



Zootaxa 5266 (1): 001–072

<https://www.mapress.com/zt/>

Copyright © 2023 Magnolia Press

# Monograph

ISSN 1175-5326 (print edition)

**ZOOTAXA**

ISSN 1175-5334 (online edition)

<https://doi.org/10.11646/zootaxa.5266.1.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:079536BC-B8C4-4974-90EA-BF600D990D14>

# ZOOTAXA

5266

## New Old World *Andrena* species, with a focus on Turkey (Hymenoptera: Andrenidae)

THOMAS JAMES WOOD<sup>1</sup>

<sup>1</sup>University of Mons, Research Institute for Biosciences, Laboratory of Zoology, Place du parc 20, 7000, Mons, Belgium

[✉ thomasjames.wood@umons.ac.be](mailto:thomasjames.wood@umons.ac.be); [ORCID iD https://orcid.org/0000-0001-5653-224X](https://orcid.org/0000-0001-5653-224X)



Magnolia Press  
Auckland, New Zealand

Accepted by J. Gibbs: 7 Mar. 2023; published: 18 Apr. 2023

THOMAS JAMES WOOD

**New Old World *Andrena* species, with a focus on Turkey (Hymenoptera: Andrenidae)**

(*Zootaxa* 5266)

72 pp.; 30 cm.

18 Apr. 2023

ISBN 978-1-77688-736-1 (paperback)

ISBN 978-1-77688-737-8 (Online edition)

FIRST PUBLISHED IN 2023 BY

Magnolia Press

P.O. Box 41-383

Auckland 1041

New Zealand

e-mail: [magnolia@mapress.com](mailto:magnolia@mapress.com)

<https://www.mapress.com/zt>

© 2023 Magnolia Press

All rights reserved.

No part of this publication may be reproduced, stored, transmitted or disseminated, in any form, or by any means, without prior written permission from the publisher, to whom all requests to reproduce copyright material should be directed in writing.

This authorization does not extend to any other kind of copying, by any means, in any form, and for any purpose other than private research use.

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)



## Table of Contents

Abstract . . . . .	4
Introduction . . . . .	4
Methodology . . . . .	5
Results . . . . .	5
Species descriptions . . . . .	5
Species descriptions . . . . .	5
<i>Andrena (Graecandrena) peculiaris</i> spec. nov. . . . .	5
<i>Andrena (Habromelissa) angustula</i> spec. nov. . . . .	8
<i>Andrena (Hoplandrena) cephalgia</i> spec. nov. . . . .	12
<i>Andrena (incertae sedis) colatorium</i> spec. nov. . . . .	16
<i>Andrena (incertae sedis) discordia</i> spec. nov. . . . .	18
<i>Andrena (incertae sedis) maharashtra</i> spec. nov. . . . .	21
<i>Andrena (incertae sedis) orichalcum</i> spec. nov. . . . .	25
<i>Andrena (Leimelissa) claves</i> spec. nov. . . . .	28
<i>Andrena (Margandrena) cilicia</i> spec. nov. . . . .	31
<i>Andrena (Melandrena) nox</i> spec. nov. . . . .	34
<i>Andrena (Notandrena) ayna</i> spec. nov. . . . .	37
<i>Andrena (Notandrena) taurus</i> spec. nov. . . . .	38
<i>Andrena (Taeniandrena) laevicorpus</i> spec. nov. . . . .	41
<i>Andrena (Taeniandrena) taedium</i> spec. nov. . . . .	44
<i>Andrena (Tarsandrena) palliata</i> spec. nov. . . . .	46
<i>Andrena (Ulandrena) graciliata</i> spec. nov. . . . .	51
New lectotype designation and clarification of phylogenetic affinities . . . . .	53
<i>Andrena (Leimelissa) flagella</i> Nurse, 1904 . . . . .	53
<i>Andrena (Leimelissa) mimetes</i> Cockerell, 1929 . . . . .	54
<i>Andrena (Melandrena) metallescens</i> Cockerell, 1906 . . . . .	55
New synonymies . . . . .	57
<i>Andrena (Avandrena) heterodoxa</i> Pérez, 1903 sp. resurrect. . . . .	57
<i>Andrena (Andrena) inconstans</i> Morawitz, 1877 . . . . .	58
<i>Andrena (Hoplandrena) rosae</i> Panzer, 1801 . . . . .	58
<i>Andrena (Truncandrena) pareklisiae</i> Mavromoustakis, 1957 . . . . .	59
Descriptions of newly discovered sexes of <i>Andrena</i> species described from a single sex . . . . .	59
<i>Andrena (Poecilandrena) adjacens</i> Morawitz, 1875 . . . . .	59
<i>Andrena (?Aciandrena) palmyriae</i> Wood, 2021 . . . . .	61
<i>Andrena (Tarsandrena) sarydzhasi</i> Osytshnjuk, 2005 . . . . .	63
<i>Andrena (Chlorandrena) tricuspidata</i> Scheuchl, 2010 . . . . .	64
<i>Andrena</i> species newly recorded for Turkey . . . . .	66
<i>Andrena (Aciandrena) israelica</i> Scheuchl & Pisanty, 2016 . . . . .	66
<i>Andrena (Aciandrena) longistilus</i> Pisanty & Wood, 2022 . . . . .	66
<i>Andrena (Andrena) fulva</i> (Müller, 1766) . . . . .	66
<i>Andrena (Andrena) lapponica</i> Zetterstedt, 1838 . . . . .	66
<i>Andrena (Euandrena) fulvata</i> Stöckhert, 1930 . . . . .	66
<i>Andrena (Euandrena) ruficrus</i> Nylander, 1848 . . . . .	67
<i>Andrena (Graecandrena) virguladivina</i> Wood, 2021 . . . . .	67
<i>Andrena (Holandrena) fimbriatoides</i> Scheuchl, 2004 . . . . .	67
<i>Andrena (incertae sedis) antilibanotica</i> Wood, 2020 . . . . .	67
<i>Andrena (incertae sedis) ebmerella</i> Scheuchl, 2011 . . . . .	67
<i>Andrena (Leimelissa) ermolenkoi</i> Osytshnjuk, 1984 . . . . .	67
<i>Andrena (Lepidandrena) rufizona</i> Imhoff, 1834 . . . . .	68
<i>Andrena (Micrandrena) elam</i> Wood, 2022 . . . . .	68
<i>Andrena (Micrandrena) sandanskia</i> Warncke, 1973 . . . . .	68
<i>Andrena (Micrandrena) subopaca</i> Nylander, 1848 . . . . .	68
<i>Andrena (Notandrena) curvana</i> Warncke, 1965 . . . . .	68
<i>Andrena (Rufandrena) parvispinae</i> Wood, 2020 . . . . .	68
<i>Andrena (Simandrena) susterai</i> Alfken, 1914 . . . . .	69
Discussion . . . . .	69
Acknowledgements . . . . .	69
References . . . . .	69

## Abstract

*Andrena* is the second most speciose genus of bees, but much taxonomic work is still required to describe taxa from its centre of diversity—the Old World Mediterranean basin including Turkey to Central Asia—as well as to resolve nomenclatural issues. An additional 16 new species discovered in museum collections are described here: *Andrena* (*Taeniandrena*) *laevicorpus* **spec. nov.** and *Andrena* (*Ulandrena*) *graciliata* **spec. nov.** from Cyprus; *Andrena* (*Taeniandrena*) *taedium* **spec. nov.** from Greece, Turkey, Lebanon, and Iran; *Andrena* (incertae sedis) *maharashtra* **spec. nov.** from India; *Andrena* (*Leimelissa*) *claves* **spec. nov.** from Kazakhstan; *Andrena* (*Hoplandrena*) *cephalgia* **spec. nov.** from Kazakhstan, Kyrgyzstan, and Tajikistan; *Andrena* (*Habromelissa*) *angustula* **spec. nov.** from Mongolia; *Andrena* (*Tarsandrena*) *palliat* **spec. nov.** from Mongolia & China; and *Andrena* (*Graecandrena*) *peculiaris* **spec. nov.**, *Andrena* (incertae sedis) *colatorium* **spec. nov.**, *Andrena* (incertae sedis) *discordia* **spec. nov.**, *Andrena* (incertae sedis) *orichalcum* **spec. nov.**, *Andrena* (*Melandrena*) *nox* **spec. nov.**, *Andrena* (*Margandrena*) *cilicia* **spec. nov.**, *Andrena* (*Notandrena*) *ayna* **spec. nov.**, and *Andrena* (*Notandrena*) *taurus* **spec. nov.** from Turkey. A lectotype is designated for *Andrena* (*Avandrena*) *heterodoxa* Pérez, 1903 **sp. resurr.** which is recognised as the senior synonym of *A.* (*Avandrena*) *siciliana* Warncke, 1980 **syn. nov.** *Andrena* (*Andrena*) *bulgariensis* Warncke, 1965 is synonymised **syn. nov.** with *A.* (*Andrena*) *inconstans* Morawitz, 1877. *Andrena* (*Hoplandrena*) *schoenitzeri* Gusenleitner, 1998 is synonymised **syn. nov.** with *A.* (*Hoplandrena*) *rosae* Panzer, 1801. *Andrena* (*Truncandrena*) *medeninensis usura* Warncke, 1967 is synonymised **syn. nov.** with *A.* (*Truncandrena*) *pareklisiae* Mavromoustakis, 1957. The female of *A.* (*Chlorandrena*) *tricuspidata* Scheuchl, 2010 and the males of *A.* (*Poecilandrena*) *adjacens* Morawitz, 1875, *A.* (*Aciandrena*) *palmyriae* Wood, 2021, and *A.* (*Tarsandrena*) *sarydzhasi* Osytshnjuk, 2005 are described for the first time. Lectotypes are designated for *Andrena* (*Melandrena*) *metallica* Radoszkowski, 1876 (= *Andrena metallescens* Cockerell, 1906) and *Andrena* (*Leimelissa*) *mimetes* Cockerell, 1929. Eighteen additional *Andrena* species are reported from Turkey for the first time, emphasising its status as the likely centre of diversity for this hyper-speciose genus.

**Key words:** endemic, Mediterranean, Palaearctic, solitary bees, steppe, taxonomy

## Introduction

*Andrena* are the second most speciose genus of bees globally with around 1,650 species following recent revisions (Ascher & Pickering 2020; Pisanty *et al.* 2022a; Wood & Monfared, 2022). They are also amongst, if not the, most rapidly speciating extant bee lineage (Bossert *et al.* 2022). This is particularly apparent in the West Palaearctic region where new species are being described at a rapid rate (e.g. Scheuchl *et al.* 2004; Grünwaldt *et al.* 2005; Scheuchl & Hazir 2008; 2012; Scheuchl & Gusenleitner 2009; Scheuchl 2010; 2011; Schwenninger 2015; Pisanty *et al.* 2016; 2018; 2022a; Praz *et al.* 2019; 2022; Wood 2021a; 2021b; Wood *et al.* 2020a; 2020b; 2021; Wood & Ortiz-Sánchez 2022; Wood & Monfared 2022).

Within the West Palaearctic fauna, Turkey clearly hosts the greatest number of *Andrena* species. Studies of this fauna were largely driven by Klaus Warncke who between 1965–1975 described 139 *Andrena* taxa from the country out of a fauna of an estimated 300 species (e.g. Warncke 1965; 1967; 1975, see Scheuchl & Gusenleitner 2009). After 1975, Warncke largely focused on other bee groups, publishing relatively little on *Andrena* (Warncke 1980; 1988), though he continued to collect *Andrena* specimens extensively in Turkey, Syria, and Israel. Taxonomic studies on Turkish *Andrena* continued after Warncke's death in 1993 (e.g. Gusenleitner 1998; Grünwaldt *et al.* 2005; Scheuchl & Hazir 2008; 2012; Scheuchl & Gusenleitner 2009; Scheuchl 2010), with some studies directly using undetermined material from the Warncke's collection, much of which was collected from the under-explored eastern part of the country in provinces such as Kars and Hakkâri.

The majority of Warncke's undetermined *Andrena* material is held in Linz, and despite the work of several taxonomists, many taxa remained undescribed. Examination of this material in conjunction with more recently collected material housed in European museums has revealed numerous unidentified taxa from across the Old World, much of it from Turkey, as well as many species newly recorded for this country. As part of ongoing revisions to Old World *Andrena*, these species are described and reported herein, and additional new synonymies, descriptions of unknown sexes, and localisation information for obscure types are also provided.

## Methodology

Morphological terminology follows Michener (2007). Specimens were measured from the centre of the clypeus at the front of the head to the apical tip of the metasoma and rounded to the nearest 0.5 mm. Photographs 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 10X infinity corrected objective lens in combination with an Olympus M.Zuiko 2x teleconverter lens, a 10 mm Kenko DG extension tube, and a Meike MK-P-AF3B 10 mm extension tube. Photographs were stacked using Helicon Focus B (HeliconSoft, Ukraine) and plates were prepared in GNU Image Manipulation Program (GIMP) 2.10. Post-processing of some images was made in Photoshop Elements (Adobe Systems, USA) to improve lighting to highlight specific characters.

Taxa are presented alphabetically, first by subgenus and then by species. For species distributions, countries marked with an ‘\*’ indicate the first record for that country. The following abbreviations are used in the species descriptions: A = antennal segments, S = metasomal sterna, and T = metasomal terga. Subgeneric concepts follow Pisanty *et al.* (2022b). In diagnoses, the defining characters of a species are given, with those of the indicated comparison species given in parentheses.

MNHN = Muséum national d’Histoire naturelle, Paris, France

NHMUK = Natural History Museum, London, United Kingdom

OÖLM = Oberösterreichs Landesmuseum, Linz, Austria

RMNH = Naturalis Biodiversity Center, Leiden, the Netherlands

SBC = Silas Bossert collection, Washington State University, Pullman, USA

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

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

## Results

### Species descriptions

#### *Andrena (Graecandrena) peculiaris spec. nov.*

**HOLOTYPE: TURKEY:** Hakkâri, Suvari Halil-Pass, 37.4994°N, 43.3381°E, 2300 m, 14.vi.1981, 1♂, leg. K. Warncke, OÖLM.

**PARATYPES: TURKEY:** Hakkâri, Suvari Halil-Pass, 2300 m, 14.vi.1981, 19♂, 17♀, leg. K. Warncke & M. Kraus, OÖLM/TJWC; Hakkâri, Suvari Halil-Pass, 2400 m, 2.vi.1980, 7♂, 2♀, leg. K. Warncke, OÖLM; Tanin-Tanin-Pass, 2300 m, 19.v.1989, 2♂, leg. K. Warncke, OÖLM.

**Description: Female:** Body length: 7–8 mm (Figure 1A). *Head:* Dark, 1.4 times wider than long (Figure 1B). Clypeus domed, irregularly punctate with punctures of different sizes, punctures confluent to separated by 0.5–2 puncture diameters; underlying surface shagreened basally and laterally, becoming weakly shagreened and shining medio-apically. Process of labrum trapezoidal, 2.5 times wider than long, apical margin weakly emarginate medially. Supraclypeal plate shagreened, weakly shining. Gena subequal to width of compound eye; ocellocipital distance equalling 1 diameter of lateral ocellus. Foveae narrow, dorsally occupying one third of space between lateral ocellus and compound eye (Figure 1C), medially slightly constricted and weakly narrowed ventrally, clearly diverging from inner margin of compound eye, separated by distance equal to basal width of A3, this space strongly polished and shining with scattered punctures (Figure 1B); foveae filled with dark brown hairs. Face, gena, vertex, and scape with golden-brown hairs, longest hairs on vertex clearly shorter than length of scape. Antennae basally dark, A5 apically, A6–12 ventrally lightened orange; A3 subequal to A4+5. *Mesosoma:* Scutum finely punctate, punctures separated by 1–2 puncture diameters, underlying surface finely shagreened, weakly shining, with weak bronzy shimmer (Figure 1D). Scutellum with punctures separated by 2–3 puncture diameters, weakly shagreened. Pronotum evenly rounded. Mesepisternum and dorsolateral parts of propodeum finely microreticulate, propodeal triangle with fine granular microreticulation, of a coarser grain than dorsolateral parts of propodeum, basally with faint network of subtly raised rugae (Figure 1E). Mesepisternum laterally with whitish hairs, these with very short



plumose branches, thus appearing thickened. Scutum and scutellum with similar thickly plumose, short brownish hairs. Propodeal corbicula incomplete, with sparse, longer whitish and finely plumose hairs, internal surface with occasional long yellowish simple hairs. Legs dark, apical tarsal segments lightened orange, pubescence whitish; flocculus, femoral and tibial scopa white. Hind tarsal claws with subtle inner tooth. Wings hyaline, stigma and venation brownish, nervulus antefurcal. *Metasoma*: Terga dark, marginal zones narrowly lightened dark brown, terga finely microreticulate, weakly shining, with obscure punctures, most clearly visible only on T3–4, here separated by 2–3 puncture diameters (Figure 1F). T2–4 laterally with narrow, broadly interrupted apical hair fringes that obscure underlying surface. Apical fringe of T5 and hairs flanking pygidial plate golden to whitish, pygidial plate rounded triangular, flattened, dorsal surface featureless.

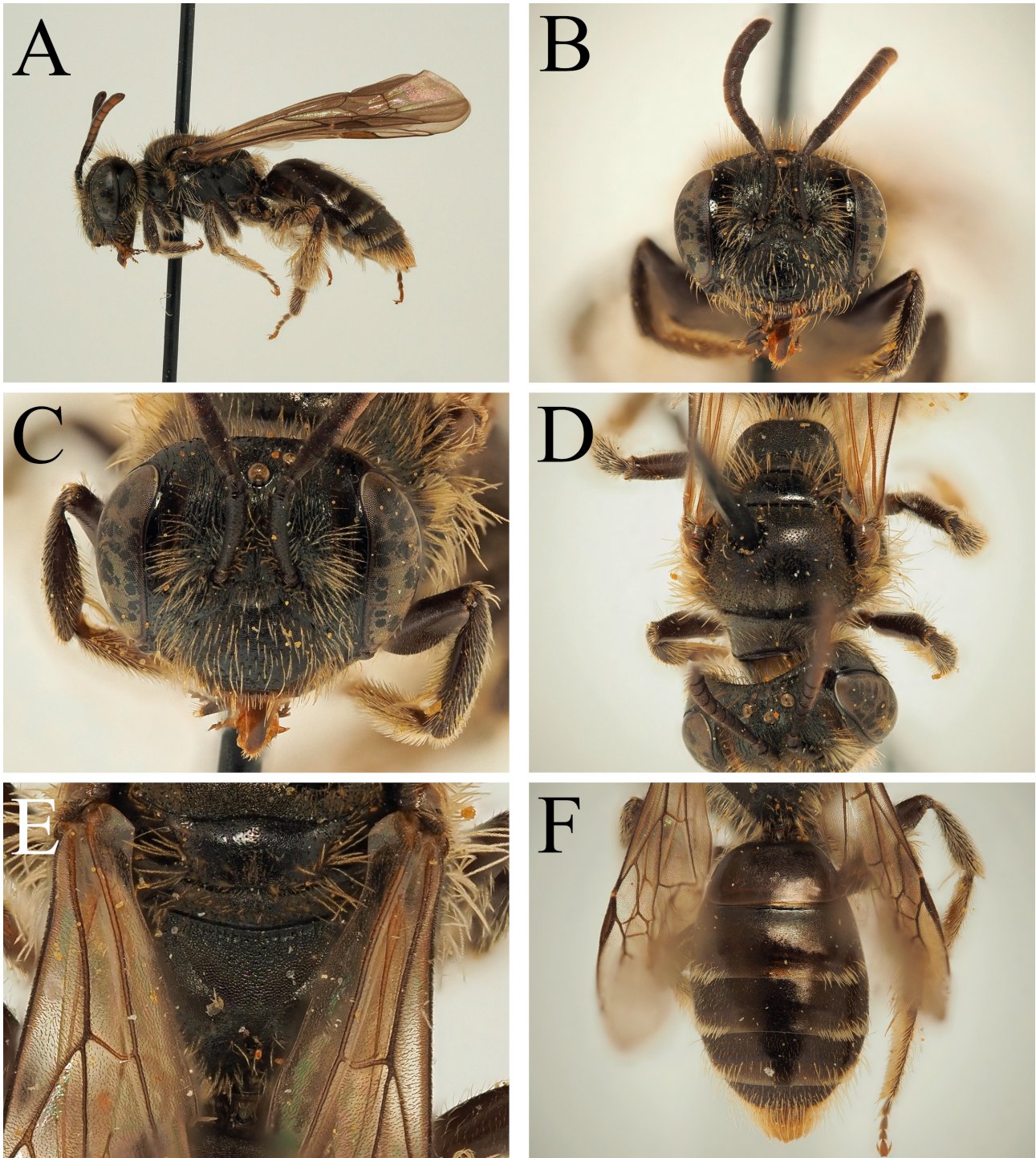


FIGURE 1. *Andrena (Graecandrena) peculiaris* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Face, dorso-frontal view, D. Scutum, dorsal view, E. Propodeum, dorsal view, F. Terga, dorsal view.



**Male:** Body length: 6.5–7 mm (Figure 2A). *Head:* Dark, 1.4 times wider than long (Figure 2B). Clypeus with dense but obscure punctures, punctures separated by 1 puncture diameter, interspaces with short, obscurely raised carinae that form incomplete lateral ridges, clypeus thus weakly transversely striate. Process of labrum short, trapezoidal, twice as wide as long, apical margin weakly emarginate. Supraclypeal plate shagreened, weakly shining. Gena slightly exceeding width of compound eye; ocellocipital distance equalling 1 diameter of lateral ocellus. Lower half of face and gena ventrally with long white hairs, none exceeding length of scape, those on clypeus forming dense, ventrally directed ‘beard’, in fresh specimens somewhat obscuring underlying surface; gena laterally, vertex, frons, and scape with hairs becoming brownish. Antennae basally dark, A5–13 ventrally lightened orange; A3 exceeding A4, shorter than A4+5, A4 wider than long. *Mesosoma:* Scutum and scutellum finely punctate, punctures separated by 0.5–2 puncture diameters, underlying surface laterally and anteriorly shagreened, becoming smooth and shining medially; scutum with weak bronzy shimmer. Remaining mesosoma structurally as in female. Mesepisternum with long white weakly plumose hairs, exceeding length of scape, hairs becoming shorter and browner on scutum and scutellum. Legs dark, apical tarsal segments lightened orange. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation brownish, nervulus antefurcal. *Metasoma:* Terga dark, marginal areas lightened dark brown with narrow hyaline rim. Tergal discs microreticulate, strongest on T1, becoming weak by T4–5, marginal areas with weak shagreenation, shining; terga with fine punctures in areas of reduced microreticulation, here separated by 2–3 puncture diameters (Figure 2C). T2–5 with weak sparse lateral hair fringes of white hairs. S8 long and narrow, parallel sided, apically truncate. Genital capsule large, rounded, gonocoxa not produced apically into teeth, inner margin forming a 90° angle but not projecting (Figure 2D), gonostyli with evenly rounded semi-circular inner margin, apically with strong and deep apical emargination, remaining parts pointed and claw-like (Figure 2E). Penis valves with broad hyaline lateral extensions occupying space between inner margins of gonostyli, weakly ventrally projecting but apex clearly truncate (Figure 2F).

**Diagnosis:** *Andrena peculiaris* can most probably be placed in the subgenus *Graecandrena*, though this must be confirmed with genetic evidence due to the challenge of morphologically defining this group of species (Pisanty *et al.* 2022b). The combination of small body size, a propodeal triangle that is predominantly granulate with only subtle basal rugosity (Figure 1E), narrow facial foveae (occupying one third of space between lateral ocellus and compound eye, Figure 1C), black male clypeus (Figure 2B), and the structure of the male genital capsule (rounded, inner margin of gonostyli creating a broadly circular area, with gonocoxal teeth absent, Figures 2D–F) suggest *Graecandrena*.

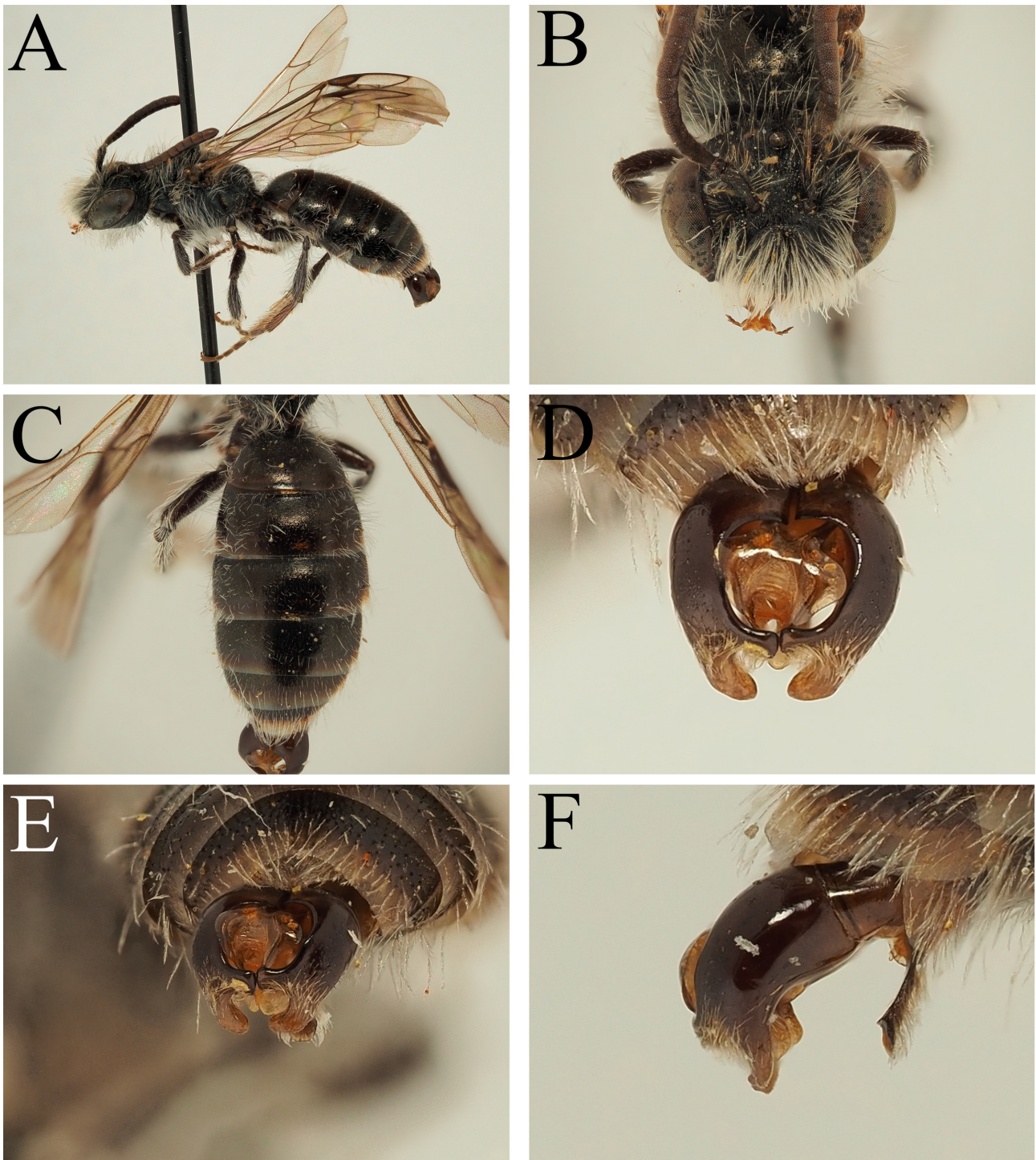
It is most similar to *A. virguladivina* Wood, 2021 which was described from north-western Syria and is newly reported from Kahramanmaraş in southern Turkey (see below). Males of both species deviate from other known *Graecandrena* species by the comparatively large genital capsule with robust gonostyli (Figures 2D–F). However, *A. peculiaris* differs in numerous other ways, specifically the absence of gonocoxal teeth (present in *A. virguladivina*), the strongly broadened penis valves with clear lateral hyaline extensions that occupying the space between the gonostyli (without such extensions in *A. virguladivina*), the gonostyli are apically strongly and deeply emarginate, each therefore being produced into two claw-like points (versus without apical emargination), and the penis valves begin to slightly diverge apically but are clearly apically truncate (versus penis valves apically diverging and produced into a clear Y-shaped bifurcation).

Females are much more similar to *A. virguladivina* but can be separated by (comparative material required) the more strongly domed and more irregularly punctate clypeus, punctures confluent to separated by 0.5–2 puncture diameters, without a subtle impunctate longitudinal line (clypeus not so strongly domed, punctures separated by 0.5–1 puncture diameters, with subtle longitudinal impunctate line), the slightly broader foveae occupying one third of space between lateral ocellus and inner margin of the compound eye, these filled with dark brown hairs, the foveae ventrally being more strongly separated from the inner margin of the compound eye (Figures 1B–C), this area strongly polished and shining (in *A. virguladivina* with foveae slightly narrower, occupying one quarter of the space between lateral ocellus and compound eye, these filled with white hairs, ventrally less strongly separated from the inner margin of the compound eye, this area not being conspicuously polished), and the comparatively broad process of the labrum that is twice as wide as long (versus process of labrum narrowly trapezoidal, more or less as wide as long). *Andrena peculiaris* females also display a faint bronzy shimmer on the scutum (Figure 1D) that appears to be absent in *A. virguladivina*, but structural characters should be used for maximum confidence.

**Notes.** This species was separated by Warncke using the unpublished name ‘*Andrena ferulata*’. The etymology of this name is unclear, and it is quite close to *A. ferulae* Pérez, 1895 which bears no morphological resemblance to the taxon, and so a new name has been chosen.

**Etymology:** Feminine form of the Latin adjective *peculiaris* meaning peculiar (singular, exceptional), in reference to the unusual morphology of this species.

**Distribution:** Eastern Turkey (Hakkâri province).



**FIGURE 2.** *Andrena (Graecandrena) peculiaris* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Terga, dorsal view, D. Genital capsule, dorsal view, E. Genital capsule, posterior-dorsal view, F. Genital capsule, lateral view.

***Andrena (Habromelissa) angustula* **spec. nov.****

**HOLOTYPE:** MONGOLIA: W [West], 40 km SW Uliastay [Uliastai], dunes [inferred 47.4474°N, 96.3626°E], 18.vii.2005, 1♂, leg. J. Halada, OÖLM.



**PARATYPES: MONGOLIA:** W [West], 40 km SW Uliastay [Uliastai], dunes, 18.vii.2005, 1♂, leg. J. Halada, OÖLM; W [West], 15 km N Altay [Altai] city, 15.vii.2005, 2♂, leg. J. Halada, OÖLM/TJWC; Chuluut Gol (riv.), 1940 m, 23.vii.2005, 1♀, leg. J. Halada, OÖLM; 50 km SW Choibalsan, 960 m, 25.vii.2007, 1♀, leg. J. Halada, OÖLM.

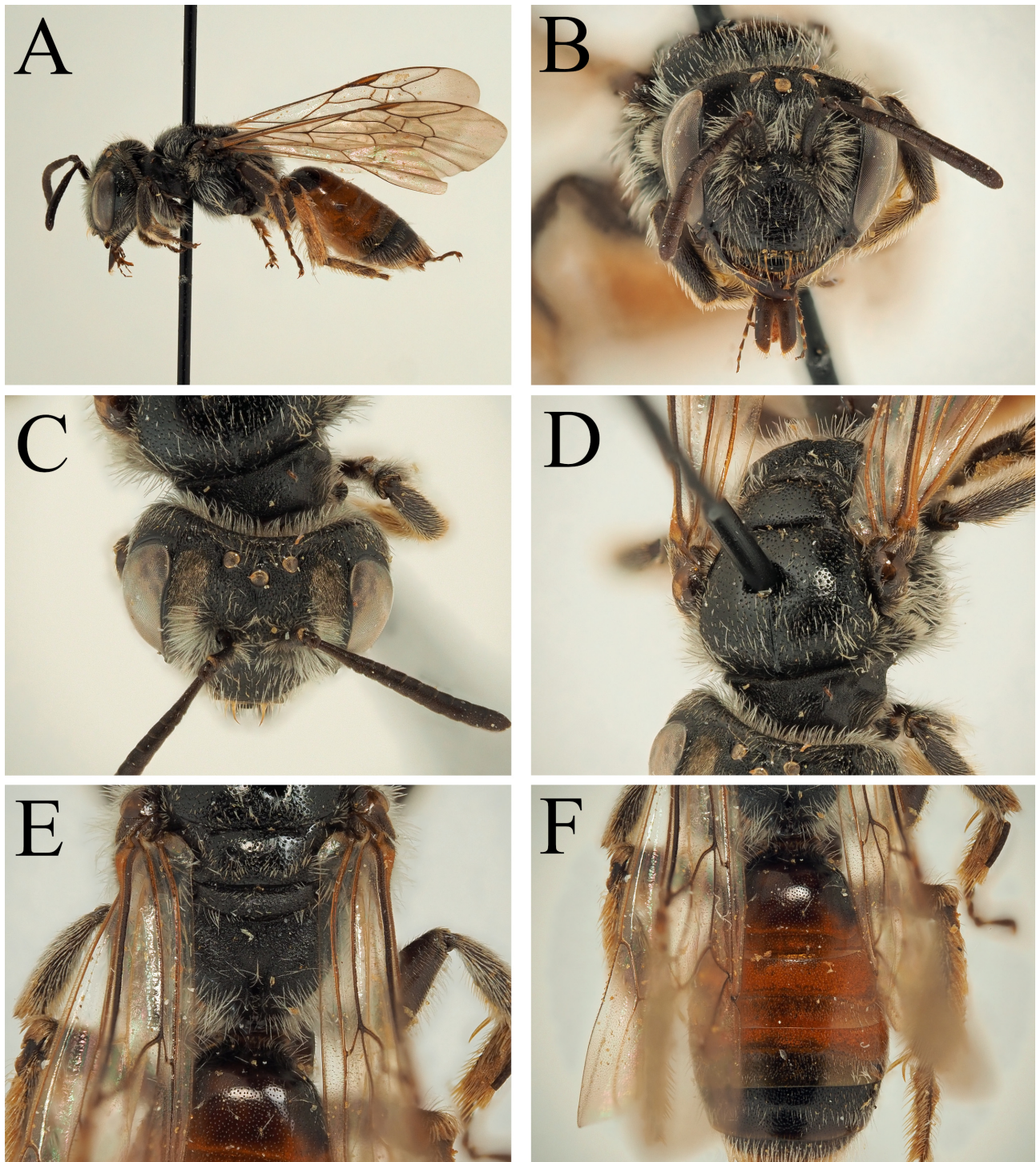
**Description: Female:** Body length: 7–8 mm (Figure 3A). *Head:* Dark, 1.2 times wider than long (Figure 3B). Clypeus weakly domed, subtly flattened medially, irregularly punctate, punctures almost confluent to separated by 2 puncture diameters; underlying surface basally and laterally shagreened and weakly shining, becoming smooth and shining at apical margin. Process of labrum unusual, with strong 90 degree angle separating frontal and ventral parts; viewed frontally process of labrum short, twice as wide as long, rectangular; viewed ventrally, forming rounded semi-circular shape, slightly wider than long. Gena equalling width of compound eye; ocelloccipital distance equalling 1 diameter of lateral ocellus. Foveae dorsally broad, occupying three quarters of space between lateral ocellus and compound eye, slightly narrowed ventrally at level of antennal insertions; filled with whitish to light brownish hairs (Figure 3C). Face, gena, vertex, and scape with short white hairs. Antennae dark, A4–12 slightly lightened ventrally by presence of grey scales, A3 subequal to A4+5+6. *Mesosoma:* Scutum and scutellum clearly but variably punctate, punctures separated by 0.5–2 puncture diameters, underlying surface shagreened and dull in anterior quarter, smooth and shining over remaining disc (Figure 3D). Pronotum with weak humeral angle. Mesepisternum and dorsolateral parts of propodeum densely microreticulate and dull; propodeal triangle poorly defined laterally, internal surface with irregular network of raised rugae in basal two thirds, apical one third granulate (Figure 3E). Mesepisternum with moderately long white hairs, scutum and scutellum with shorter white hairs; propodeal corbicula incomplete, dorsally composed of short and finely plumose whitish hairs, internal surface with many fine, simple white hairs. Legs dark, pubescence whitish, flocculus very weak, composed of white plumose hairs, femoral and tibial scopa white. Hind tarsal claws with short inner tooth. Wings hyaline, stigma and venation orange, nervulus antefurcal. *Metasoma:* Terga variably red-marked, from T1–3 entirely and T4 partially red-marked to T1 apically, T2 entirely, and T3 basally red-marked; T2 with small pair of lateral black spots; remaining terga dark (Figure 3F). Terga strongly punctured, punctures separated by 1–2 puncture diameters, punctures covering both discs and margins; tergal margins weakly depressed, most evident on T4. T2–4 with weak lateral hair fringes of sparse and obscure whitish hairs. Apical fringe of T5 and hairs flanking pygidial plate whitish to orangish-brown, pygidial plate narrowly triangular with strongly raised longitudinal ridge medially.

**Male:** Body length: 7 mm (Figure 4A). *Head:* Dark, 1.2 times wider than long (Figure 4B). Clypeus weakly domed, coloured ivory-white with exception of two dark triangular marks laterally; clypeus clearly but shallowly punctate, punctures separated by 1–2 puncture diameters, underlying surface subtly shagreened, weakly shining. Gena clearly exceeding width of compound eye, slightly produced into rounded angulation lateroventrally; ocelloccipital distance equalling 1 diameter of lateral ocellus (Figure 4C). Process of labrum narrow, apically projecting beyond vertical profile of clypeus (Figure 4D), ventral surface with shallow longitudinal impression. Mandibles long, falcate, crossing apically, with inner subapical tooth. Face, gena, vertex, and scape with white hairs, none equalling length of scape. Antennae dark, A3 slightly exceeding A4+5, much shorter than A4+5+6. *Mesosoma:* Mesosoma structurally as in female, though pronotum with much stronger humeral angle, here forming shining vertical furrow. Mesosoma with long white hairs, none exceeding length of scape. Legs dark, apical tarsal segments lightened dark reddish-brown, pubescence whitish. Hind tarsal claws with short inner tooth. Wings hyaline, stigma and venation orange, nervulus antefurcal. *Metasoma:* Terga structurally as in female, with same colouration (Figure 4E). S8 narrow, slightly broadened apically, apically with shallow median emargination. Genital capsule compact, gonocoxae produced into narrow sharply pointed teeth, gonostyli apically broadened and spatulate, dorsal surface with golden hairs (Figure 4F). Penis valves basally broad, visible on either side of gonocoxal teeth, narrowing medially.

**Diagnosis:** *Andrena angustula* can be placed in the subgenus *Habromelissa* most clearly due to male characters, specifically the combination of long mandibles, these crossing apically (Figure 4D), clypeus yellow-marked (Figure 4B), pronotum with clear humeral angle, process of labrum protuberant (Figure 4D; c.f. subgenus *Cnemidandrena*), and genital capsule with gonocoxa clearly produced apically into sharp teeth (Figure 4F). Diagnosis of females is more challenging, as many of the characters described by Hirashima and LaBerge (Hirashima 1964) appear to be typical to the type species *A. omogensis* Hirashima, 1953 as opposed to being true subgeneric characters (e.g. the wing venation, specifically the position of the second recurrent vein which joins the third submarginal cell essentially at its apex [contrast Figures 3A, 4A], the shiny dorsolateral parts of the propodeum). Females of *A. angustula* should be recognised as *Habromelissa* by their relatively small body size, their slim appearance, pronotum with weak



humeral angle, foveae occupying more than half of space between lateral ocellus and compound eye (Figure 3C), foveae not extending ventrally below the level of the antennal insertions, clypeus slightly domed (Figure 3B), and terga partly red-marked (Figure 3F).

