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Unusual *Andrena* species from the high mountains of Ladakh (Hymenoptera, Andrenidae)

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Abstract: The high mountains of the Western Himalayas have an understudied entomofauna due to their isolation and access issues. This lack of knowledge is true also for the bee fauna of this region which has been only occasionally and sporadically studied. Consequently, a visit to the region of Ladakh (Kashmir) in northern India produced several remarkable records of very poorly known bee species. *Andrena (Andrena) ladakha* WOOD nov.sp. is described, and *A. (Hoplendrena) mordax* MORAWITZ, 1876 is reported as new for India. The unknown female of *A. (incertae sedis) floridula* SMITH, 1878 is described for the first time. These findings illustrate the extent to which our understanding of alpine solitary bees of the Western Himalayas is strongly limited by a lack of sampling, exploration, and study.

Key words: alpa taxonomy, new species, alpine, India, solitary bees

Introduction

The bee genus *Andrena* is the second most speciose globally, with almost 1,700 species following recent revisions (GUSENLEITNER & SCHWARZ 2002; ASCHER & PICKERING 2023; PISANTY et al. 2022a; WOOD & MONFARED 2022; WOOD 2023a; 2023b; 2023c; 2023d; 2024). It is known for its taxonomic complexity (PISANTY et al. 2022b), in part due to its rapid speciation rate (BOSSERT et al. 2022) which means that *Andrena* lineages often do not accumulate distinctive morphological differences, even if they can be well-separated genetically and behaviourally (e.g. PRAZ et al. 2022).

Against this context, the genus has been poorly studied in southern Asia, including but not limited to the Indian subcontinent in the Himalayas. As a genus with a predominantly Holarctic distribution that shows the greatest diversity in temperate to xeric habitats (GUSENLEITNER & SCHWARZ 2002), the greatest diversity of *Andrena* species in the Indian subcontinent can be found in the Himalayas. Within the Himalayas, the oldest period of study comes from the Western Himalayas in what is now India, with numerous species described from this region during the period of the British Raj (SMITH 1878; CAMERON 1897; 1909; NURSE 1903; BINGHAM 1908; COCKERELL 1911), with essentially nothing published since then (though see notes by GRÜN WALDT et al. 2005 and TADAUCHI & MATSUMURA 2007 on Nepal). However, despite this long but interrupted history of study, the current faunal total for Indian *Andrena* is confused, with variation from 21-54 species listed (MEENA & DEY 2019; ASCHER & PICKERING 2023). This variation is due to irregular reporting standards and a lack of access to confidently or correctly determined reference specimens, since most type material for Indian *Andrena* is found outside of the country.

The correct number is between 35-40 species (WOOD, unpublished data), and a formal revision of the Indian *Andrena* fauna is almost complete (WOOD, in prep.).

In lieu of this complete catalogue, the present work focuses on Kashmir, specifically the region of Ladakh. Whilst the Western Himalayan *Andrena* fauna has been studied, it has predominantly been in the states of Uttarakhand and Himachal Pradesh, not Kashmir. In the limited works on Kashmir, SMITH (1878) described *A. floridula* SMITH, 1878 from Leh, and COCKERELL (1911) described *A. rupshuensis* COCKERELL, 1911 from Rupshu. Both of these species are very poorly known and rare, and are known only from the type series. As a result, their phylogenetic affinities are unclear which is particularly intriguing for *A. rupshuensis* as it has a clearly elongate malar space which is highly unusual within *Andrena*. There are also limited works by NURSE (1903) and NURSE (1904) who mentioned a small number of species from this region, including the description of *A. patella* NURSE, 1903 (= *A. induta* MORAWITZ, 1894). Finally, WOOD (2024) presented a new record of *A. rufina* MORAWITZ, 1876 for Kashmir including Ladakh, which also represented new species for the Indian fauna.

The emerging picture for *Andrena* in this region is therefore clear; Kashmir is relatively understudied relative to other parts of the Western Himalayas, almost all *Andrena* work was conducted more than 100 years ago, modern study is limited by a lack of material, and when study has been possible, remarkable and strange species are discovered and described. This picture differs from some other bee groups which are less constrained by material availability (most clearly for *Bombus* (Apidae) where the number of specimens are measured in the thousands as opposed to dozens (WILLIAMS 1991)), but is probably typical for solitary species with short flight periods, for example for the genera *Rophites* (WARNCKE 1979) or *Colletes* (KUHLMANN 2003). In this context, we report here records for some *Andrena* species collected at high altitude sites in the Leh district of Ladakh. Though only a few species were recorded, they represent very poorly known species with typically alpine distributions, and of which only a tiny number of specimens were previously known.

