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Monograph

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Revisions to the *Andrena* fauna of north-western Africa with a focus on Morocco (Hymenoptera: Andrenidae)

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Abstract. North-western Africa has a large *Andrena* fauna, but parts of the country away from coastal areas remain poorly studied, and confusion persists as to the identity of certain taxa due to the long history of study combined with imperfectly examined type material. New fieldwork, genetic barcoding, and study of museum material has substantially improved our understanding of this region. Eleven new species are described: *A.* (*Aciandrena*) *bendai* sp. nov., *A.* (*Aciandrena*) *ifranensis* sp. nov., *A.* (*Euandrena*) *berberica* sp. nov., *A.* (*Hoplandrena*) *darha* sp. nov., *A.* (*Micrandrena*) *anammas* sp. nov., *A.* (*Micrandrena*) *gemina* sp. nov., *A.* (*Micrandrena*) *tinctoria* sp. nov., and *A.* (incertae sedis) *muelleri* sp. nov., all from Morocco, and *A.* (*Aciandrena*) *quieta* sp. nov., *A.* (*Euandrena*) *abscondita* sp. nov., and *A.* (*Taeniandrena*) *prazi* sp. nov. from Morocco and Tunisia. *Andrena* (*Aciandrena*) *nitidilabris* Pérez, 1895 was misdiagnosed, and is actually the senior synonym of *A.* (*Graecandrena*) *montarca parva* Warncke, 1974 syn. nov. *Andrena* (*Aciandrena*) *pisantyi* sp. nov. is described from Algeria, Tunisia, and Israel, conforming to *A. nitidilabris* auctorum sensu Warncke. *Andrena* (*Graecandrena*) *andina* Warncke, 1974 stat. nov. and *A.* (*Micrandrena*) *heliaca* Warncke, 1974 stat. nov. are elevated from sub species to species status. Lectotypes are designated for *A.* (*Melanapis*) *ephippium* Spinola, 1838, *A.* (*Melanapis*) *rutila* Spinola, 1838, *A.* (*Simandrena*) *rhypara* Pérez, 1903, and *A.* (*Suandrena*) *savignyi* Spinola, 1838. Neotypes are designated for *A.* (*Melandrena*) *soror* Dours, 1872 and *A.* (*Notandrena*) *nigroviridula* Dours, 1873. The female of *A.* (*Aciandrena*) *triangulivalvis* Wood, 2020 is described. The following seven additional synonymies are reported (senior name first): *A.* (*Chrysandrena*) *testaceipes* Saunders, 1908 = *A.* (*Chrysandrena*) *rubricorpora* Wood, 2021 syn. nov., *A.* (incertae sedis) *maidaqi* Scheuchl & Gusenleitner, 2007 = *A.* (*Carandrena*) *hoggara* Wood, 2021 syn. nov., *A.* (*Lepidandrena*) *tuberculifera* Pérez, 1895 = *A.* (*Poecilandrena*) *nigriclypeus* Wood, 2020 syn. nov., *A.* (*Notandrena*) *albohirta* Saunders, 1908 = *A.* (*Notandrena*) *eddaensis* Gusenleitner, 1998 syn. nov., *A.* (*Notandrena*) *microthorax* Pérez, 1895 = *A.* (*Notandrena*) *nigrocyanea* Saunders, 1908 syn. nov., *A.* (*Simandrena*) *rhypara* = *A.* (*Simandrena*) *palumba* Warncke, 1974 syn. nov., and *A.* (*Taeniandrena*) *poupillieri* Dours, 1872 = *A.* (*Taeniandrena*) *lecerfi* Benoist, 1961 syn. nov. *Andrena* (*Notandrena*) *viridiaenea* Pérez, 1903 is returned to synonymy with *A. nigroviridula*. Relative to the 2020 baseline, 16 *Andrena* species are newly recorded for Morocco, and six species are removed from the faunal list. These revisions bring the total number of *Andrena* species known from Morocco to 202 with 25 endemic species, making it one of the hotspots for *Andrena* diversity globally.

Keywords. Apoidea, mining bees, oligolecty, DNA barcoding, pollen, endemic.

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Introduction

Morocco is a large country in north-western Africa with a diversified bee fauna approaching 1000 species (Lhomme *et al*. 2020). In common with other West Palaearctic countries, this species-rich bee fauna contains a large *Andrena* element, with 180 species listed in the most recent revision. Despite this large total, Morocco remains an understudied country for *Andrena*. Remarkably, only five papers have described what are currently recognised as valid *Andrena* species from Morocco (Benoist 1961; Warncke 1974, 1980; Wood *et al*. 2020; Wood 2021), though some other authors have described what are now junior synonyms from the country (Pérez 1895, 1902; Friese in Schulthess 1924; Cockerell 1931; Benoist 1937, 1950). This stands in stark contrast to neighbouring Algeria, from which a great number of *Andrena* species were described in the 19th and early 20th centuries, predominantly by francophone authors (Erichson 1841; Lepeletier 1841; Lucas 1849; Dufour 1853; Dours 1872, 1873; Gribodo 1894; Pérez 1902, 1903; Saunders 1908), most notably illustrated by the defining work of Pérez (1895) on new bee species (predominantly) from North Africa.

In this context, it is clear that much study remains to be carried out on the Moroccan fauna, and recent work (Wood *et al*. 2020, 2021; Wood 2023) has begun to address the shortfall in our knowledge of *Andrena* in this region. New expeditions during 2022, as well as the inspection of material from other new and old expeditions, combined with genetic analysis has revealed the presence of numerous undescribed species, as well as many species that have not previously been recorded from the country. Additionally, inspection of type material has clarified the status of several obscure names, as well as highlighting recent species that were described too hastily from north-western Africa. The opportunity is taken here to report these findings and to produce a refined and updated faunal total for Moroccan *Andrena*.

Material and methods

Andrena species were collected from Morocco between March and July of 2022, predominantly in the Anti-Atlas, High Atlas, and Middle Atlas mountain ranges, and in the Drâa valley. Genetic barcoding was carried out; a single midleg was removed from pinned specimens and sent to the Canadian Center for DNA barcoding (CCDB) in Guelph, Canada, for DNA extraction and sequencing; specimens were sequenced following standardised high-throughput protocols (Ivanova *et al*. 2006). Both Lep-F1/Lep-R1 and BeeCox1F1/BeeCox1R2 primers were used depending on the specimen (Hebert *et al*. 2004; Bleidorn & Henze 2021) to target the COI-5 region. All sequences are published on the Barcode of Life Database (BOLD) website under the dataset https://doi.org/10.5883/DS-ANDWMED. Where appropriate, reference to individual barcodes is made in the text using the BOLD accession number, e.g., five letters forming a prefix such as 'WPATW'.

Phylogenetic trees were supplemented with sequences from Spain (see Wood 2023) and additional published sequences (e.g., Schmidt *et al*. 2015; Pisanty *et al*. 2022a) that were downloaded from Genbank and the Barcode of Life Data System. Trees were also enriched with sequences produced by the Centro de Investigação em Biodiversidade e Recursos Genéticos (CIBIO, Portugal) as part of a collaboration to barcode the Portuguese bee fauna that will be published in the near future, and sequences will be available on BOLD. Sequences beginning with the code 'IBIHM' were generated by CIBIO. Sequences were aligned using MAFFT (Katoh & Standley 2013). Aligned sequences were analysed in Seaview (Gouy *et al*. 2010) using a maximum likelihood analysis (GTR + G with no partitioning) which was run with 1000 bootstraps. Intra- and interspecific distances were calculated using MEGA-X (Kumar *et al*.

2018). Outgroup taxa were selected based on the phylogenetic analysis of Pisanty *et al*. (2022b), with the selected outgroup species coming from a subgenus basal to those included in each analysis.

In order to update the faunal total for Morocco, the baseline of Lhomme *et al*. (2020) was used. For distributions, countries marked with an '*' indicate that the records presented here represent the first published record for that country. Pollen was removed from female *Andrena* specimens in order to characterise the pollen foraging niche of understudied Moroccan species. Specimens were selected from the Canary Islands, North Africa, and in some cases Sicily and southern Israel. Pollen was removed, processed, and identified following the methodology of Wood & Roberts (2018). Dietary classification follows Müller & Kuhlmann (2008).

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 to the nearest 0.5 mm. Photographs 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 5X infinity corrected objective lens. 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) in order to improve lighting to highlight specific characters.

The following abbreviations are used in the species descriptions: A = antennal segments; S = metasomal sterna; T = metasomal terga. Subgeneric concepts follow Pisanty *et al*. (2022b) with the necessary modifications made by Wood (2023) and otherwise detailed below. In diagnoses, the defining characters of a species are given, with those of the indicated comparison species given in parentheses.

The following abbreviations are used for collections:

AMC	=	Personal collection of Andreas Müller, Wädenswil, Switzerland
DEI	=	Deutsches Entomologisches Institut, Müncheberg, Germany
IRCR	=	International Center for Agricultural Research in the Dry Areas research collection, Rabat, Morocco
MNHN	=	Muséum national d'histoire naturelle, Paris, France
MRSN	=	Museo Regionale di Scienze Naturali di Torino, Turin, Italy
NHMUK	=	Natural History Museum, London, United Kingdom
NMPC	=	National Museum of Natural History, Prague, Czech Republic
OÖLM	=	Oberösterreichisches Landesmuseum, Linz, Austria
PRUN	=	Research collection of Christophe Praz, University of Neuchatel, Switzerland
RMNH	=	Naturalis Biodiversity Center, Leiden, the Netherlands
SMNHTAU	=	Steinhardt Museum of Natural History, Tel Aviv University, Israel
TJWC	=	Personal collection of Thomas J. Wood, Mons, Belgium
TUZ	=	Zoological Museum of the University of Turku, Turku, Estonia
ZMHB	=	Museum für Naturkunde, Berlin, Germany

Results

The results are divided into nine sections. First, (1) genetic data that support necessary taxonomic changes are presented. Then several taxonomic sections are presented, (2) the designation of lectotypes and (3) neotypes, (4) new synonymies, (5) new species descriptions, (6) new descriptions of *Andrena* species previously known from a single sex, (7) *Andrena* taxa with a new status, (8) a summary of species added to or removed from the Moroccan *Andrena* fauna, and finally (9) the dietary niches of *Andrena* species in north-western Africa.

1. Genetic analysis

A large quantity of pertinent genetic data for Moroccan *Andrena* was presented by Wood (2023). The data presented here are supplementary and deal with issues affecting only the North African fauna; they are targeted specifically to address problematic subgenera that were not dealt with in the previous publication.

Subgenus ***Aciandrena*** Warncke, 1968

The subgenus *Aciandrena* is species-rich and contains a swarm of poorly-understood or undescribed diversity in dry desert and Mediterranean environments in North Africa and the Middle East. Females are often inseparable, and genetic analyses or the usually distinctive male genital capsules are typically required to define species boundaries (e.g., Wood *et al*. 2020; Pisanty *et al*. 2022a). Moreover, the subgenus *Aciandrena* sensu Warncke is polyphyletic and contains multiple lineages (Pisanty *et al*. 2022b). This can be seen to a certain extent with COI analysis (Fig. 1), although COI analysis has limited power to resolve deeper phylogenetic relationships (Trunz *et al*. 2016, though see also Talavera *et al*. 2022). At the present time, it is not clear how to effectively differentiate these lineages, and so a broad *Aciandrena* concept is adopted here. A specimen from high altitude in the Middle Atlas generated a sequence that is closest to two eastern species, *A. curviocciput* Pisanty & Wood, 2022 (12.77%; Israel, Lebanon, Turkey) and *A. israelica* Scheuchl & Pisanty, 2016 (13.03%, range 12.64–13.42%; Turkey, Syria, Israel and the

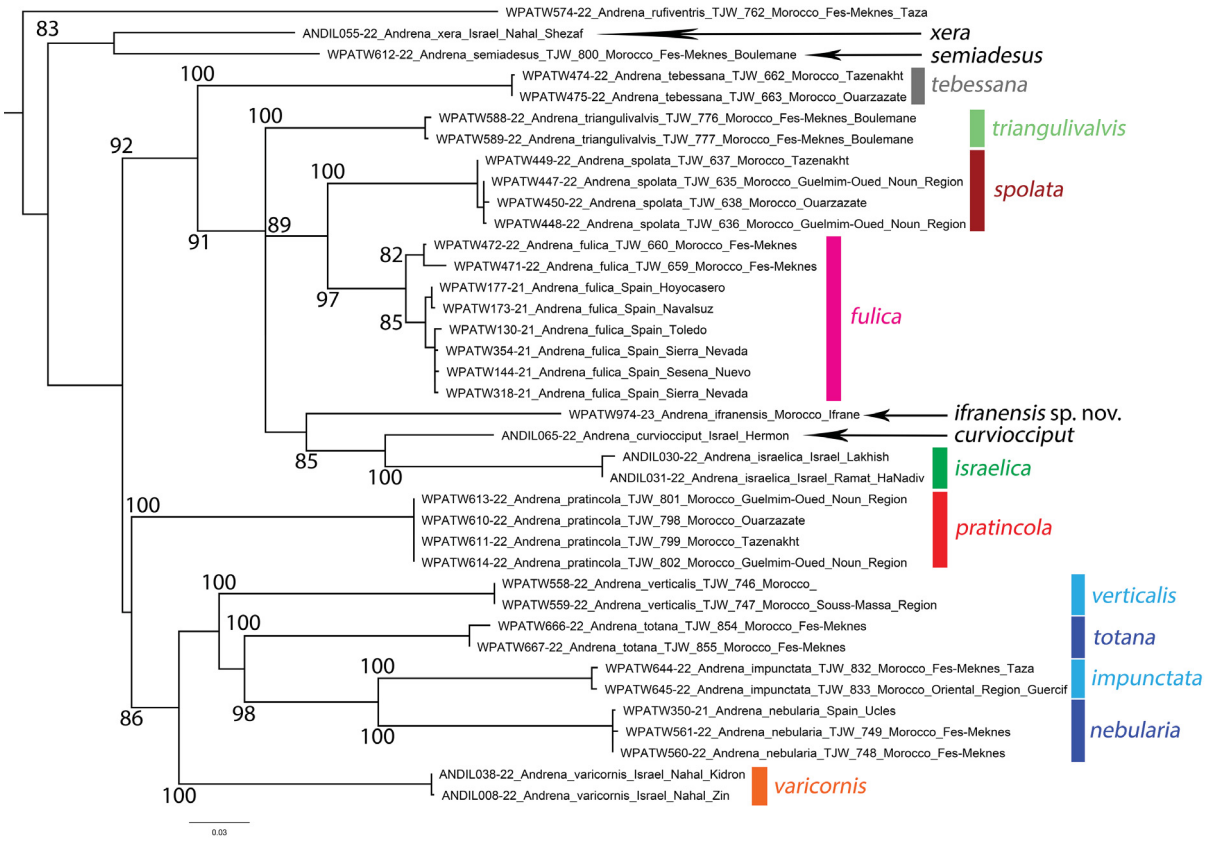

Fig. 1. Phylogenetic tree (maximum likelihood) of *Andrena* subgenus *Aciandrena* Warncke, 1968 based on the mitochondrial COI gene. Numbers adjacent to branches represent bootstrap support (values of < 75 are omitted). Species belonging to the subgenus *Graecandrena* Warncke, 1968 are marked in different shades of blue, and species belonging to the subgenus *Parandrenella* Popov, 1958 are marked in grey.

West Bank, Jordan). The species is also morphologically distinct from these comparison species, and it is described below as *Andrena ifranensis* sp. nov.

Subgenus ***Chrysandrena*** Hedicke, 1933

Members of the subgenus *Chrysandrena* are principally separated from the subgenus *Euandrena* Hedicke, 1933 in the female sex by the presence of plumose scopal hairs, since all known *Chrysandrena* species are specialists of Asteraceae, with Asteraceae-specialised bees often displaying dense, finely plumose, or branched scopal hairs (e.g., Linsley 1958; Linsley & MacSwain 1958; Moldenke 1979; pers. obs. for the genus *Andrena*), whereas *Euandrena* are not (either polylectic or specialists on other botanical families). The statuses of these two subgenera were recently confirmed as reciprocally monophyletic in the Old World (Pisanty *et al*. 2022b). This result was also found with a simple COI analysis (Fig. 2). The placement of *A. testaceipes* is also notable, as it was previously included in the subgenus *Margandrena* Warncke, 1968. The confusion surrounding its placement is discussed below in the new synonymies section; it can now be confidently placed in *Chrysandrena* based on morphology and this genetic result.

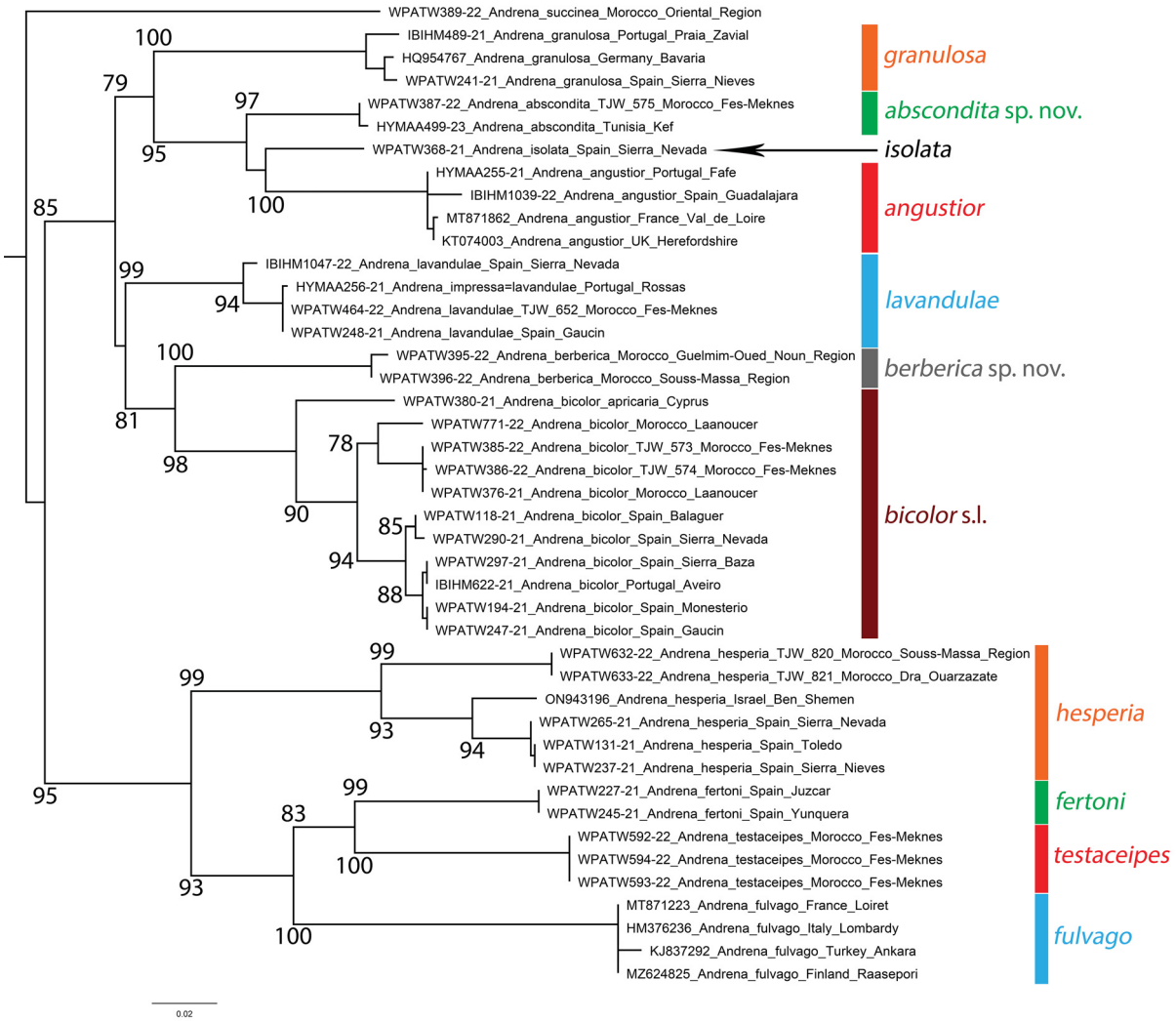

Fig. 2. Phylogenetic tree (maximum likelihood) of *Andrena* subgenera *Chrysandrena* Hedicke, 1933 and *Euandrena* Hedicke, 1933 based on the mitochondrial COI gene. Numbers adjacent to branches represent bootstrap support (values of <75 are omitted).

Subgenus ***Euandrena*** Hedicke, 1933

Wood (2023) identified a new species of *Euandrena* from the Sierra Nevada mountains in southern Spain (*Andrena isolata* Wood, 2023) that has black and orange pubescence and which consequently morphologically resembles *A. bicolor* Fabricius, 1775, but which is strongly distinct genetically. The sequence was closest to a sequence from the Moroccan Middle Atlas; an additional sequence from Tunisia is now available. The Moroccan and Tunisian sequences were separated by 0.38% and formed a clade with a bootstrap support of 97 (Fig. 2). The sequences from the Middle Atlas and Tunisia were separated from *A. isolata* by an average genetic distance of 5.08% (range 4.89–5.26%), and specimens show small morphological differences that are detailed below. They were also separated from *A. bicolor* by an average of 9.21% (range 8.27–10.53%). They are described below as *Andrena abscondita* sp. nov., distinct from both *A. bicolor* and *A. isolata*.

Additional sequences were generated from specimens also resembling *A. bicolor* from the Anti-Atlas Mountains in south-western Morocco. These sequences were strongly separated from *A. bicolor* by an average of 8.49% (range 7.89–9.40%). They formed a clade basal to the *A. bicolor* sensu lato clade (see Praz *et al*. 2019) with a bootstrap support of 100. When considering only *A. bicolor* sequences from Morocco, average separation was slightly higher at 8.83% (range 8.27–9.40%). This taxon from the Anti-Atlas is therefore described below as *Andrena berberica* sp. nov. on the basis of this genetic distance, as well as morphological differences that are given below. Therefore, three *Euandrena* species can be found in Morocco with the general colouration pattern of *A. bicolor*; *A. abscondita* sp. nov., *A. berberica*, and *A. bicolor*, illustrating the problems within this subgenus highlighted by Wood (2023; see also Praz *et al*. 2019; Pisanty *et al*. 2022a).

Subgenus ***Micrandrena*** Ashmead, 1899

Genetic analysis of the COI gene identified three undescribed *Micrandrena* species in Morocco (Fig. 3). The first is a species from the Anti-Atlas Mountains in south-western Morocco that is morphologically close to *A. tenuistriata* Pérez, 1895 but with more densely punctate terga. This species was strongly separated from *A. tenuistriata* by an average genetic distance of 10.79% (range 9.59–11.44%). Intraspecific variation was quite high at 4.00% (range 0.59–5.70%), as specimen WPATW726-22 (a male) was strongly divergent from specimens WPATW725-22 (a male) and WPATW724-22 (the holotype female). However, the two males were collected at the same site on the same day, and do not show any apparent morphological differences. Moreover, *A. tenuistriata* shows some level of intraspecific variation (2.16%; range 0.00–4.56%). As such, this genetic difference is not considered to represent anything more than variation. The holotype is designated from the female specimen and the species is described below as *A. gemina* sp. nov.

A second species was identified from the High Atlas that was also placed close to *A. tenuistriata* and *A. gemina* sp. nov., separated by 10.84% (range 10.06–11.55%) and 11.15% (range 10.24–11.58%), respectively. Morphologically it is close to *A. pauxilla* Stöckhert, 1935 as both species lack a gradulus at the base of the terga, but the two species were separated by an average of 11.32% (range 10.20–11.62%) and the new species displays consistently sparser punctures on the scutum; it is described below as *A. tinctoria* sp. nov.

Finally, Wood (2023) described *A. ortizi* Wood, 2023 from the Sierra Nevada mountains in southern Spain, and diagnosed it against *A. atlantea* Wood, 2021 from the High and Middle Atlas Mountains and an undescribed *Micrandrena* from the Middle Atlas. This latter taxon is described here as *A. anammas* sp. nov. As in Wood (2023), it is separated from *A. atlantea* (with which it can be found in sympatry) by an average genetic distance of 5.21% (range 5.13–5.28%) and from *A. ortizi* by an average genetic

distance of 6.34% (range 6.31–6.38%). *Andrena anammas* and *A. ortizi* therefore each have strong bootstrap support of 100 and 98, respectively.

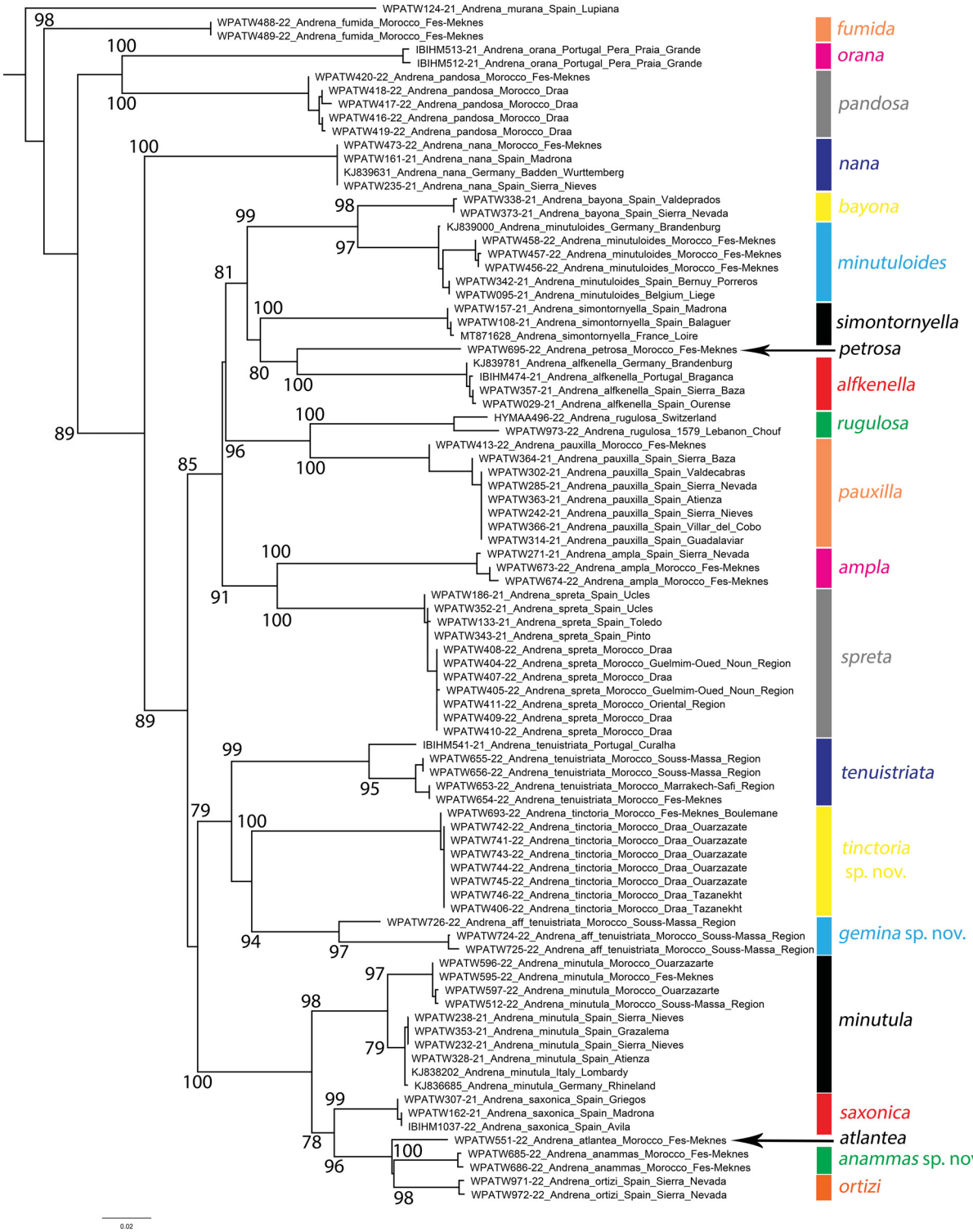

Fig. 3. Phylogenetic tree (maximum likelihood) of *Andrena* subgenus *Micrandrena* Ashmead, 1899 based on the mitochondrial COI gene. Numbers adjacent to branches represent bootstrap support (values of < 75 are omitted).

Subgenus ***Taeniandrena*** Hedicke, 1933

Taeniandrena have recently been revised by Praz *et al*. (2022; predominantly in Europe), with further Iberian revisions (e.g., Wood *et al*. 2021; Wood & Ortiz-Sánchez 2022; Wood 2023). This subgenus contains a large number of cryptic taxa that defy morphological recognition, and may represent an example of explosive adaptive radiation due to their pattern of sometimes extreme local endemism. An analysis of North African *Taeniandrena* material produced several unexpected results.

Andrena lusitania Wood & Ortiz-Sánchez, 2022

This species was described from south-western Spain and central Portugal, where it flies early in the season in March and April (Wood & Ortiz-Sánchez 2022; Wood 2023). A single female specimen was collected from the Col du Zad in the Middle Atlas at an elevation of 2100 m (full collecting details below). The Moroccan specimen differed from the barcode sequence generated from the holotype male of *A. lusitania* (IBIHM998-21) by just 0.72%. The presence of *A. lusitania* in the Middle Atlas further reinforces the ecological link between Iberia and the Middle Atlas as seen here for *Euandrena* and *Micrandrena*, as well as other *Andrena* lineages (Wood 2023).

Material examined

MOROCCO • 1 ♀; Fès-Meknès, Tiguelmamine, Col du Zad; 2100 m a.s.l.; 21 May 2022; T.J. Wood leg.; BOLD: WPATW696-22; TJWC.

Distribution

Portugal, Spain, Morocco* (Wood 2023).

Andrena fuliginata Pérez, 1895, ***Andrena gregaria*** Warncke, 1974, ***Andrena poupillieri*** Dours, 1872, and ***Andrena prazi*** sp. nov.

Praz *et al*. (2022) identified two putative lineages that could refer to the taxon *A. poupillieri*, for which the type series has been lost. Wood (2023) designated a neotype (see Fig. 4) for the lineage called *poupillieri* #2 by Praz *et al*. (2022). This species now has an unambiguous status. The identity of *poupillieri* #1 appears to be *A. gregaria* based on type examination and the generation of additional sequences from Morocco (Fig. 4). This species resembles *A. poupillieri* morphologically, but the terga are much more densely punctate, including punctures on the declivity of T1 (cf. *A. wilkella* (Kirby, 1802)). However, two specimens conforming to this concept had identical barcodes to the barcode of *A. fuliginata* used in the analysis of Praz *et al*. (2022). This *A. fuliginata* specimen (HYMAA289-22) conforms to the type concept (Fig. 5A–D) in that it has short dark hairs on the scutum underlying the longer light brown scutal hairs (Fig. 5B), the hind tibiae are orange, the terga are almost impunctate, including the declivity of T1 (Fig. 5C), and the terminal fringe is dark (Fig. 5D). There appears therefore to be some barcode sharing in this group of species; no taxonomic action is taken, and all sequences are grouped together in a broad *gregaria/fuliginata* aggregate for the time being. This aggregate shows a very low average 'intraspecific' variation of 0.37% (range 0.00–0.68%) and has a bootstrap support of 96.

In contrast, a sister clade was formed next to this aggregate consisting of specimens from Morocco originally identified as *A. russula* Lepeletier, 1841 with dark terga and one specimen from Tunisia with red-marked terga. This clade was separated from the *gregaria/fuliginata* aggregate by an average of 1.92% (range 1.61–2.74%), and has low average intraspecific variation of 0.44% (range 0.00–1.00%); this clade consequently has a bootstrap support of 94. Morphologically, it cannot be confused with either *A. gregaria* or *A. fuliginata*, and so it is described as *A. prazi* sp. nov. (see diagnosis section for this species).

Material examined

ALGERIA • ♀, lectotype of *Andrena fuliginata*; Téniet [Théniet El Had]; MNHN (Fig. 5A–D).

MOROCCO • ♀, holotype of *Andrena gregaria*; Marraquesh [Marrakech]; 1–31 Mar. 1907; Escalera leg.; OÖLM.

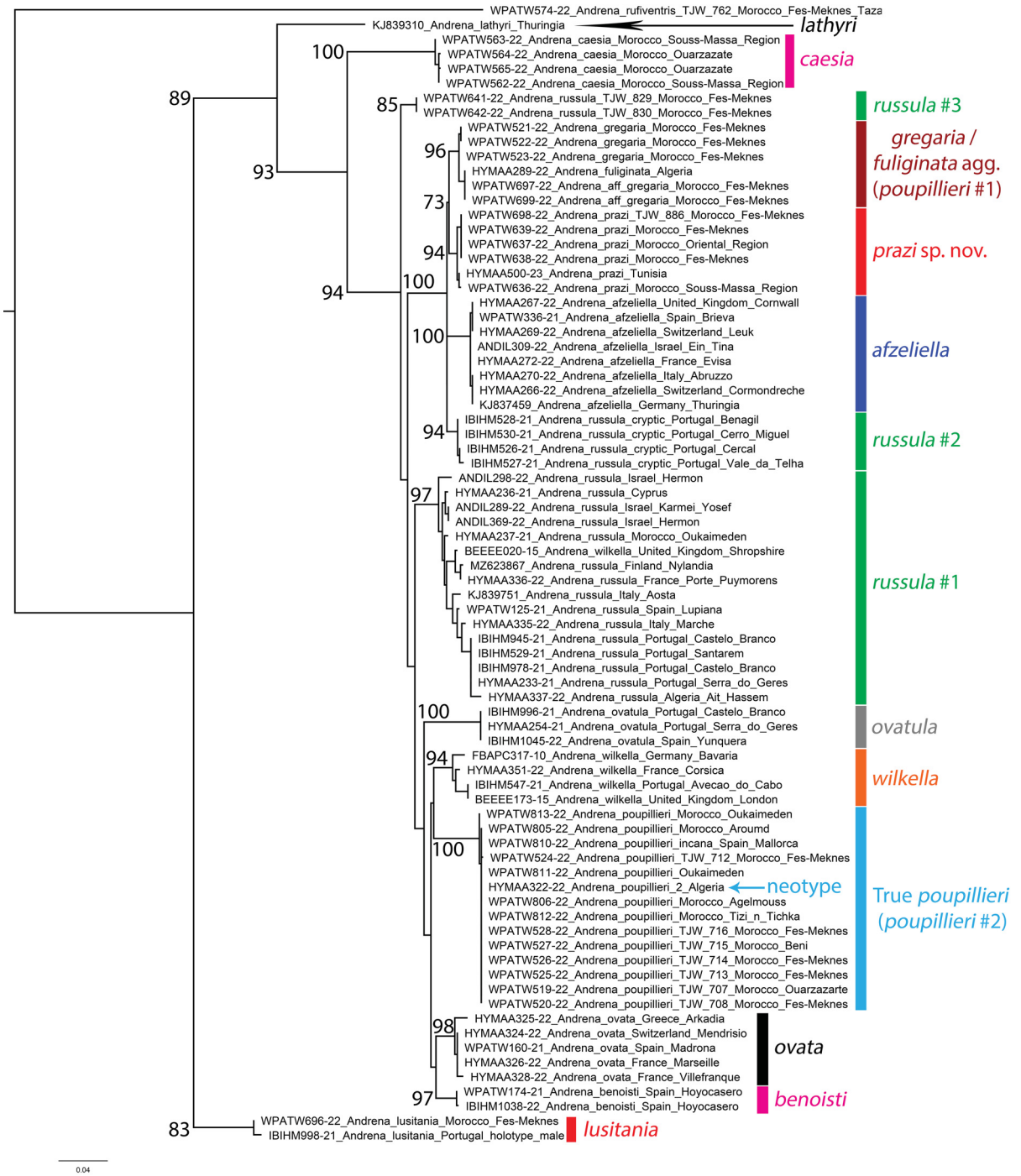

Fig. 4. Phylogenetic tree (maximum likelihood) of *Andrena* subgenus *Taeniandrena* Hedicke, 1933 based on the mitochondrial COI gene. Numbers adjacent to branches represent bootstrap support (values of < 75 are omitted).

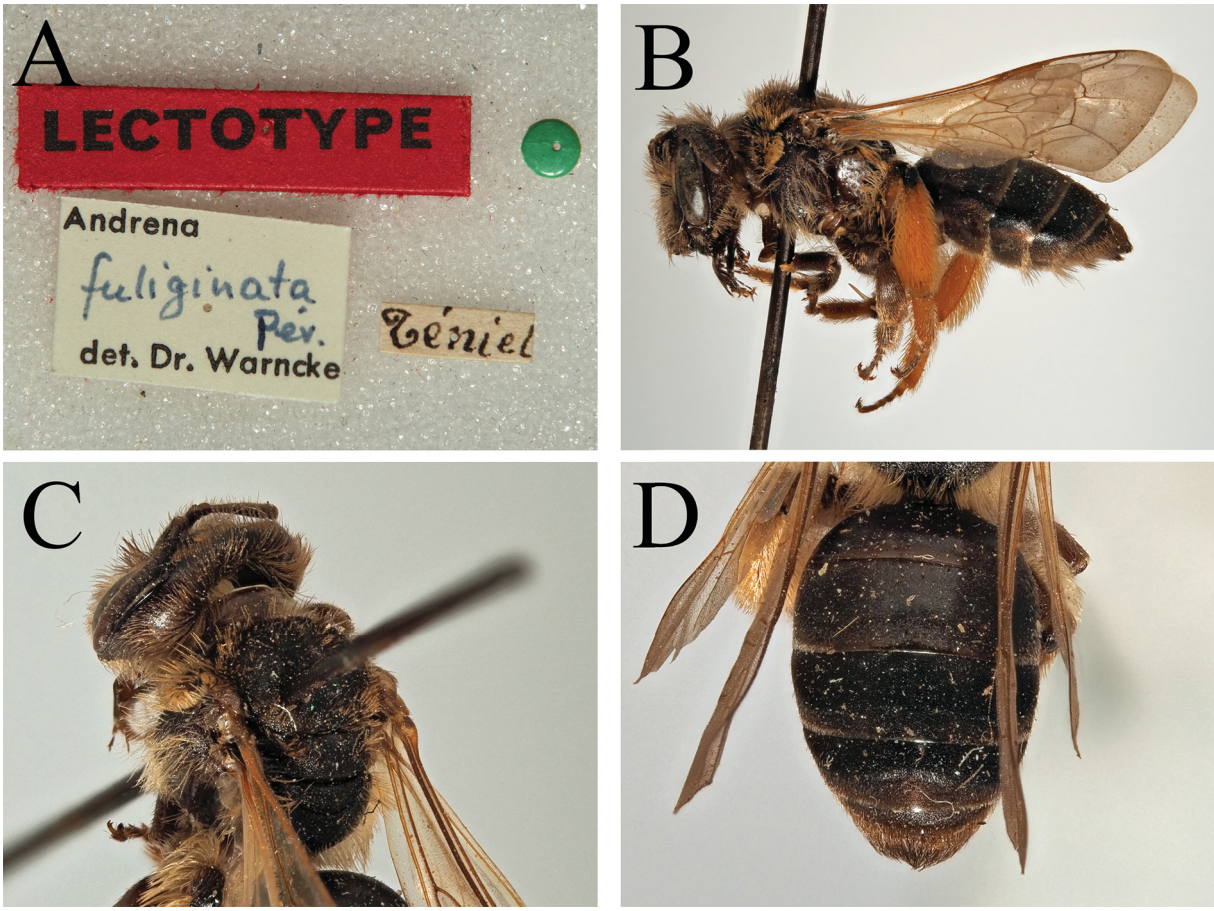

Fig. 5. *Andrena* (*Taeniandrena*) *fuliginata* Pérez, 1895, lectotype, ♀ (MNHN). **A**. Label details. **B**. Lateral habitus. **C**. Scutum, dorsolateral view. **D**. Terga, dorsal view.

