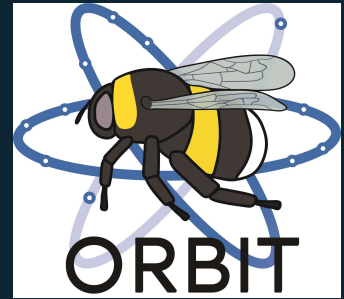




Pollinator Academy

Genus: *Andrena*



Female



Male

Genus: *Andrena* Fabricius, 1775

Clade: Anthophila

Family: Andrenidae

SubFamily: Andreninae

Tribe: Andrenini

Number of species of this genus found in Europe: ~450 species due to ongoing taxonomic revisions

Morphology & diagnosis

Mining bees are among the most common short-tongued bees. These bees can be very large or very small (4-16mm). The combination of these characters is diagnostic: forewing with three submarginal cells (except *Andrena lagopus* that has two cells), the first cell is larger than the third cell, and the third cell is larger than the second cell; the basal vein is straight; there are two subantennal sutures under each antennal insertion; the females have two large foveae between the compound eyes and the antennae, this is a kind of depression in the cuticle with a short, dense velvety hair cover as lining; the abdomen may be entirely or partly reddish and the face of some males may be yellow but without any other yellow markings on the rest of the body; the female pollen brush is present on the hind tibia, femora, and additionally a flocculus is present on the hind trochanter; in some species, a well-developed propodeal corbicula is also present.

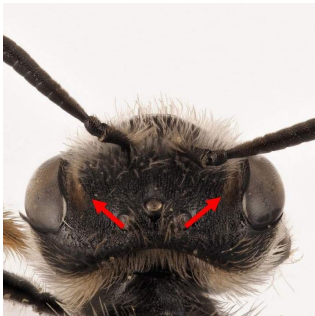
However, among the short-tongued species with three submarginal cells, they can often be recognized by the absence of distinctive characters in the other genera rather than by the presence of their own particular characters, which can be tenuous and often difficult to see or are only meaningful to a group expert. For instance, the *Andrena* can be differentiated from the common genera *Halictus* and *Lasioglossum* (Halictidae) through the basal vein which is straight in *Andrena* but curved in Halictidae, and the absence of the rima on tergum six in females. They can also be differentiated from the genus *Melitta* (Melittidae) by the narrow and elongate apical tarsal segment, whereas the same tarsal segment in *Melitta* is dilated and drop-shaped. In all cases, it should be noted that *Melitta* are much less abundant than *Andrena*. *Andrena* can also be distinguished from *Colletes* by their pointed tongue and an arcuate third transverse cubital vein, while *Colletes* have a bifid tongue tip and an S-shaped third transverse cubital vein.

Summary of distinctive traits

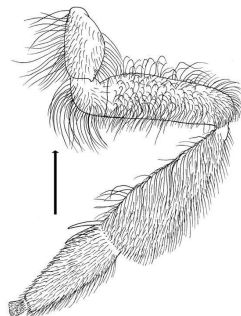
This hyper-diverse genus includes bees of very different sizes and colours. For this reason, it is difficult to pin-point any single distinctive trait that applies in all contexts. However, female *Andrena* can always be identified by the combination of the presence of:

- Facial foveae (depressions of variable size and shape that run alongside the inner margin of the compound eyes and which are filled with short, velvet-like hairs) (a)
- Presence of flocculus in females (a dense tuft of long curved hairs on posterior trochanters that is distinct from the tibial and femoral scopae but which is also used for collecting pollen) (b)
- Two subantennal sutures (often difficult to observe due to presence of facial pubescence) (c)
- Three submarginal cells in the forewing (except for a single species with two submarginal cells in the forewing (*Andrena lagopus*)) (d)

Male *Andrena* lack these distinctive characters.



(a) *Andrena fabrella* Female



(b) *Andrena* sp.



(c) *Andrena agilissima* Female



*Andrena_falsifica*_Female

General comments on identification to species level

For both sexes, it is best to spread the wings and hind legs slightly apart from the body (not too much to avoid breaking the specimens) to give a good view of the hind tibial spurs, hind face of the hind femur, the propodeum, and the punctuation of the terga. Also, for both sexes, the labrum must be clearly visible. To identify males, the genitalia must often be examined, but sometimes also sternite 8. The diagnoses proposed here are predominantly based on female specimens. Females are generally much easier to identify than the males. These are often recognized by their constant presence alongside females in the field.

Identification to the species level can be very complicated due to the sheer diversity of the genus, especially in some of the species-groups and subgenera like *Micrandrena*. A good knowledge of the local fauna with a collection of reference specimens and/or the help from a specialist are strongly advised – there is no substitute, and in most cases *Andrena* cannot be identified without consulting expertly determined material.

Morphologically similar genera, and how to distinguish them

- ***Andrena - Panurgus***

Andrena species have a pointed or rounded marginal cell. *Panurgus* species have a truncated marginal cell.

- ***Andrena - Apis***

Andrena species have a normal marginal cell. *Apis* species have an elongated (banana-shaped) marginal cell.

