

Key to simplified subgenera of the genus Bombus for female bumblebees

Paul H. Williams

with SEM images by Michael Terzo, Pierre Rasmont, Paul Williams.

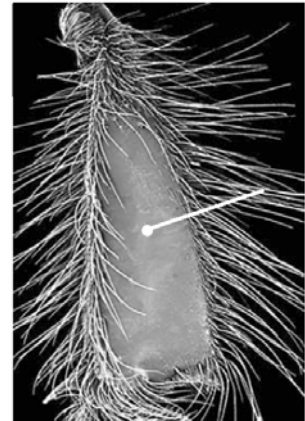
The keys have been simplified as far as possible to make them easier to use. Keys will generally be easier to use for larger and younger (less worn) individuals, and if they have had their mandibles opened and are cleaned of debris. Differences in the mid-basitarsal spine and face length are clearer for larger individuals and may be relatively undifferentiated for smaller individuals.

This version revised 20.ii.2008, based on Appendix 1 in:

Williams PH, Cameron SA, Hines HM, Cederberg B, and Rasmont P. 2008. A simplified subgeneric classification of the bumblebees (genus *Bombus*). *Apidologie* 39: 1-29.

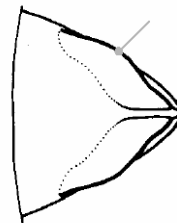
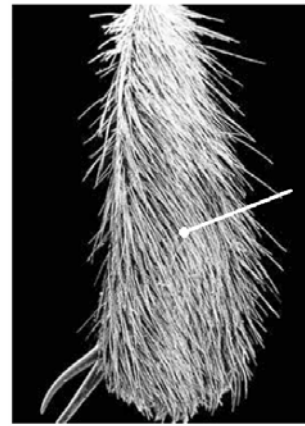
- 1 Hind tibia with the outer surface broad, almost flat, most of the outer surface in the distal half without moderate to long hairs (right, arrow), but fringed with stout hairs that form a pollen basket (corbicula), the inner distal margin with a comb of stout spines (rastellum); gastral sternum 6 without ventro-lateral keels.

⇒ 2



- Hind tibia with the outer surface strongly and uniformly convex and uniformly densely covered with moderate to long stout hairs throughout (above right, arrow), the fringing hairs often poorly differentiated and not forming a pollen basket (corbicula), the inner distal margin without a comb of stout spines (rastellum); gastral sternum 6 with ventro-lateral keels (below right, arrow). (Holarctic, Oriental).

⇒ *Psithyrus*



- 2 (1) Mandible with the anterior keel reaching and continuous with the distal margin (above right, circled); hind basitarsus with the proximal posteriorly-directed process usually narrow and pointed, longer than its breadth proximally where it joins the basitarsus (below right, lines), or if it is shorter than broad then either the lateral ocellus diameter equal to half or less than half of the distance separating the lateral ocellus from the inner margin of the eye (e.g. some of the *hypnorum*-group of *Pyrobombus* and some *Melanobombus*, from the Palaearctic and Oriental), or the hair on the side of tergum 2 is longer than the breadth of the hind basitarsus and the labrum has a strong longitudinal median furrow and ventral transverse lamella (the rare parasitic *B. (Th.) inexpectatus*, from the Alps), or the hind basitarsus narrows distally to 0.66-0.75 times the proximal breadth just distal to the proximal process (*B. (Cu.) rubicundus* and *B. (Cu.) handlirschi*, from the Andes).

⇒ 4

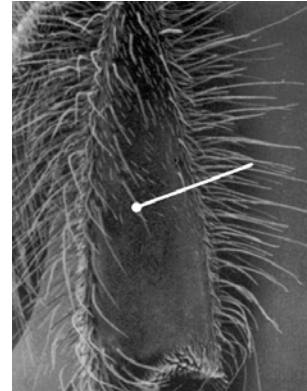
- Mandible with the anterior keel not reaching and separated from the distal margin (above right, circled); hind basitarsus with the proximal posteriorly-directed process broad and blunt, usually shorter than its breadth proximally where it joins the basitarsus (below right, lines); lateral ocellus diameter always nearly three quarters or more of the distance separating the lateral ocellus from the inner margin of the eye; either the hair on the side of tergum 2 is shorter than half of the breadth of the hind basitarsus, or the labrum lacks a distinct longitudinal median furrow and ventral transverse lamella, or both; hind basitarsus nearly equal in breadth distally and proximally beyond the proximal process.