Materials and Methods

Morphological terminology follows MICHENER (2007). The following abbreviations are used in the species descriptions: A = antennal segments, S = metasomal sternite, and T = metasomal tergite. Subgeneric concepts follow PISANTY et al. (2022b). Specimens were measured from the centre of the clypeus at the front of the head to the apical tip of the metasoma to the nearest 0.5 mm. Photographs were taken using an Olympus E-M1 Mark II with a 60 mm macro lens. Additional close-ups were taken with the addition of a Mitutoyo M Plan Apo 5X infinity corrected objective lens. Photographs were stacked using Helicon Focus B (HeliconSoft, Ukraine) and plates were prepared in GNU Image Manipulation Program (GIMP) 2.10. Post-processing of some images was made in Photoshop Elements (Adobe Systems, USA) in order to improve lighting to highlight specific characters.

Taxonomy

Andrena (Andrena) ladakha nov.sp. (Figs 1-16)

Material examined: Holotype: India: Ladakh, Leh Tehsil, Rumbak [34.0600°N, 77.4200°E], 3850 m, 1.ix.2015, 1♀, leg. M. Jacobs, coll. Biologiezentrum Linz; Paratypes: India: same information as holotype, 1♂, coll. Biologiezentrum Linz.

Diagnosis. *Andrena ladakha* is a little tricky to classify within the *Andrena*, as at first glance it does not unambiguously fall into a single subgenus. The two possible options are within *Andrena* s. str. FABRICIUS, 1775 and the subgenus *Leucandrena* HEDICKE, 1933. Due to the male characters of the pronotum with a strongly produced humeral angle, the gena broadened and produced into a roughly 90° rounded angle postero-ventrally (Fig. 9), the somewhat elongate and weakly falciform mandibles (Figs. 10-11), and the simple genital capsule (Fig. 16) it could fall into either subgenus. Indeed, the genital capsule has only very weak lateral hyaline extensions on the penis valves basally (usually more strongly produced in Palearctic *Andrena* s. str.), and hence resembles members of the *Leucandrena* such as *A. parviceps* KRIECHBAUMER, 1873 and *A. argentata* SMITH, 1844 (see photographs in WOOD 2023a). However, the female morphology is less convincingly associated with the *Leucandrena* due to the lack of distinct tergal hairbands (terga instead covered with thick though slightly abraded hairs, Fig. 8), the shape of the clypeus which is not evenly domed (only very weakly domed) and is covered with dense hairs that obscure the underlying surface (Fig. 2), the propodeal triangle is unsculptured (Fig. 6), and the process of the labrum is truncate with its apical margin weakly emarginate (Fig. 3; in *Leucandrena* typically with the process of the labrum rounded-triangular).

In frontal view, the apical margin of the clypeus is broadly rounded or emarginate, and very weakly upturned (Figs 2-3). This is reminiscent of the state in *A. (incertae sedis) fumea* WOOD, 2023 (Kyrgyzstan only) and to a lesser extent *A. (Hoplandrena) cephalgia* WOOD, 2023 (Central Asia). Based on data from Ultra-conserved Element sequencing, both of these species are actually found within the *Andrena* s. str. (BOSSERT, PISANTY, WOOD, unpublished data) despite their unusual morphology for this subgenus based on "typical" species from the Palearctic. In direct comparison, *A. ladakha* and *A. fumea* share the same short and broad sub-triangular head that has the face covered with dense pale pubescence (Fig. 2, compare photographs in WOOD 2023c) and the broadly emarginate and weakly upturned fore-margin of the clypeus and truncate roughly trapezoidal process of the labrum with emarginate apical margin (Fig. 3). In this context, and in light of the genetic reclassification of *A. fumea* as an *Andrena* s. str. (BOSSERT, PISANTY, WOOD, in prep.), it is best to classify *A. ladakha* as an *Andrena* s. str. It can be immediately recognised in combination with the aforementioned characters by the elongate malar space, this space equalling or slightly exceeding the length of the 4th antennal segment, whereas in *A. fumea* the malar space is much shorter, and moreover the basal 1/3rd of the propodeal triangle is covered with coarse raised rugae (predominantly smooth in *A. ladakha* with only a few weak rugae basally), the terga have sparse pale and dark hairs which do not obscure the underlying surface (terga covered with dense pale-orange-brown hairs which obscure the underlying surface), and the scutum is covered with black hairs (scutum covered with pale hairs in *A. ladakha*).

A noticeably elongate malar space is also found in the very rare *A. (incertae sedis) rupshuensis* which is known only from Rupshu in Ladakh at an elevation of 16,000 ft (=

c. 4,900 m), and which was described only in the female sex (COCKERELL 1911). However, *A. rupshuensis* is immediately recognisable (type photographs available on the Smithsonian Collections website) due to the terga which have clear and narrow white apical hairbands and due to the head which is 1.2 times wider than long, whereas in *A. ladakha* the terga are densely covered with a mixture of pale-orange-brown hairs and the head is 1.4 times wider than long.

