grasslands) has never been recorded before the work of Nobile et al. (2020).

**Diagnosis.** The male of *A. foeniculae* can quickly be placed into the subgenus *Notandrena* due to the short and broad head (Fig. 2B), abundant yellow markings on the



**Fig. 1** - Molecular phylogeny of selected members of the subgenus *Notandrena* Pérez, 1890, with a focus on Italian species. Maximum clade credibility tree found in Bayesian analyses of sequence data of the mitochondrial gene COI; numbers above branches indicate posterior probabilities; values below 0.5 are omitted. Outgroup taxa are not shown.





**Fig. 2** - *Andrena foeniculae* Wood, 2020, male. A, profile; B, face, frontal view; C, vertex, dorsal view; D, scutum, dorsal view; E, terga, dorsal view; F, genital capsule, dorsal view.

clypeus and lower paraocular areas, broad gena (clearly broader than the compound eye), and pronotum with a strong humeral angle. It is immediately recognisable due to the long ocelloccipital distance that is almost twice as wide as the diameter of a lateral ocellus (Fig. 2C). As in the female sex, this character is highly diagnostic for West Palearctic *Notan-*

*drena*. The additional combination of red-marked terga (Fig. 2E), compact genital capsule without the penis valves noticeably broadened (Fig. 2F; compare *A. pallitarsis*), the yellow marked clypeus and lower paraocular areas (Fig. 2B), and the late flight period of August–September means that *A. foeniculae* cannot be confused with any other *Notandrena* species.

**Description: Male:** Body length: 7–9.5 mm (Fig. 2A). *Head:* Dark, 1.45 times wider than long (Fig. 2B). Clypeus basally slightly elevated, sloping anteriorly to apical margin, entirely yellow-marked with exception of 2 small black marks medially, yellow markings extending onto lower ½ of paraocular areas; surface of clypeus regularly punctate, punctures separated by 1 puncture diameter, underlying surface shining. Process of labrum rounded rectangular, short, 3 times wider than long, apical margin emarginate. Gena broad, exceeding width of compound eye; ocelloccipital distance 1.8–2 times diameter of lateral ocellus (Fig. 2C). Face with moderate whitish to light brownish pubescence, not equalling length of scape. Antennae basally dark, A3 apically, A4–13 ventrally lightened by presence of orange scales; A3 exceeding A4, shorter than A4+5, A4 quadrate, A5–13 rectangular, longer than broad.

*Mesosoma:* Scutum and scutellum polished and shining, without sculpture, irregularly punctate, punctures separated by 0.5–3 puncture diameters, punctures sparsest medially (Fig. 2D). Pronotum with extremely strong humeral angle, surface smooth and shining. Mesepisternum with granular microreticulation, dull to weakly shining. Dorsolateral parts of propodeum with granular microreticulation, surface shallowly and obscurely punctate, punctures separated by 1 puncture diameter, surface dull to weakly shining. Propodeal triangle laterally defined by weak rim, internal surface with fine granular shagreen, basally with obscure network of weakly raised rugae, propodeal triangle thus defined by change in surface sculpture. Mesepisternum with moderately long plumose hairs, white ventrally, light brown dorsally, becoming consistently light brown on scutum and scutellum. Propodeum with whitish plumose hairs. Legs basally dark, tarsi entirely orange, pubescence whitish. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation dark orange-brown, nervulus postfurcal.

*Metasoma:* Terga with colouration variable, from almost entirely dark with apical margins of T1–2 lightened hyaline yellow-red, to T1 medially, T2 entirely with exception of 2 black oval marks laterally, and T3 predominantly red-marked (Fig. 2E). Tergal discs and margins densely punctate, punctures separated by 0.5 puncture diameters, underlying surface finely shagreened, shining. Tergal discs with scattered short white hairs, T2–4 laterally with weak apical hair fringes of white hairs, not obscuring underlying surface. T6–7 with long whitish hairs overlying pseudopygidial plate. S8 more or less columnar, slightly broadening, apical margin truncate, ventral surface basally covered with fan of laterally spreading golden-brown hairs. Genital capsule compact (Fig. 2F), gonocoxae apically evenly rounded, gonostyli apically produced into flattened shovel-like triangles, internal margin strongly raised. Penis valves basally broad, occupying ½ space between gonostyli, medially strongly narrowed, becoming linear.

#### Material examined.

**ITALY:** ABRUZZO: 2♂, 1♀, Bolognano, Colle Bianco, 13 Sep 2021, leg. G. Marcantonio, (TJWC). LAZIO: 1♂, 1♀, Maccarese (RM), 30–65 m, 25 Sep 2019, leg. M. Selis, (TJWC). CAMPANIA: 1♂, 6♀, Caselle in Pittari (SA), 14 Sep 2022, leg. S. Flaminio, (OÖLM/TJWC).

**Distribution.** Portugal, Spain, and Italy\* (Wood et al. 2020a).

#### *Andrena (Notandrena) fulvicornis* Schenck, 1853

**Remarks.** This species is common in Italy, though it has undoubtedly been previously reported from Italy under the broad concept of *A. nitidiuscula* Schenck, 1853 used by Warncke (see Schmid-Egger & Doczkal 1995; Schwenninger 2013). *Andrena nitidiuscula* is present in Italy, but it is clearly less common and shows a much more northerly distribution whereas *A. fulvicornis* extends southwards to Sicily.

#### Material examined (*Andrena fulvicornis*)

**ITALY:** PIEMONTE: 1♀, S. Paolo [Solbrito] (AT), 31 Jul 1944, leg. C. Casolari (MRSN). VENETO: 3♂, Piazzola sul Brenta, Vaccarino (PD), 28–29 Jun 2020, leg. A. Cappellari (MZUR); 1♂, Padova, 4–10 May 2022, leg. Cappellari & Geppert (MZUR). EMILIA-ROMAGNA: 69♂, 3♀, 60 km N Ravenna, 5 Jul 2000, leg. J. Halada (OÖLM). UMBRIA: 1♀, Assisi, 18–24 Jul 1962, leg. G. Barendrecht (RMNH); 1♂, Spoleto (PG), 26–31 Jul 1962, leg. G. Barendrecht (RMNH). LAZIO: 1♂, Amatrice (RI), 3 Aug 1988, leg. V. Barták (OÖLM); 1♀, Maccarese (RM), 25 Sep 2019, leg. M. Selis (MSVI); 1♂, Maccarese (RM), 2 Oct 2019, leg. M. Selis, (MSVI); 1♀, Roma, Parco della Caffarella, 13 Oct 2020, leg. M. Mei (MZUR); 1♀, Sella di Leonessa (RI), 1700–1870 m, 11 Jul 2021, leg. M. Selis (MSVI). ABRUZZO: 1♀, Sirente, Monte Rotondo (AQ), 1300 m, 1–31 Aug 1941, leg. C.N.R. (MZUR); 1♀, Sirente, Rocca di Mezzo, 1300 m, 1–31 Aug 1941, leg. C.N.R. (MZUR); 1♀, Parco Nazionale d'Abruzzo, Rifugio di Prato Rosso, 19–23 Jul 1942, leg. Santercole (MZUR); 1♀, S of Capestrano, Bussi sul Tirino env. (PE), 7 Jul 2016, leg. L. Černý (OÖLM); 2♀, Rovere (AQ), 20 Jun 1988, leg. G. Pagliano (MRSN); 1♀, S. Nicola (AQ), 13 Jun 1988, leg. G. Pagliano (MRSN). MOLISE: 1♀, Cantalupo nel Sannio (IS), 800 m, 25 Jun–27 Jul 2017, leg. M. Fede (MZUR). SICILY: 1♀, 20 km S Palermo, 800 m, 18 Jun 2012, leg. J. Halada (OÖLM); 1♂, 25 km N Agrigento, 30 May 2002, leg. J. Halada (OÖLM).

#### (*Andrena nitidiuscula*)

**ITALY:** PIEMONTE: 2♀, S. Paolo [Solbrito] (AT), 14 Aug 1946, leg. C. Casolari (MRSN). LIGURIA: 1♀, Ortovero (SV), 30 Aug 1984, leg. G. Pagliano (MRSN). FRIULI-VENEZIA GIULIA: 1♀, Duino (TS), 10 Jul 1937, leg. A. Giordani Soika (MRSN); 1♀, Musi, Lusevera (UD), 22 Jul 1989, leg. G. Pagliano (MRSN). LAZIO: 1♀, Maccarese (RM), 30



Oct 2020, leg. D. Baiocchi (MSVI). ABRUZZO: 1♀, Vasto Marina (CH), 27 Jul 1976, leg. G. Pagliano (MRSN).

**Distribution.** Unclear due to historical lumping and also some outstanding taxonomic uncertainty in south-western Europe (Wood 2023a), but principally the southern part of Central Europe (southern Germany southwards, Schmid-Egger & Doczkal 1995; Bénon & Praz 2016) through southern Europe, North Africa, Turkey, and the Levant to Iran (Wood et al. 2020b; Wood & Monfared 2022).

### Recent and new taxonomic changes

#### *Andrena (Avandrena) heterodoxa* Pérez, 1903 and *Andrena (Avandrena) siciliana* Warncke, 1980

**Remarks.** Both of these species were described from single specimens collected from Sicily (Pérez 1903; Warncke 1980). Warncke (1967) misinterpreted *A. heterodoxa* as a synonym of *A. (Euandrena) bicolor* Fabricius, 1775 because he was never able to inspect the type, but Wood (2023c) located this material and confirmed the conspecificity of *A. siciliana* and *A. heterodoxa*. Pérez's specimen is undated, and Warncke's specimen was collected in 1858, and so it is possible that *A. heterodoxa* has not been recorded for over 150 years. It is suspected to be narrowly oligolectic on *Erodium* (Geraniaceae) based on the pollen preferences of closely related species (Wood 2023a), so target searches should be made on this genus.

#### *Andrena (Melandrena) creberrima* Pérez, 1895 and *Andrena (Melandrena) discors* Erichson, 1841

**Remarks.** The status of *A. creberrima* has been confused, and has only recently been established as a junior synonym of *A. discors* (both taxa described from Algeria; Wood 2023a). All references of *A. creberrima* from Italy (e.g. Priore 1982; Pagliano 1994; Gusenleitner & Schwarz 2002) refer instead to a newly broadened concept of *A. discors*.

#### *Andrena (Micrandrena) curtula* Pérez, 1903 and *Andrena (Micrandrena) spreata* Pérez, 1895

**Remarks.** Wood (2023a) synonymised *A. curtula* with *A. spreata*, thus the listing of both *A. curtula* and *A. spreata* by Comba (2019) [species 132 and 148] refers to the same taxon. See also additional notes below on *A. curtula*.

#### *Andrena (Micrandrena) nitidula* Pérez, 1903 and *Andrena (Micrandrena) distinguenda* Schenck, 1871

**Remarks.** These two species have been deeply confused in the literature, predominantly deriving from the variable treatment of this complex by Warncke (discussed in Wood 2023a). In short, two species are present (but also

see below for the presence of a third species *A. puella* that is restricted to Corsica and Sardinia), though there is currently no consensus between morphological and genetic concepts. For the purpose of this revision, both *A. nitidula* (Liguria only) and *A. distinguenda* (widespread) are considered present in Italy following the revision of Burger and Herrmann (2003). *Andrena distinguenda* was listed by Comba (2019) [species 62], but not *A. nitidula*.

#### *Andrena (Micrandrena) obsoleta* Pérez, 1895

**Remarks.** This taxon has been deeply confused in the literature due to an incorrect lectotype designation by Warncke and subsequent incorrect interpretation. This was resolved by Wood (2023a) who designated a new lectotype, and synonymised *Andrena mariana solda* Warncke, 1974 with *A. obsoleta*. *Andrena mariana solda* was the taxon present in Italy (Sicily only, Warncke 1974), resulting in the listing of *Andrena mariana* by Comba (2019) [species 63], see also the distribution maps of Gusenleitner & Schwarz (2002). *Andrena obsoleta* thus replaces *A. mariana solda* in the Italian fauna.

#### *Andrena (Simandrena) rhypara* Pérez, 1903 and *Andrena (Simandrena) palumba* Warncke, 1974

*Andrena rhypara* was described from Algeria, and *A. palumba* was described from Tunisia, with specimens from Sicily (Warncke 1974). Wood (2023b) synonymised the two taxa. To our knowledge, *A. rhypara* has not been recorded in Italy since 1938. *Andrena rhypara* is therefore listed twice by Comba (2019), as species 195 (*A. palumba*) and species 198 (*A. rhypara*).

#### Material examined.

**ITALY:** 1♀, Siracusa, Sicilia, 1938, OÖLM (paratype of *A. palumba*).

#### *Andrena (Taeniandrena) afzeliella* (Kirby, 1802), *Andrena (Taeniandrena) ovatula* (Kirby, 1802), and *Andrena (Taeniandrena) ovata* Schenck, 1853

**Remarks.** These three species were all previously lumped under a broad interpretation of *A. ovatula* (see Gusenleitner & Schwarz 2002). Praz et al. (2022) resurrected *A. afzeliella* and *A. ovata*; all three species are present in Italy.

#### *Andrena (Taeniandrena) antonellae* Praz & Genoud, 2022

**Remarks.** This species was described from Sardinia and Corsica by Praz et al. (2022).

#### *Andrena (Taeniandrena) croceiventris* Morawitz, 1871

**Remarks.** *Andrena croceiventris* was described from Calabria (see Astafurova et al. 2021) and was considered to be

a synonym of *A. (Taeniandrena) similis* Smith, 1849 (= *A. (Taeniandrena) russula* Lepeletier, 1841) (Warncke 1967; Gusenleitner & Schwarz 2002). Praz et al. (2022) restored *A. croceiventris* to species status based on morphological and genetic data. Examination of material from the Pagliano collection (MRSN) shows that the range extends further north into Piemonte rather than the Sicily-Tuscany distribution reported by Praz et al. (2022).

Furthermore, Costa (1889: 4) described the unclear taxon *A. hyalinella* Costa, 1889 which based on the description has the metasoma extensively red-marked. Warncke (1967: 207) suggested, based on the description, that the female was similar to *A. (Margandrena) marginata* Fabricius, 1776, though noting the male was clearly different since it was described with a black clypeus, and the clypeus of *A. marginata* is white. *Andrena hyalinella* is listed as a synonym of *A. marginata* in Gusenleitner & Schwarz (2002). However, it cannot be synonymous with *A. marginata*, as the type material was collected around Cerignola in southern Italy, a low elevation area (c. 100 m above sea level) where *A. marginata* does not occur, and the species was collected in May, whereas *A. marginata* flies from July to early September. We hypothesise that *A. hyalinella* is more likely to be a junior synonym of *A. croceiventris*, though the Costa collection in Napoli must be revised in order to determine whether this type material remains preserved or has been lost.

**Material examined** (see also Praz et al. (2022) for additional material)

**ITALY:** PIEDMONT: 1♀, S. Benedetto Belbo (CN), 20 May 1989, leg. G. Pagliano (MRSN); 3♀, idem, 637 m, 2 Jun 1980, leg. G. Pagliano (MRSN). LAZIO: 2♀, Sutri env., 19 Jun 1974, leg. Ph. Pronk (RMNH). BASILICATA: 1♀, Rotonda (PZ), 5 Jul 1987, leg. G. Pagliano (MRSN). ABRUZZO: 1♀, Alfedena (AQ), 914 m, vi.1941, leg. L. Ceresa (MSNM). SICILY: 1♀, Taormina, 20 May 1922, leg. Schulthess (DEI); 1♀, Taormina, 3 May 1976, leg. S.J. v. Ooststroom (RMNH).

***Andrena (Taeniandrena) russula* Lepeletier, 1841, *Andrena (Taeniandrena) similis* Smith, 1849, and *Andrena ocreata* (Christ, 1791)**

**Remarks.** Praz et al. (2022) confirmed that *A. russula* and *A. similis* are synonymous, resolving long running taxonomic confusion. *Andrena ocreata* was treated by Warncke as the senior synonym of both taxa, but this interpretation was not followed by the community, and Praz et al. (2022) maintained the position that *A. ocreata* is a *nomen dubium*. Both *A. similis* and *A. ocreata* were listed as present in Italy by Pagliano (1994) based on previous publications. All use of these three names refers to the single taxon *A. russula*.

***Andrena (incertae sedis) numida* Lepeletier, 1841 and *Andrena (incertae sedis) hypopolia* Schmiedeknecht, 1883**

**Remarks.** Wood (2023a) clarified the relationship between these two taxa as distinct based on morphological and genetic data. *Andrena numida* is found in North Africa, Sicily, and southern Italy north to Lazio, whereas *A. hypopolia* is widely distributed across Europe and probably Turkey into northern Italy. Both *A. inconspicua* Morawitz, 1871 (described from Calabria, see Asatafurova et al. 2021) and *A. propinqua* var. *syracusae* Strand, 1921 (described from Sicily) were synonymised with *A. numida*. The exact range limits of *A. hypopolia* and *A. numida* must be clarified through additional revision of material and genetic work. To our knowledge, *A. hypopolia* extends south to Lazio (Rome) and Sardinia, and *A. numida* extends north to sandy habitats around Maccarese based on newly barcoded material. The two species therefore appear to be present more or less in sympatry, but this requires more study to confirm with certainty.

**Material examined** (*Andrena numida*)

**ITALY:** LAZIO: 2♂, 1♀, Maccarese (RM), 14 Jun 2022, leg. M. Selis (MSVI); 1♂, 1♀, Maccarese (RM), 28 Mar 2023, leg. M. Selis (MSVI) (BOLD accession numbers: WPATW996-23 and WPATW997-23). See also Wood (2023a) for additional examined specimens.

**Species confirmed as present in Italy**

***Andrena (Avandrena) avara caligata* Warncke, 1974**

**Remarks.** Listed by Comba (2019) [species 18, as *A. avara* Warncke, 1967] citing Ascher & Pickering (2015) with the comment that the species must be confirmed for Italy. *Andrena avara* is also indicated as present in Sicily based on the distribution maps of Warncke (Gusenleitner & Schwarz 2002). Examination of material from Sicily confirms the presence of *A. avara caligata*, though the collection of fresh specimens would be beneficial to establish its continued presence. *Andrena avara* s. l. represents a species complex (see Wood 2023a) of six species, and based on analysis of DNA barcodes (TJW, unpublished data), *A. avara caligata* will be elevated to species status in the near future (present also in Tunisia and Libya).

**Material examined.**

**ITALY:** SICILY: 1♀, above Trapani, 200 m, 16 Apr 1965, leg. K.M. Guichard (OÖLM); 1♀, Zafferana (CT), 800 m, 25 Apr 1965, leg. K.M. Guichard (OÖLM).

***Andrena (Chlorandrena) rhyssonota* Pérez, 1895**

**Remarks.** *Andrena rhyssonota* was described from Sicily, and so there is no need to confirm it for the Italian fauna. However, it is worthwhile to highlight that it persists on the island of Sicily, as Comba (2019) [species 44] noted that it had not been observed since 1913.



**Material examined.**

**ITALY:** SICILY: 1♀, 35 km N Gela, NE Piazza Armerina, 27–29 May 2002, leg. J. Halada (OÖLM); 1♂, Palermo, Madonie, Nociazzi, Monte S. Salvatore, 1000–1500 m, 24 Apr 2007, leg. R. & W. Zarre (OÖLM); 1♂, Enna, Monte Rossomanno, Erei Mts, 850 m, 30 Apr 2023, leg. G. Altadonna (MSVI).

