Pollinator Academy

Genus: *Bombus*

Female

Male

Genus: *Bombus* Latreille, 1802

Clade: Anthophila

Family: Apidae

SubFamily: Apinae

Tribe: Bombini

Number of species of this genus found in Europe: 67

Morphology & diagnosis

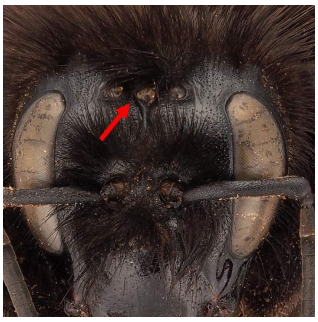
Bumblebees are large-size, robust bees (10-30mm). Based on their tongue structure, they are classified as long-tongue bees. Species within the genus, however, present a large panel of tongue lengths. Their malar space in some species can be relatively long compared to other bee clades, and the ocelli form an arc shape in the face. They are covered by a dense pilosity, that can differ in colour pattern between and within species. The wings present three submarginal cells and an especially long marginal cell. All non-parasitic species have a corbicula in the hind legs, and the large majority of brood parasitic species are included in the subgenus *Psithyrus*. On the corbicula, pollen takes a ball-shape, making bumble bees easy to recognize as this trait is only shared with honey bees in Europe. As eusocial species, there is caste differentiation, with the queen being larger than workers. Males do not show any yellow mark on the cuticle of the face. Only parasitic species do not have a worker caste. These species can be recognized because their overall pilosity is scarcer, making for instance the tergites more visible on the dorsal and lateral sides of the abdomen. Parasitic species present an atrophied corbicula, and its surface is always hairy in *Psithyrus*.

Summary of distinctive traits

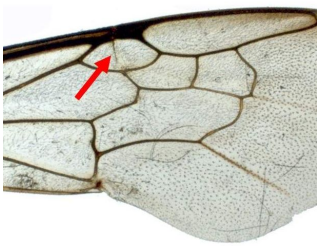
- Bumblebees (a)
- Very stout species, with dense and colorful hairs all over the body (b)
- 3 ocelli arranged in an arc shape (c)
- Presence of an incomplete vein within submarginal cell 1 (d)

(a) *Bombus laesus* Female

(b) *Bombus balteatus* Female



(c) *Bombus alpinus* Female



(d) *Bombus* sp.

identification to species level

Bumblebees are common insects, and recognising the genus in the wild is generally very straightforward. However, species identification within the genus is deceivingly complicated. It relies on subtle traits like cuticle punctation and to other details such as the shape of the labrum. The striking convergences in colour patterns among *Bombus* species and the high intra-specific colour variation within species makes colour-based species identification unreliable in most cases. When preparing specimens for collections, it is recommended to liberate the labrum on the females and to extract the genitalia on the males. The pilosity has to be kept as clean as possible, the legs have to be extended away from the ventral side of the body and the wings folded backwards without hiding the middle of the tergites. The book of Rasmont et al. (2021) offers keys at the species level for all European species.