- ***Andrena - Halictus, Lasioglossum & Sphecodes***

Andrena species have a straight or at most slightly curved basal vein. *Halictus*, *Lasioglossum* and *Sphecodes* species have a strongly curved basal vein.

- ***Andrena - Colletes***

Andrena species have submarginal cells 2 smaller than 3, a tongue pointed and the second recurrent vein is arched or straight. T3 and T4 are the largest

segments of the metasoma.

Colletes species have submarginal cells 2 and 3 of equivalent size. The tongue is bifid. The second recurrent vein is "S"-shaped, T1 and T2 are the largest segments of the metasoma.

- ***Andrena - Melitturga***

Andrena males have normally sized eyes, they are not greatly inflated.

Andrena females have foveae on the face and simple antennae. *Melitturga* males have converging eyes on the head. *Melitturga* females have no fovea on the face and club-like antennae.

- ***Andrena - Melitta***

Andrena species have two subantennal sutures, females have facial foveae and the last tarsal segment is of similar width than the previous tarsal segments.

Melitta species have a single subantennal suture, no facial fovea and most species have an enlarged last tarsal segment.

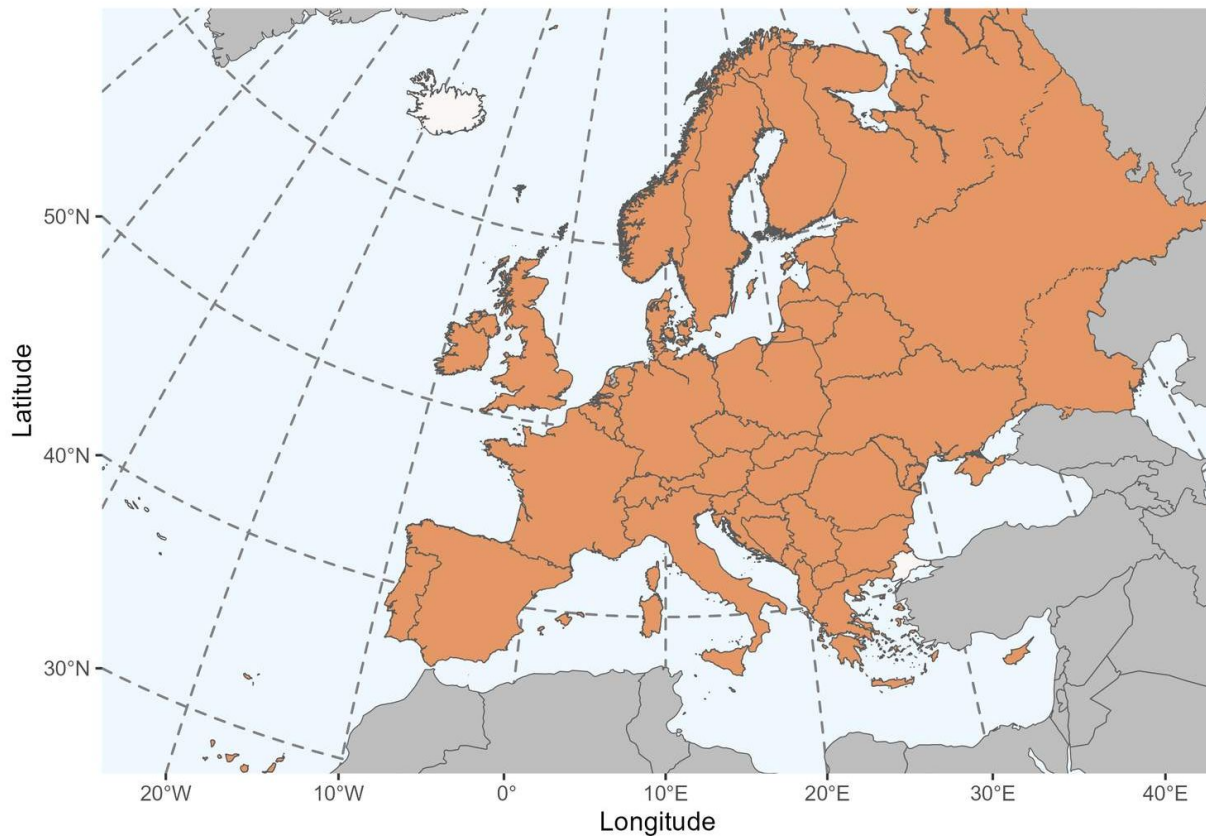
- ***Andrena - Xylocopa***

Andrena species have submarginal cell 3 smaller than submarginal cell 2, and two subantennal sutures. *Xylocopa* species have submarginal cell 3 much larger than submarginal cell 2, and only one subantennal suture.

Geographical distribution and global diversity

Andrena is the second most species-rich genus of bees. Around 1600 species are known globally (Gusenleitner & Schwarz 2002, TJWood, unpublished data). The majority of these species are found in the Holarctic. Less than 10 species occur in sub-Saharan Africa, and no species occur in South America or Oceania. The Nearctic region is home to around 550 species whereas there are around 1050 species in the Palearctic region (Gusenleitner & Schwarz 2002, TJWood, unpublished data). The subgeneric

classification of the Palearctic region was mainly established by Warncke (1968), but it has many problems that are currently being resolved following the revision of Pisanty et al. (2022). This latter classification system has been adopted, though many species currently cannot be placed or are found in unnamed lineages. These species have been listed as *incertae sedis* and pose some of the greatest identification challenges.