2. Lectotype designations

Andrena* (*Melanapis*) *fuscosa Erichson, 1835
Figs 6–7

Andrena (*Melanapis*) *fuscosa* Erichson, 1835: 103, ♂ (Spain: ZMHB).
Andrena (*Melanapis*) *rutila* Spinola, 1838: 510, ♀ (Egypt: MRSN, lectotype by present designation; Fig. 6A–D).
Andrena (*Melanapis*) *ephippium* Spinola, 1838: 511, ♀ (Egypt: MRSN, lectotype by present designation; Fig. 7A–D).

Remarks

Wood (2023) presented genetic data for *A. fuscosa* from Spain, the locus typicus. Whilst this showed that material from Spain was closely related to sequences from Israel and northern India, specimens from Morocco were separated by around 5%. Further study is required to establish whether or not North African material represents a distinct species or simply genetic drift and separation by distance. No morphological differences are immediately apparent. In any case, recognising the next available names is important, these being Spinola's names from Egypt (Spinola 1838). For both taxa, a single female specimen is conserved in the MRSN collection. Both conform to the concept of *A. fuscosa*, though *A. rutila* is extensively red-marked (Fig. 6A–D), and *A. ephippium* is predominantly dark (Fig. 7A–D); this colour variation can be found across the range of *A. fuscosa* without clear geographic gradients or

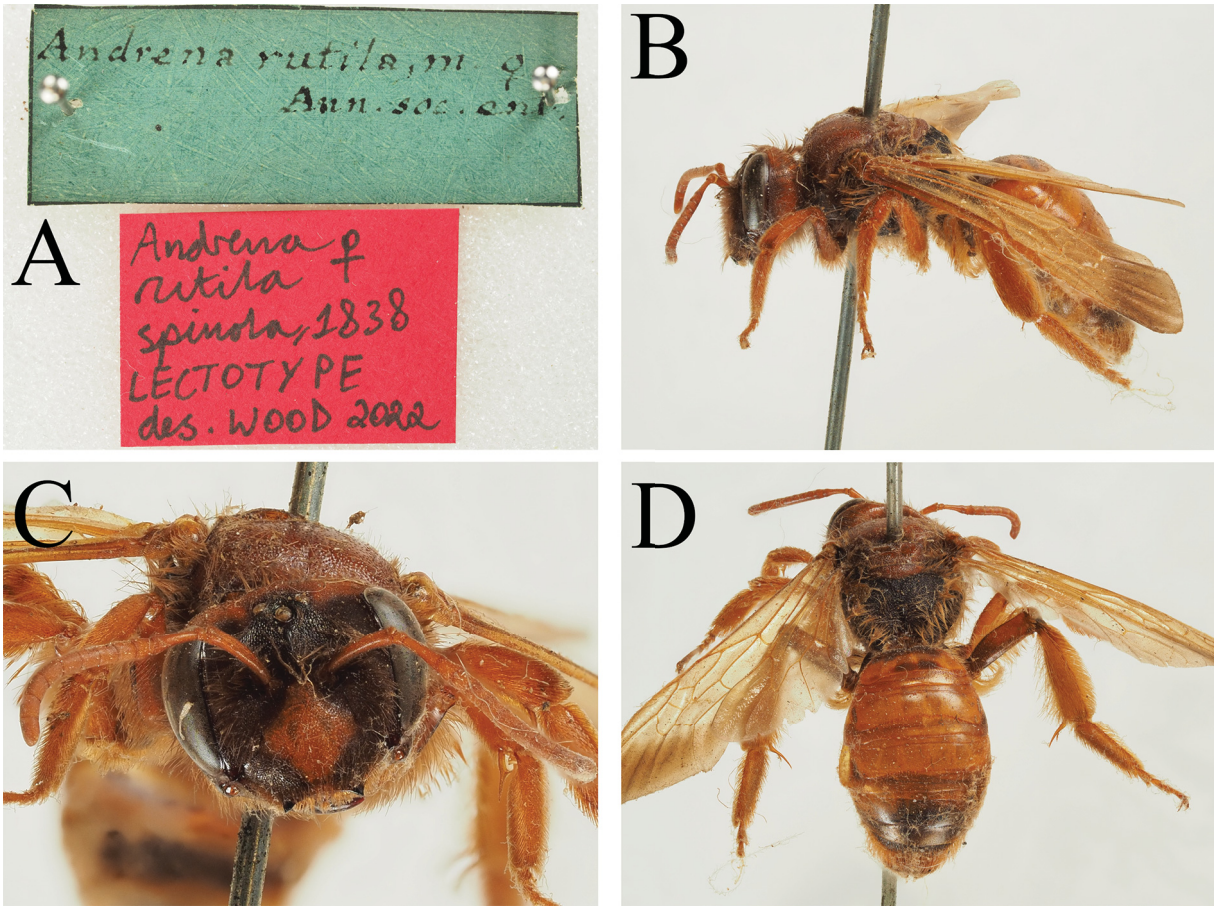

Fig. 6. *Andrena* (*Melanapis*) *fuscosa* Erichson, 1835 (lectotype of *A.* (*M.*) *rutila* Spinola, 1838), ♀ (MRSN). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

patterns other than that red colouration is both more frequent and covers a greater proportion of the body in hotter and drier environments. The *A. ephippium* specimen is damaged and is missing its head, but structurally can clearly be identified as *A. fuscosa*. The two specimens may automatically be holotypes, but since this is not clear from Spinola's original descriptions, they are here designated as lectotypes.

Distribution

Palaearctic, from the Canary Islands to Central Asia and northern India (Gusenleitner & Schwarz 2002).

Andrena* (*Suandrena*) *savignyi Spinola, 1838
Fig. 8

Andrena (*Suandrena*) *savignyi* Spinola, 1838: 512, ♀ (Egypt: MRSN, lectotype by present designation; Fig. 8A–D).

Remarks

This species is very widely distributed across dry places in the southern Palaearctic. It is beneficial to recognise the type material of Spinola. In contrast to *A rutila* and *A. ephippium*, three specimens are conserved in the Spinola collection under *A. savignyi*. Two of them, however, are female *Melitta aegyptiaca* (Radoszkowski, 1891), a species that is superficially similar due to its red-marked T1–2. Fortunately, the third specimen is a female *A. savignyi* (Fig. 8A–D). Spinola's description (Spinola

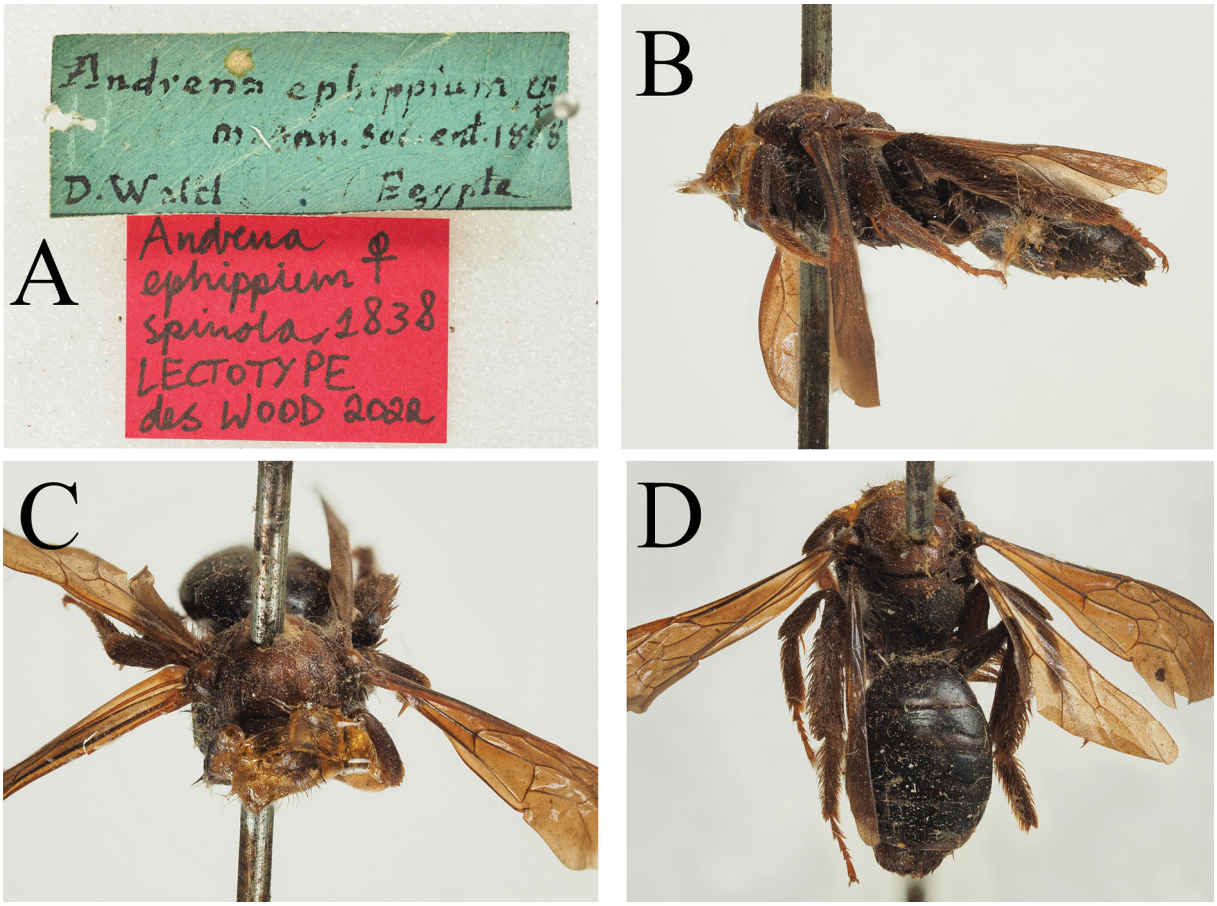

Fig. 7. *Andrena* (*Melanapis*) *fuscosa* Erichson, 1835 (lectotype of *A.* (*M.*) *ephippium* Spinola, 1838), ♀ (MRSN). **A**. Label details. **B**. Lateral habitus. **C**. Body, frontal view. **D**. Terga, dorsal view.

1838) is ambiguous, and mostly covers the colouration of the pubescence and the body, and is hence ambiguous and could refer to either species. The *Andrena* specimen is therefore designated as a lectotype to ensure the correct application of this name by future workers, and to conserve the name *M. aegyptiaca* in its current sense.

Distribution

Palaearctic, from the Canary Islands to northern India (Gusenleitner & Schwarz 2002).

3. Neotype designations

Andrena* (*Melandrena*) *soror Dours, 1872
Fig. 9

Andrena (*Melandrena*) *soror* Dours, 1872: 419, ♀ (Spain: OÖLM, neotype by present designation; Fig. 9A–D).

Material examined

Neotype

SPAIN • ♀; Madrid, 6 km N of Chinchón, M-311; 40.1800° N, 3.4465° W; 14 May 2021; T.J. Wood leg.; OÖLM.

Fig. 8. *Andrena* (*Melanapis*) *savignyi* Spinola, 1838, lectotype, ♀ (MRSN). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

Other material (illustrative)

MOROCCO • 1 ♀; Midelt; 25 May 1947; J. de Beaumont leg.; MNHN.

SPAIN • 1 ♀; Montarco; 10 May 1933; J.M. Dusmet and Alonso leg.; OÖLM.

TURKEY • 1 ♂, 1 ♀; Hakkâri, Suvari Halil-Pass; 2500 m a.s.l.; 2 Jun. 1980; M. Schwarz leg.; OÖLM.

Remarks

Dours (1872) described *A. soror* from Algeria and Spain. The identity of this species has been clear, but as Dours' collection is destroyed, there is the potential for taxonomic instability due to the lack of type material. *Andrena soror* is a rare species found in steppe environments in Spain, Morocco, and Turkey (Gusenleitner & Schwarz 2002). However, it has not been confidently recorded from Algeria, as this country mostly lacks the dry steppe environments favoured by *A. soror*. It is not clear whether Dours was using a broad concept of 'Algeria' that could have applied to other parts of north-western Africa, or whether he misidentified specimens, as is suspected for *A. griseobalteata* Dours, 1872, which was described from France and Algeria but is not known from North Africa. Following the neotype designation for *A. griseobalteata* using material from France (Wood 2023), a neotype is here designated for *A. soror* using Spanish material in order to decisively fix the concept of this taxon in line with its current usage (Fig. 9). *Andrena soror* has therefore not reliably been recorded from the Algerian fauna.

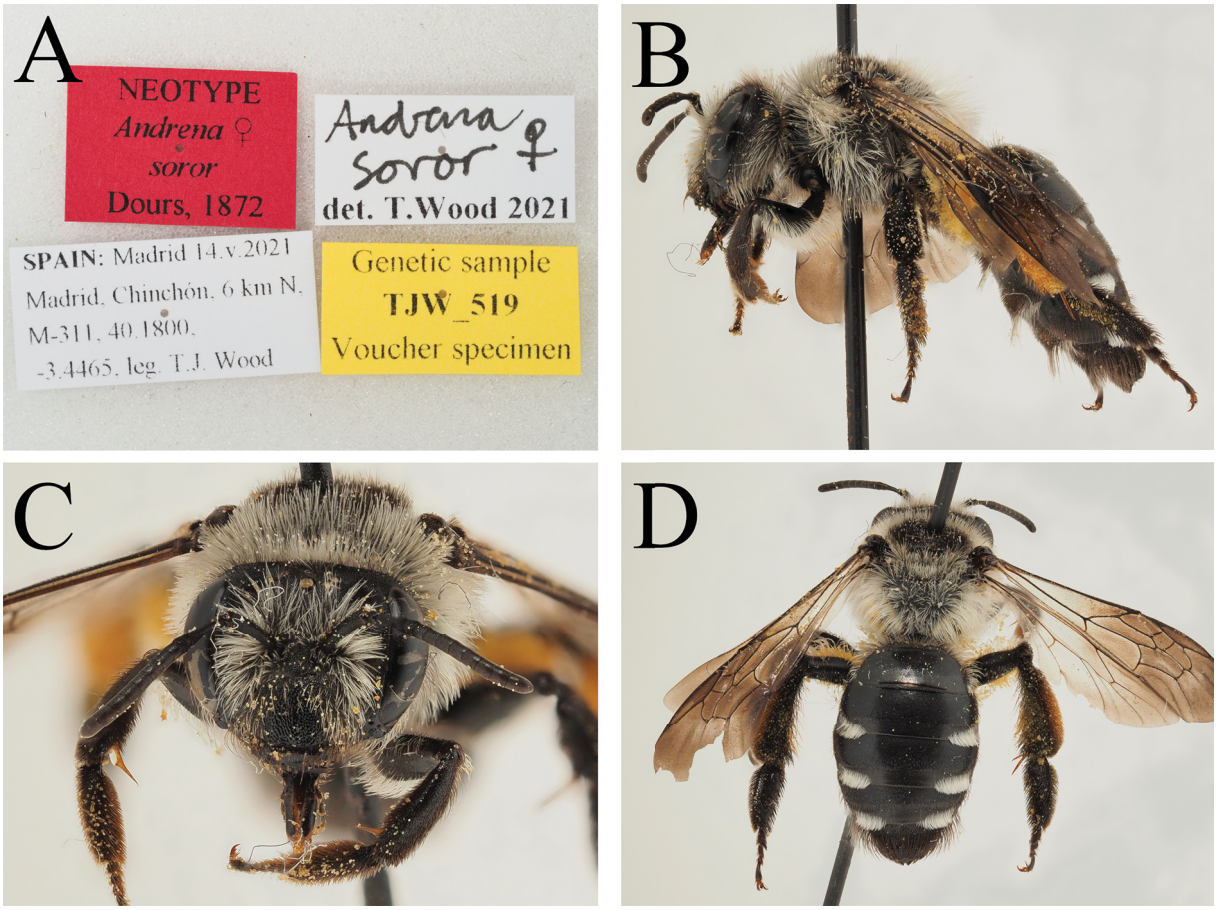

Fig. 9. *Andrena* (*Melandrena*) *soror* Dours, 1872, neotype, ♀ (OÖLM). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

Distribution

Spain, Morocco, Turkey (Gusenleitner & Schwarz 2002).

Andrena (*Notandrena*) *nigroviridula* Dours, 1873
Fig. 10

Andrena (*Notandrena*) *nigroviridula* Dours, 1873: 284, ♀♂ (Morocco: OÖLM, neotype by present designation; Fig. 10A–D).
Andrena (*Notandrena*) *viridiaenea* Pérez, 1903: 86, ♀♂ (Algeria: MNHN).

Material examined

Neotype
MOROCCO • ♀; Fès-Meknès, Taza, R507, 2 km N of Ras El Ma; 750 m a.s.l.; 34.1681° N, 4.0080° W; 10 May 2022; T.J. Wood leg.; BOLD: WPATW619-22; OÖLM.

Other material (lectotype of *A. viridiaenea*)
ALGERIA • 1 ♀; [no further information]; MNHN.

Remarks

Dours (1873) described *A. nigroviridula* from Algeria. As for all of Dours' types, the original material has been destroyed. In this context, it is beneficial to designate a barcoded neotype so that the concept can

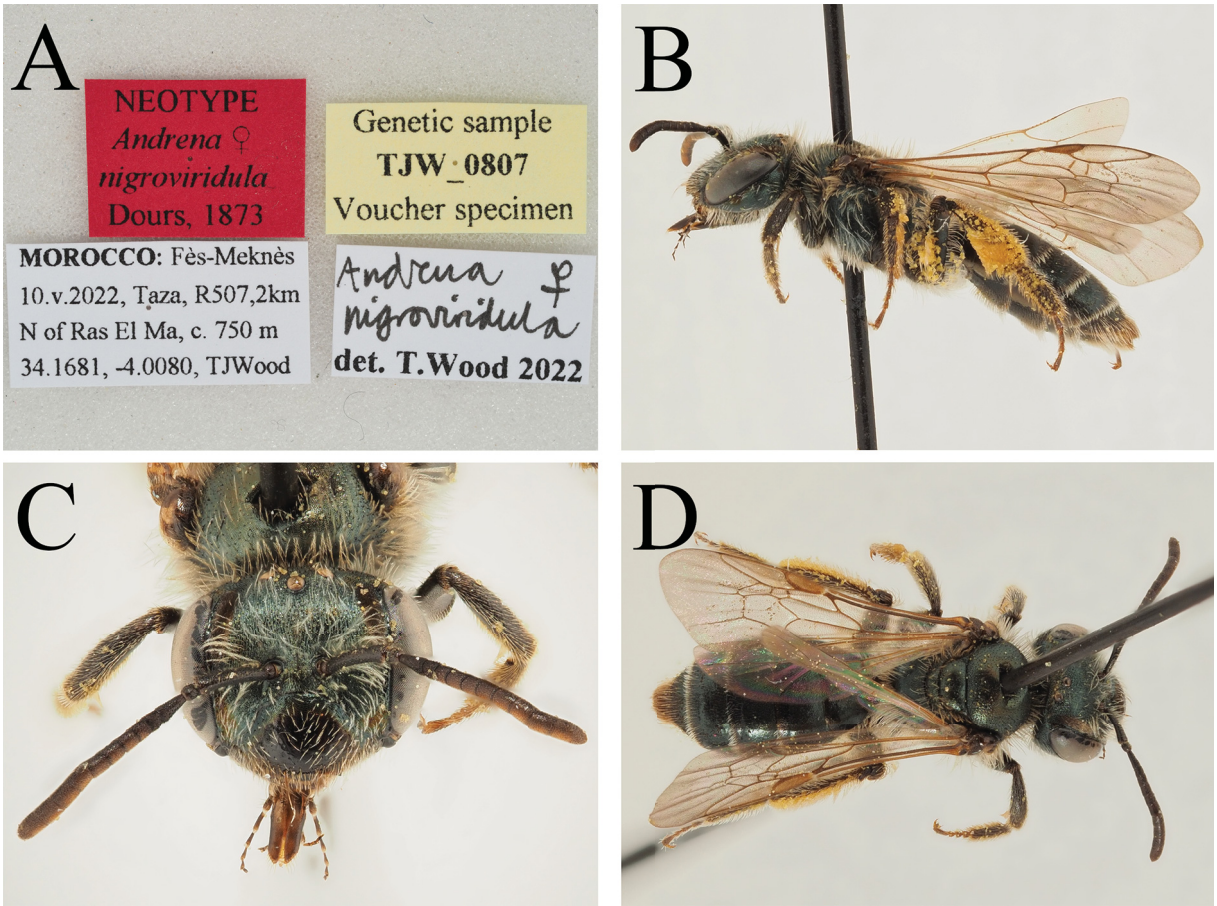

Fig. 10. *Andrena* (*Notandrena*) *nigroviridula* Dours, 1873, neotype, ♀ (OÖLM). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

be fixed for current and future workers (Fig. 10). Additionally, *A. viridiaenea* was listed as a synonym of *A. aerinifrons* Dours, 1873 by Gusenleitner & Schwarz (2002). This resulted from an inconsistent listing by Warncke (1967), who gave it as a synonym of *A. nigroviridula* on p. 193 and a synonym of *A. aerinifrons* on p. 317. Based on the examined lectotype in the MNHN collection (des. Warncke 1967), *A. viridiaenea* is returned to synonymy with *A. nigroviridula*.

Distribution

Portugal, Spain, Italy (Sicily), Morocco, Algeria, Tunisia (Gusenleitner & Schwarz 2002).

4. New synonymies

Andrena* (*Aciandrena*) *nitidilabris Pérez, 1895
Fig. 11

Andrena (*Aciandrena*) *nitidilabris* Pérez, 1895: 46, ♀ (Tunisia: MNHN).
Andrena (*Graecandrena*) *montarca parva* Warncke, 1974: 45, ♀♂ (Tunisia: OÖLM). **Syn. nov.**

Material examined

TUNISIA • ♀, lectotype of *A. nitidilabris* (Fig. 11A–F); Kérouan [Kairouan]; MNHN • ♀, holotype of *A. montarca parva*; Gafsa; 17 Mar. [year unknown]; OÖLM.

Remarks

Inspection of the MNHN collection revealed that the lectotype of *A. nitidilabris* (Fig. 11A–F) was correctly designated by Warncke (1967), but that the species was misinterpreted and later redescribed as *A. montarca parva* (type photographs at https://www.zobodat.at/belege.php). The lectotype of *A. nitidilabris* has the clypeus weakly but distinctively domed and weakly shagreened, therefore weakly shining (Fig. 11C); in *A. nitidilabris* auctorum the clypeus is strongly flattened and shagreened over the

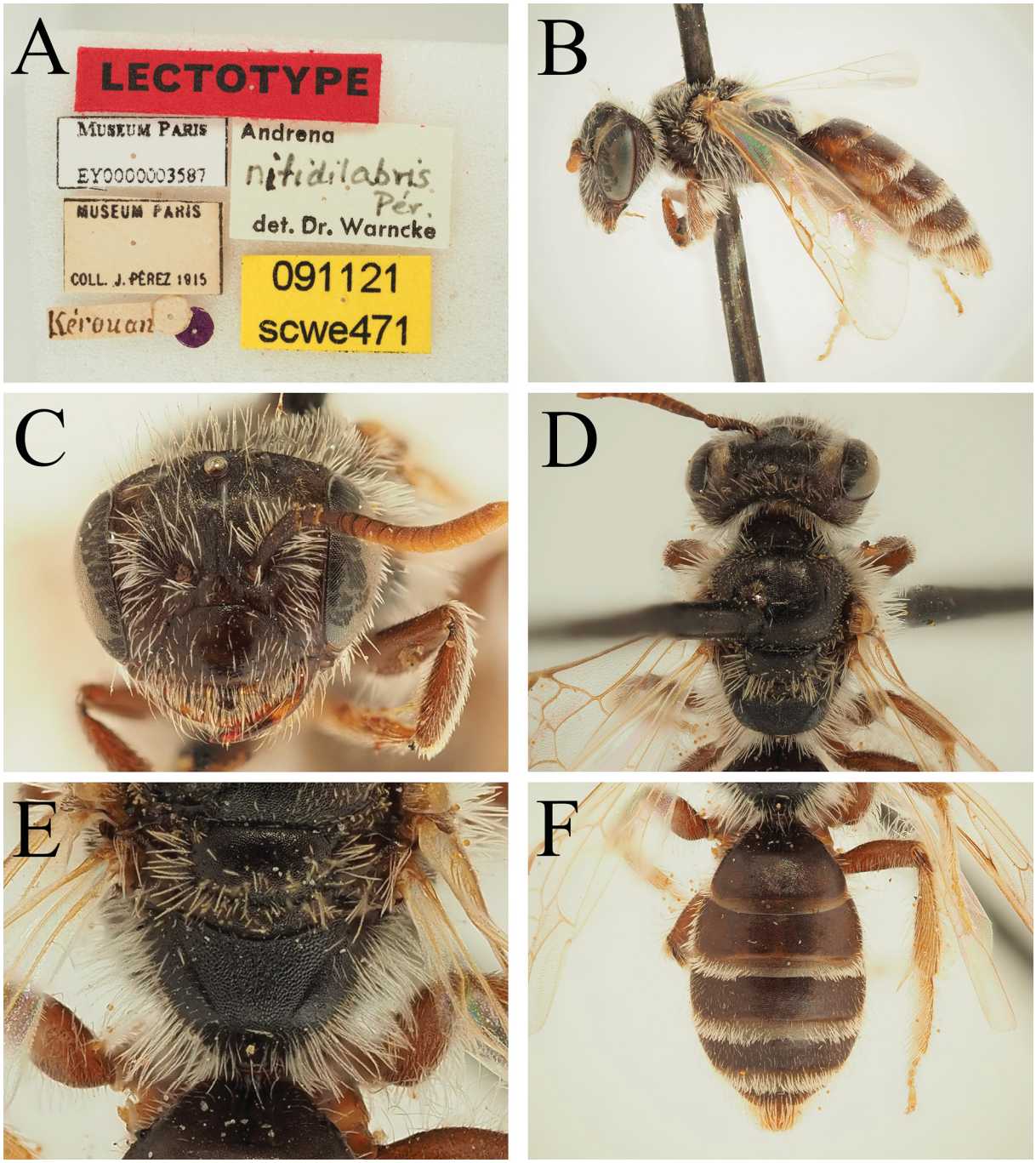

Fig. 11. *Andrena* (*Graecandrena*) *nitidilabris* Pérez, 1895, lectotype, ♀ (MNHN). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Scutum, dorsal view. **E**. Propodeum, dorsal view. **F**. Terga, dorsal view.

majority of its area (cf. *A. verticalis* Pérez, 1895) and only becomes shiny at its apical margin. The taxon referred to as *A. nitidilabris* by Warncke is actually undescribed, and is newly described below as *A. pisantyi* sp. nov.

Warncke (1974) described *A. montarca parva* from Gafsa in central Tunisia. He described it as a subspecies of *A.* (*Graecandrena*) *montarca* Warncke, 1975 (the difference in year priority is due to publication delays; see below for discussion and resolution of priority). This association was always morphologically tenuous – Gusenleitner & Schwarz (2002) noted the weak association of *A. montarca parva* with the other taxa in this grouping and argued that it deserved species status in future revisions due to the weaker terga bands (Fig. 11F), the more granular shagreen of the scutum (Fig. 11D), and the smoother and shinier clypeus (Fig. 11C). All of these characters clearly place it as the junior synonym of *A. nitidilabris*. Kairouan and Gafsa are approximately 180 km apart, so this synonymy makes additional ecological sense. *Andrena nitidilabris* is placed in the subgenus *Aciandrena* based on its morphological features (e.g., the antefurcal nervulus of the forewing, the propodeal triangle with uniform granular shagreen and without basal rugae, Fig. 11E), particularly the simple male genital capsule. Additional genetic data are required to conclusively demonstrate its phylogenetic placement, as for *A. montarca*. From this point onwards, *A. nitidilabris* without qualification refers to the species in the correct sense; *A. nitidilabris* auctorum is used to refer to the taxon sensu Warncke.

Distribution

Algeria and Tunisia (Gusenleitner & Schwarz 2002, as *A. montarca parva*).

Andrena* (*Chrysandrena*) *testaceipes Saunders, 1908
Fig. 12

Andrena (*Chrysandrena*) *testaceipes* Saunders, 1908: 196, ♀ (Algeria: NHMUK).
Andrena (*Chrysandrena*) *colorata* Alfken, 1929: 269, ♀♂ (Libya: ZMHB).
Andrena (*Chrysandrena*) *rubricorpora* Wood, 2021: 465, ♀ (Tunisia: OÖLM). **Syn. nov.**

Andrena cirtana – auctorum, nec. Lucas, 1849.

Material examined

ALGERIA • ♀, lectotype of *A. testaceipes* (Fig. 12A–D); Constantine; 20 May 1895; A.E. Eaton leg.; NHMUK.

LIBYA • 1 ♀; Wadi Kuf; 1 Apr. 1954; K.M. Guichard leg.; NHMUK.

MOROCCO • 5 ♂♂, 1 ♀; Fès-Meknès, Ahermoumou, P5407, immediately NW of Kassioua; 900 m a.s.l.; 15 May 2022; T.J. Wood leg.; TJWC • 1 ♀; SE of Asni, Oukaimeden; 2600 m a.s.l.; 24 Jul. 1985; K.M. Guichard leg.; NHMUK.

TUNISIA • ♀, holotype of *A. rubricorpora*; Zaghodan Mts; 14 May 1993; J. Batelka leg.; OÖLM • 1 ♀, paratype of *A. rubricorpora*; same collection data as for holotype; OÖLM.

Remarks

Confusion has surrounded this taxon since Warncke (1967) used *A. cirtana* Lucas, 1849 to apply to what he considered to be a red-marked species of *Margandrena* (see Warncke 1974 for subgeneric affiliation). Grünwaldt (1976) noted that the name *A. cirtana* cannot apply to this taxon, as the holotype is a male, and the male of *A. cirtana* was described as having a yellow-marked clypeus, whereas Warncke's taxon has the clypeus black. Grünwaldt argued that *A. testaceipes* was therefore the priority name. Warncke (1967) designated a lectotype for *A. testaceipes* (Fig. 12A–D) which fits Saunders' description. Importantly, this taxon does not match the criteria for the subgenus *Margandrena*, and

Fig. 12. *Andrena* (*Chrysandrena*) *testaceipes* Saunders, 1908, lectotype, ♀ (NHMUK). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

instead falls in *Chrysandrena* due to the lack of a strong pronotal angle, and the tibial scopa is composed of strongly plumose hairs. The genital capsule of *A. testaceipes* was illustrated by Scheuchl (2010), where the typical *Euandrena/Chrysandrena* form can be seen. This unclear phylogenetic position led to the description of *A.* (*Chrysandrena*) *rubricorpora* Wood, 2021 from Tunisia (Wood 2021), as it was not clear that *A. testaceipes* was actually a member of *Chrysandrena*. Genetic samples from Morocco clearly place *A. testaceipes* within *Chrysandrena*; it is therefore transferred there, and *A. rubricorpora* is synonymised with it.

One issue remains, which is the status of the true *A. cirtana*. At the moment, its identity is unclear, as Gusenleitner & Schwarz (2002) only listed this taxon in its sensu auctorum. Location and examination of the type series in the MNHN collection is necessary, as it potentially has priority over an existing name given its early description date of 1849. No action will be taken until the type series is located.

Distribution

Morocco, Algeria, Tunisia, Libya, Egypt (Gusenleitner & Schwarz 2002).

Andrena (incertae sedis) ***maidaqi*** Scheuchl & Gusenleitner, 2007

Andrena (*Poecilandrena*) *maidaqi* Scheuchl & Gusenleitner, 2007: 548, ♀♂ (United Arab Emirates: DEI).
Andrena (*Carandrena*) *hoggara* Wood, 2021: 460, ♀ (Algeria: OÖLM). **Syn. nov.**

Material examined (illustrative)

ALGERIA • ♀, holotype of *A. hoggara*; Amsel, 30 km S of Tamanrasset; 1 Apr. 1989; M. Schwarz leg.; OÖLM • 1 ♀, paratype of *A. hoggara*; Tamrit [illegible, presumed to be somewhere in south-eastern Algeria]; 4 May 1987; Strejček leg.; OÖLM.

MOROCCO • 1 ♂; 10 km SW of Akka; 28 Mar. 1986; K. Warncke leg.; OÖLM.

OMAN • 1 ♀; J. Hawrah [exact location unclear]; 1 Apr. 1983; I.L. Hamer leg.; NHMUK.

UNITED ARAB EMIRATES • 1 ♂; 5 ♀♀; Ummal al Qaiwain, NW of Biatah; 7 Mar. 2020; M. Snižek leg.; OÖLM • 4 ♂♂; Wadi Al-Hayl; 23 Feb. 2008; K. Mahamood and A. Polaszek leg.; NHMUK • 1 ♂; Hili [Al Hili]; 6 Jan. 1983; I.L. Hamer leg.; NHMUK • 1 ♀; Al Ain; 26 Mar. 1982; I.L. Hamer leg.; NHMUK • 1 ♂; Ras Al-Khaimah, NW of Munay; 9 Mar. 2019; M. Snižek leg.; OÖLM.

Remarks

Andrena maidaqi was described from the United Arab Emirates. The species is recognisable due to its distinctive male genital capsule and it likely belongs to an undescribed group of desert-dwelling *Andrena* species probably including *A. asluji* Pisanty, 2022, *A. gafsensis* Wood, 2020, *A. helouanensis* Friese, 1899, and *A. tenebricorpus* Wood, 2020 (Pisanty *et al*. 2022a). In the Arabian Peninsula, females have extensively red-marked terga, but are otherwise difficult to recognise structurally due to the absence of strong morphological characters when compared to the distinctive males. Examination of unidentified material in the Warncke collection revealed a dark male specimen from southern Morocco with the genital capsule of *A. maidaqi*. With this information, a re-examination of the type series of *A. hoggara*, described from female specimens from the Hoggar Mountains of southern Algeria, revealed that they are structurally identical to *A. maidaqi* from the United Arab Emirates. The difference is that *A. hoggara* females have predominantly dark terga, with only the marginal areas lightened reddish. This taxon is therefore synonymised with *A. maidaqi*, giving it a distribution across southern Morocco and southern Algeria to the Arabian Peninsula.

Distribution

Morocco*, Algeria*, Oman*, United Arab Emirates (Scheuchl & Gusenleitner 2007).

Andrena* (*Lepidandrena*) *tuberculifera Pérez, 1895

Andrena (*Lepidandrena*) *tuberculifera* Pérez, 1895: 54, ♀♂ (Algeria: MNHN).
Andrena (*Lepidandrena*) *atrorufa* Alfken, 1929: 268, ♀♂ (Libya: ZMHB).
Andrena (*Poecilandrena*) *nigriclypeus* Wood in Wood *et al.*, 2020: 58, ♂ (Algeria: RMNH). **Syn. nov.**

Material examined (illustrative)

ALGERIA • 1 ♂; 20 km N of Maghnia, Bab Taza, stn 14; 9 Apr. 1983; R. Leys and P.v.d. Hurk leg.; RMNH • 1 ♂; Tlemcen, 20 km N of Maghnia, Bab Taza; 9 Apr. 1983; R. Leys and P.v.d. Hurk leg.; RMNH • 12 ♂♂, 3 ♀♀; Mansourah, stn 18; 11 Apr. 1983; R. Leys and P.v.d. Hurk leg.; RMNH.

MOROCCO • 1 ♂, 1 ♀; SE of Asni, Oukaimeden; 2600 m a.s.l.; 24 Jul. 1985; K.M. Guichard leg.; NHMUK • 2 ♂♂, 3 ♀♀; High Atlas, 5 km S of Tizi-n-Test (Marrakech-Taroudant Rd); 5 Apr. 1983; G.R. Else leg.; NHMUK • 7 ♀♀; Ifrane env.; 9 May 1997; K. Deneš leg.; OÖLM • 1 ♀; Fès-Meknès, Azrou, 4 km SWW of Bakrit, Cascades Bakrit; 1650 m a.s.l.; 17 May 2022; T.J. Wood leg.; TJWC.

TUNISIA • 1 ♀; Grombalia env.; 18 Mar. 1996; K. Deneš leg.; OÖLM.

Remarks

The description of *A. nigriclypeus* was premature and was based on an incorrect subgeneric affiliation (*Poecilandrena* rather than *Lepidandrena*). Examination of more material from North Africa clearly demonstrates that *A. nigriclypeus* is a simple synonym of *A. tuberculifera*, a species which has a slightly unusual genital capsule for a member of *Lepidandrena*. The species clearly belongs in this subgenus based on female morphology.

Distribution

Morocco, Algeria, Tunisia, Italy (Sicily), Libya (Gusenleitner & Schwarz 2002).

Andrena* (*Notandrena*) *albohirta Saunders, 1908
Fig. 13

Andrena (*Notandrena*) *albohirta* Saunders, 1908: 198, ♂ (Algeria: NHMUK).
Andrena (*Notandrena*) *decaocta* Warncke, 1967: 196 (unnecessary replacement name for *A. albohirta*)
Andrena (*Notandrena*) *eddaensis* Gusenleitner, 1998: 110, ♀♂ (Tunisia: OÖLM). **Syn. nov.**

Material examined

ALGERIA • 1 ♂, syntype of *A. albohirta* (Fig. 13A–D); Biskra; 10 Feb. 1894; A.E. Eaton leg.; NHMUK.

MOROCCO • 1 ♀; E of Tagmout; 26 Mar. 1986; K. Warncke leg.; OÖLM.

TUNISIA • ♀, holotype of *A. eddaensis*; Toseur; 15 Apr. 1981; M. Schwarz leg.; OÖLM • 75 ♂♂, 5 ♀♀, paratypes of *A. eddaensis*; 10 km S of Ben Gardane; 17 Feb. 1992; K. Warncke leg.; OÖLM • 1 ♀; Hammamet; 5–19 May 1998; M. Hradský leg.; OÖLM • 4 ♂♂; S of Kebili [Qibilī], Blidette village; 25 Mar. 2006; J. Batelka leg.; OÖLM • 1 ♀; Tozeur; 4–7 Apr. 1985; P. v. Ooijen leg.; RMNH.

Remarks

Warncke (1967) proposed the replacement name *A. decaocta* for *A. albohirta* (Fig. 13A–D), arguing that it was a junior secondary homonym of *Cilissa albihirta* Ashmead, 1890, which is a synonym of *Andrena frigida* Smith, 1853 (Gusenleitner & Schwarz 2002). However, this is unnecessary, as there is a one-letter difference between the two names (ICZN 1999; Article 57.6) and this difference does not meet the exceptional criteria established by Article 58 (Variant spellings of species-group names deemed to be identical). Importantly, Warncke noted that he did not know the corresponding female. He placed the species in the subgenus *Graecandrena* (Warncke 1968, misspelt as *A. decaocto*). Confusingly, he did not list this species in his North African revision (Warncke 1974). Its identity has thus remained obscure in the writings of Warncke.

