

Chapter 4 – Identification

Keys

These are the really important tools for identifying bees. Only the most experienced are able to identify some of these insects from a sighting in the field. Eventually, after a deal of field and key experience, there comes an understanding of what various species may be. ‘Jizz’, the time of year and plants being visited, are clues as to the identification of some species. However even keying out a dead specimen can bring its problems.

Identification to genus

This proves really difficult for newcomers. As a result many people prefer to use more than one set of keys to confirm their identification. Indeed, even the most experienced will admit to using more than one. Therefore two keys, using different approaches, have been included in this chapter, though you may well find that one or the other suits your approach and understanding best. These keys have been tested and simplified wherever possible and should make the task less onerous. The many superb drawings, both of whole insects and detail, combine to ease the task.

Keys to species follow on from this first, most important step but are not covered in this volume, though details of where to find them are given in the chapter on genera.

Technical terms

While we have attempted to reduce jargon to a minimum, inevitably some technical terms have been used. These are shown in the glossary.

Key to the genera of British bees (by Graham Collins)

Introduction

There are around 250 species of bee occurring in Britain. They are an interesting group to study because of their biology and ecology and are attractive insects in themselves. Identification of bees needs to start with identification to generic level; once more experience has been gained it is usually obvious what genus is involved just from the look of the insect.

The keys presented here should enable almost all bee specimens to be assigned to a genus. It is designed for the beginner and complex technical terms are kept to a minimum. A glossary is provided and most features used in the key are illustrated in the relevant couplet. Ease of use is paramount and long, complex couplets allowing for every eventuality have been avoided – so from time to time a particular specimen might prove difficult or impossible to key out, especially when only a few genera have been encountered. Put it to one side and try again when more material has been accumulated and you have more experience. The key will only work with British examples of the genera and other works will need to be consulted for European material. The genus *Dufourea*, until recently considered extinct in Britain, is omitted from the key.

Checklist – is it a bee?

Many insects mimic bees while at the same time a number of bees, mostly cleptoparasitic species, are distinctly wasp-like. Before working through the keys it is sensible to check that your insect is a bee!

- Two pairs of membranous wings; the forewings with 9—10 enclosed cells, the hindwing with a row of hooks on its front edge which connect it to the forewing in flight.
- Mandibles present, between which a tongue is usually visible.
- Antennae with 12—13 segments (be careful, the second segment can be very short and partially hidden within the first; however, the third is usually long and distinctly conical, differing from the following segments).
- Distinct constriction between thorax and abdomen (“wasp-waist”), not easy to see in very hairy species.
- Plumose hairs; branched hairs adapted to carry pollen, these are usually obvious in non-parasitic species but in parasitic bees only a few remain, particularly on the propodeum and below the thorax. Simple hairs may also be present.
- First segment of hind tarsus usually flatter and wider than following segments.

How to use the keys

Having killed the bee, preferably in the fumes of ethyl acetate but, as an alternative, 24 hours in a domestic freezer will suffice, it should be mounted. Continental pins are recommended to facilitate handling and to allow multiple labelling. The insect should be positioned about one-third from the head so that enough room is left to manipulate the pin without damaging the bee. Appendages should be moved away from the body, the mandibles opened if possible (don't force them, the jaw muscles are much stronger than the neck muscles and loss of the head is almost inevitable). In addition, if the bee is a male (see Key 1), the genital capsule should be extracted from the gaster using a pin. Ideally it will be fully visible but still attached to the body. If it is necessary to remove

it completely, it can be mounted on a piece of card attached to the same pin as the bee. All specimens should be labelled with collecting data (at least site, vice-county, full grid reference, full date and collector), and, once identified, a determination label with the name of the species, the determiner and the date determined.

Separate keys are given to males and females. In many cases males and females of the same species are distinctly more different than the same sexes of closely related species. Identifying a bee to genus is only the first step in the process, identification to species is the ultimate aim and most published keys, and those in the long-awaited “British Bees” book, treat the sexes separately. It is thus sensible to get used to recognising males and females from the start. Failure to do so correctly will cause problems as different characters are used in the two keys.

Check the insect agrees with the characters listed above and move on to Key 1. Each key consists of couplets which list alternative character states. In this key they are subdivided into clauses, with, for example, the alternatives being a or aa, b or bb. Where possible the description is accompanied by a figure which illustrates the position and state of each character, but a separate glossary is also given. Clauses are presented in order such that easy to see, definitive characters are used before more variable and comparative ones. Tongue characters, used in a number of other keys, are only used where absolutely necessary as the tongue may well be hidden. Characters of wing venation are used widely. They are generally very constant, but occasionally particular veins can be wholly or partially absent, although often traces remain, especially at the junction with other veins; it is best to check both wings. Starting at couplet 1, read each clause and its alternative before making a decision – each half of the couplet will then lead on to either another couplet or the answer. If there appears to be a conflict between the two halves of a couplet you may have gone wrong earlier. You have two options. Either follow each lead and see if the situation resolves, or go back to the previous couplet and check it again. The number of the previous couplet is given in brackets next to the current couplet number.

Acknowledgements

I thank the following for their comments on the draft key: Mike Edwards, Roger Hawkins and Arthur Ewing.

Some special layout figures

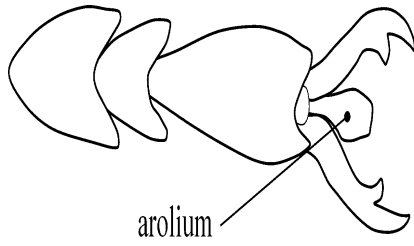


fig. 1 – tarsus

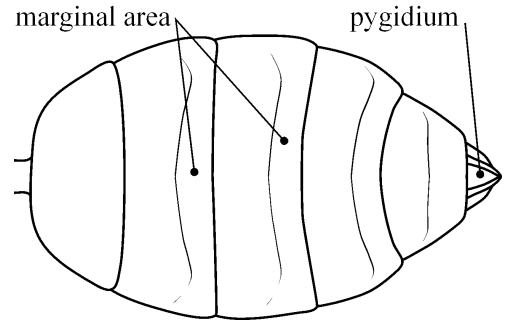


fig. 2 – gaster

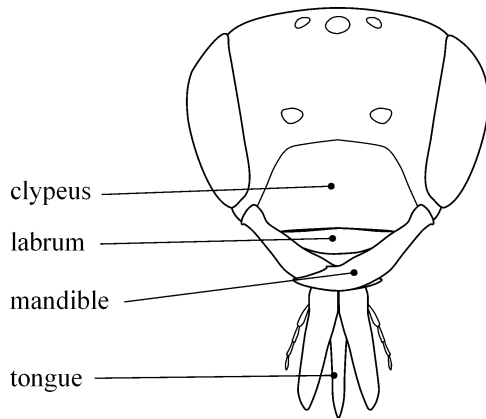


fig. 3 – face

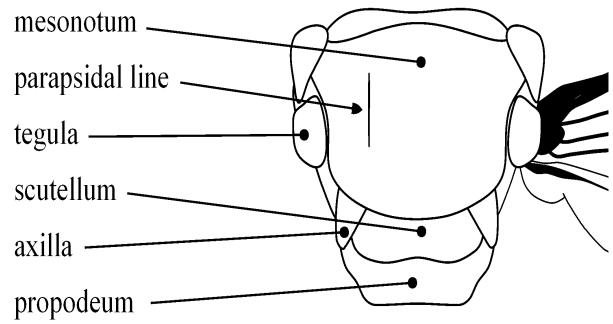


fig. 4 – thorax

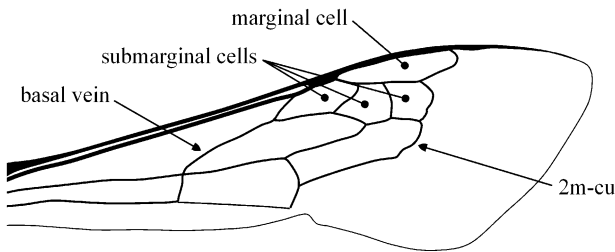


fig. 5 – forewing

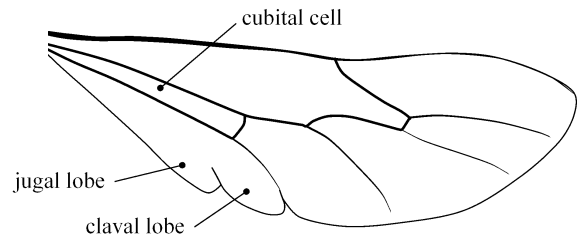
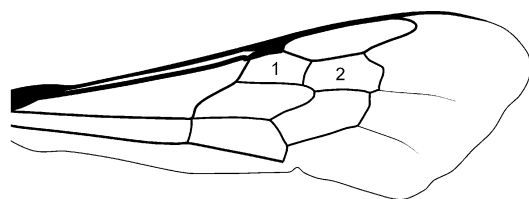
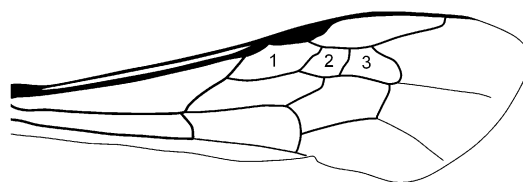


fig. 6 – hindwing

Key 2 – females

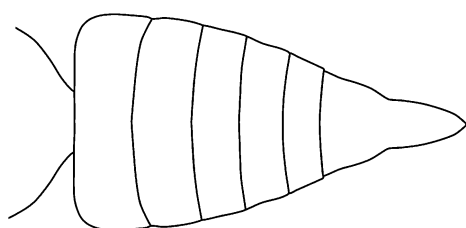


a



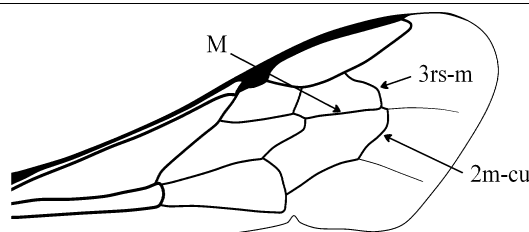
aa

- 1** a Forewing with two submarginal cells² 2
 — aa Forewing with three submarginal cells 14

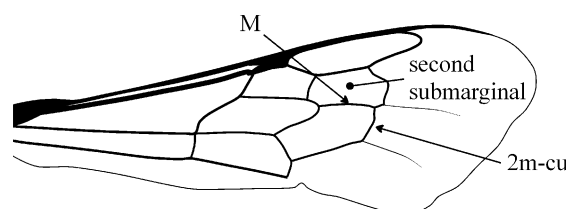


b

- 2 (1)** a Surface of eyes with long dense hairs
 b Gaster strongly narrowing to pointed apex *Coelioxys*
 Medium-sized to large bees (9–16 mm); gaster rather shining
 and with pale bands or wedge-shaped spots formed of flattened
 hairs; scutellum with rearward-pointing projections either side;
 no scopa. Cleptoparasitic on *Megachile* and *Anthophora*.
 — aa Surface of eyes bare
 bb **Gaster more-or-less parallel sided or oval, rounded at apex**..... 3



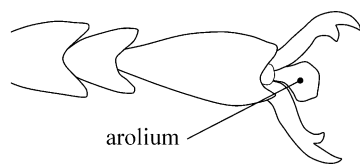
a



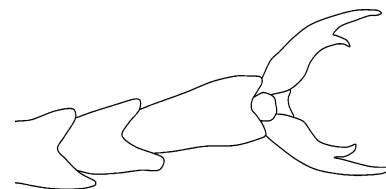
aa

² Very rarely, aberrant individuals of species with three submarginal cells appear to have only two through the loss or reduction of a cross-vein. Often this missing cross-vein can be seen as a vestige, or as short appendixes, at its junction with the other veins. If entirely absent you will be forced to follow the wrong half of the couplet and the key will fail at a later point or the bee will not match the criteria in the generic description – in this case you should try the option for three submarginal cells.

- 3 (2) a Vein 2m-cu meets M beyond point where 3rs-m does 4
 — aa Vein 2m-cu meets M opposite second submarginal cell 5
-

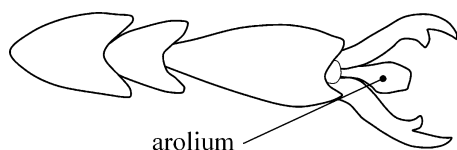


c

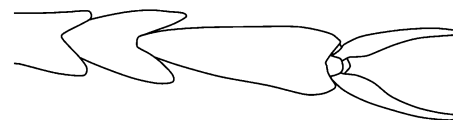


cc

- 4 (3) a Gaster black or at most with cream-coloured spots or bands, face and legs without colour
 b No scopa present
 c Arolium present between tarsal claws.....***Stelis***
 Small to medium-sized species (5—11 mm); black, sometimes with pale markings on gaster; rather shining, heavily-armoured species. Cleptoparasitic on *Osmia*, *Hoplitis*, *Anthidium* and *Heriades*.
- aa Gaster with bright yellow spots, similar colour present on face and legs
 bb Dense golden-yellow scopa on underside of gaster
 cc No arolium between tarsal claws***Anthidium***
 One British species – *manicatum*. Large (11—15 mm); black with yellow spots on gaster, tibiae, sides of mesonotum, tegulae, top of head, face and mandibles.
-

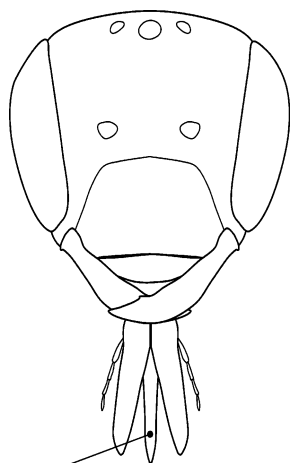


a

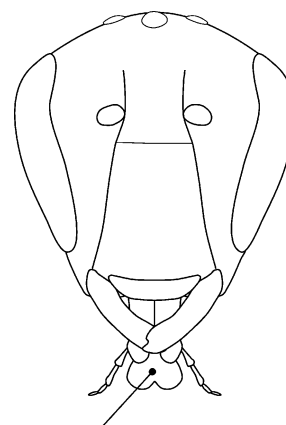


aa

- 5 (3) a Arolium present between tarsal claws..... 6
 — aa Arolium absent***Megachile***
 Medium-sized to large species (9—18 mm); head large, mandibles triangular with broad cutting edge carrying several teeth; scopa present on underside of gaster. “Leaf-cutter Bees”.
-



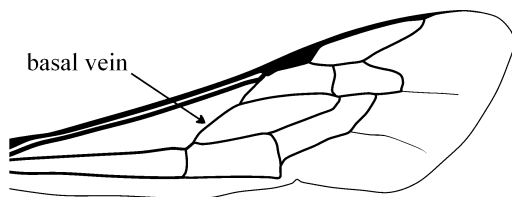
d



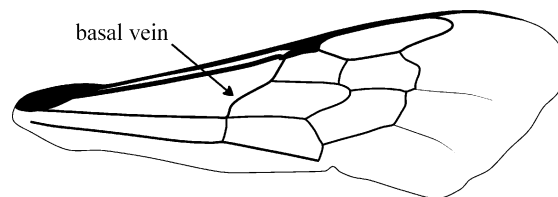
dd

- 6 (5)**
- a Scopa (pollen collecting hairs) present, either on hind leg or underside of gaster
 - b Face black beneath any hairs
 - c Legs black, without yellow markings
 - d Tongue pointed at apex, fairly short to long..... 7
-
- aa No obvious scopa present
 - bb EITHER yellow markings present on face OR face black with projecting lobes at lower corners of clypeus and a bulge below antennal bases forming a triangular concavity
 - cc Legs almost hairless and with clear yellow markings
 - dd Tongue short and bilobed at apex..... *Hylaeus*
- Small to medium-sized species (4—8 mm); very sparsely-haired bees; black with yellow on legs and (usually) face.

- 7 (6)**
- a Scopa on hind legs 8
-
- aa Scopa on underside of gaster..... 11



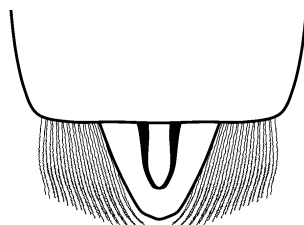
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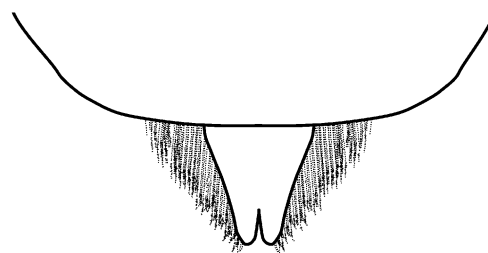
aa

- 8 (7)**
- a Basal vein (second section of M) almost straight 9

- aa Basal vein (second section of M) fairly strongly arched..... 10



c

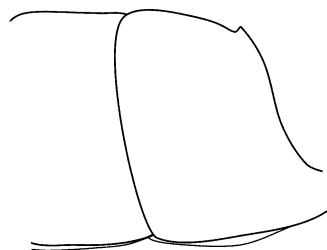


cc

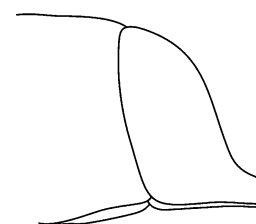
- 9 (8)**
- a Mesonotum very sparsely haired; surface brightly shining between the punctures
 - b Gaster sparsely haired, except for the apical tergites, without hint of pale bands
 - c Pygidium triangular with a blunt or rounded apex and raised median keel ***Panurgus***
Medium-sized species (7—10 mm); shiny black with pale, long haired scopa.
-
- aa Mesonotum densely haired with a mixture of black and golden-yellow hairs; surface matt between the punctures
 - bb Gaster with apical half of tergites 2—4 covered with dense, pale flattened hairs, contrasting with the sparser black hairs of the basal halves, thus appearing banded
 - cc Pygidium long triangular with a deeply notched apex, its surface flat ***Dasyпода***
One British species – *hirtipes*. Large (13—15 mm); banded bee with conspicuous scopa, the hairs of which are considerably longer than the thickness of the tibia.

