

Chapter 5 - The Genera

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<i>Sphecodes</i>	Graham Collins
<i>Stelis</i>	Graham Collins

List of British bees, with synonyms

(particularly useful and important when using older keys for identification)

Andrenidae

Andrena

- A. alfkenella* Perkins, 1914
 A. moricella Perkins, 1914
- A. angustior* (Kirby, 1802)
- A. apicata* Smith, 1847
- A. argentata*, Smith, 1844
- A. barbilabris* (Kirby, 1802)
 A. sericea (Christ, 1781) preocc.
 A. albicrus (Kirby, 1802)
- A. bicolor* Fabricius, 1775
 A. gwynana (Kirby, 1802)
- A. bimaculata* (Kirby, 1802)
- A. bucephala* Stephens, 1846
- A. carantonica* Pérez, 1902
 A. scotica Perkins, 1916
 A. jacobi Perkins, 1921
- A. chrysoceles* (Kirby, 1802)
- A. cineraria* (Linnaeus, 1758)
- A. clarkella* (Kirby, 1802)
- A. coitana* (Kirby, 1802)
- A. congruens* Schmiedeknecht, 1884
 A. confinis Stöckert, 1930
- A. denticulata* (Kirby, 1802)
- A. dorsata* (Kirby, 1802)
- A. falsifica* Perkins, 1915
- A. ferox* Smith, 1847
- A. flavipes* Panzer, 1799
 A. fulvicrus (Kirby, 1802)
- A. florea* Fabricius, 1793
- A. floricola* Eversmann, 1852
- A. fucata* Smith, 1847
- Andrena fulva* (Müller, 1776)
 A. armata (Gmelin in Linnaeus, 1790)

- A. fulvago* (Christ, 1791)
A. fuscipes (Kirby, 1802)
A. gravida Imhoff, 1832
 A. fasciata, misident.
A. haemorrhoea (Fabricius, 1781)
 A. albicans, misident
A. hattorfiana (Fabricius, 1775)
Andrena helvola (Linnaeus, 1758)
 A. subdentata (Kirby, 1802)
A. humilis Imhoff, 1832
A. labialis (Kirby, 1802)
A. labiata, Fabricius, 1781
 A. cingulata (Fabricius, 1775) preocc.
A. lapponica Zetterstedt, 1838
A. lathyri Alfken, 1899
A. lepida Schenck, 1861
A. marginata Fabricius, 1776
 A. cetii (Schrank, 1781)
A. minutula (Kirby, 1802)
 A. parvula (Kirby, 1802)
A. minutuloides Perkins, 1914
 A. parvuloides Perkins, 1914
A. nana (Kirby, 1802)
A. nanula Nylander, 1848
A. nigriceps (Kirby, 1802)
A. nigroaenea (Kirby, 1802)
A. nigrospina Thomson, 1872
 A. carbonaria, misident
A. nitida (Müller, 1776)
 A. pubescens Olivier, 1789
A. nitidiuscula Schenck, 1853
 A. lucens Imhoff, 1866
A. niveata Friese 1887
 A. spreata Perkins, 1914 misident.
A. ovatula (Kirby, 1802)
A. pilipes s.l.
A. pilipes, s.s. Fabricius, 1781
 A. spectabilis Smith 1853

A. carbonaria, misident

A. polita Smith, 1847

A. praecox (Scopoli, 1763)

A. proxima (Kirby, 1802)

A. rosae, Panzer, 1801

A. eximia, misident

A. ruficrus Nylander, 1848

A. semilaevis Pérez, 1903

A. saundersella, 1914

A. similis Smith, 1849

A. ocreata (Smith, 1849)

A. simillima Smith, 1851

A. subopaca Nylander, 1848

A. synadelpha Perkins, 1914

A. tarsata Nylander, 1848

A. analis, misident.

A. thoracica (Fabricius, 1775)

A. tibialis (Kirby, 1802)

A. tridentata (Kirby 1802)

A. trimmerana (Kirby, 1802)

A. spinigera (Kirby, 1802)

A. vaga Panzer, 1799

A. varians (Kirby, 1802)

A. wilkella (Kirby, 1802)

Panurgus

P. banksianus (Kirby, 1802)

P. ursinus, misident

P. calcaratus (Scopoli, 1763)

Apidae

Anthophora

A. bimaculata (Panzer, 1798)

A. furcata (Panzer, 1798)

A. plumipes (Pallas, 1772)

A. pilipes (Fabricius, 1775)

A. acervorum, misident.

A. quadrimaculata (Panzer, 1798)

A. retusa (Linnaeus, 1758)

Apis

A. mellifera Linnaeus, 1758

A. mellifica Linnaeus, 1761

Bombus

B. cryptarum (Fabricius, 1775)

B. lucorum, misident

B. cullumanus (Kirby, 1802)

B. distinguendus Morawitz, 1869

B. hortorum (Linnaeus, 1761)

B. humilis Illiger, 1806

B. helperanus Seidl, 1837

B. solstitialis (Panzer, 1805-6)

B. venustus Smith, 1876 preocc.

B. hypnorum (Linnaeus, 1758)

B. jonellus (Kirby, 1802)

B. lapidarius (Linnaeus, 1758)

B. lucorum s.l.

B. lucorum s.s. (Linnaeus, 1761)

B. magnus Vogt, 1911

B. lucorum, misident

B. monticola Smith, 1849

B. lapponicus, misident.

B. muscorum (Linnaeus, 1758)

B. smithianus, White

B. pascuorum (Scopoli, 1763)

B. agrorum (Fabricius, 1787) preocc.

B. pratorum (Linnaeus, 1761)

B. ruderarius (Müller, 1776)

B. derhamellus (Kirby, 1802)

B. ruderatus (Fabricius, 1775)

B. harisellus (Kirby, 1802)

B. soroensis (Fabricius, 1777)

B. soroënsis Fabricius

B. soroensis Fabricius

B. subterraneus (Linnaeus, 1758)

B. latreillellus (Kirby, 1802)

B. sylvarum (Linnaeus, 1761)

B. terrestris (Linnaeus, 1758)

Bombus (Psithyrus)

- B. barbutellus* (Kirby, 1802)
Psithyrus barbutellus (Kirby, 1802)
- B. bohemicus* (Seidl, 1837)
Psithyrus bohemicus (Seidl, 1837)
P. distinctus Pérez, 1884
- B. campestris* (Panzer, 1801)
Psithyrus campestris (Panzer, 1800)
- B. rupestris* (Fabricius, 1793)
Psithyrus rupestris (Fabricius, 1793)
- B. sylvestris* (Lepeletier, 1832)
Psithyrus sylvestris Lepeletier, 1833
P. quadricolor, misident.
- B. vestalis* (Geoffroy, 1785)
Psithyrus vestalis (Geoffroy, 1785)