***Andrena (Cnemidandrena) freygessneri* Alfken, 1904**

**Remarks.** Ebmer (2001) clarified the species status of this taxon as distinct from *A. simillima* Smith, 1851. It has an alpine distribution, and Ebmer listed a single record for Italy, Val Ferret in Piedmont, north-east of Entrèves [today found in the Valle d'Aosta], collected 12–17 Aug 1925. Inspection of additional material confirms the presence of *A. freygessneri* in the provinces of Turin, Bolzano, and Aosta, but also remarkably highlights a population in Abruzzo in the province of L'Aquila. The females from Camporotondo were all collected on *Centaurea cf. jacea*, a scarce and local plant at this locality, an association that seems worth investigation, as in the Alps the species seems to rarely use Asteraceae pollen (Müller 2018).

**Material examined**

**ITALY:** AOSTA VALLEY: 1♀, Champoluc, 20 Jul 1928, leg. L. Micheli (MSNM); 1♀, Epinel, Val de Cogne, 11 Jul 1997, leg. G. Carron (CPC); PIEDMONT: 1♀, Valle de Chisone, 50 km SWW Torino, 1450 m, 8 Aug 2011, leg. J. Halada (OÖLM). TRENTINO-ALTO ADIGE: 1♀, Gomagoi (BZ), ca. 1275 m, 10 Jul 1969, leg. S.J. v. Ooststroom (RMNH). ABRUZZO: 1♀, Rivisondoli, 13 Jul 1943, leg. C.N.R. (MZUR); 2♀, Cappadocia (AQ), Camporotondo, 1450 m, 13 Aug 2020, leg. M. Mei (MZUR); 12♀, idem, 13–19 Aug 2023, leg. M. Mei (MZUR).

***Andrena (Euandrena) allosa* Warncke, 1975**

**Remarks.** This species was recently confirmed as new for Italy (Cornalba et al. 2020), with females reported from Piemonte near Sestriere after its listing by Comba (2019) [species 64] as “presence in Italy to be confirmed”. We report here an additional female specimen from the Valle d'Aosta, expanding the known distribution of this taxon in Italy.

**Material examined**

**ITALY:** AOSTA VALLEY: 1♀, Cogne, Gimillan, 45.6193°N, 7.3675°E, 12 Jun 2021, leg. J. Litman & C. Praz (CPC).

***Andrena (Euandrena) fulvida* Schenck, 1853**

**Remarks.** This predominantly Central and Northern European species was listed by Pagliano (1994) based on Priore (1982) who listed the species from Abruzzi. The specimen reported by Priore was a male from the Grandi collection which was mentioned as aff. *fulvida* by Grandi

(1936: 114). This specimen actually comes from “Ronzano” which is in the outskirts of Bologna, whereas Priore selected Ronzano in Teramo, Abruzzo without justification, perhaps not being familiar with the true collecting locality. We redetermined this specimen as a male of *A. (Melandrena) florentina* Magretti, 1883. In any case, *A. fulvida* is confirmed as part of the Italian fauna based on a specimen from northern Italy.

**Material examined**

**ITALY:** FRIULI-VENEZIA GIULIA: 1♀, Alpi Carniche, Pontebba (UD), 20 May 2005, leg. J. Halada, (OÖLM).

***Andrena (Melandrena) chrysopyga* Schenck, 1853**

**Remarks.** This species has a very mixed history in the European literature due to numerous misidentifications. Its range is probably smaller than reported due to confusion with similar species; in short, *A. chrysopyga* is predominantly a species of steppe or warm grasslands stretching from north-western Europe (marginal occurrence on dry calcareous grasslands) to the true steppe of Central Asia. It is typically found most commonly in such open grasslands, for example historically in Lower Austria and the Pannonian basin more generally.

In Italy, the species was cited by Pagliano (1994), referencing the Veneto region (Giordani Soika 1933), Emilia-Romagna (Grandi 1937), and Sicily (Warncke 1968, recte 1967). The records from north-eastern Italy almost certainly refer to the very similar *A. korleviciana* Friese, 1887 that has a distribution around the Adriatic Sea. The reference of Warncke was to the work of Schmiedeknecht (1884) who described *A. chrysopyga* var. *stefaniana* Schmiedeknecht, 1884 from Sicily. This type material is lost, or at least its location is unclear (Gusenleitner & Schwarz 2002). It is possible that it could be in the RMNH collection (see Wood 2023a), but this must be confirmed. In any case, examination of material from Sicily confirms the presence of this species in Italy, though revision of additional Italian material is required to clarify its exact distribution. The true *A. chrysopyga* appears to be extremely rare in collections.

**Material examined**

**ITALY:** SICILY: 1♀, Sicilia orient. dint. Taormina, Sifone, 5 Jun 1950, leg. Hartig & Grisham (MZUR).

***Andrena (Micrandrena) puella* Alfken, 1938 sp. resurr.**

*Andrena puella* Alfken, 1938: 111, ♀♂ [ZMHB: Italy, paratype female and male examined]

**Remarks.** Alfken (1938) described *A. puella* from close to Tempio [Tempio Pausania] in northern Sardinia. He also reported a stylipised specimen from Sicily which he designated as a paratype, but this can be ignored due to 1) its stylipised status which renders confident determination impossible and 2) its reported large size of 7.5 mm in length which

is clearly too large to be conspecific with *A. puella* which is 5–5.5 mm in length in the male sex. It could be referable to *A. distinguenda* or *A. obsoleta* s. str. In the ZMHB, excluding the specimen from Sicily, only two paratypes remain, a male and female (Fig. 3). The two other specimens (the holotype and one paratype) were placed in the collection of Hedicke (Alfken 1938: 111), but Hedicke's collection appears to be lost, since none of his specimens or type material of other *Andrena* species could be found in the ZMHB collection (TJW). Nevertheless, the remaining paratypes are sufficient to allow for recognition of *A. puella*.

Warncke (1967: 301) mentions *A. puella* as a distinct species, but took no further action. In his distribution maps (see Gusenleitner & Schwarz 2002), he later employed a subspecific categorisation for the taxa around *A. distinguenda*, e.g. *A. d. nitidula* in south-western Europe, *A. d. puella* in Sardinia and Sicily. Gusenleitner & Schwarz (2002) consequently listed *A. puella* as a possible synonym of *A. distinguenda*. Burger & Herrmann (2003) revised members of the *A. distinguenda* group, and whilst they concluded that *A. distinguenda* and *A. nitidula* were distinct, they did not draw firm conclusions as to the identity of *A. puella* due

to low numbers of specimens, though they did inspect the type series in the ZMHB.

Examination of material from Sardinia and Corsica, some of it collected relatively recently, shows that *A. puella* is clearly distinct from *A. distinguenda*. In the female sex, apart from the consistently smaller size (6 mm versus 7–8 mm), *A. puella* can be separated by the comparatively weaker clypeal striations (Figs 4A–B), by the fine and weakly raised longitudinal striations covering the frons, these giving a smooth uniform appearance without any individual striation standing out (Figs 4C–D; in *A. distinguenda* with the frons covered with stronger and coarser raised striations, medially with a thickened longitudinal carina that contrasts the remaining raised striations), by the shorter apical tergal hairbands of T2–4, these short and not greatly exceeding the apex of the marginal areas (Figs 4E–F; in *A. distinguenda* with the apical tergal hairbands long and clearly projecting far beyond the apex of the marginal areas), by the shagreened and almost impunctate tergal discs, basolateral punctures of T2–4 obscure and disappearing into the underlying shagreen (Figs 4E–F; in *A. distinguenda* with the basolateral punctures

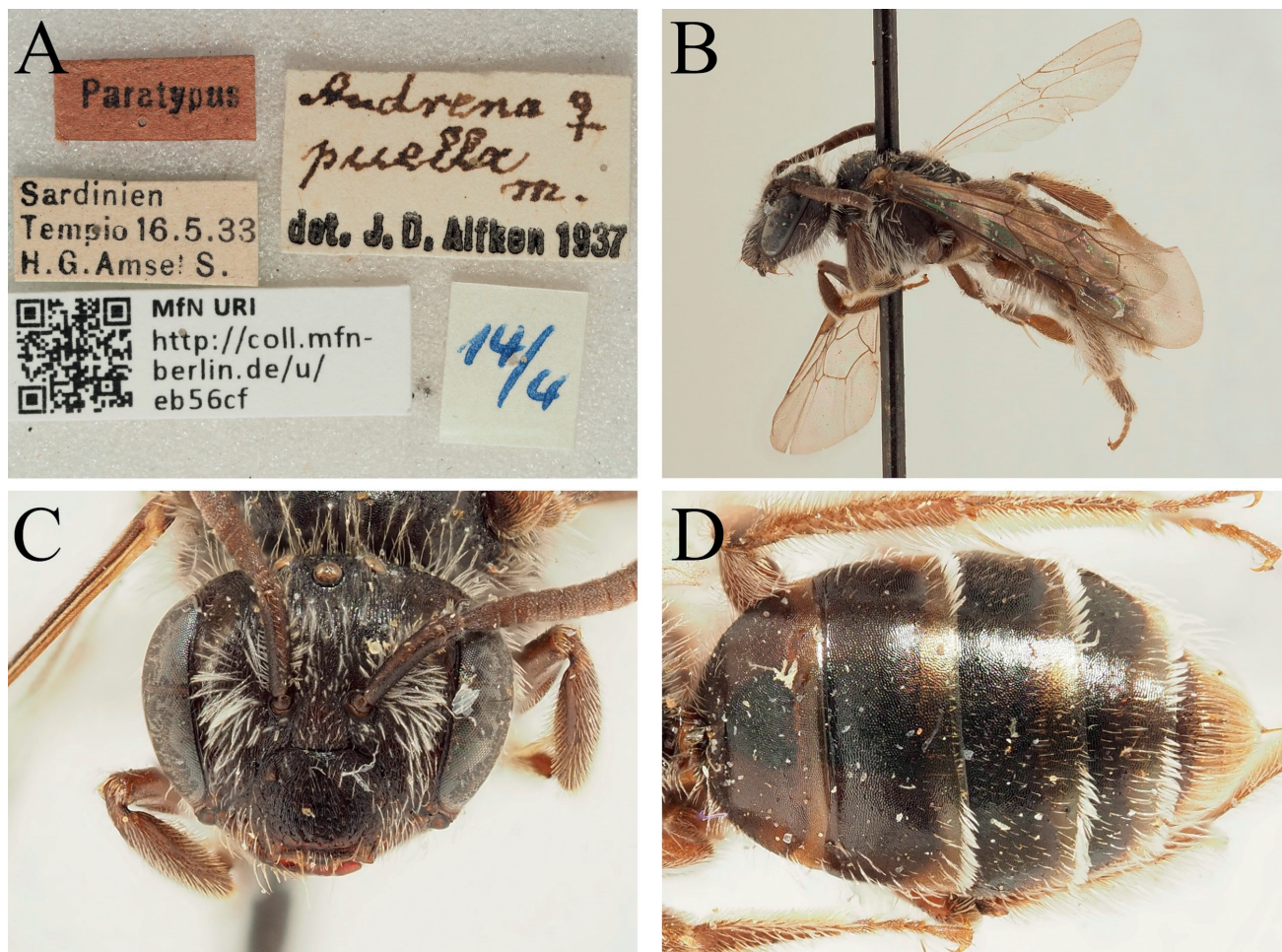


Fig. 3 - *Andrena puella* Alfken, 1938, paratype female. A, label details; B, profile; C, face, frontal view; D, terga, dorsal view.



of T2–4 distinct, clearly visible against the weakly shining underlying sculpture), and by the shorter ocellocapital distance (Fig. 4G–H; 0.5 times the diameter of a lateral ocellus versus 0.9–1 times the diameter of a lateral ocellus). Males can also be recognised by the same characters. We therefore consider *A. puella* to be a valid species, and include it as part of the Italian fauna.

#### Material examined.

**FRANCE:** 1♀, CORSICA, Bonifacio, 17 May 1896, leg. C. Fertion (MNHN); 1♂, CORSICA, Bonifacio, 16 May 1901, leg. C. Fertion (MNHN). **ITALY:** SARDINIA: 1♂, 1♀, Tempio (SS), 12–16 May 1933, leg. H.G. Amsel (ZMHB) (**paratypes**); 4♀, Bosa env. (OR), 20 May 2013, leg. J. Halada (OÖLM/TJWC); 1♀, Sant'Antioco (CI), Maladroxia, 23 May 2013, leg. J. Halada (OÖLM); 1♀, Lanusei env. (NU), 29 Jun 2000, leg. J. Halada (OÖLM); 1♂, NW, 30 km W Sassari, 19 May 2013, leg. J. Halada, (TJWC); 2♀, 5♂, Buggerru, Canyon Gutturu Cardaxius, 19 Apr 2017, leg. J. Litman & C. Praz (CPC).

**Distribution.** France (Corsica) and Italy (Sardinia).

#### *Andrena (Nobandrena) probata* Warncke, 1973

**Remarks.** Comba (2019) listed this species for Italy [species 154], but the precise specimens underpinning this listing are unclear, as the only supporting citations are Kuhlmann et al. (2015) and Oertli et al. (2005), a paper which only reports species from the Swiss canton of Valais. Kuhlmann et al. (2015) do indeed list *A. probata* for Italy. Examination of material in the Pagliano collection located a specimen of *A. probata* that was identified by F. Gusenleitner in 1993. We confirm this identification, and suggest that it is possibly the source of the listing by Kuhlmann et al. (2015). The species has also been mentioned from Valle d'Aosta by E. Scheuchl as a personal communication citation during the 2014 European Red List assessment (visible on the IUCN assessment for *A. probata*). In any case, the presence of *A. probata* in Italy can be positively confirmed based on the specimen from Abruzzo, which was further supported by an additional specimen in a private Belgian collection.

#### Material examined.

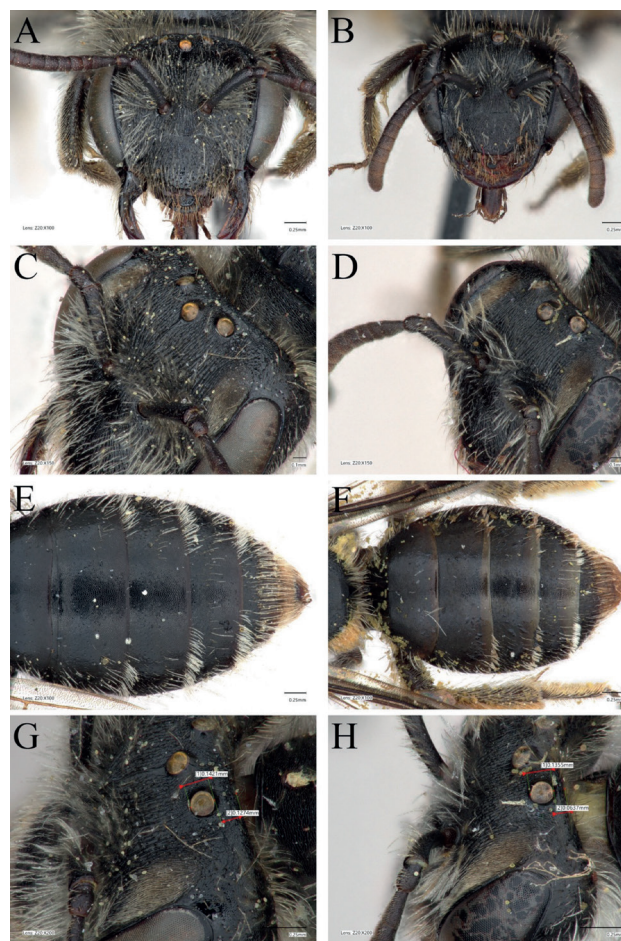
**ITALY:** ABRUZZO: 1♀, Assergi (AQ), 15 Jun 1988, leg. G. Pagliano, det. F. Gusenleitner 1993 (MRSN); 1♀, Montenerodomo (CH), 25 Jul 2005, leg. F. De Waele, (T. De Blank Collection, Belgium).

#### *Andrena (Orandrena) oralis* Morawitz, 1876

*Andrena oralis* Morawitz, 1876: 177, ♀ [ZISP: Uzbekistan, lectotype female examined by photograph]

*Andrena sogdiana* Morawitz, 1876: 177, ♂ [ZISP: Uzbekistan, male lectotype examined by photograph]

*Andrena sisymbrii* Friese, 1887: 24, ♀ [SMFD: Hungary, female lectotype by present designation, illustrated in Fig. 5]



**Fig. 4** - *Andrena distinguenda* Schenck, 1871, female. **A**, face, frontal view; **C**, frons, dorsolateral view; **E**, terga, dorsal view; **G**, vertex, dorso-lateral view; *Andrena puella* Alfken, 1938, female. **B**, face, frontal view; **D**, frons, dorsolateral view; **F**, terga, dorsal view; **H**, vertex, dorsolateral view.

**Remarks.** *Andrena oralis* was listed as present in Italy by Comba (2019) [species 162] based on Nobile & Tomarcho (2002) who reported the species from Sicily, specifically from Mount Etna (12 May 1972) and the Nebrodi mountain range (25 May 1981). *Andrena oralis* had not been previously reported from Italy, with a western limit in the Pannonian Basin and mainland Greece (Gusenleitner & Schwarz 2002). Examination of museum and new material confirms the historical presence of *A. oralis* in Sicily, and also its presence in the province of Lecce, suggesting the possibility of gene flow between southern Italian and Balkan populations of this species.

The type material of *A. oralis* and *A. sogdiana* was recently illustrated by Astafurova et al. (2022), including lectotype designation. Gusenleitner & Schwarz (2002) note that the location of the synonymous *A. sisymbrii* is unclear, listing three possible type depositories; inspection of material at the SMFD produced two syntypes, one of which is here designated as a lectotype (Fig. 5) in order to maintain the synonymy with *A. oralis*.