- 10 (8)**
- a Medium-sized species, not over 10 mm
 - b First tergite smooth and shining, with small widely-spaced punctures, almost hairless
 - c Marginal area of tergite 2 smooth and impunctate..... ***Macropis***
One British species – *europaea*. Shining black bee, with pale hair-bands on the apical tergites. Associated with yellow loosestrife.
-
- aa Large species, 13—15 mm
 - bb First tergite densely covered with deep punctures, from which arise long hairs
 - cc Marginal area of tergite 2 rather densely punctate and with surface dulled.. ***Eucera***

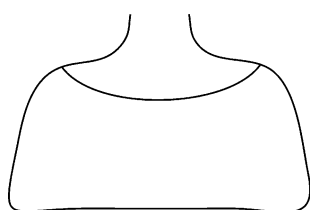
Large, dull species, with pale bands on apical tergites.



a

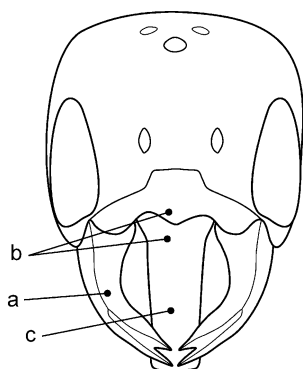


aa

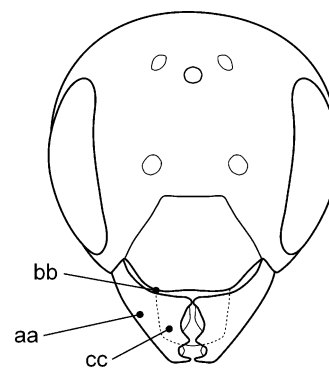


b

- 11 (7)**
- a First tergite of gaster with a strongly raised sharp ridge at front, separating dorsal surface from anterior face
 - b Viewed from above, this ridge distinctly concave*Heriades*
 One British species – *truncorum*. Medium-sized (7–8 mm), rather slender bee; body shining with dense, deep punctures; clypeus with paired median apical tubercles.
 - aa First tergite of gaster more-or-less smoothly curved from dorsal surface to anterior face, without a distinct transverse keel
 - bb If change in surface texture between dorsal surface and anterior face gives the impression of a vague ridge, this ridge viewed from above almost straight..... 12



a, b, c



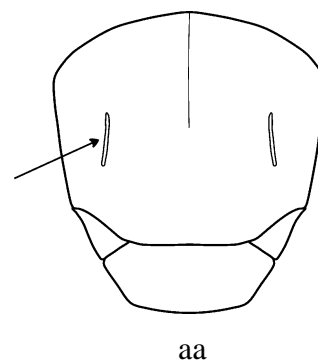
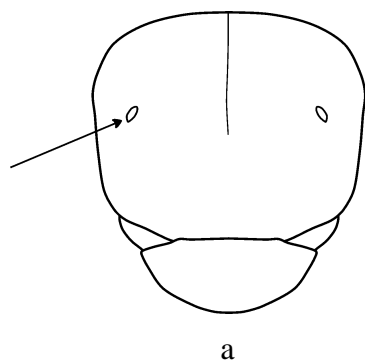
aa, bb, cc

- 12 (11)**
- a Mandibles long and narrow, tapering towards apex

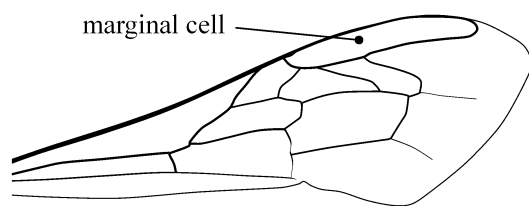
- b At rest, upper edge of mandibles nowhere near clypeus, but leaving an opening through which the labrum is clearly visible
- c Labrum very long, so that its tip is visible below apices of closed mandibles
- d Thorax elongate, area behind scutellum horizontal, almost as long as vertical posterior face of propodeum *Chelostoma*

Small to medium-sized species (5—11 mm), shining black with elongate abdomen.

- aa Mandibles shorter, length less than twice basal width, parallel sided or widening towards apex
- bb At rest, upper edge of mandibles fitting closely against edge of clypeus
- cc Labrum longer than wide but not projecting below apices of closed mandibles
- dd Thorax short, falling away vertically immediately behind scutellum..... 13

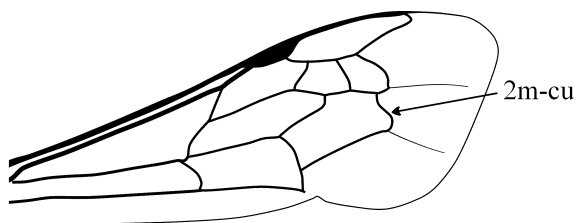


- 13 (12)** a On mesonotum, parapsidal lines short, scarcely longer than wide, appearing as a raised, flattened area usually distinct from surrounding punctures (move specimen relative to light-source to create reflections) AND/OR
- b Scopal hairs golden-reddish or black *Osmia*
Medium-sized to large species (7—14 mm); many either with long, dense red hair or metallic integument. “Mason bees”.
- aa On mesonotum, parapsidal lines linear, many times longer than wide, not always obvious AND
- bb Scopal hairs white *Hoplitis*
Medium-sized species (6—10 mm); sparsely haired with black integument.

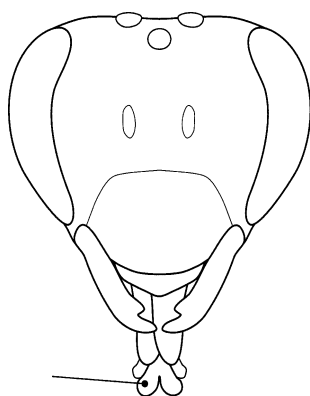


b

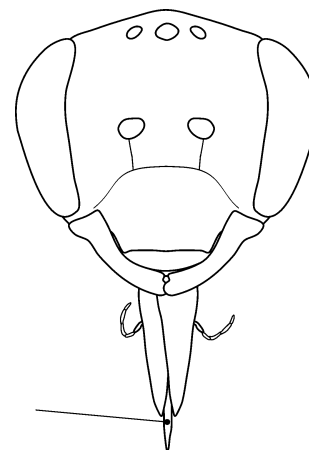
- 14 (1)**
- a Surface of eyes with long dense hairs
 - b Marginal cell long and narrow *Apis*
The Honey Bee.
 - aa Surface of eyes bare
 - bb Marginal cell usually shorter and broader 15
-



a



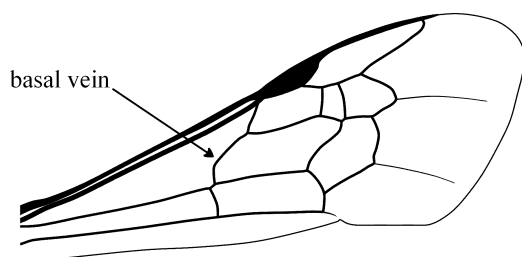
b, c



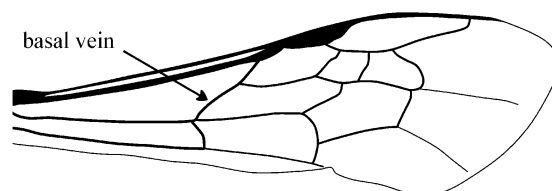
bb, cc

- 15 (14)**
- a Vein 2m-cu strongly S-shaped, the lower end bulging outwards
 - b Tongue short and bilobed at apex
 - c Head, viewed from in front, rather triangular, the inner margins of the eyes converging ventrally *Colletes*
Medium-sized to large bees (8—16 mm), most species with dense flattened hairs covering the marginal areas of the tergites, producing a banded effect; scopa on hind legs.

- aa Vein 2m-cu usually straight, at most slightly curved and then not bowed outward at lower end (illustration, next couplet)
- bb Tongue variable in length but always pointed at apex
- cc Head more rounded or oval, inner margins of eyes usually more parallel..... 16

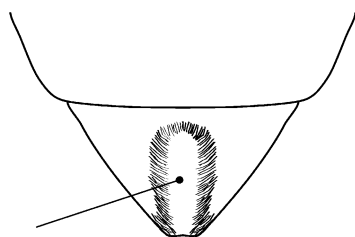


a



aa

- 16 (15)** a Basal vein strongly arched with a distinct bend towards lower end, forming almost a right angle where it meets the longitudinal vein..... 17
- aa Basal vein almost straight or slightly and evenly arched, the lower end meeting the longitudinal vein at an acute angle 20



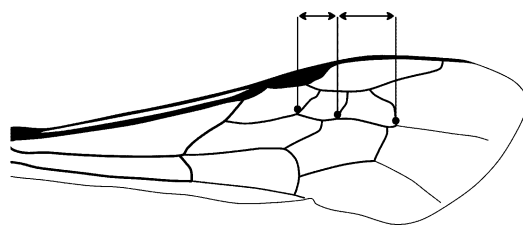
a

- 17 (16)** a Fifth tergite with a specialised hair patch, the rima, in the form of a central, longitudinal bare area surrounded on each side by dense, flattened hairs
- b Scopa on hind legs
- c Integument wholly black or metallic blue or green 18
- aa Fifth tergite without rima, either almost bare or with flattened hairs forming a complete apical band
- bb No obvious scopa
- cc Integument either metallic blue or with some tergites clear blood-red..... 19

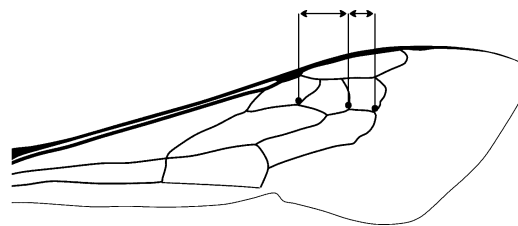
- 18** (17) a Gaster with bands or spots of whitish flattened hairs situated on the marginal areas of the tergites (glossary, fig. 2), often extending beyond the apical margin and thus masking it
- b Outer cross-veins similar in thickness and pigmentation to adjacent wing veins *Halictus*
 Small to medium-sized species (6—11 mm); integument black or metallic bronzy green.
- aa If gaster with patches of whitish flattened hairs, these are situated basally, often originating below the apical margin of the preceding tergite which is thus obvious; in some species these hair patches absent or indistinct
- bb Cross-veins towards wing tip usually finer and less obviously pigmented than adjacent longitudinal veins *Lasioglossum*
 Small to medium-sized species (5—11 mm); integument black or metallic greenish to bluish.
-

- 19** (17) a Integument obviously metallic bluish *Ceratina*
 One British species – *cyanea*. Fairly small (6—7 mm), shining metallic blue bee. Nests, and overwinters, in bramble stems. The “Blue Carpenter Bee”.
- aa Integument black, with several tergites completely blood-red *Sphecodes*
 Very small to medium-sized species (4—12 mm), gaster black with more-or-less extensive red belt, usually rather shining; heavily punctured head and thorax. Cleptoparasitic on species of *Lasioglossum*, *Halictus* and *Andrena*.
-

- 20** (16) a Wings strongly purplish-iridescent
- b Very large species, over 18 mm, with entirely black hairs on body and legs
 *Xylocopa*
 One species – *violacea* – a vagrant to Britain, but seen more often in recent years and could become established.
- aa Wings usually clear, at most smoky brownish
- bb Often smaller, if as large as 18 mm then body usually with bands or spots of lighter coloured hairs 21
-



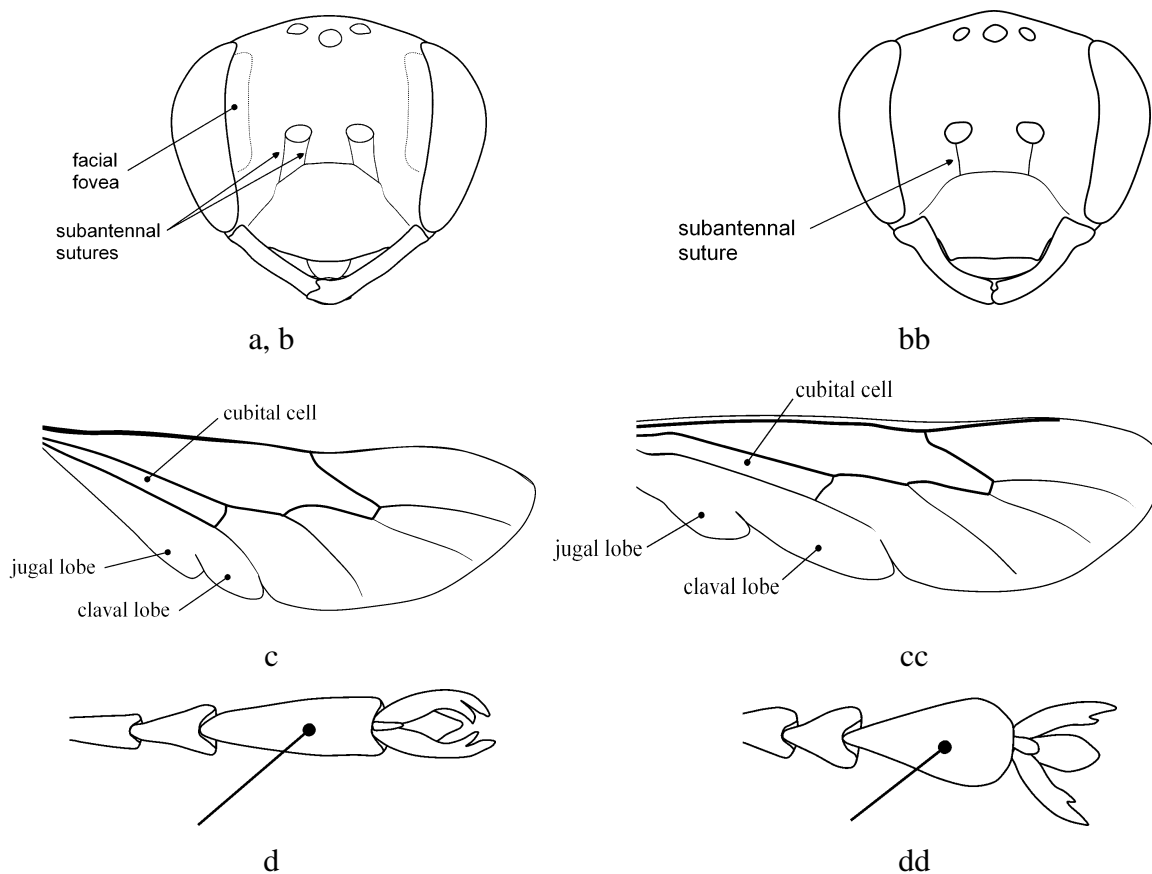
a



aa

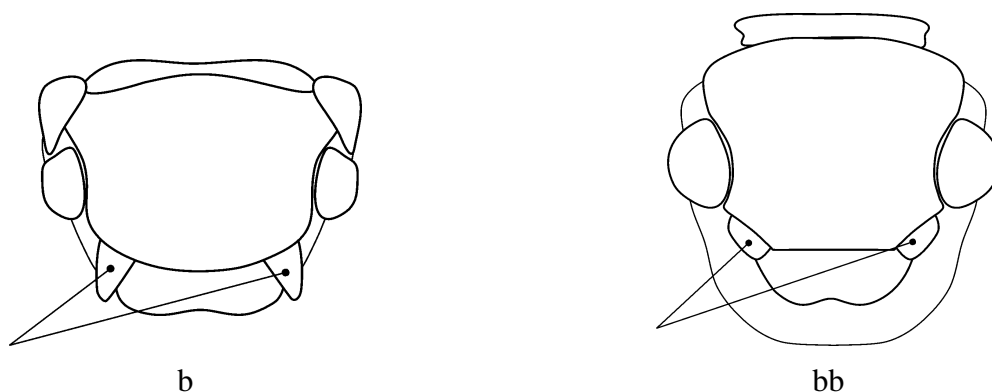
- 21** (20) a Lower border of third submarginal cell (measured between intersection with its bordering cross-veins) distinctly longer than that of second submarginal cell 22
- aa Lower border of third submarginal cell more-or-less equal in length to that of second or even shorter 24
-