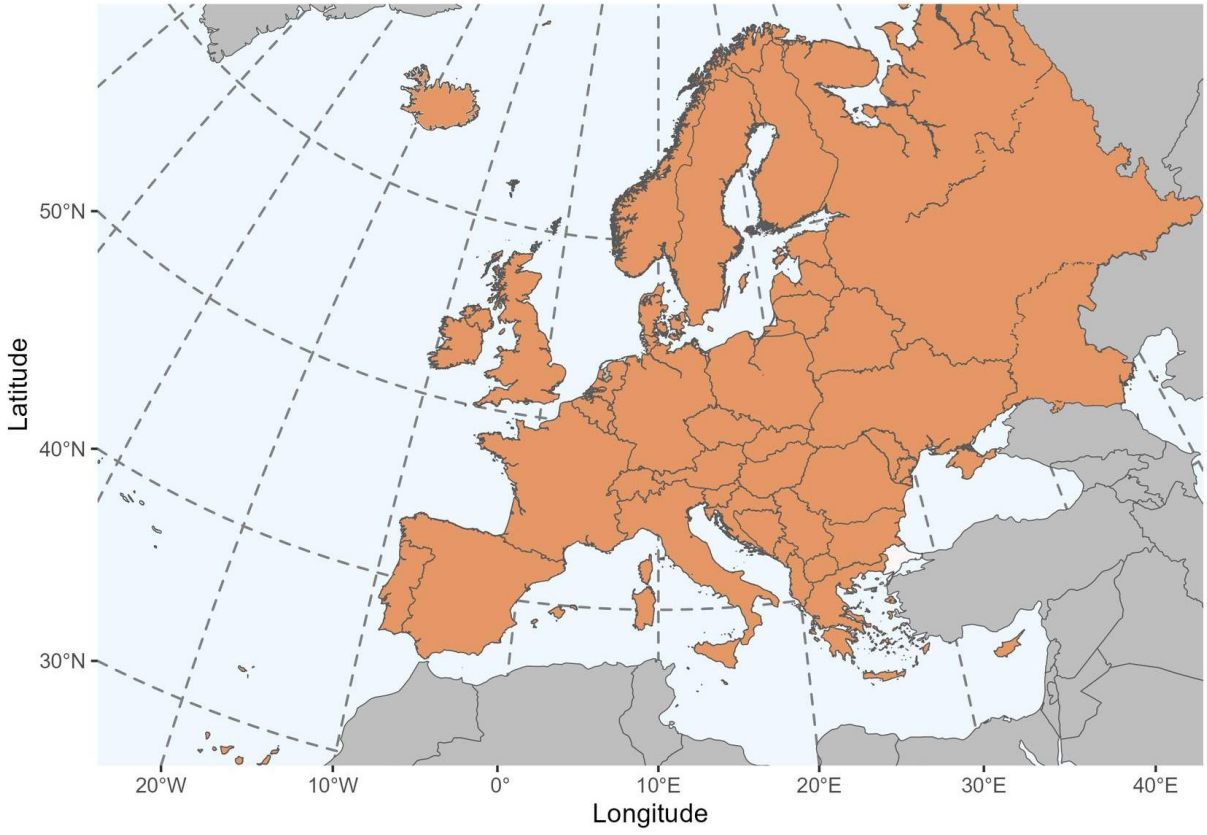
Morphologically similar genera, and how to distinguish them

- ***Bombus* - *Anthophora* & *Habropoda***
  Bombus species have ocelli arranged as an arc, never bear yellow-markings on the face and have a vein half-crossing the 1st submarginal cell.
  Anthophora and *Habropoda* species have ocelli arranged as a triangle, often bear yellow markings on the face and have no vein half-crossing the 1st submarginal cell.

Geographical distribution and global diversity

Bumblebees show a wide global distribution, but are clearly associated with cooler climates. They do not occur in Sub-Saharan Africa, the Arabian Peninsula, the southern two-thirds of India, and Oceania. Nevertheless, they have been introduced by humans in New Zealand and Tasmania for economic reasons. Overall, the genus presents around 265 described species worldwide.

In Europe, bumblebee diversity peaks in mountains and in polar areas. They have morphological adaptations to the cold, such as thick body and pilosity, and more importantly, they show endo-heterothermic thermoregulation. These features allow them to forage when temperatures are too cold for most other pollinators. Thus, they constitute the most abundant flower visitors of these environments.



Presence in Europe

They are present in the entire continent.

Biology

Seasonal life cycle

Bumblebees usually have one cycle per year. In all cases, colonies are initiated by a foundress queen. At the beginning of spring, these queens are free living while they look for a suitable place to start the colony and are usually foraging. Colony growth usually accelerates during summer. At the end of the flying season, which differs between species, the colony is breeding males and new queens. These individuals leave the colony to mate, a time point that corresponds to the end of the life of the colony. The new queens, after copulation and fertilization by males from other colonies, spend the winter in small holes until spring arrives and the cycle starts again. The annual cycle is strongly influenced by weather conditions, but there are also species-specific differences.

Reproduction

The males leave sexual pheromones on the vegetation to attract virgin females. In most cases they deposit these olfactory signals as a path that they patrol continuously, in other cases they mark an area that they control waiting for females.