Gusenleitner (1998) described *A. eddaensis* from Tunisia (type photographs on https://www.zobodat.at/belege.php), comparing it to *A. decaocta*, noting that the subgeneric placement of the latter taxon was unclear. Gusenleitner & Schwarz (2002) later moved *A. decaocta* to the subgenus *Carandrena* (= *Notandrena*). Examination of *A. eddaensis* material shows that it is conspecific with *A. albohirta*, as males are identical. In the differential diagnosis, Gusenleitner (1998) separated *A. eddaensis* from *A. decaocta* based primarily on female characters. However, the female of *A. albohirta* was never formally described. Gusenleitner (1998) stated that the female foveae are broader in *A. eddaensis* and the hind legs of the female *A. albohirta* are yellow with comparatively looser scopal hairs. It is not clear whether Gusenleitner was comparing female *A. eddaensis* to females of a different species. Based on male morphology, *A. eddaensis* is clearly a junior synonym of *A. albohirta*, which is revalidated as the correct name for this species.

Distribution

Morocco, Algeria, Tunisia (Gusenleitner & Schwarz 2002, as *A. eddaensis*).

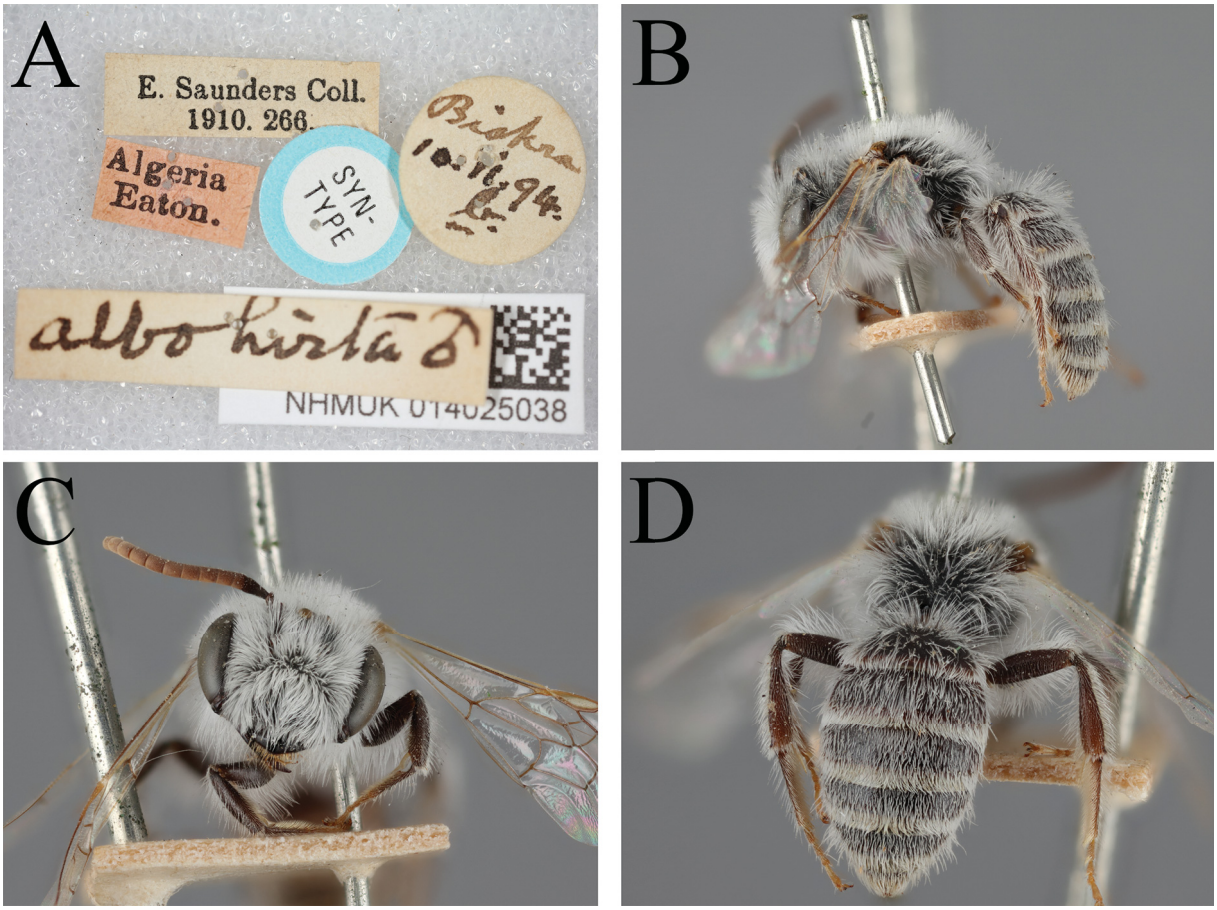

Fig. 13. *Andrena* (*Notandrena*) *albohirta* Saunders, 1908, syntype, ♂ (NHMUK). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

Andrena* (*Notandrena*) *microthorax Pérez, 1895
Figs 14–15

Andrena (*Notandrena*) *microthorax* Pérez, 1895: 38, ♀ (Algeria: MNHN).
Andrena (*Notandrena*) *nigrocyanea* Saunders, 1908: 203, ♀♂ (Algeria: NHMUK). **syn. nov.**

Material examined

ALGERIA • ♀, lectotype of *A. microthorax* (Fig. 14A–D); Biskra; MNHN • 1 ♂, syntype of *A. nigrocyanea* (Fig. 15A–D); Biskra; 8 Feb. 1894; A.E. Eaton leg.; NHMUK.

MOROCCO • 1 ♀; Rabat-Salé-Kénitra, Haouafat; 20 m a.s.l.; 12 Apr. 2021; Y. Bencharki leg.; IRCR • 1 ♀; Rabat-Salé-Kénitra, Ouled Ben Hammadi; 54 m a.s.l.; 12 Apr. 2021; Y. Bencharki leg.; IRCR.

TUNISIA • 1 ♂; La Marsa [Tunis]; 1–30 Apr. 1930; R. Meyer leg.; OÖLM • 1 ♂; Thelepte; 14 Apr. 1998; K. Deneš leg.; OÖLM.

Remarks

Warncke (1967) commented that he had a male specimen from La Marsa in Tunisia which matched Saunders' type, but that he was not sufficiently confident that this species was synonymous with *A. microthorax*. Confusingly, he then only listed *A. microthorax* but not *A. nigrocyanea* in his North

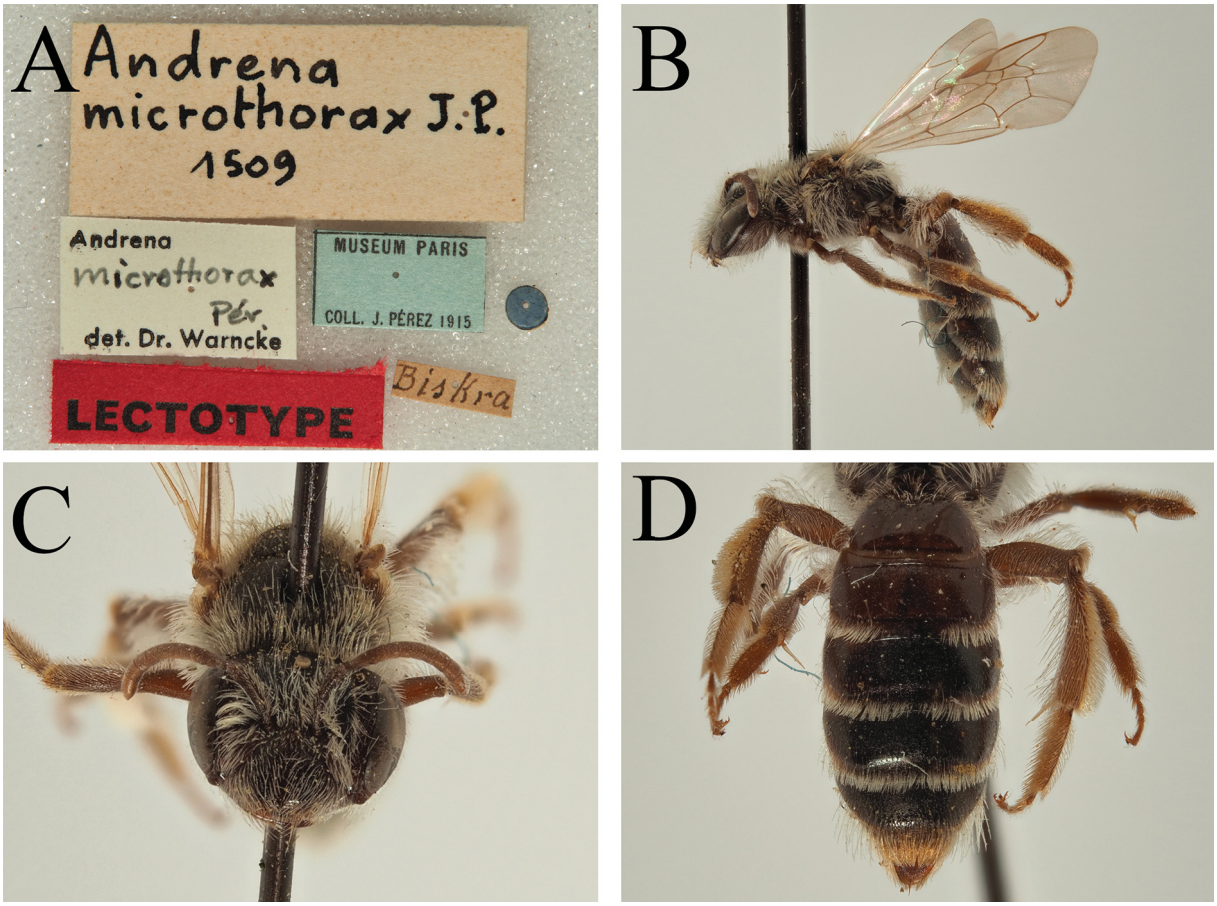

Fig. 14. *Andrena* (*Notandrena*) *microthorax* Pérez, 1895, lectotype, ♀ (MNHN). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

Africa revision (Warncke 1974). Gusenleitner & Schwarz (2002) maintained this position, citing a lack of material. Examination of type material supports their conspecificity (Figs 14A–D, 15A–D). *Andrena microthorax* is unusual among the small former species of *Carandrena* in having the body almost entirely dark and without clear metallic green reflections, a trait it shares with *A. nigrocyanea*. Both species were described from Biskra, further supporting their conspecificity; the latter taxon is therefore formally synonymised here.

Distribution

Spain, Morocco*, Algeria, Tunisia (Gusenleitner & Schwarz 2002).

Andrena* (*Simandrena*) *rhypara Pérez, 1903
Fig. 16

Andrena (*Simandrena*) *rhypara* Pérez, 1903: 83, ♀ (Algeria: MNHN, lectotype by present designation; Fig. 16A–D).
Andrena (*Simandrena*) *pleione* Benoist, 1961: 93, ♀ (Morocco: MNHN).
Andrena (*Simandrena*) *palumba* Warncke, 1974: 47, ♀ (Tunisia: OÖLM). **Syn. nov.**

Material examined (illustrative)

ALGERIA • ♀, lectotype of *A. rhypara*; Alger; MNHN.

ITALY • 1 ♀, paratype of *A. palumba*; Siracusa, Sicily; 1–30 Jun. 1938; OÖLM.

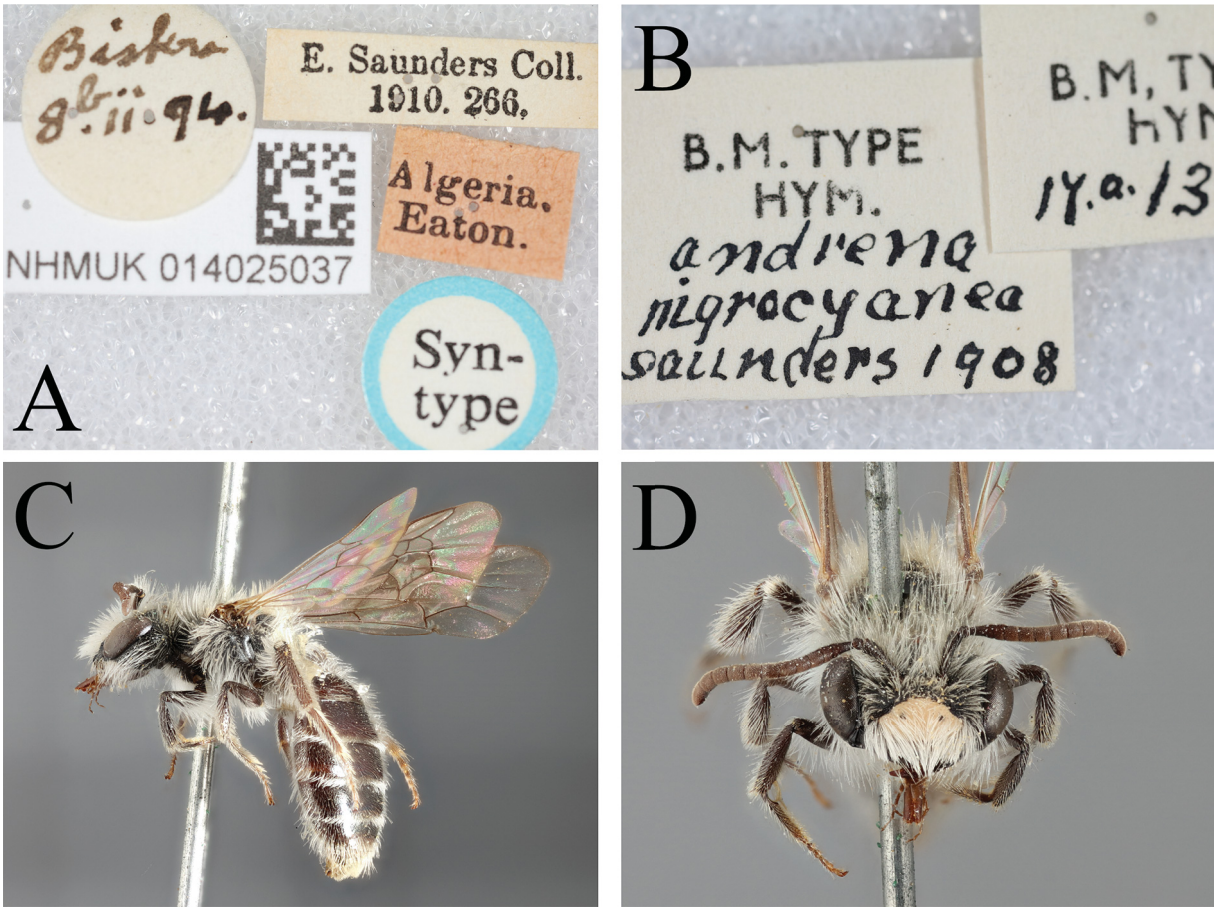

Fig. 15. *Andrena* (*Notandrena*) *microthorax* Pérez, 1895 (syntype of *Andrena* (*Notandrena*) *nigrocyanea* Saunders, 1908), ♂ (NHMUK). **A**. Label details 1. **B**. Label details 2. **C**. Lateral habitus. **D**. Face, frontal view.

MOROCCO • 7 ♂♂, 1330 ♀♀; 40 km S of Guercif; 15 May 1995; Ma. Halada leg.; OÖLM • 2 ♂♂, 1 ♀; Drâa-Tafilalet, Ouarzazate, N9, Ighrem N'Ougdal; 2000 m a.s.l.; 18 Apr. 2022; T.J. Wood leg.; TJWC • 1 ♀; High Atlas, 3 km N of Ouirgane (Marrakech-Taroudant Rd); 11 Apr. 1983; G.R. Else leg.; NHMUK.

TUNISIA • ♀, holotype of *A. palumba*; Sfax environs; OÖLM • 1 ♀; Gabes, 10 km SW of Toujane; 24 Apr. 2012; C. Sevidy and A. Müller leg.; AMC.

Remarks

Andrena rhypara is instantly recognisable in the female sex among the *Simandrena* due to the exceptionally broad facial foveae, which occupy the entirety of the space between the lateral ocelli and the compound eyes (Fig. 16C). Examination of Warncke's type material of *A. palumba* (see https://www.zobodat.at/belege.php) clearly demonstrates conspecificity between the two species. It is surprising that *A. palumba* was described, as Warncke (1967) correctly associated *A. pleione* with *A. rhypara*, but then also wrote that he could not find the type of *A. rhypara* in Paris (Warncke 1967: 193). He instead wrote that he inspected a female in the Lausanne collection which he considered to be representative of the species. However, inspection of the specimen in the MNHN collection shows a Warncke identification label along with a lectotype label. Either Warncke re-visited the MNHN collection after 1967 or he forgot that he had examined this specimen, or he examined it but did not recognise it as a syntype, and a subsequent worker added the lectotype label. The specimen itself may automatically be

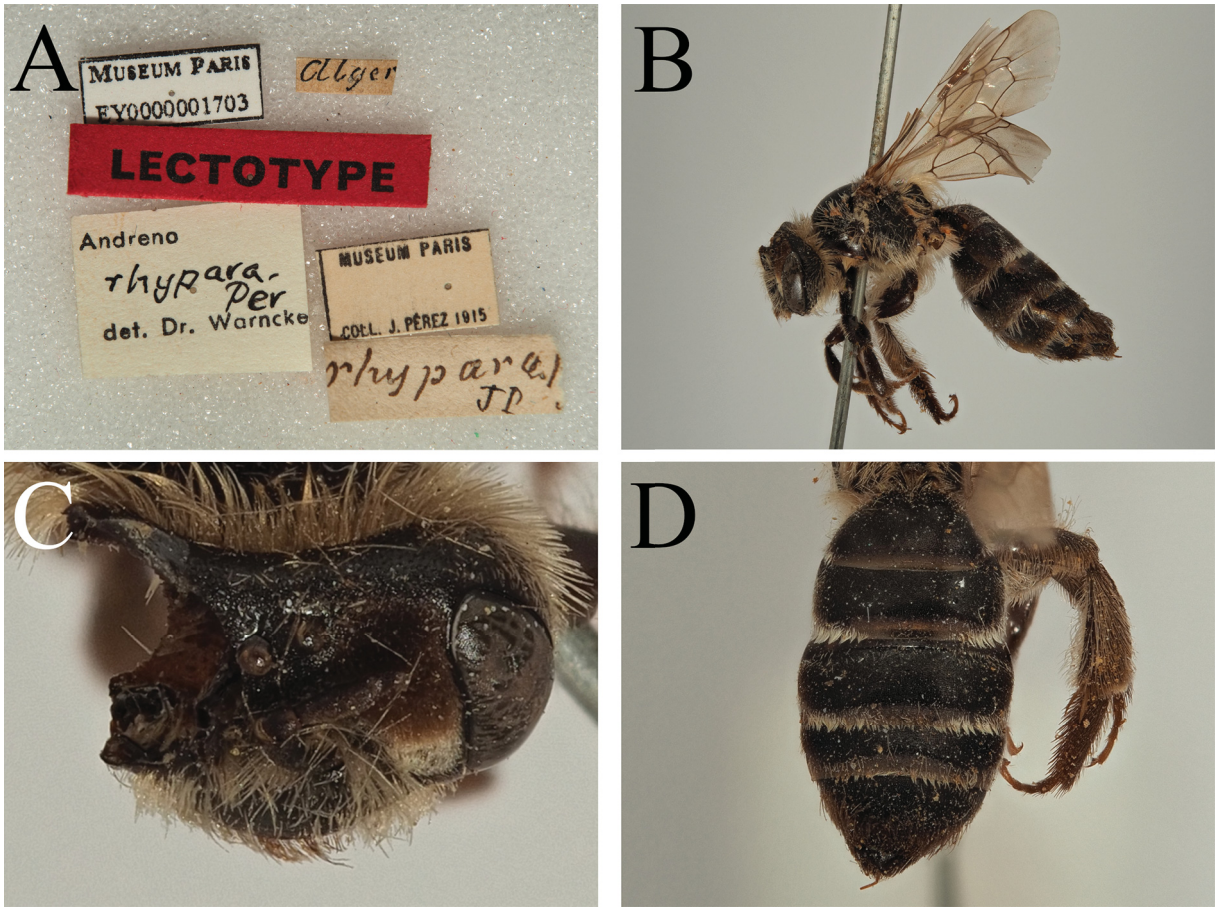

Fig. 16. *Andrena* (*Simandrena*) *rhypara* Pérez, 1903, lectotype, ♀ (MNHN). **A**. Label details. **B**. Lateral habitus. **C**. Head, dorsal view. **D**. Terga, dorsal view.

the holotype, as Pérez (1903) described only the female sex and gave 'Alger' as the collecting locality. In order to avoid doubt, this specimen is hereby designated as the lectotype, and *A. palumba* is formally synonymised with *A. rhypara*.

Distribution

Spain, Morocco, Algeria, Tunisia, Italy (Sicily) (Gusenleitner & Schwarz 2002).

Andrena* (*Taeniandrena*) *poupillieri Dours, 1872

Andrena (*Taeniandrena*) *poupillieri* Dours, 1872: 430, ♀ (Algeria: OÖLM).
Andrena (*Taeniandrena*) *lecerfi* Benoist, 1961: 92, ♀ (Morocco: MNHN; Fig. 17A–D). **Syn. nov.**

Material examined (illustrative)

ALGERIA • ♀, neotype of *A. poupillieri*; Tizi-Ouzou, Tigzirt; 6 m a.s.l.; 31 Mar. 2017; H. Ikhlef leg.; OÖLM.

MOROCCO • ♀, holotype of *A. lecerfi* (Fig. 17A–D); Grand Atlas, Tenfecht (Takeljount); 1000–1200 m a.s.l.; 28 Apr.–9 Jun. 1927; Le Cerf and Talbot leg.; MNHN • 10 ♀♀; High Atlas, 5 km S of Tizi-n-Test (Marrakech-Taroudant Rd); 5 Apr. 1983; G.R. Else leg.; NHMUK • 2 ♀♀; Fès-Meknès, Azrou, 4 km NW of Bou Anguer; 1900 m a.s.l.; 17 May 2022; T.J. Wood leg.; TJWC • 4 ♀♀; Marrakech-Safi, 1 km E of Oukaimeden, steppe; 2500 m a.s.l.; 11 Jul. 2022; T.J. Wood leg.; TJWC.

SPAIN • 1 ♂; Málaga, San Pedro de Alcántara; 15 Mar. 1986; C. v. Achterberg leg.; RMNH • 1 ♀; Mallorca, Serrel Inca; 13 Apr. 2021; J. Diaz Calafat leg.; TJWC.

TUNISIA • 1 ♀; Sidi Zine, SW of El Kef; 28 Apr. 2012; C. Sevidy and A. Müller leg.; AMC.

Remarks

The subgenus *Taeniandrena* has recently undergone extensive revisions in the West Palaearctic (Wood *et al*. 2021; Praz *et al*. 2022; Wood 2023). Many cryptic taxa that were either undescribed or lumped together under polyphyletic species concepts have now had their status clarified. Wood (2023) presented genetic data supporting the existence of a predominantly North African taxon and designated a barcoded neotype from Algeria to fix the name *A. poupillieri* to this lineage. Examination of material from Morocco has shown that this taxon is common and widespread in the Atlas Mountains. Importantly, no evidence has been found to support the presence of *A. ovatula* (Kirby, 1802) sensu stricto in North Africa. *Andrena lecerfi* (Fig. 17) was described from the High Atlas (though the exact locality mentioned on the labels cannot be located) and was treated as *A. ovatula* ssp. *poupillieri* by Warncke (1967). As Gusenleitner & Schwarz (2002) used a broad concept of *A. ovatula*, *A. lecerfi* is listed as a simple synonym of that taxon. Since the holotype morphologically corresponds to *A. poupillieri* (dark terminal fringe and dark hairs on the basitibial plate, complete apical hairband on T3, comparatively weak punctation on the disc of T2) and it was described from the High Atlas, where only *A. poupillieri* has been found to date (see

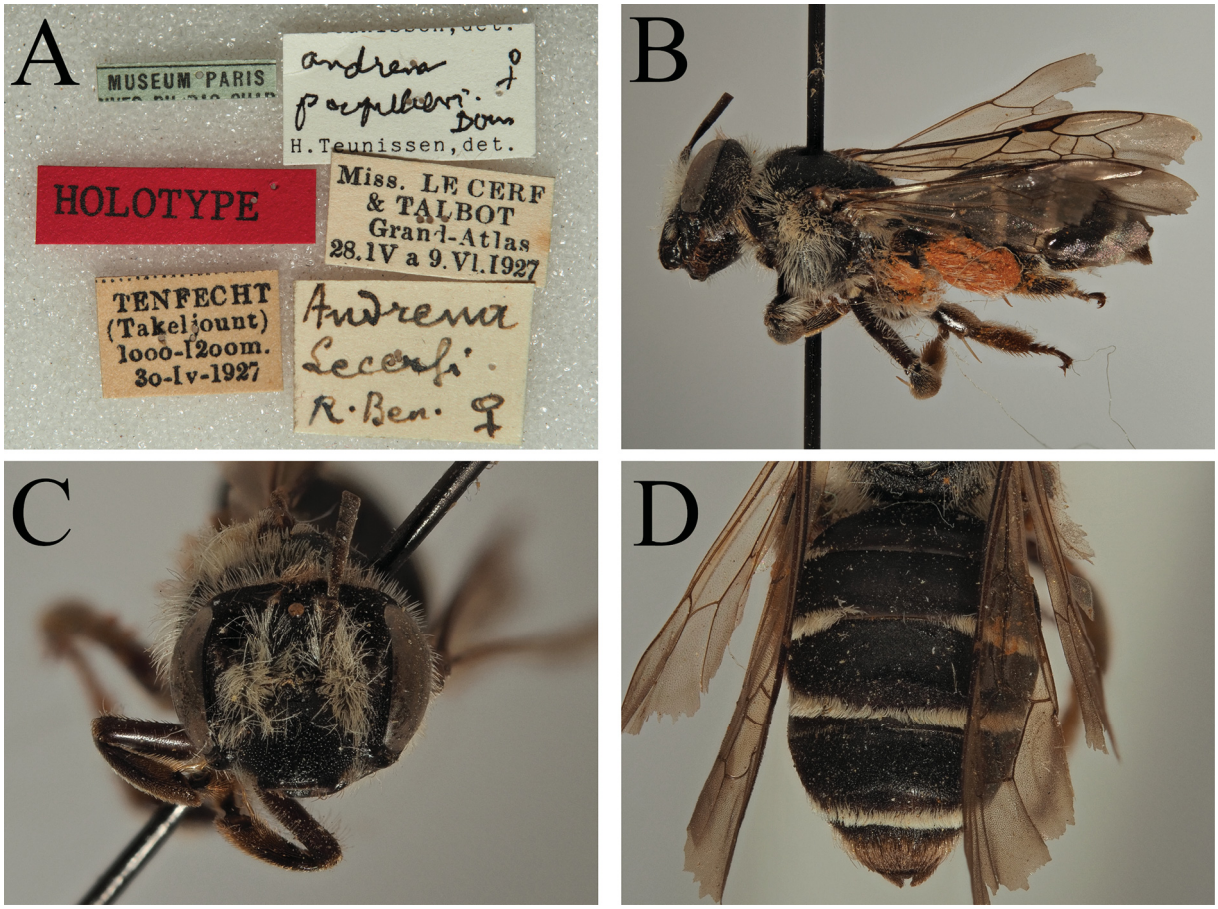

Fig. 17. *Andrena* (*Taeniandrena*) *poupillieri* Dours, 1872 (holotype of *Andrena* (*Taeniandrena*) *lecerfi* Benoist, 1961), ♀ (MNHN). **A**. Label details. **B**. Lateral habitus. **C**. Face, frontal view. **D**. Terga, dorsal view.

barcoding results above, Fig. 4), it is important to formally recognise it as a synonym of *A. poupillieri* and not *A. ovatula*, the latter taxon considered to be absent from Morocco.

Distribution

Morocco, Algeria, Tunisia, Spain (mainland and Balearic Islands) (Wood 2023).

5. New species descriptions

Andrena* (*Aciandrena*) *bendai sp. nov.
urn:lsid:zoobank.org:act:6E7EBFDC-157B-4E08-973F-75A6081FCB1B
Fig. 18A–C, E, G

Diagnosis

Andrena bendai sp. nov. can be recognised as a member of *Aciandrena* (within the limits of the current subgeneric concept, as discussed above) due to its small body size (Fig. 18A), antefurcal nervulus (Fig. 18A), a propodeal triangle with fine granular shagreen (Fig. 18B), narrow foveae (Fig. 18E), hind tarsal claws lacking an inner tooth in the female sex, and more or less impunctate terga (Fig. 18G). It lacks clearly defining features (head or clypeus not elongate, terga dark and impunctate, ocelloccipital distance not extremely short) and therefore falls close to *A. spolata* Warncke, 1968 and *A. quieta* sp. nov., which is described below. The three species are very similar in the female sex, but subtle consistent differences can be seen.

Separation from *A. spolata* can be made by the shape of the clypeus, the punctation of the paraocular areas, and tergal colouration. In *A. bendai* sp. nov., the clypeus is strongly domed and uniformly shagreened, more or less dull (Fig. 18C). In *A. spolata*, the clypeus is only very weakly domed, and the surface is weakly shagreened, weakly shining to smooth and shining apically (Fig. 18D). In *A. bendai*, the lower paraocular area is unevenly punctate; laterally, adjacent to the compound eye, this area is densely punctate with punctures separated by 0.5 puncture diameter. Adjacent to the antennal insertions, this area is essentially impunctate, with at most 1–2 scattered punctures. In *A. spolata*, the lower paraocular area is regularly punctate over its entire surface, punctures separated by 1–2 puncture diameters. In *A. bendai*, the tergal margins are narrowly lightened hyaline-yellow, colouration not covering the entire marginal area (Fig. 18G). In *A. spolata*, the marginal areas are entirely lightened hyaline yellow-white (Fig. 18H); this whitish colouration is absent from *A. bendai*.

Separation from *A. quieta* sp. nov. can be made principally by three characters relating to head morphology. In *A. bendai* sp. nov., the clypeus is strongly domed and uniformly shagreened, more or less dull. In *A. quieta*, the clypeus is only very weakly domed, and the surface is weakly shagreened and weakly shining. In *A. bendai*, the frons is covered with obscurely raised longitudinal striations, with a weakly raised carina running between the anterior ocellus and the supraclypeal plate (Fig. 18E). In *A. quieta*, the frons is covered with strong longitudinal striations, medially with a distinctly raised carina running between the anterior ocellus and the supraclypeal plate (Fig. 18F). In *A. bendai*, the lower paraocular area is unevenly punctate; laterally, adjacent to the compound eye, this area is densely punctate with punctures separated by 0.5 puncture diameter. Adjacent to the antennal insertions, this area is essentially impunctate, with at most 1–2 scattered punctures. In contrast, in *A. quieta*, the lower paraocular area adjacent to the antennal insertions is regularly punctate, punctures separated by 2–3 puncture diameters, not so strongly contrasting the area adjacent to the compound eye, here punctures separated by 0.5–1 puncture diameter.

Etymology

Named after the Czech entomologist Daniel Benda who collected the type series, as well as many other interesting specimens from Morocco and further afield.

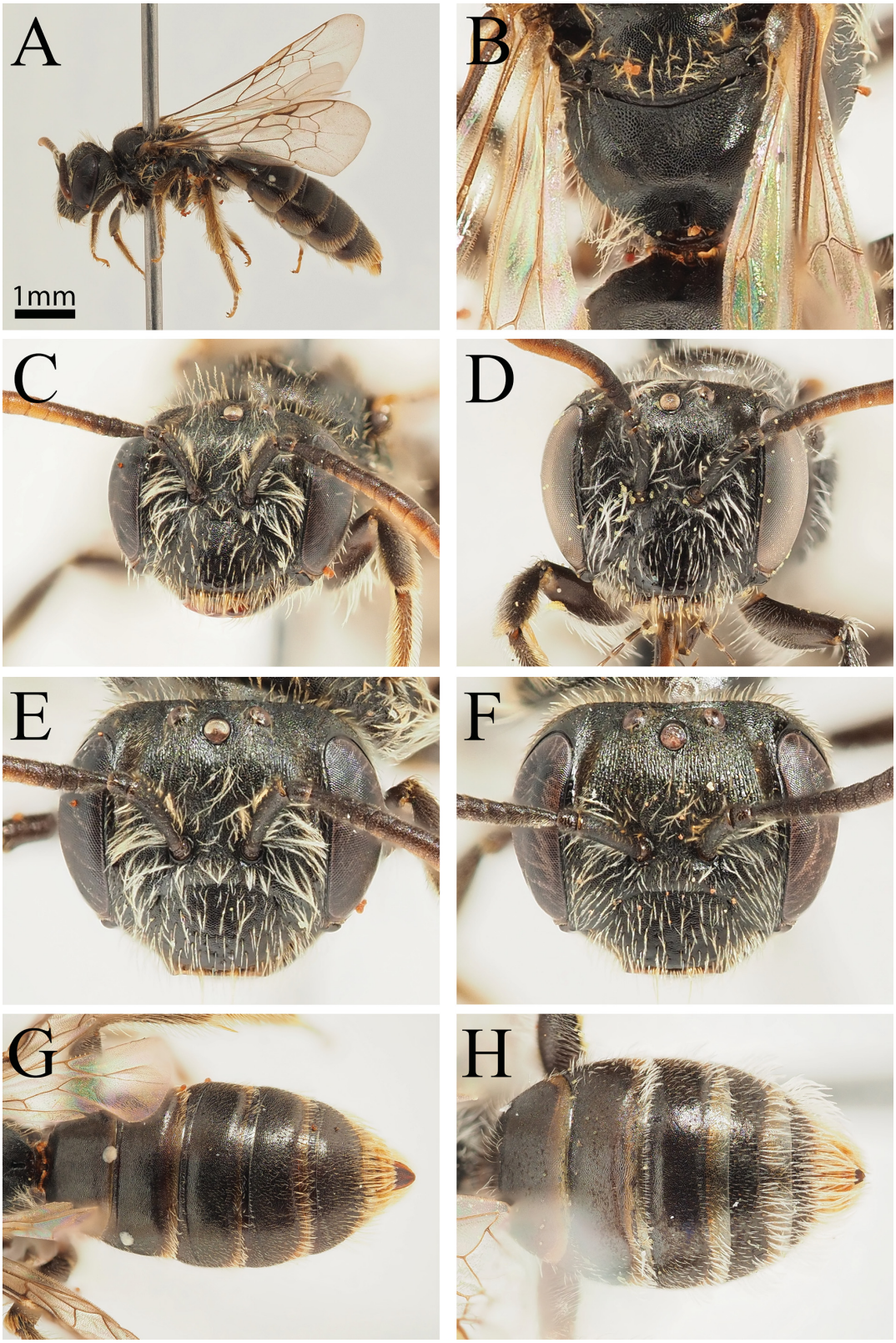

Fig. 18. *Andrena* (*Aciandrena*) *bendai* sp. nov., holotype, ♀ (NMPC). **A**. Lateral habitus. **B**. Propodeum, dorsal view. **C**. Face, frontal view. **E**. Frons, dorso-frontal view. **G**. Terga, dorsal view. — *Andrena* (*Aciandrena*) *spolata* Warncke, 1968, ♀ (TJWC). **D**. Face, frontal view. **H**. Terga, dorsal view. — *Andrena* (*Aciandrena*) *quieta* sp. nov., ♀ (NMPC). **F**. Frons, dorso-frontal view.

Material examined

Holotype

MOROCCO • ♀; Marrakech-Safi, Rehamna, Skhour des Rehamna; 516 m a.s.l.; 32.4402° N, 7.9202° W; 1–3 Apr. 2019; D. Benda leg.; NMPC.

Paratypes

MOROCCO • 1 ♀; same collection data as for holotype; 516 m a.s.l.; 32.4402° N, 7.9202° W; 1–3 Apr. 2019; D. Benda leg.; NMPC • 1 ♀; Casablanca-Settat, Machraa Ben Abbou env.; 200 m a.s.l.; 1 Apr. 2019; D. Benda leg.; NMPC • 1 ♀; same collection data as for preceding; TJWC • 1 ♀; Marrakech-Safi, Al Haouz, Tinmel env., near river; 1262 m a.s.l.; 30 Mar. 2019; D. Benda leg.; NMPC.

Description

Female

Measurements. Body length 5–6 mm (Fig. 18A).

Head. Dark, 1.25 times as wide as long (Fig. 18C). Clypeus strongly domed, with regular granular shagreen, more or less dull, at most weakly shining apically; surface irregularly punctate, punctures separated by 0.5–2 puncture diameters. Process of labrum small, triangular, slightly broader than long. Supraclypeal plate weakly domed, with very weak and obscure striations (Fig. 18E). Lower paraocular areas with contrasting punctation, densely punctate laterally adjacent to compound eye, punctures separated by 0.5 puncture diameter; area adjacent to antennal insertions essentially impunctate. Gena slightly exceeding diameter of compound eye; ocelloccipital distance ⅓ to ½ diameter of lateral ocellus. Foveae narrow, dorsally occupying ⅓ space between lateral ocellus and compound eye, ventrally narrowing further, diverging from inner margin of compound eye, separated by narrow shining strip subequal to ventral width of fovea; foveae filled with light brown hairs. Frons with weak and obscure longitudinal striations, medially with weakly raised carina running between anterior ocellus and supraclypeal plate; frons with weak green-bronze reflections. Face, gena, frons, and scape with whitish to light brownish hairs, none equalling length of scape. Antennae dark basally, A5–12 ventrally extensively lightened orange; A3 exceeding A4, shorter than A4+5.

Mesosoma. Scutum and scutellum with fine granular shagreen, weakly shining, with irregular fine punctation, punctures separated by 1–4 puncture diameters. Pronotum rounded. Mesepisternum and dorsolateral parts of propodeum with fine granular shagreen, weakly shining; propodeal triangle with larger granular 'scale-like' shagreen, laterally not delineated by carinae (Fig. 18B). Mesepisternum with moderately long light brownish hairs, scutum and scutellum almost hairless, with very short and scattered hairs. Propodeal corbicula incomplete, sparse, composed of weakly plumose light brownish hairs, internal surface with occasional long white, simple hairs. Legs dark basally, mid and hind tarsi lightened dark brown to orange, pubescence light brown. Flocculus incomplete, composed of plumose hairs; flocculus and femoral scopa with white hairs, tibial scopa with whitish to light golden hairs. Hind tibial claws simple, without inner tooth. Wings hyaline, stigma whitish-brown, venation brown, nervulus strongly antefurcal.

Metasoma. Terga dark, marginal areas narrowly lightened hyaline-yellow (Fig. 18G). Disc of T1 with strong granular microreticulation, weakly shining, sculpture becoming progressively weaker on subsequent terga, T5 with fine shagreen, more strongly shining. Tergal discs essentially impunctate, obscure punctures disappearing into background sculpture. Terga with at most scattered, very short hairs; T2–3 laterally with weakly indicated and widely interrupted apical hairbands of short whitish hairs, T4 with band complete, not obscuring underlying surface; apical fringe of T5 and hairs flanking pygidial plate golden orange. Pygidial plate rounded triangular, margin obscurely raised, internal surface regularly and densely punctate, punctures separated by <0.5 puncture diameter.

Male

Unknown.

Distribution

Western Morocco (Casablanca-Settat and Marrakech-Safi).