- 22** (21) a Fairly distinct scopa on hind legs
- b Integument dark or with reddish marks or bands, not metallic 23
- aa No evident scopa
- bb Integument distinctly metallic bluish *Ceratina*
- One British species – *cyanea*. Fairly small (6–7 mm), shining metallic blue bee. Nests, and overwinters, in bramble stems. The “Blue Carpenter Bee”.
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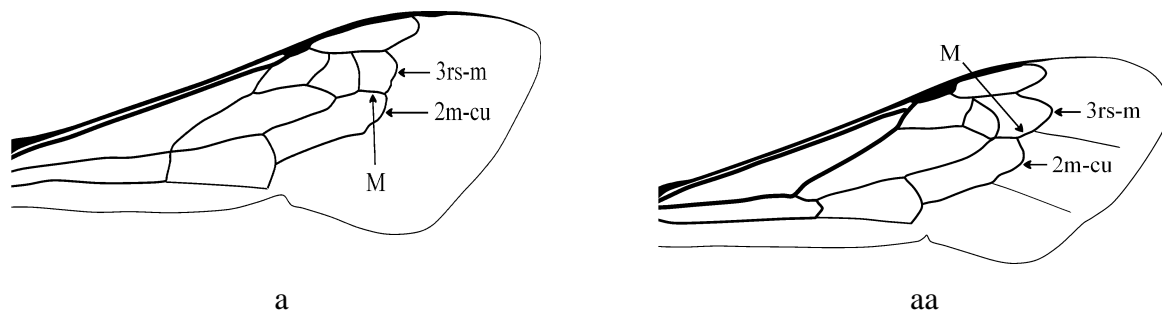


- 23 (22) a Facial foveae present – distinct depressions just inside inner border of eyes and lined with very short, dense hairs giving a velvety appearance
- b Two subantennal sutures present, showing as shining lines descending from antennal socket to meet upper border of clypeus, the shining suture defining the clypeus slightly thickened at these points
- c Jugal lobe of hindwing long, its length, measured from base of wing, distinctly more than half the length of claval lobe, usually reaching as far out as the vein closing the cubital cell [care needed – it may be folded under]
- d Last tarsal segment slender, at least three times as long as wide*Andrena*
 Small to large species (6–15 mm); a very large and diverse genus with species ranging from almost hairless to densely haired, shining to dull, some banded, and some with reddish markings on gaster.
- aa Facial foveae absent, the face inside eyes not depressed or lined with velvety hairs
- bb One subantennal suture present
- cc Jugal lobe of hindwing short, less than half length of claval lobe, and not nearly reaching vein closing the cubital cell
- dd Last tarsal segment broad, about twice as long as wide.....*Melitta*
 Medium-sized to large species (10–15 mm); integument dark; gaster with either whitish hair bands or an orange tail.

- 24** (21) a One or more pairs of legs marked with or completely yellow or reddish-orange 25
 — aa All legs with integument entirely black 26



- 25** (24) a Gaster with paired pale spots formed from dense flattened hairs
 b Axillae, on either side of scutellum, large and triangular, projecting backwards as a pair of teeth *Epeolus*
 Medium-sized species (6—11 mm); cleptoparasites of *Colletes*.
 — aa Gaster without patches of dense flattened hairs, instead patterned by yellow, red or brownish spots or bands due to pigmentation of the integument
 bb Axillae, on either side of scutellum, small and inconspicuous, not projecting backwards as teeth *Nomada*
 Small to large species (4—15 mm); gaster patterned with red or yellow and shining (thus wasp-like), head and thorax often heavily punctured. Cleptoparasites of *Andrena*, *Lasioglossum*, *Melitta* and *Eucera*.



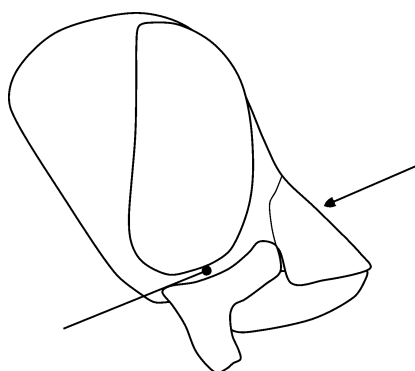
- 26** (24) a Veins 2m-cu and 3rs-m touching where they meet vein M

b Scopa present on hind leg *Anthophora*

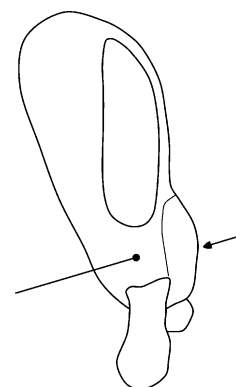
Fairly to very large species (10—17 mm); usually rather hairy; gaster with hair bands in some species; eyes, in life, sometimes rather greenish.

— aa Vein 2m-cu meeting M clearly nearer base of wing than 3rs-m does

bb Scopa either entirely absent, or pollen-collecting apparatus present in the form of a corbiculum – the hind tibia flat and shiny and bordered by long hairs 27



a, b



aa, bb

27 (26) a Cheek (malar space) short; distance from lower margin of eye to mandibular base less than one fifth of width of mandible here

b Face strongly protruding, clypeus at about 45° to vertical

c Gaster mainly sparsely haired and shining, with very long hairs confined to base, tergites with paired lateral spots formed from flattened hairs..... *Melecta*

Large to very large bees (12—16 mm), black with greyish-white hair; scutellum with paired apical prongs (difficult to see beneath hair). Cleptoparasites of *Anthophora*.

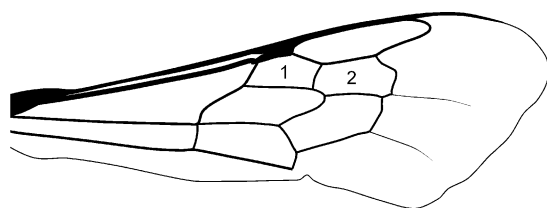
— aa Cheek (malar space) long, equal to or longer than width of mandibular base

bb Face almost flat, clypeus vertical

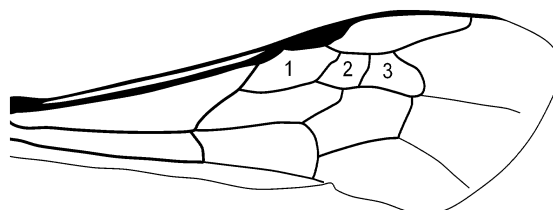
cc Gaster relatively densely long-haired, especially towards apex, never with rounded spots but often with complete bands of coloured hair *Bombus*

Medium-sized to very large species (10—35 mm); Bumblebees, with pollen-basket, and Cuckoo Bumblebees, without. [Includes the former genus *Psithyrus* now considered a subgenus of *Bombus*].

Key 3 – males



a

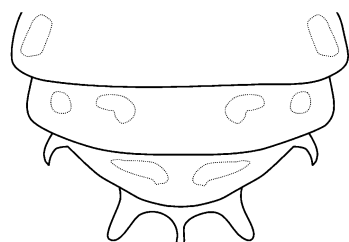


aa

| | | | |
|----------|----|--|----|
| 1 | a | Forewing with two submarginal cells ³ | 2 |
| — | aa | Forewing with three submarginal cells | 14 |

| | | | |
|--------------|----|---|---|
| 2 (1) | a | Antennae exceptionally long, at least as long as forewing <i>Eucera</i> Large species (12—16 mm); rather hairy; face yellow. | |
| — | aa | Antennae normal, rarely more than half as long as forewing | 3 |

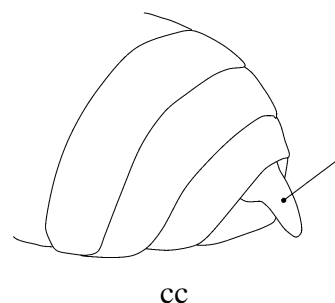
| | | | |
|--------------|----|--|---|
| 3 (2) | a | Face with yellow markings | 4 |
| — | aa | Face with integument black, although it may be covered with dense pale hairs | 6 |



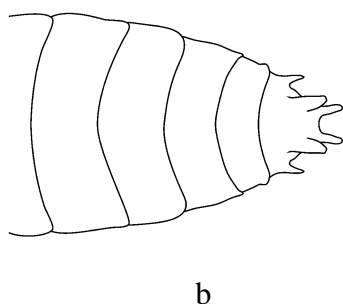
b

³ Very rarely, aberrant individuals of species with three submarginal cells appear to have only two through the loss or reduction of a cross-vein. Often this missing cross-vein can be seen as a vestige, or as short appendixes, at its junction with the other veins. If entirely absent you will be forced to follow the wrong half of the couplet and the key will fail at a later point or the bee will not match the criteria in the generic description – in this case you should try the option for three submarginal cells.

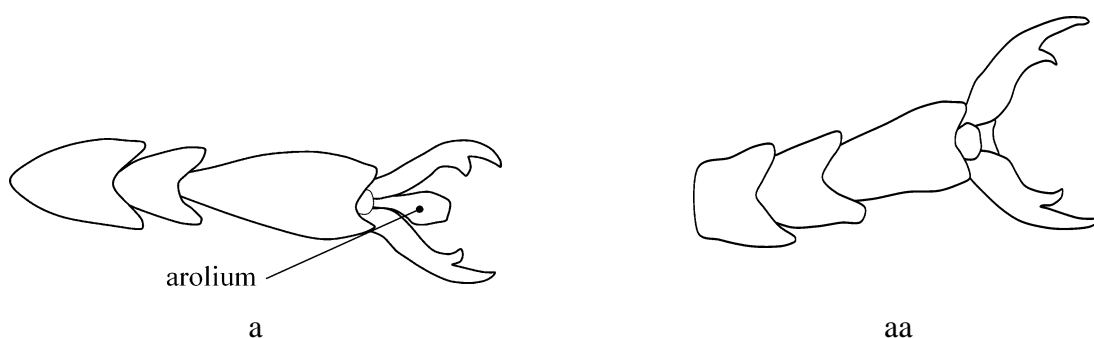
- 4 (3) a Gaster with paired, lateral, bright yellow spots
- b Tergites 6 and 7 of gaster with prominent, hook-like projections.....*Anthidium*
 One British species – *manicatum*. Large (11—15 mm); black with yellow spots on gaster, tibiae, tegulae, top of head, face and mandibles.
- aa Gaster completely black
- bb Apical tergites usually unadorned, at most with a median, down-curved projection on last tergite 5
-



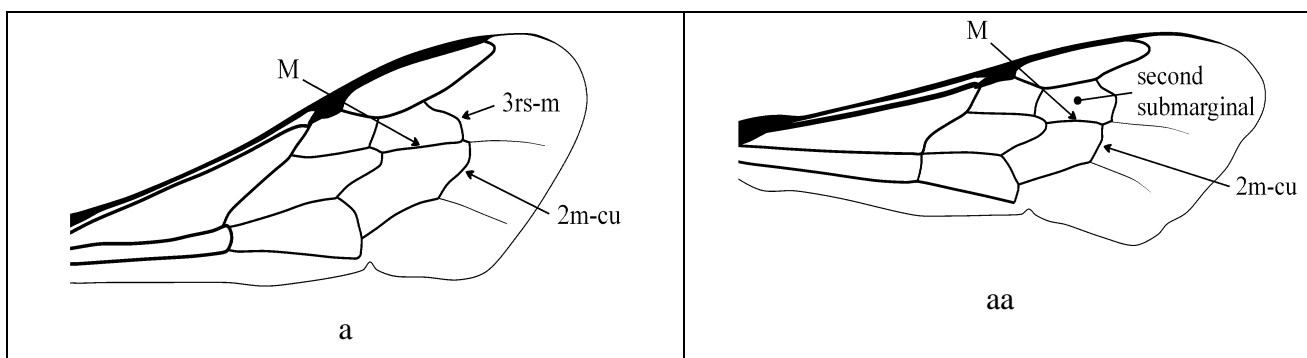
- 5 (4) a Legs with yellow spots on at least tibiae or tarsi
- b Legs slender, hind tibia oval in cross-section
- c Apex of gaster simple.....*Hylaeus*
 Small to medium-sized species (4—8 mm); very sparsely-haired bees; black with yellow on legs, face and sometimes parts of thorax; tongue short with bilobed apex.
- aa Legs completely black
- bb Legs robust, hind femur and tibia strongly swollen, the latter rather triangular in cross-section
- cc Last tergite of gaster with median, down-curved, tongue-like projection .*Macropis*
 One British species – *europaea*. Shining black bee, with pale hair-bands on the apical tergites and yellow face. Associated with yellow loosestrife.
-



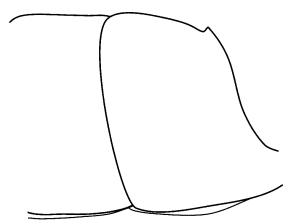
- 6 (3) a Surface of eyes with long dense hairs
- b Tergite 6 (apparent apex) of gaster with three pairs of posteriorly projecting spines..... *Coelioxys*
- Medium-sized to large species (9—14 mm); head and thorax densely and deeply punctured; gaster black and shiny, tapered towards apex, with bands of white, flattened hairs; scutellum with rearward-pointing hooks either side. Cleptoparasitic on *Megachile* and *Anthophora*.
- aa Surface of eyes bare
- bb Tergite 6 without three pairs of spines, at most with roughened rim 7
-



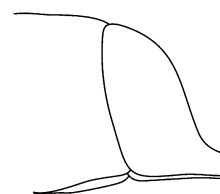
- 7 (6) a Arolium present between tarsal claws..... 8
- aa Arolium, between tarsal claws, absent..... *Megachile*
- Medium-sized to large species (9—15 mm); mandible with broad cutting edge with 3—4 teeth; tongue long; some species with front tarsus modified, expanded and pale-coloured. “Leaf-cutter Bees”.



- 8 (7) a Vein 2m-cu reaching vein M at or beyond the point that vein 3rs-m does*Stelis*
 Small to medium-sized species (5—10 mm); gaster black, black with narrow pale margins to tergites or black with pale lateral spots; rather shining, heavily-armoured species. Cleptoparasitic on *Osmia*, *Hoplitis*, *Anthidium* and *Heriades*.
- aa Vein 2m-cu reaching vein M before 3rs-m does, thus entering second submarginal cell 9

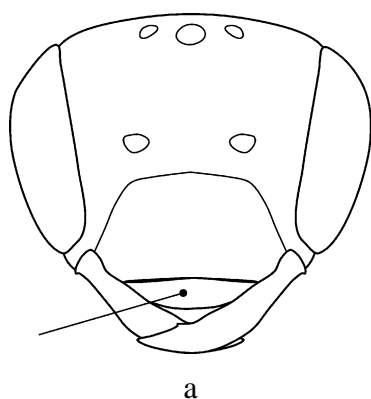


a

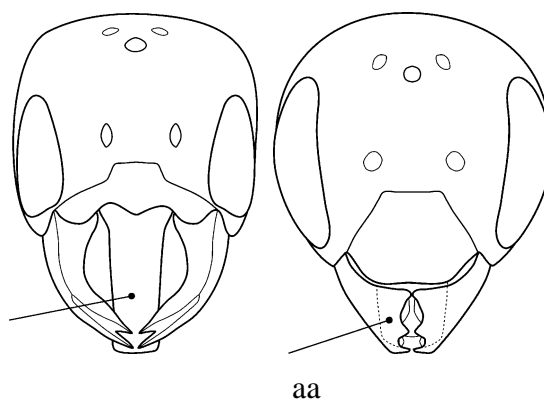


aa

- 9 (8) a First tergite of gaster with a strong transverse ridge at front, separating dorsal surface from anterior face.....*Heriades*
 One British species – *truncorum*. Medium-sized (7—8 mm), rather slender bee; body shining with dense, deep punctures.
- aa First tergite of gaster with dorsal surface smoothly rounded into anterior face 10

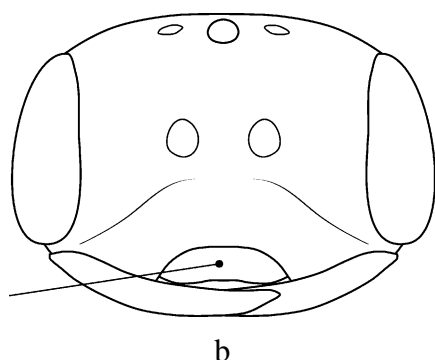


a

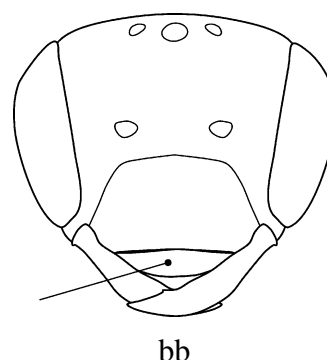


aa

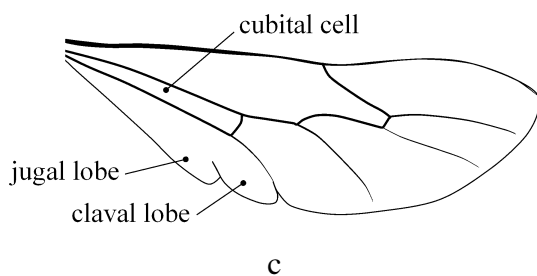
- 10** (9) a Labrum much wider than long, easily seen even when sickle-shaped mandibles are closed 11
 — aa Labrum longer than wide; in some species concealed by broad, triangular mandibles 12