Nesting

Bumble bees are eusocial, with a queen and differentiated castes of workers. Depending on the species, they can make colonies with more or less individuals (from a few workers to several hundreds). Once a queen decides a suitable place for its colony, it starts creating cells made with wax and fills them with pollen mixed with nectar. On top of these resources it lays the eggs, and takes cares for them as the only member of the colony. The brood will be all females (workers) overtaking the tasks of colony management and foraging. At this point, the queen does not leave the nest anymore.

Parasites

Certain species of bumble bees are cuckoo bees of other bumble bee species. They can be either facultative or obligatory parasites. The parasitic queen enters the host nest and either kill the queen or displace her from her position, thus taking control of the colony and laying her own eggs. The colony keeps functioning as usual and the host workers rear the eggs of the new queen. Depending on if the old queen is present and the behaviour of the new queen, the colony can keep producing workers of the host species, allowing the coexistence of both queens. In other cases, the colony only rears the offspring of the parasitic queen if the latter killed the host queen.

Floral preferences

Both queens and workers forage for pollen and nectar. Pollen, as in most bees, is mostly used to feed the offspring. A lot of species can appear quite generalist in their floral choices, adapting to what is available. Some species are much more specialized, and a few species are strongly specialized, with a dependence on a single plant species. In general, bumblebees tend to prefer zygomorphic flowers with blue or pink colours, although this can vary between species. Floral choices are quite different between sexes, as males do not collect resources for the colony.

Type species: *Apis terrestris* Linnaeus, 1758 monobasic.

Synonyms: *Bremus* Jurine, 1801 (invalidated by Commission Opinion 135, 1939); *Bremus* Panzer, 1804; *Alpinibombus* Skorikov, 1937; *Nevadensibombus* Skorikov, 1922; *Boopobombus* Frison, 1927; *Apathus* Newman, 1834; *Agribombus* Skorikov, 1938

Etymology: from Latin '*bombus*', meaning heavy sound, referring to their buzzing.

Common names:
FR: bourdons
EN: bumblebees
GER: die Hummeln
NL: hommels

SP: abejorros
CAT: abellots

List of species found in Europe:

1. *Bombus (Alpigenobombus) wurflenii* Radoszkowski, 1859
2. *Bombus (Alpinobombus) alpinus* (L., 1758)
3. *Bombus (Alpinobombus) balteatus* Dahlbom, 1832
4. *Bombus (Alpinobombus) hyperboreus* Schönherr, 1809
5. *Bombus (Alpinobombus) polaris* Ross, 1835
6. *Bombus (Bombias) confusus* Schenck, 1861
7. *Bombus (Bombus) cryptarum* (Fabricius, 1775)
8. *Bombus (Bombus) lucorum* (L., 1761)
9. *Bombus (Bombus) magnus* Vogt, 1911
10. *Bombus (Bombus) patagiatus* Nylander, 1848
11. *Bombus (Bombus) renardi* Radoszkowski, 1884
12. *Bombus (Bombus) sporadicus* Nylander, 1848
13. *Bombus (Bombus) terrestris* (L., 1758)
14. *Bombus (Bombus) xanthopus* Kriechbaumer, 1870
15. *Bombus (Cullumanobombus)* cullumanus (Kirby, 1802)
16. *Bombus (Cullumanobombus)* semenoviellus Skorikov, 1910
17. *Bombus (Kallobombus) soroeensis* (Fabricius, 1776)
18. *Bombus (Megabombus) argillaceus* Scopoli, 1763
19. *Bombus (Megabombus) consobrinus* Dahlbom, 1832
20. *Bombus (Megabombus) gerstaeckeri* Morawitz, 1881