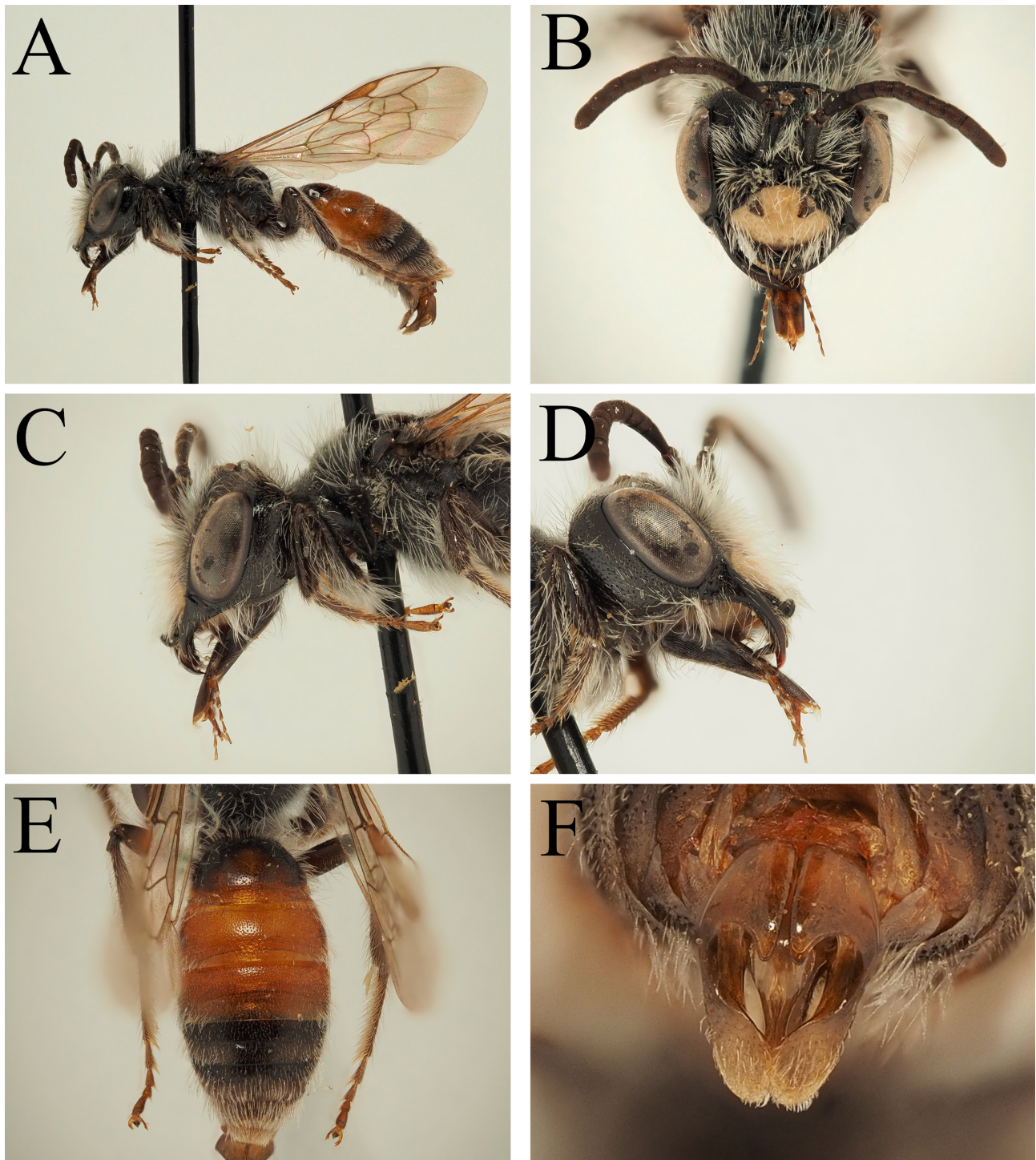


**FIGURE 3.** *Andrena (Habromelissa) angustula* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Head, dorsal view, D. Scutum, dorsolateral view, E. Propodeum, dorsal view, F. Terga, dorsal view.

This group of bees is poorly studied, with only four species known from China, Taiwan, and Japan (Table 1), three species of which are known only from the type series. The subgenus is unusual in that species mostly emerge in the autumn, a behaviour that is rare within Old World *Andrena*. Species diagnosis is challenging because only the female is known for *A. qinhaiensis* Xu, 1994 and only the male is known for *A. batangensis* Xu, 1994 and *A. nantouensis* Dubitzky, 2006. Female *A. angustula* can be separated from *A. qinhaiensis* by the dark hind tibiae



(versus orange hind tibiae), the dull clypeus (versus shiny clypeus), ocelloccipital distance subequal to diameter of lateral ocellus (versus ocelloccipital distance equalling 0.5 times diameter of lateral ocellus), clypeus microreticulate and dull (versus clypeus smooth and shining), and foveae filled with light brown hairs (versus foveae filled with dark brown hairs). Apart from the non-overlapping distributions, they can be separated from the Japanese endemic *A. omogensis* by the position of the second recurrent cross vein which connects to the third submarginal cell well before its apex (versus second recurrent cross vein meeting the third submarginal cell at or immediately before its apex) and the clypeus which is shagreened over the majority of its area, becoming shiny only at its apex (versus clypeus smooth and shiny over almost its entire area).



**FIGURE 4.** *Andrena (Habromelissa) angustula* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Head, lateral view, D. Head, reverse lateral view, mandible and process of labrum detail, E. Terga, dorsal view, F. Genital capsule, dorsal view.

**TABLE 1.** Species currently included in the subgenus *Habromelissa* and their known distributions.

Species	Distribution	Source
<i>Andrena batangensis</i> Xu, 1994	China (Sichuan)	Xu (1994)
<i>Andrena nantouensis</i> Dubitzky, 2006	Taiwan	Dubitzky (2006)
<i>Andrena omogensis</i> Hirashima, 1953	Japan	Dubitzky (2006); Ascher & Pickering (2020)
<i>Andrena qinhaiensis</i> Xu, 1994	China (Gansu*, Qinghai)	Xu (1994); current publication

*Andrena angustula* males can be separated from *A. batangensis* as the clypeus is clearly punctate (Figure 4B) and finely shagreened (clypeus impunctate and smooth and shining in *A. batangensis*) and the scutum is smooth and shiny (versus scutum with interspaces shagreened, weakly shiny). *Andrena angustula* males can be separated from *A. omogensis* by the broad gena that is clearly broader than the width of the compound eye (Figures 4C, 4D), the surface shiny and clearly punctate (gena clearly narrower than the width of the compound eye, the surface shagreened and dull in *A. omogensis*). *Andrena omogensis* is also currently known only from Japan. *Andrena angustula* males can be immediately separated from *A. nantouensis* by the red-marked terga (uniformly black-brown in *A. nantouensis*) but also by the different genital capsule with short and narrow pointed gonocoxal teeth (gonocoxal teeth elongate, with broad bases, obscuring the base of the penis valves in dorsal view in *A. nantouensis*). *Andrena nantouensis* is also restricted to the island of Taiwan (Dubitzky 2006).

**Etymology:** Feminine form of the Latin adjective *angustus* meaning narrow, with the addition of the diminutive suffix to signify both small and narrow in reference to its body shape.

**Distribution:** Mongolia.

**Comparative material examined.** *Andrena qinhaiensis*: **CHINA:** Kansu mer. [Gansu], Xiahe Labrang [Labrang Monastery], 1–15.vi.1998, 1♀, leg. V. Major, OÖLM.

### *Andrena (Hoplandrena) cephalgia* spec. nov.

**HOLOTYPE: TAJIKISTAN:** Surchobtal [Surkhob valley = Vakhsh], Djiragatal [Dzhergatol, =Vahdat], 39.3508°N, 71.1402°E, 2500 m, 14.vi.1990, 1♂, leg. J. Halada, OÖLM.

**PARATYPES: KAZAKHSTAN:** Almaty reg., Talgar, MT [Malaise Trap], 43.2906°N, 77.3062°E, 7–21.v.2013, 39♂, 10♀, leg. Barták, TJWC/OÖLM; Kazstroy [Kazhtroy, Almaty], 1240 m, MT [Malaise Trap], 21.v–30.viii.2013, 12♂, 6♀, leg. O. Nakládál, SBC; **KYRGYZSTAN:** ~25 km SSE Kara-Balta town, 1600 m, 27–28.v.1995, 1♂, leg. D. Milko, OÖLM; Frunze [Bishkek], 50 km S, Alla Arča [Ala Archa National Park], 7.vii.1981, 1♂, 1♀, leg. Kocourek, OÖLM; Jalal Abad, Arkit env., 1700–1920 m, 8.vi.2019, 5♀, leg. J. & L. Halada, OÖLM; Naryn, Distr. Naryn, Naryn Too, Salkyn-Tor NP, 2400–2500 m, 12–13.vi.2008, 2♂, leg. H. & R. Rausch, OÖLM; pr. Talash, Orto-Too Mt, Cheleke env., 1800 m, 31.v.2019, 1♂, 2♀, leg. J. & L. Halada, OÖLM; prov. Osh, Chauvay-Chay river, 1540 m, 4.vi.2019, 2♀, leg. J. & L. Halada, OÖLM; Tien-Shan [Tian-Shan], S. slope, Nyldy Rav [Tash-Tyube], 1900 m, 11.vi.1996, 1♂, 1♀, leg. D. Milko, OÖLM; Ysyk-Kol [Issyk Kul], Jeti-Oguz env., 1870 m, 12.vi.2019, 1♀, leg. J. & L. Halada, OÖLM; Ak-Suu riv., Tezskay Alatau Mt. Teplokjuchenka vill. [Teploklyuchenka], 1–30.vi.1999, 1♂, leg. V. Gurko, OÖLM; **TAJIKISTAN:** Dušambe [Dushanbe], 40 km N, Varzob, 23.vi.1981, 2♀, leg. Kocourek, OÖLM; Surchobtal [Surkhob valley = Vakhsh], Djiragatal [Dzhergatol, =Vahdat], 2500 m, 14.vi.1990, 2♂, leg. J. Halada, OÖLM.

**Description: Female:** Body length: 15–16 mm (Figure 5A). **Head:** Dark, 1.2 times wider than long (Figure 5B). Clypeus weakly domed, shallowly punctured, punctures separated by 1–2 puncture diameters, denser laterally, becoming weaker apically; underlying surface shagreened and dull laterally, becoming smooth and shining apically. Process of labrum weakly trapezoidal, twice as wide as long, apical margin very shallowly emarginate. Gena exceeding width of compound eye; ocelloccipital distance equalling 1 diameter of lateral ocellus. Foveae dorsally broad, occupying almost entire space between lateral ocellus and compound eye, slightly narrowed ventrally at level of antennal insertions; ventrally filled with whitish hairs, becoming dark brown in dorsal half. Face, gena, vertex, and scape with long whitish to light brownish hairs, none equalling length of scape, frons and area around ocellar triangle with some intermixed black hairs. Antennae basally dark, A5–12 becoming progressively more extensively lightened orange ventrally, A9–12 extensively orange ventrally; A3 exceeding A4+5, shorter than A4+5+6. **Mesosoma:** Scutum and scutellum densely microreticulate, completely dull, with shallow but obscure



punctures disappearing into microreticulation, punctures separated by 0.5–2 puncture diameters. Pronotum with humeral angle. Mesepisternum and dorsolateral parts of propodeum microreticulate, with obscure narrow punctures, punctures separated by 1–2 puncture diameters; propodeal triangle long, finely granulate, impunctate, clearly differentiated from dorsolateral parts of propodeum due to change in surface sculpture (Figure 5C). Mesepisternum with long white hairs, scutum and scutellum with shorter light golden-brown hairs; propodeal corbicula complete, with anterior and dorsal fringes composed of long and very dense whitish yellow plumose hairs, internal surface with obscure simple hairs. Legs basally dark, mid basitarsi obscurely coloured dark orange, hind tibiae and tarsi lightened orange, pubescence golden-orange. Flocculus long and dense, composed of whitish plumose hairs, femoral scopa whitish, tibial scopa golden, composed of short hairs that form a tight, triangular scopa (Figure 5D). Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus interstitial. *Metasoma*: Terga dark, tergal margins lightened reddish-brown; terga microreticulate, obscurely punctate, punctures separated by 1 puncture diameter, weakly shining. Terga in fresh specimens covered with long brownish-yellow hairs that obscure underlying surface (Figure 5E). Apical fringe of T5 and hairs flanking pygidial plate golden, pygidial plate elongate triangular with clearly raised triangular area medially, with narrow depressed marginal area in apical half.

**Male:** Body length: 13–15 mm (Figure 5F). *Head:* Dark, 1.3 times wider than long (Figure 6A). Clypeus weakly domed, densely punctate, punctures separated by 0.5–1 puncture diameters, with exception of impunctate longitudinal line medially; underlying surface shagreened and dull basally and laterally, smooth and shining medially and apically. Process of labrum weakly trapezoidal, twice as wide as long, apical margin very shallowly emarginate. Size of male head strongly variable (see Remarks); gena strongly broadened, 1.5–2.5 times wider than width of compound eye (Figures 6B–D); ocelloccipital distance equalling 1–2 times diameter of lateral ocellus. Face, gena, vertex, and scape with long light brownish hairs, some exceeding length of scape, with scattered darker hairs along inner margin of compound eye and around antennal insertions. Antennae basally dark, A4–13 lightened ventrally by presence of greyish scales; A3 exceeding A4, slightly shorter than A4+5. *Mesosoma*: Mesosoma structurally as in female with exception of pronotum with strongly pronounced humeral angle, with deep vertical furrow, surface of furrow more or less polished and shining. Mesosoma covered in long golden-brownish hairs, many exceeding length of scape. All tarsi and hind tibiae lightened orange, pubescence whitish; hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation orange, nervulus interstitial. *Metasoma*: Terga dark, marginal areas with narrow rim lightened yellow-hyaline; terga very finely shagreened, shining, finely and regularly punctate, punctures separated by 1–2 puncture diameters (Figure 6E). T1 and base of T2 with long, erect golden-brown hairs, remaining part of T2 and T3–5 covered with short and fine golden hair, underlying cuticle visible. S8 narrow, apically truncate, entirely covered ventrally with short and dense golden hairs. Genital capsule more or less elongate triangular, gonocoxae strongly produced into apically projecting teeth, gonostyli broadened and flattened apically, with strong raised internal margin basally; gonostyli with strong apical hair tuft at apex of inner margin (Figure 6F). Penis valves with laterally-projecting hyaline extensions basally, with broadened valve medially, penis valves gradually narrowing apically.

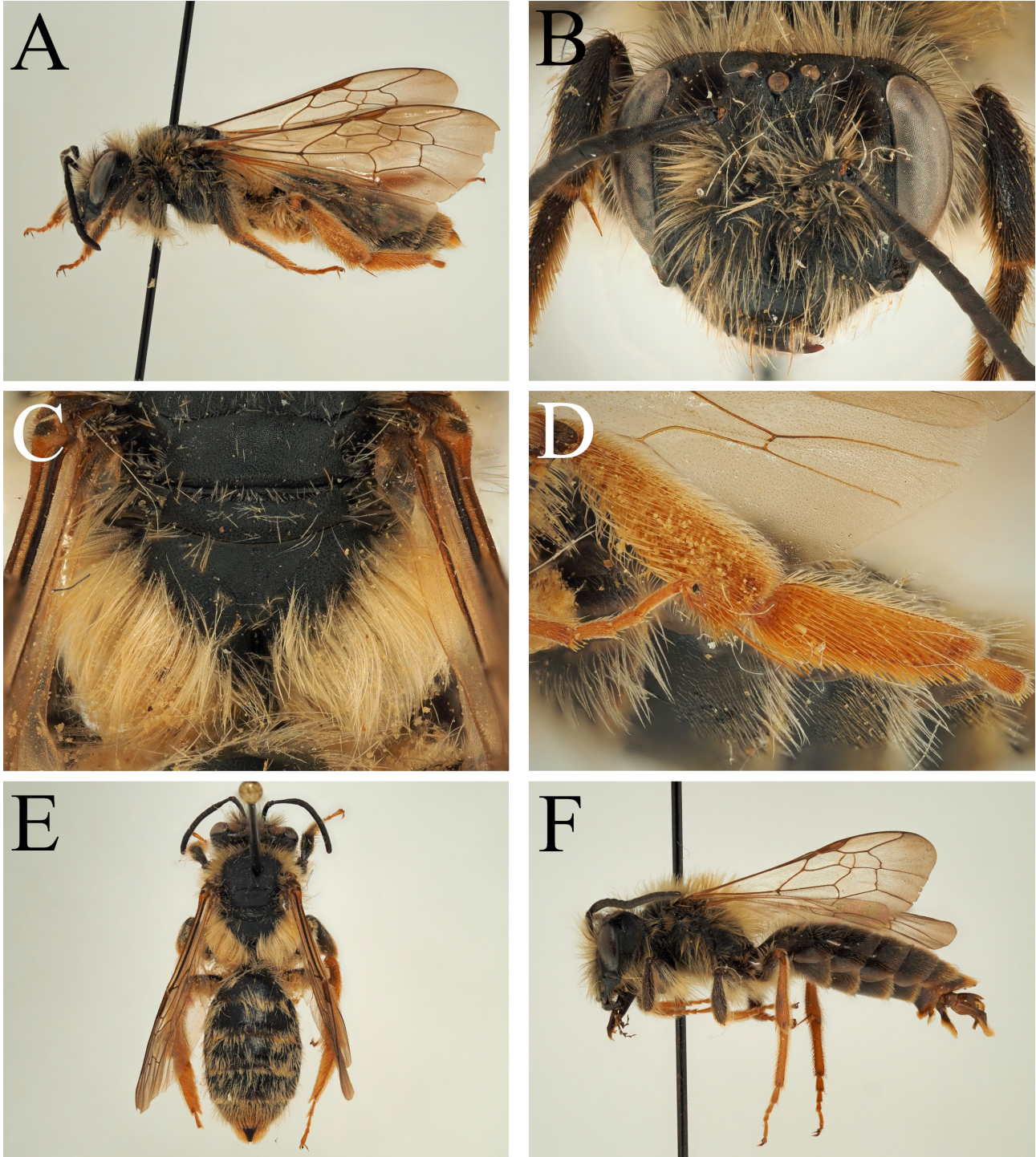
**Diagnosis:** *Andrena cephalgia* can be recognised as a *Hoplandrena* due to the elongate A3 of the female (Figure 5B, exceeding length of A4+5), the broad facial foveae, occupying almost the entire space between the lateral ocellus and the compound eye, the male mandibles long and falcate, strongly crossing apically (Figure 6A), the broad male gena (Figures 6C–D, exceeding width of compound eye), the long A3 of the male (Figures 6C–D, exceeding length of A4; note that in several species of *Hoplandrena* A3 is much shorter than A4), and the humeral angle of the pronotum (very strongly pronounced in the male). The female is somewhat atypical for a *Hoplandrena* because the flocculus is moderately developed (normally composed of only short and weak hairs), the clypeus is comparatively weakly and sparsely punctate, and the dorsolateral parts of the propodeum lack shallow but clear punctures that contrast with the impunctate propodeal triangle (Figure 5C). However, the male morphology clearly places this taxon in the subgenus *Hoplandrena*.

This Palaearctic subgenus contains 23 species (Gusenleitner & Schwarz 2002; Xu & Tadauchi 2005; Osytshnjuk *et al.* 2008), when excluding *A. grozdanici* Osytshnjuk, 1975 which belongs to the subgenus *Hamandrena* (see Dubitzky *et al.* 2010; the species status of *A. grozdanici* is also unclear and it may be a synonym of *A. nasuta* Giraud, 1863) and also *A. schoenitzeri* Gusenleitner, 1998 which was found to be a synonym of *A. rosae* Panzer, 1801 (see below). Only four species have been reported from Central Asia: *A. clusia* Warncke, 1965, *A. mordax* Morawitz, 1876, *A. rosae* Panzer, 1801, and *A. trimmerana* (Kirby, 1802) (Osytsnjuk *et al.* 2008).

The female of *A. cephalgia* can be identified because of its unusual characters for a *Hoplandrena*, specifically

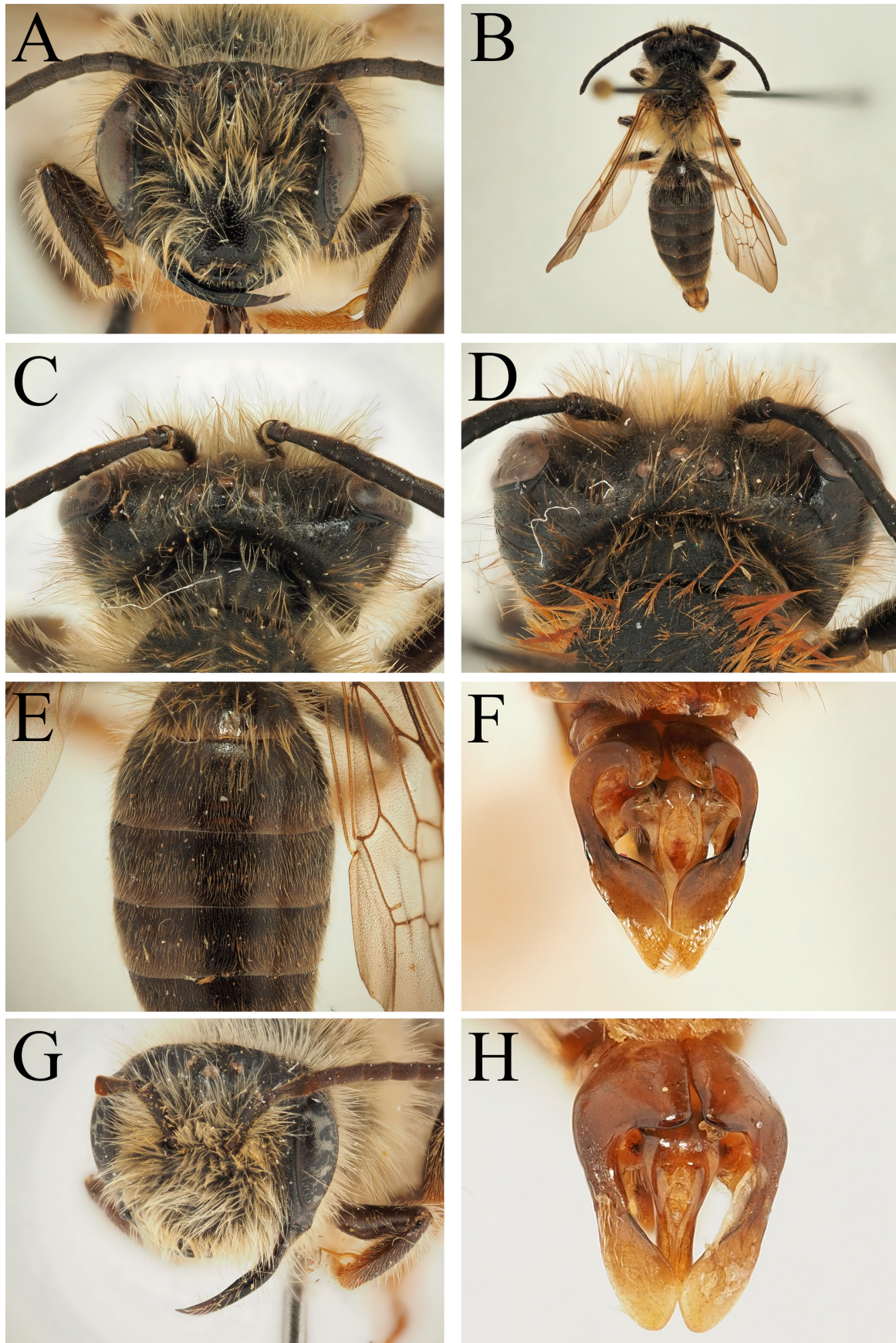


the long and relatively dense flocculus, the sparsely punctate clypeus with punctures separated by 1–2 puncture diameters (normally densely punctate with punctures separated by 0.5–1 puncture diameters), the weakly punctate dorsolateral parts of the propodeum (Figure 5C). In addition, the propodeal corbicula is also complete, with an anterior as well as dorsal fringe; this character is unknown in West Palaearctic *Hoplandrena* species. The tibial scopa is also composed of very short hairs (Figure 5D), similar to the situation in *Tarsandrena* and some *Truncandrena*, whereas it is normally composed of longer and looser hairs in *Hoplandrena*. This combination of characters therefore makes it unique within the *Hoplandrena*.



**FIGURE 5.** *Andrena (Hoplandrena) cephalgia* **spec. nov.** A. Female Habitus, lateral view, B. Female face, frontal view, C. Female propodeum, dorsal view, D. Female tibial scopa, lateral view, E. Female dorsum, F. Male habitus, lateral view.





**FIGURE 6.** *Andrena (Hoplandrena) cephalgia* **spec. nov.** male. A. Face, frontal view, B. Dorsum, C. Male head, small variation, dorsal view, D. Male head, large variation, dorsal view, E. Terga, dorsal view, F. Genital capsule, dorsal view. *Andrena (Hoplandrena) schuberthi* Gusenleitner, 1998 male. G. Face, frontal view, H. Genital capsule, dorsal view.



The male of *A. cephalgia* can be recognised because A3 is clearly longer than A4 (A3 clearly shorter than A4 in *A. rosae* and *A. trimmerana*), the body is covered with light hairs, with entirely light hairs on the face, and the genital capsule is distinct, with the penis valves possessing hyaline lateral extensions (Figure 6F) and the gonostyli are produced into apical points with a clear tuft of hairs on their inner apical margin (in *A. clusia* and *A. mordax* with extensive black hairs on the face, genital capsules otherwise, lacking lateral hyaline extensions to the penis valves, gonostyli without apical hair tufts, see Astafurova *et al.* 2022). The male is similar to *A. schuberthi* Gusenleitner, 1998 from eastern Turkey (Hakkâri) and newly reported from Iran (see below) because of the long A3 which exceeds the length of A4 (Figure 6G) and the pale pubescence of the body. However, *A. cephalgia* can be separated by its mandible with an inner subapical tooth (unidentate in *A. schuberthi*; Figure 6G) and by the complex genital capsule with 1) strongly produced gonocoxal teeth, 2) penis valves with laterally projecting hyaline extensions, 3) apically strongly flattened gonostyli with rounded lamellate inner margin, and 4) gonostyli apically with apical tuft of hairs on its inner margin (*A. schuberthi* with gonocoxae apically rounded, penis valves without lateral extensions, gonostyli not noticeably flattened, lacking any hair tufts on their inner margins; Figure 6H).

**Remarks.** The size of the male head is highly variable, with the ocelloccipital distance varying from 1 to 2 times the diameter of the lateral ocellus and the genal width varying from 1.5 to 2.5 times the width of the compound eye (Figures 6C–D). Such variation has been reported from males of other *Hoplandrena* species, and it may be related to mating structure and inter-male competition for species that nest in aggregations and mate within the nest (Paxton & Tengö 1994; Paxton *et al.* 1996).

**Etymology:** Deriving from the Greek *cephalus* (head) and *algos* (pain), therefore meaning head-pain, in reference to the often grossly expanded head of the male. It is a noun in apposition.

**Distribution:** Southern Kazakhstan, Kyrgyzstan, Tajikistan, typically at altitudes of 1500–2500 m.

**Comparative material examined.** *Andrena schuberthi*: **IRAN:** 20 km NW Neyriz/Fars Steppe, 1550 m, 18.v.1978, 1♀, leg. M. Kraus, OÖLM; **TURKEY:** Hakkâri, 18 km NW Yüksekova, 1800 m, 13.vi.1981, 1♀, leg. K. Warncke, OÖLM (holotype); Hakkâri, 18 km NW Yüksekova, 1800 m, 13.vi.1981, 1♂, 5♀, leg. K. Warncke & M. Kraus, OÖLM (paratypes); Hakkâri, S. Veregös/Mt. Sat, 2000 m, 17.vi.1984, 4♀, leg. K. Warncke, OÖLM; Hakkâri, Suvari Halil-Pass, 2300 m, 14.vi.1981, 9♂, 5♀, leg. K. Warncke & M. Kraus, OÖLM (paratypes).

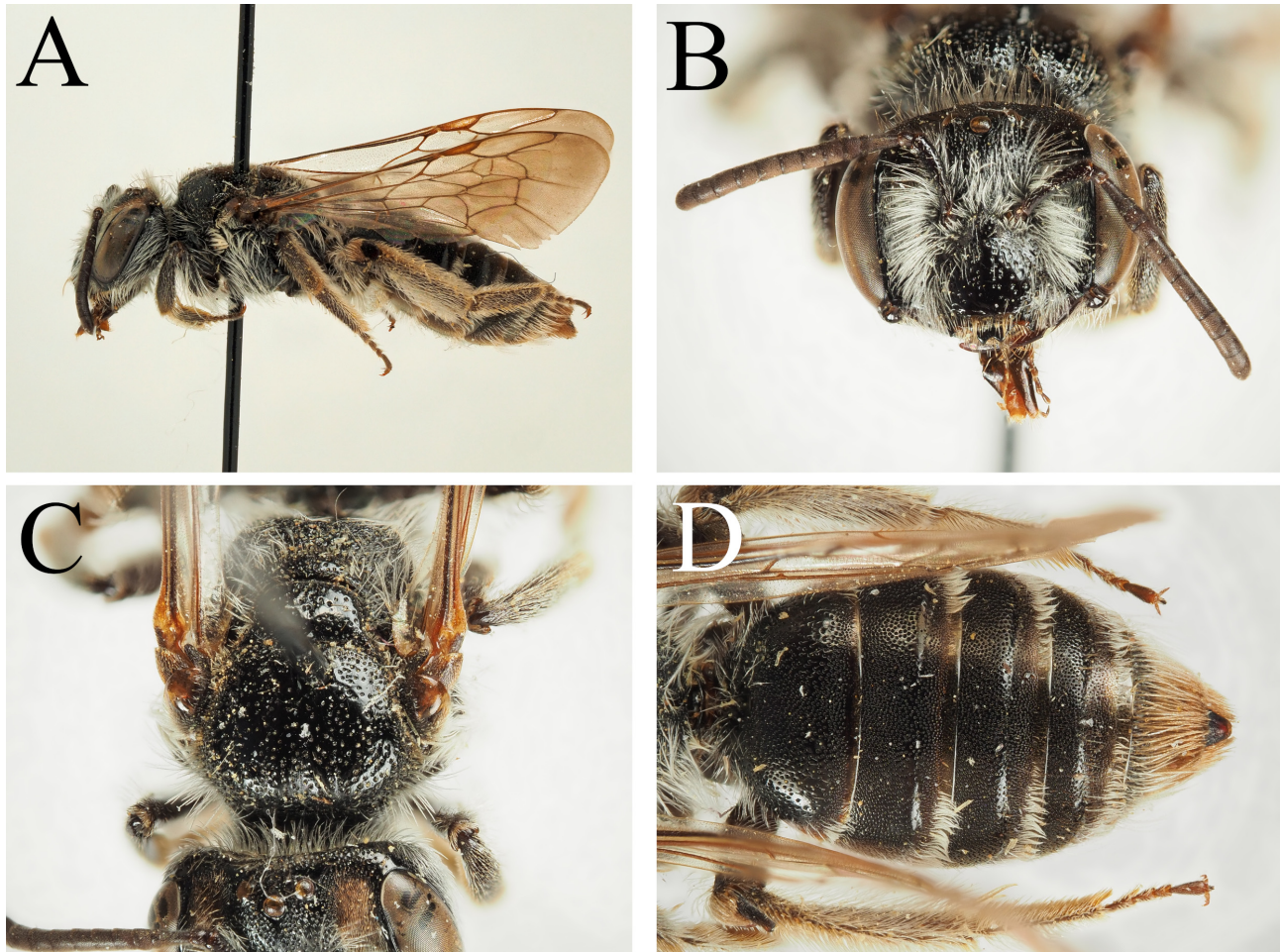
### *Andrena (incertae sedis) colatorium spec. nov.*

**HOLOTYPE: TURKEY:** İslahiye [İslahiye, 37.0246°N, 36.6228°E], 27.v.1996, 1♀, leg. Ma. Halada, OÖLM.

**PARATYPES: TURKEY:** İslahiye [İslahiye], 27.v.1996, 25♀, leg. Ma. Halada, OÖLM/TJWC; Eskişehir, Sakari İlica, near Gümele, 6–9.vii.1997, 1♀, leg. P. Průdek & M. Riha, OÖLM; 40 km E Midyat/Mardin, 900 m, 25.v.1983, 1♀, leg. OÖLM.

**Description: Female:** Body length: 10–11 mm (Figure 7A). **Head:** Dark, 1.4 times wider than long (Figure 7B). Clypeus weakly domed, coarsely and irregularly punctate, punctures separated by <0.5–4 puncture diameters; clypeus medially with raised impunctate longitudinal midline; underlying surface smooth and shining. Process of labrum trapezoidal, twice as wide as long, apical margin strongly and deeply emarginate. Gena slightly exceeding width of compound eye; ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Foveae dorsally occupying two thirds of space between lateral ocellus and compound eye, ventrally extending well below antennal insertions; ventral two thirds filled with whitish hairs, dorsal one third filled with dark brown hairs. Face, gena, vertex, and scape with moderately long white hairs. Antennae basally dark, A4–12 ventrally covered with brownish-greyish scales; A3 slightly exceeding A4+5, shorter than A4+5+6. **Mesosoma:** Scutum and scutellum coarsely and irregularly punctate, punctures separated by 1–3 puncture diameters, underlying surface essentially smooth and shining but with very fine and subtle shagreenation (Figure 7C). Pronotum with humeral angle. Mesepisternum smooth and shining, covered with numerous large punctures, punctures separated by 0.5–2 puncture diameters. Dorsolateral parts of propodeum with surface microreticulate, underlying microreticulation overlain by fine network of raised reticulation; propodeal triangle defined laterally by weak carinae, internal surface covered by dense network of clearly raised rugosity. Mesepisternum with long white hairs, none equalling length of scape; scutum and scutellum with extremely short and scattered fine white hairs; propodeal corbicula incomplete, dorsal fringe composed of long whitish plumose hairs, internal surface with long white simple hairs. Legs dark, apical tarsal segments lightened dark reddish, pubescence whitish. Flocculus white, short and dense, femoral and tibial scopa white. Hind tarsal

claws with short inner tooth. Wings hyaline, stigma and venation orange, nervulus antefurcal. *Metasoma*: Terga dark, tergal margins slightly lightened dark brown, apical rim lightened yellow-hyaline (Figure 7D). T2–4 with tergal margins clearly depressed. Terga densely and coarsely punctate, T1 on disc with large punctures, punctures separated by <math><0.5</math> puncture diameters medially, becoming sparser laterally, here separated by up to 1 puncture diameter; punctures becoming smaller on marginal area, here separated by 0.5 puncture diameters. T2–4 with discs and marginal areas with smaller punctures equivalent to size of those on marginal area of T1, punctures separated by 0.5 puncture diameters; underlying surface finely shagreened and shining; all terga with apical rim impunctate. T1–4 with short apical hair fringes of whitish hairs, simply lateral flecks on T1, becoming progressively wider, complete on T4. Apical fringe of T5 golden brownish with long overlying whitish hairs, hairs flanking pygidial plate golden brownish; pygidial plate triangular, apical margin narrowly rounded, dorsal surface with internal surface raised medially, raised area with obscure punctures, depressed marginal areas wide, impunctate.



**FIGURE 7.** *Andrena* (incertae sedis) *colatorium* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terga, dorsal view.

**Male:** Unknown.

**Diagnosis:** *Andrena colatorium* belongs to an undescribed subgenus of *Andrena* that is best referred to as the *relata*-group that is relatively basal within *Andrena* (clade 7, Pisanty *et al.* 2022b) and members of which were previously lumped into the now defunct subgenus *Poliandrena* by Warncke due to their lack of obvious distinguishing characters. The group seems to lack any uniquely defining characters, and the exact limits of the subgenus must be robustly defined genetically, but provisionally associated females can potentially be recognised by the shape of the compact body and the shape of the clypeus, which has its apical margin slightly shorter than the apico-lateral corners of the clypeus, in frontal view the clypeus therefore forming a wide ]-shape. Direct diagnosis is best made to specific species.

*Andrena colatorium* is most similar to *A. macroptera* Warncke, 1974 (Iberia and Morocco), *A. melaleuca* Pérez, 1895 (Algeria to Egypt), and *A. melanota* Warncke, 1975 (eastern Turkey) due to the slim metasoma with relatively



coarse punctures, and more distantly related to *A. corax* Warncke, 1975 (Iberia) due to the more ovoid metasoma with finer punctures. It can be separated from all these species due to the unique structure of the clypeus which is sparsely and irregularly punctate, with a raised longitudinal impunctate ridge medially, and the underlying surface is smooth and shining (Figure 7B)—in comparison species the clypeus is regularly and densely punctate with the underlying surface shagreened and at most weakly shining. The scutum is also strongly and coarsely punctate with large shining interspaces, punctures separated by 1–3 puncture diameters (Figure 7C)—in comparison species the scutal punctures are finer and more regular, separated at most by 2 puncture diameters, underlying surface shagreened to shining. Finally, the terga are strongly and coarsely punctate, punctures on disc of T1 are noticeably larger than those on T2–4, separated by at most 1 puncture diameter (Figure 7D)—in comparison species terga either with fine punctures (*A. corax*) or with punctures on T1 not noticeably larger than those on remaining terga and usually noticeably less dense, separated by 1–2 puncture diameters.

**Etymology:** From the Latin noun *colatorium* meaning colander, as the strongly and densely punctured terga resemble this kitchen utensil. It is a noun in apposition.

**Distribution:** Turkey.

### *Andrena (incertae sedis) discordia* spec. nov.

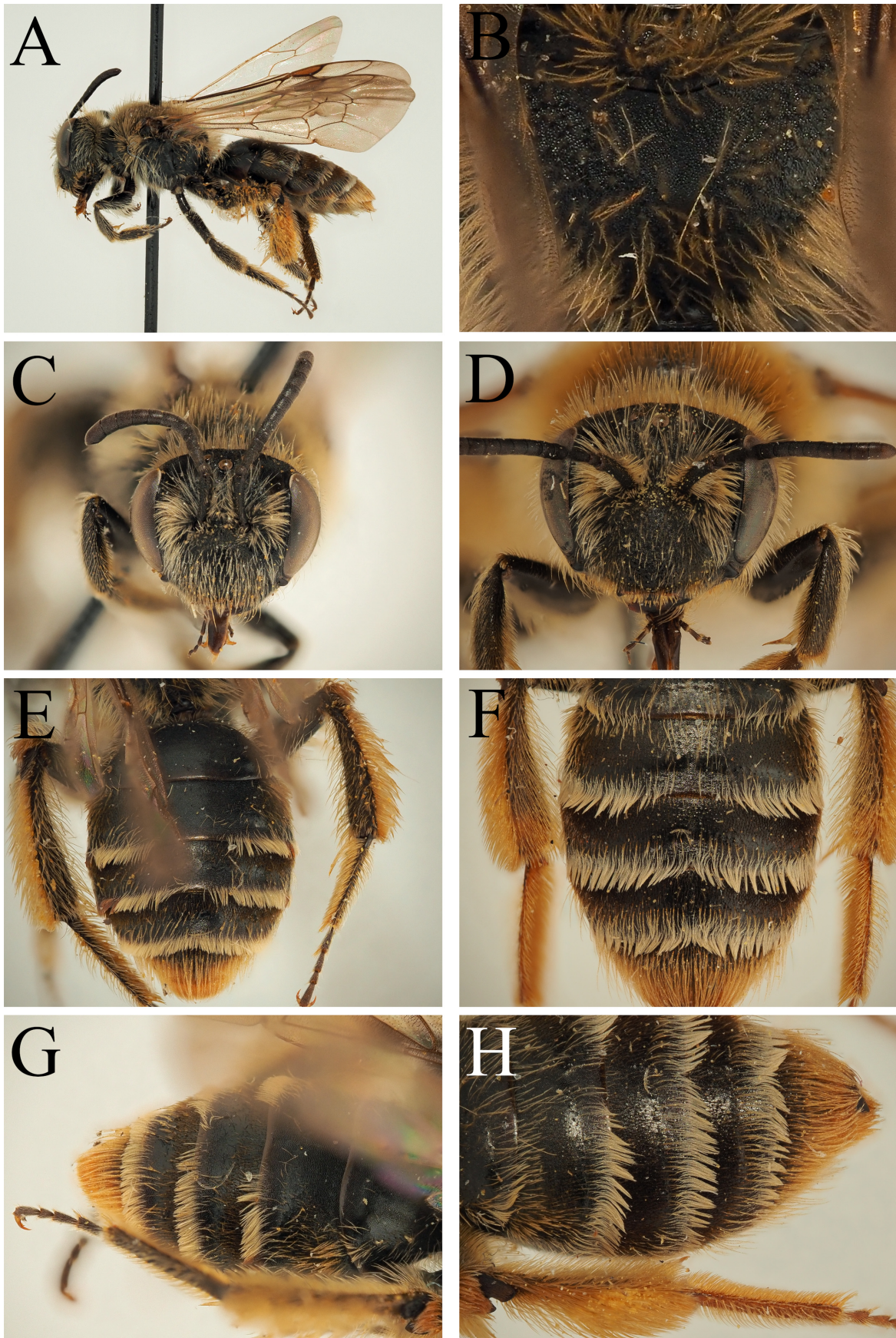
**HOLOTYPE: TURKEY:** Hakkâri, Suvari Halil-Pass, 2300 m, 37.4994°N, 43.3381°E, 14.vi.1981, 1♀, leg. K. Warncke, OÖLM.