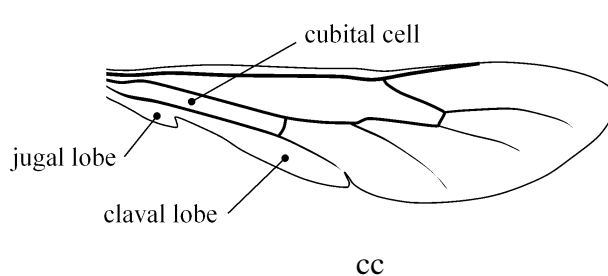
b



bb



c



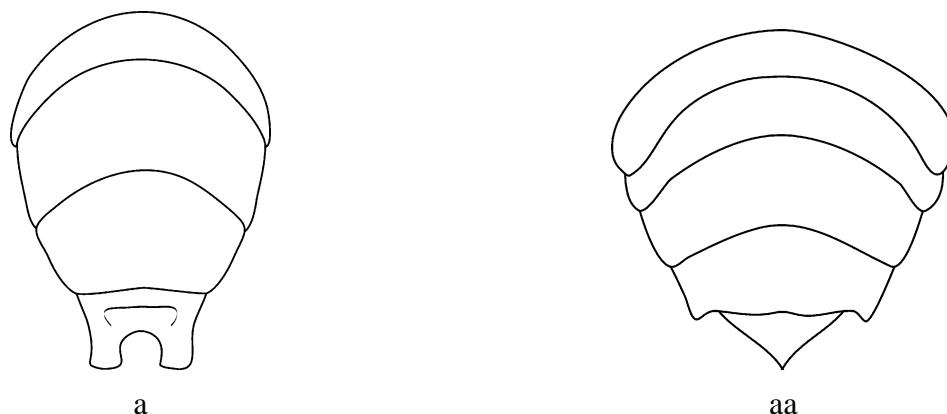
cc

- 11** (10) a Mesonotum black and shining with distinct but sparse punctures
 b Labrum fitting into excision in lower part of clypeus so that the lower borders of each are level
 c Jugal lobe of hindwing long, well over half length of claval lobe, and extending as far as or beyond vein closing cubital cell..... ***Panurgus***
 Medium-sized species (7—9 mm); deeply black and shiny; rather hairless.
 — aa Mesonotum brownish-black, surface matt with indistinct punctures

- bb Labrum hinged below level of clypeus
- cc Jugal lobe of hindwing very short, much less than half length of claval lobe and not reaching anywhere near as far as vein closing cubital cell.....*Dasypoda*
 One British species – *hirtipes*. Large (12—14 mm); banded bee with long hairs on gaster, thorax, legs and face.

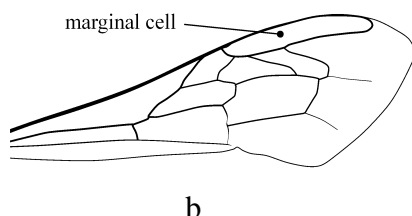


- 12 (10) a Parapsidal lines short, scarcely longer than wide, appearing as a raised, flattened area usually distinct from surrounding punctures (move specimen relative to light-source to create reflections) OR sternite 1 with a long ventral spine.
- b Gaster with sternite 2 flat and unmodified
- c Integument may be slightly metallic but black in some species*Osmia*
 Medium-sized to large species (7—13 mm); many either with long but sparse red hair or metallic integument. “Mason bees”.
- aa Parapsidal lines linear, many times longer than wide, not always obvious
- bb Gaster with sternite 2 modified into a raised welt
- cc Integument always black..... 13



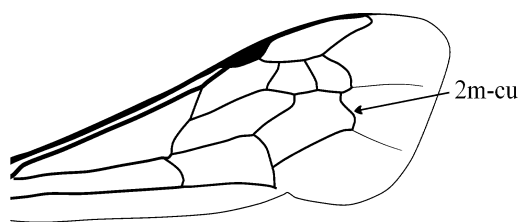
- 13 (12) a Tergite 7 of gaster ending in two, downward-pointing projections with a deep notch between them (view from behind)

- b Rim of tergite 6 with smooth outline
- c Thorax elongate; propodeum long, with a distinct division between dorsal and posterior surfaces, the dorsal area with a series of raised longitudinal keels..... *Chelostoma*
 Small to medium-sized species (5—11 mm); rather shining, black, elongate body.
- aa Tergite 7 of gaster ending in a single median point, this segment somewhat curved beneath the end of the gaster and partially concealed by tergite 6 (view from behind)
- bb Rim of tergite 6 with small lateral teeth
- cc Thorax compact; propodeum short and rounded, almost vertical with no obvious dorsal surface..... *Hoplitis*
 Medium-sized species (6—10 mm); gaster shining, sparsely haired with black integument.

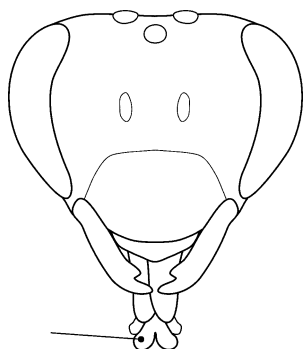


- 14 (1)** a Surface of eyes with long dense hairs
- b Marginal cell long and narrow *Apis*
 The Honey Bee; drones infrequently found.
- aa Surface of eyes bare
- bb Marginal cell usually shorter and broader..... 15

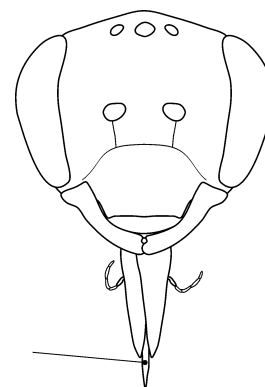
- 15 (14)** a Wings strongly purplish-iridescent
- b Very large species, over 18 mm
- c Body covered with dense, blackish-purple hairs..... *Xylocopa*
 One species – *violacea* – a vagrant to Britain, but seen more often in recent years and could become established.
- aa Wings usually clear, at most smoky
- bb Often smaller, if as large as 18 mm then body with bands or spots of lighter coloured hairs
- cc If covered with dense, black hairs then marginal cell divided in two by an extremely fine vertical false vein and jugal lobe entirely absent 16



a

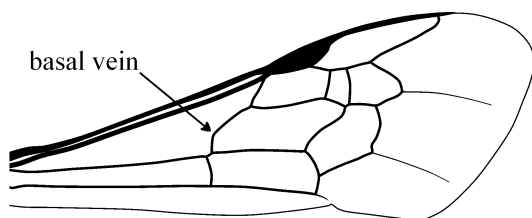


b, c

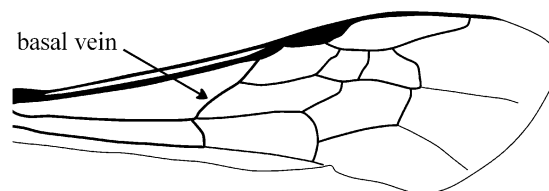


bb, cc

- 16 (15)** a Vein 2m-cu strongly S-shaped, the lower end bulging outwards
 b Tongue short and bilobed at apex
 c Head, viewed from in front, rather triangular, the inner margins of the eyes converging ventrally..... *Colletes*
 Medium-sized to large bees (7—15 mm), most species with dense flattened hairs covering the marginal areas of the tergites, producing a banded effect; sternum 7 modified with lateral extensions (needs to be fully visible for identification).
-
- aa Vein 2m-cu usually straight, at most slightly curved and then not bowed outward at lower end
 bb Tongue variable in length but always pointed at apex
 cc Head more rounded or oval, inner margins of eyes usually more parallel..... 17



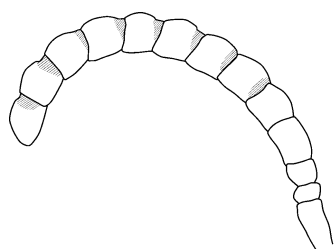
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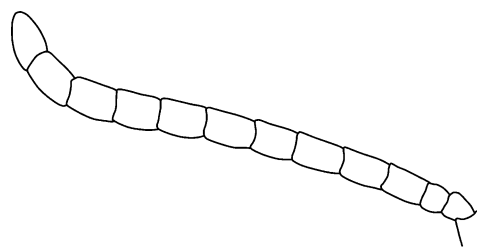
aa

- 17 (16)** a Basal vein strongly arched with a distinct bend towards lower end, forming almost a right angle where it meets the longitudinal vein..... 18

- aa Basal vein almost straight or slightly and evenly arched, the lower end meeting the longitudinal vein at an acute angle 21



d

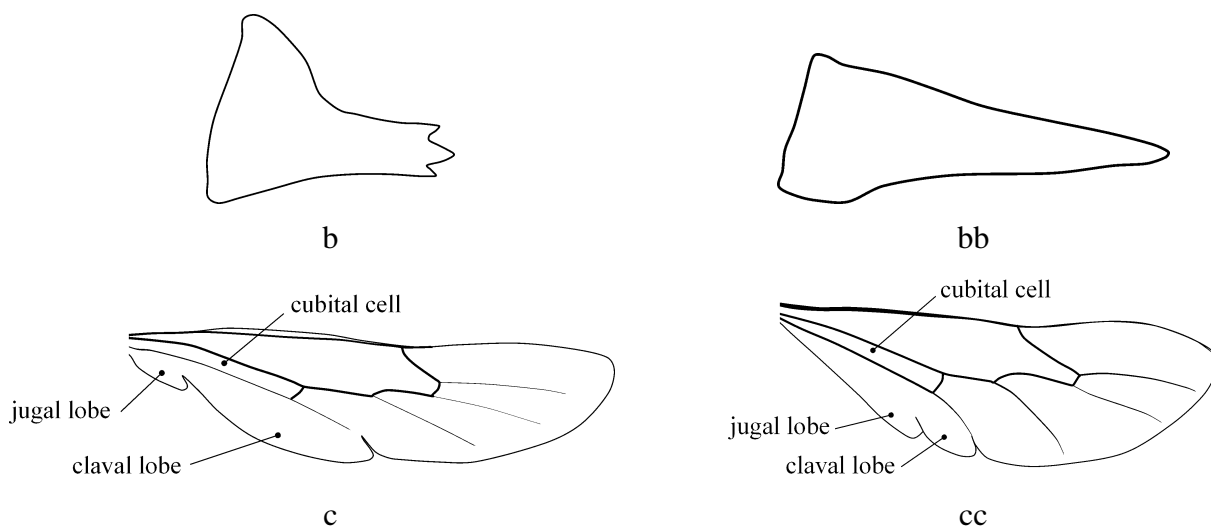


dd

- 18 (17)**
 - a Usually, one or more tergites of gaster marked with reddish or orange-brown, shining, with sparse punctures and almost hairless - but may be completely black
 - b Face with integument black (except, perhaps, tips of mandibles)
 - c Legs black, at most tarsi translucent reddish-brown
 - d Antenna black and usually with ventral surface of apical segments with a pubescent depression basally, thus appearing “knobbly” *Sphecodes*

Very small to medium-sized species (4—11 mm); gaster black, usually with more-or-less extensive red belt but melanic examples occur, usually rather shining; heavily punctured head and thorax. Cleptoparasites of species of *Lasioglossum*, *Halictus* and *Andrena*.

- aa Tergites usually black or dark-metallic; if red-marked then often with patches of whitish, flattened hairs and legs with yellow markings
- bb Face nearly always with yellow markings, at least at apex of clypeus
- cc Legs black or with yellow markings on tibia and/or tarsus
- dd Antennae variable, sometimes yellowish-orange below, but segments usually more-or-less cylindrical and with even covering of pubescence..... 19



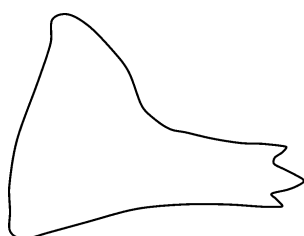
- 19 (18)**
- a Integument metallic blue AND legs black except for a minute yellow spot at base of each tibia
 - b Mandibles rather short and narrowing abruptly towards apex, ending in three teeth, black
 - c Jugal lobe of hindwing very short, much less than half length of claval lobe and not reaching anywhere near as far as vein closing cubital cell..... *Ceratina*
 One British species – *cyanea*. Fairly small (6—7 mm), shining metallic blue bee. Nests, and overwinters, in bramble stems. The “Blue Carpenter Bee”.
-
- aa Integument black, or if metallic then legs either entirely black or more extensively yellow
 - bb Mandibles sickle-shaped, narrowing evenly from base to a simple point, sometimes yellow-marked
 - cc Jugal lobe of hindwing long, well over half length of claval lobe, and extending as far as or beyond vein closing cubital cell..... 20

- 20 (19)**
- a Bands or spots of whitish flattened hairs, if present, situated on apical part of each tergite, usually extending beyond the apical margin and thus masking it; sometimes with basal bands AS WELL
 - b Outer cross-veins of similar thickness and pigmentation to adjacent veins
 - c IF head and thorax metallic bronze or green, then legs predominantly yellow or orange..... *Halictus*
 Small to medium-sized species (6—11 mm); integument black or metallic greenish; legs extensively yellow.
-
- aa Bands or spots of whitish flattened hairs, if present, situated basally and often originating beneath the apical margin of the previous tergite
 - bb Outer cross-veins thinner and less well pigmented than adjacent veins (less distinct than in females and sometimes very difficult to appreciate)

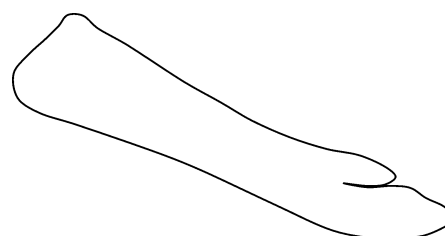
- cc IF head and thorax metallic bronze or green, then legs dark with at most tarsi yellow *Lasioglossum*

Very small to medium-sized species (4—12 mm); integument black or metallic greenish to bluish; legs usually less extensively yellow than in *Halictus*.

- 21** (17) a Face and/or mandibles with clear yellow or reddish-yellow markings on the integument..... 22
- aa Face, and mandibles, except perhaps extreme apex, black (but may have yellow hair) 26



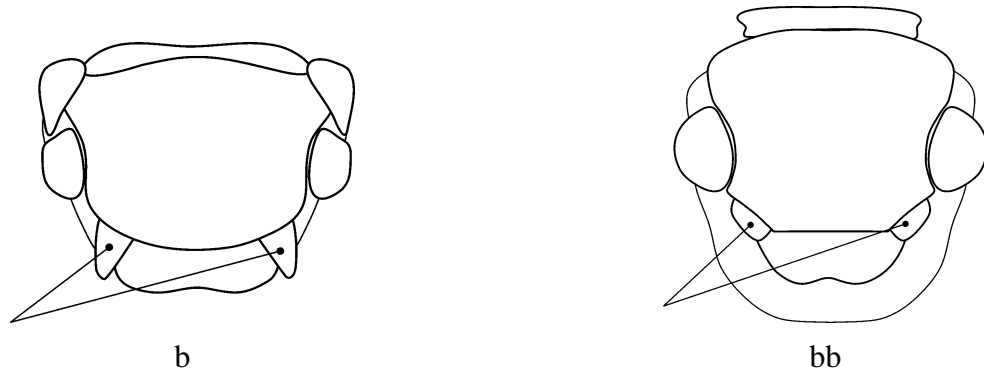
b



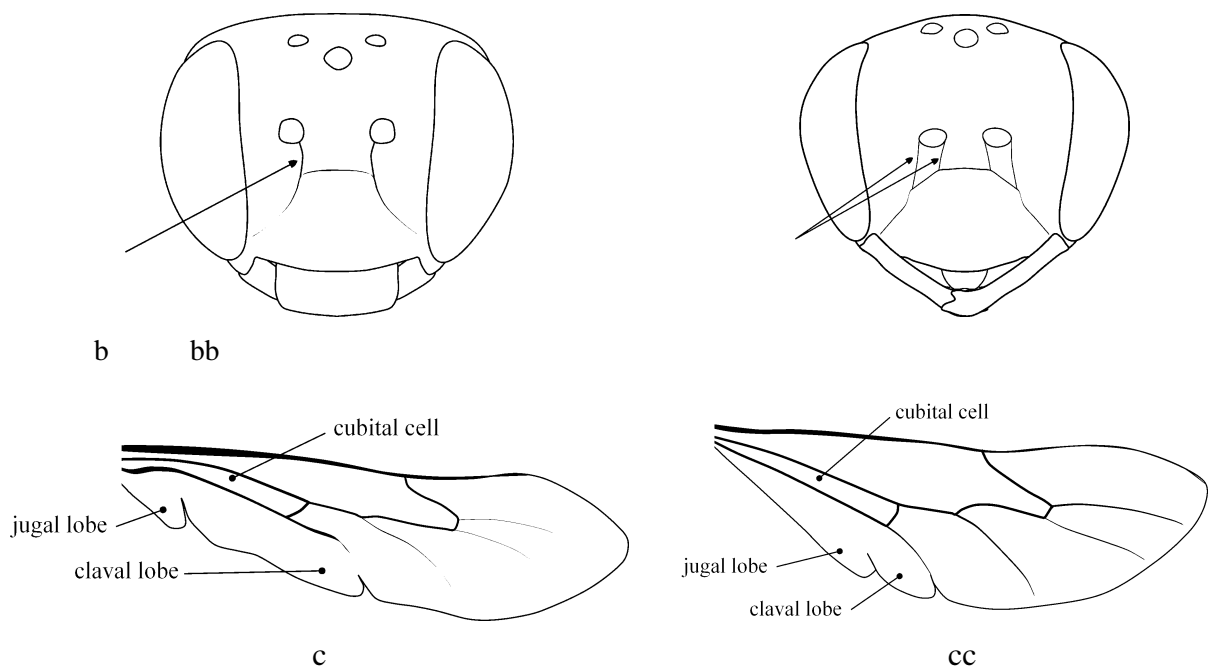
bb

- 22** (21) a Integument shining metallic blue
- b Mandibles rather short and narrowing abruptly towards apex..... *Ceratina*
- One British species – *cyanea*. Fairly small (6—7 mm), shining metallic blue bee. Nests, and overwinters, in bramble stems. The “Blue Carpenter Bee”.
- aa Integument black or marked with yellow or reddish-yellow
- bb Mandibles long, narrowing evenly from base to apex (sometimes with an accessory tooth)..... 23