Ceratina

- C. cyanea* (Kirby, 1802)

Epeolus

- E. cruciger* (Panzer, 1799)
- E. variegatus* (Linnaeus, 1758)
E. productus Thomson, 1870

Eucera

- E. longicornis* (Linnaeus, 1758)
- Eucera nigrescens* Pérez, 1879
E. tuberculata (Fabricius, 1793)

Melecta

- M. albifrons* (Forster, 1771)
M. armata (Panzer, 1795) preocc.
- M. luctuosa* (Scopoli, 1770)

Nomada

- N. argentata* Herrich-Schaeffer, 1839
- N. armata* Herrich-Schaeffer, 1839
- N. baccata* Smith, 1844
N. alboguttata, misident.
- N. castellana* Dusmet, 1913
- N. conjungens* Herrich-Schaeffer, 1839
- N. errans* Lepeletier, 1841
- N. fabriciana* (Linnaeus, 1767)

- N. ferruginata* (Linnaeus, 1767)
 N. xanthosticta (Kirby, 1802)
 N. lateralis Saunders, 1896, misident

N. flava Panzer, 1798

N. flavoguttata (Kirby, 1802)

N. flavopicta (Kirby, 1802)
 N. jacobaeae, misident.

N. fucata, Panzer, 1798

N. fulvicornis, Fabricius, 1793
 N. lineola Panzer, 1798

N. fuscicornis Nylander, 1848

N. goodeniana (Kirby, 1802)
 N. succincta, misident.

N. guttulata Schenck, 1861

N. hirtipes Pérez, 1884
 N. bucephalae Perkins, 1917

N. integra Brullé, 1832
 N. pleurosticta Herrich-Schaeffer, 1829
 N. germanica, misident.
 N. ferruginata, misident

N. lathburiana (Kirby, 1802)

N. leucophthalma (Kirby, 1802)
 N. borealis Zetterstedt, 1838

N. marshamella (Kirby, 1802)
 N. alternata, misident.

N. obtusifrons Nylander, 1848

N. panzeri Lepeletier, 1841
 N. ruficornis, misident.

N. roberjeotiana Panzer, 1799
 N. tormentillae Alfken, 1901

N. ruficornis (Linnaeus, 1758)
 N. bifida (Thomson, 1872)

N. rufipes Fabricius, 1793
 N. solidaginis, misident

N. sexfasciata Panzer, 1799
 N. 6-fasciata

N. sheppardana (Kirby, 1802)
 N. furva, misident

N. signata Jurine, 1807

N. similis Morawitz, 1872

N. striata Fabricius, 1793
N. ochrostoma (Kirby, 1802)
N. hillana (Kirby, 1802)

N. succincta Panzer, 1798

N. zonata Panzer, 1798

Xylocopa

X. violacea (Linnaeus, 1758)

Colletidae

Colletes

C. cunicularius (Linnaeus, 1761)

C. cunicularia Linnaeus

C. cunicularis Linnaeus

C. daviesanus Smith, 1846

C. daviesana, Smith

C. floralis Eversmann, 1852

C. montanus Morawitz, 1876

C. fodiens (Geoffroy, 1785)

C. halophilus Verhoeff, 1944

C. halophila, Verhoeff

C. hederæ Schmidt & Westrich, 1993

C. marginatus Smith, 1846

C. marginata, Smith

C. similis Schenck, 1853

C. picistigma Thomson, 1872

C. succinctus (Linnaeus, 1758)

C. succincta, (Linnaeus)

Hylaeus (= *Prosopis*)

H. brevicornis Nylander, 1852

P. brevicornis Nylander

P. rubicola (Smith, 1865)

H. communis Nylander, 1852

P. communis, Nylander

H. confusus Nylander, 1852

H. confusus Smith, 1853

P. confusa Nylander

H. cornutus Curtis, 1831

P. cornuta Smith

H. dilatatus (Kirby, 1802)

H. annularis (Kirby, 1802)

- P. dilatata* Kirby
H. hyalinatus Smith, 1842
 P. hyalinata Smith
H. incongruus Förster, 1871
 H. gibbus Saunders S.S. 1850
 P. genalis Thomson
H. pectoralis Förster, 1871
 H. palustris (Perkins, 1900)
H. pictipes Nylander, 1852
 P. pictipes Nylander
 P. varipes (Smith 1853)
H. punctulatissimus Smith, 1842
 H. punctulatissima Smith
H. signatus (Panzer, 1798)
 P. signata, Panzer
H. spilotus Förster, 1871
 H. euryscapus Förster, 1871
 P. masoni (Saunders, 1894)

Halictidae

Dufourea

- D. halictula* (Nylander, 1852)
D. minuta Lepeletier, 1841
 D. vulgaris Schenck, 1859

Halictus

- H. confusus* Smith, 1853
 H. flavipes, misident.
 H. alpinus Alfken, 1907
H. eurygnathus Blüthgen, 1931
 H. quadricinctus (Kirby, 1802) misident.
 H. tetrazonius (Klug, 1817) misident.
H. maculatus Smith, 1848
H. rubicundus (Christ, 1791)
 H. nesiotis Perkins, 1922
H. scabiosae (Rossius, 1790)
H. subauratus (Rossius, 1792)
 H. gramineus Smith, 1849
H. tumulorum (Linnaeus, 1758)

Lasioglossum

- L. albipes* (Fabricius, 1781)

- Halictus albipes* Kirby
- L. angusticeps* Perkins, 1895
- L. brevicorne* Schenck, 1869
H. brevicornis Schenck
Halictus breviceps, misident.
- L. calceatum* (Scopoli, 1763)
H. calceatus Fabricius
Halictus cylindricus (Fabricius, 1793)
- L. cupromicans* (Pérez, 1903)
L. cuprornicans Pérez
- L. fratellum* (Pérez, 1903)
H. freygessneri Alfken
Halictus subfasciatus (Saunders, 1896), misident
- L. fulvicorne* (Kirby, 1802)
H. fulvicornis Kirby
Halictus subfasciatus (Saunders, 1896), misident
- L. leave* (Kirby, 1802)
- L. laevigatum* (Kirby, 1802)
Halictus laevigatus Kirby
- L. laticeps* (Schenck, 1869)
Halictus semipunctulatus, misident.
- L. lativentre* (Schenck, 1853)
- L. leucopus* (Kirby, 1802)
Halictus leucopus Kirby
L. ceratum (Kirby, 1802)
- L. leucozonium* (Schränk, 1781)
Halictus leucozonius Kirby
- L. limbellum* (Morawitz, F., 1876)
- L. malachurum* (Kirby, 1802)
Halictus malachurus Kirby
H. longulus (Smith, 1848)
- L. minutissimum* (Kirby, 1802)
Halictus minutissimus (Kirby, 1802)
H. arnoldi (Saunders, 1910)
- L. morio* (Fabricius, 1793)
Halictus morio (Fabricius, 1793)
- L. nitidiusculum* (Kirby, 1802)
Halictus nitidiusculus Kirby
- L. parvulum* (Schenck, 1853)
Halictus minutum, misident.
- L. pauperatum* (Brullé, 1832)