**PARATYPES: IRAN:** Lorestan province, Dorud Lanjaban env, 960 m, 10.v.2016, 1♀, leg. M. Kafka, OÖLM; **TURKEY:** Hakkâri, Suvari Halil-Pass, 2300 m, 14.vi.1981, 2♀, leg. K. Warncke & M. Kraus, OÖLM/TJWC; Abanoz (Rte Anamur Kazenci), 1200 m, Taurus, 12–14.v.1991, 1♂, 1♀, leg. H. Teunissen, RMNH; Tanin-Tanin-Pass, 25.v.1988, 1♂, leg. K. Warncke, OÖLM; Tanin-Tanin-Pass, 2300 m, 19.v.1989, 1♂, leg. K. Warncke, OÖLM.

**Description: Female:** Body length: 8–9 mm (Figure 8A). **Head:** Dark, 1.2 times wider than long (Figure 8C). Clypeus strongly domed, surface with extremely fine network of raised circular microreticulation, thus appearing finely punctate or alveolate; this microreticulation overlaid by weakly raised carinae forming interrupted latitudinal ridges; clypeal surface appearing dull. Process of labrum narrowly trapezoidal, slightly wider than long, apically truncate. Gena equalling width of compound eye; ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Foveae narrow, dorsally occupying half distance between lateral ocellus and compound eye, ventrally narrowed in lower half, here separated from inner margin of compound eye by distance more or less equal to width; foveae filled with light brown hairs. Face, gena, vertex, and scape with whitish to light brownish hairs, lighter ventrally. Antennae dark, A3 exceeding A4, subequal to A4+5. **Mesosoma:** Scutum very densely punctate, punctures confluent to separated by 0.5 puncture diameters medially, underlying surface strongly shagreened, dull. Scutum less densely punctate, punctures separated by 1 puncture diameter, dull. Pronotum without humeral angle, evenly rounded. Mesepisternum and dorsolateral parts of propodeum microreticulate, propodeum with additional weak and sparse rugae; propodeal triangle laterally delineated by fine carinae, internal surface microreticulate, more or less without raised rugae, thus defined by change in surface sculpture (Figure 8B). Mesepisternum with whitish hairs, hairs becoming light brownish dorsally on scutum, scutellum, and propodeum. Propodeal corbicula incomplete, composed of weakly plumose light brownish hairs, internal surface with scattered long simple hairs. Legs dark, pubescence golden. Flocculus white, femoral and tibial scopae golden. Hind tarsal claws with small inner tooth. Wings hyaline, stigma and venation orange, nervulus interstitial. **Metasoma:** Terga dark, apical rim of marginal areas lightened hyaline-brown; terga finely microreticulate, weakly shining, impunctate (Figure 8E). T2–4 with dense apical whitish to brownish hairbands, more or less complete on T3–4. T2–4 laterally with light brownish to orangish pubescence, strongly contrasting whitish hairbands (Figure 8G). Apical fringe of T5 and hairs flanking pygidial plate orange, pygidial plate narrowly triangular, apically rounded, surface flat and featureless.

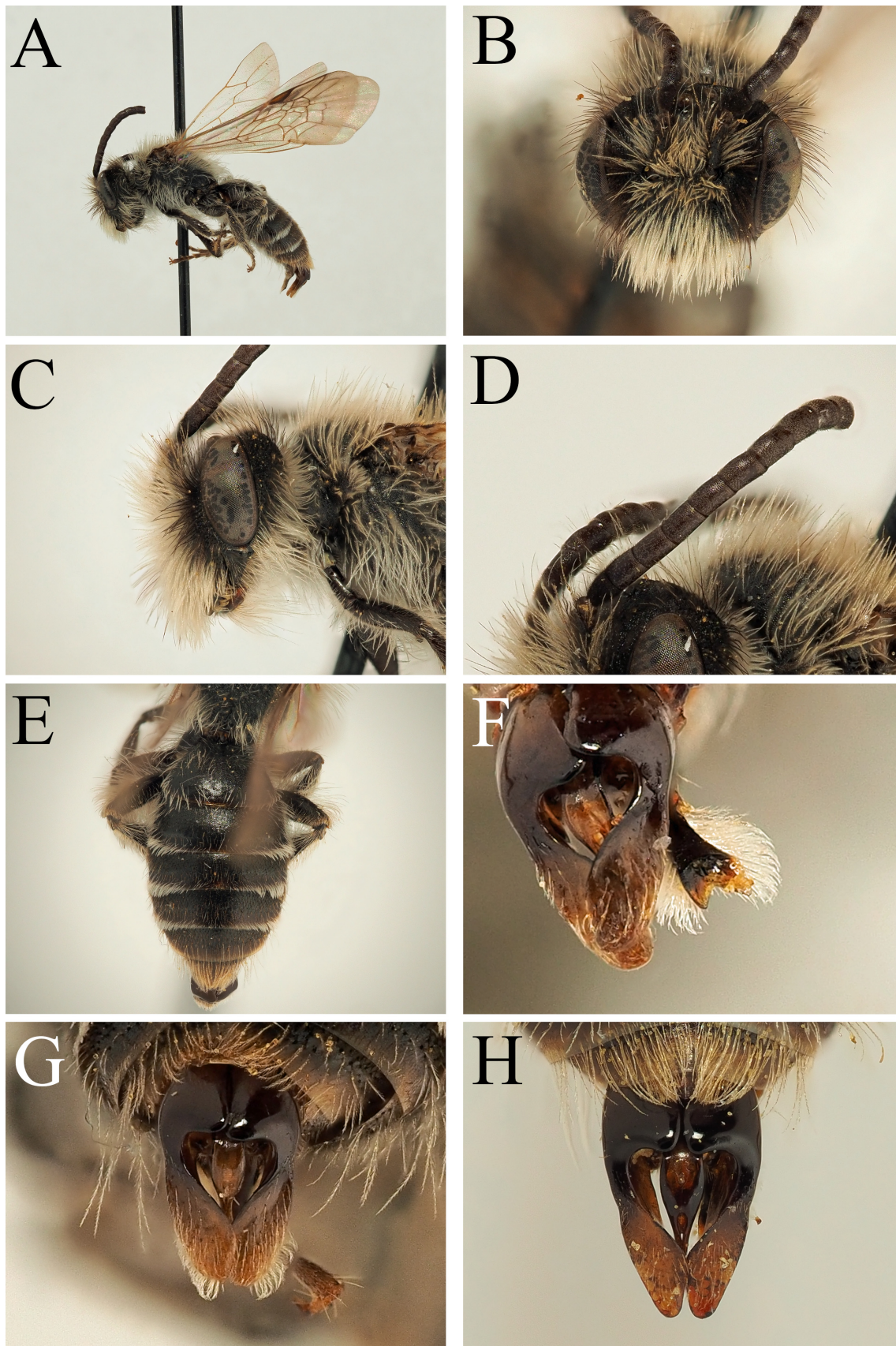
**Male:** Body length: 7–8 mm (Figure 9A). **Head:** Dark, 1.4 times wider than long (Figure 9B). Clypeus strongly domed, structurally as in female. Process of labrum trapezoidal, slightly wider than long, apically widely but shallowly emarginate. Gena slightly broader than width of compound eye; ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Face medially, gena, and vertex with long white hairs, exceeding length of scape; face laterally with extensive black hairs along inner margin of compound eye, strongly contrasting white hairs on clypeus, frons, and scape (Figure 9C). Antennae dark, A4–13 ventrally covered with silvery scales, therefore shining;





**FIGURE 8.** *Andrena* (incertae sedis) *discordia* **spec. nov.** female. A. Habitus, lateral view, B. Propodeum, dorsal view, C. Face, frontal view, E. Terga, dorsal view, G. Terga, dorsolateral view. *Andrena* (incertae sedis) *ranunculorum* Morawitz, 1877 female. D. Face, frontal view, F. Terga, dorsal view, H. Terga, dorsolateral view.





**FIGURE 9.** *Andrena* (incertae sedis) *discordia* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Face, lateral view, D. Antennae detail, E. Terga, dorsal view, F. Sternum 8, dorsal view, G. Genital capsule, dorsal view. *Andrena* (incertae sedis) *ranunculorum* Morawitz, 1877 male. H. Genital capsule, dorsal view.

A3 slightly shorter than A4 (Figure 9D). *Mesosoma*: Structurally as in female, though propodeal triangle with slightly more extensive rugae basally. Wing with nervulus weakly antefurcal. *Metasoma*: Structurally as in female with exception of tergal hairbands, these narrower and paler (Figure 9E). S8 shaped like a fishtail, strongly emarginate apically, lateral apexes pointed; ventral surface covered with long laterally projecting pale hairs (Figure 9F). Genital capsule simple, gonocoxae apically rounded, gonostyli spatulate, broadly rounded apically, penis valves narrow, narrowing apically (Figure 9G).

**Diagnosis:** Morphologically, *A. discordia* is closest to *A. ranuncolorum* Morawitz, 1877, as the male A4–13 are ventrally shiny (Figure 9D), the tergal margins occupy one third of the dorsal area with long white hair fringes in the female (Figures 8E–F), the discs of T2–4 laterally with orange brown hairs that contrast the whitish hairbands (Figures 8G–H). *Andrena ranuncolorum* is of uncertain phylogenetic placement, but probably falls into the group of species around *A. hypopolia* Schmiedeknecht, 1884 that does not belong to the true *Thysandrena* (restricted to North America) and is therefore an undescribed subgenus (Pisanty *et al.* 2022b). Female *A. discordia* can be separated from *A. ranuncolorum* by the smaller body size of 8–9 mm (versus 11–12 mm), the strongly domed but almost impunctate clypeus with weakly raised latitudinal carinae (Figures 8C–D; versus clypeus domed but with regular punctures, without latitudinal carinae), and by the foveae that narrow ventrally, their lower half separated from the inner margin of the compound eye by their own breadth (foveae not noticeably narrowed ventrally not separated from the inner margin of the compound eye by their own breadth in *A. ranuncolorum*). Males can also be separated by their smaller body size of 7–8 mm (versus 10–11 mm), their apically more rounded gonostyli (Figures 9G–H; versus gonostyli more elongate), and their deeply emarginate S8 (Figure 9F; S8 truncate in *A. ranuncolorum*).

More broadly, due to the small body size, strongly domed clypeus (Figure 8C), narrow foveae, and largely unsculptured propodeal triangle (Figure 8B), *A. discordia* is also superficially similar to the group of species around *A. seminuda* Friese, 1896. The best comparison is with *A. olympica* Grünwaldt, 2005 (which is restricted to the Peloponnese) due to the lack of long hairs that cover the terga (tergal discs with long conspicuous hairs in *A. seminuda* and *A. efeana* Scheuchl & Hazir, 2012). However, comparison of males shows no relationship, specifically as A3 is shorter than A4 (Figure 9D; A3 = A4+5 in comparison species) and the genital capsule is simple without hyaline lateral extensions on the penis valves (Figure 9G; see illustrations in Grünwaldt *et al.* 2005; Scheuchl & Hazir 2012).

**Etymology:** From the Latin noun *discordia* meaning discordant, disagreement, lack of consensus in reference to the difficulty in recognising and placing this species correctly. It is a noun in apposition.

**Distribution:** South-western and south-eastern Turkey (Taurus mountains and Hakkâri province) and western Iran (Lorestan province).

### *Andrena (incertae sedis) maharashtra spec. nov.*

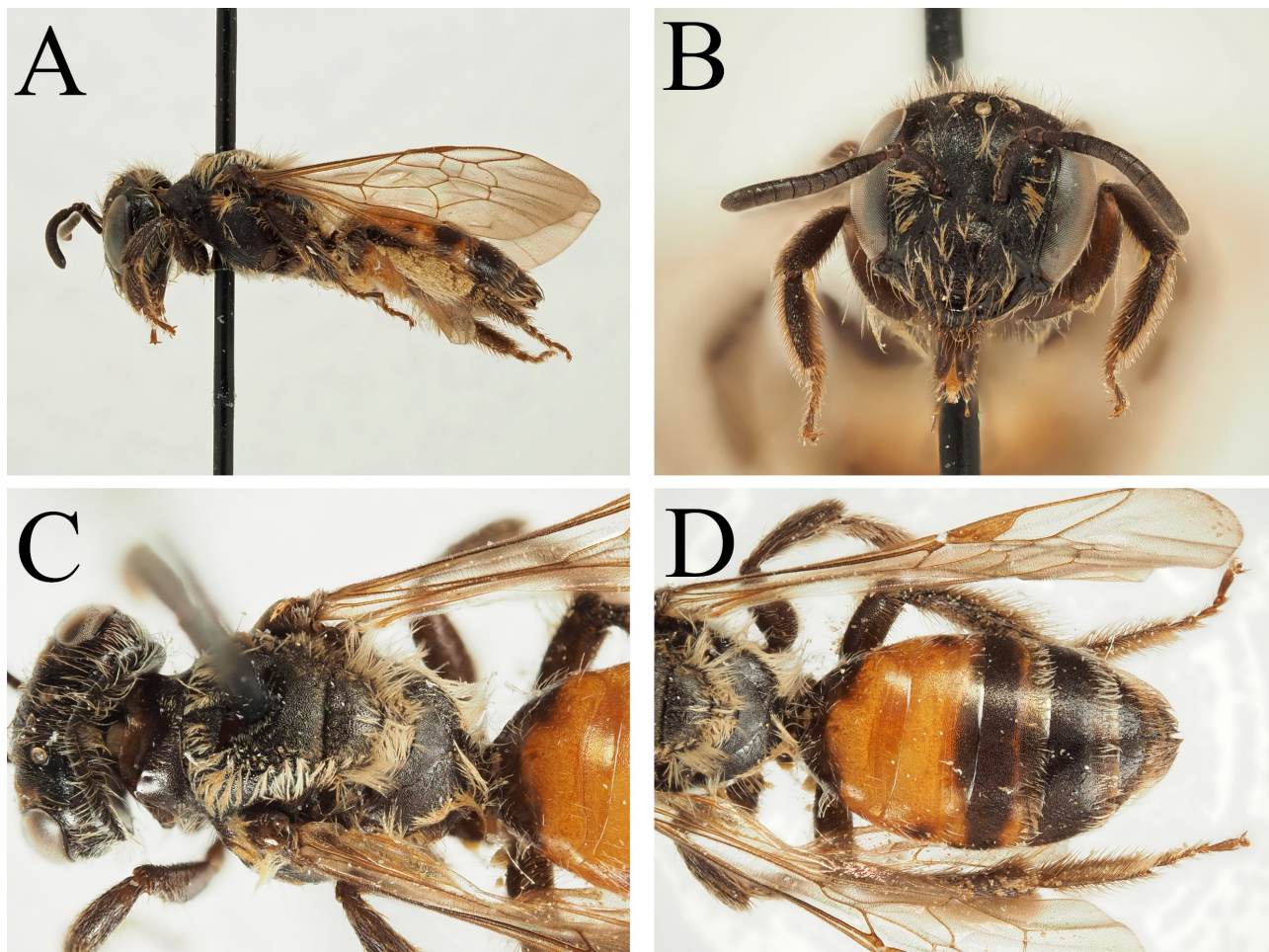
**HOLOTYPE:** INDIA: W. Maharashtra st. 70 km SSW Pune [inferred 17.9362°N, 73.6364°E], 1400 m, 30.ix.2005, 1♀, leg. J. Bezděk, OÖLM.

**PARATYPE:** INDIA: same as holotype, 1♂, leg. J. Bezděk, OÖLM.

**Description: Female:** Body length: 6 mm (Figure 10A). *Head:* Dark, 1.2 times wider than long (Figure 10B). Clypeus weakly domed in basal half, apical half with weak latitudinal impression, clypeus with irregular punctures, punctures separated by 0.5–2 puncture diameters, weak longitudinal impunctate midline present in basal half; underlying surface finely microreticulate, weakly shining. Process of labrum trapezoidal, slightly wider than long. Gena equalling width of compound eye, posterior dorsolateral margin slightly angulate, not evenly rounded, suggestive of carination; ocelloccipital distance equalling 1 diameter of lateral ocellus. Foveae dorsally occupying slightly less than half distance between lateral ocellus and compound eye, dorsal margin poorly defined, filled with brown hairs. Face, gena, vertex, and scape with short whitish to light brownish hairs. Antennae dark, A6–12 slightly lightened ventrally by presence of greyish scales; A3 = A4+5. *Mesosoma:* Scutum and scutellum very densely and regularly punctate, punctures separated by 0.5 puncture diameters, interspaces weakly shining (Figure 10C). Pronotum with humeral angle. Mesepisternum and dorsolateral parts of propodeum with fine granular shagreen; propodeal triangle broad, laterally delineated by fine low carinae, internal surface with slightly coarser granular shagreen, thus contrasting dorsolateral parts of propodeum. Mesepisternum, scutum, and scutellum with light brownish-yellowish hairs, propodeal corbicula incomplete, dorsal fringe composed of whitish weakly plumose hairs, internal surface with numerous short pale simple hairs. Legs dark. Flocculus weak, flocculus and femoral



scopa white, tibial scopa dorsally dark brown, ventrally white; remaining pubescence of legs dark brown. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus interstitial. *Metasoma*: Terga with red markings on disc and marginal area of T1, on T2 entirely with exception of lateral dark spots, T3 narrowly on area between disc and marginal area, remaining terga black; apical rim of marginal areas lightened hyaline-yellow (Figure 10D). Terga microreticulate, weakly shining, with numerous but obscure and shallow punctures, punctures separated by 1–2 puncture diameters. T3–4 with weak whitish hair fringes covering length of marginal areas, not obscuring underlying surface. Apical fringe of T5 and hairs flanking pygidial plate dark brown, pygidial plate rounded triangular, dorsal surface medially with dense punctures.

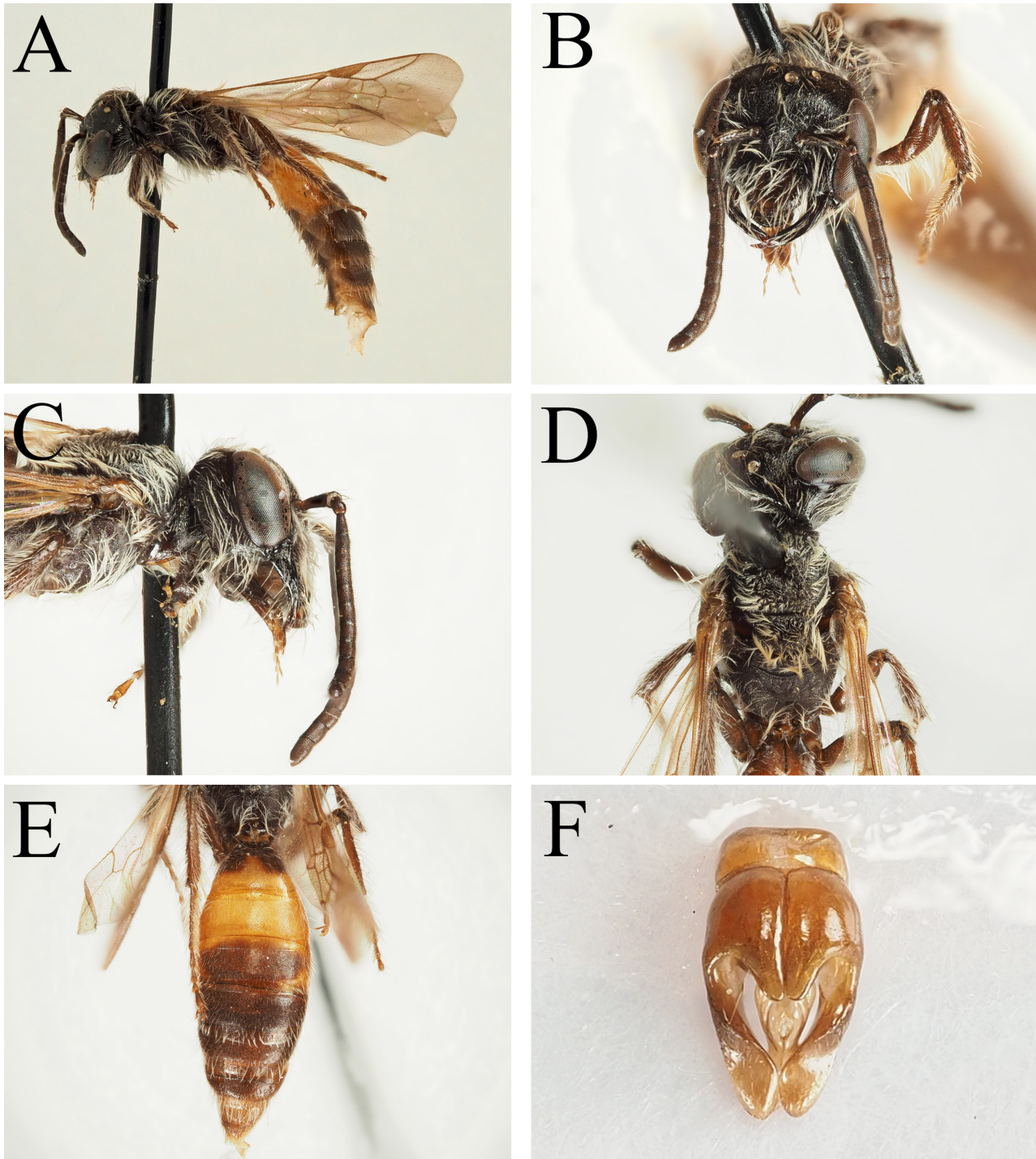


**FIGURE 10.** *Andrena* (incertae sedis) *maharashtra* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsolateral view, D. Terga, dorsal view.

**Male:** Body length: 6 mm (Figure 11A). *Head:* Dark, 1.3 times wider than long (Figure 11B). Clypeus basally slightly domed, apical two thirds depressed and more or less latitudinally flattened, irregularly and sparsely punctate, punctures separated by 1–4 puncture diameters, apico-medially more or less impunctate; underlying surface superficially shagreened, more or less shining. Process of labrum short, rectangular, twice as wide as long. Gena broader than width of compound eye, rectangular, posterior margin carinae, dorsal and ventral corners produced into clear angles (Figure 11C); ocelloccipital distance equalling 1 diameter of lateral ocellus. Face, gena, vertex, and scape with short whitish hairs. Antennae dark, A3 slightly shorter than A4+5, A4 quadrate, shorter than A5. *Mesosoma:* Mesosoma structurally as in female (Figure 11D), with exception of pronotum with strongly pronounced humeral angle, with deep vertical furrow, internal surface more or less polished and shining. Mesosoma with moderately long whitish to light brownish hairs, none equalling length of scape. Legs dark, apical tarsal segments lightened reddish-brown, pubescence whitish. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus weakly antefurcal. *Metasoma:* T2, apical part of disc of T1 and marginal area of T1 orange; remaining terga mostly dark; apical rim of marginal areas lightened hyaline-yellow (Figure 11E). Terga microreticulate, weakly shining, with occasional but obscure and scattered punctures disappearing into microreticulation. T4–5 with weak



white apical hair fringes. S8 narrow, columnar, apically truncate, ventral surface with sparse short whitish hairs. Genital capsule somewhat elongate, gonocoxae produced into strong long and apically rounded teeth, gonostyli narrow, broadening apically, spatulate (Figure 11F). Penis valves basally moderately broad, occupying half space between gonostyli, apically narrowing.

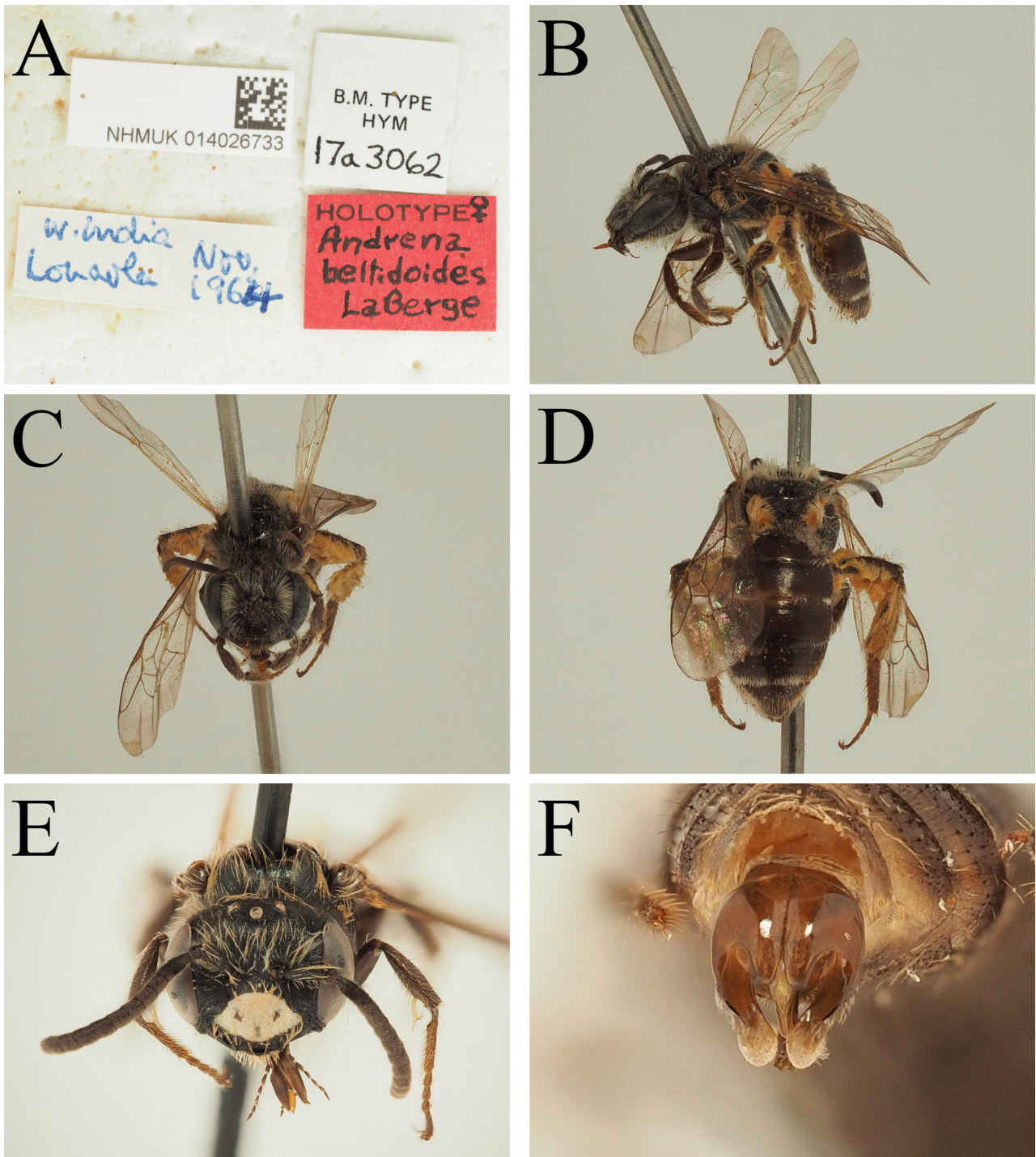


**FIGURE 11.** *Andrena (incertae sedis) maharashtra* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Head, lateral view, D. Scutum, dorsal view, E. Terga, dorsal view, F. Genital capsule, dorsal view.

**Diagnosis:** *Andrena maharashtra* could potentially be placed in the subgenus *Notandrena* as the pronotum has a humeral angle (stronger in the male), the male gena is broader than the width of the compound eye and carinate (Figure 11C), and the genital capsule is similar with penis valves that clearly narrow apically (Figure 11F). However, the head is only slightly wider than long (Figures 10B, 11B; almost always wider than long in true *Notandrena*), the propodeal triangle is broad and granularly shagreened (Figures 10C–D), the fore margin of the male clypeus is



not upturned, and the terga are red-marked (Figures 10D, 11E) and with only obscure punctures (normally clearly punctate). Some species placed in an expanded *Notandrena* (including the former subgenus *Carandrena*, see Pisanty *et al.* 2022b) actually fall elsewhere, probably including many of the Central Asian species formerly placed in the subgenus *Carandrena* (Osytshnjuk *et al.* 2005; Pisanty *et al.* 2022b; Wood & Monfared 2022). Therefore, no firm position is taken on the phylogenetic placement of *A. maharashtra* at this time.



**FIGURE 12.** *Andrena (Notandrena) bellidoides* LaBerge, 1967 holotype female. A. Label details, B. Habitus, lateral view, C. Face, frontal view, D. Terga, dorsal view. Non-type male. E. Face, frontal view, F. Genital capsule, dorsal view.

India has low *Andrena* diversity, and *A. maharashtra* is comparable to only one other species from subcontinental Asia that is also known from the Western Ghats, *A. bellidoides* LaBerge, 1967 (Figures 12A–F) that is currently placed in the *Notandrena*. Both species are small bodied and have similar characteristics such as the humeral angle and broad and granularly shagreened propodeal triangle. However, they are easily separated. Female *A. maharashtra*

have the scutellum extremely densely and evenly punctate (Figure 10C), punctures separated by 0.5 puncture diameters (*A. bellidoides* with scutum with occasional scattered punctures, surface smooth and shining), the scutum is entirely dark (versus scutum with weak greenish metallic reflections), T1–2 are red-marked (versus T1–2 dark), tibial scopa bicoloured, dark dorsally and white ventrally (versus tibial scopa unicolourous white), and the process of the labrum is trapezoidal, slightly wider than long (versus process of the labrum short and wide, 3 times wider than long). Male *A. maharashtra* can be separated by the dark clypeus (*A. bellidoides* with white-marked clypeus, Figure 12E), by the genital capsule with the outer margin of the gonostyli straight (versus with outer margin of the gonostyli displaying clear emargination, Figure 12F), by the scutellum which is extremely densely and evenly punctate, punctures separated by 0.5 puncture diameters (Figure 11D; versus scutum with occasional scattered punctures, surface smooth and shining), by the entirely dark scutum (versus scutum with weak greenish metallic reflections, Figure 12E), and by the broadened and carinate gena (versus gena broadened but posterior margin rounded, not carinate).

**Etymology:** Named after the state of Maharashtra in western India. It is a noun in apposition.

**Distribution:** Western India (Western Ghats).

**Comparative material examined.** *Andrena bellidoides*: **INDIA:** W. India, Lonavala, 1–30.xi.1964, 1♀, NHMUK (holotype, Figures 12A–D); W. Ghats, Lonavala, 1.i.1967, 2♀, OÖLM; W. Maharashtra st. 70 km SSW Pune, 1400 m, 30.ix.2005, 4♂, leg. J. Bezděk, OÖLM.

### *Andrena (incertae sedis) orichalcum spec. nov.*

**HOLOTYPE: TURKEY:** Urfa [Şanlıurfa], Ceylanpınar, 25.iv.1976, 1♀, leg. K. Warncke, OÖLM.

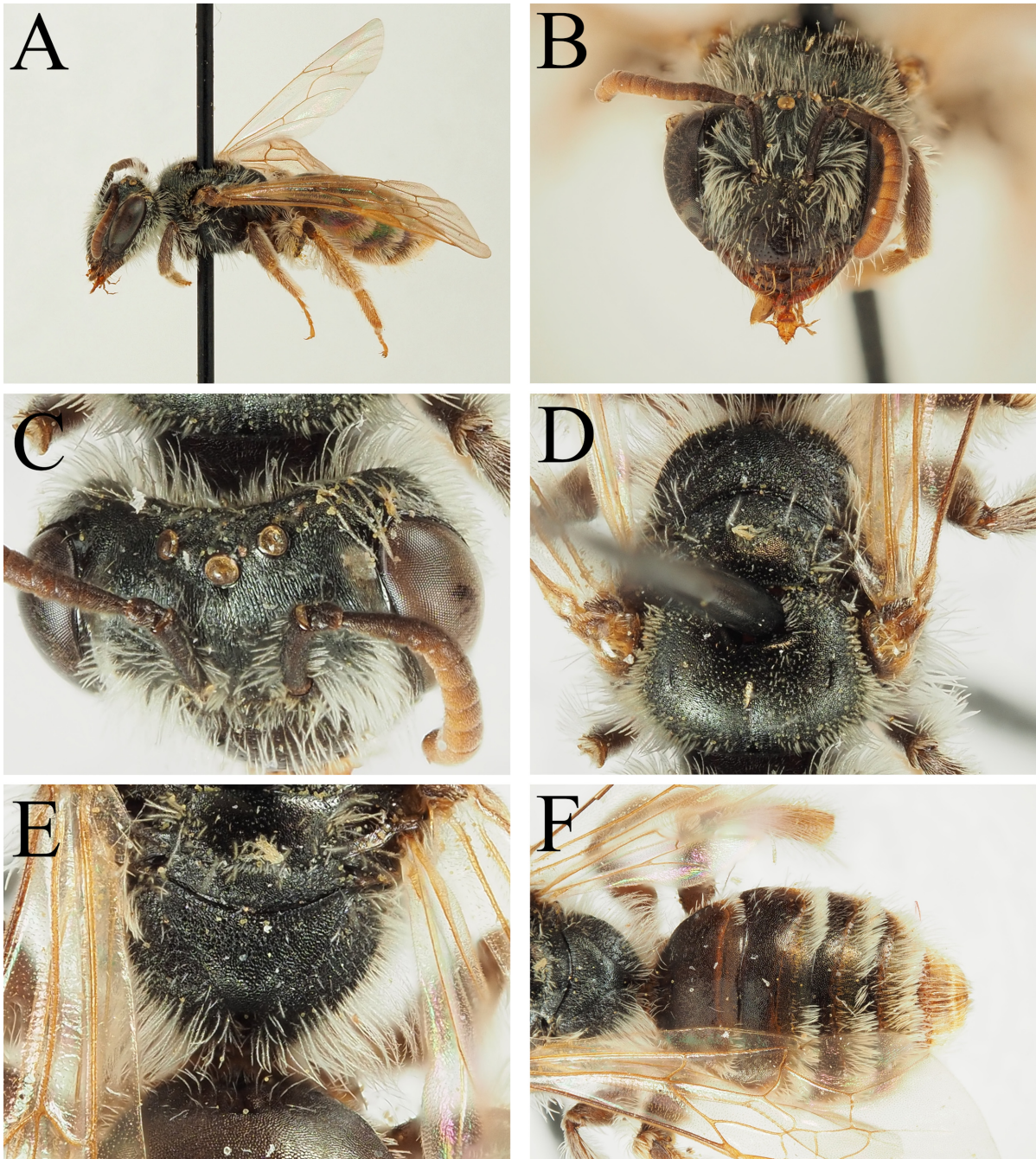
**PARATYPE: TURKEY:** Harran/Urfa [Şanlıurfa], 19.iv.1976, 1♂, leg. K. Warncke, OÖLM; Urfa [Şanlıurfa], Ceylanpınar, 24–25.iv.1976, 2♂, 7♀, leg. K. Warncke, OÖLM/TJWC.

**Description: Female:** Body length: 5.5 mm (Figure 13A). **Head:** Dark, 1.3 times wider than long (Figure 13B). Clypeus domed, punctate, punctures separated by 0.5–2 puncture diameters, underlying surface shagreened, basally dull, weakly shining medially, becoming increasingly shiny apically. Process of labrum short, pointed triangular, twice as wide as long. Gena equalling width of compound eye; ocelloccipital distance equalling 0.5 times diameter of lateral ocellus. Foveae dorsally narrow, occupying one quarter to one third space between lateral ocellus and compound eye (Figure 13C), clearly narrowed ventrally to more or less half dorsal breadth; filled with whitish hairs. Face, gena, vertex, and scape with short to moderately long white hairs, none equalling length of scape, hairs becoming somewhat dense on paraocular areas and gena. Antennae basally dark, A5–12 lightened orange ventrally; A3 slightly exceeding A4+5, shorter than A4+5+6, A4 wider than long, slightly shorter than A5. **Mesosoma:** Scutum and scutellum with clear bronzy metallic reflections, evenly punctate, punctures separated by 1–2 punctures diameters, underlying surface granularly shagreened, weakly shining (Figure 13D). Pronotum evenly rounded. Mesepisternum and dorsolateral parts of propodeum microreticulate, microreticulation overlain with fine network of raised reticulation; propodeal triangle broad, occupying majority of dorsal surface of propodeum, internal surface granularly shagreened, with finely raised rugae in basal half, propodeal triangle thus defined by change in surface sculpture (Figure 13E). Mesepisternum with moderately long white hairs, scutum and scutellum with shorter light brown hairs, hairs densely plumose but not squamous. Propodeal corbicula incomplete, dorsal fringe composed of long white plumose hairs, internal surface with long white simple hairs. Legs basally dark, extensively lightened brownish over tibiae and tarsi, becoming orange apically; pubescence whitish. Flocculus sparse, flocculus, femoral and tibial scopae white, scopal hairs simple. Hind tarsal claws with short tooth. Wings hyaline, stigma and venation orange, nervulus weakly antefurcal. **Metasoma:** Tergal discs dark, marginal areas extensively and broadly lightened brownish yellow, apically becoming hyaline (Figure 13F). Terga with regular granular microreticulation, weakly shining; impunctate. T1 with small hair fringe laterally, T2–4 with dense and broad apical fringe of white hairs, weakly interrupted on T2, complete on T3–4, obscuring underlying surface. Apical fringe of T5 and hairs flanking pygidial plate golden-orange, pygidial plate triangular, dorsal surface with obscure granulation, otherwise featureless.

**Male:** Body length: 5 mm (Figure 14A). **Head:** Dark, 1.3 times wider than long (Figure 14B). Clypeus weakly domed, densely and regularly punctate, punctures separated by 0.5–1 puncture diameters, underlying surface shagreened and weakly shining. Process of labrum trapezoidal, twice as wide as long, apical margin slightly emarginate medially. Gena equalling width of compound eye; ocelloccipital distance subequal to 1 diameter of lateral ocellus. Face, gena, vertex, and scape with long white hairs, longest on ventral margin of gena exceeding length of scape.

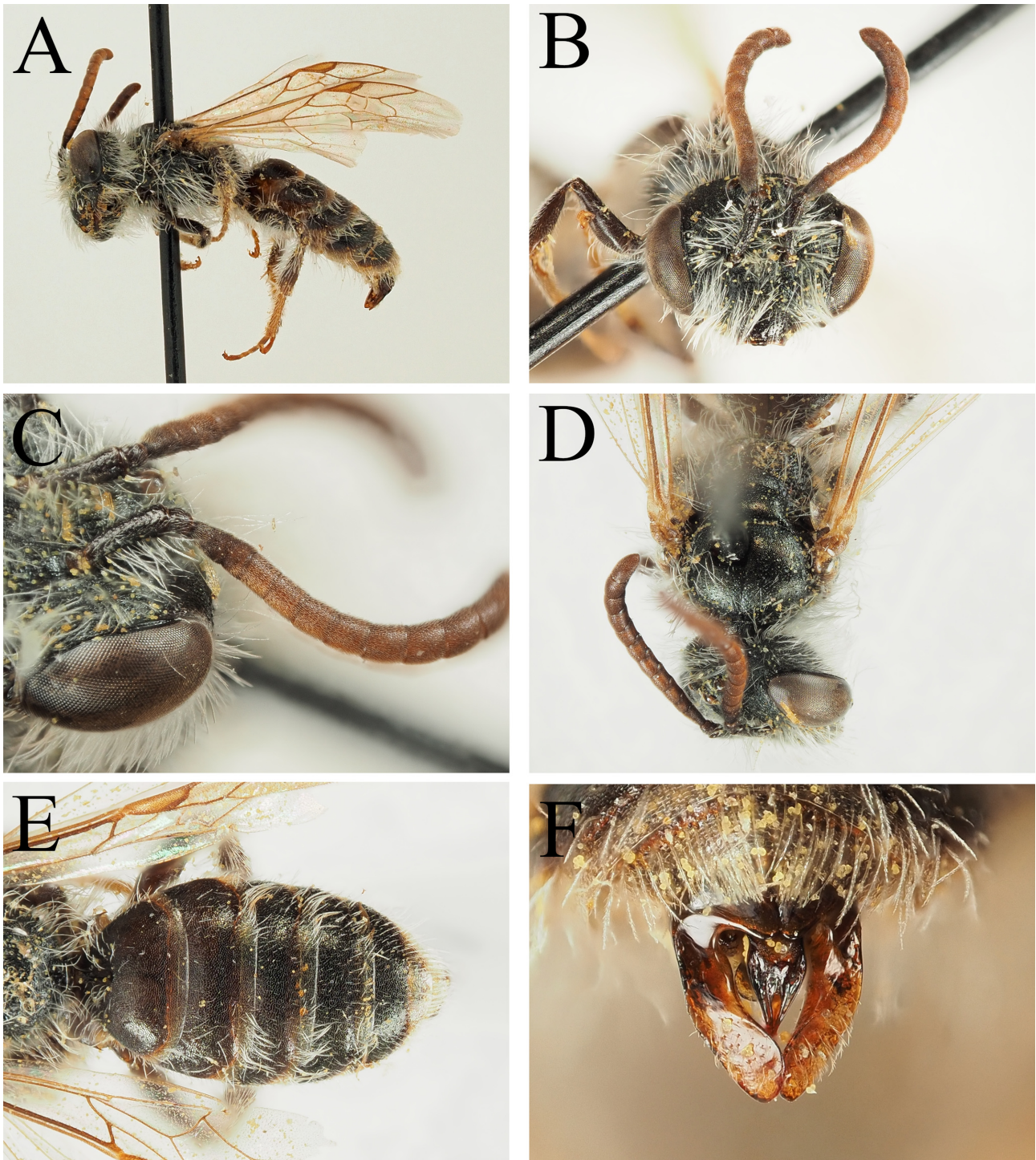


Antennae basally dark, A3 apically, A4–13 ventrally lightened dark orange-brown; A3 exceeding A4, shorter than A4+5, A4 subsquare, slightly wider than long, shorter than A5 (Figure 14C). *Mesosoma*: Scutum and scutellum with clear bronzy metallic reflections, irregularly punctate, punctures separated by 0.5–2 puncture diameters, underlying surface weakly shining (Figure 14D). Pronotum evenly rounded. Mesepisternum and propodeum structurally as in female, though basal rugae of propodeal triangle more pronounced. Mesosoma with long white hairs, longest exceeding length of scape. Legs basally dark, tarsi lightened orange, pubescence whitish. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus interstitial. *Metasoma*: Tergal discs dark, with bronzy-green metallic reflections, marginal areas extensively lightened reddish-yellowish-hyaline (Figure 14E). Terga with regular granular microreticulation, weakly shining; impunctate. Marginal areas with weak and loose hair fringes of long white hairs. Genital capsule compact, gonocoxae produced into short apically projecting rounded teeth, gonostyli slightly broadened apically, spatulate (Figure 14F). Penis valves slightly broadened medially before narrowing apically.