- 23** (22) a Some part of front or mid femora or tibiae clear yellow or reddish-yellow, usually fairly extensively (if, very occasionally, front and mid femora and tarsi apparently brownish-black then gaster with yellow spots on the integument of one or more tergites) 24
- aa Front and mid femora and tibiae completely black or brownish-black..... 25

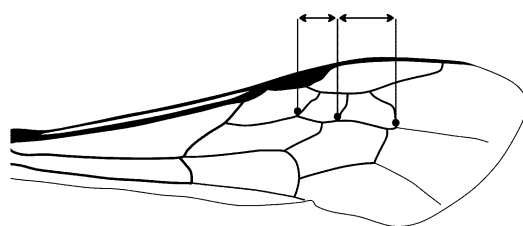


- 24** (23) a Gaster with paired pale spots formed from dense flattened scale-like hairs
- b Axillae, on either side of scutellum, large and triangular, projecting backwards as a pair of teeth *Epeolus*
 Medium-sized species (6—11 mm); cleptoparasites of *Colletes*.
- aa Gaster without scale-like hairs, instead patterned by yellow, red or brownish spots or bands due to pigmentation of the integument
- bb Axillae, on either side of scutellum, small and inconspicuous, not projecting backwards as teeth..... *Nomada*
 Small to large species (4—15 mm); gaster patterned and shining (hence wasp-like), head and thorax often heavily punctured. Cleptoparasites of *Andrena*, *Lasioglossum*, *Melitta* and *Eucera*.

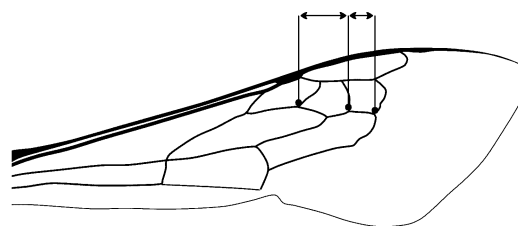


- 25** (23) a First segment of antenna (scape) with a yellow mark on front surface, contrasting with rest of antenna

- b One subantennal suture present, visible as a black line cutting through yellow facial mark above clypeus
 - c Jugal lobe of hindwing very short, much less than half length of claval lobe [care needed – may be folded under] ***Anthophora***
 Fairly to very large species (9—16 mm); usually rather hairy; gaster with hair bands in some species; eyes, in life, sometimes rather greenish.
-
- aa First segment of antenna (scape) brownish-black, like rest of antenna
 - bb Two subantennal sutures present, showing as shining lines descending from antennal socket to meet upper border of clypeus, the shining suture defining the clypeus slightly thickened at these points
 - cc Jugal lobe of hindwing long, more than half length of claval lobe and reaching as far as the vein closing the cubital cell ***Andrena*** (in part)
 Fairly small to large species (6—15 mm); a small section of this large genus has the face marked with yellow; one species with tergites 2 and 3 blood-red.

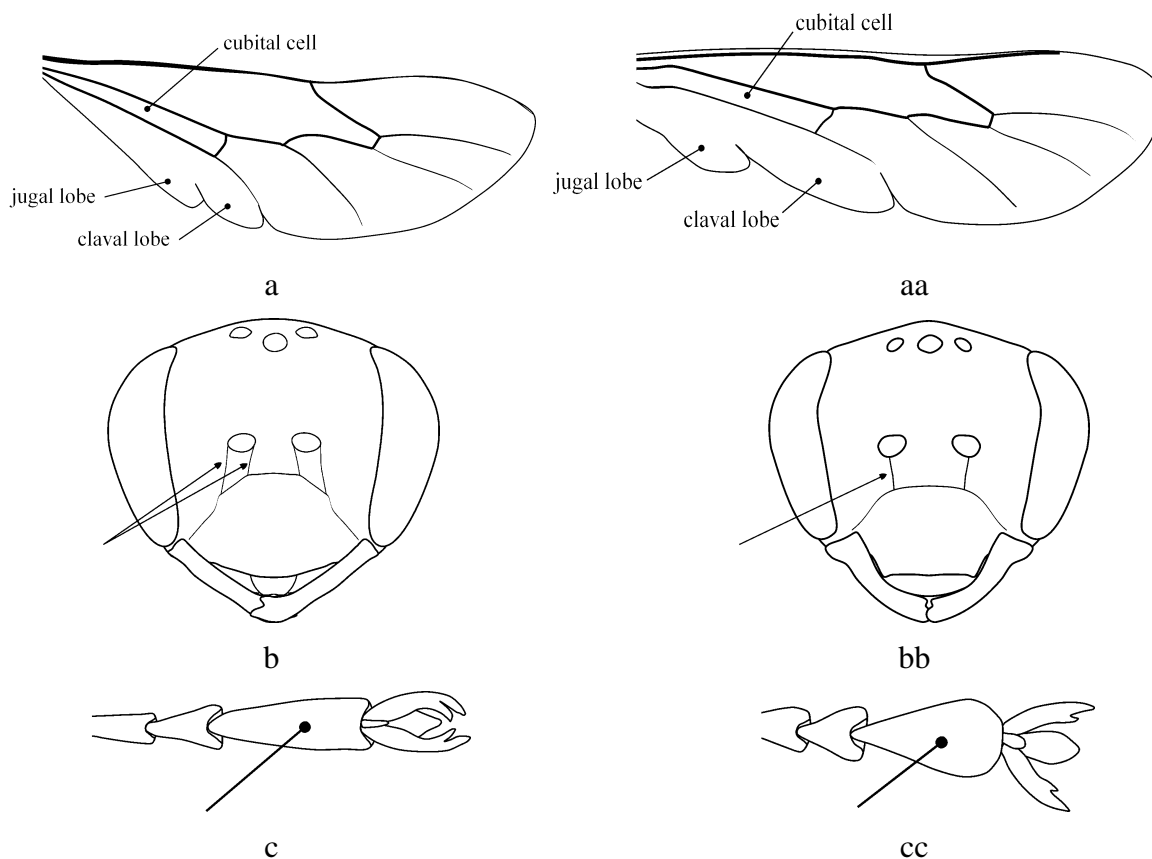


a

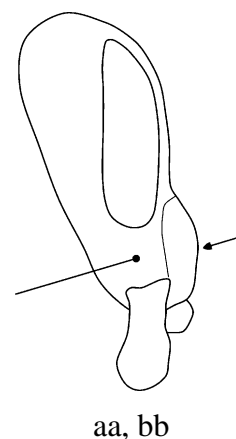
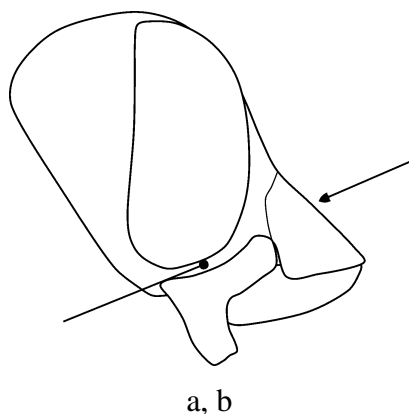


aa

- 26 (21)** a Lower border of third submarginal cell (measured between intersection with its bordering cross-veins) distinctly longer than that of second submarginal cell 27
- aa Lower border of third submarginal cell more-or-less equal in length to that of second or even shorter 28



- 27** (26) a Jugal lobe of hindwing long; its length, measured from base of wing, distinctly more than half the length of claval lobe, usually reaching as far out as the vein closing the cubital cell [care needed – may be folded under]
- b Two subantennal sutures present, showing as shining lines descending from antennal socket to meet upper border of clypeus, the shining suture defining the clypeus slightly thickened at these points
- c Last tarsal segment slender, at least three times as long as wide*Andrena*
 Small to large species (5—15 mm); a very large and diverse genus with species ranging from almost hairless to densely haired, shining to dull, some banded, and some with reddish markings on gaster.
- aa Jugal lobe of hindwing short, less than half length of claval lobe, and not nearly reaching vein closing the cubital cell
- bb One subantennal suture present
- cc Last tarsal segment broad, about twice as long as wide.....*Melitta*
 Medium-sized to large species (8—13 mm); integument dark; some species with whitish hair bands on gaster; most species with antennal segments long and concave below, the antennae appearing “knobbly”.

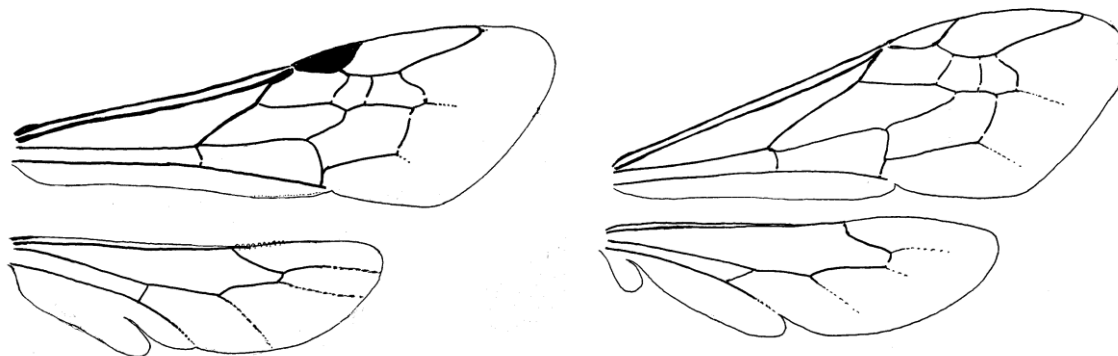


- 28** (26) a Cheek (malar space) short, distance from lower margin of eye to mandibular base less than one fifth of width of mandible here
- b Face strongly protruding, clypeus at about 45° to vertical
- c Gaster mainly sparsely haired and shining, with very long hairs confined to base, tergites with paired lateral spots formed from flattened hairs..... *Melecta*
 Large to very large bees (12—16 mm), black with greyish-white hair; scutellum with paired apical prongs (difficult to see beneath hair). Cleptoparasites of *Anthophora*.
- aa Cheek (malar space) long, equal to or longer than width of mandibular base
- bb Face almost flat, clypeus vertical
- cc Gaster relatively densely long-haired, especially towards apex, never with rounded spots but often with complete or interrupted bands of coloured hair
 *Bombus*
 Large to very large species (12—17 mm); Bumblebees and Cuckoo Bumblebees. [Includes the former genus *Psithyrus* now considered a subgenus of *Bombus*].

Key to the Genera of British Bees (by Geoff Allen)

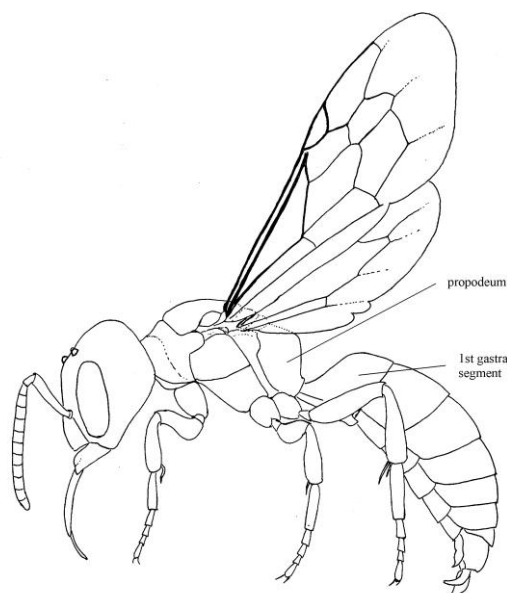
Introduction to the key – recognizing bees

Bees belong to the vast insect order Hymenoptera, which is identified by a combination of features (characters) of the wings. To be placed in this order, unless a wingless sex, the insect must possess two pairs of membranous wings, the forewings larger than the hind. Further, the wings on each side must be linked in flight by a row of hooks on the hind-wing which engage with a fold in the forewing. The wing venation is reduced compared with some other insect orders. The Hymenoptera have a complete, four stage life cycle, i.e. egg, larva, pupa and adult.



Right fore and hind-wings of two species of bees

Within the Hymenoptera is placed a suborder Apocrita (the “wasp-waisted” insects) which contains the aculeates (bees, wasps and ants) and the parasitoid groups, such as the ichneumons, chalcids and gall wasps. The wasp waist is a constriction between the first segment of the true abdomen, called the propodeum, and the second abdominal segment, which is the first segment of the gaster. The propodeum is fused broadly to the metathorax, the last segment of the true thorax, forming a composite unit sometimes termed the “alitrunk”.



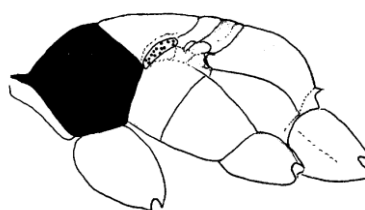
A bee from the left side showing the constriction between the propodeum and 1st gastral segment

The aculeates are divided into three superfamilies: Chrysoidea, Vespoidea and Apoidea. The bee family is part of the last of these. The classification of the bees as one taxonomic family is a direct consequence of the uniform structure of these insects.

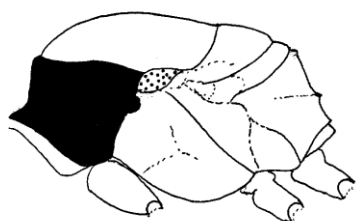
The bees are particularly related to four families of solitary wasps, the Ampulicidae, Crabronidae, Heterogynaidae and Sphecidae. All five families have an important character in common, the shape of the pronotal tubercle, which consequently places them in the superfamily Apoidea. The apoid pronotal tubercle is a lobe which extends backwards from the side of the pronotum covering the prothoracic spiracle but not reaching the tegula (forewing base), as seen from the side. In the Vespoidea, which includes our familiar social wasps amongst many other groups, the pronotum is variously formed but always reaches the tegula. Also, in Apoidea, the pronotum curves round ventrally, almost completely encircling the propleuron, to which sclerite the forelegs are attached. Dorsally, the main part of the apoid pronotum usually resembles a narrow collar at the front of the thorax.



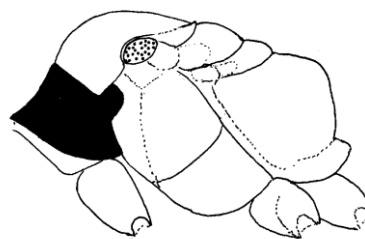
a) *Monosapyga* (Sapygidae)
a vespid wasp



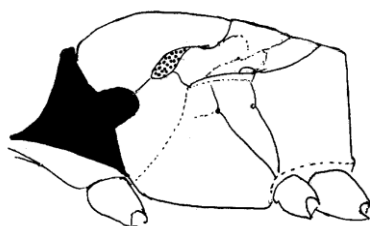
b) *Priocnemis* (Pompilidae)
a vespid wasp



c) *Ancistrocerus* (Vespidae)
a vespid wasp



d) *Pemphredon* (Crabronidae)
an apoid wasp



e) *Hylaeus* (Apidae)
a bee



f) *Hylaeus*

Thoraxes of vespoids and apoids, pronotum infilled and tegula stippled
lateral views apart from f), which is a dorsal view.

Bees can be separated from all wasps by two main features in pinned specimens. The bees, including both independent and parasitic species, have branched or feathered hairs at least somewhere on the body. In non-parasitic forms these hairs are abundant. They gather pollen from flowers and assist in its transportation to the nest. The other main character uniting the bees as a scientific family is the form of the hind basitarsus, which is laterally flattened (i.e.

from side to side) and usually bears a comb of bristly hairs, which in the female of free-living forms moves pollen from the body hairs to the scopa or the corbicula, to carry during flight.