- L. pauperatum* Saunders, 1879
- L. pauxillum* (Schenck, 1853)
H. immarginatus Schenck
Halictus pauxillus Schenck
- L. prasinum* (Smith, 1848)
Halictus prasinus (Smith, 1848)
- L. punctatissimum* (Schenck, 1853)
Halictus punctatissimus Schenck
- L. puncticolle* (Morawitz, 1872)
Halictus puncticollis Morawitz
- L. quadrinotatum* (Kirby, 1802)
H. 4-notatus Kirby
Halictus quadrinotatum Kirby
- L. rufitarse* (Zetterstedt, 1838)
H. rufitarsis, Zetterstedt
Halictus atricornis (Smith, 1870)
- L. semilucens* Alfken, 1914
- L. sexnotatum* (Kirby, 1802)
Halictus sexnotatus Kirby
H. 6-notatus Kirby
- L. sexstrigatum* (Schenck, 1870)
- L. smeathmanellum* (Kirby, 1802)
Halictus smeathmanellus Kirby
- L. villosulum* (Kirby, 1802)
Halictus villosulus Kirby
- L. xanthopus* (Kirby, 1802)
L. xanthopum (Kirby, 1802)
Halictus xanthopus Kirby
- L. zonulum* (Smith, 1848)
Halictus zonulus Smith

Rophites

- R. quinquespinosus* Spinola, 1808

Sphecodes

- S. crassus* Thomson, 1870
S. variegatus von Hagens, 1874
- S. ephippius* (Linnaeus, 1767)
S. divisus (Kirby, 1802)
S. similis Wesmael, 1835
- S. ferruginatus* von Hagens, 1882
- S. geoffrellus* (Kirby, 1802)

- S. fasciatus* von Hagens, 1882
S. affinis von Hagens, 1882
S. gibbus (Linnaeus, 1758)
S. hyalinatus von Hagens, 1882
S. longulus von Hagens, 1882
S. marginatus von Hagens, 1882
S. miniatus von Hagens, 1882
 S. dimidiatus von Hagens, 1882
S. monilicornis (Kirby, 1802)
 S. subquadratus Smith, 1845
S. niger von Hagens, 1874
 S. niger Sichel, 1865
S. pellucidus Smith, 1845
 S. pilifrons Thomson, 1870
S. puncticeps Thomson, 1870
S. reticulatus Thomson, 1870
S. rubicundus von Hagens, 1875
S. scabricollis Wesmael, 1835
S. spinulosus von Hagens, 1875

Megachilidae

Anthidium

A. manicatum (Linnaeus, 1758)

Chelostoma

C. campanularum (Kirby, 1802)

C. florissomne (Linnaeus, 1758)

Coelioxys

C. afra Lepeletier, 1841

C. brevis Eversmann, 1842

C. conoidea (Illiger, 1806)

C. vectis Curtis, 1831

C. elongata Lepeletier, 1841

C. inermis (Kirby, 1802)

C. mandibularis Nylander, 1848

C. quadridentata (Linnaeus, 1758)

C. rufescens Lepeletier & Serville, 1825

Heriades

H. rubicola Pérez, 1890

H. truncorum (Linnaeus, 1758)

Hoplitis

H. claviventris (Thomson, 1872)

H. leucomelana, misident

Megachile

M. centuncularis (Linnaeus, 1758)

M. circumcincta (Kirby, 1802)

M. dorsalis Pérez, 1879

M. leachella, misident

M. argentata, misident.

M. ligniseca (Kirby, 1802)

M. maritima (Kirby, 1802)

M. versicolor Smith, 1844

M. willughbiella (Kirby, 1802)

Osmia

O. aurulenta (Panzer, 1799)

O. bicolor (Schrank, 1781)

O. bicornis (Linnaeus, 1758)

O. rufa (Linnaeus, 1758)

O. caerulescens (Linnaeus, 1758)

O. inermis (Zetterstedt, 1838)

O. parietina, misident

O. leaiana (Kirby, 1802)

A. fulviventris, misident

O. niveata (Fabricius, 1804)

O. fulviventris (Panzer, 1798)

O. parietina Curtis, 1828

O. pilicornis Smith, 1846

O. spinulosa (Kirby, 1802)

Hoplitis spinulosa Kirby, 1802

O. uncinata Gerstäcker, 1869

O. xanthomelana (Kirby, 1802)

Stelis

S. breviscula (Nylander, 1848)

S. ornatula (Klug, 1807)

S. phaeoptera (Kirby, 1802)

S. punctulatissima (Kirby, 1802)

S. atterima (Panzer, 1798) preocc.

Melittidae

Dasypoda

D. hirtipes (Fabricius, 1793)

D. altercator (Harris, 1780)

Macropis

M. europaea Warncke, 1973

M. labiata, misident

Melitta (= Cilissa)

M. dimidiata Morawitz, 1876

M. haemorrhoidalis (Fabricius, 1775)

C. haemorrhoidalis (Fabricius, 1775)

M. leporina (Panzer, 1799)

C. leporina (Panzer, 1779)

M. tricincta Kirby, 1802

CONVENTIONS

Fabricius (sic) 1793 – The person who provided the first known description, together with the date.

Fabricius (sic) – from keys written before provenances were split

(Fabricius 1793) – species is placed in a different genus from that to which it was first ascribed.

Fabricius 1793 – where species still remains in its original genus.

Synonyms – names previously used for the same species, placed in date order below the current name. It is **very important** to know synonyms when studying or using earlier texts and keys where different names may have been used.

misident. – known misidentification

preocc. – preoccupied. A name which is not available because it has already been used in an authoritative position.

PRESENT NOMENCLATURE – supplied by M. Edwards in aculeate list, January 2007.

SYNONYMS – as used in:

Saunders, 1896 - Hymenoptera Aculeata

Sladen, 1912 – The Humble-bee

Perkins, 1919 – Keys to *Andrena*, *Nomada*

Perkins 1922 – Keys to *Halictus*, *Sphecodes*

Perkins 1925 – Keys to *Megachile*

Richards 1927 – Keys to British humblebees

Guichard, 1937 – A key to the British Species of *Colletes*.

Kloet & Hincks, 1978 – Hymenopteran checklist

Hymenopterists Handbook Supplement, 1986

SPECIES DESCRIPTIONS

Andrenidae

Genus *Andrena* (by Geoff Allen)

Number of British species

The largest bee genus in Britain, with 65 known species, and a further one on the Channel Islands.