**FIGURE 13.** *Andrena* (incertae sedis) *orichalcum* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Head, dorsal view, D. Scutum, dorsal view, E. Propodeum, dorsal view, F. Terga, dorsal view.





**FIGURE 14.** *Andrena* (incertae sedis) *orichalcum* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Antennae detail, D. Scutum, dorsal view, E. Terga, dorsal view, F. Genital capsule, dorsal view.

**Diagnosis:** *Andrena orichalcum* belongs to a group of poorly-understood species found predominantly in dry areas from Tunisia to Central Asia. The phylogenetic associations are unclear, as some (*A. pavonia* Warncke, 1974; *A. palmyriae* Wood, 2021 [see below for description of the male]; *A. xera* Pisanty, 2022) have been placed in the subgenus *Aciandrena* and some (*A. nitidicollis* Morawitz, 1876; *A. schwarzi* Warncke, 1975) have been placed in the subgenus *Graecandrena*. *Andrena orichalcum* females resemble *Graecandrena* due to the small body size, weakly domed clypeus that is evenly punctate (Figure 13B), and propodeal triangle with obscure raised rugae only at the base (Figure 13E). However, the male does not have typical genital capsule for this subgenus, instead having narrow penis valves and resembling the genital capsule of *Aciandrena* (Figure 14F). However, *A. verticalis* Pérez, 1895

which has a genital capsule that diverges from the ‘classical’ *Graecandrena* shape can be placed in this subgenus by phylogenetic analysis (Pisanty *et al.* 2022b), so the exact and consistent characters that define the subgenus are not yet clear. Direct diagnosis is best made to specific species.

In the female sex, *A. orichalcum* can be separated from all five species by the presence of bronzy reflections on the scutum and frons (Figure 13D), being dark and non-metallic in the other taxa. Additional characters can also be used: *Andrena orichalcum* females have the foveae dorsally narrow, occupying one third of the space between the lateral ocellus and the compound eye (Figure 13C) and strongly narrowing ventrally (occupying at least half to two thirds of the space between the lateral ocellus and the compound eye in *A. nitidicollis*, *A. pavonia*, *A. palmyriae*, and *A. xera*, occupying one third to half this space in *A. schwarzi* but not strongly narrowing ventrally), propodeal triangle with raised rugae basally (propodeal triangle essentially without raised rugae basally in *A. pavonia*, *A. palmyriae*, and *A. xera*), scutum and scutellum finely shagreened and weakly shining (scutum and scutellum polished and shining over the majority of their area in *A. palmyriae* and *A. schwarzi*, medially and over majority of scutellum in *A. xera*), and the process of the labrum is triangular and comes to a clear apical point (Figure 13B; process of the labrum either trapezoidal, apically truncate, or apically truncate and deeply emarginate medially in comparison species, never triangular).

The males of *A. nitidicollis* and *A. xera* are unknown. Separation from remaining taxa can also be made by the bronzy reflections on the scutum and terga that are not present in comparison species (Figure 14D). Structurally, A4 is shorter than A5, but it is only slightly shorter than broad (Figure 14C), whereas in *A. pavonia*, *A. palmyriae*, and *A. schwarzi* it is clearly very short, only half as long as broad (see Figure 36C). Additional differentiation can be made by the weakly antefurcal nervulus (strongly antefurcal in *A. pavonia*, somewhat antefurcal in *A. palmyriae*), the regular granular microreticulation on the tergal discs that is of uniform strength across terga (tergal discs with fine microreticulation, becoming weaker on the discs of T3–4 in *A. pavonia* and *A. palmyriae*), and the uniformly shagreened and only weakly shining scutum and scutellum (scutum and scutellum polished and shining over the majority of their area in *A. palmyriae*).

Finally, *A. orichalcum* is superficially similar to *A. (Micrandrena) kurda* Warncke, 1975 from the same part of southern Turkey due to the presence of bronzy reflections on the scutum, small body size, and generally narrow facial foveae. However, *A. orichalcum* can easily be separated by the facial foveae that clearly narrow ventrally (foveae narrow, but uniformly narrow along their length in *A. kurda*), by the evenly punctate clypeus that is shagreened to weakly shining apically (clypeus impunctate, with obscure network of raised latitudinal carinae, surface dull), and by the propodeal triangle with obscure raised rugae only at the base (propodeal triangle with rugae covering the entire dorsal surface).

**Etymology:** From the Latin *orichalcum* (also spelt *aurichalcum*) which is a name for a precious metal of unknown identity but which may have been bronze or brass, thus referring to the metallic reflections visible on the scutum. It is a noun in apposition.

**Distribution:** South-central Turkey.

### *Andrena (Leimelissa) claves* spec. nov.

**HOLOTYPE: KAZAKHSTAN:** Džambul env. [Russian name, Dzhambul, now Taraz], Kara Tau, průsmyk [pass] Ujuk [inferred 43.1597°N, 70.2016°E], 1000 m, 3.vi.1980, 1♀, leg. Z. Pádr, OÖLM.

**PARATYPES: KAZAKHSTAN:** Same information as holotype, 3♀, OÖLM/TJWC.

**Description: Female:** Body length: 11–12 mm (Figure 15A). **Head:** Dark, 1.3 times wider than long (Figure 15B). Clypeus strongly flattened, medially slightly concave, with two weak and subtle longitudinal impressions; clypeus shallowly and irregularly punctate, punctures separated by 1–3 puncture diameters, broad impunctate longitudinal midline present; underlying surface strongly shagreened, dull. Process of labrum extremely broad, 5 times wider than long, basally with short latitudinal impression, medially with narrow emargination. Gena equalling width of compound eye, densely but shallowly and obscurely punctate with small punctures, punctures separated by 0.5 puncture diameters; ocelloccipital distance slightly exceeding 1 diameter of lateral ocellus. Foveae broad, occupying three quarters distance between lateral ocellus and compound eye, filled with white hairs (Figure 15C). Gena, vertex, face, and scape with short white hairs. Antennae dark, A4–5 and A6 basally orange-marked ventrally; A3 = A4+5+6. **Mesosoma:** Scutum irregularly punctate, punctures separated by 0.5–2 puncture diameters, underlying



surface finely shagreened, weakly shining. Scutellum smooth and shining, sparsely and irregularly punctate (Figure 15D). Pronotum without humeral angle, surface with shallow punctures. Mesepisternum and dorsolateral parts of propodeum shagreened, weakly shining, densely and regularly punctate with shallow punctures, punctures separated by 0.5–1 puncture diameter; propodeal triangle impunctate, internal surface finely shagreened, more strongly shining; propodeal triangle with short inconspicuous longitudinal rugae basally (Figure 15E). Mesepisternum and propodeum with long white hairs, not exceeding length of scape, propodeal corbicula dorsally with dense white simple hairs, internal surface with sparse, long white hairs. Scutum and scutellum with sparse, short, simple white hairs. Legs dark, apical tarsal segments dark brown. Flocculus and femoral scopa snow-white; tibial scopa white ventrally, dark brown dorsally. Remaining pubescence of legs dark brown. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation dark brown, nervulus postfurcal. *Metasoma*: Terga dark, smooth and shining, disc of T1 clearly punctate, punctures separated by 1–3 puncture diameters, discs of T2–4 more densely punctate with finer punctures, punctures separated by 0.5–1 puncture diameters; marginal areas of T2–4 with smaller punctures, separated by 1 puncture diameter (Figure 15F). T1–4 laterally with pairs of large white hair patches overlying and obscuring underlying surface, clearly separated medially. Apical fringe of T5 and hairs flanking pygidial plate dark chocolate brown, pygidial plate narrowly triangular, with obscure longitudinal raised ridge medially.

**Male:** Unknown.

**Diagnosis:** This species can be placed into the subgenus *Leimelissa* due to the strongly flattened clypeus (Figure 15B), the short and broad process of the labrum with a shallow emargination medially (Figure 15B), the densely punctate mesepisternum and dorsolateral part of the propodeum (Figure 15E), and the finely shagreened and impunctate propodeal triangle which lacks rugae (Figure 15E). Eight species of *Leimelissa* are known, predominantly from central Asia and China (Table 2), with the new transfer of *A. flagella* Nurse, 1904 from the subgenus *Lepidandrena* (see placement of Gusenleitner & Schwarz 2002) following type inspection (see below).

**TABLE 2.** Species currently included in the subgenus *Leimelissa* and their known distributions.

Species	Distribution	Source
<i>Andrena bairacumensis</i> Morawitz, 1876	Kazakhstan	Astafurova <i>et al.</i> (2022a)
<i>Andrena beijingensis</i> Xu, 1994	China (Beijing)	Xu & Tadauchi (2008)
<i>Andrena ermolenkoi</i> Osytshnjuk, 1984	Turkey*, Armenia	Osytshnjuk <i>et al.</i> (2008); current work
<i>Andrena fallax</i> Eversmann, 1852 (= <i>A. ispida</i> Warncke, 1965)	Balkans, Turkey, Syria, Caucasus, Iran	Astafurova <i>et al.</i> (2022b); Wood & Monfared (2022)
<i>Andrena flagella</i> Nurse, 1904	Pakistan	Nurse (1904)
<i>Andrena mimetes</i> Cockerell, 1929	China (Beijing, Inner Mongolia, Shandong)	Xu & Tadauchi (2008)
<i>Andrena ponomarevae</i> Osytshnjuk, 1983	Uzbekistan, Kazakhstan, Kyr- gyzstan	Osytshnjuk <i>et al.</i> (2008); Shebl & Tadauchi (2009)
<i>Andrena westrichi</i> Gusenleitner & Schwarz, 2000	China (Inner Mongolia)	Gusenleitner & Schwarz (2002)

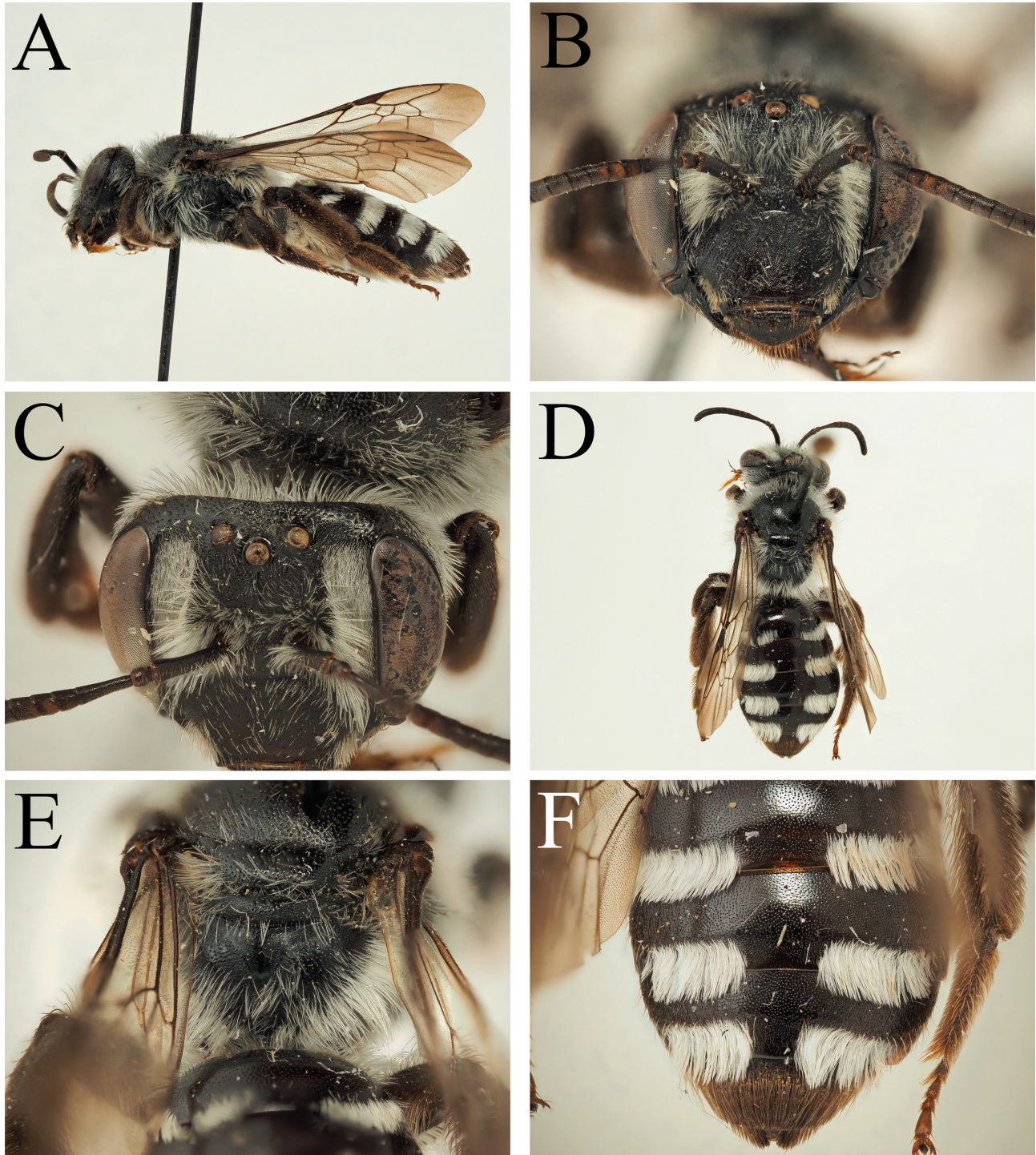
*Andrena claves* can be diagnosed by the simple scutal hairs (Figure 15A; with dense, short, and semi-squamous hairs in *A. bairacumensis* Morawitz, 1876), by the grey and white vestiture and dark metasomal terga (Figure 15D; body with extensive red vestiture, terga also yellow-red in *A. westrichi* Gusenleitner & Schwarz, 2000), by the short clypeus with the lower margin only slightly projecting beyond the lower margin of the compound eyes (Figure 15B; strongly and clearly projecting beyond the lower margin of the compound eyes in *A. beijingensis* Xu, 1994, *A. ermolenkoi* Osytshnjuk, 1984, and *A. ponomarevae* Osytshnjuk, 1983), by the short glossa and labial palpus (distinctly elongate in *A. beijingensis* and *A. mimetes* Cockerell, 1929, lectotype designated below), and by the short ocelloccipital distance slightly exceeding the diameter of a lateral ocellus (Figure 15C; equal to two times the diameter of a lateral ocellus in *A. ermolenkoi*).

*Andrena claves* is most similar to *A. fallax* Eversmann, 1852 (= *A. ispida* Warncke, 1965, see Astafurova *et al.* 2022b) due to the short clypeus. It can be separated by the slightly narrower ocelloccipital distance that is as long as 1 diameter of a lateral ocellus (slightly longer than the diameter of a lateral ocellus), by the broader foveae that occupy two thirds of the distance between the lateral ocellus and the compound eye, the foveae being filled with

white hairs (foveae occupying half of this distance, filled with light brown hairs), by the strongly separated hairbands on T2–4 (tergal hairbands complete at least on T3–4), and by the completely flattened and sparsely punctate clypeus (clypeus weakly domed, very densely punctate either side of an impunctate longitudinal line).

**Etymology:** The name is the nominative plural of the Latin noun *clavis* meaning ‘key’, as the pattern of white metasoma hairbands on the contrasting black terga is reminiscent of piano keys. It is a noun in apposition.

**Distribution:** Southern Kazakhstan.



**FIGURE 15.** *Andrena (Leimelissa) claves* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Head, dorsal view, D. Dorsum, E. Propodeum, posterior view, F. Terga, dorsal view.



*Andrena (Margandrena) cilicia* spec. nov.

**HOLOTYPE: TURKEY:** Icel, 15 km E Çamlıyayla, 800 m, st. 793, 11.x.1991, 1♀, leg. H. v. Oorschot, H. Wiering & R. Koolbergen, RMNH.

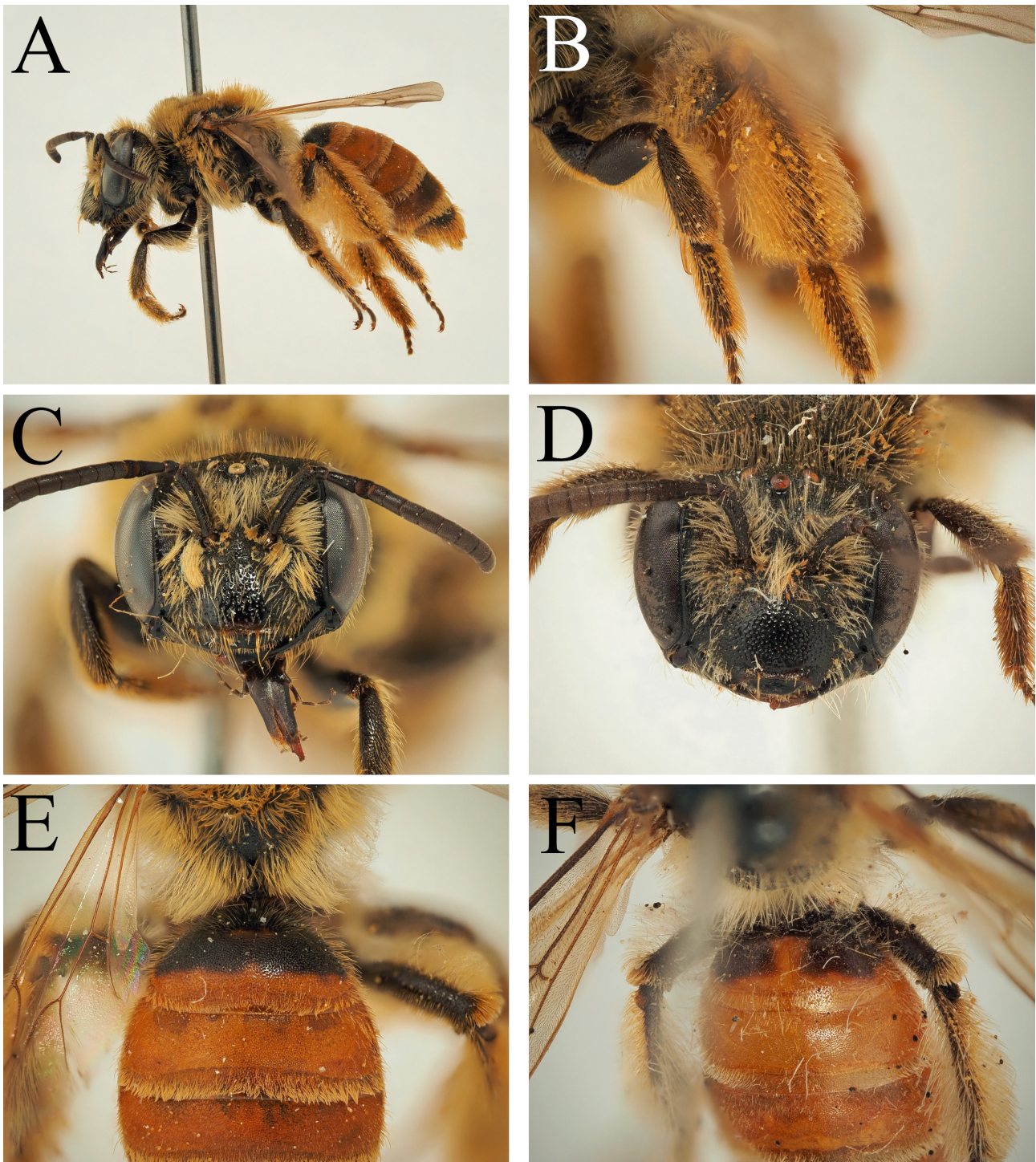
**PARATYPES: TURKEY:** Same information as holotype, 1♂, 1♀, RMNH.

**Description: Female:** Body length: 9–10 mm (Figure 16A). *Head:* Black, 1.4 times wider than long (Figure 16C). Clypeus domed, flattened on the disc, irregularly punctate with mixture of large and small punctures, punctures separated by 0.5–2 puncture diameters; underlying surface largely smooth and shining, weakly shagreened dorsally. Process of labrum broad, broadly trapezoidal with rounded corners, 3 times wider than long. Gena equalling width of compound eye, densely punctate with small punctures, punctures separated by 0.5 puncture diameters; ocelloccipital distance subequal to 2 times diameter of lateral ocellus. Foveae moderate, parallel sided, occupying half distance between lateral ocellus and compound eye, filled with yellowish hairs. Gena, vertex, face, and scape with golden-brown hairs, not exceeding half length of scape. Antennae dark, A4+5 slightly lightened orange basally, A3 = A4+5. *Mesosoma:* Scutum densely punctate over majority of area, punctures generally separated by 0.5–1 puncture diameter, confluent anteriorly, becoming sparse medially where punctures separated at most by 4 puncture diameters, underlying surface smooth and shining. Scutellum laterally densely punctate, punctures becoming sparser medially, underlying surface smooth and shining. Pronotum with weak humeral angle, inconspicuous, pronotum otherwise with longitudinal striations. Mesepisternum with fine pattern of raised honeycomb-like rugosity; propodeal triangle clearly delineated laterally with raised carinae, internal surface with network of raised carinae in basal two thirds, becoming weaker and less strongly raised apically. Mesepisternum, propodeum, scutum, and scutellum with golden-brown hairs, propodeal corbicula well-formed dorsally by long, plumose golden hairs, lateral face of propodeum with sparse, long, simple golden hairs. Legs dark, apical tarsal segments lightened reddish-brown, pubescence golden-brown, scopa golden. Femoral and tibial scopa with many densely plumose hairs, particularly ventrally (Figure 16B). Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation dark brown, nervulus postfurcal. *Metasoma:* Terga extensively marked with red: marginal area of T1, entirety of T2(3), T3–4 laterally and apically, remaining areas dark (Figure 16E). Tergal discs and marginal areas with extremely dense punctures, punctures almost confluent, separated by <0.5 puncture diameters; underlying surface finely shagreened, weakly shining. T1 laterally, T2–4 with dense apical bands of golden-yellow hairs, obscuring underlying surface. Apical fringe of T5 and hairs flanking pygidial plate golden, pygidial plate flattened, evenly rounded, medially densely punctate.

**Male:** Body length: 8 mm (Figure 17A). *Head:* 1.5 times wider than long (Figure 17B). Clypeus broad, apical margin weakly upturned; apical half with scattered shallow punctures, punctures separated by 2–3 puncture diameters, underlying surface smooth and shining, basal half densely punctate, punctures separated by 0.5 puncture diameters. Process of labrum forming an anteriorly projecting shelf (Figure 17C), laterally with two rounded knobs, medially with projecting lip with strong median emargination, ventral surface impunctate, smooth and shining. Gena strongly broadened, 1.3 times width of compound eye, laterally and dorsally with strongly produced winged carina (Figures 17D–E); ocelloccipital distance slightly exceeds 2 times diameter of lateral ocellus. Gena, vertex, face, and scape with white hairs, none exceeding half length of scape. Antennae basally dark, A3 apically, A4–13 lightened reddish-orange ventrally. A3 slightly exceeding A4, much shorter than A4+5. *Mesosoma:* Mesosoma structurally as in female; mesepisternum and propodeum with long whitish to whitish-brown hairs, longest equalling length of scape; scutum and scutellum with shorter yellowish-brown hairs. Legs and wings as in female. *Metasoma:* Terga extensively marked with red: disc and marginal area of T1 and entirety of T2–3, remaining areas dark. Tergal discs and marginal areas with extremely dense punctures (Figure 17G), punctures almost confluent, separated by <0.5 puncture diameters; underlying surface finely shagreened, weakly shining. T2 laterally, T3–5 with weak apical hairbands of whitish hairs, not obscuring underlying surface. Genital capsule simple, gonocoxae with inner margin rounded, lacking teeth, gonostyli narrowed basally, evenly broadening apically to twice basal width; penis valves moderately broadened basally, narrowing immediately, parallel sided for majority of length (Figure 17H).

**Diagnosis:** *Andrena cilicia* can be placed into the difficult *Margandrena-Chrysandrena-Euandrena* group (clade 32 in Pisanty *et al.* 2022b) due to the small body size, dorsally narrow foveae, plumose hairs of the tibial scopae (Figure 16B), and pronotum with humeral angle (more pronounced in the male sex). It is closest to *Andrena pellucens* Pérez, 1895 due to the extensively red-marked terga (Figures 16E, 17G), ventrally plumose tibial scopae, and the dark male clypeus (Figure 17B). This places it in the subgenus *Margandrena*. Despite the classification

problems in this part of the *Andrena* phylogeny, it is unlikely to fall elsewhere; the foveae are not narrowed ventrally (*Euandrena* and *Chrysandrena*) and the male penis valves lack laterally projecting extensions (most members of the *crocusella*-group).



**FIGURE 16.** *Andrena (Margandrena) cilicia* **spec. nov.** female. A. Habitus, lateral view, B. Tibial scopa, lateral view, C. Head, frontal view, E. Terga, dorsal view. *Andrena (Margandrena) pellucens* Pérez, 1895 female. D. Head, frontal view, F. Terga, dorsal view.





**FIGURE 17.** *Andrena (Margandrena) cilicia* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Face, ventral view, D. Head, dorso-lateral view, E. Head, lateral view, G. Terga, dorsal view, H. Genital capsule, dorsal view. *Andrena (Margandrena) pellucens* Pérez, 1895 male. F. Head, lateral view.



*Andrena cilicia* can be separated from *A. pellucens* in the female sex by the much stronger and denser tergal punctation (Figure 16E), punctures almost confluent, on T1 separated by <0.5 puncture diameters (in *A. pellucens* tergal punctures more scattered, on T1 separated by 1 puncture diameter, Figure 16F), by the smooth and shining integument of the scutum (scutum finely shagreened and weakly shining), and by the irregular punctation of the clypeus (Figure 16C), with both large and small punctures present, position irregular, separated by 0.5–2 puncture diameters (clypeus with only large punctures, separated by 1 puncture diameter in *A. pellucens*, Figure 16D). Males can also be separated by the same tergal punctation character (Figure 17G), but also by the structure of the gena which is broadened and conspicuously carinate (Figure 17E) with a raised, somewhat winged carina laterally and dorsally (gena broadened but evenly rounded in *A. pellucens*, not carinate, Figure 17F).

In addition, *A. pellucens* is known only from Europe, from Spain, France, Italy, Slovenia, Croatia, Hungary, and Greece (Gusenleitner & Schwarz 2002; Standfuss & Standfuss 2010). The two taxa therefore do not appear to occur in sympatry.

**Etymology:** The name comes from the classical geographical region of Cilicia that is now part of modern day Turkey. It extends roughly from Pamphylia to the Nur mountains, encompassing the *locus typicus*. It is a noun in apposition.

**Distribution:** South-western Turkey.

**Comparative material examined.** *Andrena pellucens*: **FRANCE:** Var, Grimaud, 16–22.x.1989, 2♀, leg. M.J. Gijswijt, RMNH; **ITALY:** Aurunci Mts., Formia, O. Quercia, NHMUK; Lazio, Roma, Via del la Falcognana, 18.x.1990, 4♀, leg. G.G.M. Schulten, RMNH; **SPAIN:** Barcelona, 1♀, MNHN (lectotype of *A. pellucens*).

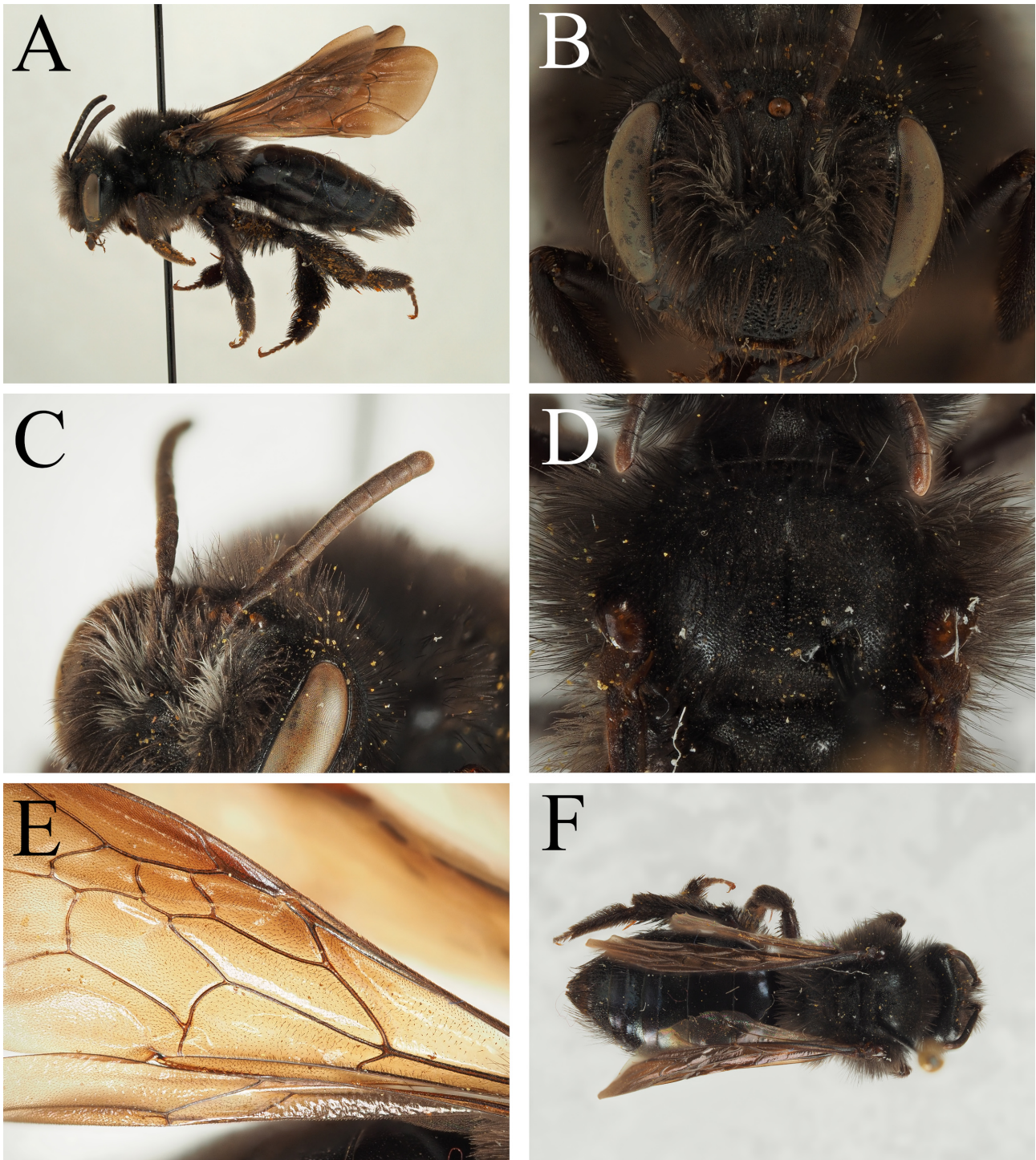
### *Andrena (Melandrena) nox* spec. nov.

**HOLOTYPE: TURKEY:** Hakkâri, S. Veregös/Mt. Sat, 2000 m [inferred 37.2986°N, 44.3103°E], 18.vi.1984, 1♀, leg. K. Warncke, OÖLM.

**PARATYPES:** Hakkâri, S. Veregös/Mt. Sat, 2000 m, 18.vi.1984, 4♀, leg. K. Warncke, OÖLM/TJWC; Hakkâri, S. Veregös/Mt. Sat, 1700 m, 15.vi.1984, 2♀, leg. K. Warncke, OÖLM.

**Description: Female:** Body length: 12–14 mm (Figure 18A). *Head:* Dark, 1.2 times wider than long (Figure 18B). Clypeus weakly domed, densely punctate, punctures confluent to separated by 1 puncture diameter, with obscure impunctate longitudinal line medially; underlying surface shagreened and dull laterally to weakly shining medially. Process of labrum trapezoidal, three times wider than long, fore margin truncate. Gena exceeding width of compound eye; ocelloccipital distance equalling 2 times diameter of lateral ocellus. Foveae dorsally broad, occupying two thirds of space between lateral ocellus and compound eye; fovea ventrally slightly diverging from inner margin of compound eye, separated by a narrow shining punctate strip, strip subequal to basal width of A3; foveae filled with dark brown hairs. Face, gena, and vertex with black hairs, base of antennal insertions and scape with intermixed black and white hairs. Antennae dark, A5–12 ventrally lightened by presence of grey scales; A3 subequal to A4+5 (Figure 18C). *Mesosoma:* Scutum punctate, punctures separated by 0.5–1 puncture diameters, punctures becoming sparser posterior-medially, here forming two small impunctate spots; underlying surface laterally and anteriorly shagreened and dull, shagreenation becoming weaker medially, here weakly shining (Figure 18D). Scutellum with punctures separated by 0.5–2 puncture diameters, medially forming two sparser spots, here smooth and shining. Pronotum without humeral angle. Mesepisternum and dorsolateral parts of propodeum microreticulate, with raised hair-bearing punctures; propodeal triangle delineated with fine carinae, internal surface microreticulate, without hair-bearing punctures, basally with raised rugosity, propodeal triangle thus contrasting dorsolateral parts of propodeum. Mesosoma covered with black hairs, none exceeding length of scape; propodeal corbicula incomplete, dense, composed of black plumose hairs, internal surface with numerous black simple hairs. Legs dark, pubescence black to dark brown; flocculus, femoral and tibial scopa black. Hind tarsal claws with inner tooth. Wings strongly infuscate, entire forewing from radial and cubital cell to wing apex infuscate; stigma and venation dark brown, nervulus interstitial to slightly antefurcal (Figure 18E). *Metasoma:* Tergal discs with strong metallic blue reflections, marginal areas lightened dark reddish-brown. Tergal discs regularly and finely punctate, T1–3 with puncture separated by 1–2 puncture diameters, T4 with punctures much sparser, punctures separated by 3–4 puncture diameters; marginal areas with obscure and scattered punctures. Terga laterally with obscure black hairs, apical fringe of T5 and hairs flanking pygidial plate black to dark brown (Figure 18F); pygidial plate rounded triangular, surface flat, featureless.





**FIGURE 18.** *Andrena (Melandrena) nox* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Antennae detail, D. Scutum, dorsal view, E. Wing detail, F. Dorsum.

**Male:** Unknown.

**Diagnosis:** *Andrena nox* can be recognised as a medium-sized *Melandrena* with dark tibial scopal hairs, regularly punctate tergal discs, and metallic blue reflections on the terga whilst simultaneously lacking lateral patches of white pubescence, placing it close to *A. cineraria* (Linnaeus, 1758), *A. barbareae* Panzer, 1805, and *A. danuvia* Stöckert, 1950. It is important to exclude *A. marmora* Nurse, 1904 (Figures 19A–D, tibial scopae dark, terga without blue reflections, terga laterally with patches of white hairs) and *A. metallescens* Cockerell, 1906 (see species entry below for lectotype designation; tibial scopae yellowish, terga laterally with patches of white hairs), and due to past taxonomic confusion, see Remarks.





**FIGURE 19.** *Andrena (Melandrena) marmora* Nurse, 1904 syntype female. A. Label details, B. Habitus, lateral view, C. Face, frontal view, D. Dorsum.

The three comparison species highlighted here were lumped together by Warncke (1967), though some subsequent authors have not followed this interpretation (e.g. Schmid-Egger & Scheuchl 1997; Amiet *et al.* 2010; Scheuchl & Willner 2016), and *A. cineraria* and *A. barbareae* have recently been shown to be distinct (Gueuning *et al.* 2020). The broad approach of Warncke is used within literature dealing with Asia (e.g. Osytshnjuk *et al.* 2008; Xu & Tadauchi 2009), though it is my opinion that *A. barbareae* represents the taxon present in much of central and eastern Asia south to the Himalayas, based on examined specimens and given its reported bivoltine behaviour.

Morphological separation between these three species is based on the degree of infumation in the wing (Figure 18E; hyaline in *A. cineraria*, infumate in *A. barbareae* and *A. danuvia*), the length of A3, and the colouration of the abdominal terga. Whereas all three species share the presence of white hairs anteriorly and posteriorly on the mesosoma with black hairs medially, thus giving a striped appearance, *A. nox* has the mesosomal hairs entirely black, providing immediate separation. Structurally, *A. nox* has A3 slightly shorter than A4+5 (Figure 18C; longer than A4+5 in *A. cineraria* and *A. danuvia*, subequal to A4+5 in *A. barbareae*), the forewings are extensive infumate, with infumation extending over the radial and cubital cell (these cells hyaline in *A. barbareae* and *A. danuvia*), and terga with strong blue metallic reflections (dark in *A. barbareae* and *A. cineraria*, strongly metallic and almost blue in *A. danuvia*). This combination of characters allows separation from the comparison species. Both *A. nox* and *A. barbareae* can be found in sympatry in eastern Turkey (see Comparative material examined), and no intermedial forms could be found in the limited material available for study. *Andrena nox* is therefore considered to be distinct from *A. barbareae* and not simply representing a melanic colour form of this taxon.

**Remarks:** It is important to clarify the status of confused taxa within this group of *Melandrena*. In addition to the taxonomic problems outlined in the diagnosis, the status of *A. marmora* and *A. metallescens*. *Andrena marmora* was described from Pakistan (Nurse 1904) and lacks metallic blue reflections on the terga, whilst also possessing white



hairs patches on the terga laterally. The syntypic series is housed at the NHMUK (Figures 19A–D). The synonymy of *A. marmorata* with *A. cineraria* proposed by Tadauchi & Matsumura (2007) is rejected for these reasons. The two taxa have been confused in the literature, and so *A. cineraria* often has a greater reported range than its true range, e.g. it is likely absent from Israel due to misidentified *A. marmorata* material (see Pisanty *et al.* 2022a). Finally, *A. gussakovskii* Lebedev, 1932 may be a junior synonym of *A. marmorata*, but this must be established through type inspection (Wood & Monfared 2022).

**Etymology:** From the Latin noun *nox* meaning night or darkness, in reference to the dark pubescence of this species. It is a noun in apposition.

**Distribution:** South-eastern Turkey (Hakkâri province).

**Comparative material examined.** *Andrena barbareae*: **TURKEY:** Hakkâri, S. Vargös/Mt. Sat, 1800 m, 21.v.1989, 1♀, leg. K. Warncke, OÖLM; Hakkâri, S. Vargös/Mt. Sat, 2000 m, 18.vi.1984, 1♀, leg. K. Warncke, OÖLM; Hakkâri, Suvani Halil-Pass, 2900 m, 20.v.1989, 1♀, leg. K. Warncke, OÖLM; Horasan, 18 km E Delibaba, 25.vi.1993, 1♀, leg. K. Deneš, OÖLM; Kars, 20 km W Sarikamis [Sarıkamış], 2200 m, 1.viii.1983, 1♀, leg. K. Warncke, OÖLM.