The sexes of the bees are usually quite easy to separate and with a little experience, it can be easier in the field to recognize the sex of a bee by its 'jiz' than to identify it to species. The males have a genital capsule which is usually withdrawn into the apex of the gaster and which only becomes apparent when the bee is about to mate. The females have a sting in the same situation in the gaster but this is reduced in function in some bees. In all British bees, males have antennae with 13 segments, including the first, elongate segment (the scape), and the gaster has seven visible dorsal plates (tergites). The females have 12 and six, respectively. The ventral plates, called sternites, correspond in number by sex but in some male bees not all seven are visible, particularly in those genera where the tip of gaster tends to curl under the fore part at rest. In these instances, the apical tergite may appear to be on the underside, sometimes apparently separated by a ridge across tergite 6.

How to use the key

Each number in the key represents a couplet. A couplet is a pair of contrasting sets of characters (sometimes called "lugs" or "leads") which should enable a choice to be made as to which most represents the bee being examined. Starting at the top (couplet 1), choose one of the two alternative character sets - the one which is most representative of the bee - then go to the couplet corresponding to the number at the end of this alternative. This leads to another couplet with two choices, and so on. Eventually, a couplet is reached where the appropriate choice will give the generic name of the bee concerned.

On occasion, it may be difficult to distinguish which alternative in a couplet most fits your bee. In this situation, first check that you have not made a mistake earlier in the key; then, if not, by following both choices one at a time, a decision may eventually be made.

Notes on the key

The key requires good visibility of the mouthparts and wings (see Appendix on "Preparation of bees for identification"; a photograph is highly unlikely to provide sight of all the characters needed to identify a bee). The key is rather artificial. That is, some of the characters used "cut across" what are assumed to be natural groupings. The characters have been selected as the easiest ones from which to make a choice of lugs. For example, the number of submarginal cells is not constant in some of the higher groupings; there may be two or three in different genera of some subfamilies. In one genus, *Eucera*, there are even some non-British species which have three submarginals instead of the usual two for the genus!

NB The key will only work for British bees; even on the near continent there are species additional to those found in the U.K., for which the key may not run true.

The key

1 Forewing with 2 submarginal cells (Fig 1; cells labelled I & II..... 2

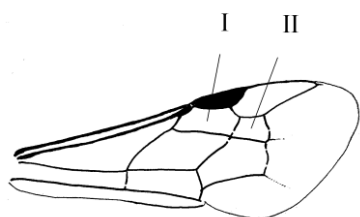


Fig 1

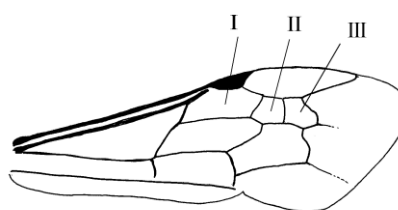


Fig 2

- Forewing with 3 submarginal cells (Fig 2; I, II & III)..... 17

[CAUTION: when looking for the number of submarginal cells, examine both forewings. In species normally with 3 submarginals the occasional specimen may have only 2 in one forewing, this being an aberration. It is extremely rare for this anomaly to occur in both forewings of one specimen].

- 2(1) Tongue of bee (shaded area) long to very long compared to the adjacent mouthparts, sometimes broadened just before the tip (Fig 3, also Figs 7 & 9); jugal lobe (JL) of hindwing reduced, shorter than half the length of the claval lobe (CL) (Fig 4), but about equal to half in *Coelioxys*, which has very hairy compound eyes, and in *Megachile*, which has a distinctly concave front face to the first tergite and no arolia 3

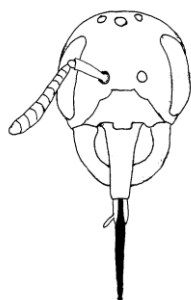


Fig 3

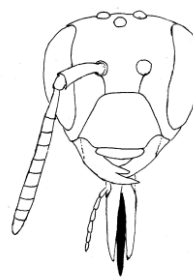


Fig 5

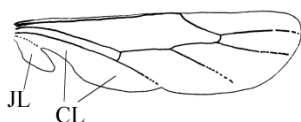


Fig 4

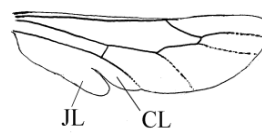


Fig 6

- Tongue (shaded area) short, projecting only a little beyond the adjacent mouthparts (Fig 5), usually pointed but sometimes bilobed; jugal lobe (JL) of hindwing longer than half the length of the claval lobe (CL) (Fig 6), but about equal to half in *Macropis* and slightly less than half in *Dasygoda* (see Figs 40 & 41)..... .12

- 3(2) Large species (male 15 mm, female 16-17 mm in length); the male with very long antennae (Fig 7) (when laid back over the bee the antenna reaches to the apex of the gaster); the female with the scopa (pollen-carrying brush) on the hind legs (Fig 8).
**Eucera** (2 British spp) (Fig 11, male)

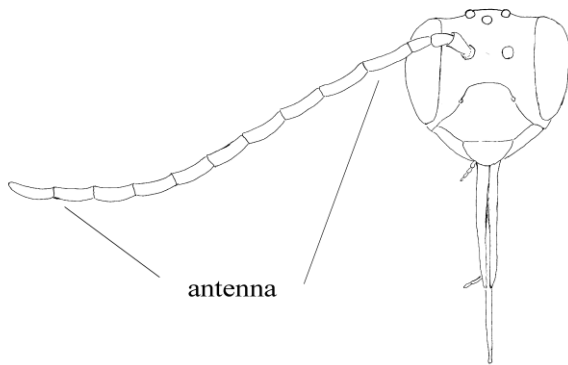


Fig 7

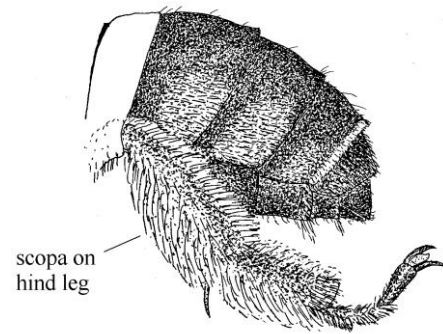


Fig 8

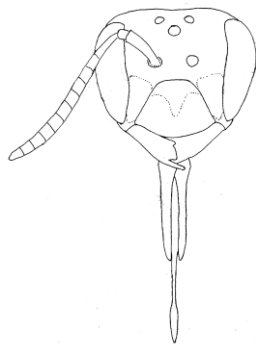


Fig 9

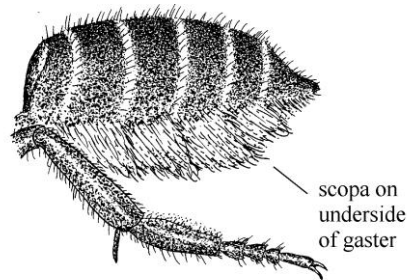


Fig 10

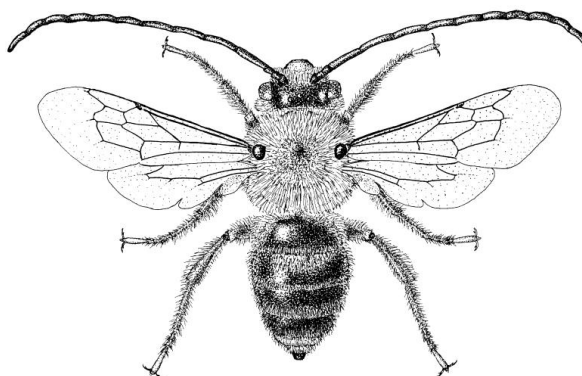


Fig 11

- Various sized; the male with shorter antennae (Fig 9); the female with the scopa (pollen-carrying brush) confined to the underside of the gaster (Fig 10), or absent in parasitic genera..... 4

- 4(3) In the forewing, the second recurrent vein (2m-cu) meets the median vein (M) at the outer end of, or beyond, the second submarginal cell (II) (Fig 12)..... 5

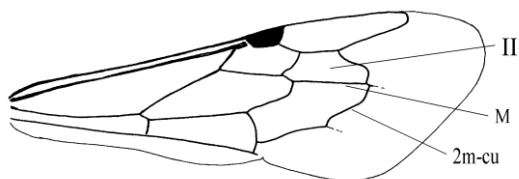


Fig 12



Fig 13

- In the forewing, 2m-cu meets M in the second submarginal cell (Fig 13). 6

- 5(4) Gaster with paired yellow integumental spots on most tergites; the female with a pronounced gastral scopa (as in Fig 10); the male with a spiny apex to the gaster **Anthidium** (1 British sp) (Fig 14)

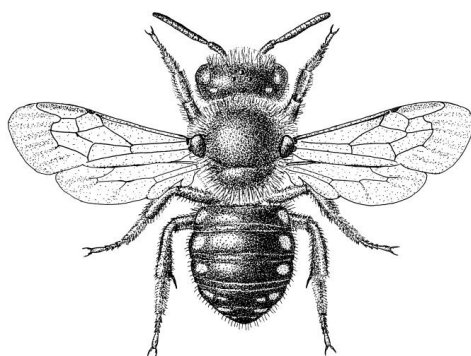


Fig 14

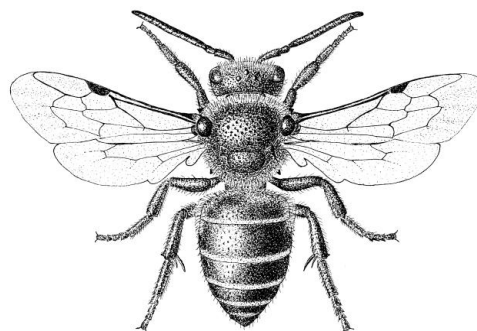


Fig 15

- Gaster with pale whitish integumental bands or spots, or unmarked; the female without a scopa; the male lacks spines at the apex of the gaster.....
..... **Stelis** (4 British spp) (Fig 15)

- 6(4) Compound eyes, C, very hairy (Fig 16)..... **Coelioxys** (7 British spp) (Fig 17)

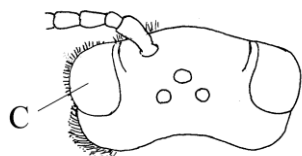


Fig 16

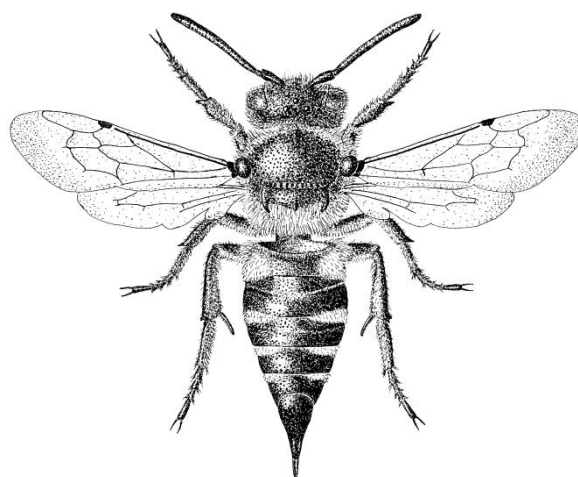


Fig 17

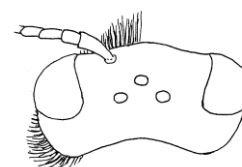


Fig 18

- Compound eyes not hairy (Fig 18)..... 7

- 7(6) Apical tarsal joints without an arolium (Fig 19); jugal lobe of hindwing about half the length of the claval lobe (as in Fig 20); front face of tergite 1 of the gaster always distinctly concave..... **Megachile** (including *Chalicodoma*) (9 British spp) (Fig 20)

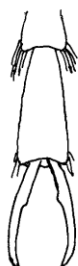


Fig 19

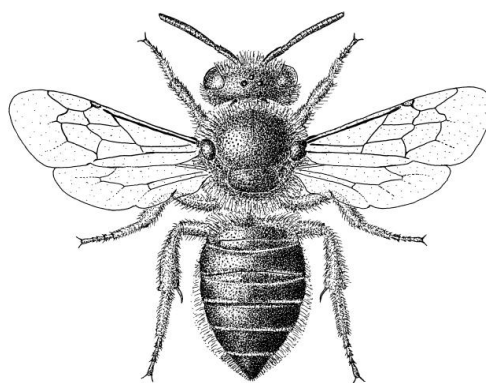


Fig 20

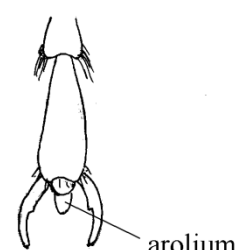


Fig 21

- The apical tarsal joints with a prominent arolium (a projection between the tarsal claws, Fig 21); jugal lobe of hindwing short, much less than half the length of the claval lobe (as in Figs 22 & 23); front face of tergite 1 slightly convex to slightly concave, except for *Heriades*, where it is concave and delimited by a strong ridge8

- 8(7) Bee robust in appearance (Figs 22, 26 & 27), always without a strong ridge separating the dorsal surface from the front face of the first gastral tergite; sometimes very hairy. 9

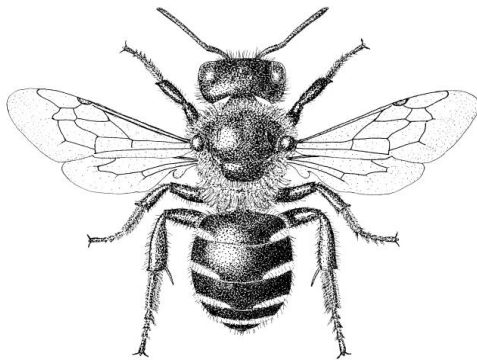


Fig 22

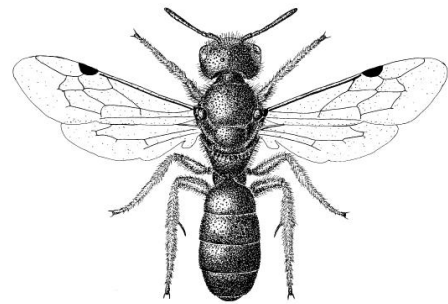


Fig 23

- Bee elongate, i.e. appearing narrow and cylindrical (Fig 23), though often very small (down to 5 mm in length), if tending to be robust, then with a strong ridge separating the dorsal surface and front face of the first gastral segment (as in Fig 28); usually with rather sparse hairs. 11

9(8) Parapsidal lines on mesoscutum short, about as wide as long and often appearing as small round shining areas (may be obscured by dense hair) (Fig 24); the gaster is *usually* densely hairy above *and/or* metallic/submetallic; tergite 4 without a white marginal hair band (unless very sun-bleached)...**Osmia** [part] (10 British spp) (Fig 26)

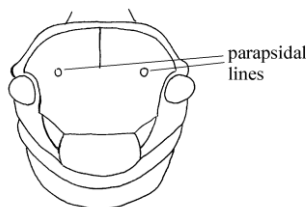


Fig 24

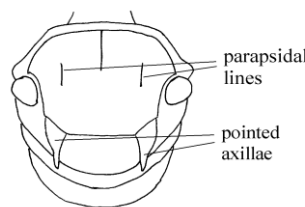


Fig 25A

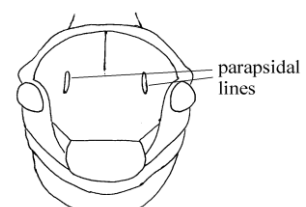


Fig 25B

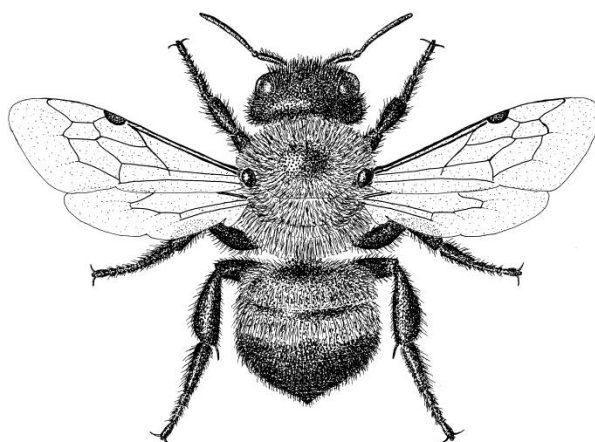


Fig 26

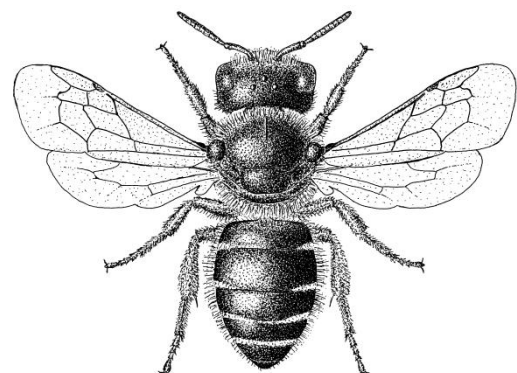


Fig 27

- Parapsidal lines on mesoscutum longer, up to five times longer than wide (*Hoplitis*, Fig 25B), or sometimes long but width reduced so as to form a narrow groove difficult to distinguish among the punctures (*Osmia spinulosa*, Fig 25A); the gaster never metallic coloured; tergite 4 with a white, sometimes dense, marginal hair band (Figs 22 & 27) 10