In the male sex, in addition to the aforementioned characters, *A. ladakha* can also be recognised due to the elongate malar space that approaches the length of the 4th antennal segment. All other *Andrena* s. str. species in the region have a much shorter malar space that is barely noticeable. The males of *A. fumea* and *A. rupshuensis* are unknown, and so cannot be compared. *Andrena cephalgia* is radically different (leading to its placement in the subgenus *Hoplandrena* PÉREZ, 1890) with a genital capsule displaying clear pointed lateral hyaline extensions on the penis valves and with the gonostyli apically pointed with their apexes covered with stiff apically-projecting hairs (see photographs in WOOD 2023d).

Description. Female. Body length 12 mm (Fig. 1). Head: Dark, 1.4 times wider than long (Fig. 2). Clypeus very weakly domed, variably punctate, punctures almost confluent in basal $\frac{1}{2}$, separated by 0.5 puncture diameters apically, with impunctate longitudinal midline; underlying surface shagreened, weakly shining. Fore margin of clypeus broadly rounded, giving impression of wide slightly upturned emargination (Fig. 3). Process of labrum trapezoidal, slightly wider than long, apical margin slightly humped, with medial emargination. Malar space elongate, at longest slightly exceeding length of A4. Gena slightly exceeding width of compound eye; ocelloccipital distance slightly exceeding diameter of lateral ocellus. Foveae dorsally occupying majority of space between lateral ocellus and compound eye, separated from lateral ocellus by distance subequal to its own diameter; foveae filled with black hairs (Fig. 4). Face medially covered with long white to pale hairs, hairs becoming black laterally and along apical margin of clypeus, longest hairs exceeding length of scape; gena and vertex with intermixed black and pale hairs. Antennae basally dark, A4-12 ventrally lightened by presence of grey-brown scales; A3 long, subequal to A4+5+6.

Mesosoma: Scutum and scutellum with fine granular microreticulation, predominantly dull, sculpture becoming weaker medially, here weakly shining; surface covered with shallow punctures, punctures separated by 0.5-1 puncture diameters (Fig. 5). Pronotum with strong humeral angle. Mesepisternum finely shagreened and weakly shining, surface covered with shallow punctures, punctures separated by 1-2 puncture diameters. Dorsolateral parts of propodeum very finely shagreened, surface covered with hair-bearing wrinkles, wrinkles separated by 2-3 wrinkle diameters; propodeal triangle delineated by change in surface sculpture, internal surface with fine granular shagreen, surface more strongly shining, basally with irregular pattern of weakly raised rugae (Fig. 6). Mesepisternum covered with long black hairs, hairs exceeding length of scape, hairs becoming pale on scutum, scutellum, and propodeum. Propodeal corbícula incomplete, dorsal fringe composed of mixture of pale weakly plumose hairs in dorsal part, becoming black strongly plumose hairs in ventral part; internal surface with scattered simple long hairs. Legs predominantly dark, apical tarsal segments of fore and mid legs and entire all tarsal segments of hind legs lightened orange, pubescence orange to brownish (Fig. 7). Flocculus complete, composed of strongly plumose dark brown hairs; femoral and tibial scopae composed of dark brown simple hairs. Hind tarsal claws with strong inner tooth.



Figs 1-8: *Andrena (Andrena) ladakha* nov.sp. female. (1) Habitus, lateral view; (2) face, frontal view; (3) process of the labrum, ventral view; (4) head, dorsal view; (5) scutum, dorsal view; (6) propodeum, dorso-posterior view; (7) hind leg, lateral view; (8) terga, dorsal view.



Figs 9-16: *Andrena (Andrena) ladakha* nov.sp. male. (9) Habitus, lateral view; (10) face, frontal view; (11) malar space, lateral view; (12) scutum, dorsal view; (13) propodeum, dorso-posterior view; (14) hind leg, lateral view; (15) terga, dorsal view; (16) genital capsule, dorsal view.

Wings hyaline, stigma and venation dark brown, nervulus weakly antefurcal.

Metasoma: Terga predominantly dark, apical rims narrowly lightened hyaline yellow-brown; tergal discs finely shagreened and predominantly shining, punctate, punctures separated by 1-2 puncture diameters. Tergal discs and margins covered with dense mixture of pale, orange-brown, and black hairs, obscuring underlying surface when not abraded (Fig. 8). Apical fringe of T5 and hairs flanking pygidial plate dark brown. Pygidial plate roughly triangular, lateral margins weakly constricted medially, surface smooth and featureless.