*Andrena marmorata*: **PAKISTAN:** Peshin, iv.1903, 1♀, leg. C.G. Nurse, NHMUK (syntype);

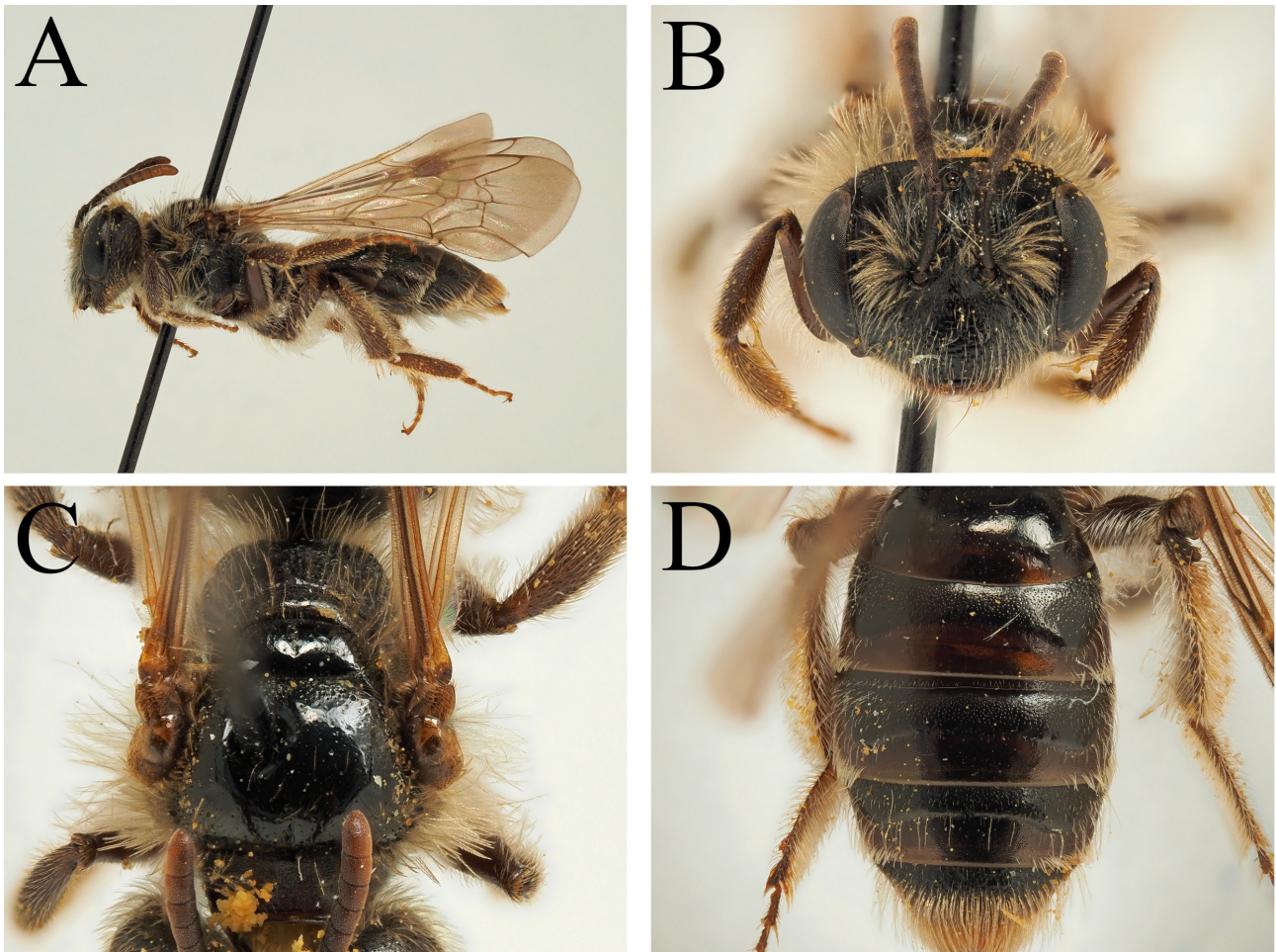
### *Andrena (Notandrena) ayna spec. nov.*

**HOLOTYPE:** Hakkâri, Beytüşşebap [inferred 37.5680°N, 43.1658°E], 25.v.1988, 1♀, leg. K. Warncke, OÖLM.

**PARATYPE:** Hakkâri, Beytüşşebap, 25.v.1988, 1♀, leg. K. Warncke, OÖLM.

**Description: Female:** Body length: 8–9 mm (Figure 20A). **Head:** Dark, 1.3 times wider than long (Figure 20B). Clypeus domed, with large, irregular punctures, punctures almost confluent to separated by 1 puncture diameter; underlying surface shagreened, weakly shining. Process of labrum broadly trapezoidal, short, three times wider than long, widely emarginate medially. Gena slightly exceeding width of compound eye; ocellocipital distance equalling 0.5 times diameter of lateral ocellus. Foveae occupying slightly less than half of space between lateral ocellus and compound eye, deeply impressed and channelled, ventrally extending to level of antennal insertions; filled with whitish to light brownish hairs; frons with strongly raised longitudinal striations. Face, gena, vertex, and scape with whitish to faintly yellowish hairs, none exceeding length of scape. Antennae basally dark, A6–12 ventrally lightened orange, A3 exceeding A4+5, slightly shorter than A4+5+6. **Mesosoma:** Scutum and scutellum extremely polished, smooth and shining, with occasional scattered punctures (Figure 20C). Pronotum carinate in ventral half, with clear humeral angle. Mesepisternum densely punctate, punctures separated by 0.5–1 puncture diameter, underlying surface weakly shining. Dorsolateral parts of propodeum with strongly raised rugosity, more or less dull; propodeal triangle predominantly smooth and shining, medially with raised, long longitudinal carinae, remaining basal surface with short carinae; propodeal triangle thus defined by change in surface sculpture; lateral (vertical) faces of propodeum with dense network of raised wrinkled rugosity. Mesosoma with whitish plumose hairs laterally, dorsally with shorter yellowish plumose hairs on the scutum and scutellum laterally. Propodeal corbicula incomplete, composed of dense fringe of plumose hairs, internal surface with sparse long simple hairs. Legs dark, tibiae apically and tarsi lightened dark reddish brown, pubescence whitish; flocculus, femoral and tibial scopae white. Hind tarsal claws with small inner tooth. Wings hyaline, stigma and venation orange-brown, nervulus interstitial. **Metasoma:** Terga dark, marginal areas long, on T2–4 occupying half dorsal length medially, marginal areas clearly depressed, lightened dark reddish-brown (Figure 20D). Disc of T1 with obscure fine punctures, punctures separated by 2–4 puncture diameters, discs of T2–4 with clear punctures basally, punctures separated by 1–2 puncture diameters, punctures becoming scarce to absent apically adjacent to tergal margins, tergal margins essentially impunctate. Tergal discs narrowly microreticulate at their bases, becoming smooth and shining on disc adjacent to tergal margins, tergal margins themselves obscurely shagreened, weakly shining. T2–4 with narrow apical fringes of whitish hairs laterally at the apex of the marginal areas, with additional long whitish hairs emerging from base of marginal areas, these slightly overlying apical fringes. Apical fringe of T5 and hairs flanking pygidial plate yellowish-white, pygidial plate broadly rounded, internal surface depressed over majority of area, with dense network of essentially confluent punctures.

**Male:** Unknown.



**FIGURE 20.** *Andrena (Notandrena) ayna* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terga, dorsal view.

**Diagnosis:** *Andrena ayna* can be recognised as a *Notandrena* by the short and broad head (Figure 20B, clearly wider than long), the dorsolateral angle of the pronotum with a strong transverse ridge, and the strongly punctate terga (Figure 20D). It is unique within *Notandrena* because the scutum and scutellum are almost entirely smooth and shining, with only a few scattered punctures (Figure 20C). It also displays other usual characters for *Notandrena*, such as the lateral faces of the propodeum that are covered in raised wrinkly rugosity (c.f. *Andrena proxima* (Kirby, 1802) and related species), and the very broad and depressed tergal margins (occupying half dorsal area). It therefore cannot be confused with any other taxon.

**Etymology:** Taken from the Turkish *ayna* which means mirror, in reference to the extremely polished scutum and scutellum. It is a noun in apposition.

**Distribution:** South-eastern Turkey (Şırnak province).

***Andrena (Notandrena) taurus* **spec. nov.****

**HOLOTYPE: TURKEY:** Abanoz (Rte Anamur Kazenci), 1200 m, Taurus, 10.v.1991, 1♀, leg. H. Teunissen, RMNH.

**PARATYPE: TURKEY:** Akseki/Taurus, 1100 m, 7.v.1991, 1♂, leg. H. Teunissen, RMNH.

**Description: Female:** Body length: 7 mm (Figure 21A). Dark, 1.3 times wider than long (Figure 21B). Clypeus flattened over majority of disc, medially with slight but distinct longitudinal impression. Clypeus punctured with large punctures, punctures separated by 1–2 puncture diameters with exception of clear longitudinal impunctate midline; underlying surface evenly shagreened, very weakly shining. Process of labrum wide, more or less

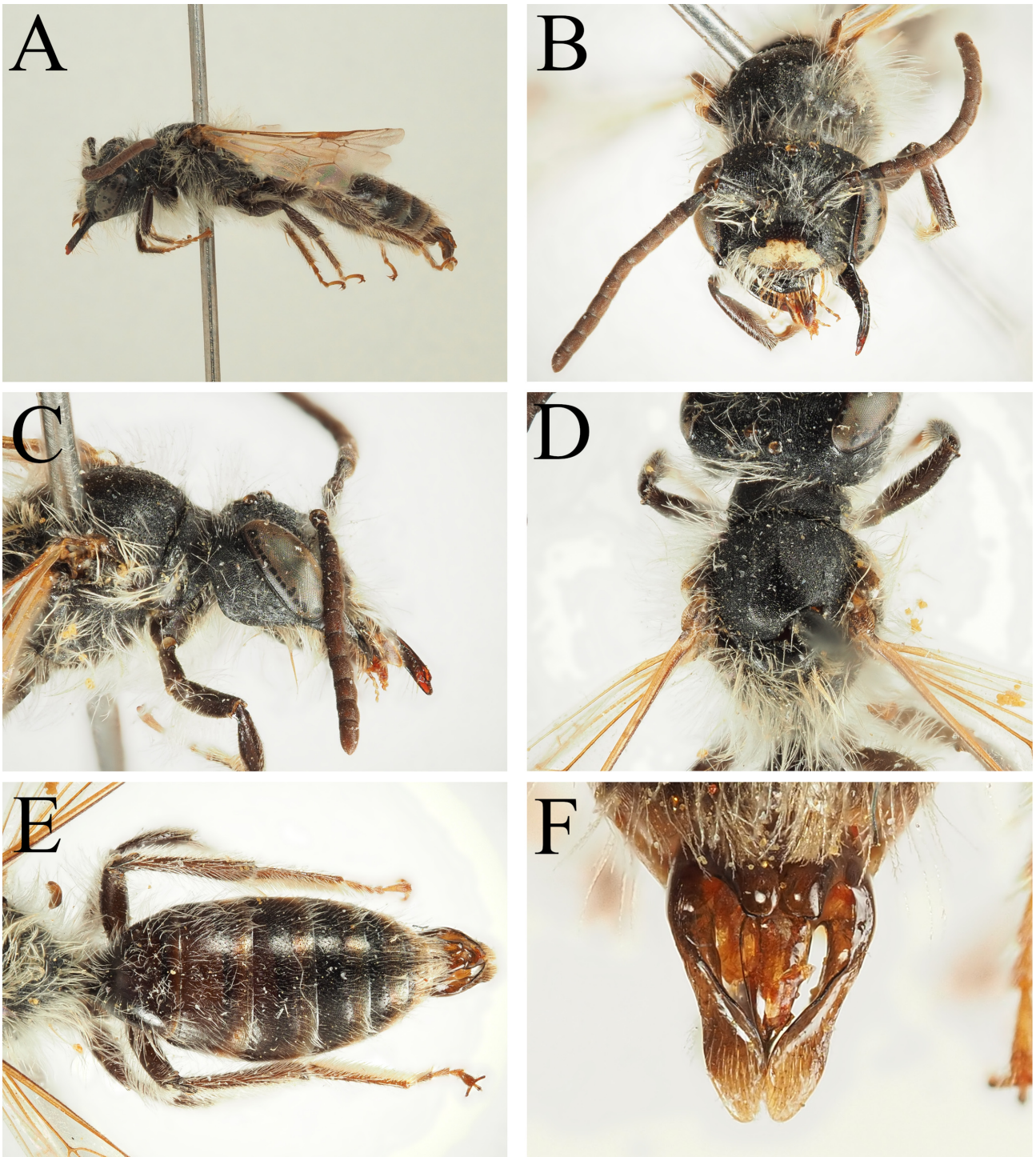


trapezoidal, with rounded corners, 3 times wider than long. Gena very slightly exceeding width of compound eye; ocellocipital distance subequal to 1 diameter of lateral ocellus. Foveae dorsally occupying one third of space between lateral ocellus and compound eye, slightly narrowed ventrally at level of antennal insertions; filled with light brownish hairs. Face, gena, vertex, and scape covered with moderately long golden-brown subtly plumose hairs, none equalling length of scape. Antennae basally dark, A5–12 ventrally lightened orange; A3 exceeding A4+5, shorter than A4+5+6. *Mesosoma*: Scutum and scutellum irregularly punctate with shallow punctures, punctures touching to separated by 2 puncture diameters, underlying surface granularly shagreened, weakly shining (Figure 21C). Pronotum with weak humeral angle. Mesepisternum and dorsolateral parts of propodeum microreticulate, microreticulation overlain by network of weakly raised reticulation; propodeal triangle poorly defined laterally, basally with short raised rugae, remaining surface with granular shagreen, lacking network of raised reticulation, thus differentiated from dorsolateral parts of propodeum. Mesepisternum with long light brownish subtly plumose hairs, none equalling length of scape, scutum and scutellum with shorter golden-brown hairs; propodeal corbicula incomplete, composed of sparse weakly plumose golden-brown hairs, internal surface with occasional simple hairs. Legs dark, apical tarsal segments lightened orange-brown; flocculus very sparse, flocculus and femoral and tibial scopa light brown; remaining leg pubescence whitish-golden. Wings hyaline, stigma and venation orange, nervulus interstitial. *Metasoma*: Terga dark, marginal areas lightened dark brown with yellow-hyaline apical rim (Figure 21D). Terga densely microreticulate, with obscure punctures that disappear into microreticulation, punctures separated by 1–2 puncture diameters on discs and marginal areas. T1 laterally with weak fringe of loose long yellowish hairs, T2–4 with dense apical fringes of shorter yellowish hairs obscuring underlying surface, weakly interrupted medially on T2. Apical fringe of T5 and hairs flanking pygidial plate golden, pygidial plate large, evenly rounded apically, internal surface slightly depressed, surface with large granular shagreen, weakly shining.



**FIGURE 21.** *Andrena (Notandrena) taurus* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terga, dorsal view.





**FIGURE 22.** *Andrena (Notandrena) taurus* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Head, lateral view, D. Scutum, dorsal view, E. Terga, dorsal view, F. Genital capsule, dorsal view.

**Male:** Body length: 8 mm (Figure 22A). **Head:** Dark, 1.4 times wider than long (Figure 22B). Clypeus dark basally and laterally, apical half yellow marked. Clypeus flattened over majority of disc, with shallow punctures, punctures separated by 1–2 puncture diameters, underlying surface shagreened, weakly shining. Process of labrum trapezoidal, twice as wide as long, apical margin truncate. Gena 1.5 times wider than width of compound eye, posterior margin angulate but not carinate (Figure 22C), ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Face, gena, vertex, and scape covered with long whitish hairs, none equalling length of scape. Antennae basally dark, A4–13 ventrally lightened ventrally by presence of grey-brownish scales; A3 subequal to A4+5, A4 more or less quadrate, shorter than A5. **Mesosoma:** Scutum densely microreticulate, with obscure shallow



punctures disappearing into microreticulation, punctures separated by 1–2 puncture diameters; underlying surface dull over majority of area, becoming weakly shining medially (Figure 22D). Scutellum more or less impunctate medially, laterally shagreened and weakly shining. Pronotum with strongly pronounced humeral angle, with deep vertical furrow, surface of furrow more or less polished and shining. Mesepisternum and propodeum as in female. Mesosoma with long whitish hairs, many clearly exceeding length of scape. Legs dark, apical tarsal segments lightened orange-brown, pubescence whitish-golden. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation orange, nervulus weakly antefurcal. *Metasoma*: Terga dark, marginal areas lightened dark brown with yellow-hyaline apical rim (Figure 22E). Terga shagreened, with obscure scattered punctures that disappear into shagreenation, punctures separated by 2–3 puncture diameters. Terga with moderate long scattered upstanding whitish hairs, T2–4 laterally with very sparse apical hair fringes, not obscuring underlying surface. S8 medially narrow, strongly broadened apically, apex truncate; underlying surface covered with dense whitish hairs. Genital capsule somewhat elongate, gonocoxae apically produced into long, more or less rounded teeth, gonostyli narrow medially, apically spatulate with strongly raised internal margin (Figure 22F). Penis valves basally moderately broad, occupying half space between gonostyli, somewhat bulbous, apically narrowing strongly.

**Diagnosis:** *Andrena taurus* can be recognised as a *Notandrena* due to the comparatively short and broad head (Figures 21B, 22B), the pronotum with a humeral angle (much stronger in the male), the broad male gena (Figure 22C, broader than the width of the compound eye), the male genital capsule with penis valves narrowing apically (Figure 22D), and the partially yellow marked clypeus (Figure 22B, not always diagnostic for *Notandrena*). The species is not quite typical for *Notandrena* as the terga are obscurely punctate (Figures 21D, 22E), with what scattered punctures are present disappearing into the abundant microreticulation present on the terga. However, the male morphology convincingly places the taxon in this subgenus, though the apex of the male clypeus does not have an upturned margin, as is found in more typical *Notandrena* species.

*Andrena taurus* can be separated from all other non-metallic *Notandrena* (the former *Notandrena* s. str., see Pisanty *et al.* 2022b) by the flattened clypeus (clearly domed in all other species) combined with the densely microreticulate and at most obscurely punctate terga (with clear punctures in other species). The male could additionally be compared to *A. langadensis* Warncke, 1965 but the body size is smaller (9 mm in *A. langadensis*) and the gonocoxae are produced into long, rounded apical teeth (without such teeth in *A. langadensis*). Finally, the female is superficially similar to *A. discordia* (which can be found with *A. taurus* in sympatry in the Taurus mountains) due to the impunctate terga, whitish tergal hairbands, and brownish hairs on the scutum and scutellum. However, *A. discordia* has the clypeus clearly domed, whereas it is flattened in *A. taurus*.

**Etymology:** Named after the Taurus mountains. It is a noun in apposition.

**Distribution:** South-western Turkey (Taurus mountains).

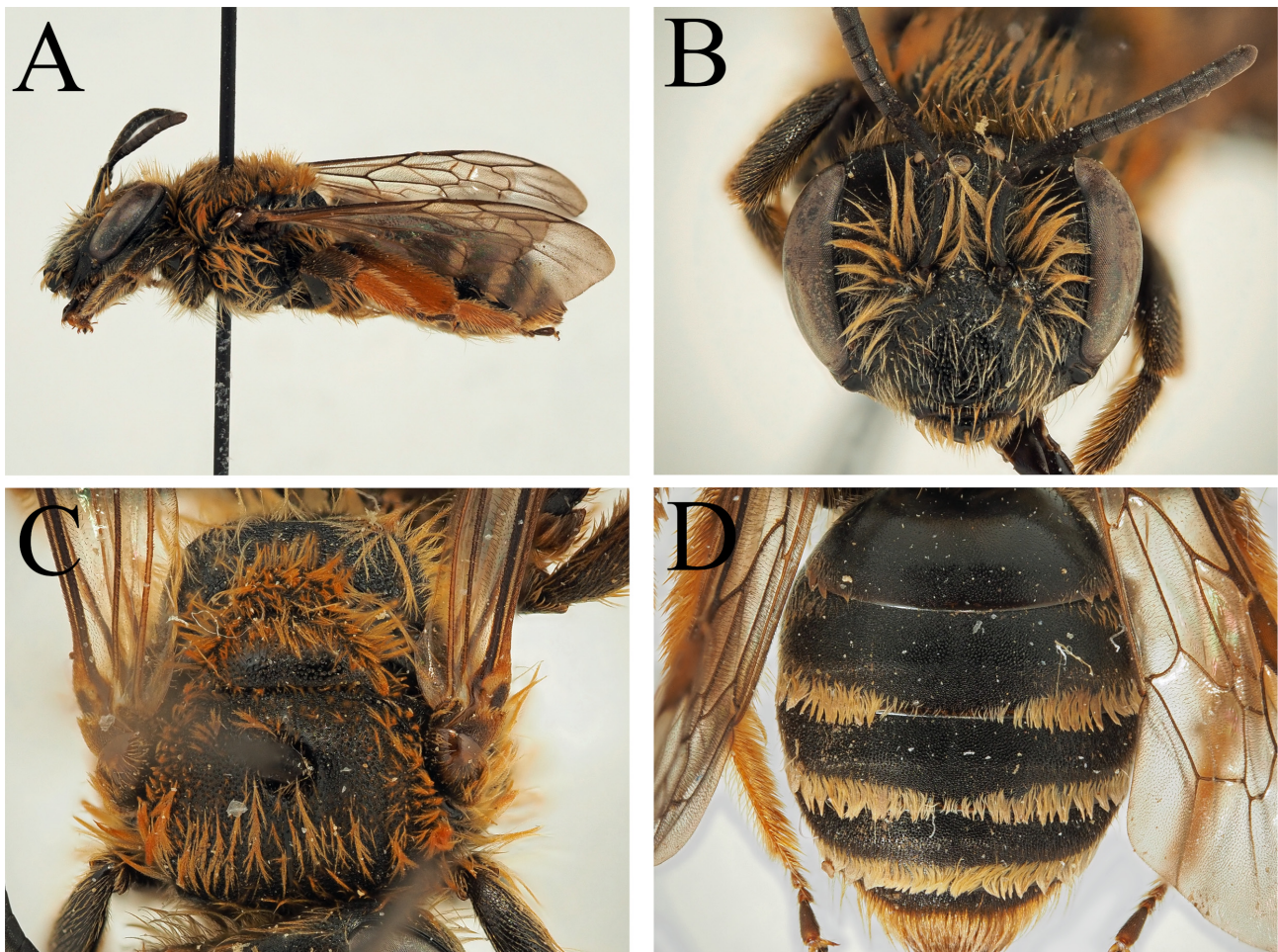
### *Andrena (Taeniandrena) laevicorpus* spec. nov.

**HOLOTYPE: CYPRUS:** W of Polis [Polis Chrysochous], 1000 m, E of Cedar Valley [inferred 35.0208°N, 32.3920°E], 8.iii.2014, 1♀, leg. M. Snižek, OÖLM. BOLD accession number HYMAA340-22.

**PARATYPES: CYPRUS:** W of Polis [Polis Chrysochous], 1000 m, E of Cedar Valley, 8.iii.2014, 3♂, leg. M. Snižek, OÖLM; Moni, 13 m [south of water treatment facility], 4.iv.2022, 1♀, leg. R. Santerre, TJWC; Halevga [Alevkaya, Karaagaç], 30.iii.1953, 1♀, leg. P.A. Buxton, NHMUK; Avdimou, 7 m, 31.iii.2022, 1♀, leg. R. Santerre, TJWC; Alassa, 298 m, 19.iv.2022, 1♂, leg. R. Santerre, TJWC; 2 km W Kato Pyrgos, 25.v.1988, 1♀, leg. T. Osten, OÖLM.

**Description: Female:** Body length: 10–11 mm (Figure 23A). *Head:* Dark, 1.25 times wider than long (Figure 23B). Clypeus flattened medially, strongly and densely punctured, punctures separated by 0.5–1 puncture diameter, slightly raised impunctate longitudinal line present medially; underlying surface weakly shagreened, shining. Process of labrum trapezoidal, short, 3 times wider than long, narrowly but shallowly emarginate medially. Gena equalling width of compound eye; ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Foveae broad, occupying three quarters distance between ocellus and compound eye, slightly narrowed ventrally, filled with yellowish hairs. Face, gena, vertex, and scape with whitish to yellowish brown hairs, lighter ventrally, browner dorsally. Antennae dark, A3 slightly exceeding A4+5, shorter than A4+5+6. *Mesosoma:* Scutum very densely punctate, punctures surrounding parapsidal lines confluent, elsewhere separated by 0.5–1 puncture diameters,

underlying surface shagreened, weakly shining (Figure 23C). Scutellum densely punctured over majority of area, punctures separated by 0.5 puncture diameters except for two medial impunctate areas, here underlying surface polished and shining. Pronotum without humeral angle, evenly rounded. Mesepisternum and dorsolateral parts of propodeum with network of raised rugosity, propodeal triangle also entirely covered with fine rugosity, poorly differentiated from remaining propodeum. Mesepisternum with pale hairs, scutum and scutellum with short golden-brown hairs, propodeal corbicula incomplete, with weakly plumose yellow-brownish hairs, internal surface with many long simple golden hairs. Legs basally dark, tarsi and hind tibiae lightened orange, pubescence golden-brown. Flocculus and femoral scopa brownish, tibial scopa golden. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus postfurcal. *Metasoma*: Terga dark, apical rim of marginal areas narrowly lightened hyaline-brown; T1 finely punctate, punctures separated by 1 puncture diameter, T2–4 very densely punctate, punctures separated by <0.5 puncture diameters, underlying surface shining (Figure 23D). T2–4 with wide whitish-yellowish apical hairbands obscuring underlying surface, more or less complete on T2, complete on T3–4. Apical fringe of T5 and hairs flanking pygidial plate golden orange, pygidial plate narrowly triangular, apically rounded, surface flat and featureless.



**FIGURE 23.** *Andrena (Taeniandrena) laevicorpus* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terga, dorsal view.

**Male:** Body length: 8–9 mm (Figure 24A). *Head:* Dark, 1.3 times wider than long (Figure 24B). Clypeus flattened medially, strongly and densely punctured, punctures separated by 0.5–1 puncture diameter, slightly raised impunctate longitudinal line present medially; underlying surface shining. Process of labrum trapezoidal, twice as wide as long, slightly emarginate medially. Gena equalling width of compound eye; ocell occipital distance equalling 1.5 times diameter of lateral ocellus. Face, gena, vertex, and scape covered in golden-brown hairs. Antennae dark,  $A_3 = 0.8$  times  $A_4$ . *Mesosoma:* Scutum densely punctured, punctures surrounding parapsidal lines separated by 0.5 puncture diameters, elsewhere separated by 1 puncture diameter; underlying surface strongly shagreened, dull. Scutellum, mesepisternum, and propodeum as in female. Mesosoma covered in long golden-brown hairs, none



exceeding length of scape. Legs basally dark, hind tarsi lightened orange; hind tibiae at least partly lightened orange. Wings as in female. *Metasoma*: Terga structurally as in female (Figure 24C). Genital capsule simple, gonocoxae slightly produced apically, gonostyli apically spatulate, penis valves narrow basally, slightly narrowing apically (Figure 24D).

**Diagnosis:** *Andrena laevicorpus* can be swiftly recognised as part of the subgenus *Taeniandrena* due to its strongly flattened clypeus in both sexes (Figures 23B, 24B). It can be placed in the group of genetically unrelated species that were previously lumped under *A. ovatula* (see Praz *et al.* 2022) due to their lack of distinguishing features, namely their small body size, more or less complete hairbands on T2–4, male A3 more or less the same length as A4 (Figure 24B), and simple male genital capsule (Figure 24D, gonocoxa apically rounded, penis valves not enlarged). In the female sex, *A. laevicorpus* can be recognised by its golden terminal fringe (Figure 23D; dark brown in true *A. ovatula* which does not occur in the eastern Mediterranean), very densely punctate terga, punctures on the disc of T2 separated by <0.5 puncture diameters, underlying surface shiny, and very densely punctate scutum, punctures around the parapsidal lines confluent, separated by 0.5–1 puncture diameter medially (Figure 23C). It is very similar to *A. afzeliella* (Kirby, 1802) and *A. taedium* spec. nov. (see below) that both occur in the eastern Mediterranean, though the exact range limits are not yet clear. *Andrena laevicorpus* can be separated from both taxa by the strength of the tergal and scutal punctures, these being weaker and slightly sparser (separated by >0.5 puncture diameters), and the underlying tergal surface is weakly shagreened and thus somewhat dull, and the shinier clypeus, this being shagreened and dull in the two comparison species. Confident separation requires comparative material, ideally with barcoded specimens as the three taxa are well-separated genetically (see Praz *et al.* 2022).



**FIGURE 24.** *Andrena (Taeniandrena) laevicorpus* spec. nov. male. A. Habitus, lateral view, B. Face, frontal view, C. Terga, dorsal view, D. Genital capsule, dorsal view.

Males have A3 0.8 times as long as A4 (Figure 24B), which also places them very close to *A. afzeliella* and *A. taedium*. Male *A. laevicorpus* can be separated from *A. afzeliella* because the penis valves are only very weakly broadened basally (Figure 24D; more clearly broadened basally in *A. afzeliella*). Robust separation from *A. taedium*

is not clear due to the low number of available barcoded specimens, but in the barcoded *A. taedium* male A3=A4, and the nervulus is more or less interstitial, whereas in *A. laevicorpus* A3 = 0.8 times longer than A4 and the nervulus is postfurcal. These types of characters may however be variable (see comments in Praz *et al.* 2022), and so association with females should be made or specimens should be barcoded. At the present time, *A. laevicorpus* is known only from Cyprus, and *A. taedium* does not appear to be present on this island, so they are provisionally considered to have an allopatric distribution.

**Remarks:** This is the taxon identified by Praz *et al.* (2022) as ‘*sp. nov. 1*’, with specimen ‘2086’ (=HYMAA340-22) designated as the holotype. Specimens collected in April 2022 were visiting *Onobrychis venosa* (Fabaceae). All specimens were collected in the spring (March–May), and so the species may be univoltine, whereas *A. taedium* appears to be bivoltine (see below).

**Etymology:** The name is combination of the Latin nouns *laevis* (smooth) and *corpus* (body) in reference to the shiny terga. It is a noun in apposition.

**Distribution:** Cyprus.

### *Andrena (Taeniandrena) taedium spec. nov.*

**HOLOTYPE: LEBANON:** Horch Ehden, Ain al Bayada Gate, 34.3033°N, 35.9831°E, 5.vii.2019, 1597 m, 1♀, leg. G. Ghisbain, OÖLM. BOLD accession number: HYMAA342-22.

**PARATYPES: GREECE:** Arkadia, 2 km NW Kosmas, 2.vi.2014, 1♂, leg. J. Litman & C. Praz, PRUN; **IRAN:** Lorestan province, Dorud Lanjaban env, 960 m, 10.v.2016, 1♀, leg. M. Kafka, OÖLM; **TURKEY:** 10 km N Tutak, Ağrı, 1500 m, 7.vi.1981, 1♀, leg. K. Warncke, OÖLM; 100 km N Adana, Feke, 12.vi.1998, 1♀, leg. Ma. Halada, OÖLM; 15 km E of Malatya, 27.vi.2000, 8♂, leg. Ma. Halada, OÖLM; 20 km E Göreme, 9.v.1994, 1♂, leg. K. Deneš, OÖLM; 50 km S Kars, Pasli, 1.vii.1997, 1♀, leg. Ma. Halada, OÖLM; Akyaka (Kızılağaç), 24.iv.2012, 1♀, leg. M. Kasperek, OÖLM; Bolu, 17 km S of Seben, 17.vi.1998, 1♂, leg. J. Halada, OÖLM; Çine, 12.iv.2018, 1♀, leg. M. Kasperek, OÖLM; Muğla, University campus, 720 m, 1–31.v.2016, 1♀, leg. Barták & Kubik, OÖLM; Nemrut Dağı, Adiyaman, 1500 m, 1.vi.1983, 1♀, leg. K. Warncke, OÖLM; Niğde, Camardi, 13.vii.1997, 1♀, leg. Ma. Halada, OÖLM; Siirt: 20 km NW Sirmak, 1500 m, 5.vi.1980, 3♀, leg. K. Warncke, OÖLM.

**Description: Female:** Body length: 10–11 mm (Figure 25A). **Head:** Dark, 1.2 times wider than long (Figure 25B). Clypeus flattened medially, strongly and densely punctured, punctures separated by 0.5–1 puncture diameter, slightly raised impunctate longitudinal line present medially; underlying surface shagreened, dull. Process of labrum trapezoidal, short, 2.5 times wider than long, narrowly but shallowly emarginate medially. Gena equalling width of compound eye; ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Foveae broad, occupying three quarters distance between ocellus and compound eye, slightly narrowed ventrally, filled with yellowish hairs. Face, gena, vertex, and scape with whitish to yellowish brown hairs, lighter ventrally, browner dorsally. Antennae dark, A3 exceeding A4+5, slightly shorter than A4+5+6. **Mesosoma:** Scutum densely punctate, punctures surrounding parapsidal lines separated by 0.5 puncture diameters, elsewhere separated by 0.5–1 puncture diameters, underlying surface generally weakly shagreened and shining (Figure 25C). Scutellum with punctures separated by 0.5–2 puncture diameters, underlying surface polished and shining over entire surface. Pronotum without humeral angle, evenly rounded. Mesepisternum and dorsolateral parts of propodeum with network of raised rugosity, propodeal triangle also covered with fine rugosity in basal two thirds, apical third with fine microreticulation, poorly differentiated from remaining propodeum. Mesepisternum with whitish hairs ventrally, becoming yellowish brown dorsally, scutum and scutellum with short yellowish brown hairs, propodeal corbicula incomplete, with weakly plumose yellow-brownish hairs, internal surface with many long simple golden hairs. Legs basally dark, tarsi and hind tibiae lightened orange. Flocculus and femoral scopa whitish yellow, tibial scopa golden; leg hair otherwise golden-brown. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus postfurcal. **Metasoma:** Terga dark, apical rim of marginal areas narrowly lightened hyaline-yellow; T1 finely and obscurely punctate, punctures separated by 1 puncture diameter, T2–4 more densely punctate, punctures separated by 0.5–1 puncture diameters, underlying surface shagreened, weakly shining (Figure 25D). T2–4 with wide whitish-yellowish apical hairbands obscuring underlying surface, more or less complete on T2, complete on T3–4. Apical fringe of T5 and hairs flanking pygidial plate golden orange, pygidial plate narrowly triangular, apically rounded, sometimes with slightly raised internal area, variable across specimens.





**FIGURE 25.** *Andrena (Taeniandrena) taedium* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terga, dorsal view.

**Male:** Body length: 9–10 mm (Figure 26A). **Head:** Dark, 1.25 times wider than long (Figure 26B). Clypeus flattened medially, strongly and densely punctured, punctures separated by 0.5–1 puncture diameter, underlying surface shiny. Process of labrum trapezoidal, twice as wide as long, strongly emarginate medially. Gena equalling width of compound eye; ocellocipital distance equalling 1.5 times diameter of lateral ocellus. Face, gena, vertex, and scape covered in long whitish yellow hairs, longest slightly exceeding length of scape. Antennae dark, A3=A4. **Mesosoma:** Scutum and scutellum densely punctate, punctures separated by 0.5 puncture diameters, underlying surface shiny. Mesepisternum and propodeum structurally as in female. Mesosoma covered in long yellowish hairs, some exceeding length of scape. Legs basally dark, hind tarsi lightened orange; hind tibiae predominantly lightened orange, variable, at least slightly darkened. Wings as in female, though nervulus variable, from interstitial to postfurcal. **Metasoma:** Terga structurally as in female (Figure 26C). Genital capsule simple, gonocoxae very slightly produced apically, essentially truncate, gonostyli apically spatulate with emargination in outer margin, sometimes weak (Figure 26D). Penis valves narrow, more or less parallel sided.

**Diagnosis:** *Andrena taedium* can be swiftly recognised as part of the subgenus *Taeniandrena* due to its strongly flattened clypeus in both sexes (Figures 25B, 26B). It can be placed in the group of genetically unrelated species that were previously lumped under *A. ovatula* (see Praz *et al.* 2022) due to their lack of distinguishing features, namely their small body size, more or less complete hairbands on T2–4 (Figure 25D), male A3 more or less the same length as A4 (Figure 26B), and simple male genital capsule (Figure 26D, gonocoxa apically rounded, penis valves not enlarged). In the female sex, *A. taedium* can be recognised due to its golden terminal fringe (dark brown in true *A. ovatula* which does not occur in the eastern Mediterranean), placing it close to *A. afzeliella* and *A. laevicorpus*. Separation from *A. laevicorpus* is given in the diagnosis for that species.





**FIGURE 26.** *Andrena (Taeniandrena) taedium* **spec. nov.** male. A. Habitus, lateral view, B. Face, frontal view, C. Terga, dorsal view, D. Genital capsule, dorsal view.

Separation from *A. afzeliella* is much more challenging. *Andrena taedium* has brighter golden-brown pubescence on the head and mesosoma (paler, often whitish in *A. afzeliella*), the body size is on average slightly larger at 10–11 mm (versus 8–10 mm), and the scutum is usually shinier (Figure 25C), with shining areas extending over the majority of the disc (usually with only a few small shining areas medially in *A. afzeliella*, typically shagreened across the entire scutum). Males can be separated by the genital capsule, with *A. taedium* having much narrower penis valves (Figure 26D; penis valves basally broadened in *A. afzeliella*) and with the outer margin of the gonostyli weakly emarginate, the apexes of the gonostyli therefore produced into rounded, apically projecting points (outer margin of the gonostyli evenly rounded). Extreme care must be taken when working with these species in the eastern Mediterranean; reference should be made to barcoded specimens.

**Remarks:** This is the taxon identified by Praz *et al.* (2022) as ‘*sp. nov. 3*’, with specimen ‘1576’ (=HYMAA342-22) designated as the holotype.

**Etymology:** From the Latin noun *taedium* meaning weariness, tedium, boredom, in reference to the very large number of cryptic species that have historically been lumped under the former broad taxon *Andrena ovatula* (Kirby, 1802) and which are highly challenging to separate morphologically. It is a noun in apposition.

**Distribution:** Greece, Turkey, Lebanon, Iran.

#### *Andrena (Tarsandrena) palliata* **spec. nov.**

**HOLOTYPE: MONGOLIA:** Arkhangay prov., 90 km NE Tsetserleg, 48.0503°N, 102.4169°E, 1400 m, along small river, 24.vii.2004, 1♂, leg. J. Straka, OÖLM.



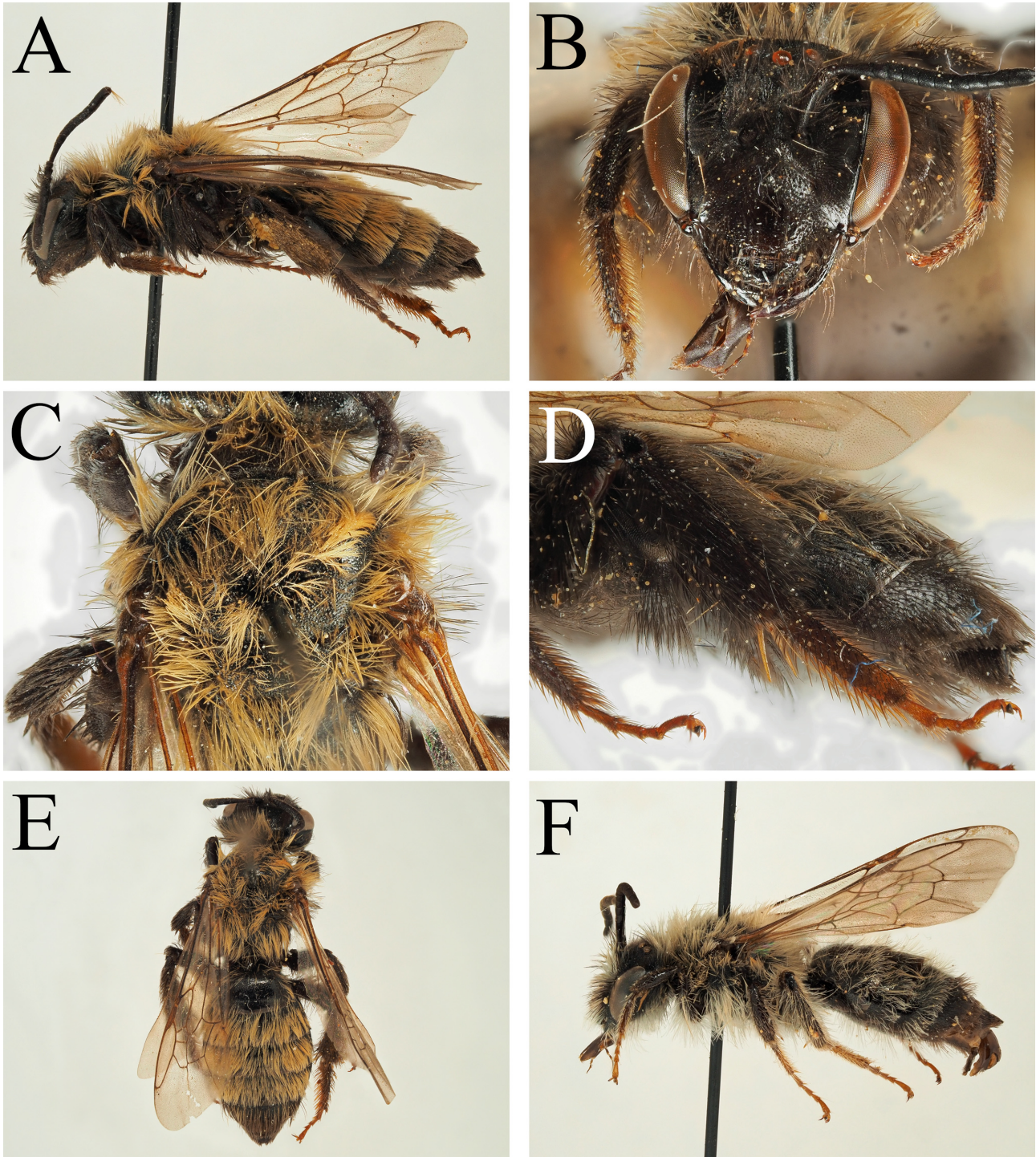
**PARATYPES: CHINA:** Tian Shan, 2000–3000 m, Urumqi 70 km Houxia, 24.vii.1991, 7♀, leg. M. Snižek, OÖLM; **MONGOLIA:** Arkhangay prov., 90 km NE Tsetserleg, 1400 m, along small river, 24.vii.2004, 2♂, 1♀, leg. J. Straka, OÖLM; Arkhangay, 90 km NE Tsetserleg, 1400 m, 27.vii.2005, 1♂, 3♀, leg. M. Kadlecová & J. Halada, OÖLM/TJWC; Arkhangay, 25 km NE Tsetserlg, 1730 m, 23.vii.2004, 1♂, leg. J. Straka, OÖLM.