Andrena* (*Aciandrena*) *ifranensis sp. nov.
urn:lsid:zoobank.org:act:A22D6009-1532-4BD7-B772-40A39F7F3748
Figs 19–20

Diagnosis

Andrena ifranensis sp. nov. can be recognised as a member of *Aciandrena* due to its small body size (Fig. 19A), strongly antefurcal nervulus (Fig. 19A), narrow facial foveae (Fig. 19B–C), the propodeal triangle with uniform granular shagreen (Fig. 19E), shagreened impunctate terga (Fig. 19F), hind tarsal claws lacking an inner tooth in the female sex, and simple male genital capsule (Fig. 20D). The species is not similar to any western Mediterranean species of *Aciandrena*, and is more similar to *A. chelma* Warncke, 1975 (Greece) and *A. pulicaria* Warncke, 1975 (?Greece; Turkey; Iran; the distinction between these two species remains obscure) due to its relatively elongate face and domed clypeus (Fig. 19B), frons with weak green-bronze reflections, shagreened terga, and the short triangular process of the labrum. However, the tergal shagreenation is weaker, the male face is black (Fig. 20B; not yellow), and the male genital capsule is different (Fig. 20D; more compact, lacking a kink on the inner margin of the gonostyli). Genetically, *A. ifranensis* placed closest to *A. curviocciput* (Israel, Lebanon, Turkey) which is morphologically similar (also with black-faced male) but differs by the slightly longer ocelloccipital distance (Fig. 19C; ocelloccipital distance essentially zero in *A. curviocciput*) and the different male genital capsule (Fig. 20D; *A. curviocciput* with clear emargination in outer margin of gonostyli). *Andrena ifranensis* should therefore be recognised as unique within the western *Aciandrena* fauna; it may represent a relictual species isolated from a group of eastern species (nearest morphological relative 2500 km away in the Greek Peloponnese), but additional genetic sampling from other species of *Aciandrena* is necessary to support this position.

Etymology

Named after the locus typicus of Ifrane, the high altitude town at the heart of the Middle Atlas.

Material examined

Holotype

MOROCCO • 1 ♀; E of Ifrane; 26 Apr. 2017; L. Černý leg.; BOLD: WPATW974-23; OÖLM.

Paratypes

MOROCCO • 1 ♀; Ifrane env.; 9 May 1997; K. Deneš leg.; OÖLM • 1 ♂; 10 km E of Ifrane; 1 Jun. 1980; K. Warncke leg.; OÖLM.

Description

Female

Measurements. Body length 5.5–6 mm (Fig. 19A).

Head. Dark, 1.1 times as wide as long (Fig. 19B). Clypeus domed, with fine granular shagreen, weakly shining, becoming smooth and shining along apical margin; clypeus with irregular scattered punctures, punctures separated by 0.5–3 puncture diameters. Process of labrum triangular, slightly broader than long. Supraclypeal plate weakly elevated, medially flattened, surface with fine granular shagreen, shining.

Gena equalling diameter of compound eye; ocelloccipital distance very short, at most ¼ diameter of lateral ocellus (Fig. 19C). Foveae narrow, dorsally occupying ½ of space between lateral ocellus and compound eye, ventrally narrowing further, slightly diverging from inner margin of compound eye by distance less than their breadth; foveae filled with light brownish hairs. Frons with extremely subtle hints of weak metallic bronze-green colouration. Face, gena, frons, and scape with short whitish hairs, none equalling length of scape. Antennae dark basally, A4–12 ventrally lightened by presence of grey scales, A3 exceeding A4, slightly shorter than A4+5.

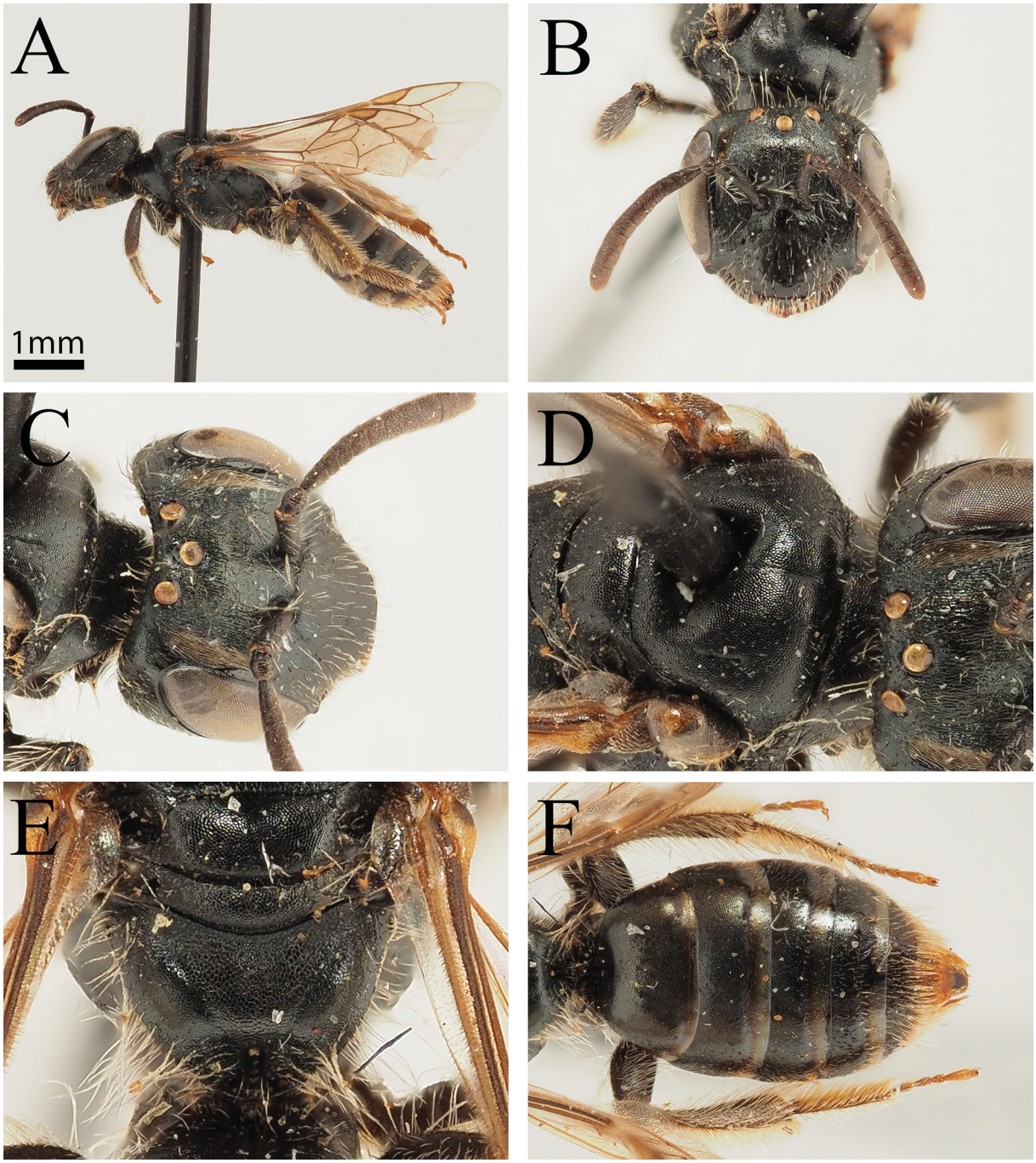

Fig. 19. *Andrena* (*Aciandrena*) *ifranensis* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Head, dorsal view. **D**. Scutum, dorsal view. **E**. Propodeum, dorsal view. **F**. Terga, dorsal view.

Mesosoma. Scutum and scutellum with fine granular shagreen, shining, surface with fine and scattered punctation, punctures separated by 1–3 puncture diameters (Fig. 19D). Pronotum rounded. Mesepisternum with slightly coarser granular shagreen, less strongly shining. Dorsolateral parts of propodeum with fine granular shagreen, contrasting propodeal triangle, this with large, granular, 'scale-like' shagreen, laterally not delineated by carinae (Fig. 19E). Mesepisternum with moderately long whitish hairs, scutum and scutellum almost hairless, with very short and scattered hairs. Propodeal corbicula incomplete, sparse, composed of weakly plumose whitish hairs, internal surface with occasional long white, simple hairs. Legs dark basally, apical tarsal segments lightened dark orange-brown, pubescence light brown. Flocculus incomplete, composed of plumose hairs; flocculus and femoral scopa with white hairs, tibial scopa with whitish to light golden hairs. Hind tibial claws simple, without inner tooth. Wings predominantly hyaline, with faint hints of scattered brownish infuscation; stigma dark orange, venation orange-brown, nervulus antefurcal.

Metasoma. Terga dark, marginal areas broadly lightened hyaline-orange (Fig. 19F). Tergal discs with strong granular microreticulation basally, weakly shining, sculpture becoming weaker apically, on tergal margins weakly shagreened and more strongly shining. Tergal discs essentially impunctate, obscure punctures disappearing into background sculpture. Terga with at most scattered, very short hairs; apical fringe of T5 and hairs flanking pygidial plate golden orange. Pygidial plate narrow pointed triangular, internal surface flattened, with large punctures, punctures separated by 0.5 puncture diameter.

Male

Measurements. Body length 5 mm (Fig. 20A).

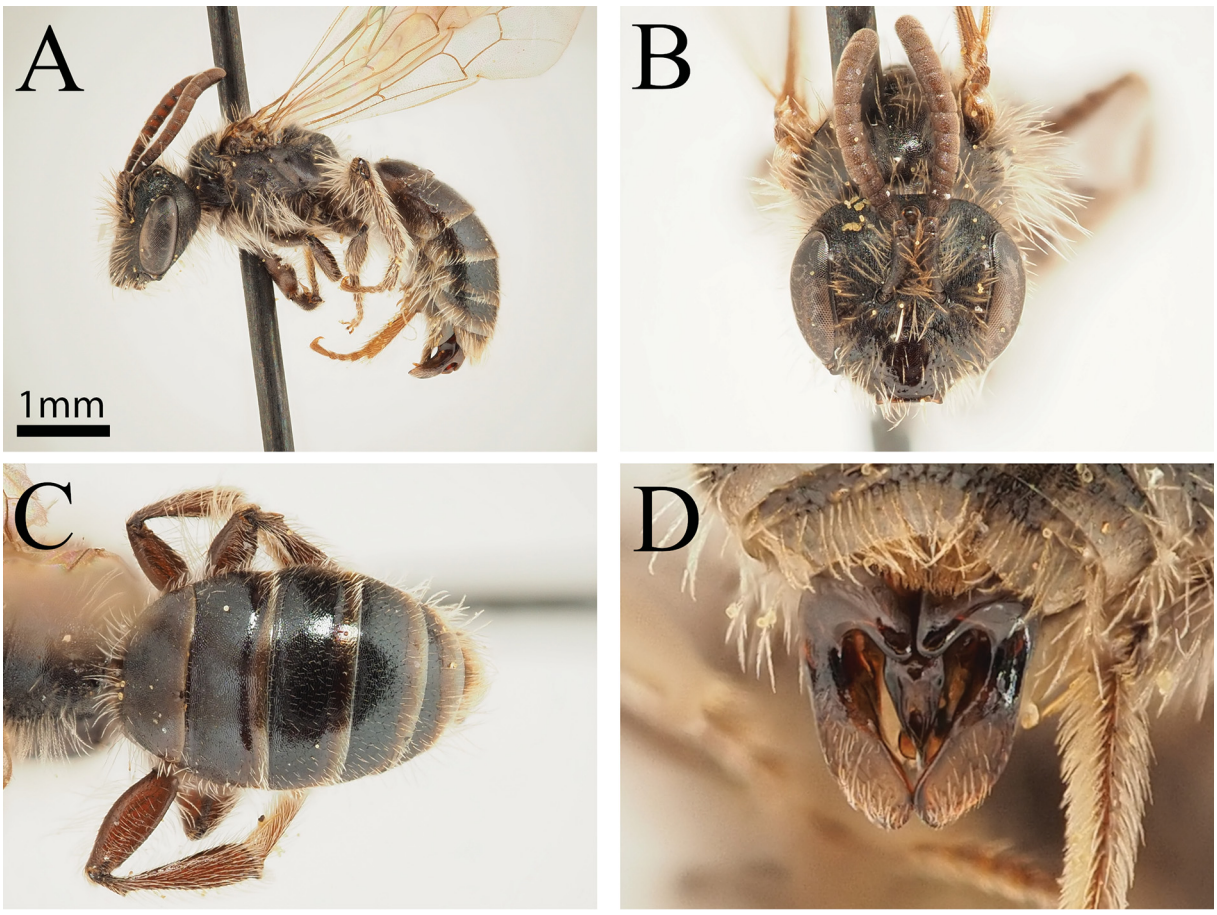

Fig. 20. *Andrena* (*Aciandrena*) *ifranensis* sp. nov., paratype, ♂ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Terga, dorsal view. **D**. Genital capsule, dorsal view.

Head. Dark, 1.1 times as wide as long (Fig. 20B). Clypeus domed, with fine granular shagreen in basal ½, apically smooth and shining, with weak and scattered punctures, punctures separated by 1–4 puncture diameters. Process of labrum narrow trapezoidal, slightly broader than long. Supraclypeal plate with weak and obscure striations. Gena equalling diameter of compound eye, surface with weak striations; ocelloccipital distance very short, at most ¼ diameter of lateral ocellus. Face, vertex, and scape with long brown hairs, longest exceeding length of scape; gena ventrally with very long whitish hairs. Antennae dark basally, A4–13 lightened brown ventrally; A3 slightly exceeding A4, shorter than A4+5.

Mesosoma. Mesosoma structurally as in female. Mesepisternum with very long whitish hairs, much longer than length of scape; hairs becoming sparser and darker on scutum, scutellum, and propodeum, here light brown to whitish. Legs dark basally, apical tarsal segments lightened dark brownish, pubescence brownish to whitish. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation dark orange, nervulus antefurcal.

Metasoma. Terga dark, marginal areas lightened hyaline brown-yellow (Fig. 20C). Tergal discs with strong granular microreticulation on T1–2, dull, sculpture becoming progressively weaker on apical segments, T4–5 with fine granular shagreen, shining. Tergal discs essentially impunctate, obscure punctures disappearing into background sculpture. Terga with short and obscure whitish hairs, base of T1 with slightly longer hairs, T2–3 with hints of lateral apical hair fringes. S8 columnar, slightly broadened apically, ventral surface densely covered with light brown hairs. Genital capsule compact, gonocoxae strongly produced into rounded teeth apically (Fig. 20D). Gonostyli strongly flattened in apical ½, spatulate, outer margin with slight obtuse angle medially. Penis valves narrow, occupying at most ½ of space between gonostyli, apically narrowing further.

Distribution

Morocco, high altitude sites in the Middle Atlas around Ifrane.

Andrena* (*Aciandrena*) *pisantyi sp. nov.
urn:lsid:zoobank.org:act:583375D4-944A-4409-9D22-EB4306293514
Figs 21–22

Andrena (*Aciandrena*) *nitidilabris* auctorum – Warncke 1967: 187, 293; 1974: 15. — Gusenleitner & Schwarz 2002: 535.

Diagnosis

Andrena pisantyi sp. nov. is challenging to confidently place in a subgenus. Warncke placed *A. nitidilabris* auctorum within the *Aciandrena*, and *A. pisantyi* can be placed there due to its small body size (Fig. 21A), antefurcal nervulus, narrow foveae which do not strongly narrow further ventrally (Fig. 21B–C), propodeal triangle with fine granular shagreen (Fig. 21D), tarsi lightened orange (Fig. 21E), hind tarsal claws lacking an inner tooth in the female sex, its more or less impunctate terga (Fig. 21F), and its simple male genital capsule (Fig. 22D). The clypeus is strongly flattened over its entire surface, which is similar to the situation found in some species formerly placed in the subgenus *Distandrena* Warncke, 1968 (= *Micrandrena*) such as the species around *A. mariana* Warncke, 1968 (see Wood 2023 for revision of this group). However, these species have the foveae very strongly narrowed below, almost linear, clearly narrower ventrally than dorsally, whereas in *A. pisantyi* the foveae are narrow, but they are not noticeably narrower ventrally than dorsally. They also show an inner subapical tooth on the hind tarsal claws, whereas this is not found in *Aciandrena* or *A. pisantyi*. *Andrena pisantyi* is therefore placed in *Aciandrena*, pending revision of this group with more powerful genetic techniques as indicated above in the section on genetic analysis.

At a specific level, *A. pisantyi* sp. nov. can be separated from the majority of other *Aciandrena* species due to its strongly flattened clypeus, which is shagreened over the majority of its area, only becoming smooth and shining along its apical margin (Figs 21B, 22B). A flattened clypeus can also be found in *A. longistilus* Pisanty & Wood, 2022 (Israel, Jordan, Syria, southern Turkey) and *A. anathema* Pisanty, 2022 (Israel and the West Bank). In the female sex, *A. pisantyi* can be separated from both of these species by the structure of the supraclypeal plate, which is covered by clear longitudinal striations, whereas in the two comparison species the supraclypeal plate has at most occasional obscure and weakly defined longitudinal sculpture. Both species also have the clypeus evenly shagreened, without a clear shining zone along the fore margin. In the male sex, both comparison species share the black, flattened clypeus; *A. longistilus* can be separated because the genital capsule is clearly elongate, with broad gonostyli. The genital capsule of *A. anathema* is more similar, but has the gonostyli relatively broader, with the inner margin raised, thickened, and forming an obtuse angle (cf. Fig. 24F; in *A. pisantyi* with the gonostyli relatively narrower, more or less parallel-sided and spatulate, the inner margin not noticeably raised or thickened or forming an obtuse angle, Fig. 22D), the tarsi are dark (orange in *A. pisantyi*, Fig. 22A), and the clypeus is less extensively smooth and shining, this area covering ¼ of the clypeal surface (in *A. pisantyi* with the apical half of the clypeus smooth and shining, Fig. 22B).

Etymology

Named in honour of the Israeli entomologist Gideon Pisanty for his work on the taxonomy of *Andrena*, both in the discovery and description of new species and at higher levels of classification.

Material examined

Holotype

TUNISIA • ♀; 55 km S of Foum Tatahouine; 25 Feb. 1992; K. Warncke leg.; OÖLM.

Paratypes

ALGERIA • 2 ♂♂, 2 ♀♀; Saida, 15 km S of Sfissifa, Ben Ikhou, stn 6; 6 Apr. 1983; R. Leys and P.v.d. Hurk leg.; RMNH.

ISRAEL • 12 ♀♀; Holot Mash'abbim Nature Reserve; 10 Mar. 2017; G. Pisanty leg.; SMNHTAU • 2 ♂♂, 1 ♀; Holot Mash'abbim [Nature Reserve]; 16 Mar. 2020; G. Pisanty leg.; SMNHTAU • 18 ♂♂; Holot Mash'abbim [Nature Reserve]; 13 Feb. 2022; G. Pisanty leg.; SMNHTAU • 14 ♂♂, 1 ♀; Holot Mash'abbim [Nature Reserve]; 13 Feb. 2022; L. Friedman leg.; SMNHTAU • 63 ♂♂, 12 ♀♀; Holot Mash'abbim [Nature Reserve]; 18 Feb. 2022; G. Pisanty leg.; SMNHTAU • 1 ♀; Holot Shunera; 10 Mar. 2017; G. Pisanty leg.; SMNHTAU • 1 ♀; Horbat Mamshit; 7 Mar. 2015; G. Pisanty leg.; SMNHTAU • 1 ♀; Mashabe Sade; 16 Feb. 1976; A. Freidberg leg.; SMNHTAU • 1 ♀; Nahal Zin; 27 Feb. 2008; H. Carmely leg.; SMNHTAU • 1 ♂, 3 ♀♀; Retamim; 273 m a.s.l.; 3 Apr. 2009; A. Freidberg leg.; SMNHTAU • 1 ♀; Shivta Junction; 16 Mar. 2020; G. Pisanty leg.; SMNHTAU • 1 ♂; Retamim; 3 Apr. 2009; A. Friedberg leg.; SMNHTAU.

TUNISIA • 2 ♀♀; Tataouine, 5 km S of Tataouine; 23 Apr. 2012; C. Sevidy and A. Müller leg.; TJWC • 1 ♂, 1 ♀; Remada; 10 Apr. 2001; M. Snižek leg.; TJWC • 1 ♂, 1 ♀; 55 km S of Foum Tatahouine; 25–29 Feb. 1992; K. Warncke leg.; OÖLM • 2 ♀♀; Ksar Hadada; 4 Apr. 1996; K. Deneš leg.; OÖLM.

Other material

ALGERIA • 2 ♀♀; Ghardaia; OÖLM.

TUNISIA • 2 ♀♀; Chenini; 4 Apr. 1999; K. Deneš leg.; OÖLM • 1 ♀; Zarzis; 22 Mar.–3 Apr. 1988; H. Wolf leg.; OÖLM.

Description

Female

Measurements. 4–5 mm (Fig. 21A).

Head. Dark, 1.2 times as wide as long (Fig. 21B). Clypeus strongly flattened over majority of surface, shallowly and irregularly punctate, punctures separated by 0.5–2 puncture diameters; clypeal surface shagreened over majority of surface, dull, shagreen becoming weak apically, narrowly smooth and

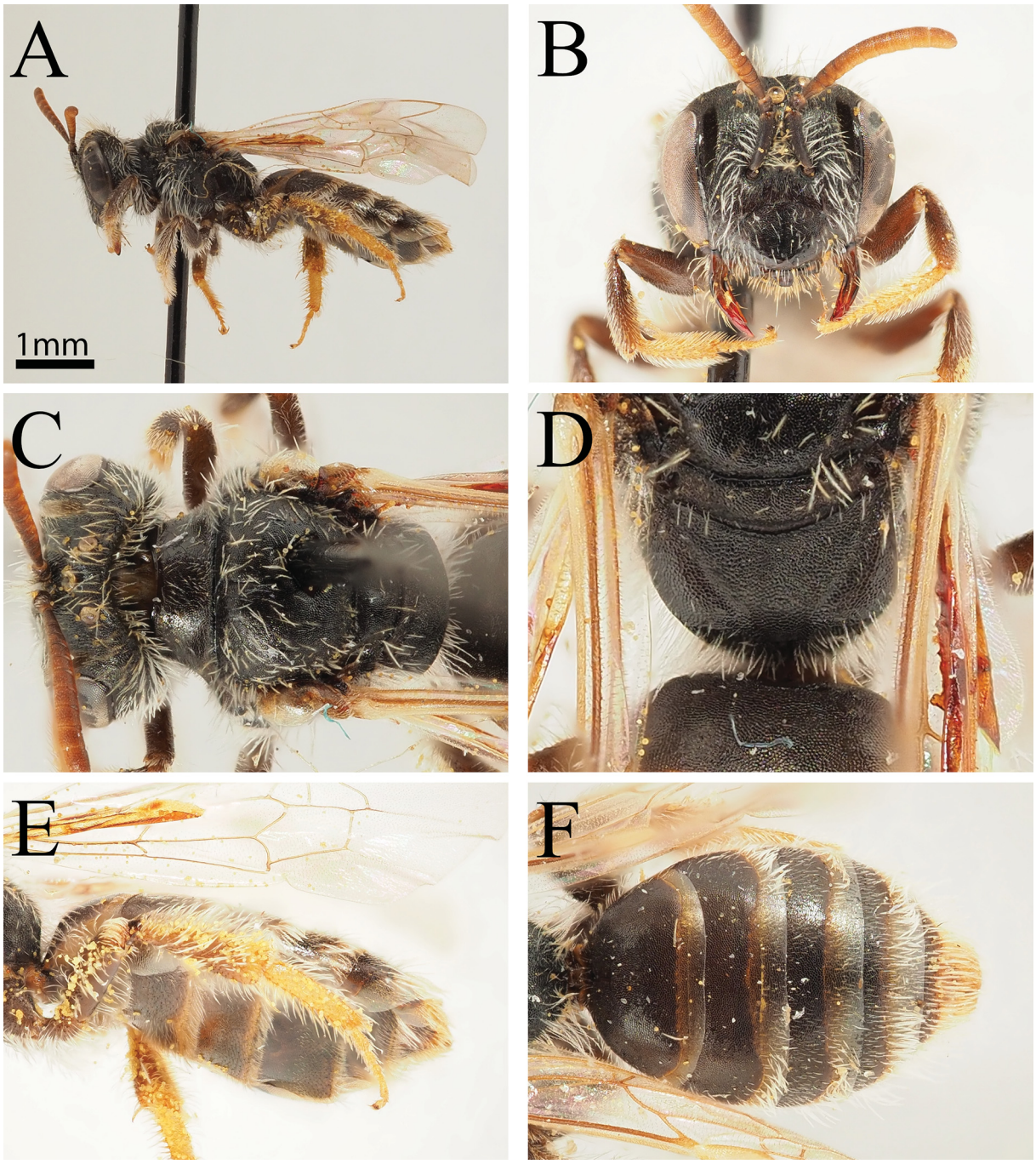

Fig. 21. *Andrena* (*Aciandrena*) *pisantyi* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Scutum, dorsal view. **D**. Propodeum, dorsal view. **E**. Hind tibia, lateral view. **F**. Terga, dorsal view.

shining along apical margin. Process of labrum narrowly trapezoidal, apical margin truncate, slightly wider than long. Supraclypeal plate flat, with weak but distinct longitudinal striations. Gena equalling diameter of compound eye; ocelloccipital distance short, ½ times diameter of lateral ocellus. Foveae narrow, dorsally occupying ⅓ space between lateral ocellus and compound eye, very slightly narrowing ventrally, effectively as broad ventrally at level of antennal insertions as dorsally; foveae filled with dark brown hairs. Face, gena, frons, and scape with short, whitish hairs, becoming longer and light brown on vertex, none equalling length of scape. Antennae dark basally, A4–12 ventrally extensively lightened bright orange; A3 exceeding A4, slightly shorter than A4+5.

Mesosoma. Scutum and scutellum with fine granular shagreen, dull to very weakly shining, weakly and sparsely punctate, punctures separated by 2–4 puncture diameters, becoming denser on scutellum, separated by 1–3 puncture diameters (Fig. 21C). Pronotum rounded. Mesepisternum and dorsolateral parts of propodeum with similar granular shagreen, not strongly contrasting propodeal triangle; propodeal triangle slightly elevated, with slightly coarser granular shagreen, laterally not delineated by carinae (Fig. 21D). Mesepisternum with moderately long, whitish hairs, scutum and scutellum with distinct short and scattered hairs. Propodeal corbicula incomplete, sparse, composed of weakly plumose whitish hairs, internal surface with occasional long, white simple hairs. Legs dark basally, tarsi and hind tibiae lightened bright orange, pubescence whitish (Fig. 21E). Flocculus incomplete, composed of plumose hairs; flocculus and femoral and tibial scopa with pure white hairs. Hind tibial claws simple, without inner tooth. Wings hyaline, stigma and venation bright orange, nervulus antefurcal.

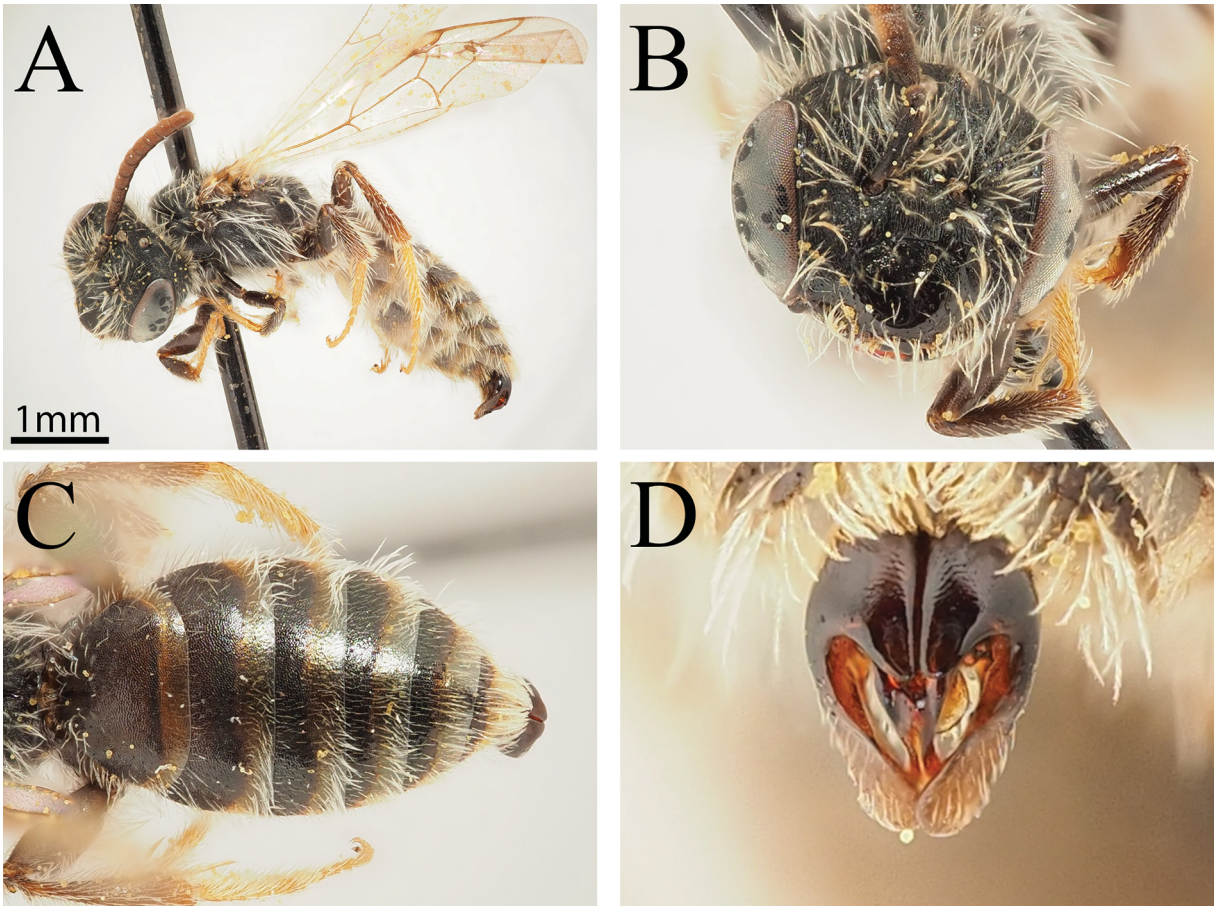

Fig. 22. *Andrena* (*Aciandrena*) *pisantyi* sp. nov., ♂ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Terga, dorsal view. **D**. Genital capsule, dorsal view.

Metasoma. Tergal discs dark, marginal areas broadly lightened hyaline-yellow to orange (Fig. 21F). Tergal discs with strong granular microreticulation basally, weakly shining, sculpture becoming weaker apically, on tergal margins weakly shagreened and more strongly shining. Tergal discs essentially impunctate, obscure punctures disappearing into background sculpture. Terga with scattered, very short hairs; T2–3 laterally with weakly indicated and widely interrupted apical hairbands of short, whitish hairs, T4 with band complete, not obscuring underlying surface; apical fringe of T5 and hairs flanking pygidial plate golden orange. Pygidial plate narrowly pointed triangular, internal surface with longitudinal raised ridge.

Male

Measurements. 4–5 mm (Fig. 22A).

Head. Dark, 1.2 times as wide as long (Fig. 22B). Head structurally as in female, though clypeus smooth and shining in apical half, this area comparatively larger than in female sex; A3 longer than A4, shorter than A4+5, but A4 very short, broader than long, ½ length of A5, A4 quadrate, as long as broad.

Mesosoma. Mesosoma structurally as in female, with following exceptions: tarsi lightened orange, hind tibiae dark. Hind tarsal claws with inner tooth.

Metasoma. Terga structurally as in female, with weak whitish hair fringes laterally on T2–4, not obscuring underlying surface (Fig. 22C). S8 columnar, slightly broadened apically, ventral surface covered with light brown hairs. Genital capsule with gonocoxae produced into strong, apically rounded teeth (Fig. 22D). Gonostyli strongly flattened in apical ½, spatulate, parallel-sided. Penis valves narrow, occupying ½ of space between gonostyli, weakly narrowing medially.

Distribution

Algeria, Tunisia, and Israel.

Andrena* (*Aciandrena*) *quieta sp. nov.
urn:lsid:zoobank.org:act:C127D7F8-BF43-4635-B31E-66BAB311ACC4
Figs 18F, 23, 24A–D

Diagnosis

Andrena quieta sp. nov. an be recognised as a member of *Aciandrena* due to its small body size (Fig. 23A), antefurcal nervulus (Fig. 23A), narrow facial foveae (Fig. 23B–C), propodeal triangle with fine granular shagreen (Fig. 23E), its more or less impunctate terga (Figs 23F, 24C), hind tarsal claws lacking an inner tooth in the female sex, and its simple male genital capsule (Fig. 24D). It lacks clearly defining features (head or clypeus not elongate, terga dark and impunctate, ocelloccipital distance not extremely short, body without metallic reflections though frons with weak green-bronze reflections, male clypeus dark, genital capsule simple with gonocoxae produced into rounded teeth) and therefore falls close to *A. spolata* and *A. bendai* sp. nov., which is described above. Diagnosis against *A. bendai* is provided in the diagnosis section for that species.

Andrena quieta sp. nov. strongly resembles *A. spolata*. However, comparison of the genital capsules shows the difference. In *A. quieta*, the gonostyli are apically strongly flattened and blade-like, the blade-like part is clearly broadened and 2 times as broad as the basal stem of the gonostylus (Fig. 24D). In *A. spolata*, the gonostyli are apically flattened and blade-like, but this blade-like part is only slightly broader than the basal stem of the gonostylus (Fig. 24F). Based on external morphology, the apical

rim of the tergal margins of *A. quieta* are only narrowly lightened yellow-hyaline, this colouration occupying only part of the marginal area (Figs 23F, 24C). In *A. spolata*, the marginal areas are entirely lightened hyaline yellow-white (Figs 18H, 24E); this whitish colouration is absent from *A. quieta*. In the female sex, two characters can be seen on the head. In *A. quieta*, the frons is covered with strong longitudinal striations, medially with a distinctly raised carina running between the anterior ocellus and the supraclypeal plate (Fig. 18F). In *A. spolata*, the frons has at most obscurely raised longitudinal striations, with a weakly raised carina running between the anterior ocellus and the supraclypeal plate (Fig. 18D). For the second character, in *A. quieta*, on the lower paraocular area adjacent to the clypeus, the surface has a fine granular shagreen with large punctures, these punctures separated by 2–3 puncture diameters. In *A. spolata*, this area also shows fine granular shagreen and punctures, but the punctures are denser, separated by 1–2 puncture diameters. Though subtle, these characters are consistent between Moroccan and Tunisian specimens. *Andrena quieta* and *A. bendai* sp. nov. can be found more or less in direct sympatry in western Morocco; they are not currently known to be present in sympatry with *A. spolata* in either Morocco or Tunisia, as *A. spolata* favours drier desert environments in the southern parts of these countries.

Etymology

The feminine nominative form of the Latin adjective '*quietus*' meaning 'at rest/peaceful/tranquil' in reference to the overlooked nature of this small but widespread species.

Material examined

Holotype

MOROCCO • ♂; Casablanca-Settat, El Jadida, 4 km NW of Quartier Arriad, pastures; 136 m a.s.l.; 32.9697° N, 8.2647° W; 1–3 Apr. 2019; D. Benda leg.; NMPC.

Paratypes

MOROCCO • 1 ♀; Casablanca-Settat, Machraa Ben Abbou env.; 200 m a.s.l.; 1 Apr. 2019; D. Benda leg.; NMPC.

TUNISIA • 1 ♀; Sidi Bouzid; 12 Apr. 1999; K. Deneš leg.; OÖLM • 1 ♀; El Jem; 6–13 Apr. 1999; K. Deneš leg.; OÖLM • 4 ♀♀; M'saken; 20 Apr. 1998; K. Deneš leg.; OÖLM • 1 ♀; Zaghouan; 18 Apr. 1998; K. Deneš leg.; OÖLM • 2 ♀♀; Kasserine; 13 Apr. 1998; K. Deneš leg.; OÖLM • 2 ♀♀; Sbeitla; 12 Apr. 1998; K. Deneš leg.; OÖLM.

Description

Female

Measurements. Body length 5–6 mm (Fig. 23A).

Head. Dark, 1.2 times as wide as long (Fig. 23B). Clypeus very weakly domed, almost flattened, finely shagreened basally, shagreen becoming finer and weaker apically, here almost smooth and shining; surface irregularly punctate, punctures separated by 0.5–2 puncture diameters. Process of labrum narrowly trapezoidal, apical margin truncate, slightly broader than long. Supraclypeal plate weakly domed, with very weak and obscure striations. Lower paraocular areas punctate, adjacent to antennal insertions regularly punctate, punctures separated by 2–3 puncture diameters; more densely punctate adjacent to compound eye, here punctures separated by 0.5–1 puncture diameter (Fig. 23C). Gena equalling diameter of compound eye; ocelloccipital distance ⅓ of diameter of lateral ocellus (Fig. 23D). Foveae narrow, dorsally occupying ⅓ of space between lateral ocellus and compound eye, ventrally narrowing further, diverging from inner margin of compound eye, separated by narrow shining strip subequal to ventral width of fovea; foveae filled with light brown hairs. Frons covered with strongly raised longitudinal striations, medially with raised carina running between anterior ocellus and supraclypeal

plate; frons and lower paraocular areas with weak green-bronze reflections. Face, gena, frons, and scape with whitish to light brownish hairs, none equalling length of scape. Antennae dark basally, A5–12 ventrally extensively lightened orange; A3 exceeding A4, slightly shorter than A4+5.