Male. Body length 11 mm (Fig. 9). Head: Dark, 1.3 times wider than long (Fig. 10). Clypeus very weakly domed, regularly punctate, punctures separated by <0.5 - 0.5 puncture diameters, underlying surface shining. Process of labrum rounded trapezoidal, anterior margin with weak emargination. Malar space elongate, at its longest subequal to length of A4 (Fig. 11). Gena strongly broadened, clearly exceeding width of compound eye, ventro-posteriorly produced into a strong almost 90° rounded angle; ocelloccipital distance 1.5 times diameter of lateral ocellus. Face medially with pale whitish hairs, hairs becoming black laterally and anteriorly, most hairs not exceeding length of scape; gena and vertex with intermixed black and pale hairs. Antennae basally dark, A4-13 lightened by presence of greyish-brown scales; A3 equalling length of A4, A4-13 long, rectangular, at least 2 times as broad as long.

Mesosoma: Mesosoma structurally as in female (Fig. 12), with exception of propodeum with dorsolateral parts with slightly denser network of wrinkles, propodeal triangle with more pronounced rugae in basal $\frac{1}{2}$ (Fig. 13). Mesepisternum with mixture of long whitish to blackish hairs, hairs exceeding length of scape, hairs becoming white to pale on scutum, scutellum, and propodeum. Legs predominantly dark, tarsi and part of hind tibiae lightened orange, pubescence whitish (Fig. 14). Hind tarsal claws with strong inner tooth. Wings hyaline, stigma and venation dark orange-brown, nervulus weakly antefurcal.

Metasoma: Terga predominantly dark, apical rims narrowly lightened hyaline brown; tergal discs finely shagreened and predominantly shining, punctate, punctures separated by 1-2 puncture diameters. Terga with sparse pale hairs, longest on disc of T1, not obscuring underlying surface (Fig. 15). T6-7 with long light brown hairs overlying pseudopygidial plate of T7. S8 narrow and columnar, ventral surface with dense lateral fan of brown hairs. Genital capsule weakly elongate, gonocoxae produced into moderately projecting rounded teeth, gonostyli slightly constricted medially, apexes slightly broadened and spatulate with inner margins weakly raised. Penis valves with weak and obscure lateral hyaline projections, valves weakly narrowing apically (Fig. 16).

R e m a r k s : The elongate malar space of this species is remarkable, as very few *Andrena* species show an elongate face or elongate malar space. This elongate malar space in combination with the elongate malar space shown by *A. rupshuensis* along with several Himalayan species of *Colletes* (M. Kuhlmann, pers. comm.) suggest that solitary bees found in high elevation sites in Kashmir are under selection pressure to access nectar in flowers with deep corollae. Detailed study of the ecological niches of these very rare species in the field is required to further clarify this point. The collecting locality (Fig. 17) supported flowers with both long (e.g. Lamiaceae) and short (e.g. Asteraceae) corollae. Essentially no *Andrena* species are known to be associated with the collection of Lamiaceae pollen in meaningful quantities, so this potentially intriguing association requires study.

Distribution: Northern India (Ladakh).

Derivatio nominis: Named after the northern union territory of India from which it was collected.

***Andrena (Hoplandrena) mordax* MORAWITZ, 1876 (Figs 18-19; 22-27)**

Material examined: Afghanistan: Grosser Pamir, Issiktal [Isik mountain, Isik, Wakhan Corridor], 3500 m, 18-25.viii.1975, 9♀, leg. H. Huss, coll. Biologiezentrum Linz; India: Ladakh, Leh Tehsil, Rumbak, 3850 m, 1.ix.2015, 1♂, 2♀, leg. M. Jacobs, coll. Maarten Jacobs.

Remarks: *Andrena mordax* is an uncommon but typical species of Central Asia. The type material (a male) was illustrated by ASTAFUROVA et al. (2022), and differs slightly from the male pictured here (Figs 23; 25; 25), specifically due to the genital capsule which has the penis valves comparatively slightly wider basally, whereas they are slightly more narrow in the Indian specimen (Fig. 27). Otherwise, the specimens conform well to the concept of *A. mordax* in both sexes (Figs 22-27; OSYTSHNJUK et al. 2008). Specimens were observed foraging on *Mentha* (Lamiaceae) at the Rumbak site (Figs 18-19). In addition to reporting *A. mordax* as new for India, the species is reported from Afghanistan for the first time from the Wakhan Corridor (Isik mountain, not to be confused with lake Issyk Kul in Kyrgyzstan), linking populations in Central Asia proper with those in Ladakh.