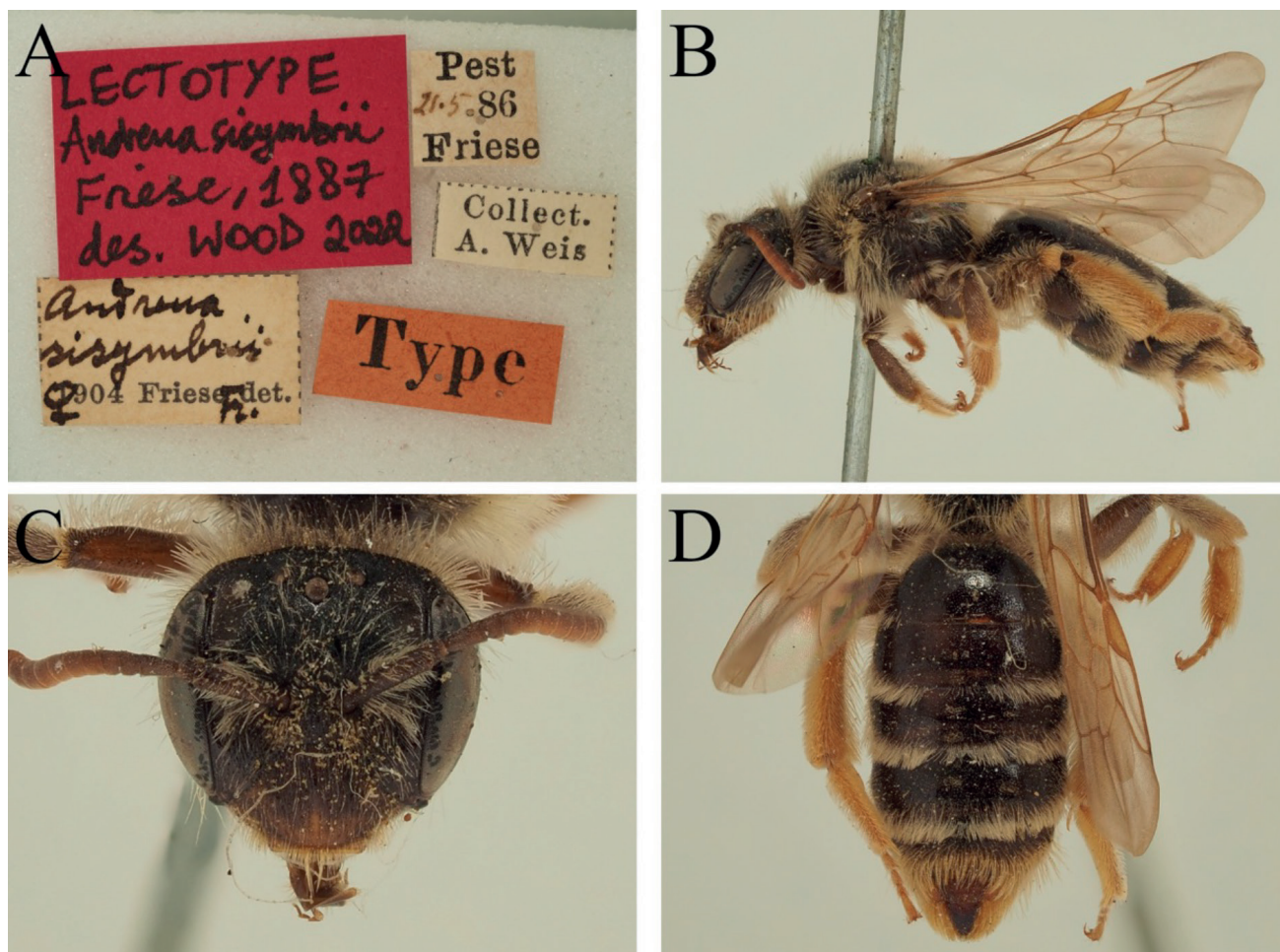


Fig. 5 - *Andrena sisymbrii* Friese, 1887, lectotype female. A, label details; B, profile; C, face, frontal view; D, terga, dorsal view.

#### Material examined.

**HUNGARY:** 1♀, Pest [Budapest], 21 May 1886, leg. H. Friese (SMFD) (lectotype of *A. sisymbrii*); 1♀, idem, 22 May 1886, leg. H. Friese (SMFD) (syntype of *A. sisymbrii*). **ITALY:** PUGLIA: 2♀, 2 km ESE, Villa Convento (LE), 24–29 Apr 2021, leg. M. Bollino (MSVI). SICILY: 1♂, Pedara (CT), Ragala, 800 m, 17 Apr 1949, leg. Hartig (MZUR).

#### *Andrena (Pallandrena) braunsiana* Friese, 1887

*Andrena braunsiana* Friese, 1887: 22, ♀♂ [SMFD: Hungary, male lectotype by current designation, illustrated Fig. 6]

*Andrena oblita* Warncke, 1967: 246, ♀♂ [OÖLM: Italy, holotype female examined] **syn. nov.**

*Andrena braunsiana* ssp. *detorta* Warncke, 1975a: 36, ♀♂ [OÖLM: Turkey, holotype female examined]

**Remarks.** Warncke (1967) described *Andrena oblita* from two females (one holotype female) from southern Italy (Calabria) and two males from Tunisia. In an unpublished work, Grünwaldt (see Wood et al. 2020b) found that the males were conspecific with *A. (Pallandrena) byrsicola* Schmiedeknecht, 1900 which was described

from Tunisia. Indeed, the two males were collected by Schmiedeknecht, but not labelled as *A. byrsicola*. The identity of the female specimens of *A. oblita* from Italy (one of which is the holotype) has remained unclear.

Examination of new material collected from northern Italy revealed the presence of *A. braunsiana*, a species previously thought to have a western limit in the Pannonian Basin and mainland Greece (Gusenleitner & Schwarz 2002). In this light, re-examination of the female material of *A. oblita* confirms its conspecificity with *A. braunsiana*, and it is here synonymised **syn. nov.** with it. Interestingly, the type material of Friese and many of the more recently collected *A. braunsiana* specimens from northern Italy were found on *Linum* (Linaceae; Fig. 6A). No *Andrena* species are currently known that collect meaningful quantities of pollen from *Linum*; this intriguing floral association should be further investigated.

Gusenleitner & Schwarz (2002) list the type depository of *A. braunsiana* as either the SMFD or the ZMHB. Examination of these collections shows that syntypic material is present in both institutions. A male from the SMFD collection is selected as a lectotype, by present designation (Fig. 6).





Fig. 6 - *Andrena braunsiana* Friese, 1887, lectotype male. A, label details; B, profile; C, face, frontal view; D, terga, dorsal view.

#### Material examined.

**AZERBAIJAN:** 1♂, Helenendorf [now Göygöl], 1886 (OÖLM) (paratype of *A. braunsiana detorta*). **BULGARIA:** 1♀, Slančev Brjag [Sunny Beach], 18–30 May 1989, leg. J. Halada, (OÖLM). **GREECE:** 1♂, Kifissia, 250 m, 2 May 1977, leg. K.M. Guichard (OÖLM). **HUNGARY:** 1♂, Pest [Budapest], 12 May 1886, leg. H. Friese, on *Linum* (Linaceae) (SMFD) (lectotype by present designation); 2♂, idem (SMFD); 1♂, idem (ZMHB). **ITALY:** EMILIA-ROMAGNA: 1♀, Bologna, Mezzolara, 1–31 May 2018, leg. Bortolotti (SFCC); 1♂, Bologna, Mezzolara, 1–30 Apr 2020, leg. Bortolotti (SFCC); 4♀, Bologna, Mezzolara, 1–30 Apr 2022, leg. S. Flaminio (SFCC); LAZIO: 1♀, Norchia (VT), 125–160 m, 14 Apr 2022, leg. M. Selis (MSVI); 2♂, Valle dell'Arcionello (VT), 30 Apr–7 May 2021, leg. M. Selis (MSVI). CALABRIA: 2♀, Antonimina (RC), [undated], leg. Paganetti (OÖLM) (holotype and paratype of *A. oblita*). **TURKEY:** 1♀, Ürgüp env., 1400 m, 30 km E Nevşehir, 30 May 2001, leg. K. Deneš, (OÖLM); 1♂, 1♀, Madensehir [Madensehri], 31 May 1972, leg. K.

Warncke (OÖLM) (female holotype and paratype of *A. braunsiana detorta*). **UKRAINE:** 1♀, Crimea, 7 Jun 1964, leg. A.Z. Osytshnjuk (OÖLM).

**Distribution.** Italy, Austria, Hungary, Slovakia, Bulgaria\*, Greece, Ukraine, Russia (European part), Turkey, Georgia, Azerbaijan (Gusenleitner & Schwarz 2002).

#### *Andrena* (incertae sedis) *ranunculorum* Morawitz, 1877

**Remarks.** This species has only been reported from Italy very occasionally: Comba (2019) mentions this species [species 216] from Monte Pollino (Calabria) and from Sicily; in addition, Westrich (2016: 13) mentions females collected in “I, Aostatal, Châtillon” on 31 May 1973 and in “I, Aostatal, Val de Cogne” on 25 Jun 2015. We report here a male from the Valle d’Aosta.

#### Material examined

**ITALY:** AOSTA VALLEY: 1♂, Cogne, Gimillan, 45.6193°N, 7.3675°E, 12 Jun 2021, leg. J. Litman & C. Praz (CPC).

**Distribution.** Spain, France, Italy, Switzerland, Turkey, Crimea, Russia, Armenia, Azerbaijan, Iran, Turkmenistan,

Uzbekistan, Kazakhstan, Tajikistan (Gusenleitner & Schwarz 2002; Wood & Monfared 2022).

### Species that are plausibly present in Italy

#### *Andrena (Aenandrena) hystrix* Schmiedeknecht, 1883

*Andrena hystrix* has a disjunct distribution, found in north-western Africa, Iberia, and France, and then again in Ukraine, Turkey, and the Caucasus (Gusenleitner & Schwarz 2002). Comba (2019) lists *A. hystrix* in Italy [species 4], citing Dylewska (1987), Comba & Comba (2010), Kuhlmann et al. (2015), and personal correspondence from V. Nobile. Dylewska (1987) does mention Italy as part of the distribution of *A. hystrix*, but gives no specimen records, and cites Warncke (1974) who does not give an overall distribution for this species. Comba & Comba (2010) report the species uncertainly (marked with a ‘?’) from the Parco Nazionale del Circeo based on a female from between 1919–1949 placed in the MZUR. All Italian material of this group from Central Italy that we have examined belongs to *A. bisulcata* Morawitz, 1877, and we consider the possibility of *A. hystrix* in central Italy to be unlikely.

However, it is possible that *A. hystrix* is present in north-western Italy in Liguria. The recently designated lectotype of *A. hystrix* comes from Marseille in south-eastern France (see Wood 2023a), and the distribution maps of Warncke et al. (1974) indicate the presence of *A. hystrix* in the Maritime Alps on the Italian border. As for other western taxa (e.g. *Andrena nitidula*; Burger & Herrmann 2003), it is quite likely that *A. hystrix* is or was present in Liguria. Targeted searches may reveal its presence, as was the case for *Dasygaster crassicornis* (Friese, 1896) which was previously thought to have a range limit in south-eastern France (Bonifacino 2021). We therefore include *A. hystrix* on the Italian list as a plausible species.

#### *Andrena (Chlorandrena) leucolippa* Pérez, 1895

**Remarks.** Wood (2023a) clarified the relationship between *A. leucolippa* and *A. boyerella* Dours, 1872, restricting *A. leucolippa* to Europe and *A. boyerella* to North Africa and Sicily. Comba (2019) lists *A. leucolippa* for Italy [species 39], citing Ascher & Pickering (2015) and Kuhlmann et al. (2015), whilst also noting that confirmation for Italy would be appropriate. These listings may simply be the result of taxonomic confusion between *A. boyerella* and *A. leucolippa*, and we have not examined any specimens of *A. leucolippa* s. str. from Italy, but as for *A. hystrix*, we consider it highly plausible that *A. leucolippa* is present in Liguria. Warncke et al. (1974) using the combination *A. boyerella* ssp. *leucolippa* gave distributional points for south-eastern France around Nice. Targeted searches in the extreme western part of Liguria may confirm its presence in Italy, and we retain it on the list as a plausible species.

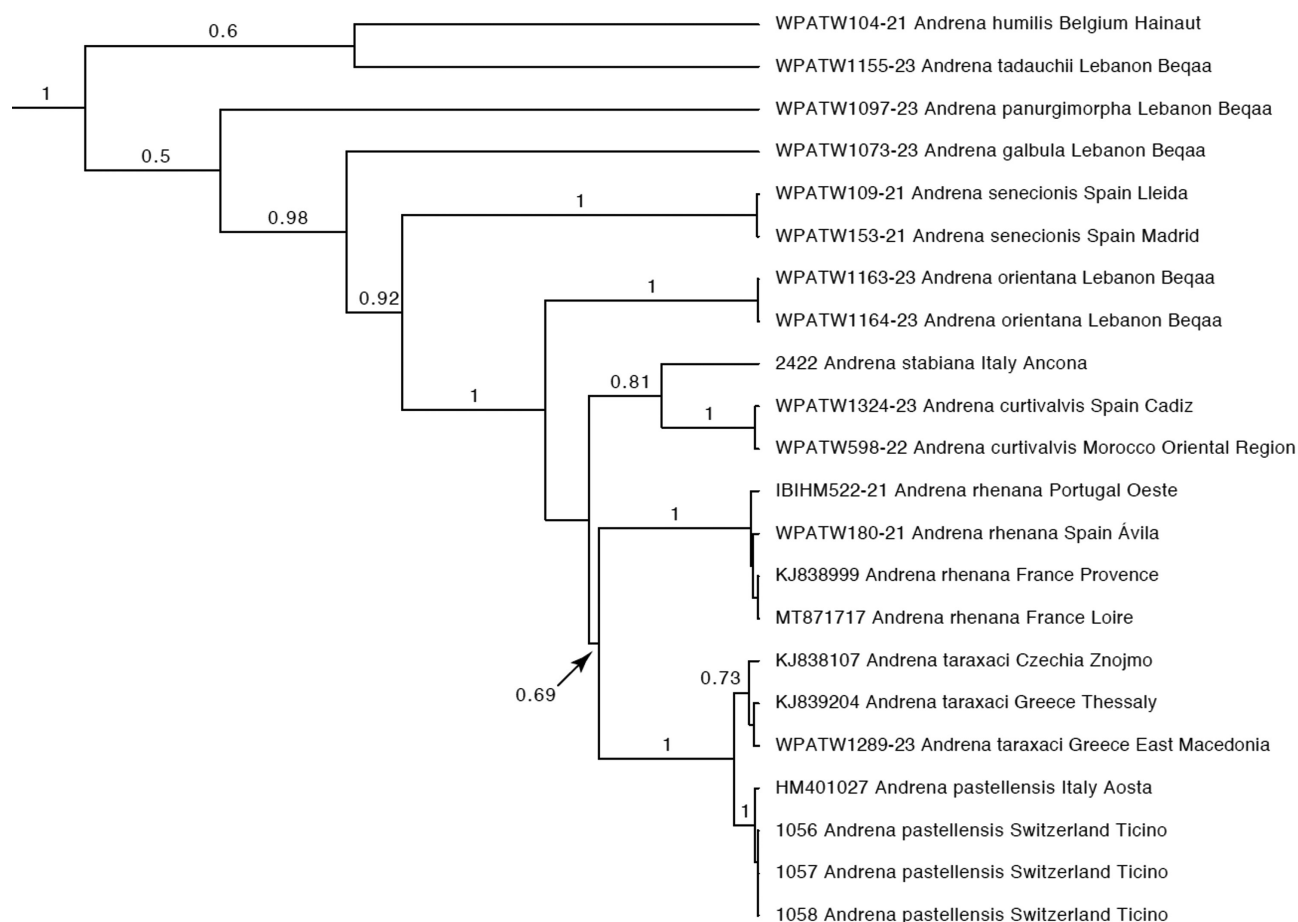
### Outstanding taxonomic problems

#### *Andrena (Chlorandrena) pastellensis* Schwenninger, 2007 and *Andrena (Chlorandrena) taraxaci* Giraud, 1861

Schwenninger (2007) described *A. pastellensis* from Italy (regions of Valle d’Aosta, Veneto, Apulia, and Lombardy) and Switzerland, with a *locus typicus* of Monte Pastello near Verona. Schwenninger diagnosed *A. pastellensis* against *A. taraxaci* initially based on geographic collecting locality, noting that separation of females could not be reliably carried out in all cases (Schwenninger 2007: 642), then giving a determination table to allow differentiation of males based on the degree of tergal shagreenation and punctation, the size and form of the genital capsule, and the shape of S8. He also listed *A. taraxaci* as present in Italy based on a male and female from Trieste collected in 1918 (OÖLM). However, Schwenninger (2015) does not list *A. taraxaci* as present in Italy.

In presenting barcodes for Central European bees, Schmidt et al. (2015) presented a sequence of *A. pastellensis* from Valle d’Aosta and sequences of *A. taraxaci* from Czechia and Greece, and reported low genetic divergence between the two taxa. They noted that additional sequences from other members of the *taraxaci*-group were needed before strong conclusions could be drawn. With an analysis of the Schmidt et al. barcoded data with the addition of new sequences from Greece and Switzerland within the context of the *taraxaci*-group more broadly (Fig. 7), the genetic distance between *A. rhenana* Stöckert, 1930 and *A. taraxaci sensu lato* (that is, including *A. pastellensis*) was 7.35% (range 6.56–8.16%). *Andrena taraxaci* and *A. pastellensis* formed two distinct clades separated by an average distance of 1.98% (range 1.56–2.33%), a value slightly above the maximal distance within *A. taraxaci sensu stricto*, 1.13% (distance between a specimen from Czechia and a specimen from Greece).

In the key of Schwenninger (2015), *A. taraxaci* and *A. pastellensis* males are separated at couplet 14, where the relative length of the genital capsule and S8, and the shape of the apex of the gonostyli are given as criteria to allow for recognition. In the female key, *A. taraxaci* and *A. pastellensis* do not fall together, as they are first separated at couplet 4 based on the colour of the hairs in the facial foveae and on the face more generally (brighter in *A. pastellensis* and darker in *A. taraxaci*); the two taxa then key out separately, *A. pastellensis* at couplet 10 and *A. taraxaci* at couplet 13. This character is however somewhat artificial and difficult to use, and does not capture all variation present, as some individuals from Italy to Switzerland can present some black hairs along the inner margins of the compound eyes, and the colour of the hairs in the foveae vary from light to light brown to darker brown. There are therefore female individuals that are difficult to unambiguously place following the criteria of couplet 4. In direct



**Fig. 7** - Molecular phylogeny of the subgenus *Chlorandrena* Pérez, 1890, with a focus on Italian species. Maximum clade credibility tree found in Bayesian analyses of sequence data of the mitochondrial gene COI; numbers above branches indicate posterior probabilities; values below 0.5 are omitted. Outgroup taxa are not shown.

comparison, the lightest *A. pastellensis* individuals from Italy do present terga that are comparatively more dull, and darker individuals of *A. taraxaci* from Greece do present terga that are comparatively more shiny, but across this west-east gradient, some intermediate individuals can be found, for example in Switzerland.

In this context, we take no taxonomic action here, but we highlight the small genetic divergence between the two taxa. Additional survey work is needed in north-eastern Italy combined with additional genetic sequences from this region and the western Balkans in order to determine if the observed genetic difference is consistent across a wider geographic range. We include both *A. pastellensis* and *A. taraxaci* on the Italian faunal list.

#### Material examined

##### (*Andrena pastellensis*)

**ITALY:** LOMBARDIA: ♂, Fara d'Adda (BG), 19 Apr 1916, leg. L. Micheli (MSNM). FRIULI-VENEZIA GIULIA: 4♀, San Vito al Tagliamento (PN), S. Paolo, Tagliamento river, 11 Apr 2014, leg. M. Snižek (OÖLM/TJWC). EMILIA-ROMAGNA: 1♀, Bologna, Parco di Villa Ghigi, 30 Mar 2017, leg. G. Ghisbain (TJWC); 1♀, Casalecchio di Reno

(BO), 9 Apr 2015, leg. D. Benda (JSCP). LAZIO: 1♀, Cassino (FR), 15 Apr 2015, leg. D. Benda (JSCP); 1♀, Montecchio (RE), Parco Sorgenti Enza, 26 Mar 2021, leg. M. Violi (MSVI); 1♀, Cicolano (RI), Cammino del Santi e del Briganti, 13 Jun 2021 (MSVI). ABRUZZO: 1♀, Rivisondoli (AQ), 1–7 Jun 1943, leg. C.N.R. (MZUR). **SWITZERLAND:** 1♂, 1♀, Canton Tessin, Bellinzona, Monte Ceneri, 3 Apr 2007, leg. H.R. Schwenninger (OÖLM) (**paratypes** of *A. pastellensis*); 1♀, Maggia, Moghegno, 8 Apr 2021, leg. J. Litman & C. Praz (TJWC); 1♀, Maggia, Torn, 8 Apr 2021, leg. J. Litman & C. Praz (TJWC).