Presence in Europe

Present across the entirety of Europe except in Iceland.

Biology

Seasonal life cycle

Andrenas are on the wing between the end of February and September, and most of them fly in spring. Most species are univoltine but a substantial proportion of them such as *Andrena flavipes* are bivoltine, sometimes with significant morphological and ethological differences between the two generations.

Reproduction

Males patrol nesting sites, going past flowers, shrubs or tree trunks. They then mark leaves, twigs, or stems with species-specific secretions from the jaw glands and fly back and forth past these spots. These scent-marked spots are attractive to females and other males and small swarms of sand bees can often be seen there. Tengö & Bergström (1967a, 1977) analysed the chemical composition of the jaw glands. Tengö (1979) shows through his experiments the function of these scents in the reproductive behavior and discussed factors (weather conditions, age) that can affect males flight activity. Mating takes place when newly emerged *Andrena* females come out of the nests or if they are found by males elsewhere on leaves or flowers. Females are known to mate only once.

Nesting

Andrena nest in the ground. Although solitary, some species can nest in large agglomerations. They are found in almost all habitat types. The majority prefer open land habitats such as nutrient-poor grassland, fertile meadows, ruderal areas, Mediterranean scrub, or fallow land. Abandoned sand, gravel and clay areas as well as forest edges also harbour many species. Although nests are not well known for many *Andrena* species, all species nest exclusively in various substrates in the soil (sand, sandy loam, loess).

Parasites

Numerous species of brood parasitic bees of the genera *Nomada* and *Sphecodes* are parasites of *Andrena*.

Floral preferences

As a genus, *Andrena* are exceptionally variable in their floral preferences, containing a mixture of generalist and specialist species. Some species are highly polylectic (such as *Andrena bicolor* or *A. flavipes*) whilst others are restricted to individual plant genera (*A. nasuta* on *Anchusa* (Boraginaceae) or *A. florea* on *Bryonia* (Cucurbitaceae)). It is therefore hard to generalise, though it can be observed that most species visit open, simple, and radially symmetrical flowers.



Type species: *Apis helvola* Linnaeus, 1758, by designation of Viereck, 1912

Subgenera found in Europe: *Aciandrena* Warncke, 1968; *Aenandrena* Warncke, 1968; *Andrena* s.str. Fabricius, 1775; *Avandrena* Warncke, 1968; *Biareolina* Dours, 1873; *Brachyandrena* Pittioni, 1948; *Campylogaster* Dours, 1873; *Charitandrena* Hedicke, 1933; *Chlorandrena* Pérez, 1890; *Chrysandrena* Hedicke, 1933; *Cnemidandrena* Hedicke, 1933; *Cordandrena* Warncke, 1968; *Cryptandrena* Pittioni, 1948; *Didonia* Gribodo, 1894; *Euandrena* Hedicke, 1933; *Graecandrena* Warncke, 1968; *Hamandrena* Dubitzky, 2010; *Holandrena* Pérez, 1890; *Hoplendrena* Pérez, 1890; *Leimelissa* Osychnyuk, 1984; *Lepidandrena* Hedicke, 1933; *Leucandrena* Hedicke, 1933; *Margandrena* Warncke, 1968; *Melanapis* Cameron, 1902; *Melandrena* Pérez, 1890; *Micrandrena* Ashmead, 1899; *Nobandrena* Warncke, 1968; *Notandrena* Pérez, 1890; *Opandrena* Robertson, 1902; *Orandrena* Warncke, 1968; *Oreomelissa* Hirashima and Tadauchi, 1975; *Pallandrena* Warncke, 1968; *Parandrenella* Popov, 1958; *Plastandrena* Hedicke, 1933; *Poecilandrena* Hedicke, 1933; *Rufandrena* Warncke, 1968; *Scitandrena* Warncke, 1968; *Simandrena* Pérez, 1890; *Stenomelissa* Hirashima and LaBerge, 1965; *Suandrena* Warncke, 1968; *Taeniandrena* Hedicke, 1933; *Tarsandrena* Osychnyuk, 1984; *Trachandrena* Robertson, 1902; *Troandrena* Warncke, 1975; *Truncandrena* Warncke, 1968; *Ulandrena* Warncke, 1968.

Synonyms: *Anthrena* Illiger, 1801; *Anthocharessa* Gistel, 1850; *Solenopalpa* Pérez, 1897

Etymology: from Ancient Greek anthrênê = wild bee

Common names:

FR: les andrènes

GER: der Sandbienen

NL: de zandbijen

ENG: mining bee

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Authors

Photographs: Paolo Rosa (ORBIT consortium)

Text: ORBIT consortium

Reviewers: Thomas J. Wood (ORBIT consortium)

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