Distribution: Kazakhstan, Uzbekistan, Tajikistan, Kyrgyzstan, China, Afghanistan*, India* (Ladakh) (OSYTSHNJUK et al. 2008; ASTAFUROVA et al. 2022).

***Andrena (Melandrena) peregrina* (SMITH, 1878) (Figs 28-35)**

Material examined: China: Yarkand [=Yarkant]; 1♀, coll. Natural History Museum, London (possible holotype/syntype of *L. peregrinus*); India: Ladakh, Leh Tehsil, Rumbak, 3850 m, 1.ix.2015, 2♂♂, 1♀, leg. M. Jacobs, coll. Maarten Jacobs.

Remarks: The status of *A. peregrina* has been confused. The species was originally described as *Lamprocolletes peregrinus*, this genus now being recognised as a subgenus of *Leioproctus* (Colletidae) whose members are restricted to Australia (MICHENER 2007). WARNCKE (1967: 298) recognised this taxon as an *Andrena*, and as a junior synonym of *A. cineraria* (LINNAEUS, 1758). This is the source for the current listing of GUSENLEITNER & SCHWARZ (2002), who also give the type depository as the Natural History Museum in London. Examination of material in this collection produced a female labelled as "Type" in the handwriting of Smith which comes from Yarkand [= Yarkant] in what is now western China (Xinjiang). However, the published type locality is Yangihissár [Yengisar] in East Turkestan [= Xinjiang in western China] (SMITH 1878: 2) which is approximately 100 km to the south-east of Yangihissár. It is therefore ambiguous as to whether or not this NHMUK specimen is actually syntypic.

Comparison with contemporary specimens from Ladakh show very close similarity. The infusate wings (Fig. 32) and short male A3 (Fig. 33) suggest proximity to *A. barbareae* PANZER, 1805, but the colouration of the metasoma is much to bright and light blue-green metallic (Figs 34-35) as opposed to the dark blue of *A. barbareae*. Given the taxonomic complexity in the group of closely related species around *A. cineraria* (GUEUNING et al. 2020), no taxonomic action is taken here. However, we consider it likely that the name *A. peregrina* will ultimately apply to populations in Kashmir, and that the status of *A. basifusca* COCKERELL, 1930 (described from Uzbekistan and currently listed as a valid species by GUSENLEITNER & SCHWARZ (2002)) will have to be dealt with in future mole-



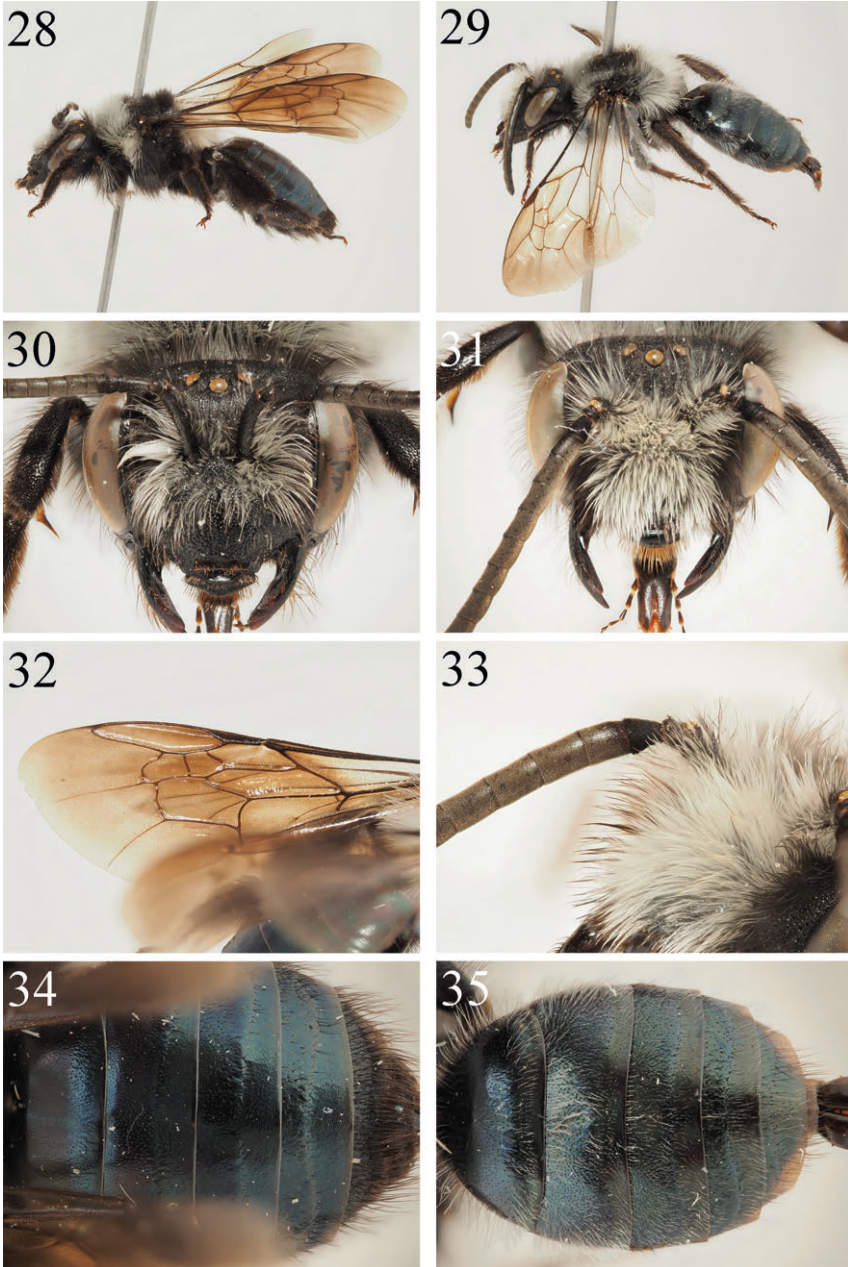
Figs 17-21: (17) Collecting site of Rumbak at 3850 m; (18-19) *Andrena mordax* MORAWITZ, 1876 female at *Mentha* flowers (Lamiaceae; photographs taken at Rumbak); (20-21) *Andrena floridula* SMITH, 1878 female at Asteraceae flowers (photographs taken in Leh gardens; photographs: M. Jacobs).