Size range of species

Some *Andrena* are small, with males about 5mm long; there is a range of intermediate sized species up to the very large *A. hattorfiana*, with females about 17mm in length.

Physical characteristics

The very varied range of species included in *Andrena* makes it difficult to characterise simply the essence of this genus. However, they are short-tongued bees, in which the tongue is pointed; all species have two grooves running down from each antennal socket to the clypeus, and three submarginal cells in the forewing. All females have a pronounced depression, with a felt-like pile, stretching down the inside of the compound eyes, a distinguishing character unique in the British bee fauna. The integument of *Andrena* is black, sometimes with paler (e.g. orange or red) marked bands on the gaster and a few species have males with the clypeus marked whitish or yellow. The gaster varies from virtually hairless (apart from the preapical tuft) through species with streaks or bands of white or coloured hair, to densely hairy in a few species. Many species are most easily recognised by characters of hair colour but unfortunately the hairs readily fade and abrade as the specimen ages in life, considerably altering its appearance. In such specimens identification can be difficult. Some of the smaller bees may superficially resemble *Lasioglossum*, often having rather sparse hair, whilst the medium sized species often look a little like the honeybee. The sting of *Andrena* is often reduced in function and, in some, both sexes produce a characteristic, obnoxious odour to repel predators.

Solitary or social?

Most species are solitary, but three are known to be communal, i.e. several females are believed to share a common entrance tunnel, each provisioning its own nest branching off this burrow.

Nesting behaviour

All British species of *Andrena* dig burrows in the ground and excavate cells at the end of branches in this. Each cell is stocked with a mass of pollen moistened with nectar upon which an egg is then laid.

General abundance

Andrena is one of the major solitary bee genera in the UK; however, the species are often very seasonal bees. Some are amongst the most common spring bees, whilst others are extremely rare, with a few possibly extinct in the UK. Other species can fly quite late in the season; often this is the second (summer) generation of two per year.

Foraging plants

Many species will visit a wide variety of flowers for pollen, including those of, for instance, Asteraceae, whilst the species of the *A. trimmerana* group specialise on tree pollen, such as that of hawthorn or oak. Others are oligolectic, ie. visiting a small range of related plants for pollen, although possibly taking nectar (only) from unrelated flowers. One species, *A. florea*, is monolectic on White bryony.

Method of transporting pollen

Pollen is usually carried on the scopa and floccus of the hind leg but in the *A. dorsata* group, for example, there is a propodeal corbicula, or pollen basket.

Parasites and cuckoos

Andrena is the usual host of the cleptoparasitic (cuckoo) bee genus *Nomada* but also hosts some

Sphcodes species. A wide range of *Andrena* species have been found carrying *Stylops*, an internal parasite of the larva. The male *Stylops* hatches out from the newly emerged host bee, leaving a gaping emergence hole between the gastral tergites, and flies off to look for a female. The latter is a very degenerate pupoid insect, which protrudes from between the gastral terga of the host *Andrena*. A host bee may carry more than one parasite and a heavily styloped specimen may possess some of the characters of the opposite sex of its species. Thus the styloped *A. chrysoceles* male frequently does not have a yellow marked clypeus, usually characteristic of its sex and species, and hence is not always readily determined using the standard identification keys.

Availability of keys

Saunders (1896)

Perkins (1919)

George Else, under preparation

DESCRIPTIONS OF SELECTED SPECIES

Andrena bicolor Fabricius, 1775

Description

Female: Length 9-11mm. When fresh the thorax is fulvous and the scopa golden; the gaster is diffusely fringed with fulvous hairs; the preapical tuft is dark in colour and the face has black hairs.

Male: Length 7-10mm. 'Gigantics' up to 10 mm. The thorax is pale greyish brown and the gaster has greyish fringes; the face has black hairs, although in second brood specimens these may unusually be more brownish.

Nesting methods

Burrows in the ground.

Flight period

Female first brood from March to May, second brood from June to August; male first brood from March to May, second brood from June to September.

Abundance in the UK

Very common in the south, north to Scotland, where it is mainly coastal.

Andrena flavipes Panzer, 1798

Description

Female: Length of female: 12-13mm. The thorax has dark brown hairs, paler at the edges; gaster with strong, nearly white, adpressed, pubescent bands, which abrade to form lateral streaks. Apart from the white bands, the gaster is rather hairless and black, with a dark preapical tuft. The scopa is yellow and the face has brown hairs.

Male: Length of male: 9-12mm. Similar in colour to female but lacks scopa and preapical tuft.

Flight period

Females 1st brood from March to June, 2nd brood from June to August; males 1st brood from March to May, 2nd brood from May to July.

Nesting methods

Burrows in the ground, often in aggregations.

Abundance in the UK

Widely distributed throughout southern England, north to Norfolk and south Wales coast.

Andrena fulva Muller in Allioni, 1766

Description

Female: Length 11-15mm. Conspicuous by its dense, bold, fulvous hairs, which cover the upper side of thorax and gaster, but which are paler on the latter. The face is clothed with black hairs, as are the floccus and scopa.

Male: Length 9-13mm. Unusually large males are sometimes produced, measuring up to 14 mm. More typical of other *Andrena* in its appearance than the female, in that it has less dense hair, at least on the gaster. However, the thorax is still fulvous and the gaster has a tuft of hairs the same colour on the second segment. The head of the insect is interesting: there is a “moustache” of white hairs on the clypeus and the mandibles are long and curved (crossing at the tips when closed). At the base of the mandible is a strong tooth projecting downwards. More slender than the female. (Other *Andrena helvola* group males may look similar).

Nesting methods

Burrows in the ground. It nests in short turf on various soil types and hence is often found on suburban lawns, where it raises mounds sometimes thought by gardeners to be the work of ants.

Flight period

Females from March to June; males from March to May.

Abundance in the UK:

Common in the south, found north to the Central Highlands of Scotland.

Andrena haemorrhoea (Fabricius, 1781)

Description

Female: Length 12-13mm. A highly distinctive, robust bee, with bright foxy red hairs on the dorsum of the thorax and forming the preapical tuft. The hairs on the face and sides of the thorax are pale whitish. The gaster is strongly punctured and rather bare apart from the preapical tuft. The scopal hairs are pale, overlying a reddish or orange tibia and tarsus. Most characteristic is the sculpturing of the dorsal area of the propodeum; a raised latticework bounded behind by a raised ridge. Specimens fade and abrade, considerably altering their appearance.

Male: Length 9-11mm. ‘Gigantics’ are rare, up to 13 mm. Less robust than the female and the hair characteristics are “watered down”, although the sculpturing of the propodeum is similar. The thoracic and facial hairs are brownish rather than bright red. There is a golden tuft at the apex of the rather bare gaster. The hind tibia is only pale at the apex and the hind tarsus is also pale.

Nesting methods

Burrows in the ground.

Active

Females from April to July; males from April to May.