Mesosoma. Scutum and scutellum with fine granular shagreen, weakly shining, with irregular fine punctation, punctures separated by 1–4 puncture diameters. Pronotum rounded. Mesepisternum and dorsolateral parts of propodeum with fine granular shagreen, weakly shining; propodeal triangle with larger granular 'scale-like' shagreen, laterally not delineated by carinae (Fig. 23E). Mesepisternum with

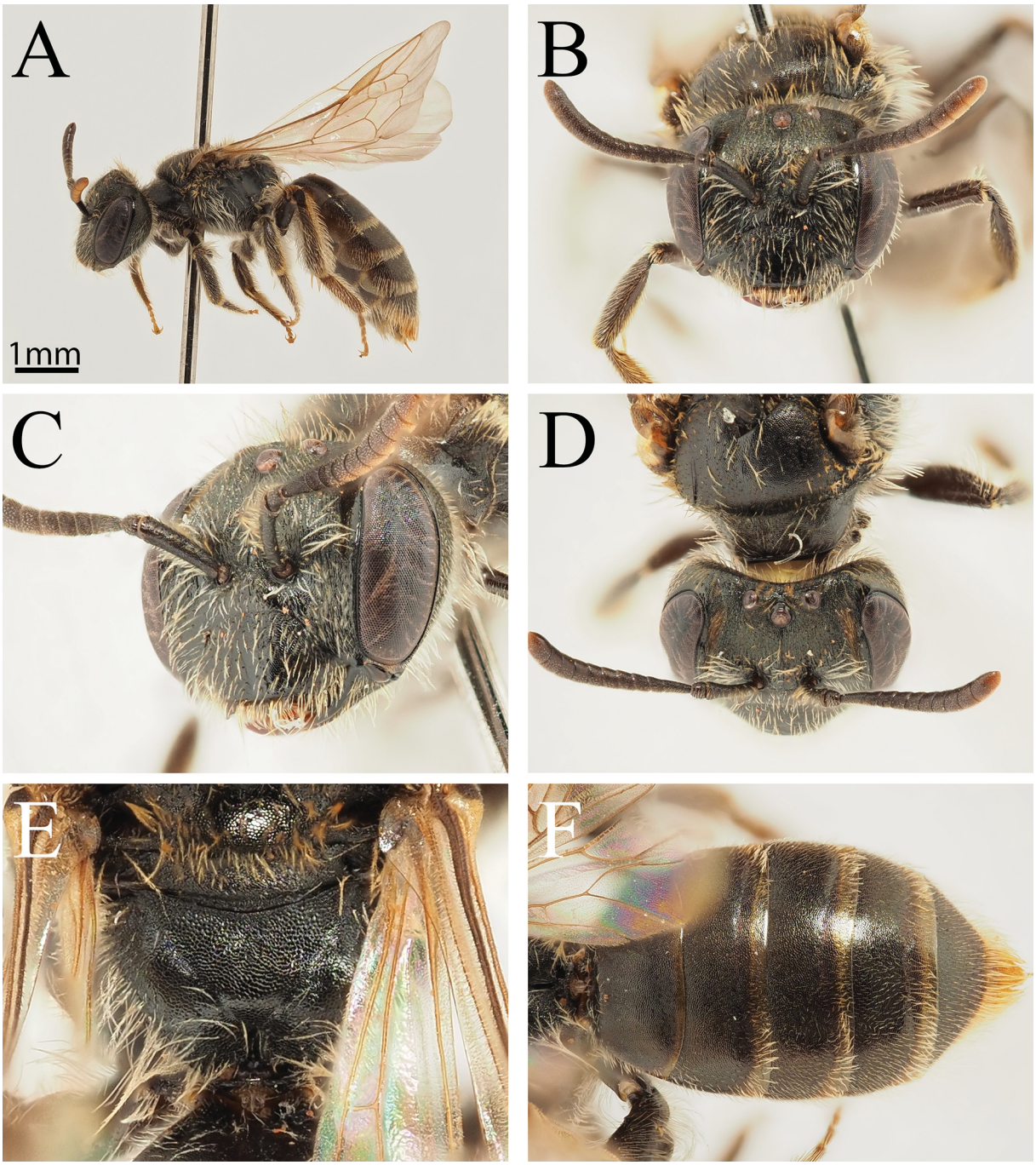

Fig. 23. *Andrena* (*Aciandrena*) *quieta* sp. nov., paratype, ♀ (NMPC). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Face, lateral view. **D**. Head, dorsal view. **E**. Propodeum, dorsal view. **F**. Terga, dorsal view.

moderately long whitish hairs, scutum and scutellum with shorter, light brown hairs. Propodeal corbicula incomplete, sparse, composed of weakly plumose, light brownish hairs, internal surface with scattered long, white simple hairs. Legs dark basally, apical tarsal segments lightened brownish, pubescence light brown. Flocculus incomplete, composed of plumose hairs; flocculus and femoral and tibial scopa with white hairs. Hind tibial claws simple, without inner tooth. Wings hyaline, stigma and venation orange, nervulus antefurcal.

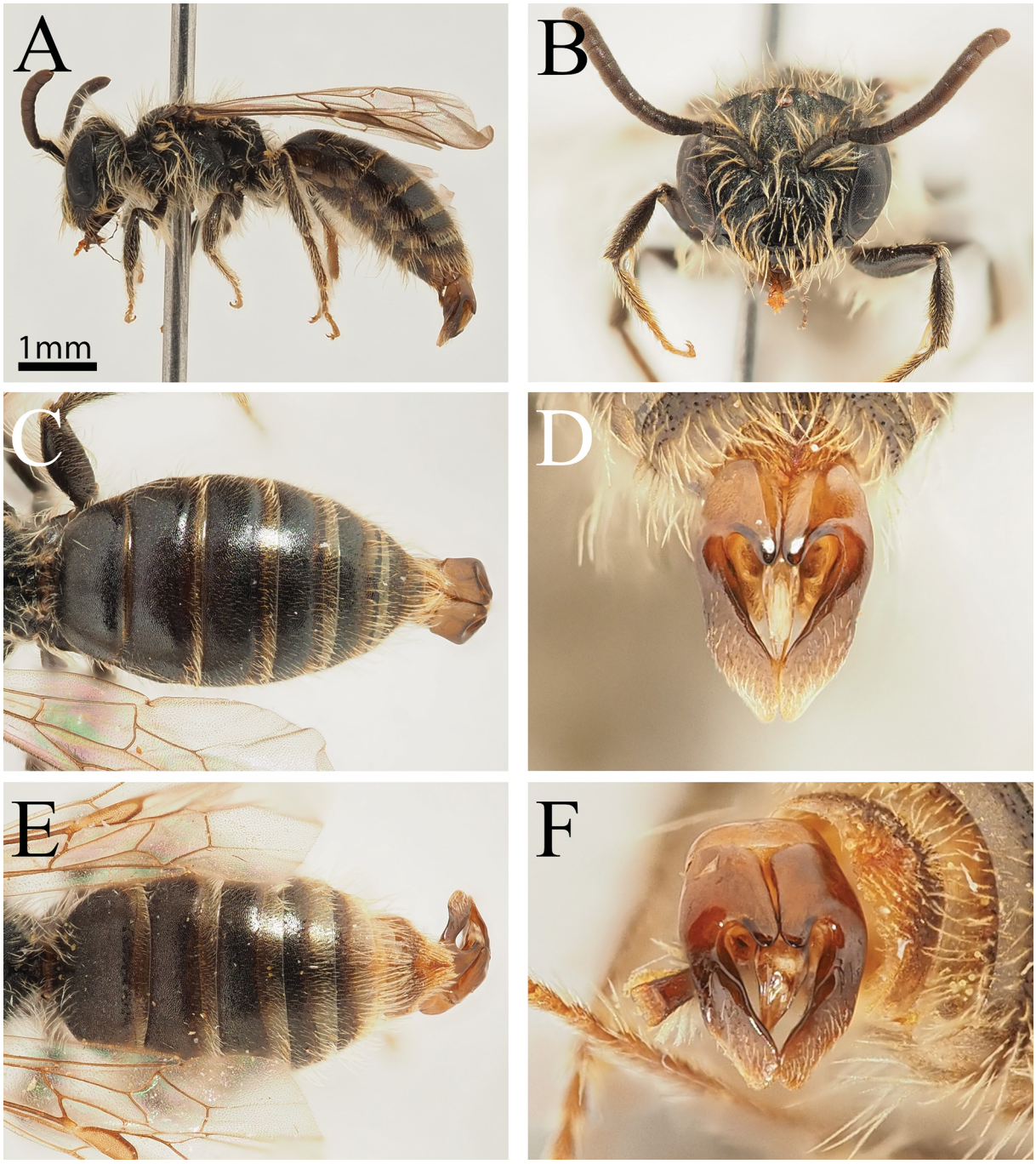

Fig. 24. *Andrena* (*Aciandrena*) *quieta* sp. nov., holotype, ♂ (NMPC). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Terga, dorsal view. **D**. Genital capsule, dorsal view. — *Andrena* (*Aciandrena*) *spolata* Warncke, 1968, ♂ (TJWC). **E**. Terga, dorsal view. **F**. Genital capsule, dorsal view.

Metasoma. Terga dark, marginal areas narrowly lightened hyaline-yellow (Fig. 23F). Disc of T1 with strong granular microreticulation, weakly shining, sculpture becoming progressively weaker on subsequent terga, T5 with fine shagreen, more strongly shining. Tergal discs essentially impunctate, obscure punctures disappearing into background sculpture. Terga with at most scattered, very short hairs; T2–3 laterally with weakly indicated and widely interrupted apical hairbands of short brownish hairs, T4 with band complete, not obscuring underlying surface; apical fringe of T5 and hairs flanking pygidial plate golden orange. Pygidial plate rounded triangular, margin obscurely raised, internal surface regularly and densely punctate, punctures separated by < 0.5 puncture diameter.

Male

Measurements. Body length 5 mm (Fig. 24A).

Head. Dark, 1.3 times as wide as long (Fig. 24B), dark, without metallic reflections. Clypeus very weakly domed, almost flattened, finely shagreened basally, shagreen disappearing apically, here smooth and shining; surface irregularly punctate, punctures separated by 0.5–3 puncture diameters. Process of labrum trapezoidal, slightly broader than long, apical margin shallowly emarginate medially. Gena subequal to diameter of compound eye; ocelloccipital distance ⅓ diameter of lateral ocellus. Frons covered with strongly raised longitudinal striations. Face, gena, frons, and scape with abundant long whitish hairs, longest exceeding length of scape. Antennae dark basally, A4–13 ventrally lightened by presence of grey scales; A3 exceeding length of A4, shorter than A4+5.

Mesosoma. Mesosoma structurally as in female. Mesepisternum, scutum, scutellum, and propodeum with long whitish hairs, longest exceeding length of scape. Legs dark basally, apical tarsal segments lightened brownish, pubescence light brown. Hind tibial claws with inner tooth. Wings hyaline, stigma orange-brown, venation brown, nervulus interstitial.

Metasoma. Terga structurally as in female (Fig. 24C). S8 long, columnar, ventral surface covered with golden hairs. Genital capsule weakly elongate, gonocoxae strongly produced into rounded teeth apically (Fig. 24D). Gonostyli with apical part strongly flattened and broadened, spatulate, 2 times as broad as basal stem part. Penis valves narrow, occupying less than ½ of space between gonostyli, slightly narrowing apically.

Distribution

Morocco (Casablanca-Settat) and Tunisia. Careful examination of material identified as *A. spolata* from across north-western Africa is likely to produce unrecognised specimens of *A. quieta* sp. nov.

Andrena* (*Euandrena*) *abscondita sp. nov.
urn:lsid:zoobank.org:act:3DDA9287-3FC1-4B64-BCC0-2F63646EFA2A
Fig. 25

Diagnosis

Andrena abscondita sp. nov. can be recognised as a member of *Euandrena* due to the narrow facial fovea (dorsally occupying ⅓ of space between the lateral ocellus and the compound eye) which narrows further ventrally, combined with the long A3 (Fig. 25B; slightly exceeding length of A4+5) and the almost simple, non-plumose hairs of the tibial scopae. Due to its black and orange colouration (Fig. 25A), it resembles *A. berberica* sp. nov. (south-western Morocco; see the diagnosis section of that species), *A. bicolor*, and *A. isolata* (Sierra Nevada, Spain). A diagnosis against *A. berberica* is given below; *A. abscondita* is much closer morphologically to *A. bicolor* and *A. isolata*. *Andrena abscondita* can be separated from *A. bicolor* by the punctation of the clypeus; in *A. abscondita*, the clypeus is densely punctate, the punctures are separated by < 0.5 puncture diameter and the underlying surface is

dull to weakly shining on the interspaces themselves (Fig. 25B). In *A. bicolor* the clypeus is less densely punctate, punctures separated by 0.5–1.5 puncture diameters medially, with the underlying surface more clearly smooth and shining. Separation from *A. isolata* is challenging morphologically, and the collecting locality should inform identification. Both species have the clypeus equally densely punctate, but the interspaces in *A. isolata* are more clearly shining than in *A. abscondita*. Additionally, *A. abscondita* has an impressed medial longitudinal line on the apical half of the clypeus (cf *A. angustior* (Kirby, 1802)) that is absent in *A. isolata*. Genetically and geographically, the two taxa are well separated and are considered to be valid species. Discovery of their respective males may provide additional diagnostic characters.

Etymology

The name comes from the feminine form of the Latin adjective '*absconditus*' which means 'covert/secret/hidden', in reference to its cryptic nature and similarity to *A. bicolor*.

Material examined

Holotype

MOROCCO • ♀; Fès-Meknès, Tiguelmamine, Col du Zad; 2100 m a.s.l.; 33.0614° N, 5.0382° W; 21 May 2022; T.J. Wood leg.; BOLD: WPATW387-22; OÖLM.

Paratypes

MOROCCO • 1 ♀; Afourer, 200 km S of Rabat; 1330 m a.s.l.; 10 May 2015; Mucska leg.; OÖLM • 1 ♀; Fès-Meknès, Laanoucer; 15–16 May 2018; P. Lhomme and O. Ihsane leg.; TJWC • 1 ♀; Oukaimeden; 2620 m a.s.l.; 13 May 2015; V. Soon leg.; TUZ.

TUNISIA • 1 ♀; Kef, 5 km W of Touiref; 28 Apr. 2012; C. Praz leg.; PRUN.

Description

Female

Measurements. Body length 9–10 mm (Fig. 25A).

Head. Dark, 1.2 times as wide as long (Fig. 25B). Clypeus weakly domed, densely punctate, punctures separated by < 0.5 puncture diameter, underlying surface shagreened and dull, at most with interspaces weakly shining apically. Clypeus with impressed medial longitudinal line on apical half. Process of labrum trapezoidal, 2 times as broad as long, surface with weak latitudinal striations. Gena broad, 1.2 times as broad as width of compound eye; ocelloccipital distance equalling 1 diameter of lateral ocellus. Foveae narrow, occupying ⅓ of space between lateral ocellus and compound eye, narrowing further ventrally at level of antennal insertions; foveae filled with dark brown hairs. Face, gena, frons, and scape with black hairs, vertex with intermixed black and light brown hairs. Antennae dark, A3 exceeding length of A4+5, shorter than A4+5+6.

Mesosoma. Scutum and scutellum with fine granular microreticulation, somewhat dull laterally and anteriorly, weakly shining medially; underlying surface clearly and densely punctate, punctures separated by 0.5–1 puncture diameter. Pronotum rounded. Mesepisternum with strong microreticulation, dull. Dorsolateral parts of propodeum with granular microreticulation; microreticulation overlain with additional network of weakly raised reticulation forming network resembling large punctures; pseudopunctures separated by 0.5–1 puncture diameter. Propodeal triangle narrow, slightly impressed and recessed below level of dorsolateral parts of propodeum; surface with fine granular shagreen, on basal ½ with network of short but distinctly raised rugae (Fig. 25D). Mesepisternum covered with long and abundant black hairs, at most with occasional light brown hair dorsally; scutum and scutellum with

shorter, light reddish-brown hairs (Fig. 25C). Propodeal corbicula incomplete, dorsal fringe composed of long, strongly plumose hairs, anteriorly black, becoming light brown posteriorly; internal surface with long, very weakly plumose pale hairs. Legs dark, pubescence dark brown to black; flocculus incomplete, flocculus and femoral scopa composed of plumose, light brown to orangeish hairs. Tibial scopa composed of very weakly plumose orange hairs. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation dark brown, nervulus interstitial.

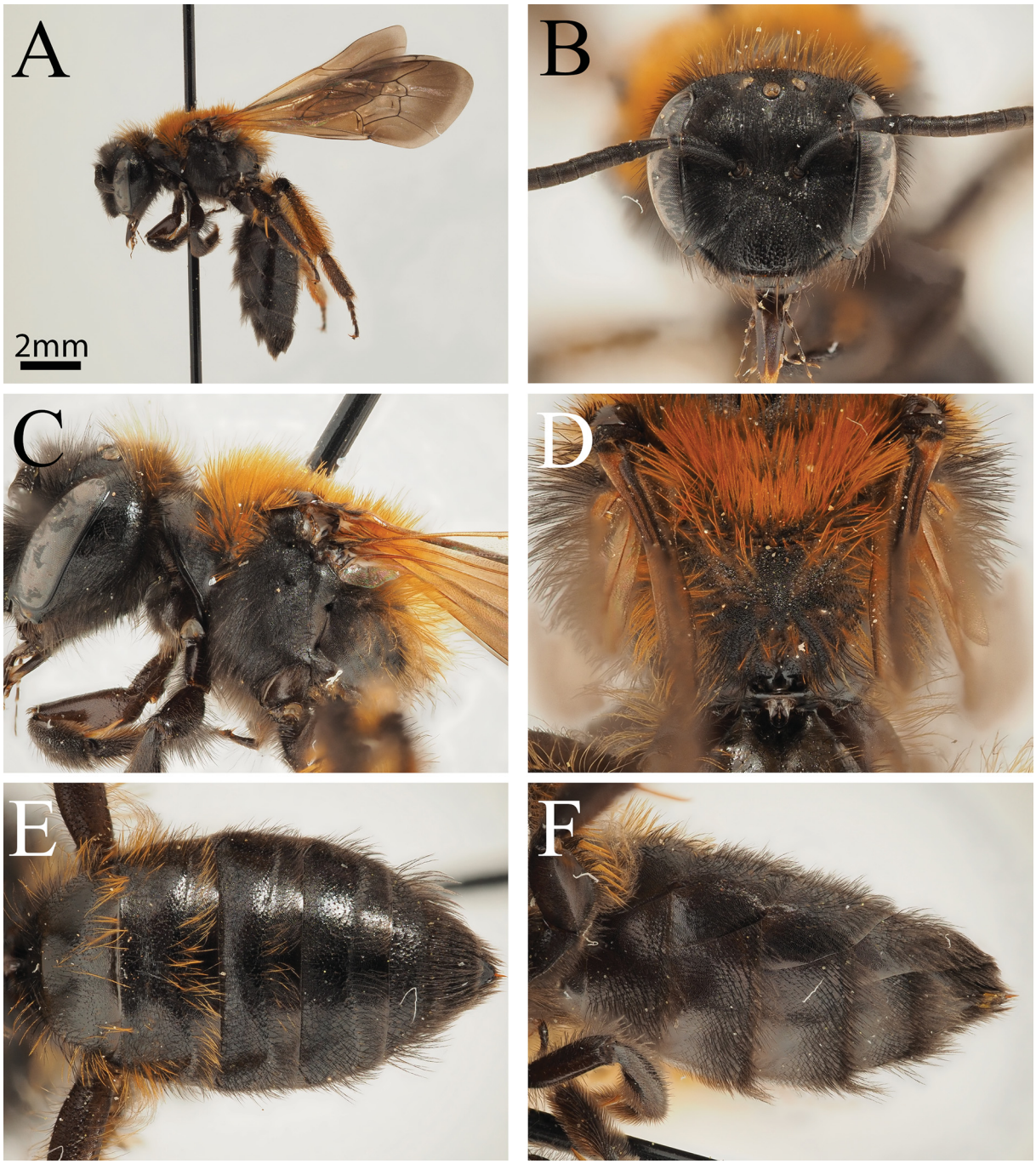

Fig. 25. *Andrena* (*Euandrena*) *abscondita* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Mesosoma, lateral view. **D**. Propodeum, dorsal view. **E**. Terga, dorsal view. **F**. Metasoma, latero-ventral view.

Metasoma. Terga dark, marginal areas at most with apical rim extremely obscurely and narrowly lightened hyaline (Fig. 25E). Tergal discs with weak and irregular shagreen, more or less shining, irregularly punctate, punctures separated by 0.5–2 puncture diameters. Discs of T1–2 with sparse, upstanding light brown hairs, these continuing onto marginal area of T2, forming long and weak apical fringe. T3 almost entirely dark-haired, with scattered light brown hairs overlying marginal area; T4 entirely black-haired. Sterna with long, upstanding apical hair fringes of black plumose hairs, not obscuring underlying surface (Fig. 25F). Apical fringe of T5 and hairs flanking pygidial plate black; pygidial plate rounded triangular, margin clearly raised, internal surface weakly domed, with large granular microreticulation, weakly shining.

Male

Unknown.

Distribution

Morocco (High and Middle Atlas) and northern Tunisia.

Andrena* (*Euandrena*) *berberica sp. nov.
urn:lsid:zoobank.org:act:E81C12A1-0C79-4ACD-89F7-F86503E96C96
Fig. 26

Diagnosis

Andrena berberica sp. nov. can be recognised as a member of *Euandrena* due to the narrow facial fovea (dorsally occupying ⅓ of space between the lateral ocellus and the compound eye) which narrow further ventrally combined with the long A3 (Fig. 26B; slightly exceeding length of A4+5) and the simple, non-plumose hairs of the tibial scopae (Fig. 26D). Due to its black and orange colouration, it resembles *A. abscondita* sp. nov. and *A. bicolor*. It can be separated from both of these species (alternative character state in parentheses) by the light brown hairs on the sterna (Fig. 26F; sterna with black hairs, Fig. 25F), the face with abundant light brown hairs medially (Fig. 26B; face almost entirely black haired, Fig. 25B), by the tergal margins with their apical rim clearly but distinctly lightened hyaline-yellow (Fig. 26E; tergal margins dark, Fig. 25E), T3–5 with narrow apical hairbands of yellowish hairs (Fig. 26E; terga with dark apical hairbands on T3–5, at most with weak light brown fringes on T2, Fig. 25E) and by the presence of abundant short black hairs on the scutum, underlying the longer, light reddish-brown hairs (Fig. 26C; scutum at most with scattered black hairs, Fig. 25C). Additionally, *A. berberica* can be separated from *A. abscondita* by the clypeus, which has punctures clearly separated by 0.5–1 puncture diameter, with the underlying surface smooth and shining (in *A. abscondita* with the clypeus densely punctate, punctures almost confluent, underlying surface dull to weakly shining, Fig. 25B).

Etymology

This species is named after the Berber people who populate the Atlas Mountains. It is a noun in apposition.

Material examined

Holotype

MOROCCO • ♀; Souss-Massa, Tafraoute, Iguissle (3 km E of Tanalt); 1500 m a.s.l.; 29.7730° N, 9.1233° W; 21 Mar. 2022; T.J. Wood leg.; BOLD: WPATW396-22; OÖLM.

Paratypes

MOROCCO • 1 ♀; Guelmim-Oued Noun, Guelmim, 5 km S of Aferkat; 700 m a.s.l.; 18 Mar. 2022; T.J. Wood leg.; TJWC • 1 ♀; Anti Atlas, 15 km N of Irherm; 6 Apr. 1983; G.R. Else leg.; NHMUK • 1 ♀; Oukaimeden; 2670 m a.s.l.; 13 May 2015; V. Soon leg.; TUZ.

Description

Female

Measurements. Body length 9 mm (Fig. 26A).

Head. Dark, 1.2 times as wide as long (Fig. 26B). Clypeus weakly domed, regularly punctate, punctures separated by 0.5–1 puncture diameter, underlying surface smooth and shining. Process of labrum trapezoidal, 2 times as broad as long. Gena 1.1 times as broad as width of compound eye; ocelloccipital

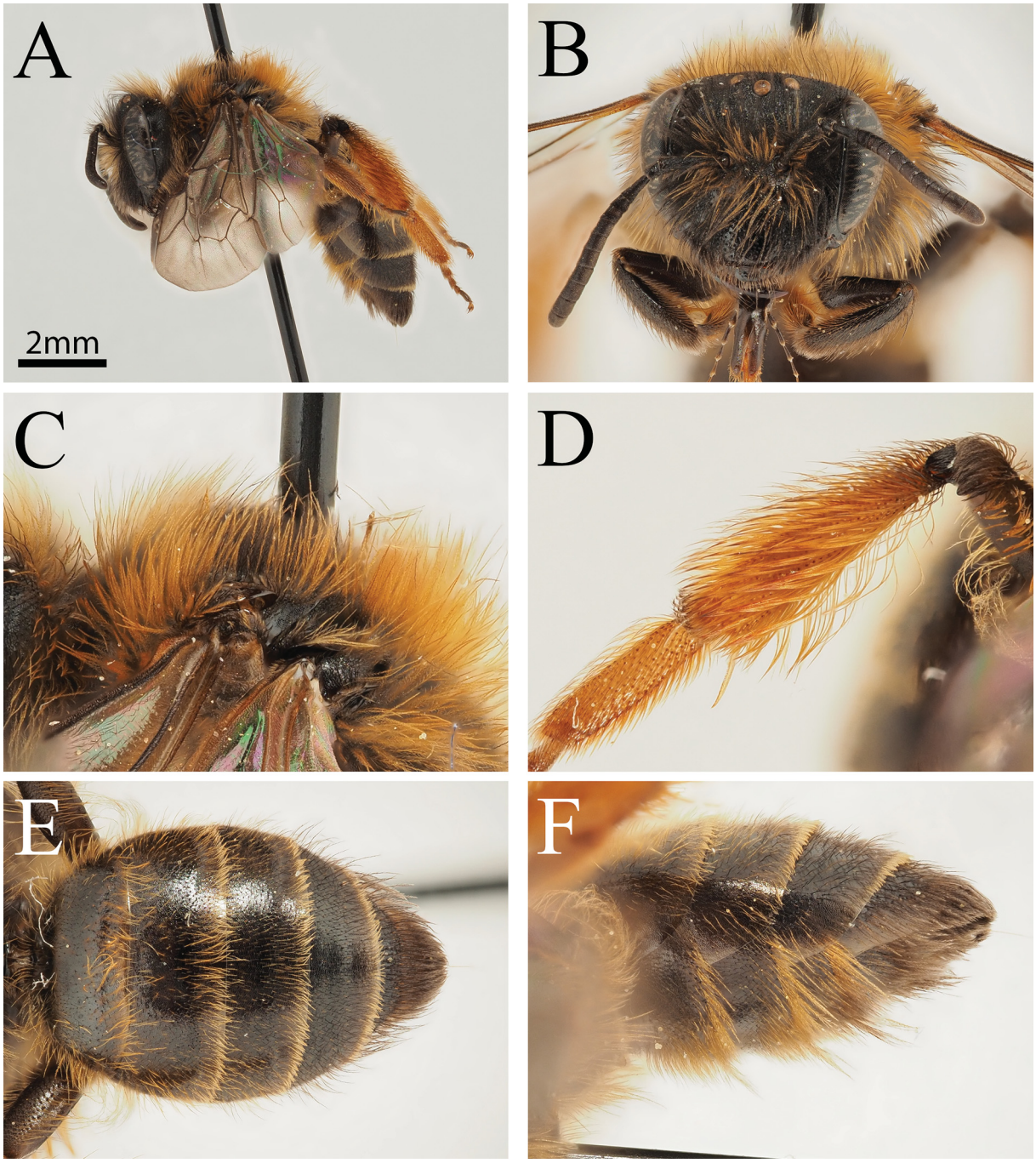

Fig. 26. *Andrena* (*Euandrena*) *berberica* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Mesosoma, lateral view. **D**. Hind tibia, lateral view. **E**. Terga, dorsal view. **F**. Metasoma, latero-ventral view.

distance subequal to diameter of lateral ocellus. Foveae narrow, occupying ⅓ of space between lateral ocellus and compound eye, narrowing further ventrally at level of antennal insertions; foveae filled with dark brown hairs. Face and frons predominantly with black hairs, medially around antennal insertions and on supraclypeal plate with abundant intermixed light brown hairs. Gena ventrally with whitish hairs, becoming light brown dorsally and on vertex. Antennae dark, A3 exceeding length of A4+5, shorter than A4+5+6.

Mesosoma. Scutum and scutellum with fine granular shagreen, somewhat dull laterally and anteriorly, weakly shining medially; underlying surface shallowly punctate, punctures separated by 0.5–2 puncture diameters. Pronotum rounded. Mesepisternum with fine granular shagreen, weakly shining. Dorsolateral parts of propodeum with granular microreticulation; microreticulation overlain with additional network of weakly raised reticulation, forming network resembling large punctures; pseudopunctures separated by 0.5–1 puncture diameter. Propodeal triangle narrow, slightly impressed and recessed below level of dorsolateral parts of propodeum; surface with fine granular shagreen, on basal ⅓ with network of short, but distinctly raised rugae. Mesepisternum with mixture of long black and light brown hairs, longest equalling length of scape; scutum and scutellum with shorter light brown hairs, scutum with intermixed and contrasting shorter black hairs (Fig. 26C). Propodeal corbicula incomplete, dorsal fringe composed of long, strongly plumose hairs, predominantly light brown with occasional intermixed black hairs; internal surface with long, weakly plumose, pale hairs. Legs predominantly dark, hind tibiae partially and hind basitarsi entirely lightened orange (Fig. 26D). Flocculus incomplete, composed of plumose hairs, flocculus and femoral scopa with orange hairs. Tibial scopa predominantly composed of simple orange hairs, hairs dorsally with apices darkened. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation dark brown, nervulus interstitial.

Metasoma. Terga dark, marginal areas with apical rim clearly lightened hyaline-yellow (Fig. 26E). Tergal discs with fine shagreen, more or less shining, sparsely punctate, punctures separated by 2–3 puncture diameters. Discs of T1–2 with upstanding, light brown hairs, T1–4 with distinct narrow apical hair bands of light brown hairs, hair bands complete, T4–5 with dark, sparse, and erect hairs on discs. Sterna with long, upstanding apical hair fringes of light orange-brown plumose hairs, not obscuring underlying surface (Fig. 26F). Apical fringe of T5 and hairs flanking pygidial plate black; pygidial plate rounded triangular, margin weakly raised, internal surface flat, with granular microreticulation, weakly shining.

Male

Unknown.

Distribution

South-western Morocco (Anti-Atlas) to the High Atlas (Oukaimeden).

Andrena* (*Hoplandrena*) *darha sp. nov.
urn:lsid:zoobank.org:act:6EECA6FB-6A55-4DFF-912F-811E74757586
Fig. 27

Diagnosis

Andrena darha sp. nov. can be recognised as part of the subgenus *Hoplandrena* through the combination of the elongate A3, which exceeds the length of A4+5 (Fig. 27B–C), the weak lateral fold on the pronotum, the elongate body shape, and the broad and finely delineated propodeal triangle, with a finely microreticulate internal surface (Fig. 27D). It is closest to *Andrena ferulae* Pérez, 1895, which is known from coastal parts of Algeria and Tunisia (Gusenleitner & Schwarz 2002). *Andrena darha* differs by (alternative character state in parentheses) the predominantly light brown facial pubescence

(Fig. 27B; entirely dark), the weakly domed and evenly punctate clypeus (clypeus strongly domed and impunctate), the internal surface of the propodeal triangle being evenly and finely microreticulate over its entire area (internal surface of the propodeal triangle medially with raised rugosity, with strongly contrasting lateral parts), whitish tergal hairbands (Fig. 27E–F; tergal hairbands dark orange-brown), and dark brown terminal fringe (Fig. 27E; terminal fringe black). It is important to note, however, that this species did not fall close to other species of *Hoplandrena* based on the COI gene. The closest match was *A.* (*Lepidandrena*) *impasta* Warncke, 1975 (ANDPH027-21, 88.44%), which is morphologically unrelated. *Andrena darha* and *A. ferulae* may represent a distinct and unrecognised lineage, but additional genetic analysis is required to establish this. No sequences are currently available for *A. ferulae*. For now, both species are retained in the subgenus *Hoplandrena* for consistency with existing concepts.

Additionally, *A. darha* sp. nov. is superficially similar to *A.* (*?Euandrena*) *ramosa* Wood, 2022 from south-western Spain due to its similar body shape, colouration, and the presence of plumose, light brown hairs on the mesepisternum, propodeal corbicula, and flocculus. However, these hairs are only weakly plumose in *A. darha*, whereas they are strongly and conspicuously plumose in *A. ramosa*. *Andrena darha* can also be separated (alternative character state in parentheses) by the presence of a humeral angle (pronotum rounded), by the broad foveae (foveae occupying at most ⅓ of the distance between the lateral ocellus and the compound eye), A4 clearly longer than broad (A4 quadrate), and the trapezoidal process of the labrum (process of the labrum broad, at least three times as broad as long).

Etymology

Named after the Draa River (Drâa, or Asif en Dra) that is the longest river in Morocco. The spelling is taken from older texts that often use 'Darha' to refer to this river. It is a noun in apposition.

Material examined

Holotype

MOROCCO • ♀; Drâa-Tafilalet, Ouarzazate, P1507, 3 km SSE of Irhels; 30.6993° N, 7.0721° W; 12 Apr. 2022; T.J. Wood leg.; BOLD: WPATW689-22; OÖLM.

Paratypes

MOROCCO • 2 ♀♀; same collection data as for holotype; OÖLM • 1 ♀; same collection data as for holotype; TJWC • 1 ♀; 50 km SW of Akka; 27 Mar. 1986; K. Warncke leg.; OÖLM • 2 ♀♀; Uarz. [Ouarzazate] Tinezouline; 800 m a.s.l.; 9 Mar. 1988; V. Lefeber leg.; RMNH • 2 ♀♀; Valée du Draa, Tizouline; 9 Mar. 1988; H. Teunissen leg.; RMNH.

Description

Female

Measurements. Body length: 10–11 mm (Fig. 27A).

Head. Dark, 1.25 times as wide as long (Fig. 27B). Clypeus weakly and evenly domed, regularly punctate, punctures separated by 0.5–1 puncture diameter, with obscure, impunctate longitudinal midline; underlying surface laterally and basally shagreened and dull, sculpture becoming weaker medially and apically, here smooth and shining. Process of labrum trapezoidal, 2 times as broad as long, apical margin obscurely emarginate, surface shining. Gena slightly exceeding width of compound eye; ocelloccipital distance equalling 1 diameter of lateral ocellus. Foveae broad, poorly and obscurely defined, occupying 60% of space between lateral ocellus and compound eye, slightly narrowing ventrally at level of antennal insertions; foveae filled with dark brown hairs. Face medially and gena ventrally and laterally with pale to light brown hairs, becoming intermixed with dark brown to black hairs on vertex, frons, and surrounding antennal insertions. Antennae dark, A4–12 ventrally obscurely lightened dark brown; A3 exceeding length of A4+5, shorter than A4+5+6; segments A4–12 all clearly longer than broad (Fig. 27C).

Mesosoma. Scutum with fine granular shagreen, obscurely shining, with shallow, obscure, and scattered punctures, punctures separated by 2–3 puncture diameters; scutellum with weaker shagreen, more strongly shining; punctures more visible, separated by 1–2 puncture diameters. Pronotum with weak but distinct humeral angle. Mesepisternum with fine granular microreticulation; dorsolateral parts of propodeum with slightly stronger granular microreticulation; microreticulation overlain with additional network of weakly raised reticulation resembling large punctures; pseudopunctures separated by

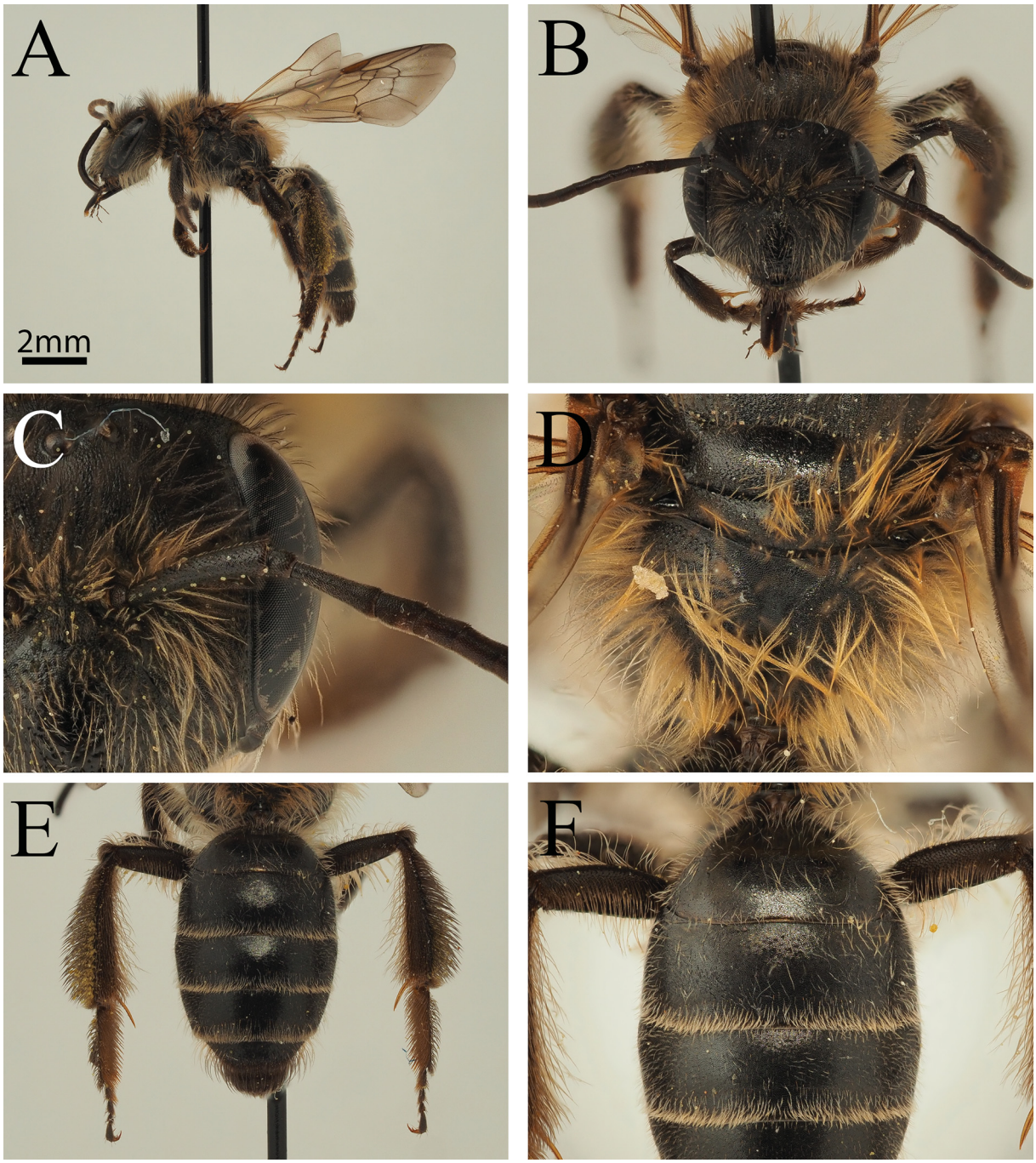

Fig. 27. *Andrena* (*Hoplandrena*) *darha* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Antennae, frontal view. **D**. Propodeum, dorsal view. **E**. Terga, dorsal view. **F**. Terga detail, dorsal view.

0.5–1 puncture diameter. Propodeal triangle without lateral carinae, surface with fine granular shagreen, weakly shining, thus defined by and contrasting sculpture of dorsolateral parts of propodeum (Fig. 27D). Mesepisternum laterally with long, light brown plumose hairs, not exceeding length of scape; scutum, scutellum, and propodeum with shorter and darker brown hairs. Propodeal corbicula incomplete, dorsal fringe composed of finely plumose light brown hairs, internal surface with long, light brown simple hairs. Legs dark, pubescence dark brown; flocculus and femoral scopa whitish, flocculus incomplete, but distinctly produced, composed of finely plumose hairs; femoral scopa composed of simple hairs. Tibial scopa composed of simple hairs, dorsally dark brown to black, ventrally becoming white. Hind tarsal claws with strong inner tooth. Wings weakly infumate, surface with obscure brownish colouration; stigma dark orange, venation dark orange to dark brown; nervulus interstitial.

Metasoma. Terga dark, apical rim of marginal zones narrowly lightened hyaline-brown (Fig. 27E). Tergal discs with uniform granular shagreen, obscurely shining, with small, obscure, and scattered hair-bearing punctures, punctures separated by 2–3 puncture diameters. T2–4 with weak apical fringes of brownish hairs forming complete hairbands (Fig. 27F). Apical fringe of T5 and hairs flanking pygidial plate dark brown, pygidial plate with obscurely thickened margin, internal surface flat, medially densely punctate, puncture separated by 0.5 puncture diameter.

Male

Unknown.

Remarks

The four specimens from RMNH were misidentified as *A. ferulae* by H. Teunissen. All specimens come from arid semi-desert in the Draa Valley south of the High Atlas Mountains, whereas *A. ferulae* is known from humid Mediterranean areas. At the Irhels site, specimens were observed visiting yellow Brassicaceae, and all pollen removed from the scopae of two females consisted of Brassicaceae pollen. Pollen specialisation is uncommon in the subgenus *Hoplandrena*, so further study is required; it is too soon to assign a dietary classification. Based on the observed dates of capture, it can be presumed that males fly in February, given their absence in collected material; the species is likely endemic to southern Morocco.