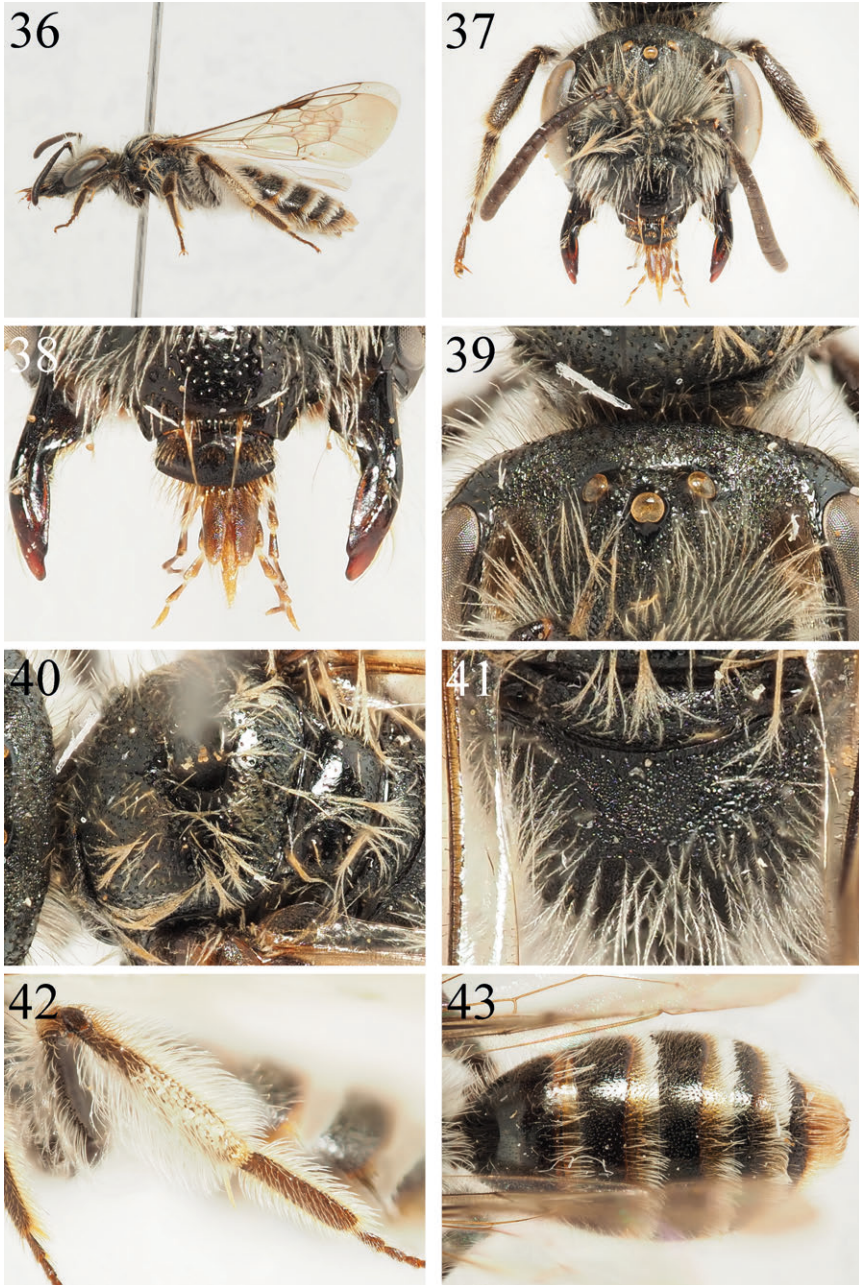
Figs 22-27: *Andrena (Hoplandrena) mordax* MORAWITZ, 1876. (22) Female habitus, lateral view; (23) male habitus, lateral view; (24) female face, frontal view; (25) male face, frontal view; (26) female terga, dorsal view; (27) male genital capsule, dorsal view.