##### (*Andrena taraxaci*)

**AUSTRIA:** 1♀, Krems an der Donau, 4 May 2008, leg. M. & Z. Halada (OÖLM); 2♂, 6♀, Niederösterreich, 7 km NE Krems, Gedersdorf, 12 Apr 2009, leg. J. Halada (OÖLM); 9♀, Oberösterreich, Plesching b. Linz, 1 May 1965, leg. H. Hamann (OÖLM); 1♀, Steiermark, Neudorf d. Ilz, 14 Apr 1992, leg. E.R. Reichl (OÖLM). **BULGARIA:** 1♀, Charmanli [Harmanli], 16 May 1979, leg. M. Kocourek (OÖLM); 2♂, 1♀, Kresna, 1–31 May 1967, leg. M. Kocourek (OÖLM); 1♀, Kresna, 12 May 1979, leg.



M. Kocourek (OÖLM); 1♀, Kresna, Javorov, 1–31 May 2010, leg. P. Pacholátka (OÖLM); 1♂, Lulun Geb. [Lyulin Mountain], 21 Apr 1964, leg. D. Marinova (NZMS); 1♂, Plovdiv, Dzhenem Tepe, 200 m, 3–14 Apr 2002, leg. A. Stojanova (NZMS). **CROATIA:** 1♀, Solin, Nad Rupotinom, 302 m, 11 May 2018, leg. O. Polašek (OÖLM). **CZECH REPUBLIC:** 1♂, 1♀, Mor., Vyskov, 15 May 1965, leg. M. Kocourek (NZMS); 1♀, Pouzdrany, 9 Jun 1959, leg. M. Kocourek (OÖLM); 2♂, Pouzdrany, 18 Apr 1977, leg. M. Kocourek (OÖLM); 2♀, Pouzdrany, 6 Jun 1980, leg. M. Kocourek, (OÖLM); 1♂, 1♀, Úhřetice, 8 Apr 1989, leg. J. Odehnal (OÖLM). **GREECE:** 1♀, Eastern Macedonia and Thrace, Drama, Volakas, 1 km SSW of Volakas, 1000 m, 24 May 2023, leg. T.J. Wood (TJWC); 1♀, Peloponnese, Rte. Skala-Neapoli, 15 Apr 1988, leg. H. Teunissen (RMNH); 1♂, Samos, Platanos, ab. 600 m, 23 Apr 1988, leg. J.A.W. Lucas (OÖLM). **NORTH MACEDONIA:** 1♂, 1♀, Polog reg., Sirichino, meadow, 430 m, 2–7 Apr 2021, leg. V. Bureš (JSCP); 1♂, Vardar reg., Pape-liste, orchard, 140 m, 6–11 Apr 2021, leg. V. Bureš (JSCP). **ROMANIA:** 1♀, Nord-Dobrugea, Enisala, 26 Apr 1996, leg. L. Rákossy (OÖLM). **SLOVAKIA:** 1♂, Košice, 1–30 Apr 1953, leg. M. Kocourek, NZMS; 1♀, Štúrovo, 2 Jun 1965, leg. M. Kocourek (NZMS). **UKRAINE:** 1♀, Dzhanikoi distr., Solenoe [Solone Ozero], 3 May 2000, leg. V. Gurko (OÖLM); 4♀, Eupatoria reg., Suvorovo [Suvorov's'ke] vill., 1–30 Apr 2000, leg. V. Gurko (OÖLM); 2♂, 4♀, Krim, Simferopol Umg., 24–27 Apr 2003, leg. S. Iwanow (OÖLM).

***Andrena (Micrandrena) niveata* Friese, 1887 and *Andrena (Micrandrena) niveata* ssp. *haloga* Warncke, 1980**

**Remarks.** *Andrena niveata* is a widespread species across most of Europe. Warncke treated populations in parts of Iberia, southern Italy, and eastern Turkey at a sub-specific level (Gusenleitner & Schwarz 2002). The Iberian subspecies *A. niveata* ssp. *lecana* Warncke, 1975 was recently elevated to specific status (Wood 2023a). *Andrena niveata* ssp. *haloga* was described from Lecce, with paratypes from Manfredonia and Monfalcone (Warncke 1980). The inclusion of material from Monfalcone is interesting, because this town is in the region of Friuli Venezia Giulia in north-eastern Italy, placing it closer to Germany and Hungary which represent the type locality for *A. niveata* (Friese 1887, no additional precision given). Adding to uncertainty is that the location of the type material of *A. niveata* is unclear as it could not be found at either the ZMHB or SMFD, the suggested depositories given by Gusenleitner & Schwarz (2002). Confusingly, Warncke (1980) reported *A. niveata* ssp. *haloga* from Tunisia, but did not list any Tunisian paratypes, and his distribution maps (Gusenleitner & Schwarz 2002) do not show any *A. niveata* s. l. dots for Tunisia. For now, only *A. niveata* is considered at the

specific level, with additional study necessary to understand the status of the subspecies *haloga*, and potentially to designate a neotype for *A. niveata* itself. In total, we have been able to examine only a single specimen of true *A. niveata* from northern Italy.

In addition, we examined male and female specimens of *A. niveata* s. l. (subspecies unclear) from Sardinia; the female agrees morphologically with *A. niveata haloga*, especially in the particularly shagreened scutum with weakly impressed punctures, as observed for example in *A. subopaca* or *A. pusilla*, and the shagreened, nearly impunctate terga, (including the margins, which are slightly impressed), as in *A. pusilla*. These female specimens also lack the conspicuous and dense hairbands on the tergal margins, and thus strongly diverge morphologically from *A. niveata* s. str. In fact, these female specimens are very difficult to separate from *A. pusilla*. The male can be recognized as *A. niveata* s. l. based on the typical genital capsule; as in the female, the terga and scutum are strongly shagreened and nearly impunctate, as in *A. pusilla* but strongly deviating from *A. niveata* s. str. One female was barcoded; the resulting barcode is genetically very close to an unpublished sequence of *A. niveata* from France (similarity 99.37% based on the BOLD identification tool) and to a published sequence from Germany (genetic distance 0.67%). Awaiting additional analyses, the identity of this Sardinian taxon is retained as *A. niveata*.

**Material examined**

(*Andrena niveata* s. str.)

**ITALY:** LOMBARDIA: 1♀, San Colombano al Lambro (MI), 30 May 1929, leg. L. Micheli, (MSNM).

(*Andrena niveata* s. l.)

**ITALY:** SARDINIA: 1♂, 3♀, Buggerru, Canyon Gutturu Cardaxius, 19 Apr 2017, leg. J. Litman & C. Praz (CPC); BOLD accession number HYMAA523-23

***Andrena (Micrandrena) alfenella* Perkins, 1914 and *Andrena (Micrandrena) pillichii* Noskiewicz, 1939**

**Remarks.** *Andrena alfenella* is a widespread West Palaearctic species that shows variation between its spring and summer generation in the strength of the integumental sculpture (weaker in the summer generation). Some authors have separated *A. pillichii* (e.g. Schmid-Egger & Scheuchl 1997), but other authors take a broader position, including *A. pillichii* within *A. alfenella* (Gusenleitner & Schwarz 2002). Pittioni (1948) listed *A. pillichii* from Italy from Torre Zuino in the Veneto region [=Torviscosa, Friuli-Venezia Giulia] from 5 Jul 1913 (NMW). *Andrena pillichii* was then subsequently listed by Pagliano (1994), but not by Comba (2019). It is not currently clear if *A. pillichii* is a valid species, and taxonomic revision is required, including the generation of genetic sequences from Hungary, the *locus typicus*. Until this point, we follow the



conservative position of Gusenleitner & Schwarz (2002) and lump *A. pillichii* within *A. alfkenella*, a species distributed throughout Italy.

***Andrena (Plastandrena) agilissima* (Scopoli, 1770), *Andrena (Plastandrena) agilissima* ssp. *melanopyga* Alfken, 1938 and *Andrena (Plastandrena) agilissima* ssp. *italica* Warncke, 1967**

**Remarks.** The subgenus *Plastandrena* Hedicke, 1933 is taxonomically complex, and care must be taken when dealing with taxa within this grouping. Species can display enormous variation in the female sex, and are often only recognisable with confidence based on the male genital capsule. Moreover, genetic data based on barcoding is often in conflict with morphological results, producing paraphyletic lineages (e.g. Wood 2023a), necessitating the use of more powerful genetic tools. In this context, we take no position here on the status of the subspecies of *A. agilissima* described by Alfken (1938) from Sardinia and Warncke (1967) from central and southern Italy, respectively, retaining a broad *A. agilissima* species concept.

***Andrena (Ulandrena) abbreviata* ssp. *osychniukae* Osytshnjuk, 1977**

**Remarks.** Listed by Comba (2019) [species 225] and by Pagliano (1994) who cites Grandi (1954) [“Lazio”]. This listing has a long history of confusion. The original source is Stöckert who in Pittioni & Schmidt (1943: 38) wrote that *A. leucorhina* Morawitz, 1876 was present in Italy based on specimens collected by Grandi around Rome. Warncke (1973) discusses this issue, and notes that he described this Italian taxon as *A. combaella* Warncke, 1966, before naming material in south-eastern Europe as *A. abbreviata osychniuki* nomen nudum (a debatable point that is not addressed here), a taxon that was subsequently described by Osytshnjuk as *A. abbreviata* ssp. *osychniukae* Osytshnjuk, 1977 (following emendation, see Gusenleitner & Schwarz 2002). This long nomenclatural story will be definitively settled in an upcoming work (Wood, *in prep.*). In the meantime, *A. abbreviata* ssp. *osychniukae* is excluded from the Italian fauna; although we have identified three females from southern Italy provisionally identified as this taxon, females are extremely difficult to separate from *A. combaella*. Until a verified male of *A. abbreviata* ssp. *osychniukae* is found in Italy, it must remain unconfirmed.

#### Material examined.

**ITALY:** PUGLIA: 1♀, Lecce, 28 May 1974, leg. Ph. Pronk (RMNH). SICILY: 2♀, 35 km N Gela, NE Piazza Armerina, 27–29 May 2002, leg. J. Halada (OÖLM).

**Species excluded from the Italian fauna**

***Andrena (Chlorandrena) cinereophila* Warncke, 1965**

**Remarks.** Listed by Comba (2019) [species 35] citing personal correspondence from V. Nobile. There is no evidence for the presence of this species in Italy, which is restricted in Europe to the southern Balkans (Gusenleitner & Schwarz 2002).

***Andrena (Chrysandrena) maculipes* Morawitz, 1876**

**Remarks.** Listed by Comba (2019) [species 50] citing Zangheri (1969). *Andrena maculipes* was described from Uzbekistan and is restricted to Central Asia (Astafurova et al. 2022). It may eventually be found to be synonymous with *A. hesperia* Smith, 1853 which was described from Italy, but the name *A. maculipes* cannot be applied to the Italian fauna.

***Andrena (Cnemidandrena) simillima* Smith, 1851**

**Remarks.** Listed by Comba (2019) [species 55] citing Comba & Comba (2001), Hellrigl (2006), and Kuhlmann et al. (2015). Given the relatively recent separation of *A. freygessneri* from *A. simillima* (Ebmer 2001), it is likely that all of these records refer to *A. freygessneri*. All examined Italian material in this former species complex belongs to *A. freygessneri* (see above). True *A. simillima* is extremely rare in Central Europe (Ockermüller et al. 2021), and its presence should be positively confirmed in Italy based on verified specimens in the light of the separation of *A. freygessneri*.

***Andrena (Cnemidandrena) tridentata* (Kirby, 1802)**

**Remarks.** Listed by Comba (2019) [species 56] citing Dylewska (1987), noting that the presence of this species in Italy should be confirmed. True *A. tridentata* is an exceptionally rare species known confidently from only the United Kingdom, Switzerland, and European Russia (Gusenleitner & Schwarz 2002; Amiet et al. 2010). Dylewska (1987) reports a female from “N-Italien” in the ZMHB from Roveredo. However, this almost certainly refers to Roveredo in Graubünden in Switzerland, from which canton Nadig collected the only known Swiss specimens of *A. tridentata*. Indeed, searches in the ZMHB collection revealed this specimen, which was indeed collected by Nadig from Switzerland (Fig. 8).

Dylewska also reports 11 female *A. tridentata* from the NMW collection. Examination of this collection produced seven female *A. tridentata* from “Velden” in the collection of the Swiss naturalist Eduard Heinrich Graeffe (1833–1916). Given that Graeffe lived in Trieste between 1875–1898 and collected in this area, it would seem logical that Velden refers to Velden am Wörthersee in Carinthia, some 100 km north of Trieste. In the 2014 European Red List assessment, Erwin Scheuchl noted that the provenance of these specimens was unclear, and

that specimens could potentially have come from Velden in the Netherlands. Given what is known about the life of Graeffe, and the presence of *A. tridentata* in south-eastern Switzerland, it seems most likely that these specimens come from Velden am Wörthersee. We therefore consider *A. tridentata* to have been present in southern Austria historically.

Finally, in the NMW collection there was also a single male [no locality given] determined by Dylewska as *A. tridentata*, but this was *A. nigriceps* (Kirby, 1802). In this context, there are no verified specimens of *A. tridentata* known from Italy, and although it was likely present in the north close to the borders with Switzerland and Austria, this cannot be positively demonstrated, and the species is now extinct from Europe. The historical presence or not of this species is therefore unverifiable, and it is not included on the Italian list.

#### Material examined.

**AUSTRIA:** 7♀, Velden [Velden am Wörthersee], [28/6, no year], coll. Graeffe (NMW). **RUSSIA:** 1♀, БАССП [Bashkiria/Bashkortostan], Иглино [Igino], 12 Aug 1954, leg. Nikoforuk (OÖLM). **SWITZERLAND:** 1♀, Rovere-

do, 23 Jul 1927, leg. Ad. Nadig (ZMHB). **UNITED KINGDOM:** 1♀, Livermere [Great Livermere], West Suffolk, 2 Aug 1912; leg. C.G. Nurse (OÖLM); 1♀, Tuddenham, W. Suffolk, 12 Aug 1909, leg. C.G. Nurse (OÖLM).

#### *Andrena (Cryptandrena) diomedea* Warncke, 1975

**Remarks.** Listed by Comba (2019) [species 58] citing Warncke (1975c; 1980) and Kuhlmann et al. (2015). All these publications use the combination *A. rotundata* ssp. *diomedea*, a species that Comba (2019) lists as species 59. Currently there is no suitable evidence to justify the elevation to species status of *A. diomedea*; genetic data is needed to first clarify the relationship of *A. rotundata* Pérez, 1895 to *A. brumanensis* Friese, 1899, particularly on Sicily where *A. rotundata* appears to exclude *A. brumanensis* (Wood, unpublished data), before the status of the taxon *diomedea* can be clarified.

#### *Andrena (Euandrena) angustior* (Kirby, 1802)

**Remarks.** Listed by Comba (2019) [species 186] citing Grandi (1937) and Pagliano (1994). These references deal with an



Fig. 8 - *Andrena tridentata* (Kirby, 1802), female. A, label details; B, profile; C, face, frontal view; D, terga, dorsal view.



older broad concept of *A. angustior* which is not found in Central Europe, this species instead favouring Atlantic areas in Western Europe (Wood et al. 2021). The member of this group present in Italy is *A. fulvata* (Wood et al. 2021).

#### *Andrena (Graecandrena) graecella* Warncke, 1965

**Remarks.** Listed by Comba (2019) [species 79] citing Warncke (1967). However, this is because Warncke's creation of the name *A. graecella* was based on the female material of *A. strymonia* Pittioni, 1950. *Andrena strymonia* was described with a male holotype, and the male is conspecific with *A. (Acandrena) aciculata* Morawitz, 1886. Warncke (1965) recognised that the female belonged to a different species, and described it as *A. graecella*. He then used this name to apply to a species found in southern and south-eastern Europe. He then realised (Warncke 1973) that Pittioni's material was actually distinct from the widespread southern species, and so he described this latter species as *A. (Graecandrena) hyemala* Warncke, 1973. Therefore, references by Warncke to *A. graecella* published between 1965 and 1973 actually refer to *A. hyemala*, which is the species present in Italy, and which is additionally listed by Comba (2019) as species 80.

**Material examined** (*Andrena hyemala*)

**ITALY:** PIEMONTE: 1♀, Monferrato, Ovada (AL), 1–30 Jun 1939, leg. Borra (MZUR).

#### *Andrena (Holandrena) fimbriata* Brullé, 1832

**Remarks.** Listed by Comba (2019) [species 85] citing De Stefani (1886), Grandi (1931; 1954), Giordani Soika (1944), Comba & Comba (1991), and Pagliano (1994). This listing is incorrect, because *A. fimbriata* is restricted to the southern Balkans only (Schönitzer et al. 1995; Gusenleitner & Schwarz 2002). This listing occurs because *A. fimbriata* was used historically in a *sensu auctorum* by previous authors (see discussion by Schönitzer et al. 1995), and so these records can be discarded as belonging to one or more different *Holandrena* species, but not the true *A. fimbriata*.

#### *Andrena (incertae sedis) iohannescaroli* Nobile, 2000

**Remarks.** Listed by Comba (2019) [species 165] citing Nobile (2000) who described the species from Sicily. However, Ghisbain et al. (2023) demonstrated that this name is invalid as it was described after 2000 without specifying a type depository. Additionally, the identity of the specimen described as *A. iohannescaroli* is unclear, as it was originally described as *Parandrena iohannescaroli* due to the reported two-submarginal cells in the forewing. However, the situation is confused; the subgenus *Parandrena* Robertson, 1897 was described from North America, and North American members of

the subgenus do have two submarginal cells in the forewing. However, West Palaearctic species placed in this subgenus by Warncke have three submarginal cells, and based on genetic evidence do not fall into this subgenus (Pisanty et al. 2022), being better placed in the subgenus *Leucandrena* Hedicke, 1933. Nobile (2000) diagnosed *A. iohannescaroli* against *A. tunetana* Schmiedeknecht, 1900 and *A. larisana* Warncke, 1965, arguing that they were similar since they both also display two submarginal cells. However, Nobile (2000: 38) reports that no material of these two species was available to him for study, and this is indeed the case since both species actually present three submarginal cells. As a result, it is not clear what *A. iohannescaroli* is being diagnosed against, and the description nor any of the illustrations allow recognition. It may be the case that the specimen is aberrant, since sometimes bees have weak wing venation and some typically three-celled species can present two submarginal cells. Study of the type specimen is required before further conclusions can be drawn.

#### *Andrena (incertae sedis) italiana* Pittioni, 1950

**Remarks.** Listed by Comba (2019) [species 232], citing Pagliano (1994) but also specifically mentioning that this is a *nomen nudum* since it appears without a description. This is correct, and consequently *A. italiana* cannot be listed as a valid species. It is not possible to comment on the possible identity of this taxon, since the publication "Pittioni 1950" is unclear, and no reference to *A. italiana* can be found.