Abundance in the UK

A universal species, very common in the south.

Andrena minutula (Kirby, 1802)

Description

(A small bee with several very similar species, which are distinguished mainly by characters of sculpturing and puncturation).

Female: Length 5-6.5 mm. Rather hairless compared with some of the larger species. The thorax with pale brown hairs round the edge and a few on the top. The gaster has white, lateral, pubescent streaks on

T2 to T4, which can vanish if the specimen becomes wet, either when killed or being softened in a relaxing jar.

Male: Length 4.5-6 mm. Similar to female but without scopa and preapical tuft. The facial hairs are usually dark.

Flight period

Females 1st brood from March to June, 2nd brood from June to August; males 1st brood from March to May, 2nd brood from June to August.

Nesting methods

Burrows in the ground.

Abundance in the UK

Very common in south, north to Scotland.

Andrena nigroaenea (Kirby, 1802)

Description

Female: Length 12-15mm. Another species which superficially resembles a hive bee, but differs from *A. scotica* in that it has a hairier gaster: the gastral hairs sometimes form diffuse fringes. These hairs, and those of the thorax, are a golden brown colour. It usually has black hairs on the face, margined with brown. The scopa is bright golden and the preapical tuft dark.

Male: Length 10-13mm. Rather robust in appearance for this genus. The hair colour, apart from there being no scopa or preapical tuft, is similar to the female.

Nesting methods

Burrows in the ground.

Flight period

Females from March to July; males from March to June.

Abundance in the UK

Common in south.

Andrena nitida (=pubescens) (Müller, 1776)

Description

Female: Length 12-16mm. A large bee, with golden brown hairs on the thorax. The gaster is shining black due to there being virtually no pilose hairs, but on the first two segments there is a patch of short adpressed white hair at each side. This wears with the active work of the bee and aging specimens appear abraded. The facial hairs are pale margined with black. The scopa is black and the preapical tuft dark.

Male: Length 10-13mm. Unusually small males sometimes occur and are about 10 mm long. Thorax with golden brown hairs. Short, pale pubescence tending to form broad, diffuse fringes on the otherwise bare, black gaster. The clypeus has a white moustache but the mandibles do not cross as much at the tips as in the *A. helvola* group.

Nesting methods

Burrows in the ground.

Flight period

Females from April to June; males from March to May.

Abundance in the UK

Fairly common in south, north to central Scotland where it is rare.

Andrena carantonica (= *scotica*) Perez, 1902

Description

Female: Length of female: 11-15mm. Resembles a hive bee in general appearance, with brownish hairs on the thorax, paler at the sides. The gaster has faint fringes of pale, brownish hairs, which are whiter and more pronounced in stylopised specimens. The face has brown hairs in the southern British form and, in the north, these hairs may be black. The scopa has dark hairs above, silver-grey hairs beneath, and the preapical tuft is dark.

Male: Length of male: 10-13mm. Gigantic males occur, up to 15 mm. Has a more slender gaster than *A. fulva* and, as in the female, the hairs on the thorax are brownish. Occasional males have a slight tooth or spine on the lower side of the head near the mandibular articulation (this spine is pronounced in the first brood of the closely related *A. trimmerana*). The hairs on the face are pale brown in the south and may be black in the north.

Flight period

Females from April to June; males from March to May.

Nesting methods

Burrows in the ground.

Abundance in the UK

Common in the south, north to Scotland.

REFERENCES & FURTHER READING

Edwards et al. BWARS 3 (2001), 4 (2002), 5 (2005), 6 (2006)
Perkins (1922)
Saunders (1896)
Schmid-Egggar/Scheuchl (1997)

Genus *Panurgus* (by Geoff Allen)

Number of British species

Two

Size range

The species are of small to medium size, ranging from 6-12mm.

Physical characteristics

These are short-tongued bees with the tongue pointed. They have two grooves running down from each antennal socket to the clypeus (not always easy to see but relating the genus to *Andrena*). There are two submarginal cells in the forewing and the marginal cell is truncated apically. The two British species have entirely black integument and the head and body hairs are sparse. The scopal hairs of the female appear zigzag shaped under a low power microscope.

Solitary or social

These are solitary bees in Britain, although some foreign species are known to be communal.

Nesting behaviour

As in the distantly related *Andrena*, both *Panurgus* species are mining bees, digging nest burrows in the ground. The cells are sub-horizontal and constructed at the end of lateral burrows. The lower surface of the cell is not flattened; the walls are smooth and coated with a secreted material. The provision is a firm, somewhat flattened ball.

General abundance

Panurgus does not form a dominant element in the British bee fauna, both species being rather scarce except in ideal habitat, where they may be locally frequent.

Foraging plants

Both species forage largely, if not entirely, on yellow flowered Asteraceae and the males can sometimes be found at rest on these flowers.

Method of transporting pollen

Pollen is carried on the scopa of the hind leg.

Parasites and cuckoos

There are no known cuckoo bees on this genus in mainland Britain but both species are parasitised by *Nomada* in the Channel Islands.

Availability of keys

Saunders (1896).

George Else, in preparation

DESCRIPTIONS OF SELECTED SPECIES

Panurgus calcaratus (Scopoli, 1763)

Description

Female: Length 7-9mm. A very black-looking bee with pale golden hairs on scopa and preapical tuft. Unlike *P. banksianus*, the terminal segments of the antennae are paler underneath, having a reddish tinge.

Male: Length 6-9mm. Rather similar to the female, including having red on the antennae but here it is much more extensive and obvious; a strong difference from the male *P. banksianus*. The hind leg of the male is very distinctive as there is a spur or "calcar" on the femur; hence the specific trivial name.

Nesting methods

Mining bees.

Flight period

From June to September, but mainly during July.

Abundance in the UK.

A widespread southern species; locally frequent.

REFERENCES & FURTHER READING

Saunders (1896)

Apidae

Genus Anthophora (by Andrew Philpott)

Number of British species

Five.

Size range

British species range in length from 8mm to 16mm.

Physical characteristics

Some *Anthophora* species are very similar in appearance to bumblebees for which they are sometimes mistaken. There is little difference in size and proportions between the sexes but there is a marked difference in colour of two of our British species, *A. plumipes* and *A. retusa*, the males being generally orange-brown and the females black. The cuticle is dark brown or black except on the face of some species where it is yellow in part. The clypeus and labrum protrude, markedly so in some species. The eyes occupy the full length of the head and are only narrowly separated from the mandibles. The tongue is very long in those species that need to gain access to the nectar of deep-throated flowers. When newly emerged and viewed dorsally, the separation of the head, thorax, and in some cases the gaster, is not obvious because of the dense hair covering. The gasters of *A. bimaculata* and *A. furcata* are almost round in appearance. *Anthophora* females have long pollen collecting hairs on the hind tibia and at the tip of the basitarsus a tuft of hairs that look like those on a neatly trimmed paintbrush.