**Description: Female:** Body length: 10–12 mm (Figure 27A). *Head:* Dark, 1.2 times wider than long (Figure 27B). Clypeus domed, regularly punctate, punctures separated by 0.5–1 puncture diameter with exception of broad impunctate longitudinal midline; underlying surface smooth and shining. Process of labrum trapezoidal, twice as wide as long, apical margin somewhat truncate, with weak and shallow median emargination. Gena slightly exceeding width of compound eye; ocelloccipital distance almost 2 times diameter of lateral ocellus. Foveae dorsally occupying just over half space between lateral ocellus and compound eye, poorly defined, ventrally slightly extending beyond antennal insertions; filled with dark brown hair. Face, gena, anterior part of vertex, and scape covered with moderately long black hairs, none equalling length of scape; vertex posteriorly with long golden-brown hairs, not strongly intermixing with black hairs anteriorly. Antennae dark, A3 exceeding A4+5, slightly shorter than A4+5+6. *Mesosoma:* Scutum and scutellum densely punctate, punctures separated by <0.5 puncture diameters over majority of disc, becoming slightly sparser medially, at most separated by 1 puncture diameter; underlying surface shagreened and weakly shining anteriorly and laterally, smooth and shining medially (Figure 27C). Pronotum with humeral angle. Mesepisternum shagreened, with hair-bearing punctures with slightly raised rims, punctures separated by 1 puncture diameter. Dorsolateral parts of propodeum microreticulate, microreticulation overlain by network of raised reticulation; propodeal triangle broad, internal surface with even granular microreticulation, thus defined by change in surface sculpture. Mesepisternum with long black hairs, slightly exceeding length of scape, scutum and scutellum with shorter golden-brown hairs. Propodeal corbicula incomplete, dorsal fringe composed of intermixed black and golden-brown weakly plumose hairs, internal surface with very short black hairs. Legs dark, apical tarsal segments lightened reddish, pubescence black. Flocculus black, short and dense, femoral and tibial scopa black, tibial scopa composed of loose, moderately long black hairs (Figure 27D). Hind tarsal claws with short inner tooth. Wings hyaline, stigma dark brown to orange, venation orange, nervulus weakly antefurcal. *Metasoma:* Terga dark, marginal areas with apical rim lightened hyaline-brown. Tergal discs microreticulate, weakly shining, microreticulation becoming weaker on marginal areas, here shining more strongly; tergal discs with fine crater punctures, basally separated by 1–2 puncture diameters, becoming sparser apically, apical parts of marginal areas impunctate. T1–4 in fresh individuals with long golden brown hairs that cover entire tergal disc and margin and obscure the underlying surface (Figure 27E). T5 with shorter black hairs, apical fringe of T5 and hairs flanking pygidial plate dark brown, pygidial plate relatively narrow, apically rounded, internal surface with elevated area medially, elevated areas with surface flat and featureless.

**Male:** Body length: 10 mm (Figure 27F). *Head:* Dark, 1.2 times wider than long (Figure 28A). Clypeus marked with yellow over majority of area with exception of two small mediolateral spots, yellow markings not extending to clypeal margins, these dark. Clypeus domed, regularly punctate, punctures separated by 0.5–1 puncture diameters with exception of narrow longitudinal impunctate line medially; underlying surface finely shagreened, weakly shining. Process of labrum rounded trapezoidal, twice as wide as long. Gena exceeding width of compound eye; ocelloccipital distance equalling 2 times diameter of lateral ocellus. Clypeus medially, antennal insertions, and scape with white hairs, inner margin of compound eye and frons with black hairs, intermixing slightly medially; gena ventrally with long white hairs, longest exceeding length of scape, becoming light brown dorsally on vertex. Antennae basally dark, A4–13 ventrally lightened by presence of grey scales; A3 exceeding A4+5, shorter than A4+5+6; A4 slightly longer than broad, shorter than A5. Scutum and scutellum densely punctate, punctures separated by <0.5 puncture diameters over majority of disc, becoming slightly sparser medially, at most separated by 1 puncture diameter; underlying surface shagreened and weakly shining anteriorly and laterally, smooth and shining medially. Pronotum with humeral angle. Mesepisternum microreticulate, with dense but poorly defined elongate punctures, punctures separated by 0.5 puncture diameters. Dorsolateral parts of propodeum microreticulate, microreticulation overlain by network of raised reticulation; propodeal triangle broad, slightly depressed below level of dorsolateral parts of propodeum, with network of raised fine rugosity over basal two thirds. Mesepisternum and propodeum with long yellowish hairs, clearly exceeding length of scape, scutum and scutellum with shorter yellowish hairs (Figure 28B). Legs basally dark, tarsi lightened orange, pubescence whitish. Hind tarsal claws with inner tooth. Wings hyaline, stigma dark brown to orange, venation orange, nervulus interstitial to weakly antefurcal. *Metasoma:* Terga dark, marginal areas with apical rim lightened hyaline-brown (Figure 28C). Terga very finely shagreened, broadly



shining; tergal discs with crater punctures, basally punctures separated by 1–2 puncture diameters, becoming sparser apically, apical parts of marginal areas impunctate. T1–4 in fresh individuals with long yellowish hairs that cover terga but do not obscure underlying surface, T5 with black hairs. S8 columnar, ventrally with short dark brown hairs. Genital capsule compact, rounded, gonocoxae produced into long, apically rounded teeth; gonostyli narrow, strongly arched, apically slightly broadened and weakly spatulate, with strongly raised internal margin (Figure 28D). Penis valves basally broad, with laterally produced rounded hyaline extensions, basal part thus appearing rounded.



**FIGURE 27.** *Andrena (Tarsandrena) palliata* **spec. nov.** female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Tibial scopa, lateral view, E. Dorsum. Male. F. Habitus, lateral view.

**Diagnosis:** *Andrena palliata* females are covered in a mixture of long orange and black hairs (Figures 27A, 27E) and have a weak humeral angle on the pronotum, and therefore superficially resemble *Andrena* s. str. or



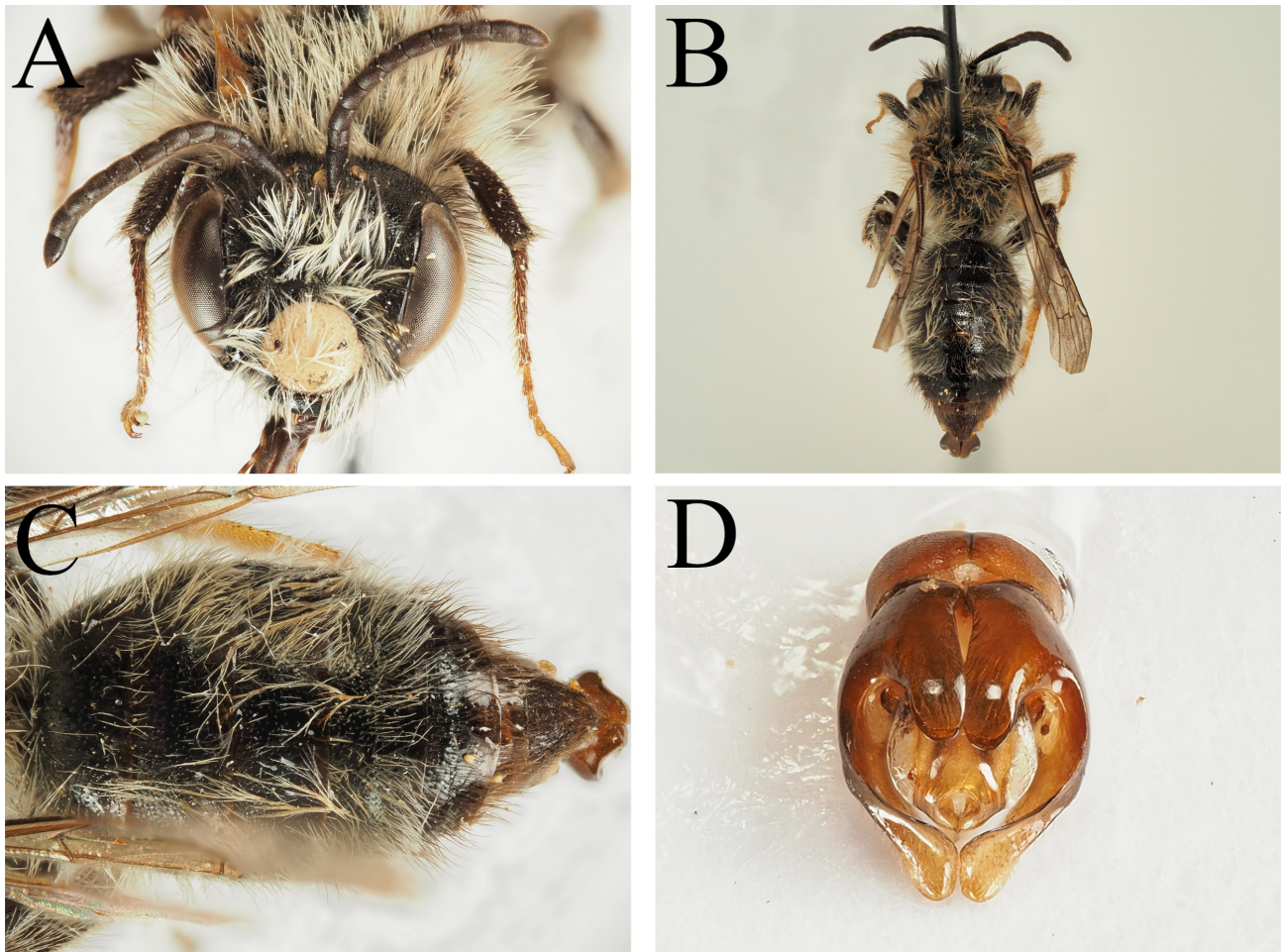
*Cnemidandrena* species such as *A. fulva* (Müller, 1766) or *A. nigriceps* (Kirby, 1802). However, the tibial scopa is composed of loose hairs (Figure 27D; tibial scopa typically with short dense hairs in *Cnemidandrena*, with the hind tibia itself being noticeably broader apically than basally) which is more typical of *Andrena* s. str., but material has been collected in the late summer, which is more typical of *Cnemidandrena*. Association with male material reveals the true phylogenetic affinity which is in the subgenus *Tarsandrena* due to the yellow-marked clypeus (Figure 28A), slightly broadened gena, humeral angle, finely rugose propodeal triangle that is slightly depressed below the level of the dorsolateral parts of the propodeum, and compact genital capsule with strongly produced gonocoxal teeth (Figure 28D). *Tarsandrena* are currently represented by eight Palaearctic species, with the highest diversity in the Eastern Palaearctic (Table 3), with only one species clearly passing the Ural mountains and entering the Western Palaearctic (*A. tarsata* Nylander, 1848).

**TABLE 3.** Species currently included in the subgenus *Tarsandrena* and their known distributions.

Species	Distribution	Source
<i>Andrena angariensis</i> Cockerell, 1929	China, Russia (Siberia, Russian Far East), Mongolia	Xu & Tadauchi (1999); Proshchalykin <i>et al.</i> (2017)
<i>Andrena bonivuri</i> Osytshnjuk, 1984	Russia (Eastern Siberia, Russian Far East)	Proshchalykin <i>et al.</i> (2017)
<i>Andrena ehnerbergi</i> Morawitz, 1888	China, Russia (Urals, Siberia, Russian Far East), Mongolia, Kyrgyzstan*	Xu & Tadauchi (1999); Proshchalykin <i>et al.</i> (2017); current publication
<i>Andrena niveomonticola</i> Xu & Tadauchi, 1999	China (Xizang, Yunnan)	Xu & Tadauchi (1999)
<i>Andrena sarydzhasi</i> Osytshnjuk, 2005	Kyrgyzstan, Uzbekistan*	Grünwaldt <i>et al.</i> (2005); current publication
<i>Andrena shawanensis</i> Xu & Tadauchi, 1999	China (Xinjiang)	Xu & Tadauchi (1999)
<i>Andrena tarsata</i> Nylander, 1848	Palaearctic	Xu & Tadauchi (1999); Gusenleitner & Schwarz (2002)
<i>Andrena truncatella</i> Xu & Tadauchi, 1999	China (Beijing, Hebei, Jilin, Heilongjiang, Shaanxi*, Shanxi*); North Korea*	Xu & Tadauchi (1999); current publication

Due to their large size (other *Tarsandrena* males clearly <10 mm in length), males are comparable only to *A. ehnerbergi* Morawitz, 1888 and *A. sarydzhasi* Osytshnjuk, 2005. *Andrena palliata* can easily be separated from *A. sarydzhasi* (male described below) as the gena is as wide as the width of the compound eye and the head is more or less as long as broad (gena strongly broadened and clearly wider than the width of the compound eye, head short, clearly much wider than long in *A. sarydzhasi*). The genital capsule of *A. palliata* is similar, but the gonocoxal teeth are more strongly pronounced and the gonostyli have their external margin clearly constricted subapically, with their apexes small, clearly smaller than the maximal breadth of the penis valves (genital capsule with external margin of gonostyli not constricted, gonostyli apically large, apexes each of comparable size to the maximal breadth of the penis valves in *A. sarydzhasi*). Separation from *A. ehnerbergi* can be made by the shape of the yellow clypeal markings, being more or less circular and not covering the entire clypeal surface (Figure 28A), with the lower paraocular areas black (clypeus with yellow markings extending to its edge, lower paraocular areas with small yellow spot in *A. ehnerbergi*), by the more scattered and more crater-like tergal punctures, punctures separated by 1–2 puncture diameters on tergal discs, tergal margins with punctures very scattered (tergal punctures regular, not crater-like, separated by 1 puncture diameter on tergal discs and margins), and by the gena which is only as wide as the width of the compound eye (clearly wider than the width of the compound eye in *A. ehnerbergi*). The genital capsule is also diagnostic, as *A. ehnerbergi* have the genital capsule close to *A. sarydzhasi* with the apexes of the gonostyli large and spatulate, with the outer margin straight, lacking the subapical contraction that is present in *A. palliata*.

Females do not resemble any known *Tarsandrena* due to the extensive long and dense hairs covering the terga, most species instead displaying complete or interrupted white apical hairbands. Additionally, the clypeus is domed (Figure 27B), with punctures becoming sparse medially, here smooth and shining; other *Tarsandrena* species typically display a more or less flattened clypeus. Female *A. palliata* should be primarily diagnosed against *Andrena* s. str. or *Cnemidandrena* using the characters detailed above.



**FIGURE 28.** *Andrena (Tarsandrena) palliata* **spec. nov.** male. A. Face, frontal view, B. Dorsum, C. Terga, dorsolateral view, D. Genital capsule, dorsal view.

**Remarks:** *Andrena palliata* was found in sympatry with two other *Tarsandrena* species in Mongolia at its two collecting sites: *A. ehnerbergi* and *A. tarsata*. These species appear to be specialists of *Potentilla* (Rosaceae). Study is required to establish whether *A. palliata* shares this pollen foraging niche.

**Etymology:** Feminine form of the Latin adjective *palliatus* meaning ‘to cloak’ (from *pallium* meaning cloak), thus meaning cloaked, covered, or protected, in reference to the dense hairs covering the female terga, and also to the somewhat obscure phylogenetic affinities of the female.

**Distribution:** China (Xinjiang) and Mongolia.

**Comparative material examined.** *Andrena ehnerbergi*: **KYRGYZSTAN:** Kungei-Alatau, 2200 m, 14.vii.2001, 1♀, leg. Z. Klyuchko, OÖLM; **MONGOLIA:** Arkhangay, 90 km NE Tsetserleg, 1400 m, 24.vii.2004, 1♂, 2♀, leg. M. Kadelcová, OÖLM; Arkhangay, 90 km NE Tsetserleg, 1400 m, 27.vii.2005, 1♂, 5♀, leg. P. Tymer & J. Halada, OÖLM; Arkhangay, 25 km NE Tsetserlg, 1730 m, 23.vii.2004, 3♂, 10♀, leg. M. Kadelcová, OÖLM.

*Andrena tarsata*: **MONGOLIA:** Arkhangay, 25 km NE Tsetserlg, 1730 m, 23.vii.2004, 1♂, 1♀, leg. J. Straka & M. Kadelcová, OÖLM.

*Andrena truncatella*: **CHINA:** Beijing, Xiaolongmen N. Park, 1300 m, 4–10.vi.2016, 8♂, 1♀, leg. E. Jendek & O. Sauša, OÖLM; Shaanxi, Qinling mts, Xunyangba (6 km E), [Xunyangbazhen] 1000–1300 m, 23.v–13.vi.1998; 1♂, leg. I.H. Marshal, OÖLM; Zhaoyi, Zhongtiao Shan mt., 21.v.1996, 22♂, leg. J. Halada, OÖLM; **NORTH KOREA:** Myohyangsan Mts., Hyangean [Hyangsan], 650 m, 28.v–2.vi.1986, 1♂, leg. Dr. T. Soldán, OÖLM.



*Andrena (Ulandrena) graciliata* spec. nov.

**HOLOTYPE: CYPRUS:** Limassol, Yermasoyia [Germasogeia], 8.iii.1979, 1♂, leg. L-Å. Janzon, OÖLM.

**PARATYPES: CYPRUS:** Limassol, Yermasoyia [Germasogeia], 6.iii.1979, 1♂, leg. L-Å. Janzon, OÖLM; Limassol, Yermasoyia [Germasogeia], 15.iii.1979, 1♂, 1♀, leg. L-Å. Janzon, OÖLM; Pissouri, 29.iii.1978, 2♂, leg. H. Teunissen, RMNH.

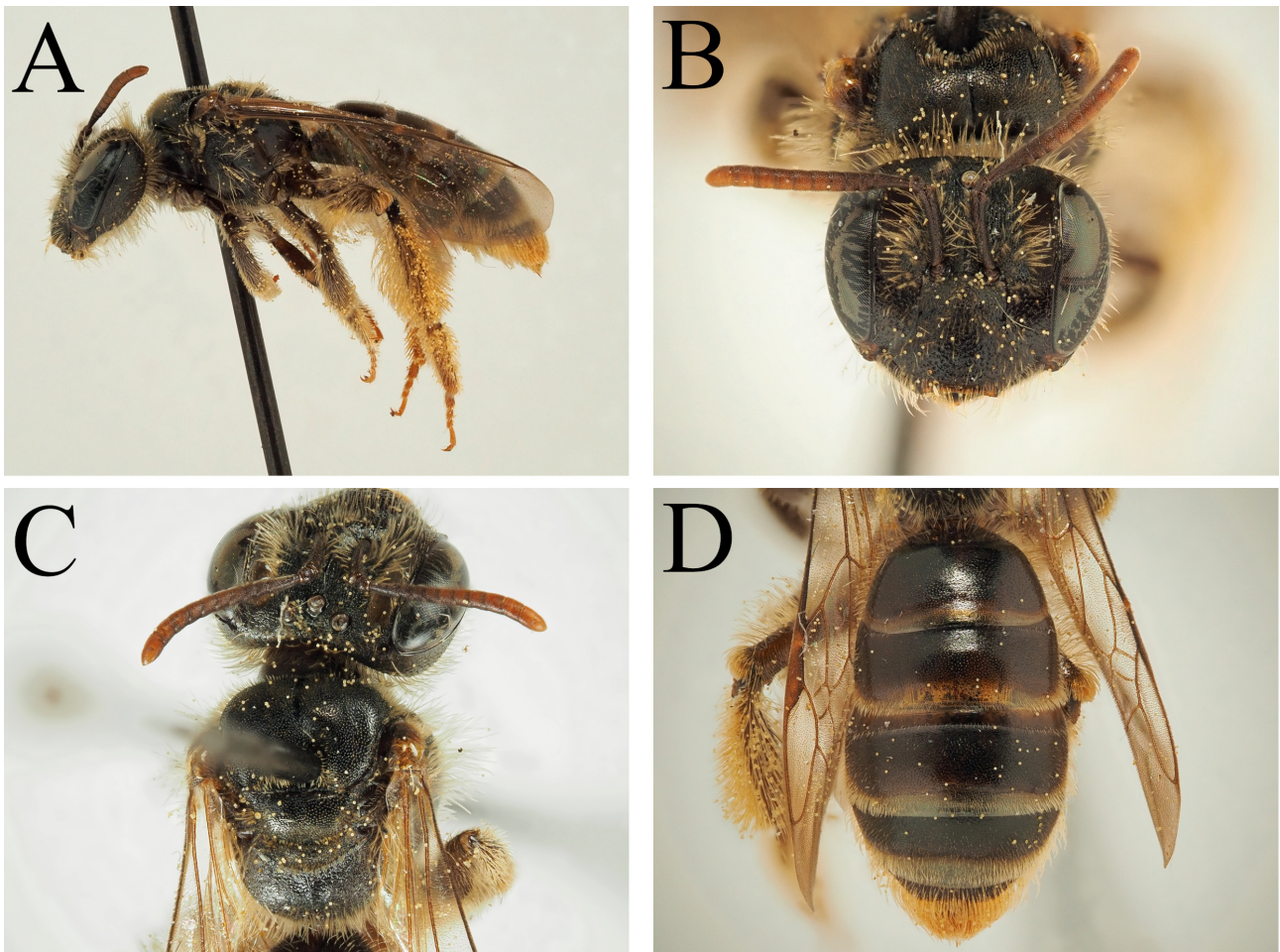
**Description: Female:** Body length: 7 mm (Figure 29A). *Head:* Dark, 1.2 times wider than long (Figure 29B). Clypeus domed, densely punctate, punctures separated by 1 puncture diameter, underlying surface microreticulate, weakly shining. Process of labrum trapezoidal, 2.5 times wider than long, apical margin truncate. Gena equalling width of compound eye; ocellocipital distance equalling 1 diameter of lateral ocellus. Foveae dorsally occupying half distance between lateral ocellus and compound eye, slightly impressed, extending ventrally to lower margin of antennal insertions; filled with light yellowish-brown hairs. Face, gena, vertex, and scape with light brownish hairs. Antennae basally dark, A5–12 ventrally lightened by presence of orange scales; A3 exceeding A4+5, shorter than A4+5+6. *Mesosoma:* Scutum and scutellum densely and regularly punctate, punctures separated by 0.5 puncture diameters, underlying surface finely shagreened, shining (Figure 29C). Pronotum evenly rounded. Mesepisternum and dorsolateral parts of propodeum microreticulate, microreticulation overlain with fine network of raised reticulation; propodeal triangle laterally delineated by weak carinae in basal half, internal surface with fine and dense network of raised rugae with clear longitudinal raised midline. Mesepisternum with long whitish hairs, hairs not equalling length of scape, scutum and scutellum with very short light brown plumose hairs. Propodeal corbicula incomplete, dorsal fringe composed of sparse light brownish hairs, internal surface with scattered simple light brown hairs. Legs dark to dark brown, apical tarsal segments lightened dark orange, pubescence light brown. Flocculus sparse, composed of scattered long whitish plumose hairs, femoral and tibial scopae weakly plumose, light yellowish-brown. Hind tarsal claws with inner tooth. Hind tibial spur broadened submedially. Wings hyaline, stigma dark orange, venation orange, nervulus weakly postfurcal. *Metasoma:* Terga dark, marginal areas broadly lightened hyaline-yellow; tergal discs basally microreticulate to finely shagreened, weakly shining, regularly and finely punctate, punctures separated by 1–2 puncture diameters (Figure 29D). T2–4 with weak apical fringes of yellowish hairs, widely interrupted on T2, complete on T3–4, not obscuring underlying surface. Apical fringe of T5 and hairs flanking pygidial plate golden, pygidial plate rounded triangular, dorsal surface flat, featureless.

**Male:** Body length: 6 mm (Figure 30A). *Head:* Dark, 1.3 times wider than long (Figure 30B). Clypeus yellow-marked in apical half, sometimes with yellow markings extending onto lower paraocular area (Figure 30C). Clypeus weakly domed, punctate, punctures separated by 0.5–1 puncture diameter, underlying surface shagreened, weakly shining. Process of labrum rectangular, twice as wide as long. Gena equalling width of compound eye; ocellocipital distance slightly exceeding 1 diameter of lateral ocellus. Gena ventrally with long white hairs, equalling length of scape, hairs becoming golden-brown on face, vertex, and scape. Antennae basally dark, A5–13 ventrally lightened by presence of dark orange-brown scales; A3 subequal to A4+5. *Mesosoma:* Scutum and scutellum irregularly punctate, punctures separated by 0.5–2 puncture diameters, underlying surface laterally shagreened and weakly shining to more or less smooth and shining medially. Pronotum evenly rounded. Mesepisternum and propodeum structurally as in female. Mesepisternum with long whitish-brown hairs, longest hairs exceeding length of scape, hairs on scutum, scutellum, and propodeum becoming golden-brown. Legs dark brown, tarsi lightened orange, pubescence light brown. Hind tarsal claws with inner tooth. Wings hyaline, stigma dark orange, venation orange, nervulus interstitial. *Metasoma:* Terga structurally as in female (Figure 30D). T2–5 with weak apical fringes of golden hairs, not obscuring underlying surface. S8 long, columnar, moderately broad, apex truncate, ventrally densely covered with golden hairs. Genital capsule elongate triangular, gonocoxae with inner margins forming more or less 90° angle, gonostyli narrow, medially constricted, apically spatulate, dorsal surface densely punctate, punctures confluent (Figure 30E). Penis valves broad, occupying majority of space between gonostyli, gradually tapering apically, with raised longitudinal part medially constricted.

**Diagnosis:** *Andrena graciliata* can be recognised as an *Ulandrena* due to the female hind tibial spur which is broadened submedially, the male face with yellow markings (Figures 30B–C), and the complex male genital capsule (Figure 30E). It is closest to *A. acerba* Warncke, 1967 which is known from Greece, Turkey, Armenia, and Iran (Wood & Monfared 2022).

The two taxa can be separated by the male genital capsule (Figure 30E), with *A. graciliata* having the inner margins of the gonocoxae forming 90° angles (forming obtuse angles in *A. acerba*, Figure 30F), the gonostyli are

medially constricted with a clear angle in their outer margin (gonostyli with outer margin more or less straight, not constricted in *A. acerba*), and the apical parts of the gonostyli are narrower, with a less pronounced inner margin, and with a more clearly and densely punctate dorsal surface, punctures confluent (gonostyli with apical parts broader, with a somewhat raised inner margin, and with sparse and obscure punctures dorsally, punctures separated by 1 puncture diameter).



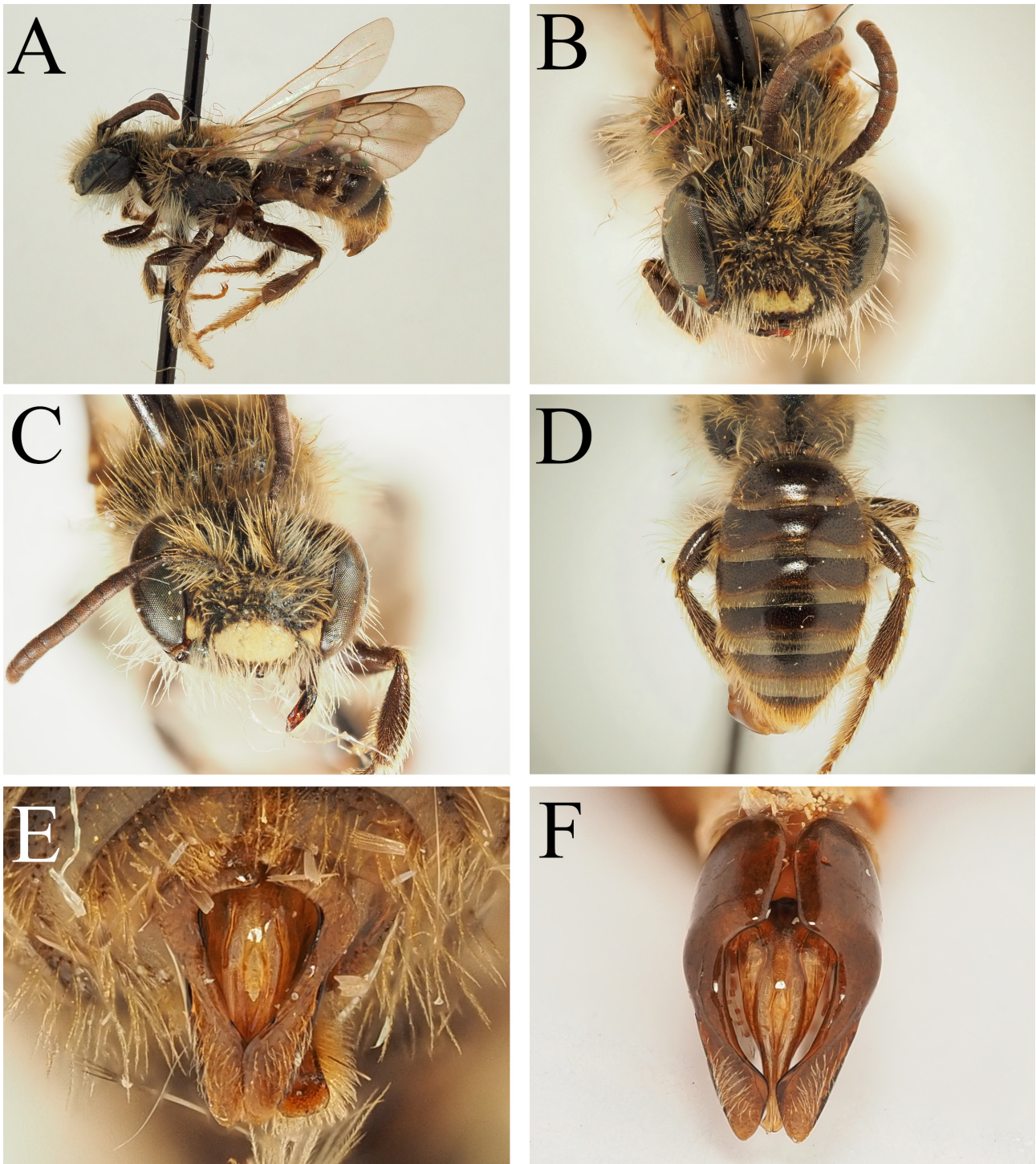
**FIGURE 29.** *Andrena (Ulandrena) graciliata* spec. nov. female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terga, dorsal view.

Females should be identified against confidently determined comparative material. In direct comparison, females of *A. graciliata* have finer and more delicate tergal punctation than *A. acerba*. Moreover, the tergal discs of *A. graciliata* are finely shagreened to basally microreticulate, with tergal punctures thus almost disappearing into this background shagreen. In contrast, *A. acerba* is obscurely to weakly shagreened (with at most a very narrow strip of microreticulation at the base of T2), and individual punctures are clearly visible against the comparatively smooth tergal structure. The two species can also be separated by their consistently different body size, with *A. graciliata* females measuring 7 mm and males 6 mm (9 mm and 8 mm in *A. acerba*), as well as their allopatric distribution, *A. acerba* never having been reported from Cyprus (Gusenleitner & Schwarz 2002). This is similar to the situation with *A. (Ulandrena) abbreviata* Dours, 1873 sensu lato, which has a wide distribution from south-eastern Europe to Central Asia, and *A. (Ulandrena) polemediana* Mavromoustakis, 1956 which is restricted to Cyprus. In this case, *A. polemediana* is consistently smaller, has finer punctation, and has small differences in the genital capsule (shorter gonocoxal teeth).

**Etymology:** Feminine form of the Latin *gracilis* (meagre, slim) with the suffix *-ta* indicating that it is an adjective; the name is in reference to the slimmer and more elongate gonostyli compared to those in the sister species *A. acerba*.

**Distribution:** Cyprus.





**FIGURE 30.** *Andrena (Ulandrena) graciliata* **spec. nov.** male. A. Habitus, lateral view, B. Face, dark form, frontal view, C. Face, light form, frontal view, D. Terga, dorsal view, E. Genital capsule, dorsal view. *Andrena (Ulandrena) acerba* Warncke, 1967. F. Genital capsule, dorsal view.

#### New lectotype designation and clarification of phylogenetic affinities

##### *Andrena (Leimelissa) flagella* Nurse, 1904

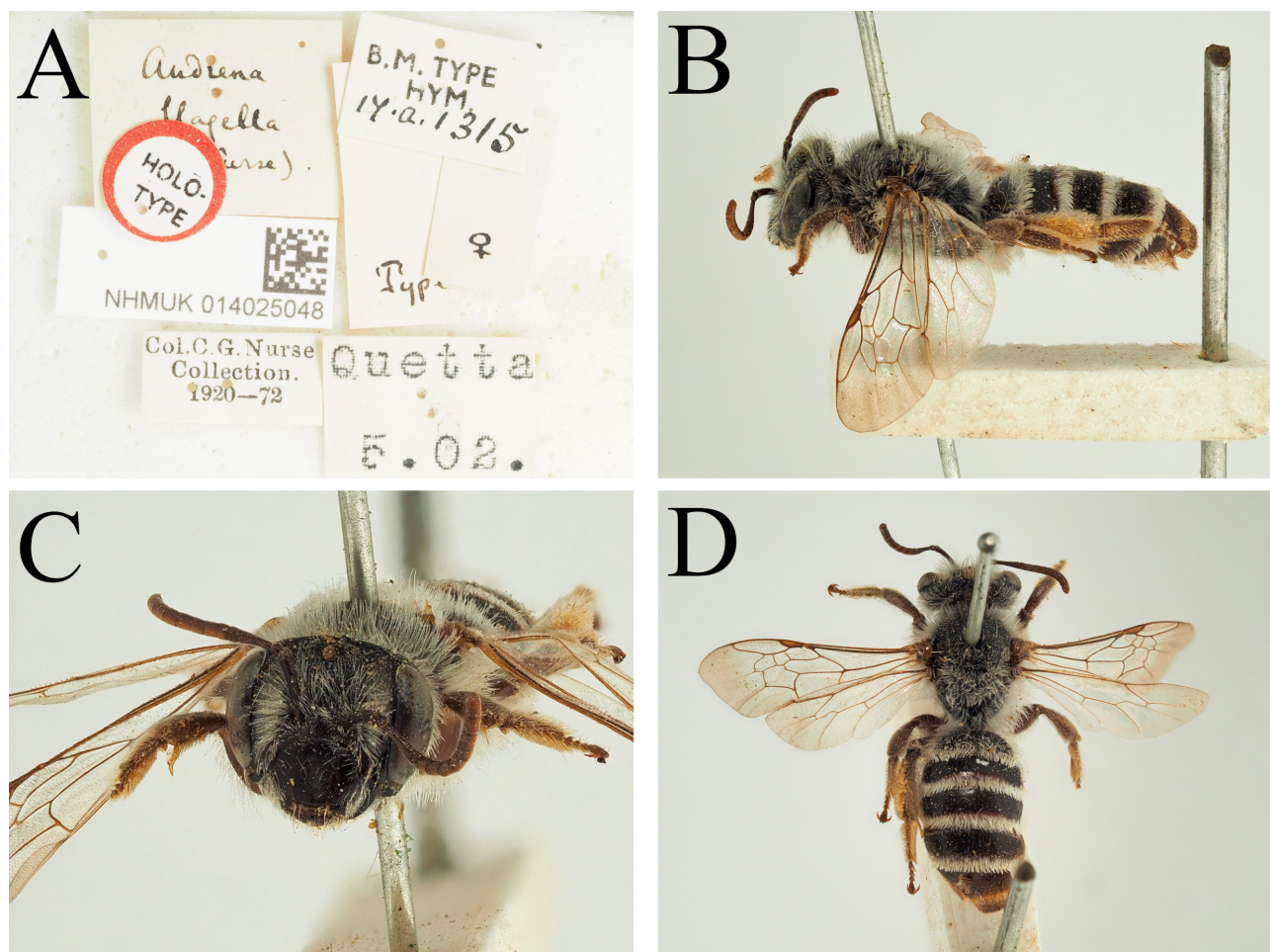
**Material examined.** PAKISTAN: Quetta, v.1902, 1♀, leg. C.G. Nurse, NHMUK (holotype).

**Remarks:** Gusenleitner & Schwarz (2002) listed this species as part of the subgenus *Lepidandrena*. Examination



of the holotype (Figures 31A–D) shows that this species displays a very broad and flattened clypeus, short and broad process of the labrum that is four times wider than long, weakly punctate mesepisternum, smooth propodeal triangle that contrasts the weakly punctate dorsolateral parts of the propodeum, and a lack of short squamous hairs on the scutum. It is therefore transferred to the subgenus *Leimelissa*.

**Distribution:** Pakistan (Quetta; Nurse 1904).



**FIGURE 31.** *Andrena (Leimelissa) flagella* Nurse, 1904 holotype female. A. Label details, B. Habitus, lateral view, C. Face, frontal view, D. Dorsum.

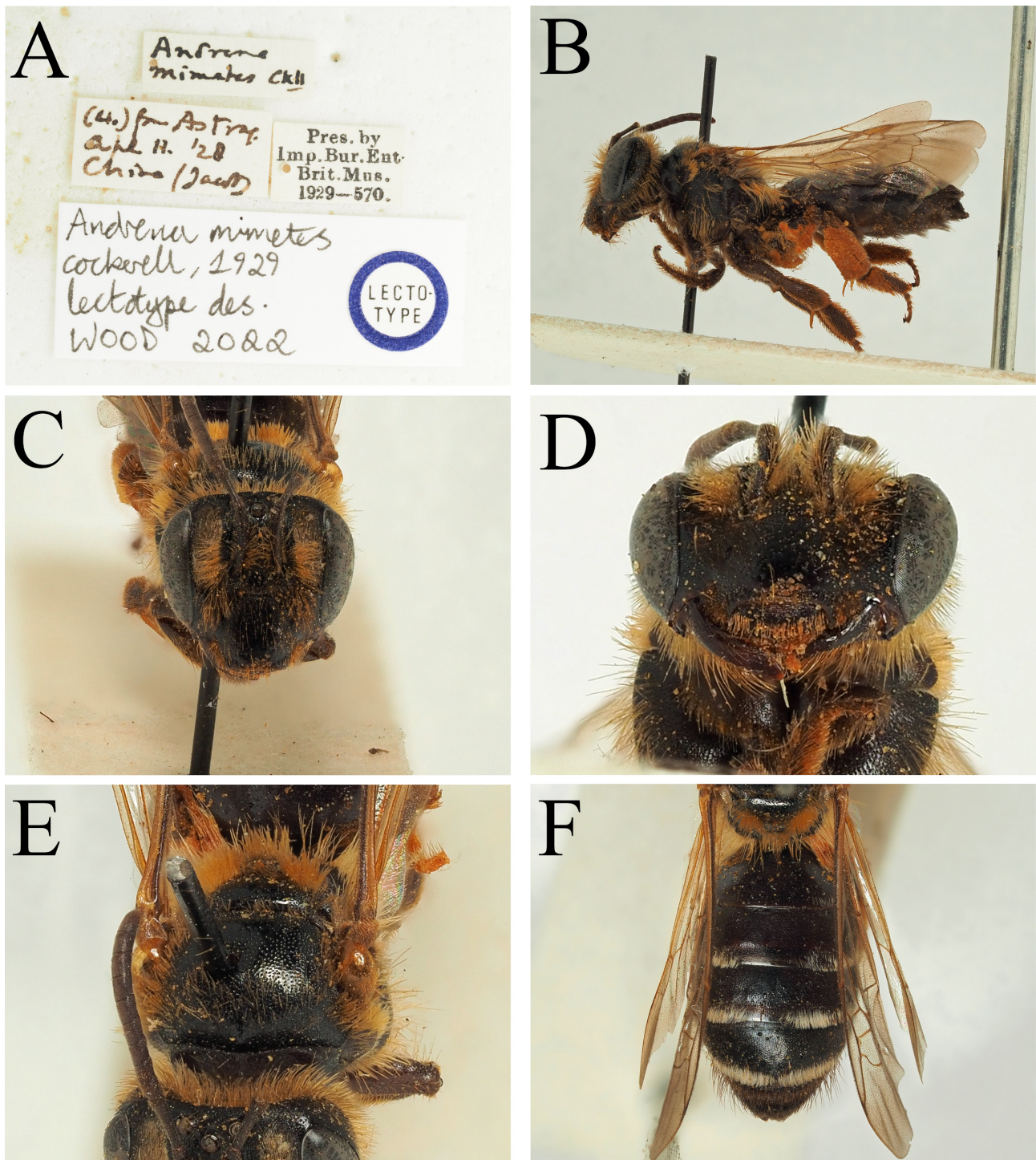
### *Andrena (Leimelissa) mimetes* Cockerell, 1929

**Material examined: CHINA:** [label almost illegible; information taken from Cockerell (1929): Tsinan (=Jinan, Shandong province), 7.iv.1928, leg. Jacot], 1♀, NHMUK (lectotype, by present designation).