#### *Andrena (incertae sedis) seminuda* Friese, 1896

**Remarks.** Listed by Comba (2019) [species 177], citing Comba & Comba (1991) who mention the species from Lazio. We consider the occurrence of *A. seminuda* in Lazio extremely unlikely, as this species ranges from the Pannonian Basin eastwards to the Balkans and Turkey, with a western range limit in eastern Austria (Gusenleitner & Schwarz 2002). We therefore do not include *A. seminuda* within the Italian fauna. The material reported by Comba & Comba (1991) is not currently available to us for study.

#### *Andrena (incertae sedis) simonferugella* Noskiewicz, 1939

**Remarks.** Listed by Comba (2019) [species 233], citing Pagliano (1994). This is clearly a mis-spelling of *A. simon-tornyella* Noskiewicz, 1939, and is not a valid species.

#### *Andrena (incertae sedis) urdula* Warncke, 1965

**Remarks.** Listed by Comba (2019) [species 161], citing Ascher & Pickering (2015), and noting that the presence

of this species in Italy should be confirmed. This listing results from a map error, as Gusenleitner & Schwarz (2002) accidentally switched the maps for *A. urdula* and *A. (Notandrena) ungeri* Mavromoustakis, 1952. *Andrena urdula* occurs only in Spain, Morocco, and Greece (Wood 2023a), whereas *A. ungeri* occurs in Friuli-Venezia Giulia in north-eastern Italy (Pagliano 1994; Gusenleitner & Schwarz 2002).

***Andrena (Leimelissa) fallax* Eversmann, 1852**

= *Andrena (Leimelissa) ispida* Warncke, 1965

**Remarks.** Listed by Comba (2019) [as *A. ispida*, species 101], citing Kuhlmann et al. (2015). The species is also listed for Italy by Dylewska (1987), but we have seen no material of *A. fallax* from Italy, and it is not indicated as present by Warncke (Gusenleitner & Schwarz 2002). We therefore do not include *A. fallax* within the Italian fauna.

***Andrena (Melanapis) rutila* Spinola, 1838**

**Remarks.** Listed by Comba (2019) [species 117], citing Warncke (1967) and Pagliano (2017), though Warncke (1967) explicitly lists it as a synonym of *A. fuscata* Erichson, 1835. There is currently no evidence to support elevating *A. rutila* to species status (Gusenleitner & Schwarz 2002; Wood 2023a); such an elevation would require dedicated genetic analysis, and the position is maintained that *A. rutila* is a variably red-marked form of *A. fuscata* that is more commonly encountered in areas with a hot microclimate.

***Andrena (Melandrena) gallica* Schmiedeknecht, 1883**

**Remarks.** Listed by Comba (2019) [species 123], citing Bischoff (1922), Priore (1982), and Kuhlmann et al. (2015). Wood & Monfared (2022) synonymised *A. gallica* (including *A. gallica* ssp. *alpicola* Bischoff, 1922 that was described from northern Italy) with *A. assimilis* Radoszkowski, 1876, a species that Comba (2019) lists as species 119.

***Andrena (Micrandrena) curtula* Pérez, 1903**

**Remarks.** Listed by Comba (2019) [species 132], citing Hellrigl (2006). As noted above, *A. curtula* is a strict synonym of *A. spreta*. The record of *A. curtula* by Hellrigl (2006) from South Tyrol is unclear, and whilst it could potentially refer to *A. spreta*, it may instead refer to the recently resurrected *A. pauxilla* Stöckert, 1935. This requires further investigation.

***Andrena (Micrandrena) djelfensis* Pérez, 1895**

**Remarks.** Listed by Comba (2019) [species 75], citing Comba & Comba (1991) and Kuhlmann et al. (2015). *An-*

*drena djelfensis* is restricted to Spain, Portugal, south-western France, and north-western Africa. Confusion arises because of the work of Warncke who initially reported *A. tomora* Warncke, 1975 as *A. djelfensis* because the females of these two species are extremely similar. The male genital capsules are however very different, as Warncke later realised (Warncke 1975a). However, this mistake persists in his distribution maps (Gusenleitner & Schwarz 2002), with points from Italy, the Balkans, and western Turkey which are referable to *A. tomora*. We have examined no specimens of the true *A. djelfensis* from Italy, and so do not consider it to be present. The sole Italian dot on the map of Gusenleitner & Schwarz (2002) occurs over Lazio, where *A. tomora* can be found.

**Material examined (*Andrena tomora*)**

**ITALY:** LAZIO: 3♂, 1♀, Albano (Roma), 5 May 1984, leg. G.G.M. Schulten (RMNH); 1♀, idem, 16 Jun 1984 (RMNH). CAMPANIA: 1♀, N of Napoli, Capalbio env. [precise locality not found], 4 Jun 2018, leg. J. Halada (OÖLM). CALABRIA: 1♂, Serra San Bruno, 22 Apr 2022, leg. S. Flaminio (SFCC).

***Andrena (Micrandrena) nanaeformis* Noskiewicz, 1925**

**Remarks.** Listed by Comba (2019) [species 139], citing Comba & Comba (2001) who recorded it from the Italian Alps. This is ecologically implausible, as *A. nanaeformis* is a species of grassy Eurasian steppe, found from central Germany (extinct) to Kazakhstan (Gusenleitner & Schwarz 2002; Westrich et al. 2011). We have examined no material of *A. nanaeformis* from the mountains of Central Europe. Although the alpine valleys of northern Italy and southern Switzerland can host (at least historically) certain steppe species such as *A. incisa* Eversmann, 1852, these are typically species of dry steppe (e.g. present also in Iberia or Turkey) which do not fit the distributional pattern of *A. nanaeformis*, and the species is excluded from the Italian list until it can be positively confirmed through specimens or genetic data. The material reported by Comba & Comba (2001) is not currently available to us for study.

***Andrena (Nobandrena) nobilis* Morawitz, 1873**

**Remarks.** Listed by Comba (2019) [species 153], citing Grandi (1937) who listed the species from Sardinia. This clearly refers to *A. (Nobandrena) compta* which is well-known from Sardinia, while *A. nobilis* is a species that ranges from the Czechia through Eastern Europe to the Balkans, Turkey, and the Caucasus (Gusenleitner & Schwarz 2002). Its presence in Sardinia is extremely unlikely given the highly probable explanation of a mistaken identity with a morphologically similar species.

***Andrena (Notandrena) schlettereri* Friese, 1896**



**Remarks.** Listed by Comba (2019) [species 30] as requiring confirmation for the Italian fauna, citing Pagliano (1994) who mentioned the species from Friuli-Venezia Giulia, without supporting specimen data. Zandigiacomo et al. (2013) also list *A. schlettereri* as present in this region, citing the distribution maps of Gusenleitner & Schwarz (2002) and arguing that they indicate the presence of *A. schlettereri* in Friuli-Venezia Giulia. These maps are too imprecise to determine marginal occurrences for national totals unless points are clearly present within a territory. This marginal occurrence derives from the fact that *A. schlettereri* was described from Pola [=Pula] in Istria (Fries 1896), now in north-western Croatia, very close to the contemporary Italian border, and historically part of the Kingdom of Italy until 1947 as part of Venezia Giulia.

Examination of syntypic material in the SMFD collection shows that Fries mis-associated the sexes of his new species, as whilst the male conforms to the concept of *A. schlettereri*, the female is actually a specimen of *A. bisulcata*. Gusenleitner & Schwarz (2002) list the Deutsches Entomologisches Institut Eberswalde (Germany) as the type depository for *A. schlettereri*, but this species is not listed in the type catalogue of this institute (Taeger et al. 2005), and could not be found during a recent visit (TJW). Fries (1896) mentioned that he had seen six specimens, so the location of the other four specimens is not precisely known. Examination of the ZMHB collection produced one male and two female specimens of *A. schlettereri* collected by Schletterer from Pola and determined by Fries. Both males and females conform to the current concept of *A. schlettereri*, showing that the incorrect sex additional of the SMFD specimens was a simple lapse by Fries. However, the ZMHB specimens are undated, although they likely do represent syntypes. Finally, there is a single female *A. schlettereri* from Pola collected by Schletterer in the NMW collection, but it is undated and determined by W. Grünwaldt. It may be the final syntype. In order to preserve the concept of *A. schlettereri* in line with its historical and contemporary use (e.g. Ockermüller et al. 2023), the dated male specimen from the SMFD is designated as a lectotype. In conclusion, Ockermüller et al. (2023) consider Pola in Croatia to be the western limit of *A. schlettereri*, and this is the position followed here, with *A. schlettereri* provisionally removed from the Italian fauna in the context of its contemporary political boundaries. Given the biogeographical similarity and short distance between Trieste and north-western Croatia, *A. schlettereri* may well be present around Trieste, and may be added to the Italian fauna in the future with additional sampling effort. However, we note that we have not examined any recently collected material of this species from Croatia, and its contemporary status within this country must also be established.

## Material examined

(*Andrena schlettereri*)

**CROATIA:** 1♂, Pola [Pula, Istria], 1–7 Apr 1894, leg. Schletterer (SMFD) (lectotype, by present designation); 1♂, 2♀, Pola [Pula, Istria], [undated], leg. Schletterer (ZMHB) (syntypes); 1♀, Pola [Pula, Istria], [undated], leg. Schletterer (NMW) (likely syntype).

(*Andrena bisulcata*)

**CROATIA:** 1♀, Pola [Pula, Istria], 1–7 Apr 1894, leg. Schletterer (SMFD) (syntype of *A. schlettereri*).

## *Andrena (Parandrenella) bicarinata* Morawitz, 1876

**Remarks.** Listed by Comba (2019) [species 167], citing Giordani Soika (1933) and Grandi (1954) who mentioned the species from the Veneto region and Emilia-Romagna, respectively. Comba (2019) notes that the presence of this species in Italy is dubious. *Andrena bicarinata* is a junior synonym of *A. (Parandrenella) tuberculiventris* Morawitz, 1876 (see Astafurova et al. 2022) and is restricted to Central Asia. These previous authors may have been referring to *A. (Parandrenella) atrata* Fries, 1887 which comes as far west as Istria in Croatia, but which has not been confidently recorded from Italy. In any case, *A. tuberculiventris* is clearly not present in Italy, and hence *A. bicarinata* is excluded from the fauna.

## *Andrena (Simandrena) palumba* Warncke, 1974

**Remarks.** Listed by Comba (2019) [species 195], citing Ascher & Pickering (2015) and Kuhlmann et al. (2015). As noted above, *A. palumba* was synonymised with *A. rhypara* by Wood (2023b).

## *Andrena (Taeniandrena) ocreata* (Christ, 1791)

**Remarks.** Listed by Comba (2019) [species 209]. As noted above, *A. ocreata* is a *nomen dubium* (Praz et al. 2022).

## *Andrena (Ulandrena) leucorhina* Morawitz, 1876

**Remarks.** Listed by Comba (2019) [species 174], citing Grandi (1954), noting that confirmation for Italy would be appropriate. *Andrena leucorhina* was described from southern Kazakhstan and is restricted to Central Asia (see discussion in Gusenleitner & Schwarz 2002). As mentioned above, the material collected by Grandi is referable to *A. combaella*; true *A. leucorhina* is not found in Europe.

## New species descriptions

*Andrena (Euandrena) sesmae* Wood, Cornalba & Praz, sp. nov.

**HOLOTYPE: ITALY:** UMBRIA: 1♀, Attigliano (TR), Fiume Tevere, 50 m, 42.509°N, 12.279°E, 17 Mar 2023 [type locality between the two provinces of Terni (Umbria) and Viterbo (Lazio) on the bed of the river Tiber], leg. M. Selis (OÖLM) (BOLD accession number WPATW998-23).

**PARATYPES: ITALY:** LOMBARDY: 6♀, Milano, Niguarda, 19 Mar 1922, leg. L. Micheli (MSNM); 3♀, Milano, 29–30 Mar 1922, leg. L. Micheli (MSNM); 2♀, Monza, 12 Mar 1922, leg. L. Micheli (MSNM); 4♀, Cecima (PV), 440–690 m, 2 Jun 2018, leg. M. Cornalba (CPC/MCC); 1♀, ibidem, 18 Mar 2019, leg. M. Cornalba (MCC); 1♀, ibidem, 9 Jun 2019, leg. M. Cornalba (MCC); 1♀, ibidem, 30 May 2020, leg. M. Cornalba (MCC); 2♀, ibidem, 6 Jun 2023, leg. M. Cornalba (MCC); 1♀, ibidem, 17 Jun 2023, leg. M. Cornalba (MCC); EMILIA-ROMAGNA: 1♀, Bologna, Ronzano, 16 Jun 1935, leg. G. Grandi, IEUB. UMBRIA: 4♂, Castel Viscardo, 10 km NW of Orvieto, 30 May–7 Jun 1991, leg. J. Gusenleitner, (OÖLM). LAZIO/UMBRIA: 1♀, Lazio (VT)/Umbria (TR), Tevere, Bomarzo/Atigliano, 50 m, 17 Mar 2023, leg. M. Selis (TJWC); 1♂ 1♀, ibidem, 15 Feb 2023, (MSVI). LAZIO: 1♂, Norchia (VT), 125–160 m, 5 Mar 2021, leg. M. Selis (TJWC); 1♂, ibidem, 19 May 2022 (OÖLM); 1♂, ibidem, 10 Mar 2022 (TJWC); 1♂, ibidem, 26 Feb 2021 (TJWC); 3♀, ibidem, 28 Feb 2021 (MSVI/TJWC); 1♂, ibidem, 5 Mar 2021 (MSVI); 1♂, ibidem, 25 Mar 2021 (MSVI); 1♀, Maccarese (RM), 30–65 m, 4 Mar 2020, leg. M. Selis (MSVI).

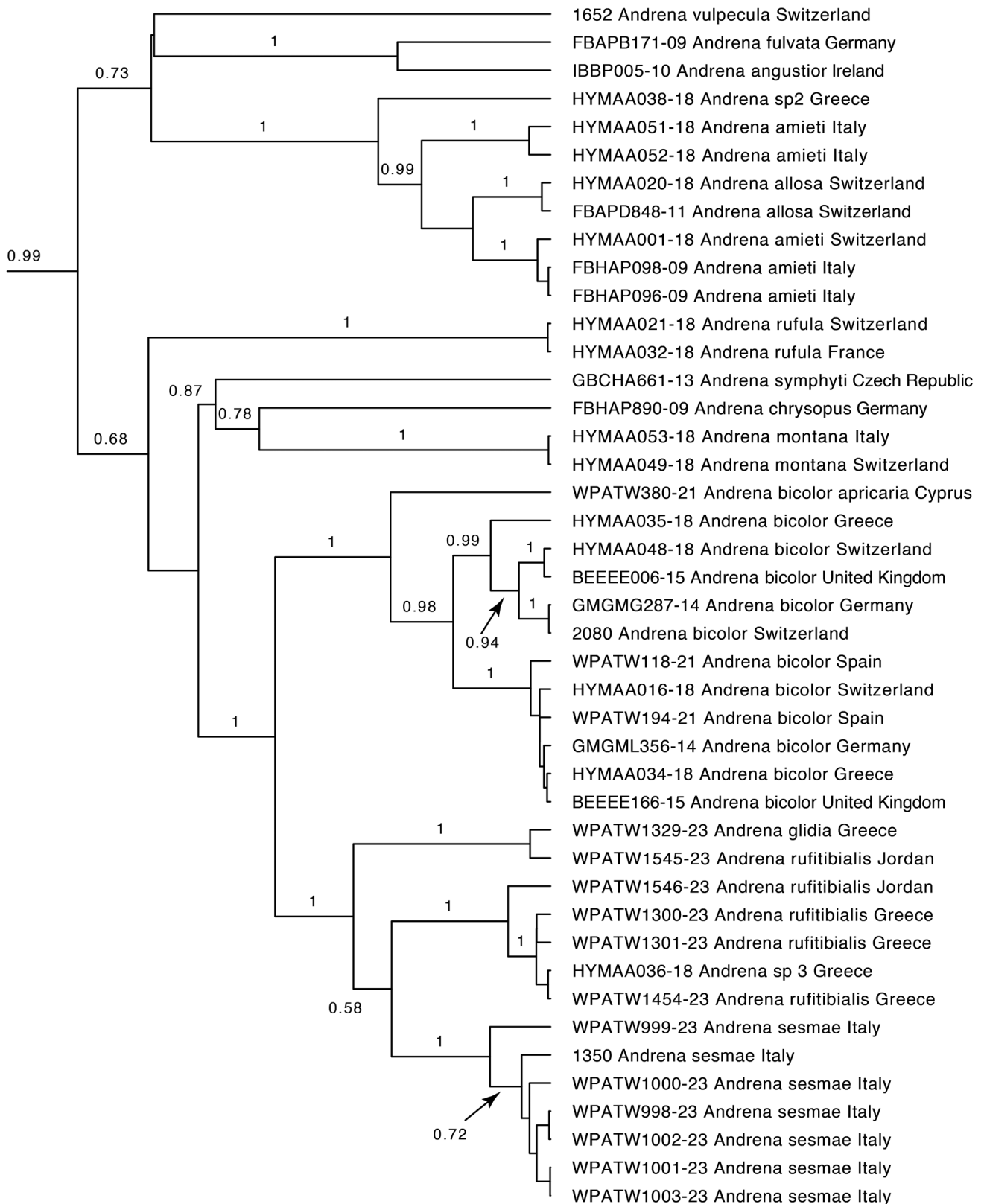
**Diagnosis.** *Andrena sesmae* sp. nov. can be placed in the subgenus *Euandrena* due to the narrow facial foveae, occupying slightly less than one third of the space between the compound eye and a lateral ocellus, the foveae narrowing further ventrally, pronotum without humeral angle, A3 long (clearly exceeding A4+5), and the predominantly simple hairs of the tibial scopae (hairs not strongly plumose as in the subgenus *Chrysandrena* Hedicke, 1933).

Diagnosis to species level is challenging due to the high degree of taxonomic complexity within the subgenus *Euandrena* (Praz et al. 2019; Wood 2023a; b). Genetic analyses suggest that *A. sesmae* sp. nov. is clearly distinct from *A. bicolor* Fabricius, 1775 s. l. (that is, the two clades found within *A. bicolor* and discussed in Schmidt et al. 2015, Praz et al. 2019, Gueuning et al. 2020), including *Andrena bicolor apricaria* Warncke, 1975, of unclear status. Genetic distance between *A. sesmae* and *A. bicolor* were on average 6.23% (range 5.09–7.74%). *Andrena sesmae* was part of a well-supported clade (Fig. 9) containing three monophyletic lineages: one lineage including all Italian specimens, attributed to *A. sesmae*, and two lineage each containing sequences from Greece and Jordan. One of these lineages was previously referred to as *Euandrena* sp. 3 (Praz et al. 2019), and can provisionally be referred to as *A. rufitibialis* Friese, 1899. The second lineage can be tentatively referred to as *A. glidia* Warncke, 1965. Although not included here, both clades are present in Israel

(G. Pisanty, pers. comm., unpublished data), indicating that these two mitochondrial lineages are widespread in the East Mediterranean. The average genetic distance between these two lineages was 5.47% (4.92–6.28%). These two lineages are morphologically variable and future research is needed to determine whether they represent two distinct species, and how to consistently recognise them morphologically. As in the case of *A. bicolor*, they are both referred to as *A. rufitibialis* s. l. for now. The genetic difference between these two lineages and *A. sesmae* was 4.05% (3.04–5.64%), but *A. sesmae* is morphologically distinct from both lineages and is therefore recognized as a distinct species. Genetic distances within *A. sesmae* were on average 0.32% (0.00–1.40%). Diagnosis is therefore made to these lineages, as well as to *A. bicolor*, to which *A. sesmae* is not immediately related.