Solitary or social

Solitary

Nesting behaviour

British *Anthophora* bees, with the exception of *A. furcata* are ground nesting and excavate their nest chambers in sand or soil on level, sloping or vertical faces. *Anthophora bimaculata*, *A. plumipes* and *A. quadrimaculata* often nest in aggregations that can sometimes be dense. *A. quadrimaculata* and *A. plumipes* will sometimes excavate their nests in walls by digging out the softer mortar between the bricks. Being such a rarity, *A. retusa* nests are rarely found in Britain but they are generally ground nesting. *A. furcata* is the only British species in the genus that nests in rotten wood and it has been observed lining its nest cells with compacted wood dust.

General abundance

Anthophora furcata is widespread in England and Wales and is the only *Anthophora* species recorded from Scotland. *A. quadrimaculata* has been a scarce bee in southern England and the Channel Islands but has been recorded more frequently in recent years. The Red Data Book listed *A. retusa* is now considered endangered and in the last twenty years has only been recorded at a few sites in southern England. The information on the remaining species is given in their Species Description.

Foraging plants

Anthophora bees collect pollen from a wide range of plants and all except *A. bimaculata* have a strong preference for plants of the family Lamiaceae. *A. bimaculata* collects mainly from Asteraceae flowers including Common Fleabane, several Knapweed and Thistle species plus Clover, Vipers Bugloss and Wood Sage. *A. furcata* collects pollen from Dead-nettles, Hedge Woundwort, and Wood Sage, while *A. plumipes* collects from a long list, including Apples and Pears, Bugle, Clover, Dead-nettles, Ground Ivy, Lungwort and Speedwells. *A. quadrimaculata* pollen records include Betony, Catmint, Clovers, Vipers Bugloss, and Wood Sage. There are no British pollen records for *A. retusa* but continental records include Bugle, Charlock and Ground Ivy.

Methods of transporting pollen

Pollen is collected on the hairy hind tibia.

Parasites or cuckoos

Coelioxys and *Melecta* bees are cleptoparasites of British Anthophora:

<i>Anthophora</i>	Cleptoparasite
<i>bimaculata</i>	<i>Coelioxys rufescens</i> and possibly <i>C. elongata</i>
<i>furcata</i>	<i>Coelioxys quadridentata</i> and <i>C. rufescens</i>
<i>plumipes</i>	<i>Melecta albifrons</i>
<i>quadrimaculata</i>	<i>Coelioxys quadridentata</i>
<i>retusa</i>	<i>Melecta luctuosa</i> - probably extinct. <i>M. albifrons</i> - possible

As well as these cleptoparasites, *Anthophora plumipes* is known to have been parasitised by two Chalcid species and is thought to be the host of one or more species of Oil Beetle. The Scarred Oil Beetle *Meloe cicatricosis* is a known parasite of *Anthophora retusa*, but this beetle is thought to be extinct in Britain.

Keys available

Saunders (1896)

George Else, in preparation.

DESCRIPTION OF SELECTED SPECIES***Anthophora bimaculata* (Panzer, 1798)****Description**

Female: Length 8-9mm. The cuticle is dark brown to black except for the lower part of the clypeus, labrum and the top of the mandibles, which are pale yellow. The eyes are mid-green. The top of the head and thorax have a mix of black and orange-brown hairs while the gastral tergites have black and cream hairs with broad pale transverse hair bands on the second and third tergites. *Anthophora bimaculata* bees are very noisy in flight and are often heard before they are seen. However, they are sometimes observed hovering silently at nest sites.

Male: Length 9-11mm. In the male the yellow cuticle of the labrum and clypeus is extended up the face to the base of the antennae. The eyes are a pale green. The head and the sides of the thorax are golden haired while the top of the thorax has gold and orange- brown hairs with just a few black ones intermixed. The first gastral segment is golden haired but the others are mainly black haired with dense pale hair bands at the rear. When freshly emerged this has to be one of our most attractive bees.

Nesting methods

Usually nests in aggregations in level soft sandy areas or banks on heathland, and also coastal dunes and cliffs.

Flight period

Single-brooded July to August.

Abundance in UK

Restricted to southern England and the Channel Islands (specifically Sark) and is usually common where found.

Anthophora plumipes* (Pallas, 1772)*Description**

Female: Length 14-16mm. Both the cuticle and the body hair of the female are black, except for the pollen collecting hairs on the hind tibia and basitarsus which are orange-brown. The clypeus and labrum protrude markedly. Gardeners who grow Lungwort will almost certainly have had the pleasure of seeing

this energetic bee hovering like a tiny humming bird as it drinks nectar with its long slender tongue before darting quickly on to the next bloom.

Male: Length 14-16mm. The top of the head and thorax are clothed in orange-brown hair as is the front of the gaster, but this grades into black at the rear. In profile the face is as the female but it is extensively marked with yellow and the tongue is long and slender. The tarsi of the middle legs have sparse hairs of extraordinary length and it is almost certainly from these that the species name originates.

Nesting methods

This species prefers vertical surfaces such as coastal cliffs and inland sand pits but will also excavate nesting chambers in the soft mortar joints in walls, and these same nest sites are used by successive generations. The nest cells are pitcher shaped and sealed off with compacted moist soil.

Flight period

Single brooded and on the wing from March to early July.

Abundance in UK

Widespread and found mainly in the south of England and the Channel Islands but there are records as far north as North Yorkshire.

REFERENCES & FURTHER READING

- Edwards et al. BWARS 6 (2006)
- Else & Roberts, (Spring 2004)
- Else & Roberts, (autumn 2004)
- Else & Roberts, (spring 2005)
- Ramsay, (2002)
- Saunders (1896)
- Westrich, (1989)

Genus *Apis* (by Michael Milton)

Number of British species

Of the six, or possibly seven, living species of the genus *Apis* identified in the world, only one species, *A.mellifera* Linnaeus, 1758 lives naturally in Britain. *Apis* probably originated in Northern India and spread almost to the Arctic Circle before being forced back to the Mediterranean area by the periods of glaciation. As the climate warmed, the sub-species *A.mellifera mellifera* migrated as far north as the Baltic up to the latitude of 60°N and into Britain.

Size range

The honeybee appears to be uniform in its physical sizes, probably due to its relatively short period of development. Average figures are:-

LENGTH mm	QUEEN	WORKER	MALE
body	16-19	11-14	14-18

Physical Characteristics

The three castes of honeybee differ considerably in their physical make-up, reflecting their different roles in the colony.

The wings of the queen extend only about half way down her abdomen, which has a pointed end and is often of a brown 'leathery' appearance. For her size, her head looks small and her legs appear long, lacking any pollen gathering hairs.