**Remarks.** The location of type material for *Andrena mimetes* has not been clear (Gusenleitner & Schwarz 2002). Cockerell (1929: 205) indicated that ‘co-types’ were sent to the British museum, but no specimens have yet been sorted into their type catalogue. Inspection of the general collection revealed a single female specimen (Figures 32A–D) labelled as *A. mimetes* by Cockerell (handwritten label with Cockerell’s distinctive handwriting) and matching the description as well as the diagnosis of subsequent authors (Xu & Tadauchi 2008). The handwritten locality label is almost illegible, but ‘Jacot’ can be identified, the name of the collector, and ‘28’, the year of collection, 1928. This specimen is hereby designated as a lectotype to fix the location of type material and to cement the species concept.

**Distribution:** China (Beijing, Inner Mongolia, Shandong; Xu & Taduachi 2008).





**FIGURE 32.** *Andrena (Leimelissa) mimetes* Cockerell, 1929 lectotype female. A. Label details, B. Habitus, lateral view, C. Face, frontal view, D. Labrum detail, E. Scutum, dorsal view, F. Terga, dorsal view.

***Andrena (Melandrena) metallescens* Cockerell, 1906**

*Andrena (Melandrena) metallica* Radoszkowski, 1876 nec. Fabricius

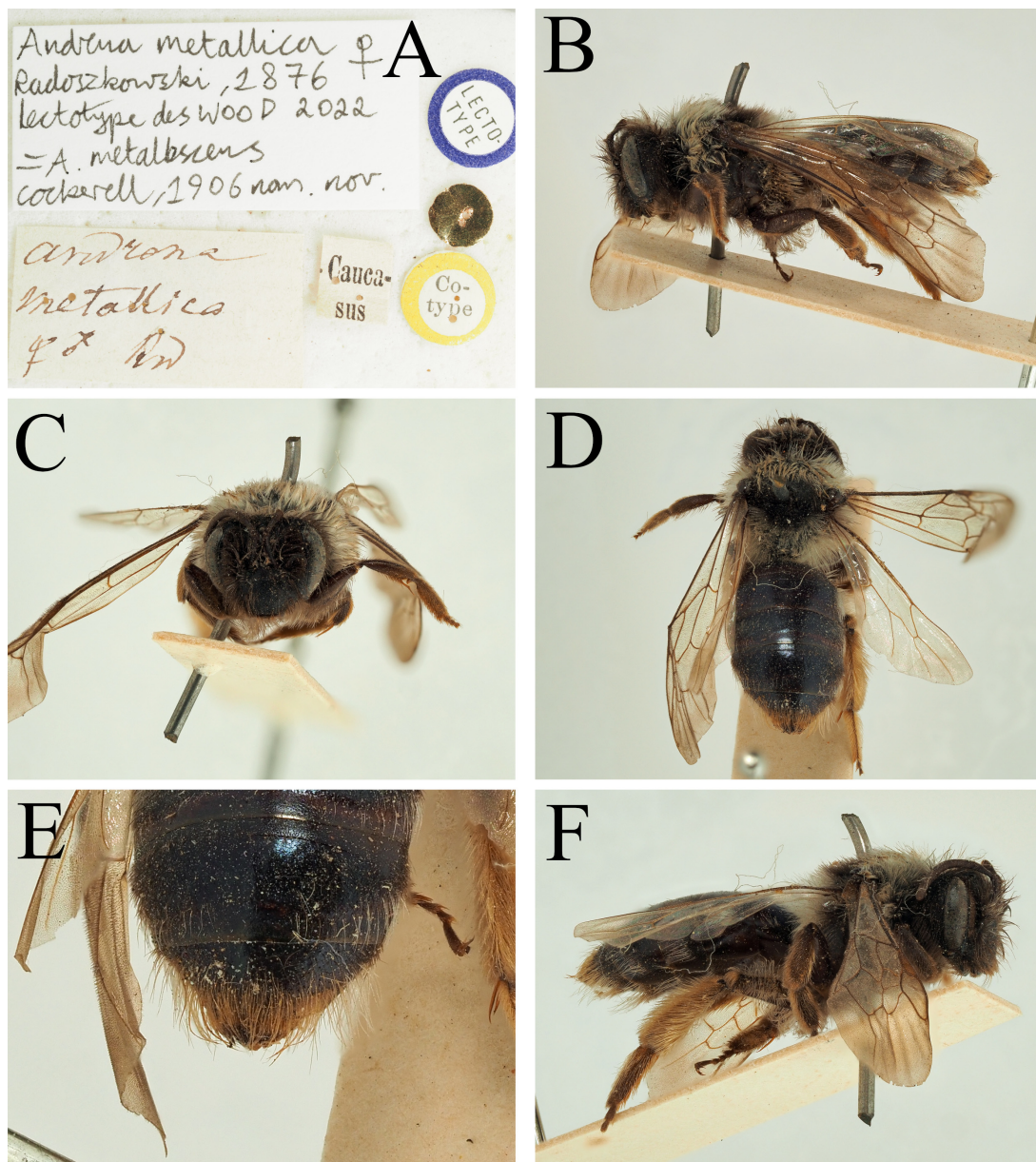
*Andrena (Melandrena) metallescens* Cockerell, 1906 *nom. nov.* for *A. metallica*

**Material examined:** **CAUCASUS:** Caucasus, 1♀, NHMUK (lectotype, by present designation); **RUSSIA:** Sarepta [Volgograd], 1893, 1♀, leg. Becker, OÖLM.



**Remarks.** Searches in the NHMUK collection unexpectedly uncovered a specimen of *Andrena metallescens* (Figures 33A–D) which is a replacement name for *A. metallica* Radoszkowski, 1876 (nec. Fabricius). The type depository for *A. metallica* is unknown (Gusenleitner & Schwarz 2002; Osytshnjuk *et al.* 2008), as much of Radoszkowski's collection has been dispersed between different museums and the location of type material is not always clear (e.g. Wood 2021a; Wood & Monfared 2022). Cockerell (1906: 166) gave no additional details as to whether or not he had examined material, and therefore it is not clear if he moved the specimen to London or it was moved by someone else. There is no accession number bearing the year that the specimen was integrated into the NHMUK collection, as is typically found on specimens (e.g. Figures 19A, 31A, 32A). The specimen itself is clearly part of Radoszkowski's original syntypic series as it bears (Figure 33A) the same printed "Caucasus" label as for *A. assimilis* Radoszkowski, 1876 (see Wood & Monfared 2022) and a golden disc of the sort that Radoszkowski typically used to demark his type specimens (see Rosa *et al.* 2015). The specimen also bears a label with Radoszkowski's handwriting with the name *Andrena metallica*. The specimen conforms to Radoszkowski's description and subsequent use by other authors (e.g. Osytshnjuk *et al.* 2008), and therefore it is hereby designated as a lectotype.

**Distribution:** Caucasus, southern part of European Russia, Kazakhstan (Osytsnjuk *et al.* 2008; Proshchalykin *et al.* 2017).



**FIGURE 33.** *Andrena (Melandrena) metallica* Radoszkowski, 1876 (= *Andrena metallescens* Cockerell, 1906) lectotype female. A. Label details, B. Habitus, lateral view, C. Face, frontal view, D. Terga, dorsal view, E. Terminal fringe, dorsal, F. Habitus, reverse view.



## New synonymies

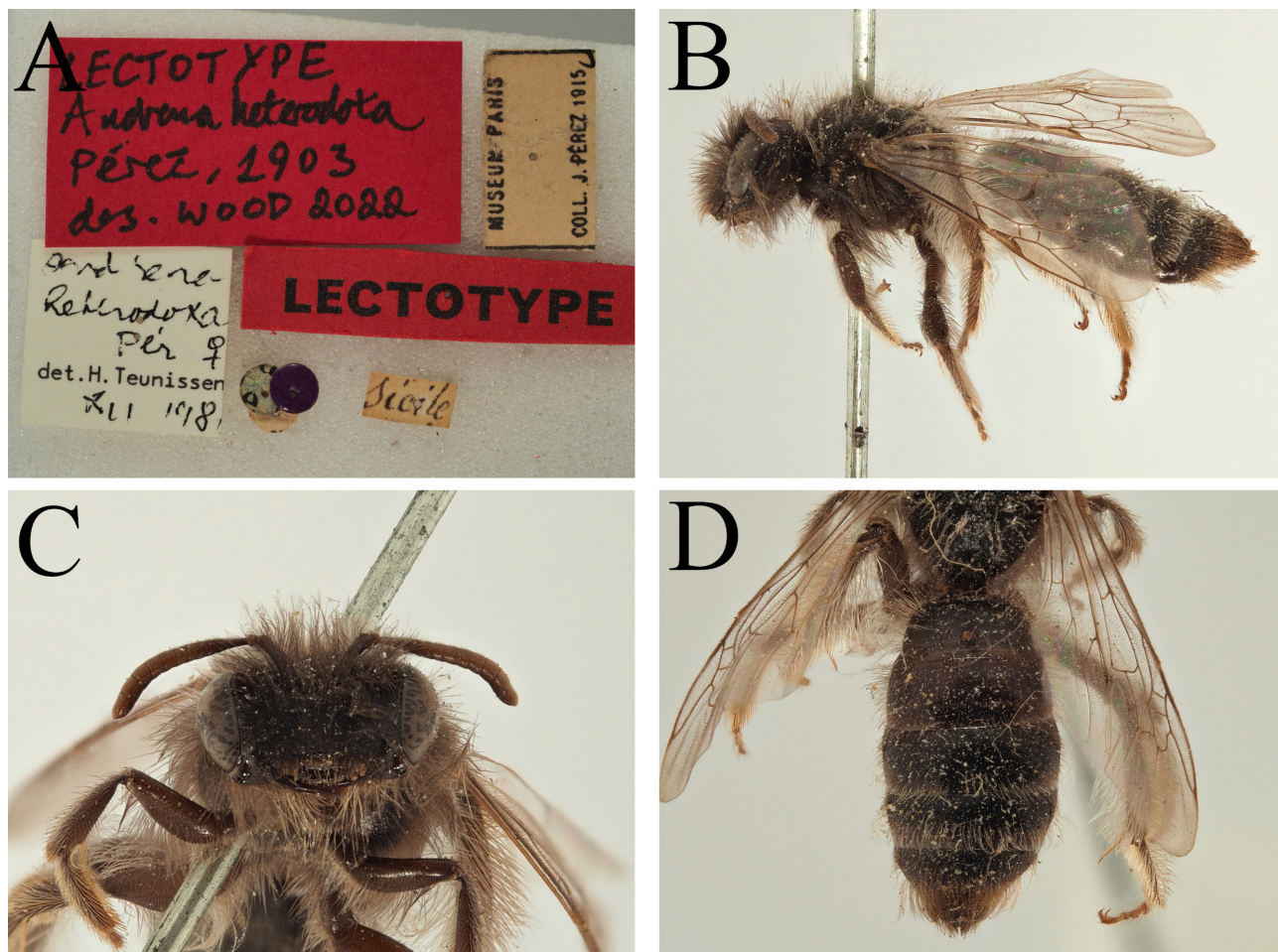
### *Andrena (Avandrena) heterodoxa* Pérez, 1903 sp. resurr.

*Andrena (Avandrena) siciliana* Warncke, 1980 syn. nov.

**Material examined:** ITALY: Sicile, 1♀, MNHN (lectotype of *A. heterodoxa*, by present designation); Sicilia, 1858, 1♀, leg. Mann, OÖLM (holotype of *A. siciliana*).

**Remarks:** Pérez's (1903) description is typically unhelpful, first drawing comparison to the group of *gwynana* (= *A. bicolor* Fabricius, 1775, subgenus *Euandrena*), before comparing the species to *A. panurgina* De Steffani, 1889 (as *A. panurgina* Pérez, 1903 nec. De Steffani, but fortunately Pérez's *panurgina* is the same taxon as De Steffani's). No mention is made of the important presence of long spines on the posterior face of the hind femur. However, Pérez does mention that the taxon differs from *A. panurgina* by the much broader process of the labrum (this being narrowly triangular and pointed in *A. panurgina*).

Warncke (1967) reported that he could not find type material for this taxon in the MNHN collection, and synonymised the taxon with *A. bicolor*, presumably based on the description. However, type material is present in the MNHN, with a single female specimen of *A. heterodoxa* (Figures 34A–D). This lectotype label was presumably added by H. Teunissen, as the handwritten determination label was added by Teunissen in December 1981, but it is not a valid lectotype since it was never published. The specimen may automatically be a holotype, but this is not clear from Pérez's description. It is therefore hereby designated as a lectotype.



**FIGURE 34.** *Andrena (Avandrena) heterodoxa* Pérez, 1903 lectotype female. A. Label details, B. Habitus, lateral view, C. Face, ventrolateral view, D. Terga, dorsal view.

Warncke (1980) described *A. siciliana* from Sicily, based on a single specimen collected in 1858. This specimen is identical to *A. heterodoxa* through the combination of long spines on the posterior face of the hind femur, extensive black pubescence on the mesosoma and face, and broad process of the labrum. It is therefore synonymised **syn. nov.** *Andrena heterodoxa* appears to be restricted to Sicily. Pérez's specimen is undated, so the only known year of capture is 1858. Under the most optimistic scenario, it has therefore not been reported since 1903 at the latest (the year of Pérez's publication), and under the most pessimistic scenario it has possibly not been caught in the past 165 years (since 1858). However, members of the subgenus *Avandrena* are often specialists of *Erodium* (Geraniaceae, though see Pisanty *et al.* 2022a) and are therefore frequently overlooked (e.g. Wood & Ortiz-Sánchez 2022). It is therefore possible that *A. heterodoxa* persists to this day on the island of Sicily.

**Distribution:** Italy (Sicily).

### *Andrena (Andrena) inconstans* Morawitz, 1877

*Andrena (Andrena) bulgariensis* Warncke, 1965 **syn. nov.**

**Material examined:** **ARMENIA:** Helenowka [Sevan], 1♀, ZISP (lectotype of *A. inconstans*, illustrated Astafurova *et al.* 2021); **BULGARIA:** Situjakowo, Tschertér Tepé, 1730 m, 1–30.iv.1916, 4♀, leg. S.G. Boetticher, OÖLM (holotype of *A. bulgariensis*, two paratypes); Situjakowo, Tschertér Tepé, 1730 m, 1–30.iv.1917, 2♂, leg. S.G. Boetticher, OÖLM (paratypes of *A. bulgariensis*); Ljulin Geb. [Liulin], 1000 m, 4.iv.1940, 1♀, leg. B. Pittioni, OÖLM; Melnik, Pirin Mountains, 1–30.vi.1988, 1♀, leg. U. Buchsbaum, TJWC; **CRIMEA:** Crim, 1♀, OÖLM (paratype of *A. bulgariensis*); **TURKEY:** Bolu lake env., 28.iv.1994, 1♀, leg. K. Deneš, OÖLM; Kars, 20 km W of Sarikamiş, 2100 m, 26.v.1980, 5♀, leg. K. Warncke & M. Schwarz, OÖLM; W Sarikamis [Sarikamiş]/Kars, 31.v.1977, 4♀, leg. K. Warncke, OÖLM.

**Remarks:** Many of the *Andrena* species described by Morawitz have recently had their type material clarified and illustrated with high-quality photographs (Astafurova *et al.* 2021; 2022a). This work has clarified the relationship between several obscure taxa nominally known only from the Caucasus versus nominally more widespread West Palaearctic species. Examination of the type photographs of *A. inconstans* that was described from what are now modern day Armenia and Azerbaijan reveals that this is the senior synonym of *A. bulgariensis* **syn. nov.** that was later described by Warncke (1965) from Bulgaria and Crimea. The type specimens are identical, and the distribution of '*Andrena bulgariensis*' extends from Bulgaria across northern Turkey to the Caucasus. *Andrena inconstans* could therefore be considered to have a circum-Black Sea distribution.

**Distribution:** Bulgaria, Romania, Crimea, Turkey, Armenia, Azerbaijan (Gusenleitner & Schwarz 2002; Wood 2021a; Astafurova *et al.* 2021).

### *Andrena (Hoplendrena) rosae* Panzer, 1801

*Andrena (Hoplendrena) schoenitzeri* Gusenleitner, 1998 **syn. nov.**

**Remarks.** Gusenleitner (1998) described *A. schoenitzeri* (type photographs available at <https://www.zobodat.at/belege.php>) from eastern Turkey and Azerbaijan and diagnosed it against *A. clusia* and *A. mordax* due to its dark pubescence. However, this overlooks dark individuals of *A. rosae*. Structurally, there are no differences between the two taxa, with females displaying the same medially shining propodeal triangle, terga with at most short and scattered hairs, and densely punctate clypeus, with males sharing the same quadrate A3 (slightly shorter than broad, at most one quarter the length of A4), apically truncate S8 (not medially emarginate), and simple genital capsule. *Andrena rosae* is an extremely widespread species, but shows substantial colour variation across this range for both the terga and pubescence. In the Eastern Palaearctic for example, it shows the presence of white apical tergal hairbands (ssp. *alfkeni* Friese, 1914, e.g. Xu & Tadauchi 2005). In Turkey, the species is absent from the western part of the country (see map in Gusenleitner & Schwarz 2002), but reappears in the east where individuals are almost entirely black, though individuals with very dark red discs of T2 can be found, as is the case for one of the paratypes of *A. schoenitzeri*. These black individuals can be found from eastern Turkey, through the Caucasus and Iran to some parts of Central Asia where the more typical red form also occurs.



**Distribution.** Palaearctic, from Iberia to Japan (Gusenleitner & Schwarz 2002).

**Material examined.** **AZERBAIJAN:** Elisabethpol [Ganja], 1♀, OÖLM (paratype of *A. schoenitzeri*); **TURKEY:** Hakkâri, Şivelan, 18.v.1975, 1♀, leg. K. Warncke, OÖLM (paratype of *A. schoenitzeri*); Hakkari, Suvari Halil-Pass, 2300 m, 14.vi.1981, 1♂, 3♀, leg. K. Warncke & M. Kraus, OÖLM (paratypes of *A. schoenitzeri*); Hakkari, Suvari Halil-Pass, 2500 m, 2.vi.1980, 2♀, leg. K. Warncke, OÖLM (paratypes of *A. schoenitzeri*); Kars, 20 km W Karakurt, 1600 m, 27.v.1980, 1♀, leg. K. Warncke, OÖLM (paratype of *A. schoenitzeri*); Kars, 20 km W Sarikamis [Sarıkamış], 2100 m, 26.v.1980, 1♀, leg. M. Schwarz (holotype of *A. schoenitzeri*); Kars, 20 km W Sarikamis [Sarıkamış], 2100 m, 4♂, 1♀, leg. K. Warncke, OÖLM (paratypes of *A. schoenitzeri*); Pass W Hakkari, Altın Dağları [Khrebet Altyn], 2600–3000 m, 13.viii.1979, 1♀, leg. K. Warncke, OÖLM (paratype of *A. schoenitzeri*); W Sarikamis [Sarıkamış]/Kars, 30–31.v.1977, 1♂, 3♀, leg. K. Warncke, OÖLM (paratypes of *A. schoenitzeri*).

### *Andrena (Truncandrena) pareklisiae* Mavromoustakis, 1957

*Andrena (Truncandrena) medeninensis usura* Warncke, 1967 **syn. nov.**

**Remarks:** Warncke took a broad approach to the taxon *Andrena medeninensis* Pérez, 1895 that was described from Tunisia (the town of Medenine). He gave it a distribution across the Mediterranean and described multiple subspecies for somewhat differentiated populations (Warncke 1967; Warncke 1974), including a subspecies for Turkey that was called *usura*.

This subspecies is widely distributed in the eastern Mediterranean, but in cooler Levantine habitats, and is thus disconnected from populations of *A. medeninensis* s. str. in North Africa. Genetic work is ongoing on this complex, and at least one subspecies of *A. medeninensis* s.l. will be elevated in an upcoming revision (TJW, *in prep.*). Concerning the eastern population, *A. medeninensis usura* has been confused and reported from the island of Cyprus (Varnava *et al.* 2020), from which *A. pareklisiae* was described by Mavromoustakis (1957). The difference between these taxa is unclear in the literature, as Warncke (1967) made no reference to it in his description of *A. medeninensis usura*. Examination of a female paratype of *A. pareklisiae* and the female holotype of *A. medeninensis usura* reveals that they are conspecific, and *A. medeninensis usura* is synonymised **syn. nov.** with *A. pareklisiae*. This taxon therefore has a broader Levantine distribution that previously recognised, extending eastwards to Iran. In Lebanon, it is present at high altitude sites.

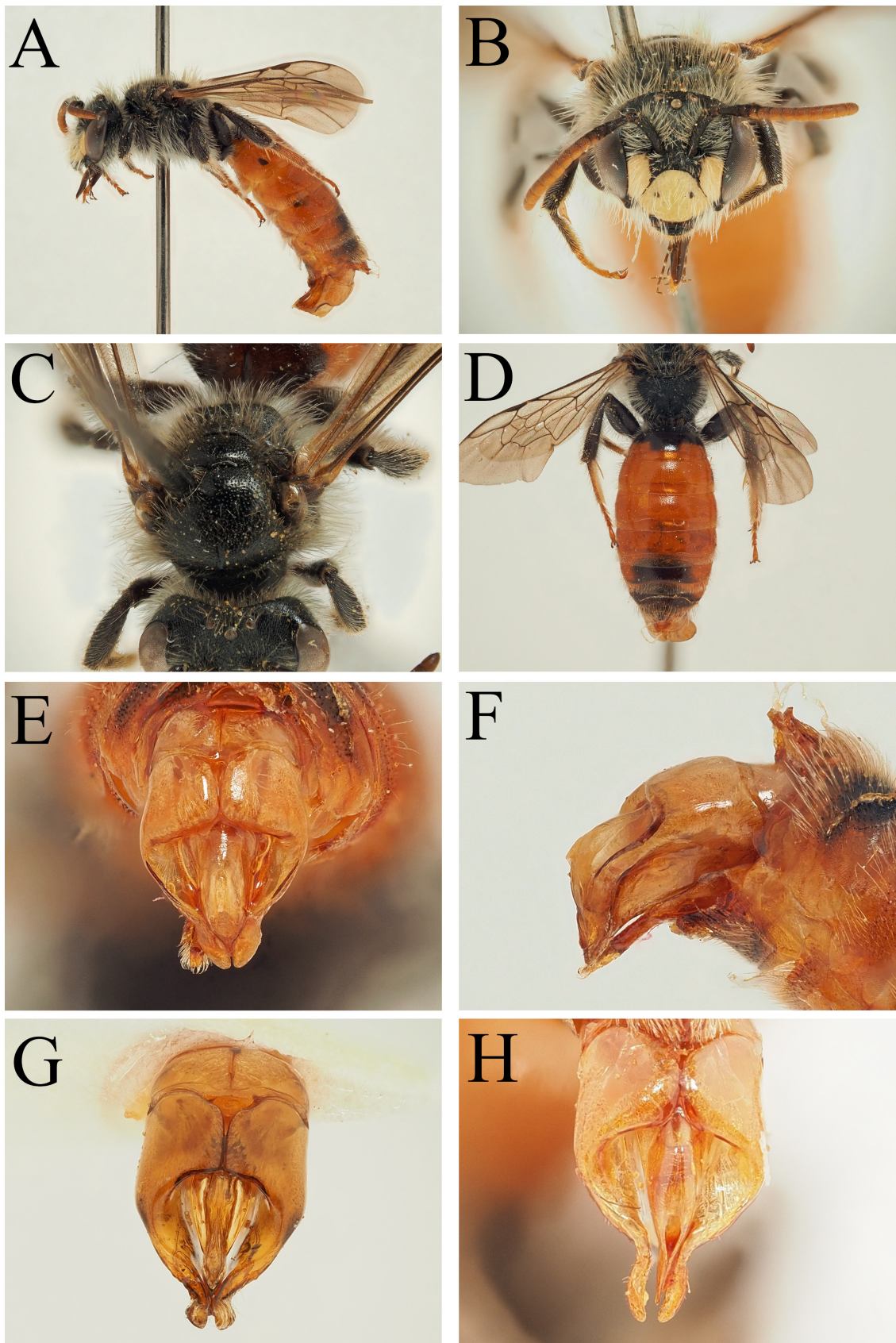
**Distribution:** Cyprus, Turkey, Lebanon, Syria, Iran (Varnava *et al.* 2020; Wood *et al.* 2020a; Wood & Monfared 2022, previous records as *A. medeninensis usura*).

**Material examined:** **CYPRUS:** Famagusta, 9.iii.1932, 1♀, leg. E.E. Green, OÖLM (determined as *A. medeninensis usura* by K. Warncke); Lania [Laneia], 11.iv.1953, 1♀, leg. G.A. Mavromoustakis, OÖLM (paratype of *A. pareklisiae*); **TURKEY:** Ayvalik, 13.iv.1965, 1♀, leg. K. Warncke, OÖLM (holotype of *A. medeninensis usura*).

### Descriptions of newly discovered sexes of *Andrena* species described from a single sex

#### *Andrena (Poecilandrena) adjacens* Morawitz, 1875

**Description: Male:** Body length: 8 mm (Figure 35A). **Head:** Dark, 1.2 times wider than long (Figure 35B). Clypeus entirely yellow marked with exception of two small black marks medio-laterally, yellow markings extending onto lower paraocular areas, extending dorsally as far as lower margin of antennal insertions. Clypeus domed, shallowly punctate, punctures separated by 1–3 puncture diameters, underlying surface superficially shagreened, weakly shining. Process of labrum trapezoidal, twice as wide as long, apical margin very weakly emarginate. Gena equalling width of compound eye, ocelloccipital distance equalling two thirds diameter of lateral ocellus. Face, gena, vertex, and scape with long white hairs, becoming slightly yellowish-brown on vertex; longest hairs on lower part of gena exceeding length of scape. Antennae basally dark, A4 apically, A5–13 ventrally lightened orange; A3 slightly exceeding A4+5, shorter than A4+5+6. **Mesosoma:** Scutum and scutellum clearly punctate, punctures separated by 1–2 puncture diameters, underlying surface weakly shagreened apically and laterally, becoming smooth and shining medially (Figure 35C). Mesepisternum and dorsolateral parts of propodeum microreticulate with short and obscurely raised rugosity; propodeal triangle clearly delineated laterally by raised carinae, internal surface with dense



**FIGURE 35.** *Andrena (Poecilandrena) adjacens* Morawitz, 1875 male. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terna, dorsal view, E. Genital capsule, dorsal view, F. Genital capsule, lateral view. *Andrena (Poecilandrena) labiata* Fabricius, 1781 male. G. Genital capsule, dorsal view. *Andrena (Poecilandrena) hybrida* Warncke, 1975 male. H. Genital capsule, dorsal view.



network of raised rugae covering entire surface. Mesepisternum with long white hairs exceeding length of scape, scutum and scutellum with shorter yellowish-brown hairs, propodeum with sparser and shorter whitish plumose hairs. Legs dark, fore and mid basitarsi obscurely and partially lightened orange, predominantly dark, hind basitarsi entirely orange; pubescence whitish. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation dark orange, nervulus interstitial. *Metasoma*: Terga extensively red-marked; T1 apico-laterally on disc and marginal area, T2–4 entirely, T5 laterally on disc; remaining areas dark (Figure 35D). Tergal discs regularly punctate, punctures separated by 1–2 puncture diameters, marginal areas slightly depressed, with obscure sparse punctures, becoming impunctate apically, underlying surface finely shagreened, weakly shining. T1 with moderately long whitish upstanding hairs, remaining terga with short obscure whitish hairs. S8 long and columnar, apically slightly truncate, ventrally with short golden hairs. Genital capsule large, gonocoxae without apical teeth, gonostyli apically converging, produced into narrow apically projecting pegs (Figure 35E). Penis valves very broad, occupying entire space between gonostyli, with clear valve opening medially, slightly bulbous in profile view (Figure 35F).

**Diagnosis:** *Andrena adjacens* can quickly be recognised as a *Poecilandrena* due to its small body size, extensive red colouration of the terga (Figure 35D), white facial markings on the clypeus and lower paraocular areas (Figure 35B), and typical construction of the genital capsule (Figures 35E–F). The specific construction of the genital capsule does not match any known *Poecilandrena*. It is most similar to *A. labiata* (Figure 35G) and *A. hybrida* (Figure 35H). The penis valves are much broader, occupying the entire area between the gonostyli (Figure 35E; with clear space visible in the two comparison taxa), and the gonostyli are weakly apically produced, thickened, and not outwardly reflexed (gonostyli apically produced into long and tapering points in *A. hybrida*, points shorter in *A. labiata* but clearly outwardly reflexed at their apexes). *Andrena adjacens* was described from Alexandropol [Gyumri] in northern Armenia. The two collecting localities of Erzincan and Erzurum are approximately 375 km and 230 km to the west, respectively, but these are areas with a similar climate. An Turko-Armenian fauna can be found in north-eastern Turkey, as supported by the discovered of *A. (Leimelissa) ermolenkoi* Osytshnjuk, 1984 in this region (see below). The female type of *A. adjacens* is illustrated by Astafurova *et al.* (2021).

**Distribution:** Turkey and Armenia (Astafurova *et al.* 2021).

**Material examined:** **TURKEY:** 14 km N Erzincan, road Erzincan to Çayırh, st. 466, 2000 m, 10.vi.1988, 1♂, leg. H. & Th. v. Oorschot, H. v. d. Brink, H. Wiering, RMNH; Erzurum, 17.vi.1971, 1♂, leg. H. Ozbek, OÖLM.

### *Andrena* (?*Aciandrena*) *palmyriae* Wood, 2021

**Description: Male:** Body length: 5–6 mm (Figure 36A). *Head:* Dark, 1.25 times wider than long (Figure 36B). Clypeus weakly domed, densely punctate, punctures separated by 1 puncture diameter, underlying surface finely shagreened, weakly shining. Process of labrum short, slightly wider than long, deeply semi-circularly emarginate medially. Gena subequal to width of compound eye; ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Face, gena, vertex, and scape with white hairs, none equalling length of scape. Antennae basally dark, A3 apically and A4–13 lightened bright orange ventrally. A3=A4+5, A4 extremely short, clearly wider than long, half length of A5 (Figure 36C). *Mesosoma:* Scutum and scutellum finely and irregularly punctate, punctures separated by 1–4 puncture diameters, underlying surface smooth and shining, becoming shagreened laterally (Figure 36D). Pronotum without humeral angle, evenly rounded. Mesepisternum and dorsolateral parts of propodeum finely microreticulate; propodeal triangle poorly defined, internal surface almost indistinguishable from dorsolateral parts, with short and weak rugae basally. Mesosoma with long white hairs, longest equalling length of scape. Legs dark basally, tarsi and hind tibiae lightened orange. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus antefurcal. *Metasoma:* Tergal discs dark, marginal areas extensively lightened yellow-orange, becoming hyaline apically (Figure 36E). Tergal discs microreticulate basally, dull, microreticulation disappearing apically, here smooth and shining; areas lacking microreticulation sparsely punctate, punctures separated by 2–3 puncture diameters. T1–4 apically with loose white hairbands. Genital capsule compact, gonocoxae very weakly produced, apically rounded, gonostyli apically spatulate, penis valves moderately broad basally, gradually narrowing apically (Figure 36F).

**Diagnosis:** *Andrena palmyriae* was originally tentatively placed in the *Aciandrena* based on the unsculptured propodeal triangle, antefurcal nervulus, and domed and striation-free clypeus. It was described from a single female, and no male material was available for study. A long series of females and males was found in unidentified Warncke material from relatively close to the *locus typicus* of Palmyra in the Syrian desert. Males have a dark clypeus (Figure

36B), whereas most *Aciandrena* species have a yellow-marked clypeus. Subgeneric placement in the many small black species found in deserts is highly challenging (Pisanty *et al.* 2022b), and genetic work will be needed to decisively resolve this issue. For species diagnosis, male *A. palmyriae* should be recognised by its combination of simple genital capsule (Figure 36F), dark clypeus, ventrally orange antennae,  $A_3=A_4+5$ ,  $A_4$  extremely short, half as long as  $A_5$  (Figure 36C), propodeal triangle with obscure striations at its base, antefurcal nervulus, light orange tarsi (Figure 36A), and reddish-orange hyaline tergal margins (Figure 36E). Separation from other species is challenging because some species that are similar in the female sex have been described only from females (specifically, *A. nitidicollis* and *A. xera*). It can be separated from males of the similar *A. badiyah* Wood, 2021 as this species has a yellow clypeus. It is almost identical to *A. pavonia*, but the scutum and scutellum are extensively shiny (Figure 36D; shagreened and dull in *A. pavonia*) and the clypeus is more densely punctate, punctures separated by 1 puncture diameter, without clear shining interspaces (punctures separated by 1–2 puncture diameters in *A. pavonia*, with shining interspaces).



**FIGURE 36.** *Andrena* (?*Aciandrena*) *palmyriae* Wood, 2021 male. A. Habitus, lateral view, B. Face, frontal view, C. Antennae detail, D. Scutum, dorsal view, E. Terga, dorsal view, F. Genital capsule, dorsal view.



**Remarks.** The large series of specimens allows further assessment of the diagnostic criteria proposed by Wood (2021) for the female sex in the original description of this species based on a single specimen. The emarginate process of the labrum remains a key character; though not every specimen displayed a process of the labrum that was a deeply and strongly emarginate as in the holotype, every examined female showed at least some degree of emargination. Likewise, the scutum was always predominantly shiny, and the nervulus of the forewing was always more or less interstitial.

**Distribution:** Syria (Wood 2021).

**Material examined: SYRIA:** 110 km E of Palmyra, 350 m, 22.iv.1992, 20♂, 40♀, leg. K. Warncke, OÖLM.

### *Andrena (Tarsandrena) sarydzhasi* Osytshnjuk, 2005

**Description: Male:** Body length: 10 mm (Figure 37A). *Head:* Dark, 1.5 times wider than long (Figure 37B). Clypeus yellowish-white, with two small black marks laterally. Clypeus very weakly domed, densely but shallowly punctate, punctures separated by 0.5 puncture diameters, underlying surface shagreened, weakly shining. Process of labrum truncate, rectangular, slightly wider than long, fore margin thickened and weakly upturned. Gena exceeding width of compound eye, produced into a square point (Figure 37C); ocelloccipital distance equalling 1.5 times diameter of lateral ocellus. Face medially, scape, vertex dorsally, and gena ventrally with long white hairs, some exceeding length of scape; inner margin of compound eyes and gena posteriorly with contrasting equally long black hairs. Antennae dark, A3 exceeding A4+5, shorter than A4+5+6; A4 short, square, shorter than A5, A5–13 all longer than broad. *Mesosoma:* Scutum and scutellum irregularly punctate, punctures separated by 1–3 puncture diameters, underlying surface smooth and shining. Pronotum with strong humeral angle. Mesepisternum shagreened, with dense but shallow punctures, punctures separated by 0.5–1 puncture diameters. Dorsolateral parts of propodeum with dense network of raised rugosity, dull; propodeal triangle laterally delineated by obscure carinae, internal surface weakly depressed with network of sparser carinae with shining interspaces, thus contrasting dull dorsolateral parts of propodeum (Figure 37D). Mesepisternum with long white hairs, clearly exceeding length of scape, scutum and scutellum with white hairs, becoming intermixed with black hairs medially, propodeum with intermixed black and white hairs, generally black dorsally, white ventrally (Figure 37E). Legs dark, apical tarsal segments lightened orange, pubescence whitish basally to brown apically. Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation orange, nervulus weakly antefurcal. *Metasoma:* Terga dark, marginal areas subtly lightened dark brown; tergal discs densely punctate, punctures separated by 1 puncture diameter, marginal areas less densely punctate, punctures separated by 2–3 puncture diameters; underlying surface smooth and shining. T2–4 with weak apical whitish hair fringes, not obscuring underlying surface. Genital capsule compact, gonocoxae apically produced into rounded teeth, gonostyli with blades strongly broadened and flattened, penis valves with broad, rounded, hyaline lateral extensions (Figure 37E).

**Diagnosis:** Male *A. sarydzhasi* can be quickly recognised as a *Tarsandrena* due to the short and broad head (Figure 37B), white-marked clypeus, broadened gena, strong humeral angle, finely rugose propodeal triangle that is slightly depressed below the level of the dorsolateral parts of the propodeum (Figure 37D), and compact genital capsule with strongly produced gonocoxal teeth (Figure 37F).

In Central Asia, due to its large size (for a *Tarsandrena*), it is comparable only to *A. ehnerbergi* (see also Diagnosis for *A. palliata* **spec. nov.** above). Separation can be made with reference to the sparser scutal punctures, punctures separated by 1–3 puncture diameters with frequent areas of puncture-free integument (in *A. ehnerbergi* with dense and regular punctures; specimens with punctures separated by more than one puncture diameter are rare), and also by a comparison of the propodeal triangle which is broad basally and strongly narrowed apically and which is slightly depressed over its area relative to the dorsolateral parts of the propodeum (in *A. ehnerbergi* with the propodeal not so strongly narrowed apically, and not depressed relative to the dorsolateral parts of the propodeum). The gena is also more strongly expanded and forming a right angled rounded corner ventrally (Figure 37C; gena expanded but more or less evenly rounded in *A. ehnerbergi*), but given the low number of examined *A. sarydzhasi* specimens it is unclear whether or not this is a consistent character.

**Distribution:** Uzbekistan\* and Kyrgyzstan (Grünwaldt *et al.* 2005, Table 3).

**Material examined: KYRGYZSTAN:** Sary-Dzhaz, Kaindy ravine, prope Tash-Koroo, 2700 m, 17.vii.1993, 2♂, 1♀, leg. D. Milko, OÖLM; **UZBEKISTAN:** Perewal Kamschik [Pereval Kamchik, mountain pass], 6.vii.1987, 1♀, leg. P. Salk, OÖLM.