⇒ 3



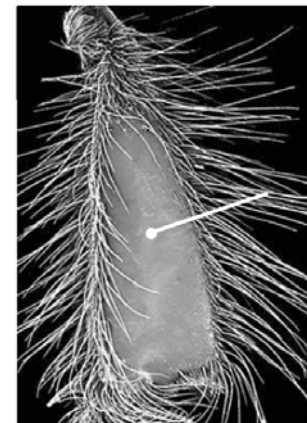
- 3 (2) Hind tibia with the outer surface coarsely sculptured (imbricate), matt and not shining, with very long stout hairs in the middle of the proximal half that are spaced widely by more than the breadth of an antennal segment (right, arrow). (Palearctic).

➔ **Mendacibombus**



- Hind tibia with the outer surface weakly sculptured (reticulate coriaceous), smooth and brightly shining, and without long stout hairs in the middle of the proximal half beyond the proximal quarter (similar right, arrow). (Holarctic).

➔ **Bombias**



- 4 (2) Mandible distally broadly rounded, with two anterior teeth and often a posterior tooth (right, spots); hind basitarsus with the longest erect hairs near the anterior margin of the outer surface shorter than the narrowest breadth of the basitarsus.

⇒ 5



- Mandible distally not broadly rounded, but with six evenly-spaced large triangular teeth (which may become worn down) (right, spots); hind basitarsus with the longest erect hairs near the anterior margin of the outer surface as long or longer than the narrowest breadth of the basitarsus (but which may become broken off). (Palearctic, Oriental).



⇒ **Alpigenobombus**

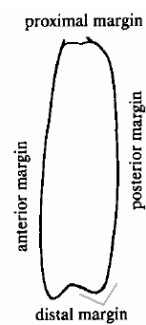
- 5 (4) Mid basitarsus with the distal posterior corner extended to form a sharp angle of 45° or less, often produced as a narrow tooth or spine (right, lines) (it may be less pronounced in some of the smallest individuals), or if borderline then the ocello-ocular area with the unpunctured and shining areas occupying less than half of the distance between the lateral ocellus and the inner margin of the eye (e.g. *B. (Th.) digressus*, from Central America, and *B. (Sb.) sibiricus*, from the eastern Palaearctic and Oriental). (Note: oculo-malar distance approximately 1.0-2.5 times the breadth of the mandible proximally between the outer ends of its articulations [condyles].).

⇒ 6



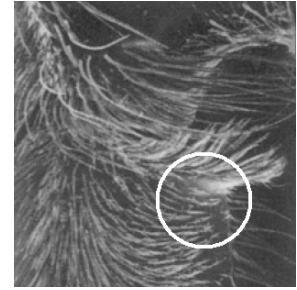
- Mid basitarsus with the distal posterior corner broadly or narrowly rounded, but forming an angle of more than 45° , and without a narrow tooth or spine (right, lines), or if borderline then the ocello-ocular area with the unpunctured and shining areas occupying three quarters of the distance between the lateral ocellus and the inner margin of the eye (e.g. *B. (Pr.) hypnorum*, from the Palaearctic and Oriental). (Note: oculo-malar distance approximately 0.5-1.6 times the breadth of the mandible proximally between the outer ends of its articulations [condyles].).

⇒ 9



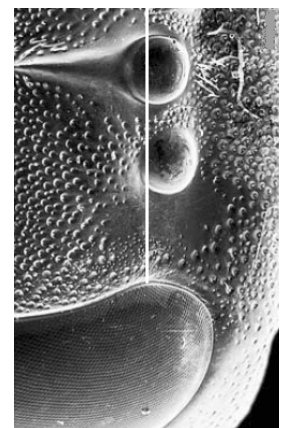
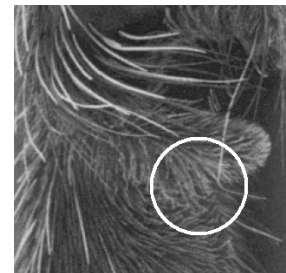
- 6 (5) Hind basitarsus with the proximal posteriorly-directed process with the dense plume of moderately long branched hairs on its proximal surface not continuing onto its outer surface, which is shining and often bare, or at most the outer surface with widely scattered rather decumbent short hairs with broad shining areas between them (above right, circled); median ocellus with its anterior margin lying on a line linking the corners between the anterior and dorsal margins of each compound eye (below right, line).

⇒ 7



- Hind basitarsus with the proximal posteriorly-directed process with the dense plume of moderately long branched hairs on its proximal surface continuing onto its outer surface as a dense erect brush of moderately long branched hairs that obscures the outer surface of the basitarsus between them (above right, circled); median ocellus with its anterior margin lying anterior to a line linking the corners between the anterior and dorsal margins of each compound eye (below right, line). (Palearctic, Oriental).