10(9) Axilla acutely pointed (Fig 25A); male with a long spine on the first gastral sternite; female with a golden scopa. **Osmia spinulosa** (Fig 27)

- Axilla with posterolateral margin rounded (Fig 25B); male with a transverse apical process on the second sternite; female with an off-white scopa. **Hoplitis** (2 British spp) (Fig 22)

11(8) The first gastral tergite with a transverse ridge separating the dorsal area from the anterior area (Fig 28). **Heriades** (2 British spp) (Fig 30, male)

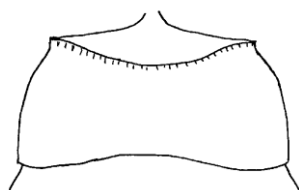


Fig 28



Fig 29

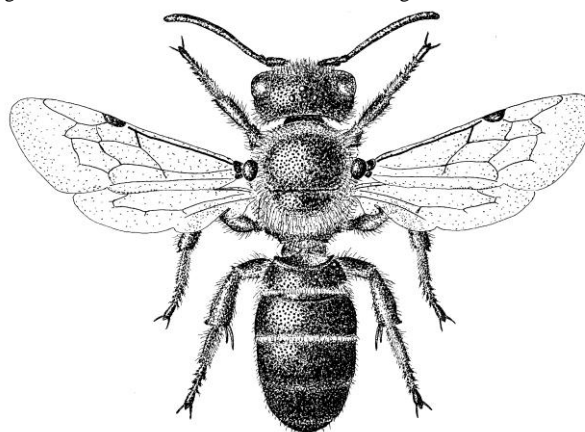


Fig 30

- The first gastral tergite without a transverse ridge, the dorsal area sloping into the anterior area (Fig 29)..... **Chelostoma** (2 British spp) (Fig 23)

12(2) Moderately small to very small (length 4.5 to 9 mm); rather hairless, black bees, the female with no scopa, i.e. without a brush of hairs for carrying pollen; the base of the tibiae and usually the face with yellow spotting, the male's face may be extensively ivory white or yellow; tongue (shaded area) bifid and broadest at the apex (Fig 31)..... **Hylaeus** (12 British spp) (Fig 32)

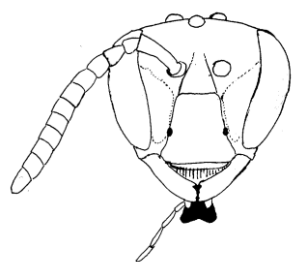


Fig 31

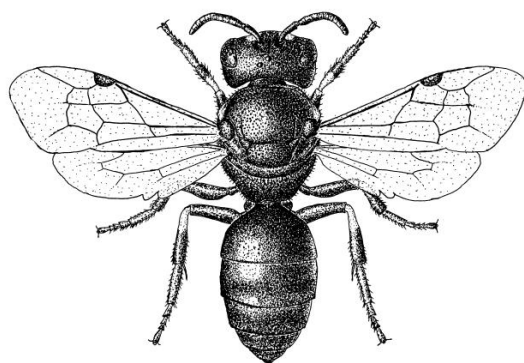


Fig 32

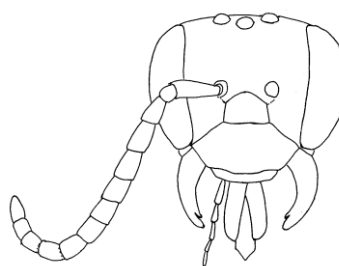


Fig 33

- Variesly sized bees; often very hairy, the female with a scopa, as in Fig 8; without white or yellow spots, except the clypeus and sclerite above of the male *Macropis* which are wholly yellow; tongue pointed at the apex (Fig 33) 13

13(12) Basal vein of forewing strongly curved (Fig 34)..... 14

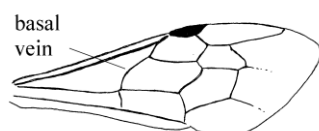


Fig 34

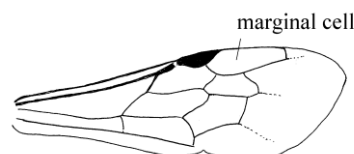


Fig 35

- Basal vein of forewing only gently curved (Fig 35). 15

14(13) Gaster with well-developed white hair bands. **Rophites** (1 British sp)
[probably extinct]

- Gaster without hair bands. **Dufourea** (2 British spp)
[One, perhaps both, probably extinct]

15(13) On the face of the bee, 2 sutures or grooves run from each antennal socket down to the clypeus (Fig 36) (the inner groove may be very difficult to see); forewing with marginal cell truncate at outer end (Fig 35); jugal lobe of hind-wing long, nearly as

long as the claval lobe. **Panurgus** (2 British spp) (Fig 39)

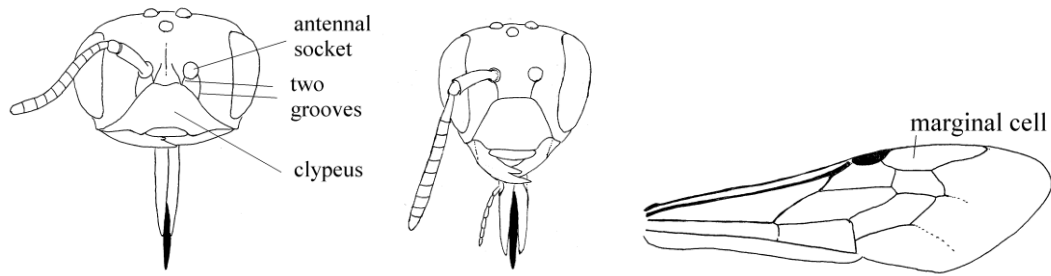


Fig 36

Fig 37

Fig 38

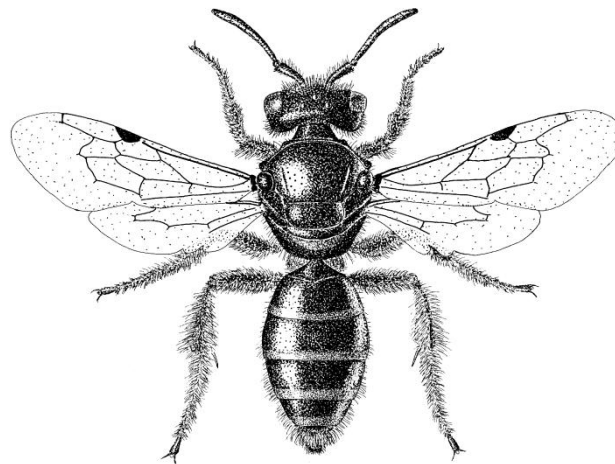


Fig 39

- On the face of the bee, only 1 groove runs from each antennal socket down to the clypeus (Fig 37); forewing with marginal cell narrowing to the outer end (Fig 38); jugal lobe of hind-wing shorter, no longer than half the length of the claval lobe..... 16

16(15) Base of gaster shining black and tergites 3 to 4 or 5 with narrow white adpressed hair bands or streaks; hind legs highly modified, with at least the tibia and basitarsus enlarged; scopal hairs are off-white on tibia and black on basitarsus (as in Fig 40); in the female thorax with black hairs interspersed with the brown, with only brown hairs in the male; the male with the clypeus (and the sclerite above) yellow.....
 **Macropis** (1 British sp) (Fig 40)

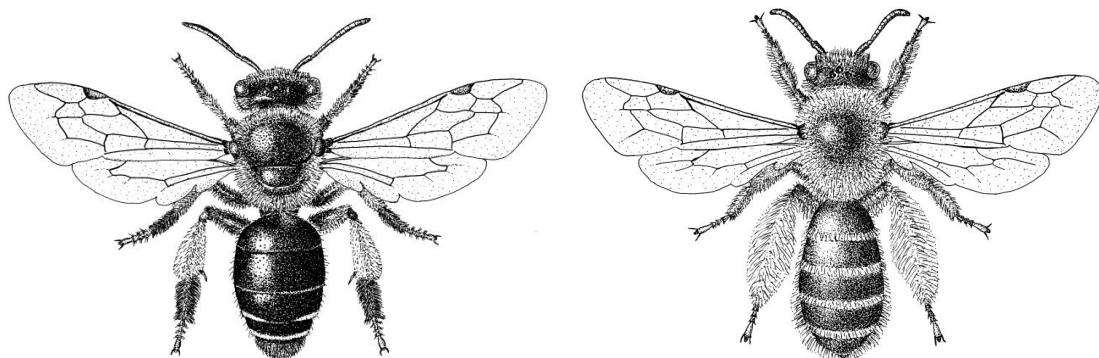


Fig 41

Fig 40

- Gaster dull, with strong white hair bands in fresh females, and golden-brown bands in the fresh male; female hind legs with dense, golden scopa; in both sexes thorax with brown hairs, paler at the sides; the male with face black beneath the hairs.
.....**Dasygaster** (1 British sp) (Fig 41)

- 17(1)** Tongue of bee short, usually pointed but sometimes bilobed, projecting only a little beyond the adjacent mouthparts (Fig 42); jugal lobe (JL) of hindwing longer than half the length of the claval lobe (CL) (Fig 43) except in *Melitta*, where it is slightly shorter than half..... 18

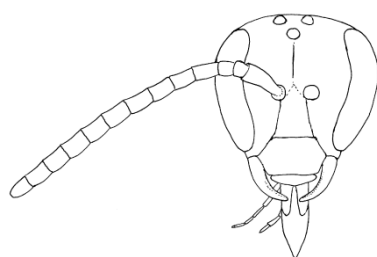


Fig 42

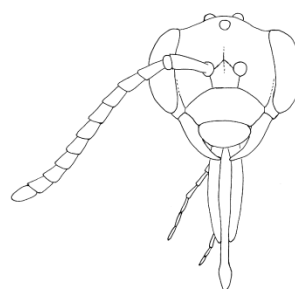


Fig 44

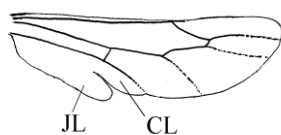


Fig 43



Fig 45

- Tongue long to very long compared with the adjacent mouthparts, sometimes with a broadened tip (Fig 44); jugal lobe (JL) of hindwing reduced (absent in *Apis* and *Bombus*), shorter than half the length of the claval lobe (Fig 45)..... 23

- 18(17)** In the forewing, the third submarginal cell (III) elongate, so that its length as measured on the median vein (M) is nearly as long as the first cell (I) (Fig 46)..... 19

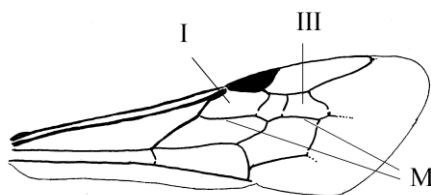


Fig 46

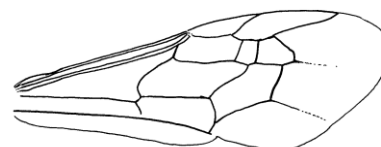


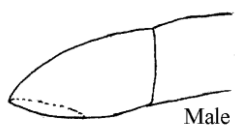
Fig 47

- The third submarginal cell distinctly shorter than the first, as measured above (Fig 47).
..... 20

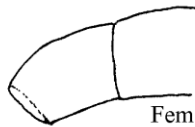
19(18) The hind-wing jugal lobe elongate, nearly as long as the claval lobe (as in Fig 51); the final segment of the antennae very obliquely truncate at the apex, appearing almost conical in some aspects (Fig 48); on the face of the bee, 2 sutures or grooves run from each antennal socket down to the clypeus (this may not be apparent in some hairy faced species - the inner groove may be very difficult to see) (Fig 50); the female with a depressed, felty area adjacent to the inner margin of each compound eye (not felty in the male) (Fig 50). **Andrena** (68 British spp) (Fig 51)



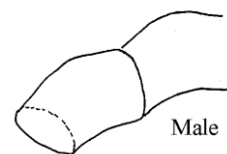
Fig 48



Male



Fem



Male

Fig 49

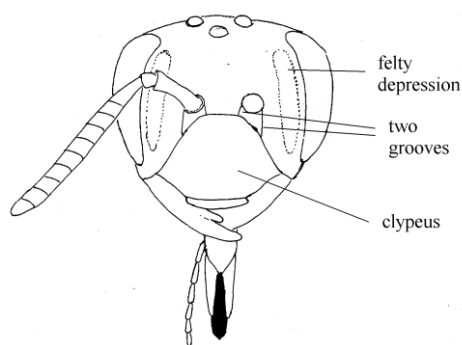


Fig 50

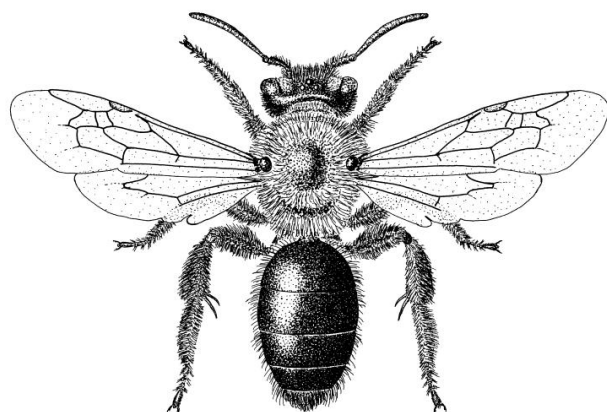


Fig 51

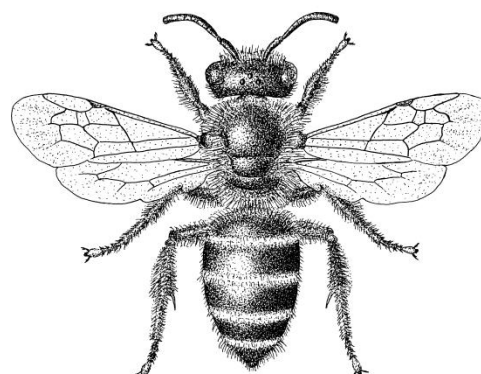


Fig 52

- The jugal lobe only approximately half the length of the claval lobe (as in Fig 52); the final segment of the antennae rather squarely truncate (Fig 49); on the face of the bee, only 1 groove runs from each antennal socket down to the clypeus (sometimes hairy faced, when groove is difficult to see); the female and male without a depressed, felty area adjacent to the inner margin of the compound eyes.
**Melitta** (4 British spp) (Fig 52)

- 20**(18) Basal vein of forewing only gently curved; second recurrent vein (2m-cu) curved outwards in an "S" shape (Fig 53); tongue bifid and broadest at the apex (shaded area) (Fig 54).**Colletes** (9 British spp) (Fig 57)

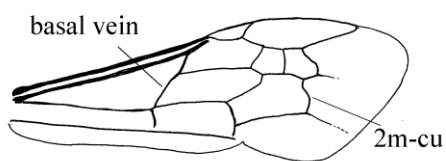


Fig 53

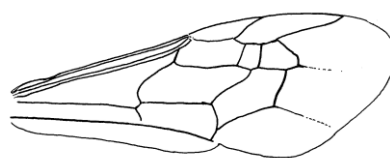


Fig 55

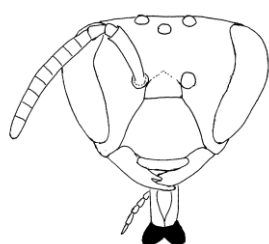


Fig 54

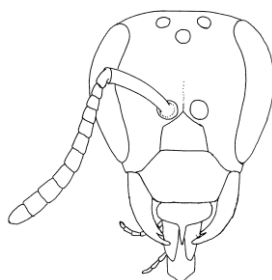


Fig 56

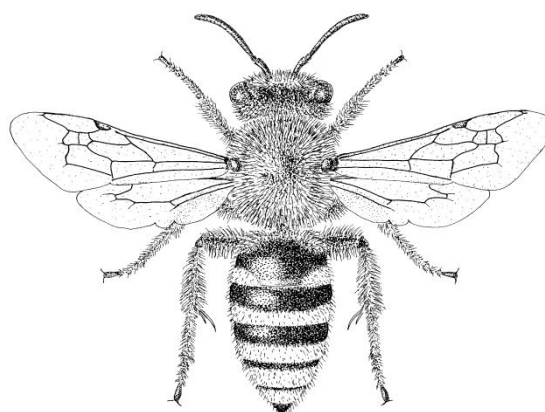


Fig 57

- Basal vein of forewing strongly curved or arched; second recurrent vein curved inwards (Fig 55); tongue pointed (Fig 56)..... 21

- 21**(20) Tergite 5 of female gaster without a specialised preapical "rima", i.e. the hair unparted and thin (Fig 58); base of female gaster with at least part of first and all of second tergites red; male with flagellar segments specialised, either with a longitudinal ridge or with transverse, depressed hair bands (either of which can give the antenna a "knobbly" appearance) (Fig 59), and often with a very fine latticework of ridges as seen under moderately high power; apex of male clypeus always without a pale marking, though often with pale hairs.....**Sphecodes** (16 British spp) (Fig 60)