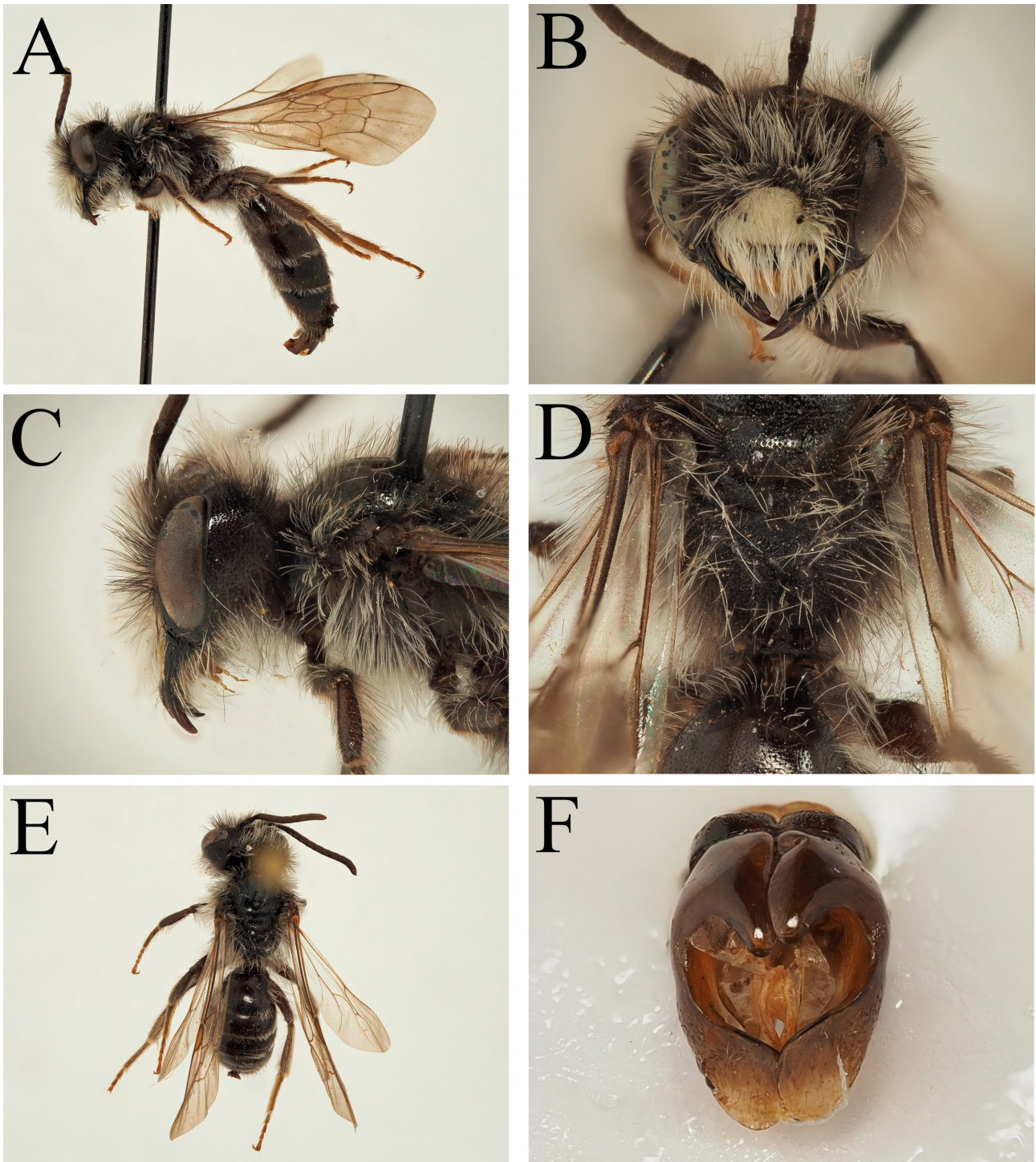


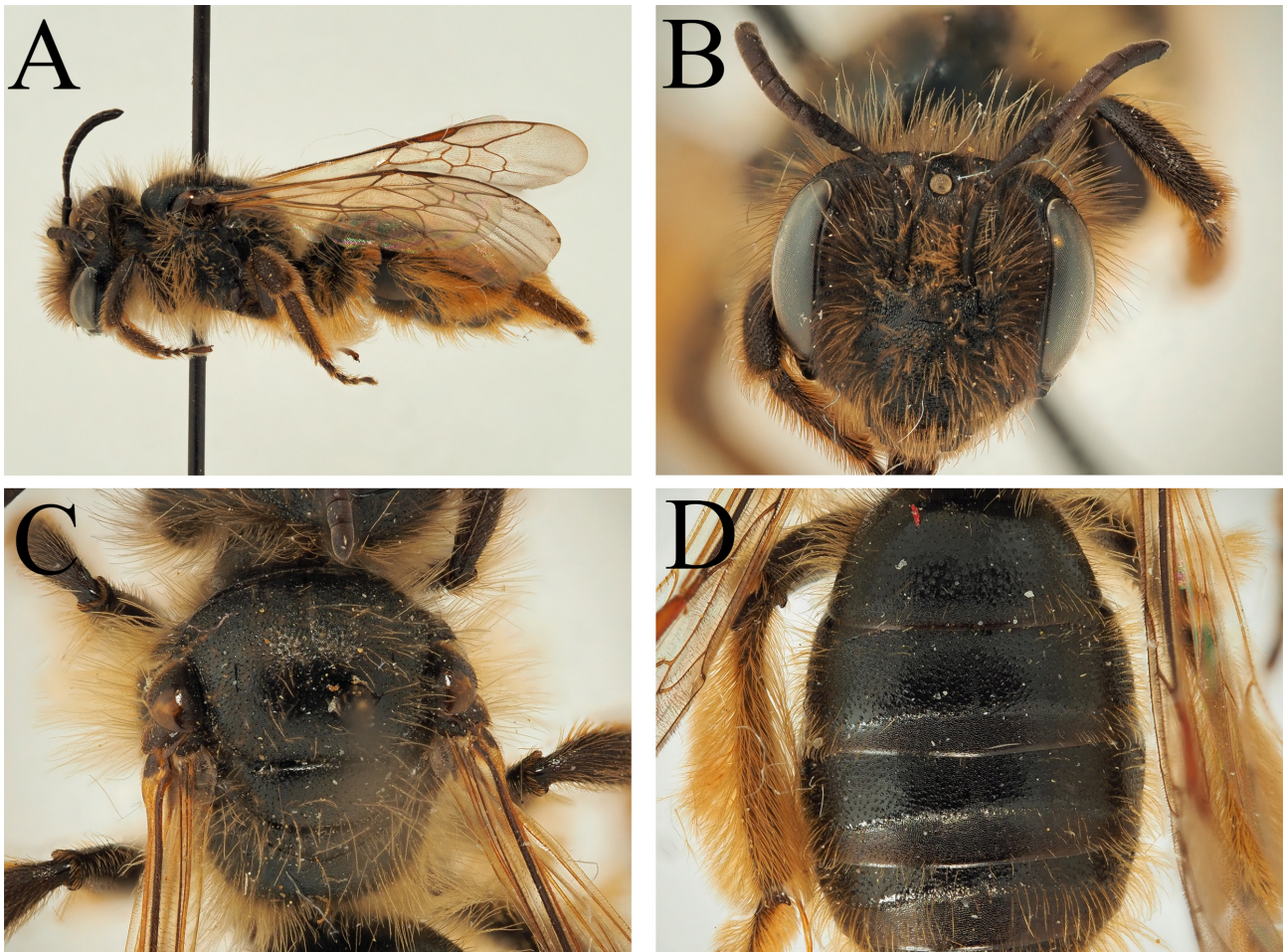
FIGURE 37. *Andrena (Tarsandrena) sarydzhasi* Osytshnjuk, 2005 male. A. Habitus, lateral view, B. Face, frontal view, C. Head, lateral view, D. Propodeum, dorsal view, E. Dorsum, F. Genital capsule, dorsal view.

***Andrena (Chlorandrena) tricuspidata* Scheuchl, 2010**

**Description: Female:** Body length: 10–11 mm (Figure 38A). *Head:* Dark, 1.2 times wider than long (Figure 38B). Clypeus domed, with obscure raised latitudinal carinae, interspaces with obscure shallow punctures, punctures separated by 1 puncture diameter, underlying surface finely shagreened, weakly shining. Process of labrum rectangular-trapezoidal, short, three times wider than long, fore margin almost as long as basal margin. Gena 1.3 times wider than width of compound eye; ocelloccipital distance equalling 1.5 times diameter of lateral ocellus.



Foveae occupying two thirds space between lateral ocellus and compound eye, deeply channelled and impressed dorsally, ventrally strongly narrowed to at most one quarter of their dorsal width; foveae filled with light brown hairs. Face medially, gena, vertex, and scape with long, light brown hairs, not exceeding length of scape, face laterally with intermixed dark brown hairs, concentrated along inner margin of compound eye and frons. Antennae dark, A3 subequal to A4+5+6. *Mesosoma*: Scutum and scutellum irregularly punctate with punctures of different sizes, punctures separated by 0.5–2 puncture diameters, underlying surface shagreened, most strongly laterally, becoming weaker medially, here weakly to moderately shining (Figure 38C). Pronotum without humeral angle, evenly rounded. Mesepisternum and dorsolateral parts of propodeum with fine microreticulation, with raised hair-bearing points that merge into weak and fine raised rugosity. Propodeal triangle weakly delineated by fine low carinae, internal surface with fine microreticulation and weak basal rugae, without hair-bearing points, thus contrasting dorsolateral parts of propodeum. Mesepisternum with long golden hairs, some exceeding length of scape, hairs on scutum and scutellum shorter; propodeal corbicula sparse, incomplete, composed of plumose golden hairs, internal surface with scattered golden plumose hairs. Legs dark, apical tarsal segments lightened dark reddish brown, pubescence golden. Posterior face of hind femur with row of projecting rounded tooth-like spines. Flocculus light brownish, femoral and tibial scopa golden, with numerous plumose hairs. Hind tarsal claws with small inner tooth. Wings hyaline, stigma and venation orange, nervulus postfurcal. *Metasoma*: Terga dark, marginal areas depressed, lightened dark reddish brown (Figure 38D). Tergal discs with crater punctures, most evident on T1, punctures separated by 1–2 puncture diameters, underlying surface weakly shagreened, weakly shining. T2–4 with sparse, loose golden hair fringes at the base of the marginal areas. Apical fringe of T5 and hairs flanking pygidial plate orange, pygidial plate rounded triangular, surface densely punctate.



**FIGURE 38.** *Andrena (Chlorandrena) tricuspadata* Scheuchl, 2010 female. A. Habitus, lateral view, B. Face, frontal view, C. Scutum, dorsal view, D. Terga, dorsal view.

**Diagnosis:** Female *A. tricuspadata* can swiftly be recognised as *Chlorandrena* due to the presence of raised thorn-like pegs on the posterior face of the hind femur, hind tibiae with plumose scopal hairs, and strong ‘crater

punctures' on the terga (Figure 38D). It falls into the *taraxaci*-group of species due to the distinctive facial foveae which strongly narrow ventrally (Schwenninger 2015). Following the key of Schwenninger, females go to couplet 4 as the terga lack dense apical hairbands, the foveae are dorsally separated from the lateral ocelli by a distance equal to their diameter. However, here they do not fit nicely with the existing characters, as the foveae are dorsally bright but the face has many dark brown hairs, particularly along the inner margin of the compound eyes (Figure 38B). The species can ultimately be diagnosed within the *taraxaci*-group by the finely shagreened terga which are therefore weakly shining (particularly on the disc of T1) combined with the strongly depressed, dark brown, and weakly shining tergal margins, the strong crater punctures on the tergal discs, scutum evenly and finely shagreened without clear shining area, and the intermixed light and dark hairs on the face with bright facial foveae. The species is also restricted to the Crimean Peninsula.

**Distribution:** Crimea (Scheuchl 2010).

**Material examined:** **CRIMEA:** Tshatyr-Dagh [Chatyrdah], 1000 m, 2♂, 7♀, 8.iv.2000, leg. V. Gurko, OÖLM; Kap Kasantyp steppe [Kazantyp], 13–15.v.2002, 1♀, leg. Y. Budaschkin, OÖLM; Kap Kasantyp steppe [Kazantyp], 1.v.2003, 15♂, 12♀, leg. Y. Budaschkin, OÖLM; Karadagh [Kara Dag], Vodianja balka, 21–30.iv.2003, 2♀, leg. Y. Budaschkin, OÖLM; Yalta Bezirk, 18–24.v.2003, 2♀, leg. S. Iwanow, OÖLM.

### *Andrena* species newly recorded for Turkey

#### *Andrena (Aciandrena) israelica* Scheuchl & Pisanty, 2016

**Material examined:** **JORDAN:** 16 km WNW Aljun [Aljoun], 600 m, 21.v.2007, 1♀, leg. Z. Kejval, OÖLM; Irbid, Saham vill, 19.iv.2003, 1♀, leg. I. Pljuschch, OÖLM; **SYRIA:** 50 km NE Tartus, Banyas [Baniyas], 1.v.2000, 1♀, leg. F. Kantner, OÖLM; **TURKEY:** Nemrut Dağı, Adiyaman, 1500 m, 1.vi.1983, 7♀, leg. K. Warncke, OÖLM.

**Distribution:** Turkey\*, Syria\*, Israel and the West Bank, Jordan\* (Pisanty *et al.* 2016).

#### *Andrena (Aciandrena) longistilus* Pisanty & Wood, 2022

**Material examined:** **TURKEY:** Harran/Urfa [Şanlıurfa], 19.iv.1976, 1♂, leg. K. Warncke, OÖLM.

**Distribution:** Israel, Jordan, Syria, and Turkey\* (Pisanty *et al.* 2022b).

#### *Andrena (Andrena) fulva* (Müller, 1766)

**Material examined:** **TURKEY:** NE Turkey, Artvin, 1.vii.1990, 2♀, leg. J. Wimmer, OÖLM.

**Distribution:** Temperate Europe and Turkey\* (Gusenleitner & Schwarz 2002).

#### *Andrena (Andrena) lapponica* Zetterstedt, 1838

**Material examined:** **TURKEY:** Erzurum, Palandöken Dagi, 2450 m, 11.vii.1986, 1♀, leg. J.A.W. Lucas, OÖLM.

**Distribution:** Europe from Scandinavia and Russia to the southern Balkans (North Macedonia, Bulgaria), Turkey\* (Wood 2021a).

#### *Andrena (Euandrena) fulvata* Stöckhert, 1930

**Material examined:** **TURKEY:** Prov. Istanbul, Kemerburgaz, vic. Gokturk, 150–300 m, 4.iv.1983, 1♂, leg. deFreina, OÖLM.

**Distribution:** North-western Europe to Bulgaria and Turkey\* (Wood 2021a; Wood *et al.* 2021).



***Andrena (Euandrena) ruficrus* Nylander, 1848**

**Material examined:** TURKEY: Kars, 20 km W of Sarıkamış, 2100 m, 29.v.1983, 5♀, leg. K. Warncke, OÖLM.

**Distribution:** Central and Northern Europe (in the south known only from mountainous areas) and Russia to Turkey\*. Not known from the southern Balkans or the Caucasus (Gusenleitner & Schwarz 2002).

***Andrena (Graecandrena) virguladivina* Wood, 2021**

**Material examined:** TURKEY: Maras [Kahramanmaraş] 700 m, 2.vi.1983, 1♀, leg. K. Warncke, OÖLM.

**Distribution:** Turkey\* and Syria (Wood 2021).

***Andrena (Holandrena) fimbriatoides* Scheuchl, 2004**

**Material examined:** SYRIA: 30 km NW Dara, 29.iii.1994, 1♂, leg. S. Becvar, OÖLM; TURKEY: Uzuncaburç, 30 km N of Silifke, 28.v.1996, 1♀, leg. M. Halada, OÖLM.

**Distribution:** Turkey\*, Syria\*, Israel, and Jordan (Scheuchl *et al.* 2004; Pisanty *et al.* 2016).

***Andrena (incertae sedis) antilibanotica* Wood, 2020**

**Material examined:** TURKEY: Gaziantep, 20 km E Gaziantep, 600 m, 12.vi.1979, 1♀, leg. C. Holzschuh & F. Resal, OÖLM; Halfeti (Birecik), 30.v.1998, 1♀, leg. M. Snižek, OÖLM; Halfeti env., 3–5.v.1994, 3♀, leg. M. Halada, OÖLM; Hakkâri, Beytüşşebap, 25.v.1988, 1♂, 11♀, leg. K. Warncke, OÖLM; Hakkâri, 5 km N Oramar [river], 1450 m, 11.vi.1981, 2♀, leg. K. Warncke, OÖLM; Şemdinli, Hakkâri, 1700 m, 12.vi.1981, 1♀, leg. K. Warncke, OÖLM; Birecik/Urfa, 22.v.1983, 1♀, leg. K. Warncke, OÖLM; Gaziantep: Nizip, 27.v.1978, 1♀, leg. M. Schwarz, OÖLM; Urfa [Şanlıurfa], 2.vi.1968, 2♀, leg. J. Gusenleitner, OÖLM; Urfa: Urfa Umgbg. [Şanlıurfa], 31.v.1965, 3♀, leg. M. Schwarz, OÖLM.

**Distribution:** Syria, Turkey\*, Iran (Wood & Monfared 2022).

***Andrena (incertae sedis) ebmerella* Scheuchl, 2011**

**Material examined:** TURKEY: Antalya pr., 12 km NE Kumluca, 12.v.2006, 1♀, leg. Kadlec, OÖLM.

**Remarks:** This species was described from one male and two female specimens from the island of Samos in Greece. It displays an unusual combination of characters that defy subgeneric placement, though in my opinion the female morphology suggests affiliation with the group of *Avandrena* that lack spines on the posterior faces of their hind femorae. However, genetic work is needed to decisively settle its placement.

The specimen collected here conforms to the description of the species, though the foveae are ventrally wider than illustrated by Scheuchl (2011: 1593), here being deeply impressed and channelled, ventrally as wide as dorsally. The specimen also has a body length of 8 mm, compared to the 6.5 mm reported for the Greek specimens. Additional specimens are required to establish whether Turkish populations represent a closely related but distinct taxon.

**Distribution:** Greece (Samos) and Turkey\* (Scheuchl 2011).

***Andrena (Leimelissa) ermolenkoi* Osytshnjuk, 1984**

**Material examined:** TURKEY: Kars, 10 km E Karakurt, 1460 m, 31.v.1988, 20♂, 7♀, leg. K. Warncke, OÖLM; Kars, 15 km E Karakurt, 1460 m, 2.vi.1988, 1♂, 1♀, leg. K. Warncke, OÖLM; Kars, 10 km E Karakurt, 1500 m, 28.v.1983, 5♂, leg. K. Warncke, OÖLM; Erçek/Van, 9.vi.1977, 1♂, 1♀, leg. K. Warncke, OÖLM; Karakurt/Arastal, 23.v.1975, 1♂, leg. K. Warncke, OÖLM.

**Distribution:** Turkey\* and Armenia (Osytsnjuk *et al.* 2008).

***Andrena (Lepidandrena) rufizona* Imhoff, 1834**

**Material examined:** BULGARIA: Pamporovo, 1–6.vii.1985, 1♂, 1♀, leg. K.M. Guichard, NHMUK; TURKEY: Artvin, Kaçkar Dağı, 2200–2700 m, Yaylalar env., 6–10.vii.1997, 1♀, leg. D. Hauck, OÖLM; Pass W Hakkâri, Altın Dağları [Khrebet Altyn], 2600–3000 m, 13.viii.1979, 2♀, leg. K. Warncke, OÖLM.

**Distribution:** Spain, France, Switzerland, Germany, Italy, Austria, Czech Republic, Poland, Bulgaria\*, Russia, Georgia, Turkey\* (Gusenleitner & Schwarz 2002).

***Andrena (Micrandrena) elam* Wood, 2022**

**Material examined:** TURKEY: Karadut env., 50 km NE Adiyaman, 1.vi.2001, 3♀, leg. K. Deneš, OÖLM; Şemdinli, Hakkâri, 1700 m, 12.vi.1981, 3♀, leg. K. Warncke, OÖLM.

**Distribution:** Turkey\* and Iran (Wood & Monfared 2022)

***Andrena (Micrandrena) sandanskia* Warncke, 1973**

**Material examined:** ALBANIA: Voskopojë, 8.vi.2018, 1♀, leg. K. Janssen, K. Janssen Colln.; TURKEY: Muğla, University campus, 720 m, 1–31.v.2016, 1♂, leg. H. Pala, OÖLM; Samsung [Samsun], University Campus [Ondokuz Mayıs University], 22.vi–4.vii.2014, 1♀, leg. Barták & Kubik, OÖLM; Siirt, 20 km NW of Sirnak [Şırnak], 5.vi.1980, 46♀, leg. M. Schwarz & K. Warncke, OÖLM; Sogusku [Soğuksu] env., 80 km N of Ankara, 1300 m, 14.vi.2001, 2♀, leg. K. Deneš, OÖLM.

**Distribution:** Albania\*, North Macedonia, Greece, Bulgaria, Turkey\* (Wood 2021a).

***Andrena (Micrandrena) subopaca* Nylander, 1848**

**Material examined:** TURKEY: Bolu, Abant Gölü, 14.vi.2000, 1♀, leg. K. Deneš, OÖLM.

**Distribution:** Europe to Russia, the Caucasus, and Turkey\* (Gusenleitner & Schwarz 2002).

***Andrena (Notandrena) curvana* Warncke, 1965**

**Material examined:** TURKEY: Aspendos/Antalya, 25.iv.1984, 1♂, leg. K. Warncke, OÖLM; Konya, Sultan Dağları, Akşehir, 1100 m, 28.v.1979, 1♂, leg. H. & Th. v. Oorschot & H. Wiering, RMNH.

**Distribution:** Central Europe to Turkey\* (Gusenleitner & Schwarz 2002).

***Andrena (Rufandrena) parvispinae* Wood, 2020**

**Material examined:** SYRIA: Slenfe [Slanfah], 19.iv.1986, 4♂, leg. K.M. Guichard, NHMUK; TURKEY: Antakya, 28.iii.1999, 12♂, leg. M. Halada, OÖLM; Iskenderun, Belen env nur Dağları mer., 28.iii.1994, 1♂, leg. M. Snižek, OÖLM.

**Distribution:** Turkey\* (Hatay province) and Syria (Wood *et al.* 2020a).

***Andrena (Simandrena) susterai* Alfken, 1914**

**Material examined:** TURKEY: Bolu, Abant Gölü, 14.vi.2000, 1♀, leg. K. Deneš, OÖLM.

**Distribution:** Germany, Austria, Czech Republic, Poland, Slovenia, Slovakia, Croatia, Hungary, Romania, Bulgaria, Ukraine, Russia, and Turkey\* (Gusenleitner & Schwarz 2002; Wood 2021a).



## Discussion

The global *Andrena* fauna is currently undergoing a major period of taxonomy study, which may eventually be comparable to previous highly productive periods between 1895–1920 (predominantly driven by Cockerell, Pérez, and Viereck) and 1965–1985 (predominantly driven by LaBerge, Osytshnjuk, and Warncke). Despite the long history of study, the regularity with which undescribed *Andrena* species are found in museum collections makes it very difficult to estimate the likely true diversity of this genus. It may well exceed 2,000 species with continued studies in countries hosting understudied Mediterranean and hot and cold steppe habitats across both the New and Old worlds.

Concerning the Turkish *Andrena* fauna, the combination of the newly described species, species reported new for the country, and other recent descriptions (Pisanty *et al.* 2022a), brings the total estimated number of *Andrena* species known from Turkey to 376, with an additional three *Cubiandrena* species (Ascher & Pickering 2020; Wood 2020; Wood 2021b; Pisanty *et al.* 2022a; TJW *unpublished data*). This total is provisional, as a thorough revision is required due to the variety of different taxonomic concepts that have been employed in the literature and which have therefore made their way into online databases. I have excluded 12 species listed by online databases or by Warncke (1975) due to uncertainty over their presence in Turkey following completed or pending taxonomic revisions that have altered or will alter species concepts (e.g. Schmid-Egger 2005; Pisanty *et al.* 2022a; Wood & Monfared 2022). What is clear however, is that Turkey has by far the largest *Andrena* fauna in the West Palaearctic, with the next largest faunas of Israel, Spain, and Greece numbering around 220 species (Pisanty *et al.* 2022a), and the second largest fauna globally after that of the United States (c. 461, Ascher & Pickering 2020) which covers a land area over 10 times greater.

Total *Andrena* diversity in Turkey will almost certainly exceed 400 species due to the implications of the future use of molecular tools (e.g. Praz *et al.* 2019; 2022; Pisanty *et al.* 2022). In this context, accurate predictions of Turkish diversity for this hyper-speciose genus are difficult. The most productive areas found in this study were Mediterranean to mountainous areas in south-western Turkey, and mountainous areas in south-eastern Turkey; these regions are likely to host remaining undiscovered and undocumented *Andrena* species.

## Acknowledgements

The author is supported by an F.R.S.-FNRS fellowship (Chargé de recherches). My thanks go to Joseph Monks (NHMUK), Frederique Bakker (RMNH), Agnièle Touret-Alby and Romain Le Divelec (MNHN), and Esther Ockermüller and Martin Schwarz (OÖLM) for access to and help with their respective collections. I thank Gideon Pisanty (SMNHATAU) and Christophe Praz (Neuchâtel) for essential conversations on *Andrena* taxonomy. I thank also Yulia Astafurova (Russian Academy of Science, St. Petersburg) and Gideon Pisanty for helpful comments on the manuscript.

## References

- Amiet, F., Herrmann, M., Müller, A. & Neumeyer, R. (2010) Apidae 6: *Andrena*, *Melitturga*, *Panurginus*, *Panurgus*. Centre Suisse de Cartographie de la Faune (CSCF)/Schweizerische Entomologische Gesellschaft (SEG), Neuchâtel, 318 pp.
- Ascher, J.S. & Pickering, J. (2020) Discover Life bee species guide and world checklist (Hymenoptera: Apoidea: Anthophila). Available from: [https://www.discoverlife.org/mp/20q?guide=Apoidea\\_species](https://www.discoverlife.org/mp/20q?guide=Apoidea_species) (accessed 7 October 2022)
- Astafurova, Y.A., Proshchalykin, M.Y., Sidorov, D.A. & Osytshnjuk, A.Z. (2021) The type specimens of bees (Hymenoptera, Apoidea) deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg. Contribution IV. Family Andrenidae, genus *Andrena* Fabricius, 1775, species described by F. Morawitz. *Zootaxa*, 5037 (1), 1–78. <https://doi.org/10.11646/zootaxa.5037.1.1>
- Astafurova, Y.A., Proshchalykin, M.Y. & Sidorov, D.A. (2022a) The bees of the genus *Andrena* Fabricius, 1775 (Hymenoptera, Andrenidae) described by Ferdinand Morawitz from the collection of Aleksey Fedtschenko. *Zookeys*, 1120, 105–176. <https://doi.org/10.3897/zookeys.1120.90206>
- Astafurova, Y.A., Proshchalykin, M.Y. & Sidorov, D.A. (2022b) The type specimens of bees (Hymenoptera, Apoidea) deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg. Contribution V. Family Andrenidae, genus *Andrena* Fabricius, 1775, species described by E. Eversmann. *Zootaxa*, 5190 (3), 393–418. <https://doi.org/10.11646/zootaxa.5190.3.4>

- Bossert, S., Wood, T.J., Patiny, S., Michez, D., Almeida, E.A.B., Minckley, R.L., Packer, L., Neff, J.L., Copeland, R.S., Straka, J., Pauly, A., Griswold, T., Brady, S.G., Danforth, B.N. & Murray, E.A. (2022) Phylogeny, biogeography and diversification of the mining bee family Andrenidae. *Systematic Entomology*, 47, 283–302.  
<https://doi.org/10.1111/syen.12530>
- Cockerell, T.D.A. (1906) New Rocky Mountain Bees, and other notes. *The Canadian Entomologist*, 211, 160–166.
- Cockerell, T.D.A. (1929) Redhaired bees from China. *Entomologist*, 62, 205–207.
- Dubitzky, A. (2006) New palearctic species of the bee genus *Andrena* (Insecta: Hymenoptera: Andrenidae). *Zootaxa*, 1284 (1), 1–27.  
<https://doi.org/10.11646/zootaxa.1284.1.1>
- Dubitzky, A., Plant, J. & Schönitzer, K. (2010) Phylogeny of the bee genus *Andrena* Fabricius based on morphology (Hymenoptera: Andrenidae). *Mitteilungen der Münchner Entomologischen Gesellschaft*, 100, 137–202.
- Grünwaldt, W., Osytshnjuk, A.Z. & Scheuchl, E. (2005) Neue *Andrena*-Arten aus der Paläarktis (Hymenoptera: Apidae: Andreninae). *Entomofauna*, 26, 349–368.
- Gueuning, M., Frey, J.E. & Praz, C. (2020) Ultraconserved yet informative for species delimitation: Ultraconserved elements resolve long-standing systematic enigma in Central European bees. *Molecular Ecology*, 29, 4203–4220.  
<https://doi.org/10.1111/mec.15629>
- Gusenleitner, F. (1998) Neue westpaläarktische *Andrena*-Arten (Hymenoptera: Apidae: Andreninae). *Entomofauna*, 19, 109–144.
- Gusenleitner, F. & Schwarz, M. (2002) Weltweite Checkliste der Bienengattung *Andrena* mit Bemerkungen und Ergänzungen zu paläarktischen Arten (Hymenoptera, Apidae, Andreninae, *Andrena*). *Entomofauna*, Supplement 10, 1–1280.
- Hirashima, Y. (1964) Systematic and biological studies of the family Andrenidae of Japan (Hymenoptera, Apoidea). Part 2. Systematics 4. *Journal of the Faculty of Agriculture, Kyushu University*, 13, 71–97.
- Mavromoustakis, G.A. (1957) New Bees of the Genera *Andrena* and *Nomada* from the Island Cyprus (Hymenoptera, Apoidea). *Beiträge zur Entomologie*, 7, 42–49.
- Nurse, C.G. (1904) New species of Indian Hymenoptera. Apidae. *Journal of Bombay Natural History Society*, 15, 557–585.
- Osytsnjuk, A.Z., Romasenko, L., Banaszak, J. & Cierznia, T. (2005) Andreninae of the Central and Eastern Palearctic. Part 1. Polish Entomological Monographs II. Polish Entomological Society, Poznań, 235 pp.
- Osytsnjuk, A.Z., Romasenko, L., Banaszak, J. & Motyka, E. (2008). Andreninae of the Central and Eastern Palearctic. Part 2. Polish Entomological Monographs V. Polish Entomological Society, Poznań, 233 pp.
- Paxton, R. & Tengö, J. (1994) Intranidal mating, emergence, and sex ratio in a communal bee *Andrena jacobae* Perkins 1921 (Hymenoptera: Andrenidae). *Journal of Insect Behavior*, 9, 421–440.  
<https://doi.org/10.1007/BF02214020>
- Paxton, R., Thorén, P.A., Tengö, J., Estoup, A. & Pamilo, P. (1996) Mating structure and nestmate relatedness in a communal bee, *Andrena jacobae* (Hymenoptera, Andrenidae), using microsatellites. *Molecular Ecology*, 5, 511–519.  
<https://doi.org/10.1046/j.1365-294X.1996.00117.x>
- Pérez, J. (1903) Espèces nouvelles de Mellifères (paléarctiques). *Procès Verbaux Société Linnéenne de Bordeaux*, 58, 78–93, 208–236.
- Pisanty, G., Scheuchl, E. & Dorchin, N. (2016) Eight new species of *Andrena* Fabricius (Hymenoptera: Apoidea: Andrenidae) from Israel—a Mediterranean hotspot for wild bees. *Zootaxa*, 4189 (3), 485–515.  
<https://doi.org/10.11646/zootaxa.4189.3.3>
- Pisanty, G., Scheuchl, E. & Dorchin, N. (2018) Taxonomic review of the subgenus *Andrena* (*Poecilandrena*) (Hymenoptera: Andrenidae) in Israel and the Levant. *Zootaxa*, 4374 (2), 151–188.  
<https://doi.org/10.11646/zootaxa.4374.2.1>
- Pisanty, G., Scheuchl, E., Martin, T., Cardinal, S. & Wood, T.J. (2022a) Twenty-five new species of mining bees (Hymenoptera: Andrenidae: *Andrena*) from Israel and the Levant. *Zootaxa*, 5185 (1), 1–109.  
<https://doi.org/10.11646/zootaxa.5185.1.1>
- Pisanty, G., Richter, R., Martin, T., Dettman, J. & Cardinal, S. (2022b) Molecular phylogeny, historical biogeography and revised classification of andrenine bees (Hymenoptera: Andrenidae). *Molecular Phylogenetics and Evolution*, 170, 107151.  
<https://doi.org/10.1016/j.ympev.2021.107151>
- Praz, C., Müller, A. & Genoud, D. (2019) Hidden diversity in European bees: *Andrena amieti* sp. n., a new Alpine bee species related to *Andrena bicolor* (Fabricius, 1775) (Hymenoptera, Apoidea, Andrenidae). *Alpine Entomology*, 3, 11–38.  
<https://doi.org/10.3897/alpento.3.29675>
- Praz, C., Genoud, D., Vaucher, K., Bénon, D., Monks, J. & Wood, T.J. (2022) Unexpected levels of cryptic diversity in European bees of the genus *Andrena* subgenus *Taeniandrena* (Hymenoptera, Andrenidae): implications for conservation. *Journal of Hymenoptera Research*, 91, 375–428.  
<https://doi.org/10.3897/jhr.91.82761>
- Proshchalykin, M.Y., Astafurova, Y.V. & Sidorov, D.A. (2017). Family Andrenidae. In: Lelej, A.S., Proshchalykin, M.Y. & Loktionov, V.M. (Eds.), Annotated Catalogue of the Hymenoptera of Russia. Vol. I. Symphyta and Apocrita: Aculeata. *Proceedings of the Zoological Institute Russian Academy of Sciences*, Supplement 6, pp. 263–276.
- Radoszkowski, O. (1876) Matériaux pour servir à une faune hyménoptérologique de la Russie. [II]. *Horae Societatis Entomologicae Rossicae*, 12, 82–110.



- Rosa, P., Wiśniowski, B. & Xu, Z. (2015) Annotated type catalogue of the Chrysididae (Insecta, Hymenoptera) deposited in the collection of Radoszkowski in the Polish Academy of Sciences, Kraków. *ZooKeys*, 486, 1–100.  
<https://doi.org/10.3897/zookeys.486.8753>
- Scheuchl, E., Schindler, M. & Al-Ghzawi, A.M. (2004) *Andrena (Holandrena) fimbriatoides* Scheuchl spec. nov. (Hymenoptera: Apoidea, Andrenidae), a new bee species from Jordan. *Zoology in the Middle East*, 32, 85–89.
- Scheuchl, E. (2010) Beitrag zur Kenntnis westpaläarktischer Bienen der Gattung *Andrena* (Hymenoptera: Apidae: Andreninae). *Linzer biologische Beiträge*, 42, 1445–1455.
- Scheuchl, E. (2011) *Andrena ebmerella*, eine neue Sandbienen-Art von Samos (Hymenoptera: Apidae: Andreninae). *Linzer biologische Beiträge*, 43, 1587–1593.
- Scheuchl, E. & Hazir, C. (2008) Description of a new *Andrena* species from Turkey, *Andrena (Notandrena) selcuki* n. sp. (Hymenoptera: Apoidea, Andrenidae). *Zootaxa*, 1763, 63–66.
- Scheuchl, E. & Gusenleitner, F. (2009) *Andrena (Margandrena) elsei* nov.sp., eine neue türkische Sandbienenart (Hymenoptera, Apidae, Andreninae). *Linzer biologische Beiträge*, 41, 947–962.
- Scheuchl, E. & Willner, W. (2016) *Taschenlexikon der Wildbienen Mitteleuropas: alle Arten im Porträt*. Quelle et Meyer Verlag, Wiebelsheim, 920 pp.
- Scheuchl, E. & Hazir, C. (2012) Description of three new *Andrena* species (Hymenoptera: Apoidea: Andrenidae) from Turkey. *Florida Entomologist*, 95, 831–838.  
<https://doi.org/10.1653/024.095.0403>
- Schmid-Egger, C. & Scheuchl, E. (1997) *Illustrierte Bestimmungstabellen der Wildbienen Deutschlands und Österreichs und Berücksichtigung der Arten der Schweiz. Band III. Andrenidae*. Velden, Eigenverlag, 180 pp.
- Schmid-Egger, C. (2005) *Proxiandrena* subgen. nov. und Revision der west- und zentralpaläarktischen Arten der *Andrena proxima*-Gruppe (Hymenoptera, Apidae). *Revue Suisse de Zoologie*, 112, 1029–1044.
- Schwenninger, H.R. (2015) Revision of the Western Palaearctic species of the *Andrena taraxaci*-group with description of four new species (Hymenoptera: Andrenidae). *Stuttgarter Beiträge zur Naturkunde A, Neue Serie*, 8, 251–270.
- Shebl, M.A. & Tadauchi, O. (2009) The Genus *Andrena* from Kazakhstan and Kyrgyzstan (Hymenoptera, Andrenidae) (3). *Esakia*, 49, 21–62.
- Standfuss, K. & Standfuss, L. (2010). *Andrena pellucens* Pérez, 1895 und *Nomada argentata* Herrich-Schäffer, 1839 in Griechenland (Hymenoptera, Andrenidae et Apidae). *Bembix-Zeitschrift für Hymenopterologie*, 30, 35–40.
- Tadauchi, O. & Matsumura, T. (2007) The genus *Andrena* collected from Nepal (Hymenoptera, Andrenidae) with redescrptions of some types of *Andrena* described from North India. *Esakia*, 47, 1–20.
- Varnava, A.I., Roberts, S.P.M., Michez, D., Ascher, J.S., Petanidou, T., Dimitriou, S., Devalez, J., Pittara, M. & Stavriniades, M.C. (2020) The wild bees (Hymenoptera, Apoidea) of the island of Cyprus. *ZooKeys*, 924, 1–114.
- Warncke, K. (1965) Beitrag zur Kenntnis der Bienengattung *Andrena* Fabricius in Griechenland. *Beiträge zur Entomologie*, 15, 27–76.
- Warncke, K. (1967) Beitrag zur Klärung paläarktischer *Andrena*-Arten. *Eos*, 43, 171–318.
- Warncke, K. (1974) Beitrag zur Kenntnis und Verbreitung der Sandbienen in Nordafrika (Hymenoptera, Apoidea, *Andrena*). *Mitteilungen aus dem Zoologischen Museum in Berlin*, 50, 3–54.
- Warncke, K. (1975) Die Sandbienen der Türkei (Hymenoptera, Apoidea, *Andrena*), Teil B. *Mitteilungen der Münchner Entomologischen Gesellschaft*, 65, 29–102.
- Warncke, K. (1980) Zur Verbreitung der Bienengattung *Andrena* F. in Tunesien. *Mitteilungen der Münchner Entomologischen Gesellschaft*, 70, 86–87.
- Warncke, K. (1988) Isolierte Bienen vorkommen auf dem Olympe in Griechenland (Hymenoptera, Apidae). *Linzer biologische Beiträge*, 20, 83–117.
- Wood, T.J. (2020) Discovery of a new *Cubiandrena* species in Turkey (Hymenoptera: Andrenidae). *Zoology in the Middle East*, 66, 367–374.  
<https://doi.org/10.1080/09397140.2020.1835217>
- Wood, T.J. (2021a) Revision of the *Andrena* (Hymenoptera: Andrenidae) fauna of Bulgaria and North Macedonia with description of three new species. *Belgian Journal of Entomology*, 117, 1–39.
- Wood, T.J. (2021b) Fifteen new *Andrena* species from little-visited arid, Mediterranean, and mountainous parts of the Old World (Hymenoptera: Andrenidae). *Zootaxa*, 4933 (4), 451–492.  
<https://doi.org/10.11646/zootaxa.4933.4.1>
- Wood, T.J., Boustani, M. & Rasmont, P. (2020a) A revision of the *Andrena* (Hymenoptera: Andrenidae) of Lebanon with the description of six new species. *Annales de la Société entomologique de France*, 56 (4), 279–312.  
<https://doi.org/10.1080/00379271.2020.1794960>
- Wood, T.J., Michez, D., Cejas, D., Lhomme, P. & Rasmont, P. (2020b) An update and revision of the *Andrena* fauna of Morocco (Hymenoptera, Apoidea, Andrenidae) with the description of eleven new North African species. *ZooKeys*, 974, 31–92.  
<https://doi.org/10.3897/zookeys.974.54794>
- Wood, T.J., Ghisbain, G., Michez, D. & Praz, C. (2021) Revisions to the faunas of *Andrena* of the Iberian Peninsula and Morocco with the descriptions of four new species (Hymenoptera: Andrenidae). *European Journal of Taxonomy*, 758, 147–193.  
<https://doi.org/10.5852/ejt.2021.758.1431>
- Wood, T.J. & Ortiz-Sánchez, F.J. (2022) Description of three new *Andrena* Fabricius, 1775 species from understudied parts of

- Iberia (Hymenoptera: Andrenidae). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, 70, 114–123.
- Wood, T.J. & Monfared, A. (2022) A revision of the *Andrena* (Hymenoptera: Andrenidae) fauna of Iran, with the description of 16 new species. *European Journal of Taxonomy*, 843, 1–136.  
<https://doi.org/10.5852/ejt.2022.843.1947>
- Xu, H.-L. (1994) Descriptions of new species of genus *Andrena* from China (Apoidea, Andrenidae). *Sinozoologia*, 11, 197–204. [in Chinese]
- Xu, H.-L. & Tadauchi, O. (1999) A revision of the subgenus *Tarsandrena* of the genus *Andrena* of Eastern Asia. *Esakia*, 39, 31–46.
- Xu, H.-L. & Tadauchi, O. (2005) A revision of the subgenus *Hoplandrena* of the genus *Andrena* of Eastern Asia (Hymenoptera, Andrenidae). *Esakia*, 45, 19–40.
- Xu, H.-L. & Tadauchi, O. (2008) The Subgenera *Margandrena*, *Leimelissa*, *Stenomelissa* and *Zonandrena* of the Genus *Andrena* of Eastern Asia (Hymenoptera, Andrenidae). *Journal of the Faculty of Agriculture, Kyushu University*, 53 (1), 63–66.
- Xu, H.-L. & Tadauchi, O. (2009) The subgenus *Melandrena* of the genus *Andrena* of Eastern Asia (Hymenoptera, Andrenidae). *Journal of the Faculty of Agriculture, Kyushu University*, 54 (1), 109–122.