⇒ **Sibiricobombus**



- 7 (6) Clypeus with scattered large medium or small punctures over most of its area (right, circled), or at least extending onto the outer quarters of the weakly flattened, bulbous, central area (e.g. *B. (Mg.) hortorum*, from the Palaearctic), or forming very dense patches in the lateral depressions adjacent and parallel to the ventral labral margin (e.g. *B. (Mg.) senex*, from Sumatra); if the corbicular fringes are shorter than the greatest breadth of the hind tibia then the proximal half of the outer surface of the hind tibia has long hairs in the centre (and the body hair is all black: *B. (Th.) brevivillus*, from north-eastern Brazil); sternum 6 without a raised median longitudinal ridge in the posterior one third, or if a strong ridge is present then either the clypeus has medium and large punctures (e.g. *B. (Th.) muscorum*, from the Palaearctic) or antennal segment 4 is shorter than broad (e.g. *B. (Mg.) trifasciatus*, from the Oriental).

⇒ 8

- Clypeus predominantly smooth and shining, the strongly flattened central area with only widely scattered micro-punctures (right, circled), larger punctures only at the edges, or if more extensively covered with many small and medium punctures then the corbicular fringes are shorter than the greatest breadth of the hind tibia and the proximal half of the outer surface of the hind tibia has no long hairs in the centre beyond the proximal quarter (and the dorsal body hair is extensively yellow: *B. fragrans*, *B. fedtschenkoi*, and *B. amurensis*, from the central and eastern Palaearctic); sternum 6 with a raised and often shiny median longitudinal keel in the posterior one third. (Holarctic, Oriental).

⇒ *Subterraneobombus*



- 8 (7) Sternum 2 usually slightly bulging between the anterior and posterior margins in a weak rounded transverse ridge; hind tibia with the corbicular surface at least moderately convex anteriorly and often swollen and almost lacking any posterior concavity in the distal half, or if flatter then either the clypeus is densely punctured (e.g. *dahlbomii*-group, from the Neotropics), or the ocello-ocular area with the unpunctured and shining areas occupying two thirds of the distance between the lateral ocellus and the inner margin of the eye (e.g. *B. pomorum*, from the Palaearctic); clypeus dorsally uniformly convex and always without a deep dorsal median longitudinal groove with many punctures, clypeus in its central half with a few large punctures and sometimes densely punctured, or if it has only sparsely scattered fine punctures then there is no dorsal groove and the thoracic hair is largely orange-brown and segment 4 of the antenna is longer than broad (e.g. *B. pascuorum*, from the Palaearctic). (Note: oculo-malar distance approximately 1.0-1.5 times the breadth of the mandible proximally between the outer ends of its articulations [condyles].) (Holarctic, Oriental, Neotropics).

➤ **Thoracobombus**

- Sternum 2 flat between the anterior and posterior margins, with the weakly bulging transverse ridge absent; hind tibia with the corbicular surface nearly flat and only very weakly convex anteriorly and concave posteriorly in the distal half; clypeus in its dorsal third often with a deep median longitudinal groove with many punctures (*hortorum*-group), clypeus in its central half shining with only sparsely scattered small punctures and no large or dense punctures. (Note: oculo-malar distance approximately 1.0-2.5 times the breadth of the mandible proximally between the outer ends of its articulations [condyles].) (Palaearctic, Oriental).

➤ **Megabombus**

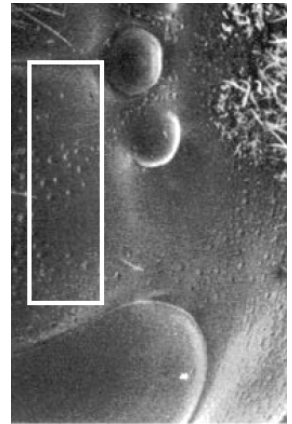
- 9 (5) Ocello-ocular area with the unpunctured and shining areas medium or small, the area anterior to the three ocelli unpunctured for less than the breadth of an ocellus (right, box), or if this area is largely unpunctured then the diameter of the lateral ocellus more than half of the distance separating the lateral ocellus from the inner margin of the eye (e.g. *B. (Cu.) brachycephalus*, from Central America).