Distribution

Southern Morocco in the Drâa Valley.

Andrena* (*Micrandrena*) *anammas sp. nov.

urn:lsid:zoobank.org:act:F44C6808-4589-49ED-BD9B-D3FC6E1B91C5

Fig. 28

Diagnosis

Andrena anammas sp. nov. can quickly be recognised as a member of *Micrandrena* due to its small body size (Fig. 28A), dark integument, and entirely rugose propodeal triangle. Due to the comparatively (for a *Micrandrena*) long face and clypeus (Fig. 28B; head overall only 1.1 times as wide as long), narrow facial fovea (dorsally occupying ¼ of space between the lateral ocellus and the compound eye, consistently wide along its length), and densely punctate scutum (Fig. 28C; punctures separated by < 1 puncture diameter) they are comparable to *A. atlantea* Wood, 2021 (High and Middle Atlas Mountains in Morocco) and *A. ortizi* (Spain, Sierra Nevada). *Andrena anammas* can be separated from *A. atlantea* (with which it can be found in direct sympatry) by the stronger sculpture of the scutum and terga, these areas with clear microreticulation and at most weakly shining (in *A. atlantea* with sculpture of the scutum and terga weaker, more strongly shining). Due to this stronger sculpture, the punctation

of the tergal discs is weak and obscure (Fig. 28D), whereas in *A. atlantea* it is more clearly visible against the underlying sculpture. Specimens of *Andrena anammas* are also slightly smaller (6 mm versus 7.5–8 mm).

Finally, *A. anammas* sp. nov. is most similar to *A. ortizi,* which measures 7 mm in length. The two species can be separated by the width of the tergal margins; in *A. anammas*, the tergal margins occupy at most ⅓ of the disc of T2 and ½ of the discs of T3–4, whereas in *A. ortizi* the marginal areas occupy at least ½ of the disc of T2 and over ½ of the discs of T3–4. Additionally, in *A. anammas* the discs of T2–3 are obscurely punctate, with punctures disappearing into the background microreticulation (Fig. 28D), whereas in *A. ortizi* they are strongly and densely punctate (see figures in Wood 2023).

Etymology

Named after the Amazigh (Berber) name for the Middle Atlas (Atlas Anammas). It is a noun in apposition.

Material examined

Holotype

MOROCCO • ♀; Fès-Meknès, Ifrane, P7231, 2 km NE of Michlifen; 1900 m a.s.l.; 33.4323° N, 5.0629° W; 24 May 2022; T.J. Wood leg.; BOLD: WPATW685-22; OÖLM.

Paratype

MOROCCO • ♀; Fès-Meknès, Azrou, P7217, 10 km S of Azrou; 1800 m a.s.l.; 18 May 2022; T.J. Wood leg.; BOLD: WPATW686-22; TJWC.

Other material (identified as *Andrena atlantea*; see also Wood 2021)

MOROCCO • 1 ♀; same collection data as for paratype; BOLD: WPATW551-22; TJWC.

Description

Female

Measurements. Body length 6 mm (Fig. 28A).

Head. Dark, 1.1 times as wide as long (Fig. 28B). Clypeus elongate, not much broader than long, apically distinctly exceeding lower level of compound eyes, evenly domed, with large punctures, punctures separated by 1–2 puncture diameters; underlying surface medially and basally with granular microreticulation, weakly shining, apically more strongly shining. Process of labrum narrow, rounded, as long as broad. Gena equalling width of compound eye; ocelloccipital distance 0.5 times diameter of lateral ocellus. Foveae narrow, occupying ⅓ of space between lateral ocellus and compound eye, very slightly narrowing ventrally at level of antennal insertions; foveae filled with whitish hairs. Face, gena, vertex, and scape with white hairs. Antennae dark, A3 equalling or very slightly exceeding length of A4+5.

Mesosoma. Scutum and scutellum with granular microreticulation, weakly shining, regularly punctate, punctures separated by 0.5–1 puncture diameter (Fig. 28C). Pronotum rounded. Mesepisternum with strong granular microreticulation, dull. Dorsolateral parts of propodeum with granular microreticulation overlain by additional network of raised reticulation. Propodeal triangle laterally delineated by raised carinae, internal surface with pattern of strongly raised rugae, interspaces shining. Mesepisternum laterally with whitish hairs, scutum and scutellum with shorter whitish hairs. Propodeal corbicula incomplete, dorsal fringe composed of whitish plumose hairs, internal surface with long, white simple hairs. Legs dark, pubescence brownish. Flocculus incomplete, composed of plumose hairs; flocculus, femoral scopae, and tibial scopae composed of white simple hairs. Hind tarsal claws with inner tooth. Wings hyaline, stigma dark brown to black, venation dark brown, nervulus interstitial.

Metasoma. Terga dark, apical margins at most with apical rims narrowly and obscurely lightened dark brown (Fig. 28D). Tergal margins relatively broad, on T2 occupying ⅓ of visible segment, on T3–4 occupying slightly more than ½ of visible segment. Tergal discs microreticulate, weakly shining, obscurely punctate, punctures disappearing into underlying sculpture, separated by 1–2 puncture diameters. T2–4 laterally with narrow apical hair fringes on apex of tergal margins, obscuring underlying surface, broadly interrupted medially. Apical fringe of T5 and hairs flanking pygidial plate dark brown, hairs of T5 laterally overlain by long white hairs. Pygidial plate rounded triangular, medially with elevated longitudinal midline, surface with obscure punctures.

Male

Unknown.

Remarks

The species was collected from small *Alyssum* (Brassicaceae) flowers in subalpine habitats.

Distribution

High altitude sites in the Moroccan Middle Atlas (Azrou, Ifrane).

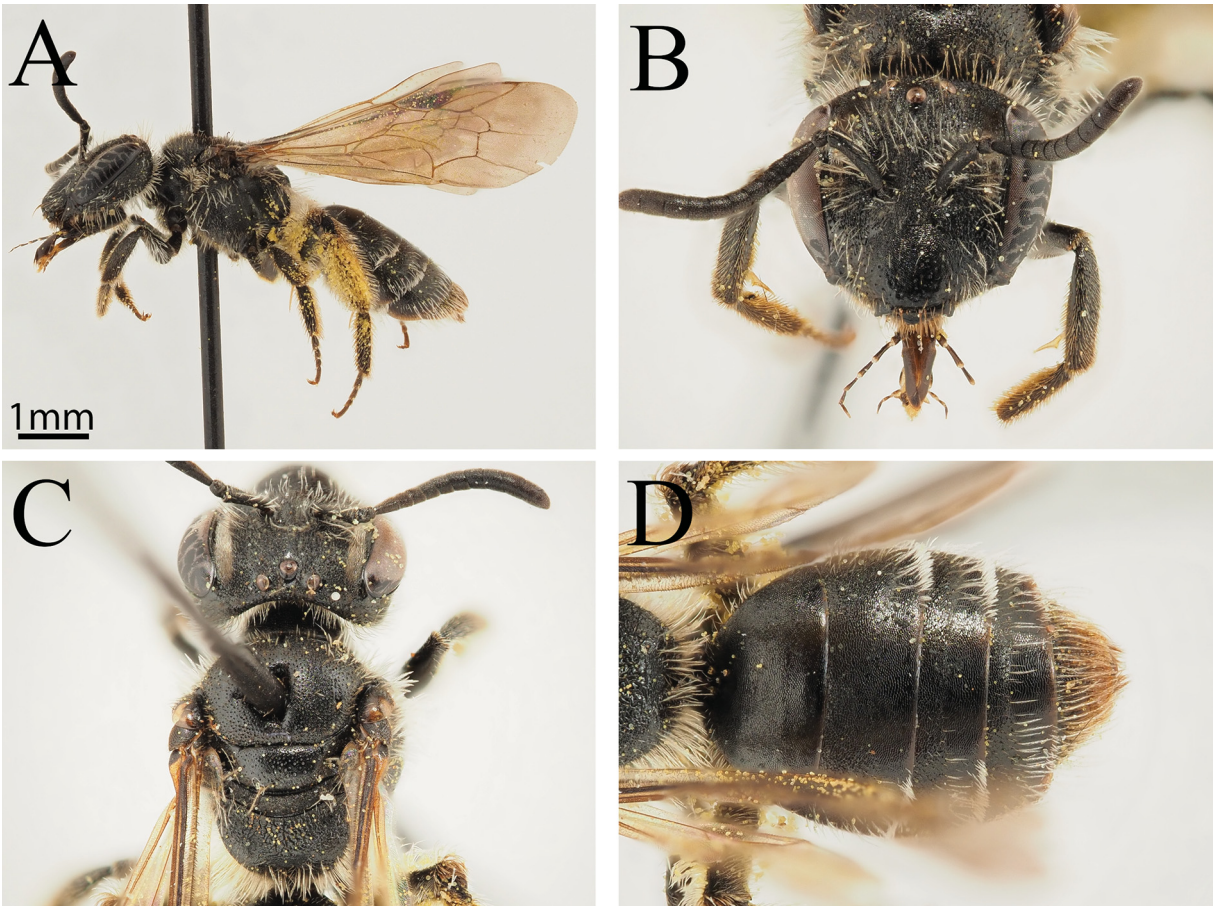

Fig. 28. *Andrena* (*Micrandrena*) *anammas* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Scutum, dorsal view. **D**. Terga, dorsal view.

Andrena* (*Micrandrena*) *gemina sp. nov.
urn:lsid:zoobank.org:act:D2CF5BBB-DF33-4D0C-8877-ECFA20F743A1
Figs 29A–E, 30

Diagnosis

Andrena gemina sp. nov. can quickly be recognised as a member of *Micrandrena* due to its small body size (Fig. 29A), dark integument, and partly rugose propodeal triangle (Figs 29D, 30D). It is very close to *A. tenuistriata* due to the facial foveae that narrow ventrally (Fig. 29B), the domed clypeus, the intermixed light and dark pubescence on the male face (Fig. 30B), and the sculpture of the propodeal triangle which is rugose medially, but this rugosity does not extend to cover the entire propodeal triangle, laterally and apically with granular microsculpture (Figs 29D, 30D). This combination of characters is found only in *A. tenuistriata*. The two species differ by the tergal punctation, as *A. gemina* has the terga densely and finely punctate (Fig. 29E), whereas in *A. tenuistriata* the terga are more or less impunctate, at most with obscure and scattered punctures (Fig. 29F). The two species can be found in sympatry in Morocco, and they are decisively separated by barcodes (Fig. 3), with an average separation of 10.79% (range 9.59–11.44%, see above).

Etymology

Feminine form of the Latin adjective '*geminus*', meaning 'twin' ('similar, resembling, like'), in reference to the close morphological and genetic similarity to *A. tenuistriata*.

Material examined

Holotype

MOROCCO • ♀; Souss-Massa, R105, Tizirt, 10 km N of Agadir N'Guemzt; 29.9640° N, 9.0146° W; 12 Mar. 2022; T.J. Wood leg.; BOLD: WPATW724-22; OÖLM.

Paratypes

MOROCCO • 1 ♀; Anti Atlas, 5 km N of Irherm; 6 Apr. 1983; G.R. Else leg.; NHMUK • 1 ♀; Fès-Meknès, Azrou, P7217, 10 km S of Azrou; 1800 m a.s.l.; 18 May 2022; T.J. Wood leg.; OÖLM • 1 ♀; same collection data as for preceding; TJWC • 1 ♀; Souss-Massa, Tafraoute, Iguissle (3 km E of Tanalt); 1500 m a.s.l.; T.J. Wood leg.; OÖLM • 1 ♂; Souss-Massa, Tiznit, Inskat, Barrage Youssef Ben Tachfine; 22 Mar. 2022; T.J. Wood leg.; OÖLM • 1 ♂; same collection data as for preceding; TJWC.

Description

Female

Measurements. Body length 5–5.5 mm (Fig. 29A).

Head. Dark, 1.25 times as wide as long (Fig. 29B). Clypeus domed, with irregular shallow punctures, punctures separated by 0.5–2 puncture diameters; underlying surface shagreened, weakly shining. Process of labrum trapezoidal, slightly broader than long, apical margin truncate. Gena equalling width of compound eye; ocelloccipital distance ⅓ diameter of lateral ocellus. Foveae dorsally occupying ⅓ of space between lateral ocellus and compound eye, narrowing further ventrally, separated from inner margin of compound eye by distance less than ventral width of fovea; foveae filled with dark brown hairs. Face, gena, vertex, and scape with whitish hairs, becoming light brownish dorsally. Antennae dark, A5 ventrally lightened by presence of greyish scales; A3 slightly exceeding length of A4+5, shorter than A4+5+6.

Mesosoma. Scutum and scutellum with granular shagreen, weakly shining, finely punctate, punctures separated by 0.5–2 puncture diameters (Fig. 29C). Pronotum rounded. Mesepisternum with fine granular

shagreen, shining. Dorsolateral parts of propodeum microreticulate, microreticulation overlain by additional network of raised reticulation. Propodeal triangle laterally delineated by very fine carinae; internal surface with fine raised rugosity on basal half, surface laterally and apically with fine granular microreticulation, sculpture of propodeal triangle thus contrasting with dorsolateral parts of propodeum (Fig. 29D). Mesepisternum with long whitish hairs, not equalling length of scape, scutum and scutellum with shorter light brown hairs. Propodeal corbicula incomplete, dorsal fringe composed of light

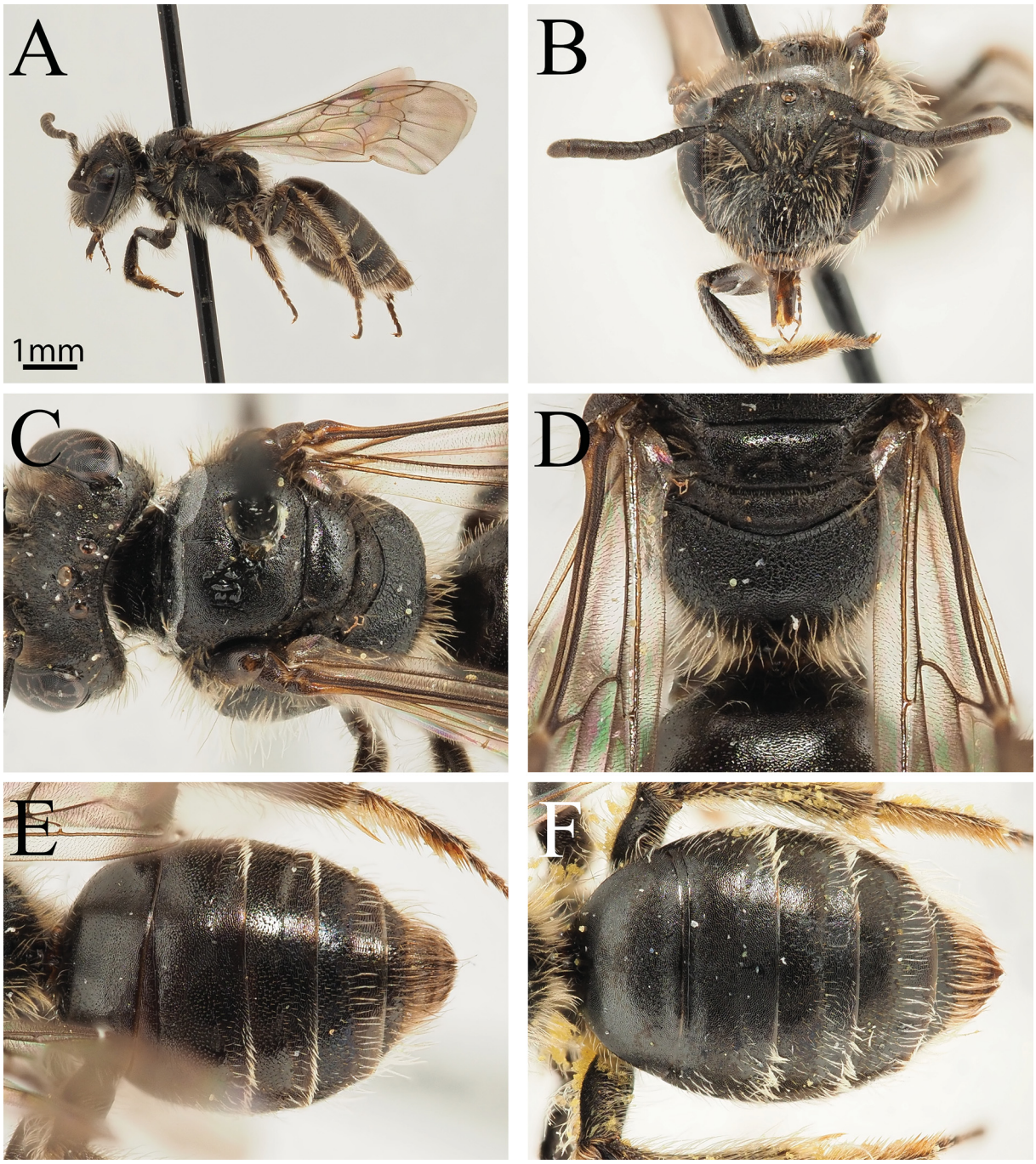

Fig. 29. *Andrena* (*Micrandrena*) *gemina* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Scutum, dorsal view. **D**. Propodeum, dorsal view. **E**. Terga, dorsal view. — *Andrena* (*Micrandrena*) *tenuistriata* Pérez, 1895, ♀. **F**. Terga, dorsal view.

brownish plumose hairs, internal surface with scattered long, white simple hairs. Legs dark, pubescence light brownish. Flocculus incomplete, composed of plumose hairs; flocculus, femoral scopae, and tibial scopae composed of white simple hairs. Hind tarsal claws with small inner tooth. Wings hyaline, stigma orange-brown, venation brown, nervulus interstitial.

Metasoma. Terga dark, apical margins at most with apical rims narrowly and obscurely lightened dark brown (Fig. 29E). Tergal discs densely and finely punctate, punctures separated by 0.5–1 puncture

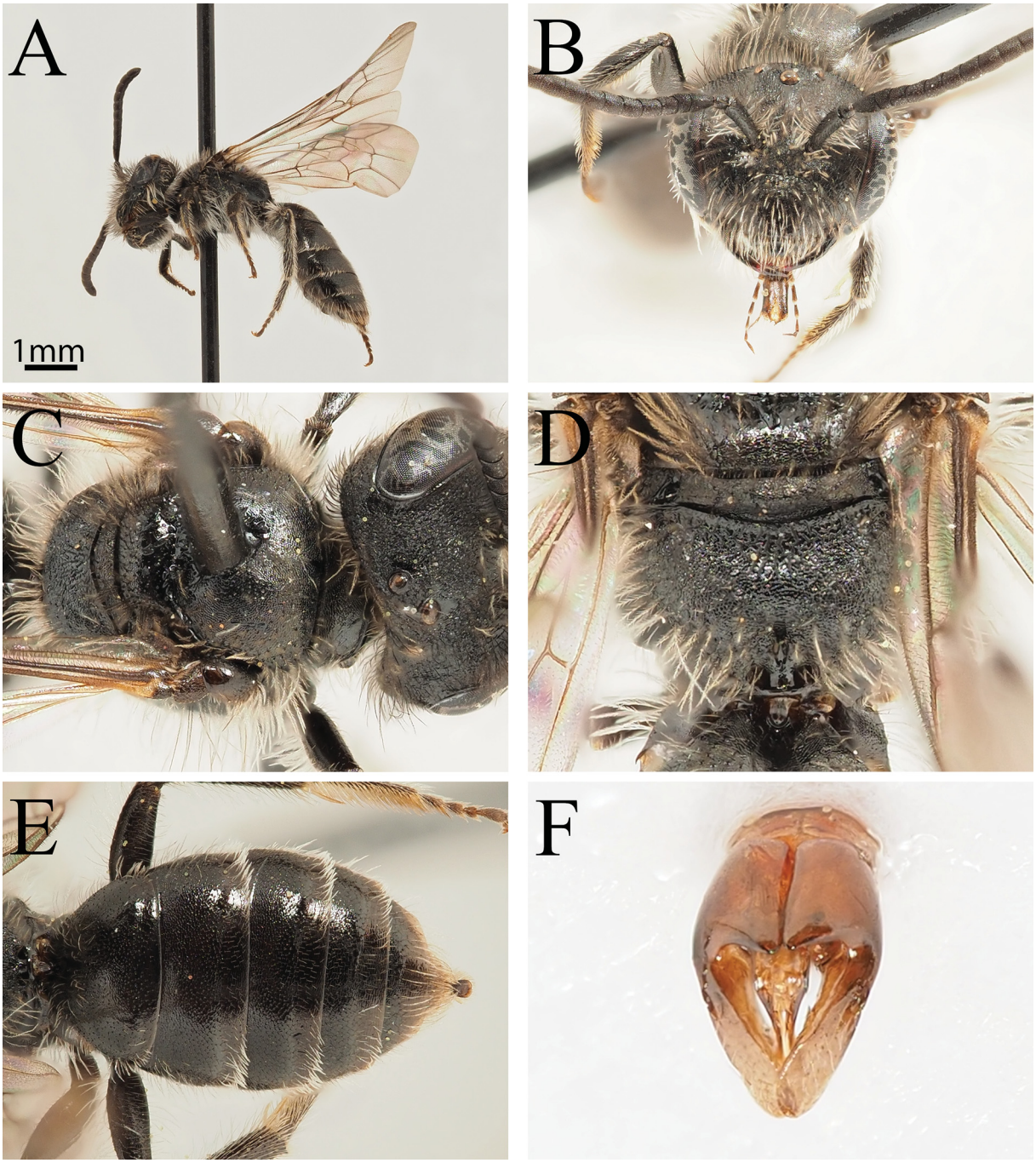

Fig. 30. *Andrena* (*Micrandrena*) *gemina* sp. nov., paratype, ♂ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Scutum, dorsal view. **D**. Propodeum, dorsal view. **E**. Terga, dorsal view. **F**. Genital capsule, dorsal view.

diameter, underlying surface finely shagreened, weakly shining. Tergal margins weakly depressed, with obscure and scattered punctures. T2–3 laterally with weak narrow apical hair fringes; base of marginal area of T4 with sparse long light brown hairs overlying but not obscuring marginal area. Apical fringe of T5 and hairs flanking pygidial plate dark brown; pygidial plate rounded triangular, surface featureless, dull.

Male

Measurements. Body length 5 mm (Fig. 30A).

Head. Dark, 1.25 times as wide as long (Fig. 30B). Clypeus domed, irregularly punctate with shallow punctures, punctures separated by 0.5–2 puncture diameters, densest basally and laterally; underlying surface weakly microreticulate basally, becoming smooth and shining apically. Process of labrum trapezoidal, slightly broader than long, apical margin truncate. Gena equalling width of compound eye; ocelloccipital distance ½ of diameter of lateral ocellus. Face and scape covered with long, intermixed black and white hairs, some equalling length of scape; gena ventrally with white hairs, vertex with black hairs. Antennae dark, A4–13 ventrally lightened by presence of greyish scales; A3 longer than A4, shorter than A4+5, A4 subquadrate, broader than long, shorter than A5.

Mesosoma. Mesosoma structurally as in female (Fig. 30C–D).

Metasoma. Metasoma structurally as in female (Fig. 30E). S8 columnar, apical margin truncate to slightly rounded, ventral surface covered with light brown hairs. Genital capsule with gonocoxae weakly produced into rounded teeth apically (Fig. 30F). Gonostyli flattened and spatulate for majority of length, slightly broadening apically, inner and outer margins weakly but distinctly diverging, apices rounded. Penis valves narrow, occupying ½ of space between gonostyli, narrowing medially.

Distribution

South-western (Anti-Atlas) and northern (Middle Atlas) Morocco.

Andrena* (*Micrandrena*) *tinctoria sp. nov.
urn:lsid:zoobank.org:act:E576F900-F7F4-4E58-8FCD-38F7322BCC7D
Fig. 31

Diagnosis

Andrena tinctoria sp. nov. can quickly be recognised as a member of *Micrandrena* due to its small body size (Fig. 31A), dark integument, and entirely rugose propodeal triangle (Fig. 31D). At the base of T2–4 it lacks a gradulus (Fig. 31E), which when combined with its slightly but distinctly depressed marginal areas of T3–4 (Fig. 31F), microreticulate tergal discs with scattered punctures, and clypeus with a longitudinal impunctate mid-line, underlying surface shagreened with apical margin weakly shining, these characters place it close to *A. pauxilla*. The two species are extremely close morphologically, though not genetically (Fig. 3). The best character allowing separation is the density of punctures on the scutum; in *A. tinctoria*, the scutal punctures are separated by 1–2 puncture diameters, whereas in *A. pauxilla* they are separated by 0.5–1 puncture diameter. The ocelloccipital distance is also different, at most 0.5 times the diameter of a lateral ocellus in *A. tinctoria* (Fig. 31C), but equal to the diameter of a lateral ocellus in *A. pauxilla*.

Etymology

Named after the plant woad (*Isatis tinctoria*, Brassicaceae) from which it can be collected in large numbers. The word '*tinctoria*' itself means 'used as a dye'. It is a noun in apposition.

Material examined

Holotype

MOROCCO • ♀; Drâa-Tafilalet, Ouarzazate, 1 km N of Sour; 31.1321° N, 7.5946° W; 13 Apr. 2022; T.J. Wood leg.; BOLD: WPATW745-22; OÖLM.

Paratypes

MOROCCO • 10 ♀♀; Drâa-Tafilalet, Ouarzazate, 2 km W of Agouim; 1800 m a.s.l.; 13 Apr. 2022; T.J. Wood leg.; OÖLM • 5 ♀♀; same collection data as for preceding; TJWC • 1 ♀; Drâa-Tafilalet, Tazenakht, Tachaokcht; 1900 m a.s.l.; 16 Apr. 2022; T.J. Wood leg.; OÖLM • 7 ♀♀; High Atlas, 1–5 km S of Tizi-n-Test (Marrakech-Taroudant Rd); 1 Apr. 1983; G.R. Else leg.; NHMUK • 9 ♀♀; High Atlas, 3 km S of Idni (Marrakech-Taroudant Rd); 10 Apr. 1983; G.R. Else leg.; NHMUK • 1 ♀; High Atlas, Tizi-n-Test Rd; 1000–2000 m a.s.l.; 20 May 1975; G.R. and A.C. Else leg.; NHMUK • 1 ♀; W of Taroudant, Oued Souss; 31 Mar. 1983; G.R. Else leg.; NHMUK • 1 ♀; Fès-Meknès, Boulemane, R503, 7 km SE of Boulemane; 1900 m a.s.l.; 22 May 2022; T.J. Wood leg.; TJWC • 1 ♀; Drâa-Tafilalet, Tazenakht, P1507, 5 km NE of Tazenakht; 17 Apr. 2022; T.J. Wood leg.; TJWC • 14 ♀♀; 60 km N of Ksar-es-Souk [Errachidia]; 10 Apr. 1979; K. Warncke leg.; OÖLM.

Description

Female

Measurements. Body length 6–6.5 mm (Fig. 31A).

Head. Dark, 1.2 times as wide as long (Fig. 31B). Clypeus weakly domed, densely and deeply punctate, punctures separated by 0.5–1 puncture diameter with exception of longitudinal impunctate midline; underlying surface basally and medially shagreened and dull, sculpture weaker apically, becoming smooth and shining between punctures. Process of labrum trapezoidal, slightly broader than long, apical margin truncate. Gena equalling width of compound eye; ocelloccipital distance ½ of diameter of lateral ocellus. Foveae dorsally occupying slightly less than ½ of space between lateral ocellus and compound eye, very slightly narrowing ventrally at level of antennal insertions; foveae filled with light brown hairs. Face, gena, vertex, and scape with long whitish to light brownish hairs, none equalling length of scape. Antennae dark, A3 slightly shorter than A4+5.

Mesosoma. Scutum with fine granular shagreen, weakly shining, regularly punctate, punctures separated by 1–2 puncture diameters (Fig. 31C). Scutellum smooth and shining, punctures separated by 0.5–2 puncture diameters. Pronotum rounded. Mesepisternum with fine granular shagreen, weakly shining. Dorsolateral parts of propodeum microreticulate, microreticulation overlain by additional network of raised reticulation. Propodeal triangle laterally delineated by very fine carinae, internal surface covered with fine network of raised rugosity (Fig. 31F). Mesepisternum with long whitish hairs, longest nearly equalling length of scape, scutum and scutellum with shorter, light brownish hairs. Propodeal corbicula incomplete, dorsal fringe composed of whitish plumose hairs, internal surface with scattered long, white simple hairs. Legs dark, pubescence light brownish. Flocculus incomplete, composed of plumose hairs; flocculus, femoral scopae, and tibial scopae composed of white simple hairs. Hind tarsal claws with small inner tooth. Wings hyaline, stigma orange-brown, venation brown, nervulus interstitial.

Metasoma. Terga dark, apical rims of marginal zones at most very narrowly lightened dark brown (Fig. 31F). Disc of T1 with strong granular microreticulation, weakly shining, sculpture becoming progressively weaker on subsequent terga, T4 with fine shagreen, more strongly shining. Tergal discs obscurely punctate, punctures separated by 1–2 puncture diameters, disappearing into underlying sculpture. T2–4 laterally at their bases without graduli (Fig. 31E). Margins of T2 weakly, T3–4 clearly depressed. T2–4 with clear white hairbands on apical rim of marginal areas, broadly interrupted on

T2–3, nearly complete on T4; margins of T2–4 additionally with loose fringe of hairs emerging from junction of marginal area and disc, hairs extending to reach apices of apical hair fringes. Apical fringe of T5 and hairs flanking pygidial plate predominantly dark brown, T5 laterally with long white hairs overlying dark brown hairs. Pygidial plate rounded triangular, surface flat, featureless.

Male

Unknown.

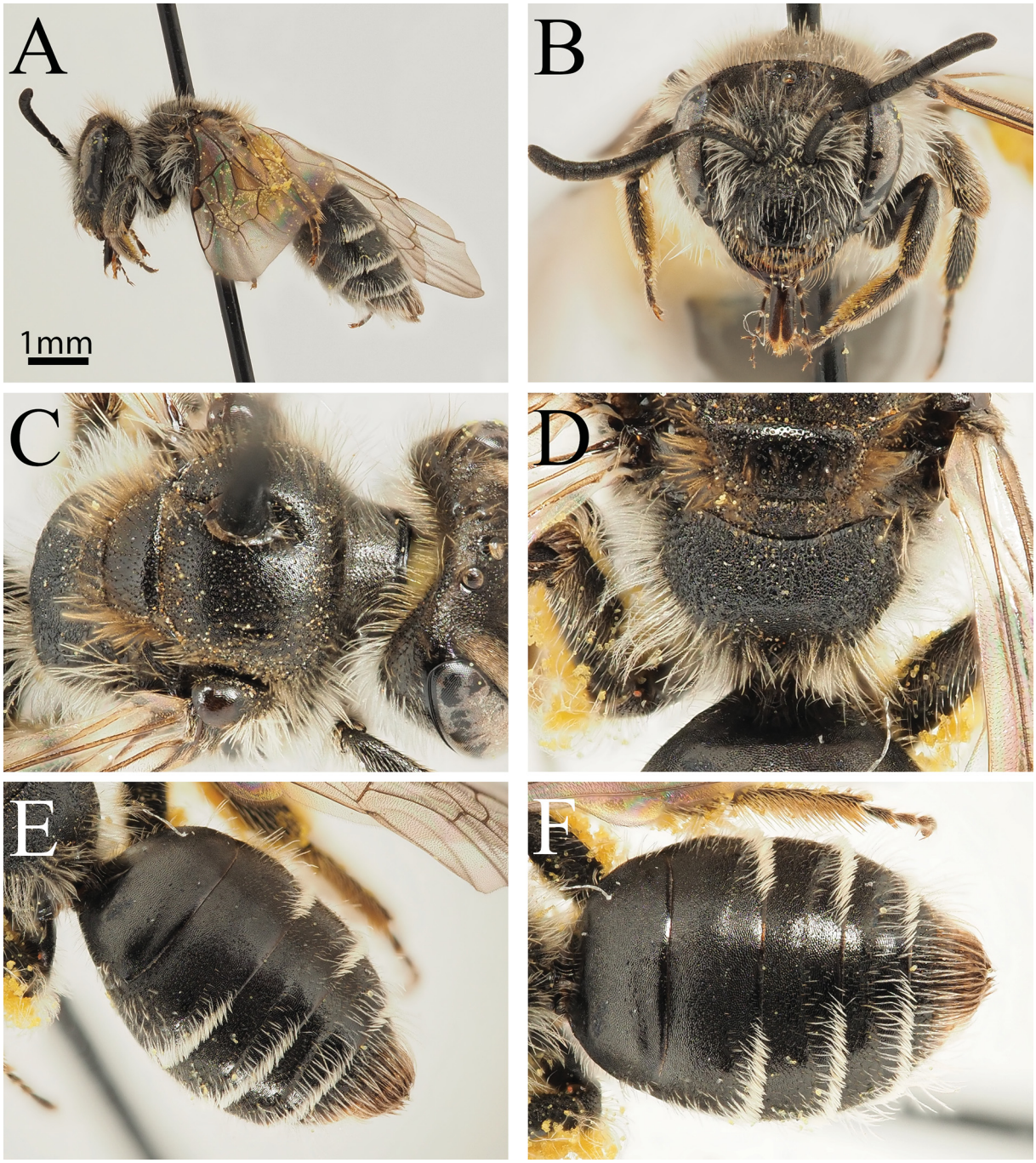

Fig. 31. *Andrena* (*Micrandrena*) *tinctoria* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Scutum, dorsal view. **D**. Propodeum, dorsal view. **E**. Terga, dorsolateral view. **F**. Terga, dorsal view.

Remarks

This species appears to be broadly oligolectic on Brassicaceae (Table 1). It can be collected abundantly from *Isatis tinctoria* and other spring-flowering Brassicaceae. This specialisation is not surprising given that its closest genetic relative, *A. tenuistriata* (Fig. 3), is also oligolectic on Brassicaceae (Wood 2023).

Distribution

Morocco, predominantly the southern edge of the High Atlas, extending south to the northern side of the Anti-Atlas at Taroudant and Tachaokcht and north to the high steppe around Boulemane in the Middle Atlas.

Andrena* (*Taeniandrena*) *prazi sp. nov.
urn:lsid:zoobank.org:act:E6998BD0-47F2-44A3-8C2A-34FD3549E9A2
Fig. 32

Diagnosis

Andrena prazi sp. nov. can be recognised as a member of *Taeniandrena* due to its strongly flattened clypeus. Morphological identification of females of species of *Taeniandrena* is extremely challenging, and care must be taken; ideally, comparison with barcoded specimens should be made. With these caveats, *A. prazi* can be recognised in fresh specimens by its combination of bright orange-red pubescence on the face and mesosoma (Fig. 32A–C), its bright orange-red terminal fringe (Fig. 32E–F), its orange hind tibiae (Fig. 32D), the variable orange-red colouration of the hind femur, mid tibiae and tarsi, and fore tibiae (sometimes entirely dark), its sometimes entirely red terga (Fig. 32E–F; red colouration present in Tunisian populations, Moroccan populations with terga dark), the tergal discs clearly, finely, and densely punctate, and T2–4 laterally with extremely thick hairbands, broadly interrupted on T2–3, complete on T4, obscuring the underlying surface (Fig. 32E–F). Its bright orange-red pubescence combined with orange hind tibiae (and sometimes hind femur) resemble conditions in *A. russula* Lepeletier, 1841 (=*A. similis* Smith, 1849) sensu lato (see above; also Praz *et al*. 2022), but the tergal discs are clearly punctate (Fig. 32E–F), whereas in *A. russula* the tergal discs are essentially impunctate. Faded specimens can resemble members of the *gelriae* group (see Praz *et al*. 2022), but none of these have yet been recorded in North Africa, and the extremely thick hairbands of *A. prazi* permit recognition.

Etymology

Named in honour of the Swiss entomologist Christophe Praz for his work on bee taxonomy, particularly for the genus *Megachile*, but also on many other bee groups including *Andrena*.

Material examined

Holotype

MOROCCO • ♀; Oriental, Guercif, Debdou, 2 km S of Debdou; 1500 m a.s.l.; 33.9495° N, 3.0524° W; 11 May 2022; T.J. Wood leg.; BOLD: WPATW637-22; OÖLM (Fig. 32H).

Paratypes

MOROCCO • 1 ♀; same collection data as for holotype; TJWC • 1 ♀; Fès-Meknès, Taza, P5420, 10 km NE of Ctre Commune Bab Boudir; 1350 m a.s.l.; 16 May 2022; T.J. Wood leg.; OÖLM • 1 ♀; Fès-Meknès, Taza, P5425, 3 km W of Aghil Oumial; 1300 m a.s.l.; 12 May 2022; T.J. Wood leg.; OÖLM • 1 ♀; Fès-Meknès, Taza, R507, 3 km N of Tametrhouste; 1500 m a.s.l.; 10 May 2022; T.J. Wood leg.; OÖLM • 1 ♀; Souss-Massa, Tafraoute, Iguissle (3 km E of Tanalt); 1500 m a.s.l.; 13 Mar. 2022; T.J. Wood leg.; OÖLM (Fig. 32G) • 1 ♀; Fès-Meknès, 5 km SE of Boulemane, junction of R503 and N4; 1900 m a.s.l.; 19 May 2022; T.J. Wood leg.; TJWC.

TUNISIA • 1 ♀; Kef, Sidi Mtir, SW of El Kef; 28 Apr. 2012; C. Praz leg.; PRUN • 1 ♀; 10 km ESE of Maktar; 900 m a.s.l.; 10 Mar. 1994; H. v. Oorschot and E. Rubbrecht leg.; RMNH.

Description

Female

Measurements. Body length 9–10 mm (Fig. 32A).

Head. Dark, 1.3 times as wide as long (Fig. 32B). Clypeus strongly flattened over majority of surface, densely punctate, punctures separated by 0.5–1 puncture diameter with exception of slightly raised, longitudinal, impunctate midline; underlying surface finely microreticulate, dull. Process of labrum trapezoidal, short, 3 times as broad as long, surface with raised irregular striations, apical margin emarginate. Gena equalling width of compound eye; ocelloccipital distance 1.5 times diameter of lateral ocellus. Foveae broad, occupying majority of space between lateral ocellus and compound eye, separated from lateral ocellus by distance equal to its diameter, slightly narrowing ventrally at level of antennal insertions; foveae filled with light brown hairs. Face, gena, vertex, and scape with bright orange-red hairs in fresh specimens, fading to yellow-orange. Antennae dark, A3 exceeding length of A4+5, shorter than A4+5+6.

Mesosoma. Scutum with fine granular shagreen, weakly shining, densely and regularly punctate, punctures separated by 0.5–1 puncture diameter. Scutellum smooth and shining, without sculpture, punctured, punctures laterally separated by 1 puncture diameter, becoming weak to absent medially, separated by 2–3 puncture diameters. Pronotum rounded. Mesepisternum and dorsolateral parts of propodeum finely microreticulate, weakly shining to dull, microreticulation overlain with additional network of weak reticulation resembling punctures; pseudopunctures separated by 0.5–1 puncture diameter. Propodeal triangle laterally delineated by very fine carinae, internal surface covered, finely rugose-areolate (Fig. 32C). Mesepisternum, scutum, and scutellum in fresh specimens with bright orange-red hairs. Propodeal corbicula incomplete, dorsal fringe dense, composed of strongly plumose orange-red hairs, internal surface with long orange hairs. Colouration of legs variable; light form with legs basally dark, orange markings on fore tibiae and tarsi, mid tibiae and tarsi, hind femorae, tibiae, and tarsi; dark form with orange markings restricted to hind tibiae and tarsi; pubescence of legs light orange (Fig. 32D). Flocculus complete and dense, composed of plumose hairs, flocculus and femoral and tibial scopae composed of bright orange simple hairs. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation orange, nervulus postfurcal.