21. *Bombus (Megabombus) hortorum* (L., 1761)
22. *Bombus (Megabombus) ruderatus* (Fabricius, 1775)
23. *Bombus (Megabombus) saltuarius* (Skorikov, 1923)
24. *Bombus (Melanobombus) lapidarius* (L., 1758)
25. *Bombus (Melanobombus) sichelii* Radoszkowski, 1859
26. *Bombus (Mendacibombus) mendax* Gerstäcker, 1869
27. *Bombus (Psithyrus) barbutellus* (Kirby, 1802)
28. *Bombus (Psithyrus) bohemicus* Seidl, 1838
29. *Bombus (Psithyrus) campestris* (Panzer, 1801)
30. *Bombus (Psithyrus) flavidus* Eversmann, 1852
31. *Bombus (Psithyrus) norvegicus* (Sparre-Schneider, 1918)
32. *Bombus (Psithyrus) quadricolor* (Lepeletier, 1832)
33. *Bombus (Psithyrus) rupestris* (Fabricius, 1793)
34. *Bombus (Psithyrus) sylvestris* (Lepeletier, 1832)
35. *Bombus (Psithyrus) vestalis* (Geoffroy, 1785)
36. *Bombus (Pyrobombus) brodmannicus* Vogt, 1909
37. *Bombus (Pyrobombus) cingulatus* Wahlberg, 1854
38. *Bombus (Pyrobombus) glacialis* Friese, 1902
39. *Bombus (Pyrobombus) haematurus* Kriechbaumer, 1870
40. *Bombus (Pyrobombus) hypnorum* (L., 1758)
41. *Bombus (Pyrobombus) jonellus* (Kirby, 1802)
42. *Bombus (Pyrobombus) konradini* Reinig, 1965
43. *Bombus (Pyrobombus) lapponicus* (Fabricius, 1793)
44. *Bombus (Pyrobombus) modestus* Eversmann, 1852

45. *Bombus (Pyrobombus) monticola* Smith, 1849
46. *Bombus (Pyrobombus) pratorum* (L., 1761)
47. *Bombus (Pyrobombus) pyrenaeus* Pérez, 1879
48. *Bombus (Sibiricobombus) niveatus* Kriechbaumer, 1870
49. *Bombus (Subterraneobombus) distinguendus* Morawitz, 1869
50. *Bombus (Subterraneobombus) fragrans* (Pallas, 1771)
51. *Bombus (Subterraneobombus) subterraneus* (L., 1758)
52. *Bombus (Thoracobombus) armeniacus* Radoszkowski, 1877
53. *Bombus (Thoracobombus) deuteronymus* Schulz, 1879
54. *Bombus (Thoracobombus) humilis* Illiger, 1806
55. *Bombus (Thoracobombus) inexspectatus* (Tkalců, 1963)
56. *Bombus (Thoracobombus) laesus* Morawitz, 1875
57. *Bombus (Thoracobombus) mesomelas* Gerstäcker, 1869
58. *Bombus (Thoracobombus) mlokosievitzii* Radoszkowski, 1877
59. *Bombus (Thoracobombus) mucidus* Gerstäcker, 1869
60. *Bombus (Thoracobombus) muscorum* (L., 1758)
61. *Bombus (Thoracobombus) pascuorum* (Scopoli, 1763)
62. *Bombus (Thoracobombus) pomorum* (Panzer, 1805)
63. *Bombus (Thoracobombus) ruderarius* (Müller, 1776)
64. *Bombus (Thoracobombus) schrencki* Morawitz, 1881
65. *Bombus (Thoracobombus) sylvarum* (L., 1761)
66. *Bombus (Thoracobombus) veteranus* (Fabricius, 1793)
67. *Bombus (Thoracobombus) zonatus* Smith, 1854

Subgenera found in Europe:

- *Alpigenobombus* Skorikov, 1914
- *Alpinobombus* Skorikov, 1914
- *Bombias* Robertson, 1903
- *Bombus* s.str. Latreille, 1802
- *Cullumanobombus* Vogt, 1911
- *Kallobombus* Dalla Torre, 1880
- *Megabombus* Dalla Torre 1880
- *Melanobombus* Dalla Torre, 1880
- *Mendacibombus* Skorikov, 1914
- *Psithyrus* Lepeletier, 1833
- *Pyrobombus* Dalla Torre, 1880
- *Sibiricobombus* Vogt, 1911
- *Subterraneobombus* Vogt, 1911
- *Thoracobombus* Dalla Torre, 1880

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Authors

Photographs: Paolo Rosa (ORBIT consortium)

Text: ORBIT consortium

Reviewers: Guillaume Ghisbain (ORBIT consortium)

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