cular-based revisions. In any case, the material examined here is likely the taxon referred to as *A. cineraria* by NURSE (1904: 557) who stated that the species was common in Kashmir.

Distribution: Unclear due to uncertain taxonomic status and treatment as part of a broad *A. cineraria* concept. Possibly found across mountainous areas in Central Asia, but detailed study using genetic tools is required.



Figs 28-35: *Andrena (Melandrena) peregrina* (SMITH, 1878). (28) Female habitus, lateral view; (29) male habitus, lateral view; (30) female face, frontal view; (31) male face, frontal view; (32) female forewing, dorsal view; (33) male antenna, ventro-lateral view; (34) female terga, dorsal view; (35) male terga, dorsal view.



Figs 36-43: *Andrena (incertae sedis) floridula* SMITH, 1878 female. (36) Habitus, profile view; (37) face, frontal view; (38) process of labrum, frontal view; (39) head, dorsal view; (40) scutum, dorsal view; (41) propodeum, dorsal view; (42) hind leg, profile view; (43) terga, dorsal view.

***Andrena (incertae sedis) floridula* SMITH, 1878 (Figs 20-21, 36-43)**

Material examined: India: Ladakh, Leh Tehsil, city gardens, 3500 m, 30.viii.2015, 1♀, leg. M. Jacobs, coll. Biologiezentrum Linz.

Diagnosis: *Andrena floridula* was described from Drás [= Dras], Kárgil [Kargil], and Leh in Ladakh (SMITH 1878: 2). It was described only in the male sex, with the flight period given as August-September. GUSENLEITNER & SCHWARZ (2002) gave the type depository as the NHMUK, but no specimens or record of *A. floridula* could be found there. Donald Baker (unpublished Phd thesis) suggested that type material could be in the Zoological Survey of India collection in Kolkata which is currently unavailable for study. In any case, although the female was not previously known, the contemporary specimen from Leh is unmistakably *A. floridula* based on the description, illustration (SMITH 1878: figure 4, as *A. floracula* sic), collecting locality, and flight period.

Although Smith writes that the specimens he described were males ("Mas.-"), the specimen pictured in his figure 4 actually appears to be a female, as there appear to be scopal hairs present on the hind tibiae. In any case, the specimen matches the description with regards to the key criteria which are that the hind legs are covered with silvery pubescence (Fig. 42) and the ovate metasoma has the apical margins testaceous with a thin fringe of whitish pubescence (Fig. 43). Indeed, the terga have not only their margins lightened white-hyaline, but the transitional area between the margin and the tergal discs is lightened dark orange-red.

Examination of this contemporary specimen shows that it presents an unusual combination of characters that defies classification within the existing subgeneric system. The facial foveae are relatively narrow and impressed (Figs 37; 39), slightly narrowing ventrally (but not as clearly as in members of the subgenus *Euandrena* HEDICKE, 1933), the head is almost round in frontal view (only 1.1 times wider than long, Fig. 37), the ocelloccipital distance exceeds two times the diameter of a lateral ocellus (Fig. 39), with the vertex itself being clearly depressed at the meeting point with the two lateral ocelli (similar to the condition in the subgenus *Oreomelissa* HIRASHIMA & TADAUCHI, 1975 and allied subgenera), the head and mesosoma show weak metallic green reflections (Figs 37; 39-40), the propodeal triangle is poorly delineated but weak lateral carinae and some raised rugae are present laterally and basally (Fig. 41), the scopal hairs are weakly plumose on the hind femorae and less so on the hind tibiae (Fig. 42), and there are no other distinctive characters. Without available male specimens (as the genital capsule is unknown) or any genetic data, it is not possible to confidently place the species within a subgenus.