Metasoma. Tergal colouration variable; light form with tergal discs extensively orange-marked, orange markings extending weakly onto darker tergal margins (Fig. 32E); dark form with terga almost entirely dark with only apical margins narrowly lightened hyaline-brown (Fig. 32F). Tergal discs finely shagreened, weakly shining. Tergal discs finely punctate; disc of T1 with punctures separated by 1–2 puncture diameters, T2–4 with punctures separated by 0.5–1 puncture diameter. Terga with marginal areas up to hyaline margin with fine network of latitudinal wavy shagreen, densely but obscurely punctate, punctures separated by 0.5 puncture diameter, marginal areas less strongly shining than discs. T2–4 with extremely dense and long apical hairbands composed of orange-red hairs, widely interrupted on T2–3, complete on T4, obscuring underlying surface. Apical fringe of T5 and hairs flanking pygidial plate golden-orange; pygidial plate rounded triangular, internal surface obscurely raised medially, otherwise featureless.

Male

Unknown.

Remarks

Like other species of *Taeniandrena*, *A. prazi* sp. nov. is strongly associated with Fabaceae and can be considered to be a specialist on this botanical family (Table 1). Pollen analysis included the taxa *Astragalus* type, *Lotus* spp., *Genista* type, *Medicago sativa* type, *Onobrychis* spp., and *Trifolium pratense*

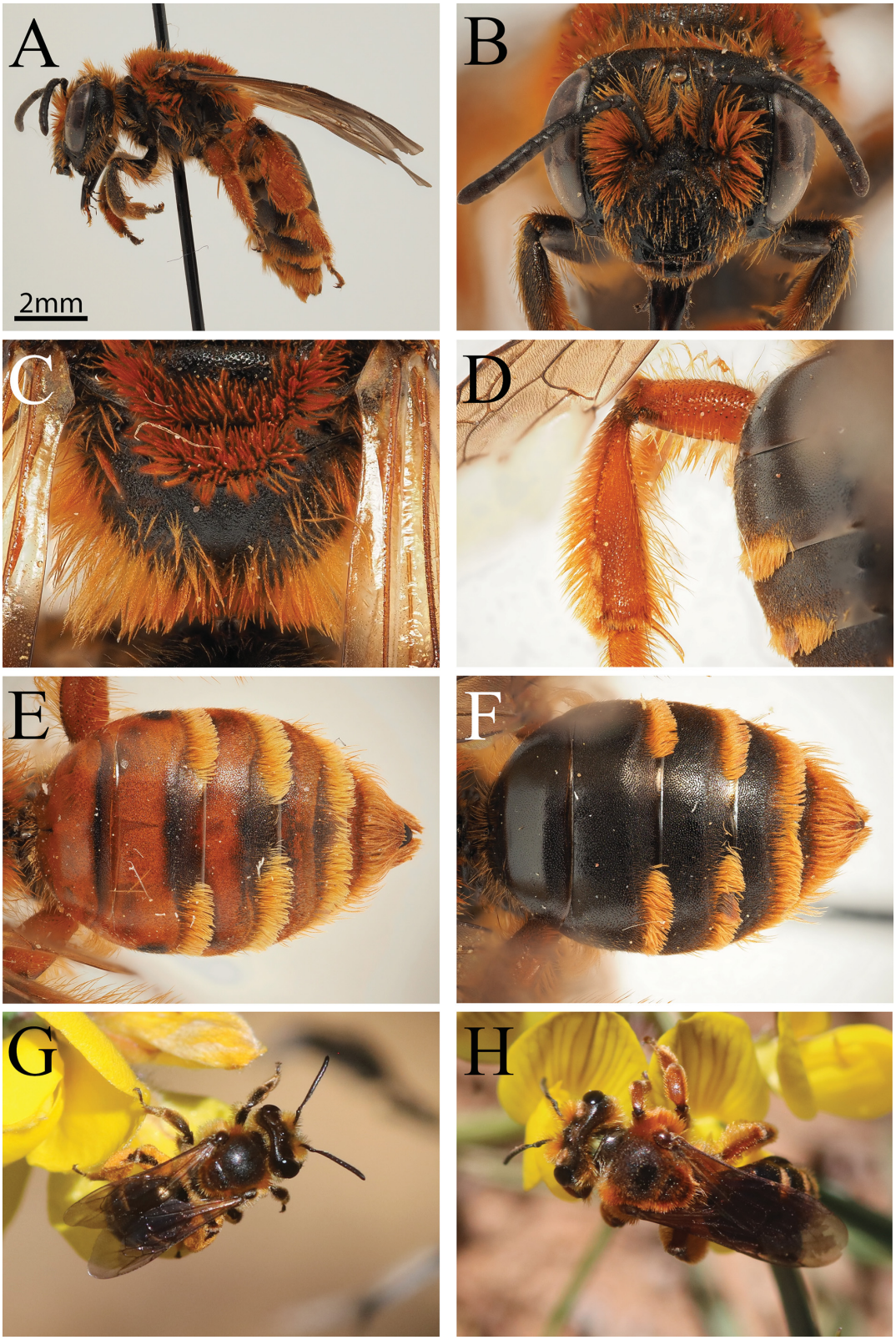

Fig. 32. *Andrena* (*Taeniandrena*) *prazi* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Propodeum, dorsal view. **D**. Hind leg, dorsal view. **E**. Terga, light form, dorsal view. **F**. Terga, dark form, dorsal view. **G**. Dark form, ♀, Anti-Atlas, Iguissle, 13 Mar. 2022. **H**. Intermediate form, ♀, Massif de Debdou, 11 May 2022.

type, indicating that it has a broad dietary range (broad oligolecty, Müller & Kuhlmann 2008) within the Fabaceae. The variable colouration of the terga and legs may present a longitudinal gradient, with the darkest specimens collected in the Anti-Atlas (Fig. 32G), the extensively red-marked specimens in Tunisia (Fig. 32E), and somewhat intermediate forms with dark terga (Fig. 32F), but extensive orange-markings on the legs found in northern Morocco (Fig. 32H).

Distribution

Morocco (from the Anti-Atlas, Middle Atlas, and Massif de Debdou) to northern Tunisia (El Kef and Maktar). Almost certainly present also in Algeria.

Andrena (incertae sedis) ***muelleri*** sp. nov.
urn:lsid:zoobank.org:act:53444414-9FEC-4BA4-9649-8B1747110481
Figs 33A, C, E, 34

Diagnosis

Andrena muelleri sp. nov. is part of an undescribed subgenus best referred to as the *relata* group (see Pisanty *et al*. 2022b), which does not display clear defining or distinctive characters, leading to its lack of historical recognition. This group is incompletely characterised, but can predominantly be recognised by the weak and poorly defined propodeal triangle (Fig. 34E), the compact head, with the clypeus having the fore margin slightly raised and forming a ‘]’ shape (Fig. 34C), the ovoid metasoma (Fig. 34F), and the lack of any distinctive derived characters. Consequently, diagnosis is best made with reference to the most similar morphological species, *A. corax* Warncke, 1975 (Portugal and Spain), *A. macroptera* Warncke, 1974 (Portugal, Spain, Morocco), and *A. melaleuca* Pérez, 1895 (Algeria to Egypt). *Andrena muelleri* has finely punctate terga (Fig. 34F), which excludes *A. macroptera* and *A. melaleuca* which have strong and coarse punctation on the tergal discs.

Andrena muelleri sp. nov. is thus extremely similar to *A. corax*. *Andrena muelleri* can be separated (alternative character state of *A. corax* in parentheses) by the clypeus, which has weak latitudinal striations and a variably produced impunctate longitudinal mid-line on its basal half (Fig. 34B; clypeus without latitudinal striations or a longitudinal, impunctate mid-line), by the facial foveae which are filled with brown hairs (Fig. 33A), outer margin thus appearing well defined (facial foveae filled with black hairs, outer margin poorly defined, Fig. 33B), by the more brownish pubescence, on the face with pubescence ventrally white, becoming light brown dorsally, scutum and scutellum with short light brown hairs over the majority of their surface, medially with dark brown hairs (Fig. 33C; face uniformly with white-grey pubescence, scutum and scutellum with short white-grey pubescence, medially with extensive and strongly contrasting short black pubescence, Fig. 33D), and by the punctation of the scutum, which becomes sparse medially, punctures separated by 2–3 puncture diameters, underlying surface with granular shagreen, dull to weakly shining (Fig. 33E; scutum with regular punctures, punctures only becoming slightly sparser medially, separated at most by 2 puncture diameters, usually by 1 puncture diameter; underlying surface smooth and shining, Fig. 33F). The two species cannot be found in sympatry, as *A. corax* is restricted to Iberia and *A. muelleri* is currently known only from south-western Morocco.

Etymology

This species is named in honour of the Swiss entomologist Andreas Müller for his work on bee taxonomy, particularly on the tribe Osmiini, and for his collection of the type series of this species.

Material examined

Holotype

MOROCCO • ♀; 20 km N of Tafraoute; 1220 m a.s.l.; 14 Apr. 2017; A. Müller leg.; OÖLM.

Paratypes

MOROCCO • 1 ♀; 20 km N of Tafraoute; 1220 m a.s.l.; 14 Apr. 2017; A. Müller leg.; TJWC • 2 ♀♀; 40 km SSE of Ait Baha, Kasbah de Tizourgane; 1190 m a.s.l.; 22 Apr. 2019; A. Müller leg.; OÖLM.

Description

Female

Measurements. Body length: 11–12 mm (Fig. 34A).

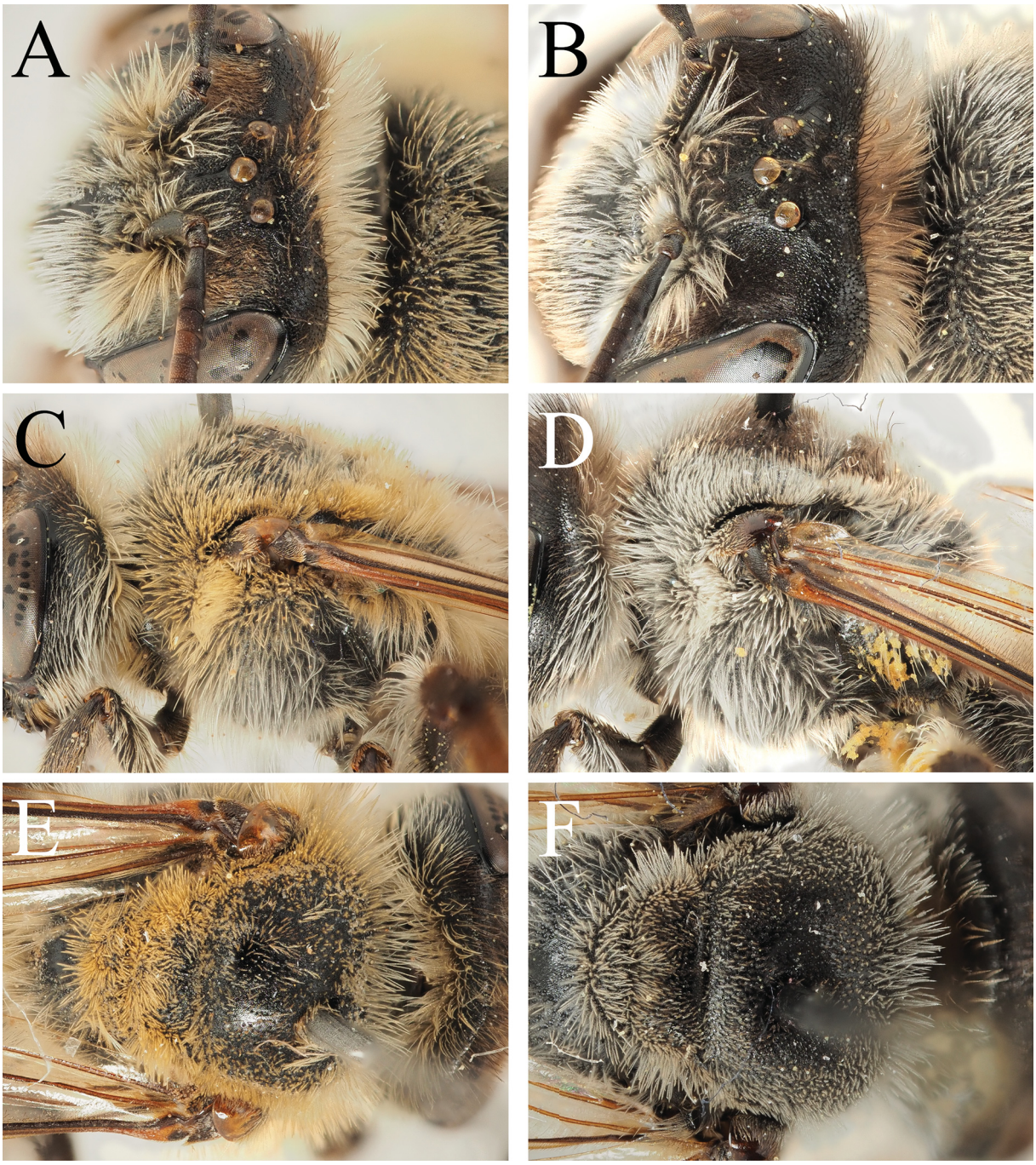

Fig. 33. *Andrena* (incertae sedis) *muelleri* sp. nov., holotype, ♀ (OÖLM). **A**. Head, dorsolateral view. **C**. Mesosoma, lateral view. **E**. Scutum, dorsal view. — *Andrena* (incertae sedis) *corax* Warncke, 1975, ♀ (TJWC). **B**. Head, dorsolateral view. **D**. Mesosoma, lateral view. **F**. Scutum, dorsal view.

Head. Dark, 1.25 times as wide as long (Fig. 34B). Clypeus weakly domed, densely punctate with latitudinally elongate punctures, punctures typically separated by 0.5–1 puncture diameter, sometimes with poorly defined longitudinal impunctate mid line; underlying surface shagreened, weakly shining, with obscure but numerous, weakly raised latitudinal striations between punctures. Apical margin of clypeus weakly upturned. Process of labrum trapezoidal, twice as broad as long, apical margin thickened and truncate, strongly emarginate, basal surface with latitudinal striations (Fig. 34C). Gena slightly exceeding width of compound eye; ocelloccipital distance 2 times diameter of lateral ocellus (Fig. 34D).

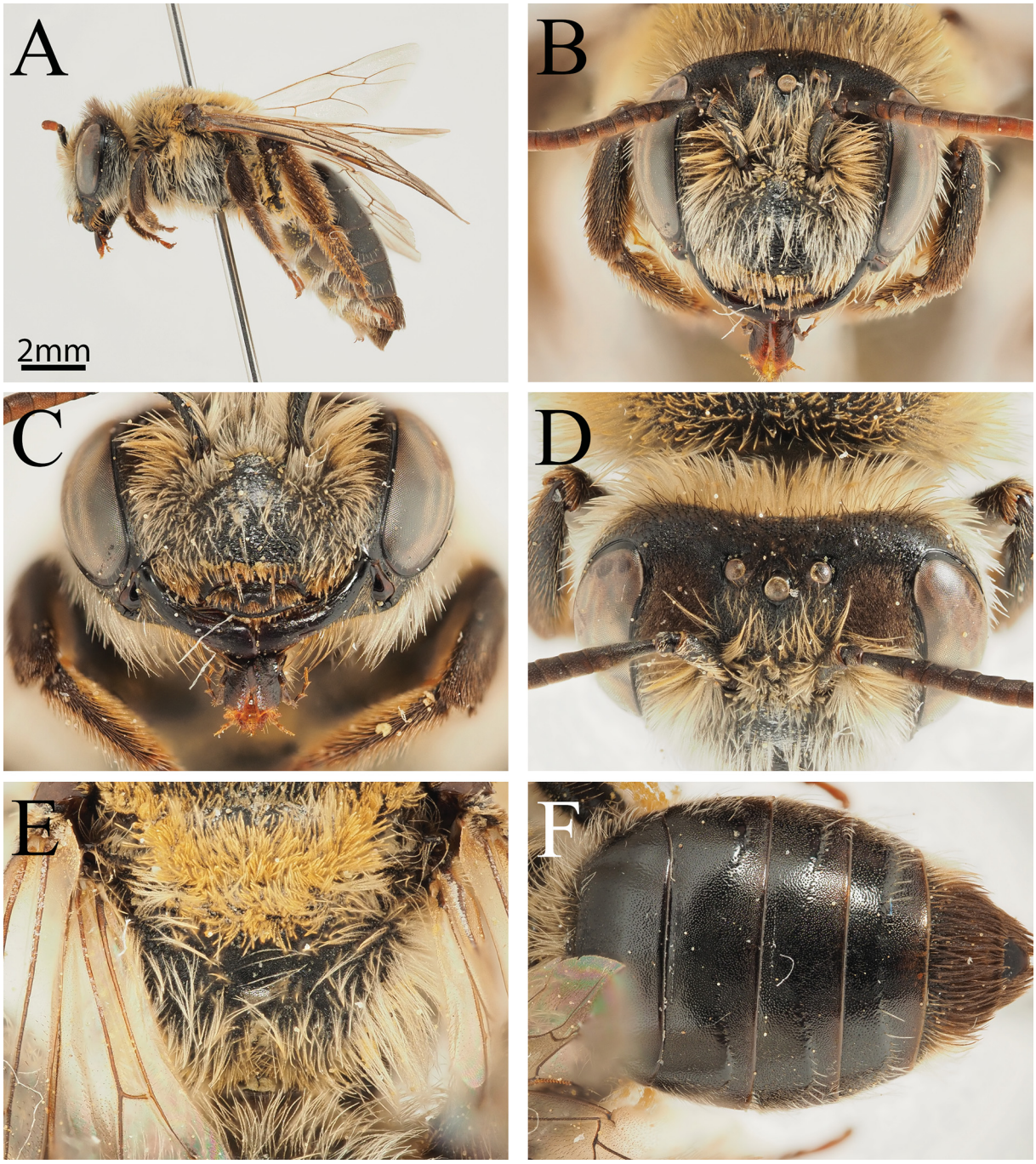

Fig. 34. *Andrena* (incertae sedis) *muelleri* sp. nov., holotype, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Process of labrum, fronto-ventral view. **D**. Head, dorsal view. **E**. Propodeum, dorsal view. **F**. Terga, dorsal view.

Foveae broad, occupying ¾ of space between lateral ocellus and compound eye, dorsally separated from lateral ocellus by distance equal to diameter of lateral ocellus, ventrally extending below antennal insertions; foveae filled with brown hairs (Fig. 33A). Face on ventral half and gena ventrally with whitish hairs, becoming light brown around antennal insertions, frons, and gena posteriorly; vertex with intermixed black and brown hairs. Antennae dark basally, A4–12 ventrally lightened orange-brown; A3 slightly exceeding A4+5, shorter than A4+5+6.

Mesosoma. Scutum and scutellum laterally and anteriorly with strong granular shagreen, dull, shagreen becoming weaker medially, here weakly shining; surface predominantly densely punctate, punctures separated by 0.5–1 puncture diameter, becoming sparser medially, here separated by 2–3 puncture diameters (Fig. 33E). Pronotum with obscure and small humeral angle. Mesepisternum and dorsolateral parts of propodeum with granular microreticulation, microreticulation overlain with additional network of weakly raised reticulation, surface dull. Propodeal triangle poorly defined laterally by very weak carinae, internal surface with fine granular shagreen, on basal half with short, raised rugae (Fig. 34E). Mesepisternum with white hairs on ventral half, becoming light brown dorsally (Fig. 34C). Scutum and scutellum with short and strongly plumose light brown hairs, almost squamous, medially with intermixed short dark brown hairs. Propodeal corbicula incomplete, dorsal fringe dense, composed of long, plumose, light brown hairs, internal surface with abundant long, light golden hairs. Legs dark, apical tarsal segments lightened dark reddish-brown, pubescence light to dark brown. Flocculus incomplete but distinctly produced, composed of plumose hairs; flocculus and femoral scopa white, tibial scopa dorsally dark brown, ventrally becoming white, hairs simple. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation brown, nervulus interstitial.

Metasoma. Terga dark, apical margin very narrowly lightened dark brown (Fig. 34F). Tergal discs finely and densely punctate, disc of T1 with punctures sparse laterally, separated by 2–4 puncture diameters, becoming dense medially, separated by 1 puncture diameter. Margin of T1, discs and margins of T2–4 densely and evenly punctate, punctures separated by 0.5–1 puncture diameter. Terga almost without sculpture, smooth and shining between punctures. Terga with scattered short white hairs, forming small patches basolaterally; tergal discs and marginal zones mostly hairless, apical hair bands absent. Apical fringe of T5 and hairs flanking pygidial plate dark brown, at most with occasional long white hairs laterally on T5; pygidial plate with clear raised area medially, surface dull.

Male

Unknown.

Distribution

Southern Morocco in the Anti-Atlas around Tafraoute.

6. New descriptions of species of Andrena *previously known only from a single sex*

Andrena* (*Aciandrena*) *triangulivalvis Wood, 2020

Fig. 35

Andrena (*Aciandrena*) *triangulivalvis* Wood in Wood *et al.*, 2020: 36, figs 9–12, ♂ (Morocco, OÖLM).

Diagnosis

Andrena triangulivalvis can be recognised as a member of *Aciandrena* due to its small body size (Fig. 35A), narrow foveae (Fig. 35B), propodeal triangle with fine granular shagreen (Fig. 35C), hind tarsal claws lacking an inner tooth in the female sex, and more or less impunctate terga (Fig. 35D). It has weak metallic green-bronze reflections on the frons, which places it close to *A. bendai* sp. nov., *A. ifranensis* sp. nov., and *A. quieta* sp. nov. It can be separated from all these species by the structure of the head;

the head is relatively elongate (for an *Aciandrena*), only 1.1 times as broad as long (Fig. 35B; shorter, 1.2–1.25 times as broad as long in *A. bendai* and *A. quieta*), the clypeus is weakly domed and smooth and shining over almost its entire area (domed but uniformly shagreened in *A. bendai* and *A. ifranensis*), and the frons has at most very weak and obscure longitudinal striations (Fig. 35B; with clear longitudinal striations in *A. quieta*, Fig. 18F). The tergal margins are also broadly lightened hyaline-orange (Fig. 35D), excluding *A. bendai* (Fig. 18G) and *A. quieta* (Fig. 23F), which have the tergal margins only narrowly lightened. In the male sex, the genital capsule is very different to all North African species of *Aciandrena*, with strongly expanded penis valves forming a triangular shape (Wood *et al*. 2020).

Material examined

MOROCCO • 2 ♀♀; 30 km E of Midelt; 13 May 1995; Mi. Halada leg.; OÖLM • 2 ♀♀, 2 ♂♂; 70 km S of Oujda; 8 Apr. 1995; Ma. Halada leg.; OÖLM • 1 ♀, 2 ♂♂; same collection data as for preceding; TJWC • 2 ♀♀; Fès-Meknès, Boulemane, R503, 7 km SE of Boulemane; 1900 m a.s.l.; 22 May 2022; T.J. Wood leg.; TJWC • 1 ♀; Rissani/Tafilalet; 800 m a.s.l.; 24 May 1984; W. Perraudin leg.; OÖLM.

Description

Female

Measurements. Body length 5–6 mm (Fig. 35A).

Head. Dark, 1.1 times as wide as long (Fig. 35B). Clypeus weakly domed, basally with fine granular shagreenation, smooth and shining over almost entire area; surface clearly punctate, punctures separated by 1–2 puncture diameters. Process of labrum small, triangular, slightly broader than long. Supraclypeal plate weakly domed, with very weak and obscure striations. Lower paraocular areas punctate, adjacent to antennal insertions regularly punctate, punctures separated by 1–2 puncture diameters; becoming more densely punctate adjacent to compound eye, here punctures separated by 0.5–1 puncture diameter. Gena slightly exceeding diameter of compound eye; ocelloccipital distance ⅓ of diameter of lateral ocellus. Foveae dorsally occupying ½ of space between lateral ocellus and compound eye, ventrally strongly narrowing to ½ of this width, diverging from inner margin of compound eye, separated by narrow shining strip equal to ventral width of fovea; foveae filled with light brown hairs. Frons with weak and obscure longitudinal striations, medially with weakly raised carina running between anterior ocellus and supraclypeal plate; frons with weak green-bronze reflections. Face, gena, frons, and scape with whitish to light brownish hairs, none equalling length of scape. Antennae dark basally, A5–12 ventrally extensively lightened orange; A3 equalling A4+5.

Mesosoma. Scutum and scutellum with fine granular shagreen, weakly shining, with irregular fine punctation, punctures separated by 1–4 puncture diameters. Pronotum rounded. Mesepisternum and dorsolateral parts of propodeum with fine granular shagreen, weakly shining; propodeal triangle with larger granular 'scale-like' shagreen, laterally not delineated by raised carinae (Fig. 35C). Mesepisternum with moderately long whitish hairs, scutum and scutellum with very short and scattered hairs. Propodeal corbicula incomplete, sparse, composed of weakly plumose whitish hairs, internal surface with occasional long white simple hairs. Legs dark basally, hind tarsi lightened orange, pubescence light brown to whitish. Flocculus complete, composed of plumose hairs; flocculus and femoral scopa with white hairs, tibial scopa with whitish to light golden hairs. Hind tibial claws simple, without inner tooth. Wings hyaline, stigma and venation orange, nervulus weakly antefurcal.

Metasoma. Terga dark, at most with hints of obscure metallic reflections, marginal areas broadly lightened orange basally, hyaline-yellow apically, light colouration covering entire marginal area (Fig. 35D). Disc of T1 with strong granular microreticulation, weakly shining, sculpture becoming progressively weaker on subsequent terga, T5 with fine shagreen, more strongly shining. Tergal discs essentially impunctate, obscure punctures disappearing into background sculpture. Terga with at most scattered very short hairs;

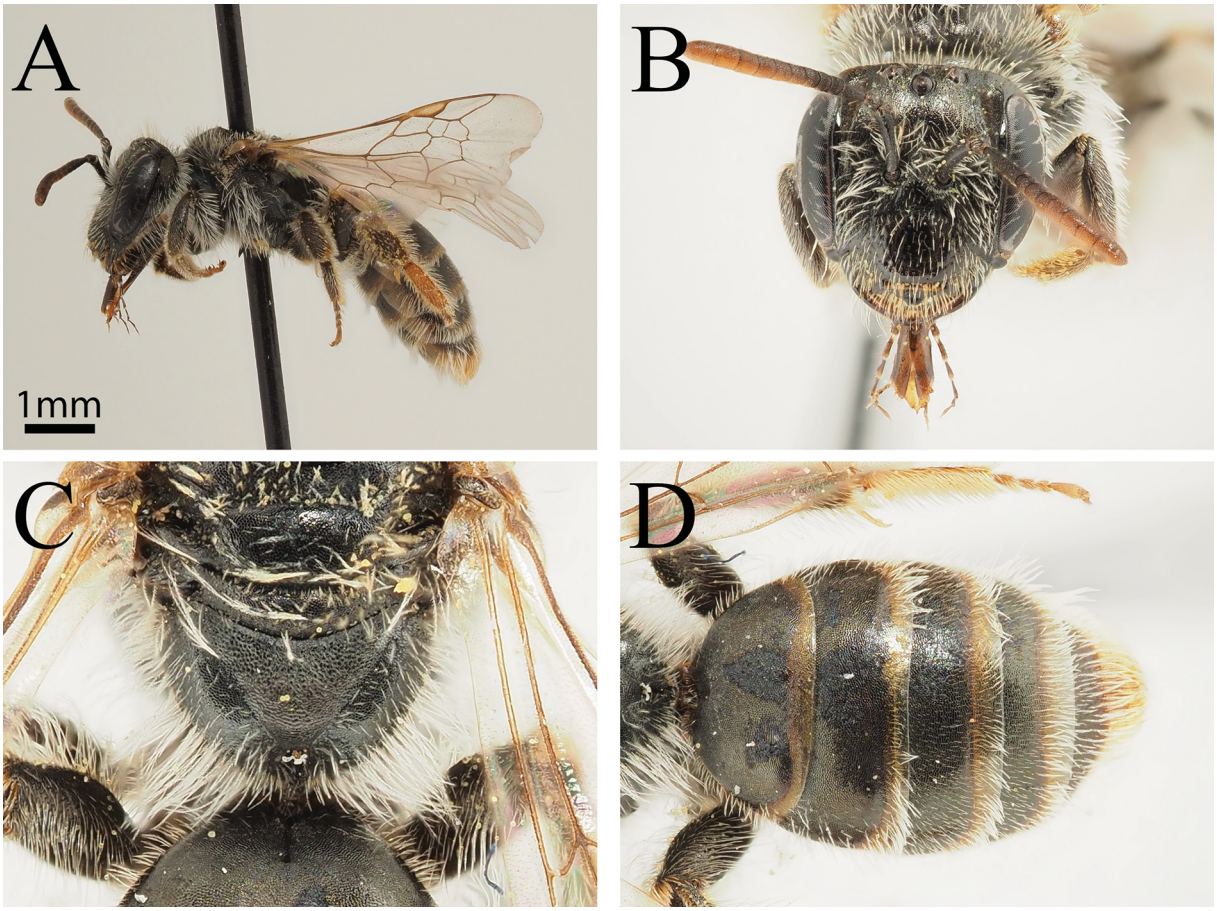

Fig. 35. *Andrena* (*Aciandrena*) *triangulivalvis* Wood, 2020, ♀ (OÖLM). **A**. Lateral habitus. **B**. Face, frontal view. **C**. Propodeum, dorsal view. **D**. Terga, dorsal view.

T2–3 laterally with weakly indicated and widely interrupted apical hairbands of short whitish hairs, T4 with band complete, not obscuring underlying surface; apical fringe of T5 and hairs flanking pygidial plate golden orange. Pygidial plate narrowly triangular, internal surface obscurely shagreened, dull.

Distribution

Eastern Morocco in semi-desert or cold steppe habitats, around the towns of Rissani, Boudenib, Midelt, Boulemane, and Ain Bni Mathar (provinces of Drâa-Tafilalet, Fès-Meknès, and Oriental; Wood *et al*. 2020).

7. Taxa of Andrena *with a new status*

Andrena* (*Graecandrena*) *andina Warncke, 1974 stat. nov.

Andrena (*Graecandrena*) *montarca andina* Warncke, 1974: 45, ♂ (Morocco: OÖLM).

Material examined

Holotype

MOROCCO • ♂; Tamlalet el Djedid [Tamallalt], Marakesh; 7 Apr. 1923; A. Schulthess leg.; OÖLM.

Other material

MOROCCO • 1 ♀; Casablanca-Settat, Machraa Ben Abbou env.; 200 m a.s.l.; 1 Apr. 2019; D. Benda leg.; NMPC • 1 ♂; Ain Leuh; 1394 m a.s.l.; 31 Mar. 2020; Y. Bencharki and I. Ouayach leg.; IRCR • 4 ♀♀; Oueled Sghir; 4 Apr. 2018; A. Sentil and I. El Abdouni leg.; IRCR • 1 ♀; Oueled Sghir; 8–9 Apr. 2019; A. Sentil leg.; IRCR.

Remarks

Warncke described *Andrena montarca andina* in 1974 (Warncke 1974), and *Andrena montarca* itself in 1975 (Warncke 1975). This was due to publication delays, and resulted in a number of subspecies being described before their nominal parent taxon (e.g., see Wood *et al*. 2020; Wood 2023). Though this is the case for the taxa associated with *A. montarca*, this problem of priority has not been addressed until now (e.g., Gusenleitner & Schwarz 2002). Since *A. montarca parva* is a junior synonym of *A. nitidilabris*, the only issue concerns the status of the Spanish (*A. montarca*) and Moroccan (*A. montarca andina*) taxa. There are slight but consistent differences in the males, most clearly in the shape of the clypeus (strongly domed in *A. montarca*, weakly domed in *A. montarca andina*) as well as in the colouration of the antennae and the strength of the tergal hairbands (weaker in *A. montarca andina*). Given available evidence that both taxa are likely to represent distinct species, both are treated here as valid, which has the advantage of solving the precedence issue. Additional collections including genetic analysis will provide further clarity. Moreover, the phylogenetic position of *A. montarca* and *A. andina* is also unclear; they could realistically belong to any one of the subgenera *Aciandrena*, *Graecandrena*, or *Micrandrena*; genetic work is needed to decisively settle the issue.

Andrena* (*Micrandrena*) *heliaca Warncke, 1974 stat. nov.
Fig. 36A, C, E, G

Andrena (*Fumandrena*) *pandosa heliaca* Warncke, 1974: 41, ♀♂ (Morocco: OÖLM).

Material examined

Holotype

MOROCCO • 1 ♀; Marruecos, Marraquesh [Marrakech]; 1–31 Apr. 1907; Escalera leg.; OÖLM.

Other material

MOROCCO • 1 ♀; Béni Mellal-Khenifra, Khenifra, P7311, immediately W of Lac Ouiouane; 1600 m a.s.l.; 20 May 2022; T.J. Wood leg.; TJWC • 1 ♀; Drâa-Tafilalet, Tazenakht, 1 km W of Anezal; 1600 m a.s.l.; 15 Apr. 2022; T.J. Wood leg.; TJWC • 1 ♀; Drâa-Tafilalet, Tazenakht, 9 km W of Anezal; 1600 m a.s.l.; 15 Apr. 2022; T.J. Wood leg.; TJWC • 2 ♀♀; Drâa-Tafilalet, Tazenakht, Anezal, 5 km NE of Ait Igga; 21 Apr. 2022; T.J. Wood leg.; TJWC • 1 ♀; Fès-Meknès, Ahermoumou, P5407, immediately NW of Kassioua; 900 m a.s.l.; 15 May 2022; T.J. Wood leg.; TJWC • 1 ♂, 1 ♀; Souss-Massa, Tiznit, Tanalt, oasis between Ait Moussa and Anadia; 22 Mar. 2022; T.J. Wood leg.; TJWC • 1 ♀; Taroudant; 22 Apr. 1990; Ma. Halada leg.; OÖLM • 1 ♀; 5 km S of Taroudant, Adouer [Adouar]; 2 Apr. 1983; G.R. Else leg.; NHMUK • 1 ♀; 20 km N of Tafraoute; 1220 m a.s.l.; 14 Apr. 2017; A. Müller leg.; AMC.

Other material (*Andrena pandosa* s. str.)

ALGERIA • 1 ♀; Tiaret; OÖLM (holotype) • 1 ♂, 1 ♀; 6 km E of Saida, stn 41; 28 Apr. 1993; R. Leys and P.v.d. Hurk leg.; RMNH • 1 ♀; 10 km NE of Rebahia, Ain el Djorf, stn 39; 27 Apr. 1993; R. Leys and P.v.d. Hurk leg.; RMNH.

JORDAN • 5 ♀♀; 15 km E of Petra; 26 Apr. 2008; K. Deneš leg.; OÖLM.

MOROCCO • 2 ♀♀; 10 km E of Guelmin; 15 Apr. 1995; Ma. Halada leg.; OÖLM • 1 ♀; 20 km W Boudnib; 9 Apr. 1995; Ma. Halada leg.; OÖLM • 1 ♀; Anti Atlas, 15 km N of Irherm; 6 Apr. 1983; G.R. Else; NHMUK • 6 ♀♀; Drâa-Tafilalet, Ouarzazate, N9, Ighrem N'Ougdal; 2000 m a.s.l.; T.J. Wood leg.; TJWC • 1 ♀; Drâa-Tafilalet, Tazenakht, 1 km W of Anezal; 1600 m a.s.l.; 15 Apr. 2022; T.J. Wood leg.; TJWC • 14 ♀♀; Drâa-Tafilalet, Tazenakht, 9 km W of Anezal; 1600 m a.s.l.; 15–16 Apr. 2022; T.J. Wood leg.; TJWC • 1 ♀; Drâa-Tafilalet, Tazenakht, Anezal, 5 km NE of Ait Igga; 21 Apr. 2022; T.J. Wood leg.; TJWC • 3 ♀♀; Fès-Meknès, Aknoul, R510, 500 m S of Tizi Nador; 1300 m a.s.l.; 14 May 2022; T.J. Wood leg.; TJWC • 1 ♀; High Atlas, 19 km S of Tizi-n-Test (Marrakech-Taroudant Rd); 8 Apr. 1983; G.R. Else; NHMUK • 1 ♂; High Atlas, 3 km N of Ouirgane (Marrakech-Taroudant Rd); 11 Apr. 1983; G.R. Else; NHMUK.

SPAIN • 6 ♂♂, 1 ♀; Fuerteventura, S Costa Calma, Montañeta de los Verdes; 1 Apr. 2015; A. Müller leg.; AMC.

SYRIA • 5 ♀♀; 50 km E of Palmyra; 450 m a.s.l.; 22 Apr. 1992; K. Warncke leg.; OÖLM • 1 ♀; 80 km E of Palmyra; 450 m a.s.l.; 22 Apr. 1992; K. Warncke leg.; OÖLM.

TUNISIA • 4 ♂♂, 3 ♀♀; Chenini; 4 Apr. 1999; K. Deneš leg.; OÖLM • 4 ♀♀; Ksar Hadada; 5 Apr. 1996; K. Deneš leg.; OÖLM • 1 ♂, 3 ♀♀; Sbeitla; 12 Apr. 1998; K. Deneš leg.; OÖLM.

TURKEY • 1 ♀; Birecik/Urfa; 19 Apr. 1984; K. Warncke leg.; OÖLM.

WEST BANK • 23 ♂♂, 3 ♀♀; Judea, Har Gilo; 19 Apr. 1988; R. Leys leg.; RMNH.

Remarks

Warncke described *A. pandosa* Warncke, 1968 from Algeria, and later described several subspecies from Spain (ssp. *trigona* Warncke, 1975), Morocco (ssp. *heliaca*), and Libya (ssp. *excelsa* Warncke, 1974). The species sensu Warncke has a distribution across North Africa, from the eastern Canary Islands to the Levant and southern Turkey, as well as Portugal and Spain (Gusenleitner & Schwarz 2002). While genetic sequences could be generated for all *A. pandosa* s. str. specimens sampled (Fig. 3), all specimens of *A. pandosa heliaca* (n = 5, from four localities) failed despite using the same primer, suggesting some change in the COI gene. Sequences of *A. pandosa* s. str. from Morocco closely matched sequences from the West Bank (ANDIL321-22 and ANDIL351-22; 98.71–99.19%), strongly supporting the position that *A. pandosa* s. str. does have a distribution encompassing North Africa to the Levant and southern Turkey.