The drone, about the same weight as the queen, has a square stumpy body to house the muscles for the large wings which completely cover the abdomen. The head is large, spherical and is dominated by the very large compound eyes, which meet at the top, forcing the ocelli down the face. He has no sting, wax glands or pollen baskets, and has an extra joint on the antennae, which are long and thick. The mandibles are small, toothed but feeble.

The worker, the smallest of the three castes, has a triangular shaped head with well developed, spoon shaped mouth parts to mould wax and a long proboscis. The legs are adapted to help with the gathering and transport of pollen. The sting is barbed.

All bees in the colony, except the queen, are of uniform colouring, generally of a dark background, with orange or brown cross striping on the abdomen. Colouring may vary considerably due to hybridisation with imported races.

Foraging Plants

A. mellifera forages for four articles:-

Nectar, to provide them with carbohydrates to feed themselves and their young and to store, in the form of honey collected from flowers, ferns and trees

Pollen, provides proteins, vitamins and minerals to feed themselves, young and to store.

Water, to dilute stores and to use as a colony-cooling agent.

Propolis, a glutinous plant resin used for DIY in the nest area.

Foraging is carried out only by the worker caste, at up to 5km from the nest site but, if possible, will obtain requirements within a 2km radius, a foraging area of 1250 hectares. As distance from the nest increases, so the profitability of the source diminishes. *A. mellifera* does not forage at random but is guided by colony scout bees. The direction and distance to a profitable foraging area is communicated by a "dance" on the nest combs. The honeybee forages over most of the year whenever forage is available and weather is favourable; a very large number of plants are visited. Typical foraging plants are:-

CROP PLANTS.

HERBACEOUS WEEDS, typically in field margins, headlands, road verges.

GRASSLANDS and PASTURE PLANTS.

WOODLANDS

HEATHS and MOORLANDS provide a variety of perennial weeds and particularly heathers.

GARDENS provide a valuable sequence of background forage.

Method of Transporting Pollen

Pollen is collected from the plant anthers by the front legs and the proboscis and also as a result of pollen adhering to the body hairs. The forelegs then brush the pollen from the proboscis and the front part of the body, making it sticky with regurgitated honey.

The bee then hovers in flight and moves the pollen from the front legs and the posterior to the middle legs. It is then moved to the pollen combs on the inner hind basitarsi and on to the outer pollen baskets. Some of these operations may be carried out as the bee flies back to the nest. At the nest, the pollen baskets are cleared and roughly placed in the cells by the forager. The final placing is done by house bees, pressing the pollen into the cells with their mandibles and forelegs.

The great majority of pollen foragers will only visit one plant species on a trip but a variety of pollens may be stored in the same cell. Pollen collection is directly related to the amount of unsealed brood in the colony. The average pollen load is about 20mg. and the annual requirements of a colony may vary between 20 and 40Kg.

Parasites or Cuckoos

The honeybee suffers from a number of parasites and predators, some of an irritant nature, some fatal to the colony. The most important are:

Braula coeca, an inquiline dipteran.

Acarapis woodi, an endemic mite that invades the trachea of young adult bees.

Varroa destructor, first identified in Britain (Devon) in 1992. It is an eight legged, reddish brown mite which can be seen with the naked eye on adult bees and particularly on the white larvae. It breeds rapidly in the capped brood cells, particularly drone cells. It feeds on the haemolymph of adult bees and appears to act as a vector for a number of virus diseases which may be dormant in the colony. About three years after the original infestation a rapid colony collapse takes place.

Two species of wax moth cause damage to colonies; the Greater wax moth *Galleria mellonella* and the Lesser wax moth *Achroia grisella*. There are no cuckoo bee parasites of *Apis mellifera*.

Nesting

In colonies.

Flight period

Throughout the year.

Distribution in UK

Everywhere, but truly wild bees are less able to be mapped.

REFERENCES & FURTHER READING

Colin G. Butler

Genus *Bombus* (by Robin Williams)

Bumblebees are among the best known of British insects and are generally loved for their colourful appearance, rounded, furry looks and busy lifestyle. They are very much part of garden life, where they play a vital part in helping to pollinate flowers, but are even more important in that same role for agricultural crops and wild flowers. Their importance comes from their methods of feeding and the long life of colonies, which may feed from April to October, pollinating many different species of flower over this time. However, bumblebees are not one of our success stories. They are in general decline, with some species in near-catastrophic decline unless agricultural practices change. Through the auspices of Hymettus Ltd, a bumblebee conservation organisation, efforts are now under way to see what can be done to meet their needs, without adversely affecting farming.

Number of British species

The genus *Bombus* has seen a number of changes recently, including the genus *Psithyrus*, the cuckoo bumblebees, being subsumed within *Bombus* as a sub-genus. The official number of species is 27 but two of these appear to be extinct in Britain, and there are continuing arguments about which are distinct species, or sub-species. True bumblebees form colonies of queen, workers and males; they number 19 species currently found in Britain. The cuckoo female takes over a colony of true bumblebees, replacing the queen, and she and her offspring are looked after completely by the original inhabitants. There are 6 species of cuckoo bumblebees.

Size range

These may vary from tiny workers of 5mm or less, to some queens of as much as 25mm. When the first workers emerge, they are often very small, while later, if foraging is poor, more stunted workers may be produced; it is sometimes difficult to reconcile the size of these as being bumblebees. Queens are the largest of each species, generally followed by males, then normally smaller workers, though all may vary in size. 'Normal' sizes for fully-fed queens & workers are from 9-25mm, and males from 11-16mm.

Physical characteristics

They are best described as plump, hairy insects, with small wings in relation to their bulk. They may be distinguished from other bees by a thin cross-bar which divides the sub-marginal cell, at the front of the forewing, but they can really only be confused in appearance with one male solitary bee, *Anthophora plumipes*. Bumblebees have two pairs of wings, linked together by hooks, a dark cuticle (skin), and three pairs of hairy legs. Females have 12 antennal segments and 6 visible abdominal segments, while males have 13 antennal, 7 abdominal segments and longer antennae. True bumblebee females all have obvious pollen baskets on the back legs, which consist of long hairs framing a flat, shiny area of tibia. Cuckoo bumblebees have dull hind tibiae covered in short hairs. They also have dark bronze wings, whereas the true bumblebee has nearly translucent ones, though this may not always be an obvious distinction.

Solitary or social

Bumblebees are social insects in which the generations depend on each other. Although only the queen over-winters in Britain, the rest of the year is spent in a colony, with queen, workers and, eventually, males, living together. The queen true bumblebee over-winters alone, often in an old mouse nest, emerges, lays eggs and rears the first workers. These in turn rear others and keep the colony supplied with food. The cuckoo bumblebee female looks for a true bumblebee nest in the spring, replaces the original queen, and then lays her own eggs which produce females and males, who are looked after by the original workers. Each cuckoo bee is an inquiline of one or more species of bumblebee; they do not produce a full colony of their own, or carry out communal foraging.