Description. Female. Body length: 9 mm (Fig. 36). Head: Dark, 1.1 times wider than long (Fig. 37), integument with weak metallic green reflections most visible on gena and vertex. Clypeus weakly domed, irregularly punctate, punctures basally and laterally separated by 0.5 puncture diameters, medially becoming scattered, separated by 1-3 puncture dimeters, underlying surface polished and shining. Process of labrum broadly trapezoidal, 2 times wider than long, apical margin with extremely deep rounded emargination, emargination reaching ½ of visible length (Fig. 38). Gena slightly exceeding width of compound eye; ocelloccipital distance 2 times diameter of lateral ocellus (Fig. 39); vertex slightly but distinctly depressed at level of posterior margin of lateral ocelli. Foveae dorsally occupying slightly less than ½ space between lateral ocellus and compound eye, narrowly slightly ventrally, ventrally extending to slightly below lower margin of antennal insertions; foveae filled with light brown hairs. Face, gena, vertex, and

scape covered with pale whitish pubescence. Antennae basally dark, A4-12 ventrally lightened by presence of brownish scales; A3 slightly exceeding A4+5, shorter than A4+5+6.

Mesosoma: Scutum predominantly polished and shining, weakly shagreened anteriorly, surface irregularly punctate, punctures separated by 0.5-2 puncture diameters; surface with subtle metallic reflections laterally; scutellum more strongly polished and shining and more sparsely punctate, punctures separated by 0.5-4 puncture diameters (Fig. 40). Pronotum with weak but distinct humeral angle, humeral angle with longitudinal carina. Mesepisternum and dorsolateral parts of propodeum microreticulate, dull, microreticulation overlain by raised network of rugosity; propodeal triangle laterally delineated by fine carina, internal surface slightly depressed, covered with fine network of raised carinae over majority of surface (Fig. 41). Mesosoma covered with pale hairs, not exceeding length of scape. Propodeal corbicula incomplete, dorsal fringe composed of long plumose pale hairs, internal surface with abundant plumose pale hairs. Legs dark, pubescence light brown. Flocculus complete, strongly produced, composed of white plumose hairs; femoral and tibial scopae composed of bright white-silvery hairs, hairs of femoral scopae somewhat plumose, hairs of tibial scopae obscurely plumose (Fig. 42). Hind tarsal claws with small inner tooth. Wings hyaline, stigma and venation dark brown, nervulus weakly antefurcal.

Metasoma: Tergal discs dark, marginal areas broadly lightened hyaline orange-brown, apical rims lightened hyaline whitish (Fig. 43). Tergal discs polished and shining, irregularly punctate, punctures separated by 0.5-3 puncture diameters, most dense basally, becoming weaker apically onto tergal margins. Tergal discs with scattered pale pubescence, tergal margins with pubescence longer and forming distinct hairbands on T2-4, weakly interrupted on T2, complete on T3-4, obscuring underlying surface laterally. Apical fringe of T5 and hairs flanking pygidial plate orange-brown. Pygidial plate rounded triangular, lateral margins slightly raised, internal surface flat and dull, featureless.

Distribution: India (Ladakh) (SMITH 1878).

Discussion

To our knowledge, the present work constitutes the first description of new *Andrena* species from the mountains of Kashmir since the publication of COCKERELL (1923) who described species from around Murree in the modern state of Pakistan, and is one of the few publications to have presented detailed *Andrena* records at all from this region in around 100 years (WOOD & MONFARED 2022; WOOD 2024). Though sampling was limited, in part due to the lateness of the season (late August and early September) when the principal *Andrena* months are the springtime or early summer, it was still able to detect species that had either not previously been recorded in India, or had not been seen in nearly 150 years. Given the likely role that the high mountains of Kashmir play as a link between the Himalayan and Central Asian mountain chains and their associated faunas, a renewed sampling effort is required in this region to better understand the unusual species present, their potentially intriguing ecologies, and their phylogenetic positions and relations to the global *Andrena* fauna.

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Zusammenfassung

Im Hochgebirge des westlichen Himalaya ist die Entomofauna aufgrund ihrer Abgeschlossenheit und des schwierigen Zugangs nur wenig erforscht. Dieser Mangel an Wissen gilt auch für die Bienenfauna dieser Region, die nur gelegentlich und sporadisch untersucht wurde. Ein Besuch in der Region Ladakh (Kaschmir) in Nordindien führte daher zu mehreren bemerkenswerten Nachweisen sehr wenig bekannter Bienenarten. *Andrena (Andrena) ladakha* WOOD nov.sp. wird beschrieben, und *A. (Hoplendrena) mordax* MORAWITZ, 1876 wird als neu für Indien gemeldet. Das unbekannte Weibchen von *A. (incertae sedis) floridula* SMITH, 1878 wird zum ersten Mal beschrieben. Diese Ergebnisse verdeutlichen, wie sehr unser Verständnis der alpinen Wildbienen des westlichen Himalaya durch fehlende Aufsammlungen, Erkundungen und Studien eingeschränkt ist.

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