Recognition of *A. sesmae* sp. nov. requires the use of a combination of characters, and also the recognition that pubescence colour is highly variable, and no individual pubescence character can be used in isolation. In the female sex, *A. sesmae* should be recognised by the facial pubescence which is often extensively pale with black hairs restricted to the inner margins of the compound eye (Fig. 10A), or the clypeus (Fig. 10C). This contrasts *A. bicolor* which typically displays abundant black hairs on the face, either entirely black or usually with some sparse pale hairs also present around the antennal insertions or on the frons. Some *A. sesmae* converge on this colour pattern, with very dark individuals showing only scattered ginger hairs around the antennal insertions (Figs 10E, G). The same pattern is seen for the pubescence of the mesepisternum, which can be extensively pale (Figs 10B, D), but can also display many black hairs (Figs 10F, H), and hence approaches the condition of *A. bicolor* which usually displays abundant black hairs on the mesepisternum. In addition, *A. sesmae* (and *A. rufitibialis* s. l.) have a fringe of light grey hairs along the margin of T2–T4; in *A. bicolor* s. l., the same fringe of hairs is less dense, and usually darker, typically yellowish brown in fresh specimens. The scutum of *A. sesmae* also has numerous, short dark hairs beneath the longer light hairs, a condition rarely observed in *A. bicolor* in central Europe. Some individuals of *A. sesmae* from the Milan region show the hind tibiae and basitarsi partially lightened orange (Fig. 11F). This may result in some confusion with *A. ruficrus* Nylander, 1848, but this latter species has the facial foveae short and broad, not clearly narrowing ventrally, and the mesepisternum lacks black hairs, whereas in the only individuals of *A. sesmae* with light orange hind tibiae, the mesepisternum shows abundant black hairs; in addition, the tergal discs are shagreened and very finely punctate in *A. ruficrus*, contrasting with the condition in *A. sesmae*.

Pale individuals of *A. sesmae* sp. nov. (with abundant pale hairs on the face and mesepisternum) resemble *A. rufitibialis* s. l. The key point of difference that allows separation, and which also allows separation from *A. bicolor*,



**Fig. 9** - Molecular phylogeny of selected members of the subgenus *Euandrena* Hedick, 1933, with a focus on Italian species. Maximum clade credibility tree found in Bayesian analyses of sequence data of the mitochondrial gene COI; numbers above branches indicate posterior probabilities; values below 0.5 are omitted. Outgroup taxa, as well as *A. fulvida* and *A. ruficrus*, which formed the sister group to all other included taxa, are not shown.





**Fig. 10** - *Andrena sesmae* Wood, Cornalba & Praz, sp. nov., female, face lateral view and mesepisternum, lateral view. **A–B**, holotype, Attigliano, 17 Mar 2023; **C–D**, Paratype, Attigliano, 17 Mar 2023; **E–F**, Paratype, Niguarda, 19 Mar 1922; **G–H**, Paratype, Niguarda, 19 Mar 1922.

is that the scutum is covered entirely with strong and dense granular shagreen, and is almost entirely dull. The surface is punctate, but the punctures are relatively shallow, and are typically separated by 0.5–1 puncture diameters except medially where they can be separated by up to 3 puncture diameters (Fig. 11C). In comparison species, the scutum is usually at least partially shiny, sometimes extensively so, and scutal punctures are usually stronger, more distinct, and slightly denser (the holotypes of the additional East Mediterranean comparison taxa *A. rufitibialis limosa* Warncke, 1975 and *A. robusta* Warncke, 1975 also display a shiny scutum; the status of these taxa remains to be established). *Andrena sesmae* can therefore be recognised in an Italian context by the typically pale hair of the face and mesepisternum combined with the uniformly strongly shagreened and dull scutum with obscure punctation. However, some barcoded specimens of *A. bicolor* from Lebanon (e.g. WPATW1138-23) show a scutum that is almost equally dull, with shining areas greatly reduced; it is clear that extreme care must be taken in this complex group, including the use of molecular data whenever possible.

Males of *sesmae* sp. nov. are, as always in the subgenus *Euandrena*, more challenging to recognise. The combination of face with intermixed black and white hairs, mesepisternum with intermixed black and white hairs, and scutum with strong and dense granular shagreen, almost entirely dull (as in the female sex) should allow recognition. However, there is a great deal of variation in pubescence colouration. For the facial hair, it can vary from a more or less even mix of black and white (Fig. 12C) to entirely black (Fig. 12D, thus resembling males of *A. bicolor*), to extensively white (Fig. 12E). The same goes for the mesepisternum which is typically a mixture of black and white (Fig. 13A), but can be entirely covered with black hairs (Fig. 13B). As for females, the key character is the uniformly shagreened and dull scutum. This combination of characters should allow recognition in most cases, though consultation of barcoded material should be made for the highest degree of confidence.

**Description: Female:** Body length: 8.5–9.5 mm (Fig. 11A). **Head:** Dark, 1.2 times wider than long (Fig. 11B). Clypeus weakly domed, densely but shallowly punctate, punctures separated by <0.5–0.5 puncture diameters, underlying surface strongly shagreened, dull. Process of labrum rounded triangular, 2.5 times wider than long, surface with weak wrinkles, predominantly shining. Gena slightly exceeding width of compound eye; ocellocipital distance slightly exceeding diameter of lateral ocellus. Foveae dorsally narrow, occupying  $\frac{1}{3}$  of space between compound eye and lateral ocellus, equalling width of flagellum, slightly narrowing further ventrally at level of antennal insertions; foveae filled with dark brown hairs. Face with variable pubescence, palest forms with abundant pale hairs covering majority of face, with black hairs restricted to inner margins of compound eyes (Fig. 10A, 11B), sometimes extending onto clypeus (Fig. 10C). Darker forms with face predominantly covered by black hairs, with ginger hairs around antennal insertions and on frons (Figs 10E, G). Gena and vertex equally variable, with predominantly pale or predominantly dark pubescence; facial hair moderately long, none equalling length of scape. Antennae basally dark, A5–12 ventrally slightly lightened by presence of grey scales; A3 exceeding A4+5, shorter than A4+5+6.

**Mesosoma:** Scutum uniformly covered with strong and dense granular shagreen, and almost entirely dull, surface shallowly punctate, punctures separated by 0.5–1 puncture diameters, medially separated by up to 3 puncture diameters (Fig. 11C). Pronotum rounded. Mesepisternum with granular microreticulation, dull. Dorsolateral parts of propodeum with fine granular microreticulation, sculpture overlain with sparse network of raised rugosity forming appearance of large shallow punctures with raised rims, pseudopunctures separated by 0.5–1 puncture diameters. Propodeal triangle narrow, laterally finely delineated by faintly raised narrow carinae, internal surface with granular microreticulation without pseudopunctures, basally with irregular weakly

raised rugae; propodeal triangle thus defined by change in surface sculpture. Mesepisternum with variable pubescence, from predominantly covered with long light brown hairs with only scattered black hairs (Figs 10B; 10D) to intermixed ginger and black hairs (Fig. 10F) to predominantly black haired (Fig. 10H). Propodeal corbícula incomplete, dorsal fringe loosely formed, composed of light brown plumose hairs, internal surface with numerous plumose hairs. Legs usually dark (Fig. 10E), hind tibiae and basitarsi sometimes lightened orange (Fig. 10F); pubescence of legs light to dark brown. Flocculus complete, composed of light brown plumose hairs; femoral and tibial scopae composed of golden-orange partially plumose hairs, comprising a mixture of simple and weakly plumose hairs. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation dark brown, nervulus interstitial.

**Metasoma:** Tergal discs dark, apical margins narrowly lightened hyaline yellow-brown, underlying surface shagreened, weakly shining. Tergal discs irregularly punctate, punctures separated by 1–2 puncture diameters, on T1 punctures with partially raised rims, resembling crater punctures; marginal areas more or less punctate. Tergal discs with long erect hairs, basally pale to light reddish-brown, apically with increasing abundance of shorter black hairs on discs of T3–4; T1–4 apically with brownish-grey hairs forming weak complete apical hairbands, not obscuring underlying surface, most clearly produced

on T3–4 (Figs 11E–F). Apical fringe of T5 and hairs flanking pygidial plate dark brown. Pygidial plate rounded triangular, surface weakly shining, featureless.

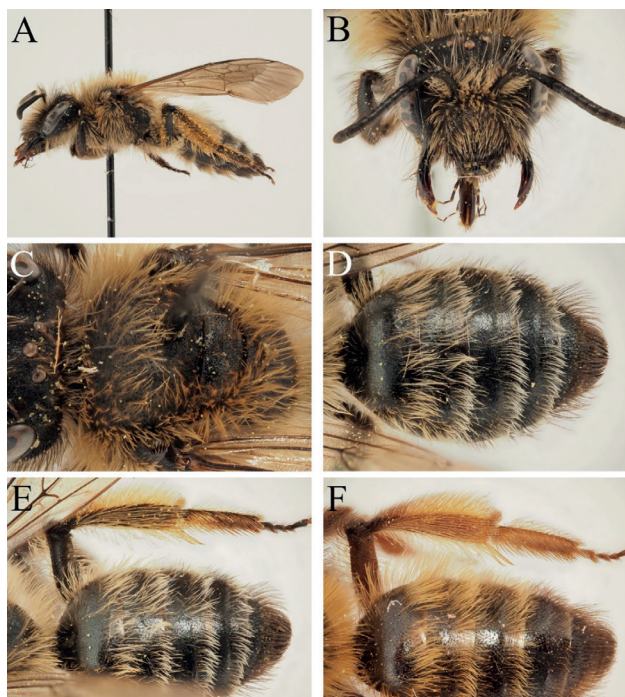
**Male:** Body length: 8–9 mm (Fig. 12A). **Head:** Dark, 1.25 times wider than long (Fig. 12B). Clypeus weakly domed, broadly flattened medially, surface densely but shallowly punctate, punctures separated by <0.5–0.5 puncture diameters, underlying surface strongly shagreened, dull. Process of labrum rounded trapezoidal, 2–2.5 times wider than long, anterior margin truncate, humped, emarginate. Gena slightly exceeding to exceeding width of compound eye; ocelloccipital distance 1.5 times diameter of lateral ocellus. Facial pubescence variable, from mixed black and white (Fig. 12C) to entirely black (Fig. 12D) to predominantly white with black hairs restricted to inner margins of compound eyes and apex of clypeus (Fig. 12E); gena and vertex equally variable, facial pubescence long, longest hairs exceeding length of scape. Antennae dark basally, A4–13 ventrally lightened by presence of grey scales; A3 exceeding A4, shorter than A4+5, A4 quadrate, only lightly longer than broad, A5–13 rectangular, clearly longer than broad.

**Mesosoma:** Mesosoma structurally as in female (Fig. 12F). Mesepisternum with pubescence variable, from covered with intermixed black and white hairs (Fig. 13A) to entirely covered with black hairs (Fig. 13B); hairs exceeding length of scape. Scutum and scutellum with pubescence variable, from white to orange-brown. Legs dark, pubescence whitish. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation dark brown, nervulus interstitial.

**Metasoma:** Terga structurally as in female, pubescence more scattered, T2–4 with very weak apical hairbands composed of long sparse hairs, not obscuring underlying surface (Fig. 13C). T6–7 with long brown hairs overlying pseudopygidial plate. S8 narrow, columnar, ventral surface covered with spreading dark brown hairs. Genital capsule simple, gonocoxae apically produced into slight rounded bumps, gonostyli narrow, slightly broadened apically, spatulate, inner margins slightly raised (Fig. 13D). Penis valves narrow, more or less parallel-sided though medially constricted, occupying  $\frac{1}{4}$  of space between gonostyli.

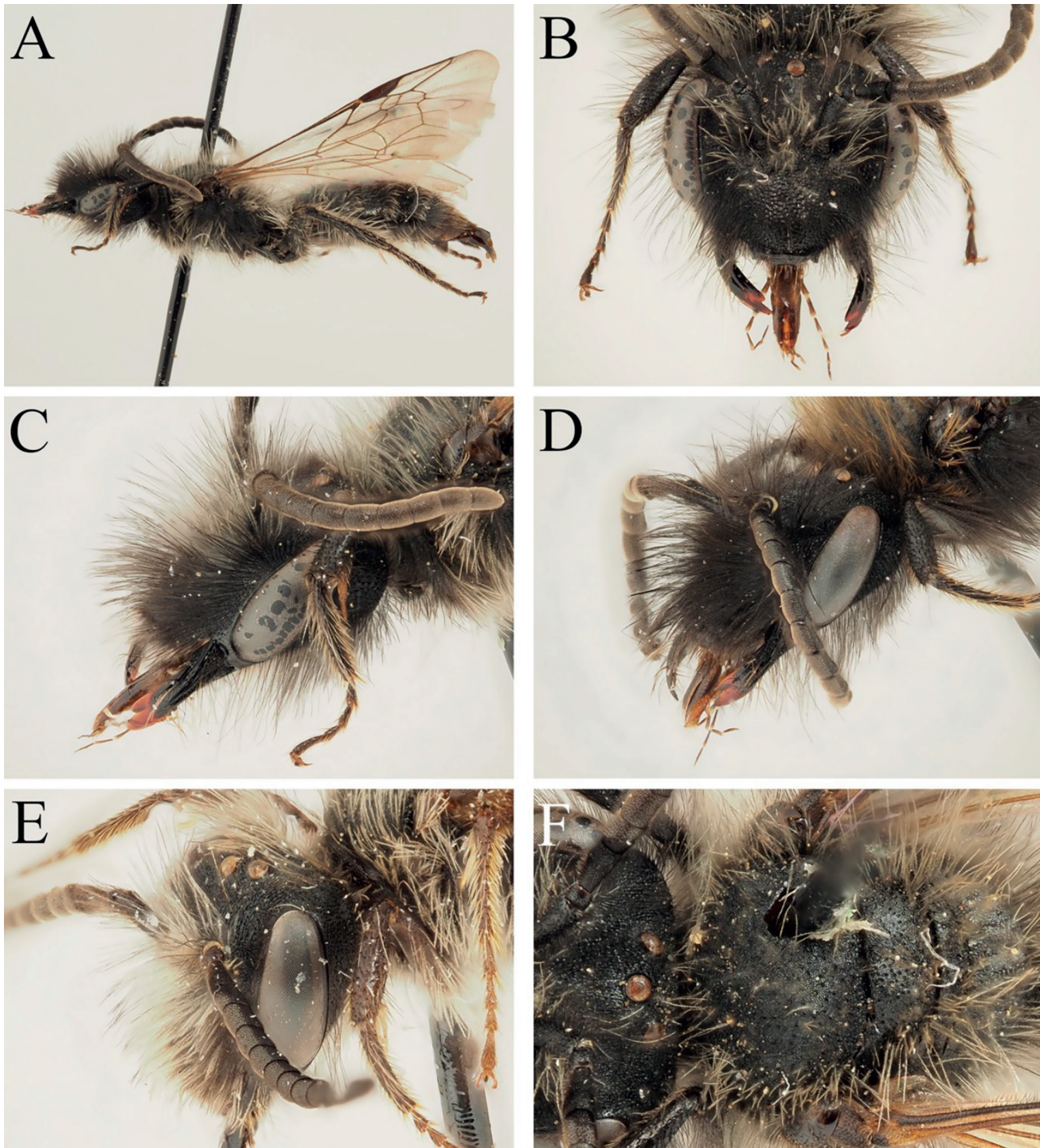
**Remarks.** The species appears to be bivoltine, with the first generation in March (and presumably early April) and the second generation at the end of May into June. All of the second-generation females observed at the Cecima site were collecting pollen on *Campanula rapunculus* (Campanulaceae), except one that was collecting on *Loncomelos brevistylus* (= *Ornithogalum pyramidale* auct.; Asparagaceae). The only first-generation female observed at the site was collected on *Crepis sancta* (Asteraceae).

**Etymology.** From Sésma, the name of Cecima in the local dialect. Cecima is the village in the northern foothills of the Ligurian Apennines (SW Lombardy) in whose vicinity this species was first detected by one of us (MC). The name takes the genitive form.



**Fig. 11** - *Andrena sesmae* Wood, Cornalba & Praz, sp. nov., female. **A**, profile; **B**, face, frontal view; **C**, scutum, dorsal view; **D**, terga, dorsal view; **E**, terga and hind leg, dorsolateral view (holotype, Attigliano, 17 Mar 2023); **F**, terga and hind leg, dorsolateral view (paratype, Niguarda, 19 Mar 1922).





**Fig. 12** - *Andrena sesmae* Wood, Cornalba & Praz, sp. nov., male. **A**, profile; **B**, face, frontal view; **C**, face, lateral view (paratype, Norchia, 10 Mar 2022); **D**, face, lateral view (paratype, Norchia, 2 Feb 2022); **E**, face, lateral view (paratype, Castel Viscardo, 30 May 1991); **F**, scutum, dorsal view.