⇒ 10



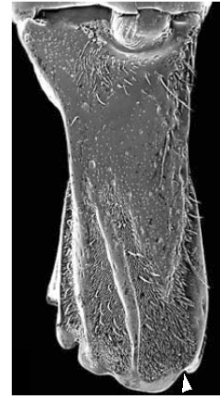
- Ocello-ocular area with the unpunctured and shining areas very large and including most of the area anterior to the three ocelli for a distance of more than the breadth of an ocellus except for narrow bands of punctures between the median and lateral ocelli (right, box); diameter of the lateral ocellus less than or equal to half of the distance separating the lateral ocellus from the inner margin of the eye. (Oriental).

⇒ ***Orientalibombus***



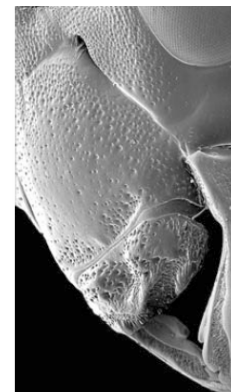
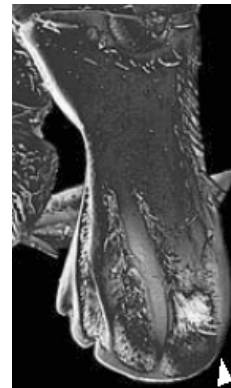
- 10 (9) Mandible distally with a notch (incisura) nearly as deep as wide (above right, arrow) separating a strong posterior tooth (which may become worn down); clypeus in the dorsal half always strongly swollen and bulging, concave ventrally with deep lateral depressions adjacent and parallel to the labral margin (below right); diameter of the lateral ocellus less than or equal to half of the distance separating the lateral ocellus from the inner margin of the eye; labrum always with a broad median longitudinal furrow; hind tibia outer surface in the proximal half without long hairs beyond the proximal quarter.

⇒ 11



- Mandible distally with a notch (incisura) less than half as deep as wide, or often completely lacking (above right, arrow) and not separating a weak posterior tooth; clypeus usually weakly swollen or nearly flat throughout, with only shallow lateral depressions adjacent and parallel to the ventral labral margin (below right), or if it is strongly swollen dorsally and concave ventrally then either the diameter of the lateral ocellus is more than half of the distance separating the lateral ocellus from the inner margin of the eye (e.g. *B. (Cu.) brachycephalus*, from Central America), or the labrum has almost no median longitudinal furrow and the hind tibia has the outer surface in its proximal half with long hairs throughout (*B. (Cu.) rubicundus*, from the Andes).

⇒ 12



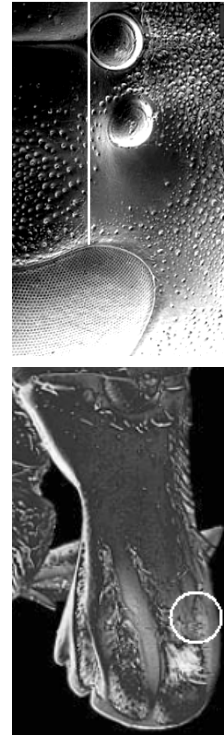
- 11 (10) Hind basitarsus with the posterior margin strongly and evenly convex; oculo-malar distance just shorter or distinctly shorter than the breadth of the mandible proximally between the outer ends of its articulations (condyles). (Holarctic, Oriental).

⇒ **Bombus** *s.str.*

- Hind basitarsus with the posterior margin strongly convex in its proximal quarter, the remainder nearly straight; oculo-malar distance longer than the breadth of the mandible proximally between the outer ends of its articulations (condyles). (Holarctic).

⇒ **Alpinobombus**

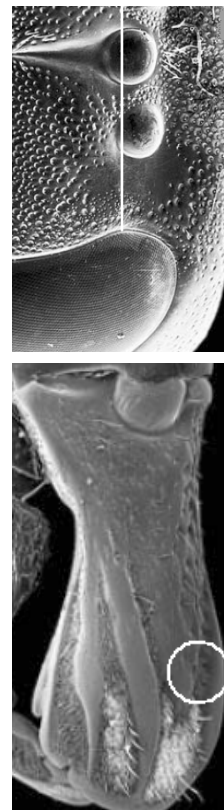
- 12 (10) Median ocellus with its anterior margin lying on a line linking the corners between the anterior and dorsal margins of each compound eye (similar to above right, line), the diameter of the lateral ocellus less than half or equal to half of the distance separating the lateral ocellus from the inner margin of the eye, or if the ocelli are larger and situated more anteriorly then the hind basitarsus has very densely overlapping pale short plumose hairs throughout the outer surface excluding the proximal posterior process (*B. (Ml.) rufofasciatus* and *B. (Ml.) simillimus*, from the Himalaya); hind basitarsus with the posterior margin convex in the proximal quarter, the remainder nearly straight, or if it is more evenly convex then this is weak and nearly straight (e.g. *B. (Kl.) soroeensis*, from the Palaearctic); mandible with the posterior groove (sulcus obliquus) indistinct or absent (below right, circled), or if stronger then again the hind basitarsus has very densely overlapping pale yellowish short plumose hairs throughout its outer surface excluding the proximal posterior process (e.g. *B. (Ml.) lapidarius*, from Europe); oculo-malar distance nearly as long as (0.9 times) or longer than the breadth of the mandible proximally between the outer ends of its articulations (condyles).