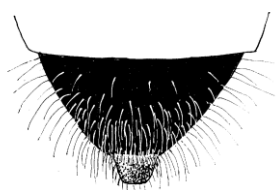


Fig 58

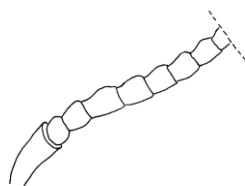


Fig 59

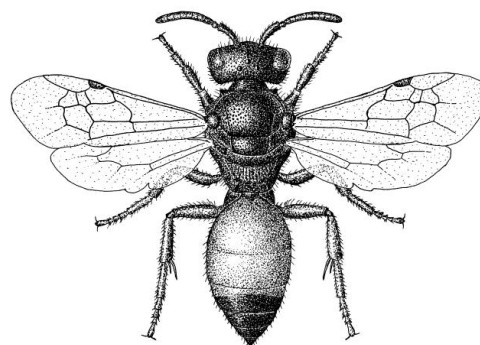


Fig 60

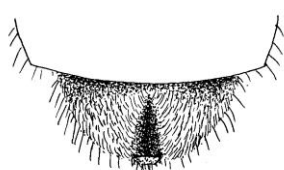


Fig 61

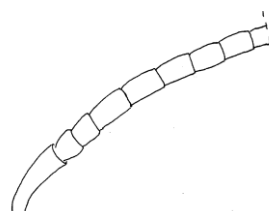


Fig 62

- Female with the preapical tuft on tergite 5 of the gaster specialised to form the "rima" i.e. this tuft is composed of longitudinally parted, adpressed hair (Fig 61); the female gaster is predominantly black, dark brown or metallic green beneath any hairs; male with flagellar segments of the antenna unspecialised (Fig 62), though often pale beneath; apex of male clypeus usually, and mandibles often, with a pale cream or yellow spot..... 22

22(21) On the middle tergites, the hair bands or spots at the apical margin of the segment (as in Fig 65), in the metallic species there may additionally be a band at the base of tergite 2; in the female, the third submarginal cross vein and second recurrent vein (2m-cu) of forewing are pigmented similarly to adjacent veins (Fig 63)..... **Halictus** (6 British spp) (Fig 65)

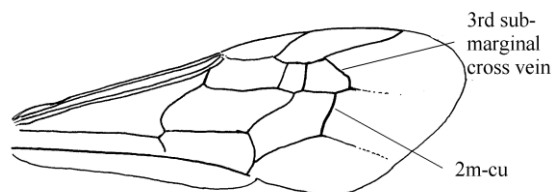


Fig 63

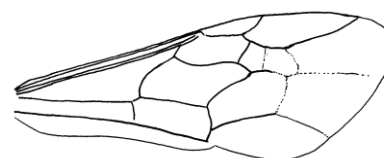


Fig 64

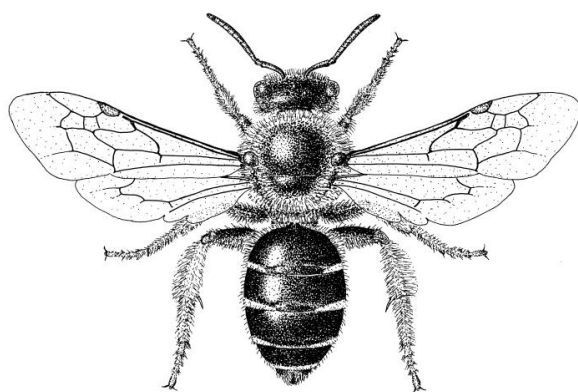


Fig 65

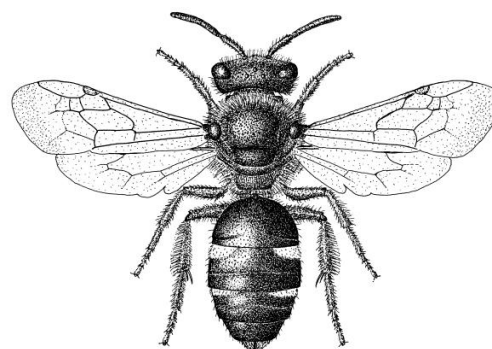


Fig 66

- On the middle tergites, the hair bands or spots either at the base of the segment (as in Fig 66) or absent; in the female, the third submarginal cross vein (sometimes additionally the second cross vein) and second recurrent vein more faintly pigmented than adjacent veins (Fig 64). **Lasioglossum** (31 British spp) (Fig 66)

23(17) A small (length 5 to 6 mm), rather hairless, faintly metallic blue bee; forewing venation as in Fig 67. **Ceratina** (1 British sp) (Fig 68)

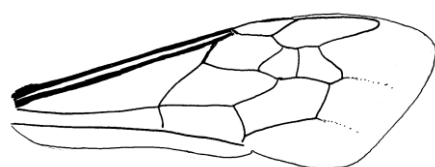


Fig 67

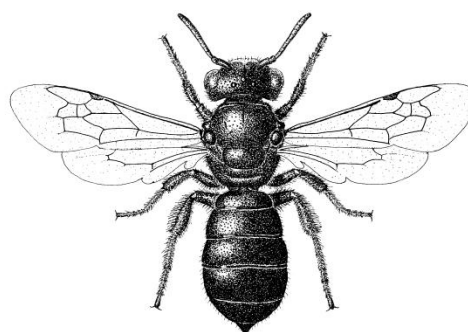


Fig 68

- Not metallic blue, species small to very large, sometimes very hairy; forewing venation unlike Fig 67..... 24

24(23) Gaster of bee with paired white hair spots or tufts at sides of some tergites..... 25

- Gaster without paired white hair spots at sides of tergites..... 26

25(24) Small to medium (length 6 to 9 mm), rather hairless bees; the thorax with only pale, adpressed hair in streaks; with paired white/off-white adpressed hair spots on the gaster; the scutellum frequently marked with red; legs beyond the femur brick red

with black tibial spurs.....**Epeolus** (2 British spp) (Fig 69)

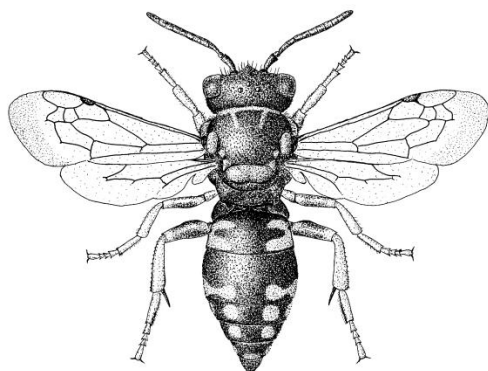


Fig 69

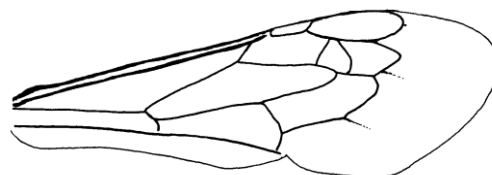


Fig 70

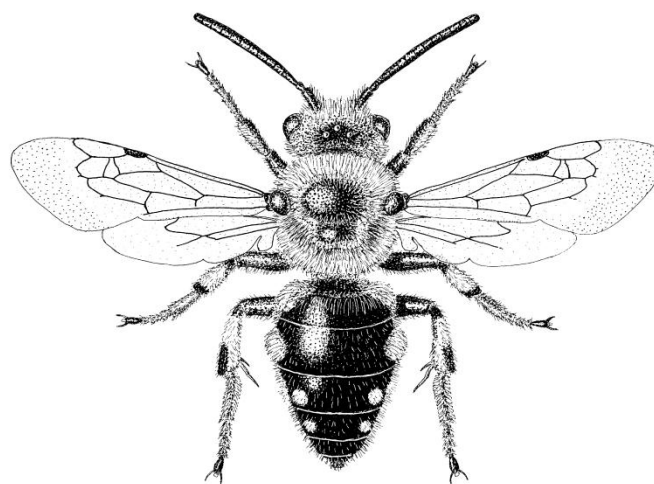


Fig 71

- Much larger (length 13 to 17 mm), hairy bees; the thorax with upstanding hairs, at least some black; some tergites with paired lateral white tufts of hair; scutellum dark beneath any hairs; legs black; forewing venation as in Fig 70.....
.....**Melecta** (2 British spp) (Fig 71, male)

- 26(24)** Rather hairless bees; very small to moderately large (length 4.5 to 15 mm); usually conspicuously marked with red and/or yellow, and most often wasp-like in appearance; mandibles usually running to a simple point (as in Fig 72), occasionally (2 species) divided at the tip to form two adjacent teeth (Fig 73); face Fig 72.....
.....**Nomada** (28 British spp) (Figs 74 & 75)

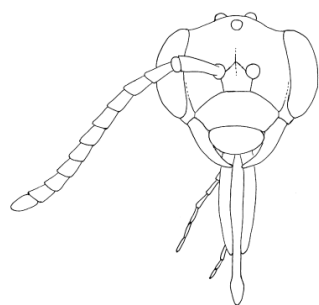


Fig 72



Fig 73

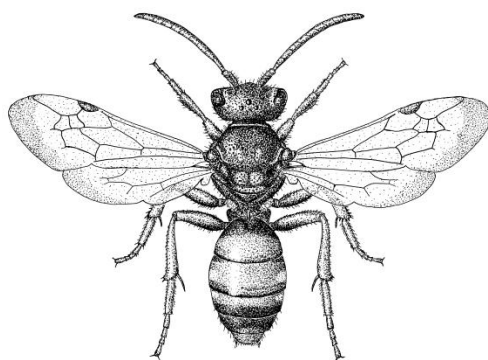


Fig 74

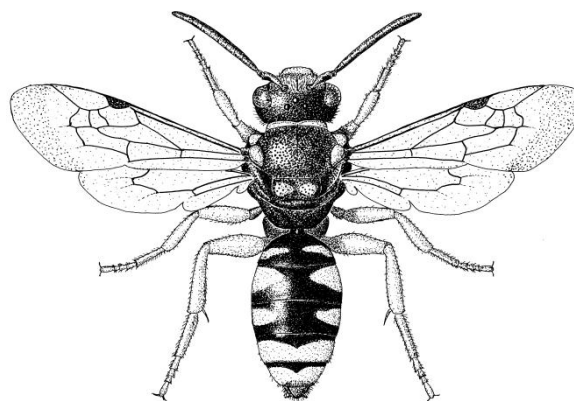


Fig 75



Fig 76



Fig 77

- Hairy; where any yellow markings, these mainly confined to the clypeus; mandibles with at least one inner tooth near the apex (Fig 76), sometimes two, or often with the apex modified into a cutting edge with notches (Fig 77)..... 27

27(26) Jugal lobe of hind-wing present; malar space (the space between the bottom of the compound eye and the root of the mandible) very short, much shorter than the basal width of the mandible (Figs 78 & 80); hind tibia of female with a scopa, that is a brush of pollen-carrying hairs; clypeus of male usually, and that of female sometimes, with yellow markings..... 28

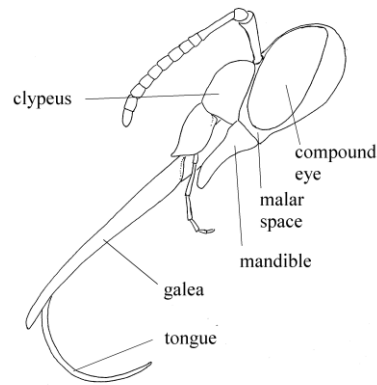


Fig 78

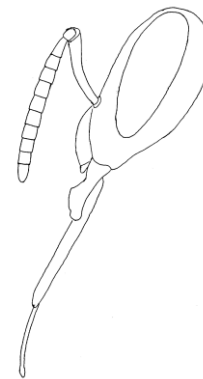


Fig 79

- Jugal lobe of hindwing absent; malar space long to very long, at least as long as the basal width of the mandible (Fig 79); hind tibia of female usually with a corbicula, i.e. a flattened, hairless, shining area occupying most of the outside of the segment and surrounded by curved stiff hairs that hold the collected pollen in a caked mass; clypeus of both male and female without yellow markings..... 29

28(27) Mouthparts of bee only of moderate length, galea unusually short and wide (Fig 80); base of the first segment of the gaster concave, defining an acarinium in some species (a pouch which may be infested with mites); stigma of forewing very reduced, so as to be scarcely discernible on the usually strongly iridescent wing, forewing venation as in Fig 81; usually very large bees, length up to 25 mm, resembling large *Bombus* **Xylocopa** (1 vagrant sp)

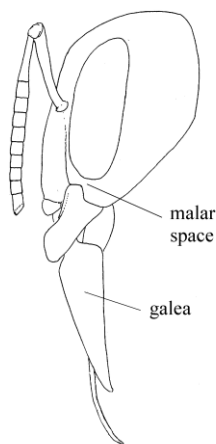


Fig 80

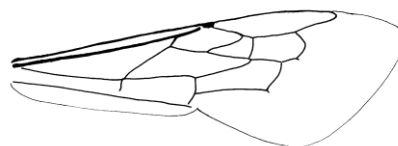


Fig 81

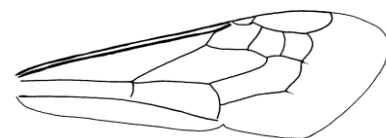


Fig 82

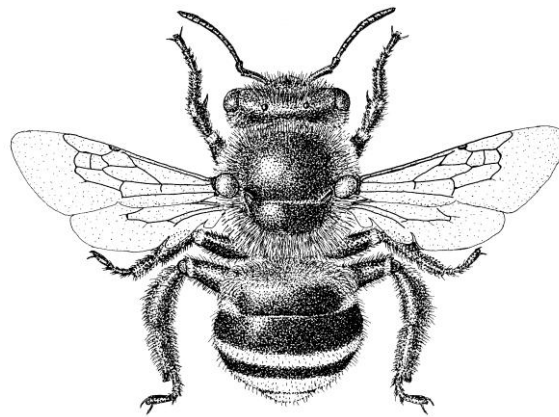


Fig 83

- Mouthparts of bee unusually long, galea long and slender (Fig 78); base of the first segment of gaster nearly flat, without an acarinium; stigma of forewing more visible, wings not strongly iridescent, forewing venation as in Fig 82; (medium sized robust bees, length 9 to 17 mm, some species resembling small *Bombus*).
.....**Anthophora** (5 British spp) (Fig 83)

[The odd specimen of *Melecta* lacking white hair patches on the gaster may run to this couplet but will not fit either alternative. Males of this genus do not have a yellow marked clypeus and the form of the third submarginal cell will also separate them].

- 29**(27) Forewing with a shorter, broader marginal cell (Fig 84); first submarginal cell (I) with a complete false vein (Fig 84); compound eyes without hairs; usually robust bees; gastral tergites black beneath the usually dense hair (length 7 to 22 mm)..... **Bombus** (including *Psithyrus*) (26 British spp) (Fig 86)

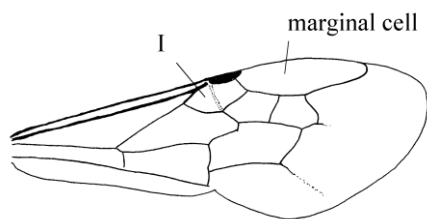


Fig 84

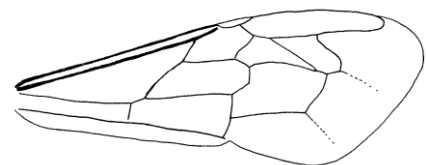


Fig 85

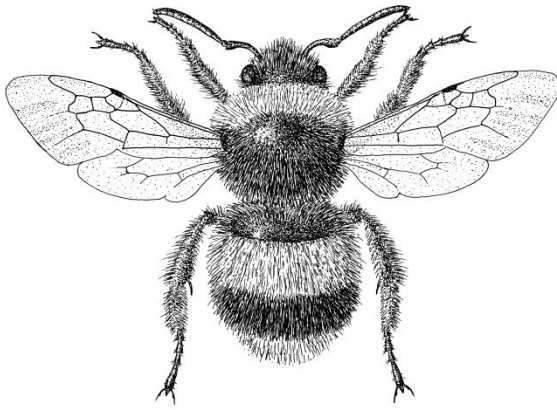


Fig 86

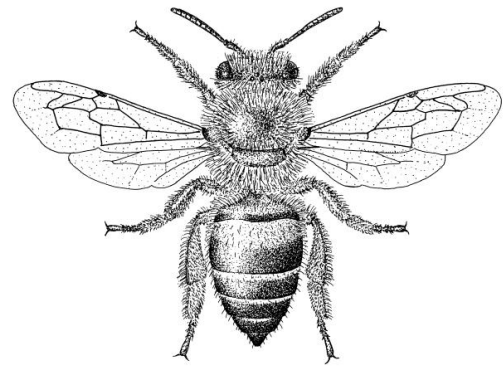


Fig 87

- Forewing with an elongate, narrow marginal cell (Fig 85); first submarginal cell without a false vein (Fig 85); compound eyes hairy; bee not robust (except male/drone, which is rarely collected); gastral tergites dark brown, frequently marked with one or more orange bands (the worker with basal, adpressed hair bands)..... **Apis** (1 British sp) (Fig 87)
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