**Distribution.** Northern and central Italy (Lombardy, Emilia-Romagna, Umbria, Lazio).

#### Discussion

The revisions presented here produce a final faunal total of 218 species. This places the Italian *Andrena* fauna slightly

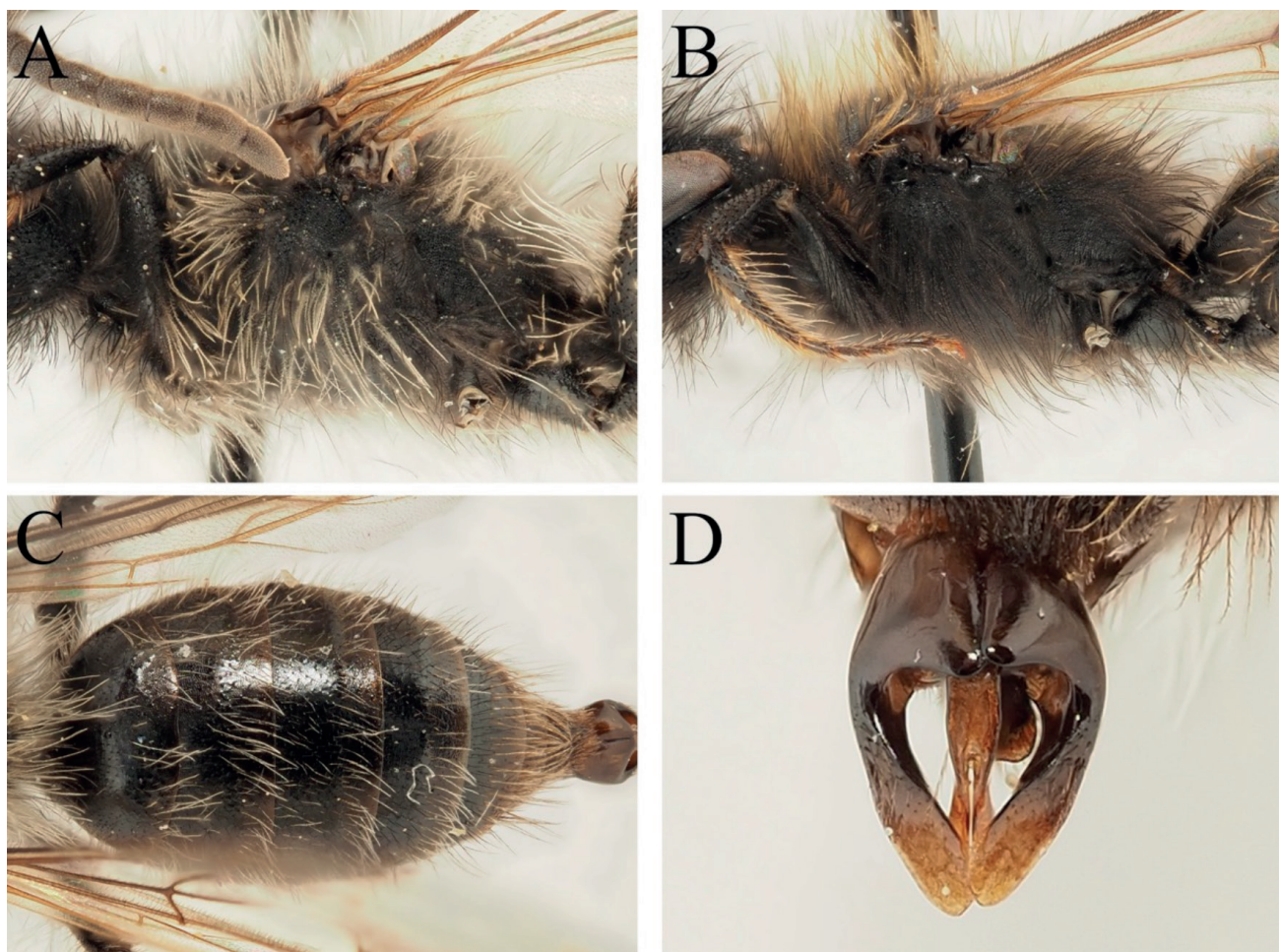
behind that of Spain (228 species; Wood 2023a) and that of Greece (c. 220), though the Greek fauna requires a modern revision to take into account recent taxonomic advances and to clarify the state of several unclear taxa. Whilst it is clear that the three major Mediterranean peninsulas (Iberian, Italic, and Balkan) host comparable *Andrena* diversity, there



are major differences in patterns of endemism. Currently only three *Andrena* species are known to be endemic to Italy: *A. croceiventris*, *A. heterodoxa*, and *A. sesame* sp. nov., an endemism rate of 1.4%. If one includes the three species *A. antonellae*, *A. puella*, and *A. stabiana* that are present outside of Italy only on Corsica, and can therefore be considered to be endemic to this slightly broader region, then this still only gives an endemism rate of 2.8% for Italy plus Corsica. Either way, this low rate of endemism (either 1.4% or 2.8%) is much lower than that of Spain (9.6%), Morocco (12.4%), or the Iberian Peninsula as a whole (14.0%; Wood 2023a; 2023b, less *A. foeniculae*). The endemism rate for the Greek *Andrena* fauna requires dedicated attention and quantification, as many species thought to be endemic are shared with neighbouring Turkey and under-sampled southern Balkan countries (e.g. Wood 2021; 2023c), though the rate of endemism of Greece is still expected to be higher than that of Italy. The low endemism pattern observed in Italy within *Andrena* is reflective of that seen in other groups of Apoidea, such as the Melittidae, with no species endemic to Italy compared to several Iberian or Balkan endemic species

(Michez et al. 2004; Michez & Eardley 2007), and the wider Mediterranean fauna more generally (Lhomme et al. 2020).

The low endemism rate observed for the Italian fauna is partly a result of its connection to and influence from many different biogeographical areas. In hosting Euro-Siberian, West Mediterranean, East Mediterranean, and North African species, Italy supports an *Andrena* fauna of comparable size to that of Spain and Greece despite lacking strong unique elements. Two aspects of these biogeographical trends deserve attention, the first being the surprising influence of traditionally ‘eastern’ species, specifically the presence of *A. braunsiana*, *A. cordialis*, *A. oralis*, *A. rugothorace* Warncke, 1965, and *A. transitoria* Morawitz, 1871. *Andrena braunsiana*, *A. cordialis*, and *A. oralis* were considered to have their western range limit in eastern Austria in the Pannonian Basin and are species of open habitats or steppe, as is the case for *A. transitoria* which has declined in Central Europe (e.g. Kratschmer et al. 2021) probably as a direct result of the loss of this habitat type. The presence of these species in central, southern, and in some cases northern Italy indicates greater than



**Fig. 13** - *Andrena sesame* Wood, Cornalba & Praz, sp. nov., male. **A**, mesepisternum, lateral view (paratype, Norchia, 10 Mar 2022); **B**, mesepisternum, lateral view (paratype, Norchia, 2 Feb 2022); **C**, terna, dorsal view; **D**, genital capsule, dorsal view.

previously thought faunal interchanges with the Pannonian Basin and the Balkans. Italy clearly represents the western limit for all of these eastern taxa.

An additional region with greater than expected faunal interchange are the central Apennines in the region of Abruzzo and eastern Lazio. Here, *A. amieti*, *A. freygessneri*, and *A. probata* can be found, the first found predominantly in the Alps (though present also on Monte Pollino in southern Italy), the second thought to be restricted to the Alps, and the third split between populations in the Alps and the southern Balkans to Turkey. Again, this implies that interchanges between the Central Apennine fauna and the montane faunas of the Alps and Balkans are or have been more frequent than might have been assumed based on seemingly fragmented contemporary distributions.

Finally, the *Andrena* fauna of Sicily should be discussed. In addition to hosting some of the unexpected eastern faunal elements, Sicily naturally hosts several North African or North African/Iberian elements which are found nowhere else in Italy (e.g. Flaminio et al. 2023). Many of these species are very rare in collections, and have not been recorded recently. To our knowledge, the following species have not been seen for over 50 years, specifically *A. rhypara* (last record 1938), *A. obsoleta* (1950), *A. belididis* (1965), and *A. avara caligata* (1965). We have not been able to examine any Sicilian specimens of *A. boyerella*, *A. passerina* Warncke, 1974, *A. rugothorace*, *A. transitoria*, or *A. tuberculifera* Pérez, 1895. Most concerning, the Sicilian endemic *A. heterodoxa* is known only from a few specimens, only one of which is dated, coming from 1858 (Wood 2023b). Even if the specimen described by Pérez (1903) was collected close to its date of description, *A. heterodoxa* would still not have been recorded for over 100 years. All ten of the species highlighted here should be the focus of renewed sampling efforts to determine whether or not they persist on the island and within the Italian fauna more broadly.

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Appendix I – Checklist of *Andrena* species present in Italy.

Genus	Subgenus	Species	Authority	Desc.	Pag.1994	Comba 2019	No.	Notes	Other taxa
<i>Andrena</i>	<i>Taeniandrena</i>	<i>aberrans</i>	Eversmann, 1852			Comba	204		
<i>Andrena</i>	<i>Aenandrena</i>	<i>aeneiventris</i>	Morawitz, 1872	ITA	YES	Comba	1		
<i>Andrena</i>	<i>Notandrena</i>	<i>aerinifrons</i>	Dours, 1873		YES	Comba	25		
<i>Andrena</i>	<i>Plastandrena</i>	<i>afrensis</i>	Warncke, 1967			Comba	5	Steinmann 2002	
<i>Andrena</i>	<i>Taeniandrena</i>	<i>afzeliella</i>	(Kirby, 1802)			NEW		Praz et al. 2022	
<i>Andrena</i>	<i>Plastandrena</i>	<i>agilissima</i>	(Scopoli, 1770)		YES	Comba	6		<i>agilissima melanopyga</i> Alfken, 1938 Sardinia/ <i>agilissima italica</i> Warncke, 1967
<i>Andrena</i>	<i>Chlorandrena</i>	<i>agnata</i>	Warncke, 1967	ITA	YES	Comba	32		
<i>Andrena</i>	<i>Melandrena</i>	<i>albopunctata</i>	(Rossi, 1792)	ITA	YES	Comba	118		
<i>Andrena</i>	<i>Micrandrena</i>	<i>alfkenella</i>	Perkins, 1914		YES	Comba	130	Pagliano also lists <i>pillichii</i>	
<i>Andrena</i>	<i>Euandrena</i>	<i>allosa</i>	Warncke, 1975			Comba	64		
<i>Andrena</i>	<i>Micrandrena</i>	<i>alutacea</i>	Stoeckhert, 1942			Comba	183		
<i>Andrena</i>	<i>Euandrena</i>	<i>amieti</i>	Praz, Müller & Genoud, 2019			Comba	65		
<i>Andrena</i>	<i>Micrandrena</i>	<i>ampla</i>	Warncke, 1967			Comba	184		
<i>Andrena</i>	<i>Micrandrena</i>	<i>anthrisci</i>	Blüthgen, 1925			Comba	131	Not confirmed ,but considered likely	
<i>Andrena</i>	<i>Taeniandrena</i>	<i>antonellae</i>	Praz & Genoud, 2022	ITA		NEW		Praz et al. 2022	
<i>Andrena</i>	<i>Andrena</i>	<i>apicata</i>	Smith, 1847		YES	Comba	7		
<i>Andrena</i>	<i>Leucandrena</i>	<i>argentata</i>	Smith, 1844		YES	Comba	111		
<i>Andrena</i>	<i>Melandrena</i>	<i>assimilis</i>	Radoszkowski, 1876		YES	Comba	119		<i>gallica</i> var <i>alpicola</i> Bischoff, 1922
<i>Andrena</i>	<i>Avandrena</i>	<i>avara</i>	Warncke, 1967			Comba	18		
<i>Andrena</i>	<i>Melandrena</i>	<i>barbareae</i>	Panzer, 1805			Comba	120		
<i>Andrena</i>	<i>Leucandrena</i>	<i>barbilabris</i>	(Kirby, 1802)		YES	Comba	112		
<i>Andrena</i>	<i>Notandrena</i>	<i>bellidis</i>	Pérez, 1895			NEW		New, Sicily	
<i>Andrena</i>	<i>Euandrena</i>	<i>bicolor</i>	Fabricius, 1775		YES	Comba	66		
<i>Andrena</i>	<i>Melandrena</i>	<i>bicolorata</i>	(Rossi, 1790)	ITA	YES	Comba	98		
<i>Andrena</i>	<i>Plastandrena</i>	<i>bimaculata</i>	(Kirby, 1802)		YES	Comba	169		<i>vitreipennis</i> Costa 1861/ <i>magrettiana</i> Schmiedeknecht, 1884
<i>Andrena</i>	<i>Notandrena</i>	<i>binominata</i>	Smith, 1853			Comba	26		
<i>Andrena</i>	<i>Aenandrena</i>	<i>bisulcata</i>	Morawitz, 1877		YES	Comba	2		<i>echinulata</i> Perez, 1903/ <i>doderoi</i> Jaeger, 1934
<i>Andrena</i>	<i>Chlorandrena</i>	<i>boyerella</i>	Dours, 1872			Comba	33		
<i>Andrena</i>	<i>Pallandrena</i>	<i>braunsiana</i>	Friese, 1887		YES	Comba	164	Listed as <i>oblita</i>	<i>oblita</i> Warncke, 1967
<i>Andrena</i>	<i>Cryptandrena</i>	<i>brumanensis</i>	Friese, 1899		YES	Comba	57	listed as <i>clypeata</i>	
<i>Andrena</i>	<i>Hoplandrena</i>	<i>bucephala</i>	Stephens, 1846			Comba	92		

Genus	Subgenus	Species	Authority	Desc.	Pag.1994	Comba 2019	No.	Notes	Other taxa
<i>Andrena</i>	<i>Euandrena</i>	<i>chrysopus</i>	Pérez, 1903	ITA	YES	Comba	67		
<i>Andrena</i>	<i>Melandrena</i>	<i>chrysopyga</i>	Schenck, 1853		YES	Comba	227		var <i>stefaniana</i> Schmiedeknecht, 1884
<i>Andrena</i>	<i>Notandrena</i>	<i>chrysosceles</i>	(Kirby, 1802)		YES	Comba	155		
<i>Andrena</i>	<i>Melandrena</i>	<i>cineraria</i>	(L., 1758)		YES	Comba	121		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>cinerea</i>	Brullé, 1832		YES	Comba	34		
<i>Andrena</i>	<i>Andrena</i>	<i>clarkella</i>	(Kirby, 1802)			Comba	8		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>clypella</i>	Strand, 1921		YES	Comba	36		
<i>Andrena</i>	<i>Oreomelissa</i>	<i>coitana</i>	(Kirby, 1802)		YES	Comba	163		
<i>Andrena</i>	<i>Brachyandrena</i>	<i>colletiformis</i>	Morawitz, 1873	ITA	YES	Comba	22		described as <i>Colletes parvula</i> / var. <i>sardinica</i> Strand, 1915
<i>Andrena</i>	<i>Ulandrena</i>	<i>combaella</i>	Warncke, 1966	ITA	YES	Comba	172		
<i>Andrena</i>	<i>Simandrena</i>	<i>combinata</i>	(Christ, 1791)		YES	Comba	191		
<i>Andrena</i>	<i>Nobandrena</i>	<i>compta</i>	Lepeletier, 1841		YES	Comba	152		
<i>Andrena</i>	<i>Simandrena</i>	<i>congruens</i>	Schmiedeknecht, 1883		YES	Comba	192		
<i>Andrena</i>	<i>Cordandrena</i>	<i>cordialis</i>	Morawitz, 1877			NEW		New, Sicily	
<i>Andrena</i>	<i>Taenidandrena</i>	<i>croceiventris</i>	Morawitz, 1871	ITA		NEW		Praz et al. 2022	<i>stefanii</i> Perez, 1895
<i>Andrena</i>	<i>Notandrena</i>	<i>curvana</i>	Warncke, 1965			Comba	156	See Ebmer 1994	
<i>Andrena</i>	<i>Lepidandrena</i>	<i>curvungula</i>	Thomson, 1870		YES	Comba	102		
<i>Andrena</i>	<i>Melandrena</i>	<i>danuvia</i>	Stoeckhert, 1950		YES	Comba	122		
<i>Andrena</i>	<i>Holandrena</i>	<i>decepiens</i>	Schenck, 1859		YES	Comba	84		
<i>Andrena</i>	<i>Cnemidandrena</i>	<i>denticulata</i>	(Kirby, 1802)		YES	Comba	51		
<i>Andrena</i>	<i>Melandrena</i>	<i>discors</i>	Erichson, 1841		YES	Comba	228	Listed as <i>creberrima</i>	
<i>Andrena</i>	<i>Micrandrena</i>	<i>distinguenda</i>	Schenck, 1871		YES	Comba	62		
<i>Andrena</i>	<i>Lepidandrena</i>	<i>dorsalis</i>	Brullé, 1832		YES	Comba	103		
<i>Andrena</i>	<i>Simandrena</i>	<i>dorsata</i>	(Kirby, 1802)		YES	Comba	193		
<i>Andrena</i>	<i>Ulandrena</i>	<i>elegans</i>	Giraud, 1863	ITA	YES	Comba	173		
<i>Andrena</i>	<i>Micrandrena</i>	<i>enslinella</i>	Stoeckhert, 1924		YES	Comba	133		
<i>Andrena</i>	<i>Micrandrena</i>	<i>fabrella</i>	Pérez, 1903		YES	Comba	76		
<i>Andrena</i>	<i>Micrandrena</i>	<i>falsifica</i>	Perkins, 1915		YES	Comba	134		
<i>Andrena</i>	<i>Hoplandrena</i>	<i>ferox</i>	Smith, 1847		YES	Comba	94		
<i>Andrena</i>	<i>Truncandrena</i>	<i>ferrugineicrus</i>	Dours, 1872		YES	Comba	218		
<i>Andrena</i>	<i>Parandrenella</i>	<i>figurata</i>	Morawitz, 1866			Comba	168		
<i>Andrena</i>	<i>Holandrena</i>	<i>flavilabris</i>	Schenck, 1874			Comba	86		
<i>Andrena</i>	<i>Melandrena</i>	<i>flavipes</i>	Panzer, 1799		YES	Comba	229		<i>kraussei</i> Strand, 1921
<i>Andrena</i>	<i>Bryandrena</i>	<i>florea</i>	Fabricius, 1793		YES	Comba	179		
<i>Andrena</i>	<i>Melandrena</i>	<i>florentina</i>	Magretti, 1883	ITA	YES	Comba	99		



Genus	Subgenus	Species	Authority	Desc.	Pag.1994	Comba 2019	No.	Notes	Other taxa
<i>Andrena</i>	<i>Micrandrena</i>	<i>floricola</i>	Eversmann, 1852			Comba	135		
<i>Andrena</i>	<i>Lepidandrena</i>	<i>florivaga</i>	Eversmann, 1852			Comba	104		
<i>Andrena</i>	<i>Notandrena</i>	<i>foeniculae</i>	Wood, 2020			NEW			
<i>Andrena</i>	<i>Holandrena</i>	<i>forsterella</i>	Osytsnjuk, 1978		YES	Comba	87		
<i>Andrena</i>	<i>Cnemidandrena</i>	<i>frejgessneri</i>	Alfken, 1904			Comba	52		
<i>Andrena</i>	<i>Andrena</i>	<i>fucata</i>	Smith, 1847		YES	Comba	9		
<i>Andrena</i>	<i>Taeniandrena</i>	<i>fuliginata</i>	Lepeletier, 1841		YES	Comba	205		
<i>Andrena</i>	<i>Andrena</i>	<i>fulva</i>	Müller, 1766	ITA	YES	Comba	10		
<i>Andrena</i>	<i>Chrysandrena</i>	<i>fulvago</i>	(Christ, 1791)		YES	Comba	48		
<i>Andrena</i>	<i>Euandrena</i>	<i>fulvata</i>	Stoeckhert, 1930		YES	Comba	187	Listed twice by Pagliano	
<i>Andrena</i>	<i>Notandrena</i>	<i>fulvicornis</i>	Schenck, 1853			NEW			
<i>Andrena</i>	<i>Euandrena</i>	<i>fulvida</i>	Schenck, 1853		YES	Comba	68		
<i>Andrena</i>	<i>Ulandrena</i>	<i>fulvitaris</i>	Brullé, 1832		YES	Comba	224		<i>carinula</i> Perez 1895
<i>Andrena</i>	<i>Micrandrena</i>	<i>fumida</i>	Pérez, 1895		YES	Comba	77		
<i>Andrena</i>	<i>Cnemidandrena</i>	<i>fuscipes</i>	(Kirby, 1802)		YES	Comba	53		
<i>Andrena</i>	<i>Melanapis</i>	<i>fuscosa</i>	Erichson, 1835		YES	Comba	116		
<i>Andrena</i>	<i>Taeniandrena</i>	<i>gelrae</i>	van der Vecht, 1927			Comba	206		
<i>Andrena</i>	<i>Euandrena</i>	<i>granulosa</i>	Pérez, 1902		YES	Comba	69		
<i>Andrena</i>	<i>Melandrena</i>	<i>gravidia</i>	Imhoff, 1832		YES	Comba	230		
<i>Andrena</i>	<i>Notandrena</i>	<i>griseobalteata</i>	Dours, 1872		YES	Comba	157	Listed as <i>erythrocnemis</i>	
<i>Andrena</i>	<i>Trachandrena</i>	<i>haemorrhoea</i>	(Fabricius, 1781)		YES	Comba	217		
<i>Andrena</i>	<i>Charitandrena</i>	<i>hattorfiana</i>	(Fabricius, 1775)		YES	Comba	31		
<i>Andrena</i>	<i>Aenandrena</i>	<i>hedikae</i>	Jaeger, 1934		YES	Comba	3		
<i>Andrena</i>	<i>Andrena</i>	<i>helvola</i>	(L., 1758)			Comba	11		
<i>Andrena</i>	<i>Chrysandrena</i>	<i>hesperia</i>	Smith, 1853	ITA	YES	Comba	49		<i>asunica</i> Strand, 1921
<i>Andrena</i>	<i>Avandrena</i>	<i>heterodoxa</i>	Pérez, 1903	ITA	YES	Comba	20	Listed as <i>siciliana</i>	<i>siciliana</i> Warncke, 1980
<i>Andrena</i>	<i>Chlorandrena</i>	<i>humilis</i>	Imhoff, 1832		YES	Comba	37		<i>ssp ardeola</i> Warncke 1975
<i>Andrena</i>	<i>Graecandrena</i>	<i>hyemala</i>	Warncke, 1973			Comba	80		
<i>Andrena</i>	<i>numida-group</i>	<i>hypopolia</i>	Schmiedeknecht, 1883		YES	Comba	214		
<i>Andrena</i>	<i>Aenandrena</i>	<i>hystrix</i>	Schmiedeknecht, 1883			Comba	4	Considered plausibly present	69, 117, 343, C8, CK03
<i>Andrena</i>	<i>Graecandrena</i>	<i>impunctata</i>	Pérez, 1895	ITA	YES	Comba	81		
<i>Andrena</i>	<i>incisa-group</i>	<i>incisa</i>	Eversmann, 1852			Comba	24		
<i>Andrena</i>	<i>Taeniandrena</i>	<i>intermedia</i>	Thomson, 1870		YES	Comba	207		