While the statuses of ssp. *excelsa* and ssp. *trigona* are obscure and require more focused study, *A. heliaca* stat. nov. is clearly distinct from *A. pandosa* s. str. The two species could be found in sympatry west of Anezal near Tazenakht in the Anti-Atlas. Specimens in sympatry showed the same morphological characters typical of each taxon, without introgression. Specifically, *A. heliaca* is slightly larger (Fig. 36A; 8–9 mm versus 6–7 mm in *A. pandosa* s. str., Fig. 36B), has the process of the labrum forming a single point (Fig. 36C; process of the labrum bidentate in *A. pandosa* s. str., Fig. 36D), the scutum and scutellum have extremely weak sculpture and are more or less smooth and shining (Fig. 36E; scutum and scutellum with regular granular shagreen in *A. pandosa* s. str., weakly shining, Fig. 36F), and the terga are dark, without the apical margins lightened, with weak sculpture, tergal discs clearly and distinctly punctate (Fig. 36G; terga with marginal areas broadly lightened hyaline-brown, terga with strong shagreen, tergal discs obscurely punctate, punctures disappearing into the underlying sculpture in *A. pandosa* s. str., Fig. 36H).

Based on analysed pollen (Fig. 1), both *A. heliaca* and *A. pandosa* s. str. (as well as *A. pandosa trigona*) appear to be specialised on *Reseda* (Resedaceae).

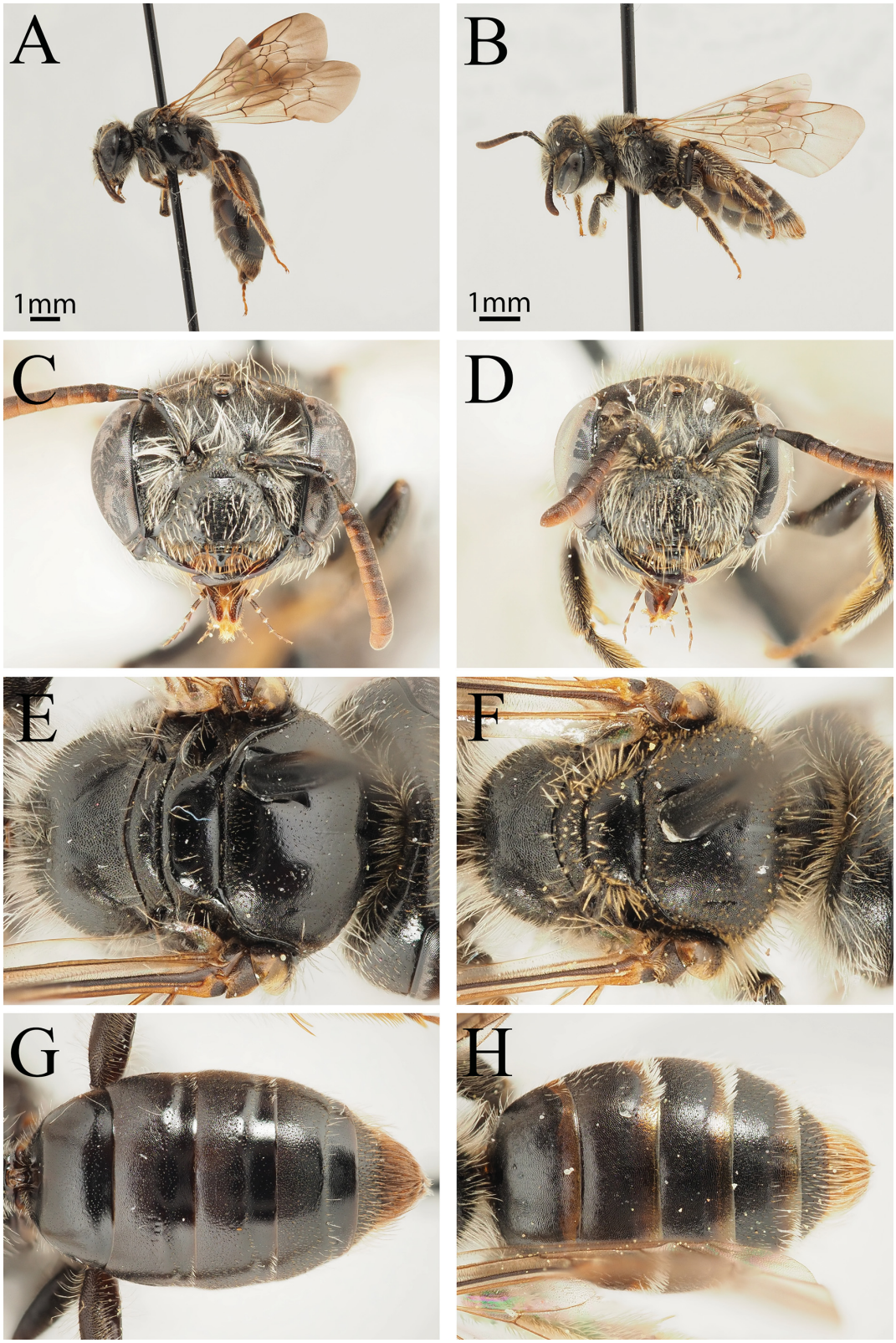

Fig. 36. *Andrena* (*Micrandrena*) *heliaca* Warncke, 1974, ♀ (TJWC). **A**. Lateral habitus. **C**. Face, frontal view. **E**. Scutum, dorsal view. **G**. Terga, dorsal view. — *Andrena* (*Micrandrena*) *pandosa* Warncke, 1968, ♀ (TJWC). **B**. Lateral habitus. **D**. Face, frontal view. **F**. Scutum, dorsal view. **H**. Terga, dorsal view.

Distribution

Morocco, across the Anti-Atlas and High Atlas to the Middle Atlas (near Ahermoumou). Currently not known from Algeria or Tunisia.

8. Additional new species added to or removed from the Moroccan faunal list

Species added

These changes are made relative to the baseline of Lhomme *et al*. (2020).

Andrena* (*Graecandrena*) *nebularia Warncke, 1975

Andrena (*Graecandrena*) *nebularia* Warncke, 1975: 301.

Remarks

Reported by Wood (2023).

Distribution

Morocco and Spain (Wood 2023).

Andrena* (*Holandrena*) *flavilabris Schenck, 1874

Andrena (*Holandrena*) *flavilabris* Schenck, 1874: 170.

Material examined

ALGERIA • 2 ♂♂; Mansourah, stn 22; 14 Apr. 1983; R. Leys and P.v.d. Hurk leg.; RMNH • 1 ♀; Tlemcen, Bois de Zarifet, stn 11; 8 Apr. 1983; R. Leys and P.v.d. Hurk leg.; RMNH • 1 ♂; Tlemcen, camp municipal, stn 4; 20 Apr. 1983; R. Leys and P.v.d. Hurk leg.; RMNH.

MOROCCO • 1 ♂; Ain Leuh; 1514 m a.s.l.; 31 Mar. 2020; Y. Bencharki and I. Ouayach leg.; IRCR.

Distribution

Unclear due to historical synonymy with *A.* (*Holandrena*) *decipiens* Schenck, 1861, but probably Morocco*, Algeria*, most of Europe, Cyprus, Turkey, and the Caucasus.

Andrena* (*Leucandrena*) *parviceps Kriechbaumer, 1873

Andrena (*Leucandrena*) *parviceps* Kriechbaumer, 1873: 55.

Material examined

MOROCCO • 1 ♀; Oukaimeden; 2620 m a.s.l.; 13 May 2015; V. Soon leg.; TUZ.

Remarks

Unexpectedly collected at high altitude in the High Atlas, this is the first record of this species from North Africa.

Distribution

Morocco*, Southern and Central Europe to Turkey and northern Iran (Gusenleitner & Schwarz 2002; Wood & Monfared 2022).

Andrena* (*Micrandrena*) *atlantea Wood, 2021

Andrena (*Micrandrena*) *atlantea* Wood, 2021: 474.

Remarks

Described from the High and Middle Atlas Mountains (Wood 2021).

Distribution

Morocco (Wood 2021).

Andrena* (*Micrandrena*) *mica Warncke, 1974

Andrena (*Micrandrena*) *mica* Warncke, 1974: 40.

Remarks

Wood (2023) elevated this taxon to species status and presented Moroccan data. Previously reported from Morocco by Warncke (1974) as *A. mariana mica*.

Distribution

Morocco, Algeria, Tunisia (Wood 2023).

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

Andrena (*Micrandrena*) *obsoleta* Pérez, 1895: 44.

Remarks

Wood (2023) clarified the status of this taxon, which was incorrectly treated by Warncke (1967; 1974). It is the senior synonym of *A. mariana solda* Warncke, 1974 and is found across the Mediterranean parts of north-western Africa to Sicily.

Distribution

Morocco, Algeria, Tunisia, Italy (Sicily) (Warncke 1974, as *A. mariana solda*).

Andrena* (*Micrandrena*) *pauxilla Stöckhert, 1935

Andrena (*Micrandrena*) *pauxilla* Stöckhert, 1935: 71.

Remarks

Wood (2023) elevated this taxon to species status and presented Moroccan data.

Distribution

Morocco, Spain, France, Germany (Wood 2023).

Andrena* (*Notandrena*) *inflata Wood, 2021

Andrena (*Notandrena*) *inflata* Wood, 2021: 463.

Material examined

MOROCCO • 1 ♂; Safi [3.5 km SE of Safi, Oulad Ahmed Ben Ali]; 28 Feb. 2023; A. Elkarrmy leg.; TJWC.

TUNISIA • 1 ♂; 68 km SE of Gafsa; 15 Mar. 1976; U. Lanham and B. Solounias leg.; OÖLM • 1 ♂; same collection data as for preceding; TJWC.

Remarks

Wood (2021) described this species based on a single male from southern Tunisia with a unique and highly distinctive genital capsule. Inspection of additional material has revealed a specimen from south-western Morocco, as well as additional specimens from southern Tunisia. At the Moroccan site, *A. aerinifrons* was abundant, with males and females present. It is possible that some of these '*A. aerinifrons*' females actually represent the female of *A. inflata*, which is currently unknown (males are easily separable due to their strongly different genital capsules), but no differences were apparent. Barcoding is needed to correctly identify the female of *A. inflata*.

Distribution

Morocco* and Tunisia (Wood 2021).

Andrena* (*Notandrena*) *reperta Warncke, 1974

Andrena (*Notandrena*) *reperta* Warncke, 1974: 48.

Material examined

MOROCCO • 1 ♀; Fès-Meknès, Boulemane, R503, 7 km SE of Boulemane; 1900 m a.s.l.; 22 May 2022; T.J. Wood leg.; TJWC • 1 ♂; Ouezzane; 4 Apr. 1990; H. Teunissen leg.; RMNH • 1 ♂; Taferiate; 10 Mar. 1988; V. Lefeber leg.; RMNH • 1 ♂; Tissa env.; 8 May 1997; K. Deneš leg.; OÖLM.

Remarks

Wood (2023) presented genetic data on *A. reperta* from Morocco and elevated *A.* (*Notandrena*) *varuga* Warncke, 1975 (Spain only) to species status.

Distribution

Morocco, Algeria, Tunisia (Wood 2023).

Andrena* (*Plastandrena*) *nigrospina Thomson, 1872

Andrena (*Plastandrena*) *nigrospina* Thomson, 1872: 80.

Material examined

MOROCCO • 5 ♀♀; Béni Mellal-Khenifra, Khenifra, P7311, immediately W of Lac Ouiouane; 1600 m a.s.l.; 20 May 2022; T.J. Wood leg. TJWC.

Remarks

Wood (2023) presented genetic data clarifying the status of this species, including sequences from Morocco.

Distribution

Unclear due to historical synonymy with *A.* (*Plastandrena*) *pilipes* Fabricius, 1781, but probably from Morocco (Middle Atlas) across cooler parts of Europe to Turkey and Central Asia.

Andrena* (*Taeniandrena*) *beaumonti Benoist, 1961

Andrena (*Taeniandrena*) *beaumonti* Benoist, 1961: 91.

Remarks

Wood *et al*. (2021) restored this taxon to species status; it was originally described from the High Atlas (Benoist 1961) and incorrectly combined with *A. wilkella* (Kirby, 1802) by Warncke (1967).

Distribution

Morocco (Wood *et al*. 2021).

Andrena* (*Truncandrena*) *abunda Warncke, 1974

Andrena (*Truncandrena*) *abunda* Warncke, 1974: 34.

Material examined

ALGERIA • 1 ♀; 25 km E of Setif; 1–30 Apr. 1944; OÖLM (paratype).

MOROCCO • ♀ (holotype); Koudia; 19 Jan. 1970; OÖLM • 1 ♀ (paratype); same collection data as for holotype; OÖLM • 1 ♀ (paratype); Koudia; 18 Jan. 1969; OÖLM • 1 ♀ (paratype); Koudia; 13 Apr. 1969; OÖLM • 1 ♀; 20 km N of Missour; 14 May 1995; Ma. Halada leg.; OÖLM • 1 ♀; Fès-Meknès, Taza, P5425, 1.5 km S of Taza Airport; 600 m a.s.l.; 12 May 2022; T.J. Wood leg.; TJWC • 1 ♀; Fès-Meknès, Taza, R507, 2 km N of Ras El Ma; 750 m a.s.l.; 10 May 2022; T.J. Wood leg.; TJWC • 1 ♀; Timgad; 29 Apr. 1979; OÖLM.

Remarks

Wood (2023) elevated this taxon to species status. It was originally described from Morocco and Algeria as *A. medeninensis abunda* (Warncke 1974).

Distribution

Morocco and Algeria (Warncke 1974).

Species removed

Andrena* (*Melandrena*) *hispania Warncke, 1967

Andrena (*Melandrena*) *hispania* Warncke, 1967: 212.

Listed by

Warncke (1967; 1974); Gusenleitner & Schwarz (2002); Lhomme *et al*. (2020).

Reason for exclusion

Wood (2023) synonymised *A. hispania* with *A.* (*Melandrena*) *morio* Brullé, 1832.

Andrena* (*Melandrena*) *vachali Pérez, 1895

Andrena (*Melandrena*) *vachali* Pérez, 1895: 33.

Listed by

Warncke (1974); Gusenleitner & Schwarz (2002); Lhomme *et al*. (2020).

Reason for exclusion

Wood (2023) synonymised *A. vachali* with *A.* (*Melandrena*) *discors* Erichson, 1841.

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

Andrena (*Simandrena*) *palumba* Warncke, 1974: 47.

Listed by

Warncke (1974); Gusenleitner & Schwarz (2002); Lhomme *et al*. (2020).

Reason for exclusion

Andrena palumba is now a junior synonym of *A. rhypara* (see above).

Andrena* (*Taeniandrena*) *ovatula (Kirby, 1802)

Andrena (*Taeniandrena*) *ovatula* (Kirby, 1802): 149.

Listed by

Warncke (1974); Gusenleitner & Schwarz (2002); Lhomme *et al*. (2020).

Reason for exclusion

Andrena ovatula s. str. is not found in north-western Africa; all putative material examined to date refers to *A. poupillieri* (Praz *et al*. 2022; Wood 2023).

Andrena* (*Taeniandrena*) *wilkella (Kirby, 1802)

Andrena (*Taeniandrena*) *wilkella* (Kirby, 1802): 145.

Listed by

Warncke (1974, as *A. wilkella beaumonti*); Gusenleitner & Schwarz (2002); Lhomme *et al*. (2020).

Reason for exclusion

Wood *et al*. (2021) restored *A. beaumonti* to species status; true *A. wilkella* has a south-western range limit in central Spain and is not found in North Africa.

Andrena (incertae sedis) ***melaleuca*** Pérez, 1895

Andrena (incertae sedis) *melaleuca* Pérez, 1895: 175.

Listed by

Wood *et al*. (2020); Lhomme *et al*. (2020).

Reason for exclusion

The specimens presented by Wood *et al*. (2020) were misidentified; their true identity is *A. macroptera*.

These changes bring the total number of *Andrena* species known from Morocco to 202, an increase of 22 relative to the baseline of Lhomme *et al*. (2020) (16 species elevated or newly recorded, 12 species newly described, six species removed). A total of 25 species are currently considered to be endemic with the addition of the species newly described above, though an unknown proportion are likely to

also be present in difficult to access and poorly-sampled parts of western Algeria. Three species are now considered not to be endemic to Morocco: *A.* (incertae sedis) *breviceps* Wood, 2020 was reported as present also in Algeria (Wood 2021), *A.* (incertae sedis) *laurivora* Warncke, 1974 was reported as present also in Spain (Wood *et al*. 2021), and *A.* (*Notandrena*) *hebescens* Wood, 2020 is also found in the Canary Islands (Fuerteventura; Ghisbain *et al.* 2023).

9. Dietary niches of **Andrena** *species in north-western Africa*

Wood (2023) presented pollen load data for understudied West Mediterranean species of *Andrena*, including data from Morocco. Supplementary data are presented here (Table 1) for species with distributions broadly restricted to North Africa, and which are hence not present in the Iberian Peninsula, with some taxa extending to the Canary Islands, Sicily, and the Levant. A total of 294 pollen loads from 36 species from six countries was analysed. The majority of species for which novel data are presented are oligolectic, or suspected to be oligolectic based on their phylogenetic position and the known dietary specialisation of closely related species. For example, though relatively few pollen loads are presented for species of *Chrysandrena*, *Suandrena* Warncke, 1968, *Taeniandrena*, and *Ulandrena* Warncke, 1968 in the present work, members of these subgenera are well known to be strongly associated with the botanical families Asteraceae, Brassicaceae, Fabaceae, and Asteraceae, respectively. The proportion of oligolectic or probably oligolectic species is 80.6% (29/36 species), which is extremely high, though this is of course biased because more widespread polylectic species are not considered here; the overall trends in the pollen preferences of Moroccan *Andrena* at an individual species and at a community level will be analysed in detail in a subsequent work.

However, it is important to note here some interesting findings within the pollen preferences of North African *Andrena*. *Andrena mediovittata* Pérez, 1895 (Fig. 37A; Canary Islands, Morocco, and Algeria) is a rare species in collections, and appears to be found in marginal desert edge environments in Morocco and Algeria flying early in the year (March–April), which may explain why it is so infrequently collected. The subspecies *A. m. arvensis* Warncke, 1968 is found on the Canary Islands. Analysis of pollen showed that *A. mediovittata* sensu lato collects predominantly from Asteraceae, but also from Brassicaceae in much smaller quantities. Interestingly, of the 83.6% of pollen collected from Asteraceae, three subfamilies were used: Asteroideae (25.6%), Carduoideae (18.9%), and Cichorioideae (39.1%). This use of multiple Asteraceae subfamilies is notable in an *Andrena* species which collects such a large proportion of its pollen from Asteraceae; most *Andrena* species specialised on Asteraceae utilise a single subfamily. For example, *Andrena isis* Schmiedeknecht, 1900 (Fig. 37B; Canary Islands and North Africa to the Levant) collects exclusively from the Asteraceae subfamily Cichorioideae, as is typical for the subgenus *Chlorandrena*. However, as for the Iberian fauna (Wood 2023), several North African *Chlorandrena* specialise on the Asteraceae subfamily Asteroideae, here represented by *A. boyerella* Dours, 1872 (Fig. 37C; north-western Africa and Sicily) and *A. sinuata* Pérez, 1895 (North Africa). The same division can be seen in the subgenus *Ulandrena*, where *A. speciosa* Friese, 1899 (North Africa to the Levant) and *A. tadorna* Warncke, 1974 (North Africa to the Levant and the Arabian Peninsula) appear to exclusively utilise Asteroideae and Cichorioideae, respectively.

Andrena spolata (Fig. 37D; Canary Islands and North Africa to the Levant) was unsurprisingly found to be oligolectic on Brassicaceae. To date, all known *Aciandrena* species for which pollen preferences have been assessed have been found to be specialised on this botanical family (e.g., Wood 2023), though *A. judaea* Scheuchl & Pisanty, 2016 is strongly suspected of being oligolectic on *Sedum* (Crassulaceae) (G. Pisanty, in litt.). Given the taxonomic complexity involved in both the classification of the subgenus and the delineation of its constituent species, broad generalisations are limited, but it is here hypothesised that all true *Aciandrena* species will be found to be specialised on Brassicaceae. Their use of such a common and abundant resource combined with their pattern of local or regional endemism suggests close

Table 1 (continued on next 2 pages). Host plant use and dietary classification for selected Iberian species of *Andrena*; *n* = total number of pollen loads; *N* = number of pollen loads from different localities. Plant taxa: ADO = Adoxaceae; API = Apiaceae; AST = Asteraceae; BOR = Boraginaceae; BRA = Brassicaceae; CIS = Cistaceae; CON = Convolvulaceae; FAB = Fabaceae; GER = Geraniaceae; LAM = Lamiaceae; ONA = Onagraceae; PAP = Papaveraceae; RES = Resedaceae; ZYG = Zygophyllaceae. Countries: DZ = Algeria; ESP = Spain; IL = Israel; ITA = Italy; MA = Morocco; TN = Tunisia.

Species	n	N	Origin (and number) of pollen loads	Result of microscopic analysis of pollen grains (% of pollen grains)	Percentage of pure loads of preferred host	Percentage of loads with preferred host	Host range
Aciandrena Warncke, 1968							
A. spolata Warncke, 1968	20	8	ESP (6), IL (5), MA (9)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
aegyptiaca-group							
A. aegyptiaca Friese, 1899 s. str.	6	1	DZ (6)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Cichorioideae)
A. aegyptiaca cannabina Warncke, 1968	1	1	ESP (1)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Cichorioideae)
Chlorandrena Pérez, 1890							
A. boyerella Dours, 1872	24	11	MA (24)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Asteroideae)
A. isis Schmiedeknecht, 1900	8	5	ESP (1), MA (5), TN (2)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Cichorioideae)
A. sinuata Pérez, 1895	3	3	MA (1), TN (2)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Asteroideae)
Chrysandrena Hedicke, 1933							
A. testaceipes Saunders, 1908	3	1	MA (3)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Cichorioideae)
Graecandrena Warncke, 1968							
A. totana Warncke, 1974	8	3	MA (8)	BRA 97.6, RES 2.4	75.0	100.0	broadly oligolectic (Brassicaceae)
Lepidandrena Hedicke, 1933							
A. tuberculifera Pérez, 1895	15	9	DZ (1), MA (14)	BRA 94.9, CIS 2.0, others 3.2	60.0	100.0	broadly oligolectic (Brassicaceae)
Melandrena Pérez, 1890							
A. discors Erichson, 1849 (including *A. vachali* Pérez, 1895)	16	7	ESP (2), MA (13)	BRA 48.1, AST 26.8, RES 9.5, PAP 5.7, BOR 4.6, GER 2.5, others 2.9	13.3	80.0	polylectic s. str.

Table 1 (continued). Host plant use and dietary classification for selected Iberian species of *Andrena*; *n* = total number of pollen loads; *N* = number of pollen loads from different localities. Plant taxa: ADO = Adoxaceae; API = Apiaceae; AST = Asteraceae; BOR = Boraginaceae; BRA = Brassicaceae; CIS = Cistaceae; CON = Convolvulaceae; FAB = Fabaceae; GER = Geraniaceae; LAM = Lamiaceae; ONA = Onagraceae; PAP = Papaveraceae; RES = Resedaceae; ZYG = Zygophyllaceae. Countries: DZ = Algeria; ESP = Spain; IL = Israel; ITA = Italy; MA = Morocco; TN = Tunisia.

Species	n	N	Origin (and number) of pollen loads	Result of microscopic analysis of pollen grains (% of pollen grains)	Percentage of pure loads of preferred host	Percentage of loads with preferred host	Host range
Micrandrena Ashmead, 1899							
A. fumida Pérez, 1895	3	3	MA (3)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Cichorioideae)
A. heliaca Warncke, 1974	5	4	MA (5)	RES 100.0	100.0	100.0	narrowly oligolectic (*Reseda*, Resedaceae)
A. mica Warncke, 1974	4	2	MA (4)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
A. pandosa Warncke, 1968 s. str.	21	4	ESP (4), MA (17)	RES 100.0	100.0	100.0	narrowly oligolectic (*Reseda*, Resedaceae)
A. pandosa trigona Warncke, 1975	5	5	ESP (5)	RES 99.7, others 0.3	80.0	100.0	narrowly oligolectic (*Reseda*, Resedaceae)
A. tinctoria sp. nov.	14	4	MA (14)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
Nobandrena Warncke, 1968							
A. compta Lepeletier, 1841	3	3	ITA (1), MA (2)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
Notandrena Pérez, 1890							
A. albohirta Saunders, 1908	6	2	TN (6)	ZYG 100.0	100.0	100.0	narrowly oligolectic (*Zygophyllum*, Zygophyllaceae)
A. acutidentis Wood, 2020	7	2	MA (7)	BRA 93.0, API 4.9, FAB 2.1	71.4	100.0	possibly broadly oligolectic (Brassicaceae)
numida-group							
A. numida Lepeletier, 1841	14	8	MA (12), TN (2)	BRA 73.0, API 27.0	57.1	57.1	mesolectic (Apiaceae & Brassicaceae)
Ovandrena Wood, 2023							
A. marsae Schmiedeknecht, 1900	4	2	MA (4)	FAB 53.3, RES 34.1, BOR 10.1, others 2.4	50.0	50.0	polylectic s. str.
Parandrenella Popov, 1958							
A. tebessana Scheuchl, Benarfa & Louadi, 2011	10	3	MA (10)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
Pruinosandrena Wood, 2023							
A. succinea Dours, 1872	5	5	MA (3), TN (2)	BRA 65.9, RES 23.5, LAM 7.5, others 3.1	20.0	80.0	polylectic s. str.

Table 1 (continued). Host plant use and dietary classification for selected Iberian species of *Andrena*; *n* = total number of pollen loads; *N* = number of pollen loads from different localities. Plant taxa: ADO = Adoxaceae; API = Apiaceae; AST = Asteraceae; BOR = Boraginaceae; BRA = Brassicaceae; CIS = Cistaceae; CON = Convolvulaceae; FAB = Fabaceae; GER = Geraniaceae; LAM = Lamiaceae; ONA = Onagraceae; PAP = Papaveraceae; RES = Resedaceae; ZYG = Zygophyllaceae. Countries: DZ = Algeria; ESP = Spain; IL = Israel; ITA = Italy; MA = Morocco; TN = Tunisia.

Species	n	N	Origin (and number) of pollen loads	Result of microscopic analysis of pollen grains (% of pollen grains)	Percentage of pure loads of preferred host	Percentage of loads with preferred host	Host range
Simandrena Pérez, 1890							
A. biskrensis Pérez, 1895	15	10	IL (2), MA (13)	BRA 74.3, RES 19.6, ONA 3.2, ADO 2.6, AST 0.3	66.7	93.3	polylectic with a strong preference (Brassicaceae)
A. selena Gusenleitner, 1994	4	3	IL (2), MA (1), TN (1)	BRA 90.7, API 9.3	75.0	100.0	possibly polylectic with a strong preference for Brassicaceae
Suandrena Warncke, 1968							
A. fratella Warncke, 1968	2	1	MA (2)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
A. savignyi Spinola, 1838	2	2	ESP (1), MA (1)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
Taeniandrena Hedicke, 1933							
A. caesia Warncke, 1974	18	6	MA (18)	FAB 99.4, BRA 0.6	94.4	100.0	broadly oligolectic (Fabaceae)
A. poupillieri Dours, 1872	5	3	MA (5)	FAB 100.0	100.0	100.0	broadly oligolectic (Fabaceae)
A. prazi sp. nov.	4	4	MA (4)	FAB 100.0	100.0	100.0	broadly oligolectic (Fabaceae)
Truncandrena Warncke, 1968							
A. medeninensis Pérez, 1895 s. str.	3	2	MA (3)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
A. minapalumboi Gribodo, 1894	9	5	MA (8), TN (1)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
A. rufescens Pérez, 1895	7	3	MA (7)	BRA 100.0	100.0	100.0	broadly oligolectic (Brassicaceae)
Ulandrena Warncke, 1968							
A. speciosa Friese, 1899	4	4	MA (2), TN (2)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Asteroideae)
A. tadorna Warncke, 1974	2	2	MA (2)	AST 100.0	100.0	100.0	broadly oligolectic (Asteraceae; Cichorioideae)
incertae sedis							
A. mediovittata Pérez, 1895 (including *A. m. arvensis* Warncke, 1968)	10	3	ESP (7), MA (3)	AST 83.6, BRA 16.4	60.0	100.0	polylectic with a strong preference for Asteraceae
A. tenebricorpus Wood, 2020	4	2	MA (4)	BRA 93.8, CON 6.2	75.0	100.0	probably broadly oligolectic (Brassicaceae)

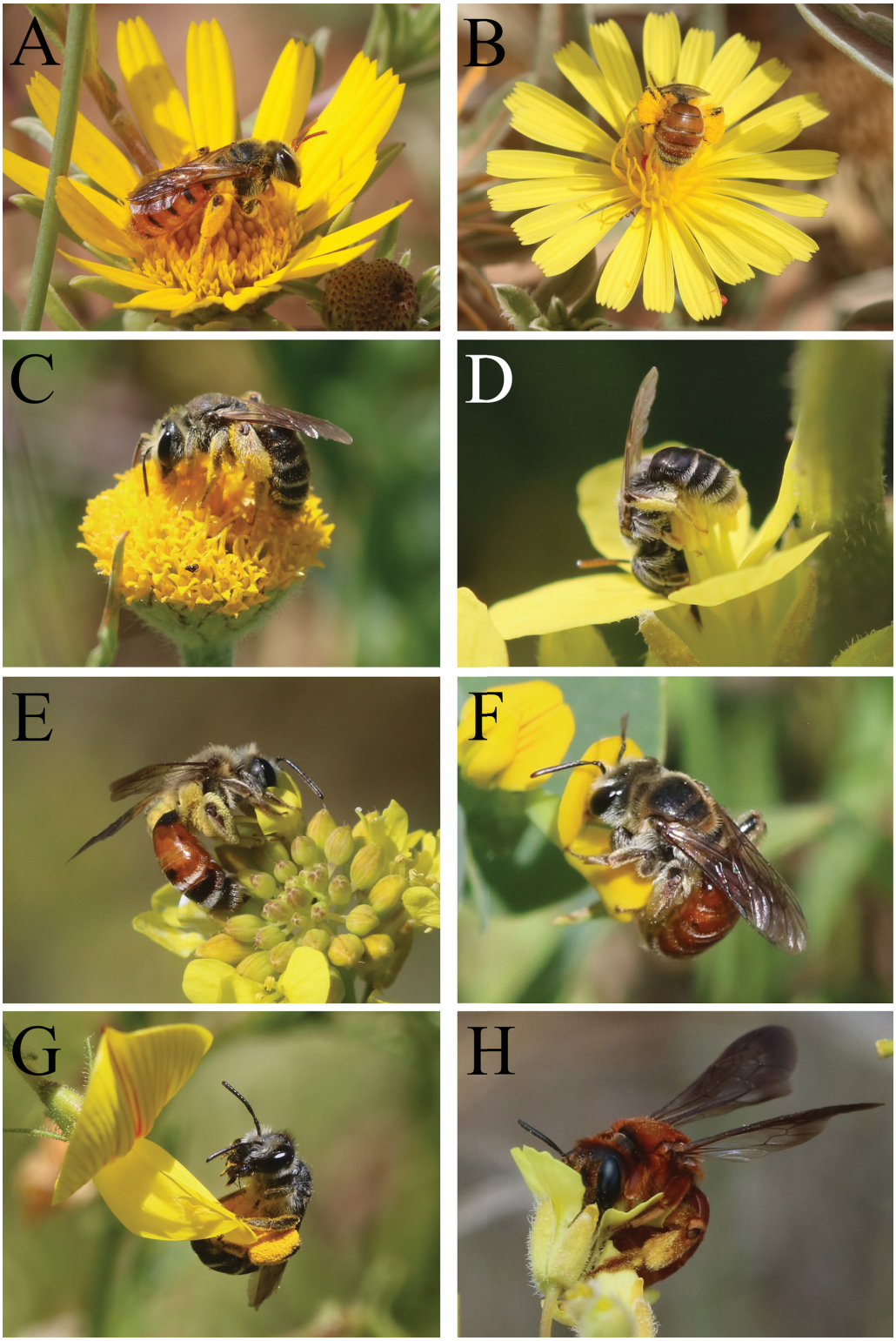

Fig. 37. A. *Andrena* (incertae sedis) *mediovittata* Pérez, 1895 (TJWC). **B**. *Andrena* (*Chlorandrena*) *isis* Schmiedeknecht, 1900 (TJWC). **C**. *Andrena* (*Chlorandrena*) *boyerella* Dours, 1872 (TJWC). **D**. *Andrena* (*Aciandrena*) *spolata* Warncke, 1968 (TJWC). **E**. *Andrena* (*Truncandrena*) *rufescens* Pérez, 1895 (TJWC). **F**. *Andrena* (*Ovandrena*) *marsae* Schmiedeknecht, 1900 (TJWC). **G**. *Andrena* (*Taeniandrena*) *caesia* Warncke, 1974 (TJWC). **H**. *Andrena* (*Pruinosandrena*) *succinea* Dours, 1872 (neotype, OÖLM; see Wood 2023).

adaptation to local climatic conditions, or perhaps repeated expansion and shrinking of distributions; further study of this phenomenon is warranted. Another lineage that extensively uses Brassicaceae is the subgenus *Truncandrena* Warncke, 1968. Not all members of this subgenus are specialised on Brassicaceae (e.g., some are specialised on Cistaceae; Wood 2023), but it is the most commonly used botanical family; this is well illustrated by *A. rufescens* Pérez, 1895 (Fig. 37E; Morocco and Algeria), which is found early in the season (March–April) on ruderal species of Brassicaceae.

Andrena marsae Schmiedeknecht, 1900 (Fig. 37F; Morocco, Algeria, and Tunisia) is a poorly-known species that was recently placed in the small subgenus *Ovandrena* Wood, 2023. Surprisingly, *A. marsae* was found to be polylectic; two other species of *Ovandrena*, *A. oviventris* Pérez, 1895 (West Mediterranean) and *A. farinosa* Pérez, 1895 (Spain only), were found to be oligolectic on *Reseda* and Fabaceae, respectively. Though *A. marsae* does collect from Fabaceae (Fig. 37F), it does not appear to be restricted to this botanical family. The dietary niche of the fourth *Ovandrena* species, *A. farinosoides* Wood, 2020 (Morocco only), which is known from semi-desert habitats in north-eastern Morocco, remains unclear; a single female was collected during 2022 on *Peganum harmala* (Nitrariaceae), but had her scopae empty.

Andrena caesia Warncke, 1974 (Fig. 37G; Morocco, Algeria, and Tunisia) was found to be oligolectic on Fabaceae, as is expected for members of *Taeniandrena* (Praz *et al*. 2022). In desert edge habitats it foraged from a variety of herbaceous and shrubby Fabaceae, including *Astragalus*, *Lygos*, *Ononis*, and other Genistae. This broad use of multiple subfamilies within Fabaceae suggests, as for *A. prazi* sp. nov., that the niche of *A. caesia* may be temporal, showing adaptation to local environmental conditions rather than to specific Fabaceae resources, within the context of being a lineage of *Andrena* specialised on this family.

Finally, though most of the North African species studied here were found to be oligolectic, some lineages did display polylecty. This included *Andrena succinea* Dours, 1872 (Fig. 37H; North Africa to the Middle East), which was recently returned to species status and placed in the newly erected subgenus *Pruinosandrena* Wood, 2023 (Wood 2023). Nothing has been published on the pollen preferences of members of this subgenus. The limited number of samples available for *A. succinea* suggest that it is polylectic, though more work is needed to cement this assessment, as well as to determine the niche of the other species of *Pruinosandrena*.

Discussion

At 202 species, the *Andrena* fauna of Morocco is one of the largest in the world, slightly exceeding that of Iran (Wood & Monfared 2022), but smaller than the 220–228 species known from Greece, Israel, and Spain (Pisanty *et al*. 2022a; Wood 2023). The rate of endemism is very similar to that of the Iberian Peninsula, with 25 species endemic to Morocco (12.4%) and 33 species endemic to the Iberian Peninsula (14.5%; addition of *A. montarca*, loss of *A. lusitania*). Comparison with other countries is premature due to the incompleteness of sampling within and between countries, but these endemism rates are likely to be high amongst *Andrena* faunas globally.

Several important trends should be noted with the completion of these modern revisions of the Iberian (Wood 2023) and Moroccan faunas. The first is that Moroccan *Andrena* often show sizeable genetic differentiation from the nominal representatives of the same species in the Iberian Peninsula. This can be seen in multiple subgenera (e.g., *Chrysandrena* for *A. hesperia*, *Melanapis* Cameron, 1902 for *A. fuscosa*), where very widespread species showing minimal morphological differentiation have a substantial barcode difference exceeding 4%. In contrast, some species thought to be endemic to the Iberian Peninsula have been found in Morocco and show minimal genetic differentiation, often < 1% despite what are clearly separated populations (e.g., *A. lusitania*, *A. nebularia*). Finally, there are also

morphologically similar taxa present in southern Iberia and northern Morocco that show clear genetic differentiation along with some subtle morphological differences (e.g., *A. abscondita* sp. nov./*A. isolata* and *A. anammas* sp. nov./*A. ortizi*). It is clear that no generalisations can be made for the individual species present in Iberia and Morocco and their specific evolutionary histories; some species may have colonised Iberia via Europe and Morocco via North Africa, and have only more recently entered geographical proximity across the Strait of Gibraltar. The degree to which the Strait itself acts as a true barrier to gene flow is unclear given the variable genetic distances presented here and in Wood (2023) for taxa present on both sides of this divide. Since *Andrena* lineages have been highly mobile throughout their relatively short evolutionary history, with at least 10 independent exchanges between the Palaearctic and Nearctic during the past 25 million years (Bossert *et al*. 2022; Pisanty *et al*. 2022b), it is logical to assume that taxa can and do pass over this stretch of water, which is only 13 kilometres wide at its narrowest point. However, it is clear that many taxa or sister taxa are genuinely separated, with some bees species even going as far as to have evolved different nesting strategies between North African and European sister species (Müller *et al*. 2017). Further study will illuminate broader trends in the biogeographical history of West Mediterranean *Andrena* and faunal exchanges between Iberia and Morocco.

For the 13 new species described here, 11 are currently known only from Moroccan specimens. This is highly similar to the result seen in osmiine bees, where 13 of the 14 newly described species in a Moroccan-focused revision were found to be restricted to this country (Müller 2022). The southern provinces of Morocco produced, in whole or in part, material for seven of the newly described 11 Moroccan endemic species of *Andrena*. Difficulty in sampling western and south-western Algeria has reduced the opportunity to detect these taxa outside of Morocco, but it may also genuinely be the case that these newly described species are true endemics, as the vast majority of the rocky desert habitat that they inhabit occurs on the Moroccan side of the border. What is clear is that as increased attention has been paid to the Moroccan bee fauna in recent years (e.g., Ortiz-Sánchez & Patiny 2019; Wood *et al*. 2020; Müller 2022), the number of newly described endemic species has greatly increased. Even if increased sampling demonstrates that some of these species are more widespread, it seems highly likely that Morocco will sooner or later be demonstrated to host the second highest endemic bee species richness of Mediterranean countries after Turkey (Lhomme *et al*. 2020).

Finally, the examination of old type material resulted in the clarification of the statuses of several taxa that had been insufficiently characterised and their names used incorrectly, in some cases in a sensu auctorum. As for all other bee groups, improved curation, imaging, access to, and potentially barcoding of type material will greatly facilitate ongoing revisionary taxonomic efforts (Praz & Bénon 2023). Within the genus *Andrena*, the majority of relevant types for the Moroccan fauna are held in just a few institutions (predominantly MNHN and OÖLM; NHMUK and ZMHB to a lesser extent), but taxonomic problems have continued to persist to the present day despite this. Improved support for museum collections and researchers is critical to maintain and produce a stable taxonomic framework for current and future studies on the ecology and conservation on the rich bee fauna of the Mediterranean basin.

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