⇒ 13

- Median ocellus with its anterior margin lying anterior to a line linking the corners between the anterior and dorsal margins of each compound eye (similar to above right, line), the diameter of the lateral ocellus more than half of the distance separating the lateral ocellus from the inner margin of the eye, or if the ocelli are smaller then the hind basitarsus has the posterior margin strongly and nearly evenly convex (*cullumanus*-group, from the Palaearctic); mandible with the posterior groove (sulcus obliquus) present (below right, circled); if the hind basitarsus on its outer surface has pale yellowish short plumose hairs, then they are not densely overlapping, at least in the proximal quarter; oculo-malar distance either equal to (e.g. *B. coccineus*, from the Andes) but may be much shorter than (0.5-1.0 times) the breadth of the mandible proximally between the outer ends of its articulations (condyles). (Holarctic, Neotropics).

⇒ ***Cullumanobombus***



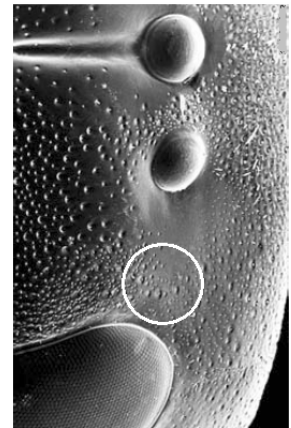
- 13 (12) Ocello-ocular area with the band of punctures along the inner margin of the eye almost always with very few small punctures, only scattered large punctures separated by more than their own widths (right, circled), the unpunctured and shining areas usually large, occupying as much as three quarters of the distance between the lateral ocellus and the inner margin of the eye, or rarely the ocello-ocular area almost completely covered with very dense intermediate-sized punctures (*B. abnormis* and *B. mirus*, from the central Himalaya). (Holarctic, Oriental, northern edge of the Neotropics).



⇒ **Pyrobombus**

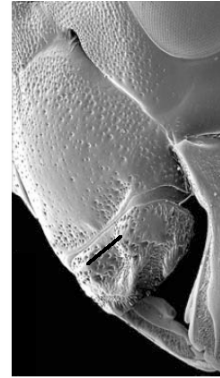
- Ocello-ocular area with the band of punctures along the inner margin of the eye always with many small and large punctures intermixed and separated by less than the widths of the large punctures (right, circled), the unpunctured and shining areas occupying about half of the distance between the lateral ocellus and the inner margin of the eye.

⇒ 14



- 14 (13) Mid basitarsus with the longest erect hairs (which may become broken off) near the proximal margin of the outer surface from the posterior aspect as long as or longer than the distal breadth of the basitarsus, or if shorter then the hind tibia with the distal posterior corner extended into a finger-like process that is longer than broad (*B. festivus*, from the Oriental); labrum with the median longitudinal furrow broad, approximately one third of the total breadth of the labrum (similar to above right, line); clypeus shining with only widely scattered and mostly fine punctures (similar to below right, circled), or if there is a clearer median ventral area then it is not narrowly raised; hind tibia with the outer corbicular surface sometimes with short or medium hairs, but any long hairs are restricted to the proximal quarter or to the outer edges. (Note: body length 9-32 mm.) (Palearctic, Oriental).

⇒ **Melanobombus**



- Mid basitarsus with the longest erect hairs near the proximal margin of the outer surface from the posterior aspect shorter than the distal breadth of the basitarsus; hind tibia with the distal posterior corner scarcely extended into a finger-like process, which is shorter than broad; labrum with the median longitudinal furrow narrow, approximately one fifth of the total breadth of the labrum (above right, line); clypeus in the central area densely covered with large and small punctures, except in a slightly narrowly raised ventral median longitudinal band which is unpunctured and shiny (below right, circled); hind tibia with the outer corbicular surface without short or medium hairs but sometimes with one or two scattered long stout hairs near the centre in the proximal half. (Note: body length 9-18 mm.) (Palearctic).

⇒ **Kallobombus**