Genus	Subgenus	Species	Authority	Desc.	Pag.1994	Comba 2019	No.	Notes	Other taxa
<i>Andrena</i>	<i>Chlorandrena</i>	<i>kamarti</i>	Schmiedeknecht, 1900		YES	Comba	38		
<i>Andrena</i>	<i>Melandrena</i>	<i>korleviciana</i>	Friese, 1887			Comba	231		
<i>Andrena</i>	<i>Ulandrena</i>	<i>kriechbaumeri</i>	Schmiedeknecht, 1883		YES	Comba	180		
<i>Andrena</i>	<i>Holandrena</i>	<i>labialis</i>	(Kirby, 1802)		YES	Comba	88		
<i>Andrena</i>	<i>Poecilandrena</i>	<i>labiata</i>	Fabricius, 1781		YES	Comba	175		
<i>Andrena</i>	<i>Biareolina</i>	<i>lagopus</i>	Latreille, 1809		YES	Comba	21		
<i>Andrena</i>	<i>Andrena</i>	<i>lapponica</i>	Zetterstedt, 1838			Comba	12		
<i>Andrena</i>	<i>Taenandrena</i>	<i>lathyri</i>	Alfken, 1899		YES	Comba	208		
<i>Andrena</i>	<i>Simandrena</i>	<i>lepida</i>	Schenck, 1859		YES	Comba	194		<i>ardens</i> Perez 1895
<i>Andrena</i>	<i>Chlorandrena</i>	<i>leucolippa</i>	Pérez, 1895			Comba	39	Considered plausibly present	109a, CK03
<i>Andrena</i>	<i>Notandrena</i>	<i>leucophaea</i>	Lepeletier, 1841			Comba	27		
<i>Andrena</i>	<i>Melandrena</i>	<i>limata</i>	Smith, 1853		YES	Comba	124		
<i>Andrena</i>	<i>Limbandrena</i>	<i>limbata</i>	Eversmann, 1852		YES	Comba	181		<i>squamea</i> Giraud
<i>Andrena</i>	<i>Chlorandrena</i>	<i>livens</i>	Pérez, 1895		YES	Comba	40		<i>gruenwaldti</i> Warncke, 1967
<i>Andrena</i>	<i>Margandrena</i>	<i>marginata</i>	Fabricius, 1776		YES	Comba	114		<i>hyalinella</i> Costa, 1888
<i>Andrena</i>	<i>Brachyandrena</i>	<i>miegiella</i>	Dours, 1873		YES	Comba	23		<i>lojaconi</i> De Steffani, 1889
<i>Andrena</i>	<i>Micrandrena</i>	<i>minutula</i>	(Kirby, 1802)		YES	Comba	136		
<i>Andrena</i>	<i>Micrandrena</i>	<i>minutuloides</i>	Perkins, 1914		YES	Comba	137		
<i>Andrena</i>	<i>Andrena</i>	<i>mitis</i>	Schmiedeknecht, 1883		YES	Comba	13		<i>palumboi</i> De Steffani, 1889
<i>Andrena</i>	<i>Lepidandrena</i>	<i>mocsaryi</i>	Schmiedeknecht, 1883		YES	Comba	105		
<i>Andrena</i>	<i>Euandrena</i>	<i>montana</i>	Warncke, 1973	ITA		Comba	70		
<i>Andrena</i>	<i>Melandrena</i>	<i>morio</i>	Brullé, 1832		YES	Comba	125		
<i>Andrena</i>	<i>Didonia</i>	<i>mucida</i>	Kreischbaumer, 1873	ITA	YES	Comba	61		
<i>Andrena</i>	<i>Truncandrena</i>	<i>mucronata</i>	Morawitz, 1871		YES	Comba	219		
<i>Andrena</i>	<i>Micrandrena</i>	<i>nana</i>	(Kirby, 1802)		YES	Comba	138		<i>var taorminae</i> Strand, 1921
<i>Andrena</i>	<i>Micrandrena</i>	<i>nanula</i>	Nylander, 1848		YES	Comba	140		
<i>Andrena</i>	<i>Hamandrena</i>	<i>nasuta</i>	Giraud, 1863		YES	Comba	83		
<i>Andrena</i>	<i>Cnemidandrena</i>	<i>nigriceps</i>	(Kirby, 1802)			Comba	54		
<i>Andrena</i>	<i>Melandrena</i>	<i>nigroaenea</i>	(Kirby, 1802)		YES	Comba	126		<i>serotina</i> De Steffani, 1889
<i>Andrena</i>	<i>Chlorandrena</i>	<i>nigroolivacea</i>	Dours, 1873		YES	Comba	41		
<i>Andrena</i>	<i>Notandrena</i>	<i>nigroviridula</i>	Dours, 1873		YES	Comba	28		
<i>Andrena</i>	<i>Melandrena</i>	<i>nitida</i>	(Müller, 1776)		YES	Comba	127		
<i>Andrena</i>	<i>Notandrena</i>	<i>nitidiuscula</i>	Schenck, 1853		YES	Comba	158		



Genus	Subgenus	Species	Authority	Desc.	Pag.1994	Comba 2019	No.	Notes	Other taxa
<i>Andrena</i>	<i>Micrandrena</i>	<i>nitidula</i>	Pérez, 1903			NEW		Burger & Herrmann 2003	
<i>Andrena</i>	<i>Micrandrena</i>	<i>niveata</i>	Friese, 1887		YES	Comba	141		<i>ssp haloga</i> Warncke, 1980
<i>Andrena</i>	<i>numida-group</i>	<i>numida</i>	Lepeletier, 1841		YES	Comba	215		<i>inconspicua</i> Morawitz, 1871
<i>Andrena</i>	<i>Hoplandrena</i>	<i>nuptialis</i>	Pérez, 1902		YES	Comba	95		
<i>Andrena</i>	<i>Andrena</i>	<i>nycthemera</i>	Imhoff, 1866		YES	Comba	14		
<i>Andrena</i>	<i>Micrandrena</i>	<i>obsoleta</i>	Pérez, 1895			Comba	63	Listed as <i>mariana</i>	
<i>Andrena</i>	<i>Orandrena</i>	<i>oralis</i>	Morawitz, 1876			Comba	162		
<i>Andrena</i>	<i>Rufandrena</i>	<i>orbitalis</i>	Morawitz, 1871	ITA	YES	Comba	189		
<i>Andrena</i>	<i>Taeniandrena</i>	<i>ovata</i>	Schenck, 1853			NEW		Praz et al. 2022	
<i>Andrena</i>	<i>Taeniandrena</i>	<i>ovatula</i>	(Kirby, 1802)		YES	Comba	210		
<i>Andrena</i>	<i>Notandrena</i>	<i>pallitarsis</i>	Pérez, 1903		YES	Comba	159		
<i>Andrena</i>	<i>Lepidandrena</i>	<i>pandellei</i>	Pérez, 1895		YES	Comba	106		
<i>Andrena</i>	<i>Avandrena</i>	<i>panurgina</i>	Destefani, 1889	ITA	YES	Comba	19		
<i>Andrena</i>	<i>Leucandrena</i>	<i>parviceps</i>	Kreichbaumer, 1873		YES	Comba	113		
<i>Andrena</i>	<i>Graecandrena</i>	<i>passerina</i>	Warncke, 1974		YES	Comba	82		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>pastellensis</i>	Schwenninger, 2007	ITA		Comba	42		
<i>Andrena</i>	<i>Lepidandrena</i>	<i>paucisquama</i>	Noskiewicz, 1924		YES	Comba	107		
<i>Andrena</i>	<i>Margandrena</i>	<i>pellucens</i>	Pérez, 1895		YES	Comba	115		
<i>Andrena</i>	<i>Plastandrena</i>	<i>pilipes</i>	Fabricius, 1781	ITA	YES	Comba	170	Listed as <i>carbonaria</i> (also Pagliano x2)	
<i>Andrena</i>	<i>Ulandrena</i>	<i>polita</i>	Smith, 1847		YES	Comba	182		
<i>Andrena</i>	<i>Poecilandrena</i>	<i>potentillae</i>	Panzer, 1809		YES	Comba	176		
<i>Andrena</i>	<i>Andrena</i>	<i>praecox</i>	(Scopoli, 1763)		YES	Comba	15		
<i>Andrena</i>	<i>Nobandrena</i>	<i>probata</i>	Warncke 1973			Comba	154		
<i>Andrena</i>	<i>Simandrena</i>	<i>propinqua</i>	Schenck, 1853		YES	Comba	196	as <i>dorsata propinqua</i>	
<i>Andrena</i>	<i>Micrandrena</i>	<i>proxima</i>	(Kirby, 1802)		YES	Comba	185		
<i>Andrena</i>	<i>Micrandrena</i>	<i>puella</i>	Alfken, 1938	ITA	YES	Comba	197		
<i>Andrena</i>	<i>Micrandrena</i>	<i>pusilla</i>	Pérez, 1903		YES	Comba	142	listed as <i>ssp pusilla</i>	<i>pseudasuniensis</i> Strand, 1921
<i>Andrena</i>	<i>Notandrena</i>	<i>ranunculi</i>	Schmiedeknecht, 1883		YES	Comba	29		
<i>Andrena</i>	<i>numida-group</i>	<i>ranunculum</i>	Morawitz, 1877			Comba	216		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>rhenana</i>	Stoeckhert, 1930			Comba	43	Gamba and Carta 2021	
<i>Andrena</i>	<i>Simandrena</i>	<i>rhypara</i>	Pérez, 1903			Comba	198		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>rhyssonota</i>	Pérez, 1895	ITA	YES	Comba	44		
<i>Andrena</i>	<i>Andrena</i>	<i>rogenhoferi</i>	Morawitz, 1871		YES	Comba	16		
<i>Andrena</i>	<i>Hoplandrena</i>	<i>rosae</i>	Panzer, 1801		YES	Comba	96		

Genus	Subgenus	Species	Authority	Desc.	Pag.1994	Comba 2019	No.	Notes	Other taxa
<i>Andrena</i>	<i>Cryptandrena</i>	<i>rotundata</i>	Pérez, 1895		YES	Comba	59		<i>ssp diomedia</i> Warncke 1975
<i>Andrena</i>	<i>Euandrena</i>	<i>ruficrus</i>	Nylander, 1848		YES	Comba	71		
<i>Andrena</i>	<i>Lepidandrena</i>	<i>rufizona</i>	Imhoff, 1834		YES	Comba	108		<i>alpina</i> Morawitz, 1872
<i>Andrena</i>	<i>Euandrena</i>	<i>rufula</i>	Schmiedeknecht, 1883		YES	Comba	72		
<i>Andrena</i>	<i>Micrandrena</i>	<i>rugothorace</i>	Warncke, 1965			Comba	143		
<i>Andrena</i>	<i>Micrandrena</i>	<i>rugulosa</i>	Stoeckhert, 1935		YES	Comba	144		
<i>Andrena</i>	<i>Taenidandrena</i>	<i>russula</i>	Lepeletier, 1841		YES	Comba	211	Listed as <i>ocreata</i> and <i>similis</i> (x2)	
<i>Andrena</i>	<i>Lepidandrena</i>	<i>sardoa</i>	Lepeletier, 1841	ITA	YES	Comba	109		
<i>Andrena</i>	<i>Suandrena</i>	<i>savignyi</i>	Spinola, 1838		YES	Comba	202		
<i>Andrena</i>	<i>Micrandrena</i>	<i>saxonica</i>	Stoeckhert, 1935		YES	Comba	145		
<i>Andrena</i>	<i>Opandrena</i>	<i>schencki</i>	Morawitz, 1866		YES	Comba	89		
<i>Andrena</i>	<i>Truncandrena</i>	<i>schmiedeknechti</i>	Magretti, 1883	ITA	YES	Comba	220		
<i>Andrena</i>	<i>Ulandrena</i>	<i>schulzi</i>	Strand, 1921		YES	Comba	226		
<i>Andrena</i>	<i>Scitandrena</i>	<i>scita</i>	Eversmann, 1852		YES	Comba	190		<i>obscuricanda</i> Costa, 1861
<i>Andrena</i>	<i>Hoplandrena</i>	<i>scotica</i>	Perkins, 1916		YES	Comba	93	Listed as <i>caran-tonica</i> , <i>jacobi</i>	
<i>Andrena</i>	<i>Micrandrena</i>	<i>semilaevis</i>	Pérez, 1903		YES	Comba	146		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>senecionis</i>	Pérez, 1895		YES	Comba	45		
<i>Andrena</i>	<i>Leucandrena</i>	<i>sericata</i>	Imhoff, 1868		YES	Comba	166		
<i>Andrena</i>	<i>Euandrena</i>	<i>sesmae</i>	Wood, Cornalba & Praz, 2023	ITA		NEW		Newly described	
<i>Andrena</i>	<i>Micrandrena</i>	<i>simon-tornyella</i>	Noskiewicz, 1939		YES	Comba	147		
<i>Andrena</i>	<i>Micrandrena</i>	<i>spreti</i>	Pérez, 1895		YES	Comba	148		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>stabiana</i>	Morice, 1899	ITA	YES	Comba	46	listed as <i>ssp stabiana</i>	
<i>Andrena</i>	<i>Micrandrena</i>	<i>strohmella</i>	Stoeckhert, 1928			Comba	149		
<i>Andrena</i>	<i>Micrandrena</i>	<i>subopaca</i>	Nylander, 1848		YES	Comba	150		
<i>Andrena</i>	<i>Suandrena</i>	<i>suerinensis</i>	Friese, 1884			Comba	203		
<i>Andrena</i>	<i>Simandrena</i>	<i>susterae</i>	Alfken, 1914			Comba	199	Specimen det Gusenleitner 2007	
<i>Andrena</i>	<i>Euandrena</i>	<i>symphyti</i>	Schmiedeknecht, 1883		YES	Comba	73		
<i>Andrena</i>	<i>Chlorandrena</i>	<i>taraxaci</i>	Giraud, 1861		YES	Comba	47	Schwenninger 2007	
<i>Andrena</i>	<i>Tarsandrena</i>	<i>tarsata</i>	Nylander, 1848		YES	Comba	213		<i>basilinea</i> Kriechbaumer, 1873
<i>Andrena</i>	<i>Micrandrena</i>	<i>tenuistriata</i>	Pérez, 1895		YES	Comba	151		<i>pilosella</i> De Steffani, 1889

Genus	Subgenus	Species	Authority	Desc.	Pag.1994	Comba 2019	No.	Notes	Other taxa
<i>Andrena</i>	<i>Simandrena</i>	<i>thomsonii</i>	Ducke, 1898			Comba	200		
<i>Andrena</i>	<i>Melandrena</i>	<i>thoracica</i>	(Fabricius, 1775)			Comba	128		
<i>Andrena</i>	<i>Plastandrena</i>	<i>tibialis</i>	(Kirby, 1802)		YES	Comba	171		
<i>Andrena</i>	<i>Micrandrena</i>	<i>tomora</i>	Warncke, 1975			Comba	78		
<i>Andrena</i>	<i>Simandrena</i>	<i>transitoria</i>	Morawitz, 1871			Comba	201		
<i>Andrena</i>	<i>Hoplendrena</i>	<i>trimmerana</i>	(Kirby, 1802)		YES	Comba	97		<i>lombardica</i> Schmiedeknecht, 1883
<i>Andrena</i>	<i>Truncandrena</i>	<i>truncatilibris</i>	Morawitz, 1877		YES	Comba	221		
<i>Andrena</i>	<i>Truncandrena</i>	<i>tschecki</i>	Morawitz, 1871		YES	Comba	222		
<i>Andrena</i>	<i>Lepidandrena</i>	<i>tuberculifera</i>	Pérez, 1895			Comba	110		
<i>Andrena</i>	<i>Notandrena</i>	<i>ungeri</i>	Mavromoustakis, 1952		YES	Comba	160		
<i>Andrena</i>	<i>Melandrena</i>	<i>vaga</i>	Panzer, 1799		YES	Comba	129		
<i>Andrena</i>	<i>Holandrena</i>	<i>variabilis</i>	Smith, 1853		YES	Comba	90		<i>calabra</i> Costa, 1863
<i>Andrena</i>	<i>Andrena</i>	<i>varians</i>	(Rossi, 1792)		YES	Comba	17		<i>nigrocinerea</i> De Steffeni 1889
<i>Andrena</i>	<i>Leucandrena</i>	<i>ventralis</i>	Imhoff, 1832		YES	Comba	100		
<i>Andrena</i>	<i>Cryptandrena</i>	<i>ventricosa</i>	Dours, 1873		YES	Comba	60		
<i>Andrena</i>	<i>Graecandrena</i>	<i>verticalis</i>	Pérez, 1895		YES	Comba	234		<i>catania</i> Strand, 1921
<i>Andrena</i>	<i>Simandrena</i>	<i>vetula</i>	Lepeletier, 1841		YES	Comba	188		<i>tyrrhena</i> Alfken, 1938
<i>Andrena</i>	<i>Truncandrena</i>	<i>villipes</i>	Pérez, 1895			Comba	223	Warncke maps	
<i>Andrena</i>	<i>Poecilandrena</i>	<i>viridescens</i>	Viereck, 1916		YES	Comba	178		
<i>Andrena</i>	<i>Euandrena</i>	<i>vulpecula</i>	Kreichbaumer, 1873		YES	Comba	74		
<i>Andrena</i>	<i>Holandrena</i>	<i>wilhelmi</i>	Schuberth, 1995			Comba	91		
<i>Andrena</i>	<i>Taeniandrena</i>	<i>wilkella</i>	(Kirby, 1802)		YES	Comba	212		