Nesting behaviour

When she leaves her birth-nest, the queen mates in flight with one of the many males produced by the colony. She then searches for a burrow or cold place underground and sleeps until spring. She emerges and makes her new colonial nest after feeding heavily on nectar and pollen. The colony starts with the queen preparing a nectar pot made of wax, which provides a store of nectar for feeding herself while she

broods her eggs. After the first workers have emerged she concentrates on egg laying while they undertake all the remaining tasks.

A number of groups, with specialised nesting and larval feeding habits, have been recognised by entomologists.

Pocket-makers store their pollen in wax, beside the larvae, which feed directly without outside help. Of this category, Carder-bees make nests on the surface from materials combed up from round them; while another group live underground.

Pollen-storers gather pollen in special cells, and the larvae are fed from these by nurse-bees.

General abundance

There are six widely spread and common species of the true bumblebees: *Bombus hortorum*, *B. lapidarius*, *B. lucorum*, *B. pascuorum*, *B. pratorum*, and *B. terrestris*. Of the cuckoo bees, *Bombus campestris* & *B. vestalis* remain common.

Sadly though, many species of bumblebees have been in decline for some decades and once-common species, such as *B. sylvarum*, are critically rare now. This is believed to be due to changes in farming practice. In some species, it seems there is a need to have an area ten square kilometres or so, which contains patches of flowers sufficient to provide continuous pollen and nectar, from the start of a colony in April to its finish in September. This does not occur with modern methods of silage making. The commoner species of bumblebees appear much more tolerant of varying conditions and are often found in gardens, with their wide selections of nectaring and pollen-producing plants.

Foraging plants

Bumblebees have two separate requirements from their foraging, nectar and pollen, which may not be produced by the same plant. In the wild, Comfrey and thistles seem particularly attractive and are good plants to examine when searching for bumblebees. It is important that there are sufficient plants in flower to provide pollen and nectar throughout their life, so the bees use many different species during the course of the year.

Methods of transporting pollen

True bumblebee females transport pollen on their back legs, held in the long hairs that frame the tibia and form the pollen-basket. Cuckoo bees have no need to collect food, as this is provided, involuntarily, by their hosts, so have no pollen baskets.

Parasites or cuckoos

Bumblebees have two main enemies: cuckoo bumblebees, which prey on the true bumblebees, and parasites from other families or groups. Velvet-ants, *Mutilla* spp., lay their eggs inside the bee cells and the larvae then eat those of the bees. The Wax-moth, *Aphomia sociella*, wreaks considerable damage, as its larvae eat the wax of the cells and, sometimes, eggs and larvae. Conopid and Callyphorid flies, some hoverflies and nematode worms, all cause problems for the bees. However, mites, often seen in numbers on the outside of bumblebees, are not harmful, merely hitching a lift between nests, where they act as scavengers on the debris.

Keys available

The most user-friendly keys are:

Alford, (1973)

Benton, (2000)

Benton, (2005?)

Prÿs-Jones, (1991)

DESCRIPTIONS OF SELECTED SPECIES

Bombus terrestris (Linnaeus, 1758)

Description

A black and yellow-banded bee; comparatively short and even coat; short tongue; very short head with broad face.

Queen: Length 20-22mm. Black with a band of deep yellow across the front of the thorax (sometimes lost) and one on the 2nd abdominal segment, which may be dark brown or almost vanish; yellow/tawny tail starting on 4th segment.

Worker: Length 11-17mm. Colouring as queen, but the tail is white or tawny-white, always shading to tawny at extreme base.

Male: Length 14-16mm. Colouring as worker; short antennae; dark facial hairs.

Nesting methods

Subterranean nests; 100-1,000 insects per colony, from early March to mid-October; pollen-storer.

Flight period

Queen: from early March to mid-May; new generation from end of June to end of October. However, in southern Britain nests have been found throughout the year; worker: mid-April to mid-October; male: start of June to early November.

Abundance in UK

Common, particularly in the south of England, less so in north; intermittently found in north of Scotland; frequent in gardens.

Bombus lapidarius (Linnaeus, 1758)

Description

A distinctive black bee with a red tail; dense but short and fine coat; medium tongue and medium head.

Queen: Length 20-22mm. Black, with last three segments bright scarlet.

Worker: Length 11-16mm. Colouring as queen.

Male: Length 14-16mm. Colouring as queen, but a sulphur-yellow band in front of thorax and a narrower one behind; sulphur-yellow face.

Nesting methods

Colony, from mid-March to end of September; subterranean pollen-storer; 100-300 insects.

Flight period

Queen: from mid-March to end of May, with new generation from end of July to early October; worker: start of April to end of September; male: end July to start of October.

Abundance

Common and widely distributed in Britain, except Scotland where confined to certain coasts; lowland species, often in gardens, sand dunes and chalk downs.

Bombus pascuorum (Scopoli, 1763)

Description

A tawny bee, but very variable, from delicate yellow to almost black abdomen; thin & scruffy coat, less so in queens; long tongue and long head.

Queen: Length 15-18mm. Head clothed with mixture of pale and black hairs; thorax bright tawny to greyish; abdomen with varying degrees of black giving segmented appearance.

Worker: Length 9-15mm. Colouring as queen, but very variable from bright to nondescript.

Male: Length 12-14mm. Colouring as queen, but often very pale; antennae with each joint of flagellum

much swollen behind.

Nesting methods

Colony of 60-150 insects from mid-April to start of November, on surface; bird boxes and aerial cavities.

Flight period

Queen from early-April to mid-May, new generation from mid-August to end of October; worker from early May to start of November; male from mid-July to start of November.

Abundance in UK

Common throughout Britain and Ireland, frequently found in gardens; prefers sheltered positions.

***Bombus (=Psithyrus) campestris* (Panzer, 1801)**

Description

Banded cuckoo bee with yellow tail, which has both 'dark' and 'pale' versions; thin, stiff and coarse coat: short tongue and short head.

Female: Length 17-19mm. 'Light' specimens: head black with some yellow on top; thorax black with wide yellow band on front and another on back, sometimes duller; abdomen black with sides of 4th and 5th segments yellow; 'dark' specimens are all black except for all-but invisible sooty-yellow on sides of last two segments.

Male: Length 15-16mm. 'Light' as female, but yellow sides extend up 3rd abdominal segment, giving appearance of much longer black split in middle; 'dark' as female, but sooty yellow on sides of tail slightly brighter. An all black male is also known.

Nesting methods

Cuckoo on *Bombus pascuorum*.

Flight period

Females from early May to mid June; new generation from mid July to early September; males from mid July to early September.

Abundance in UK

Quite common, distributed throughout Britain.

***Bombus (=Psithyrus) vestalis* (Geoffroy, 1785)**

Description

Large, banded cuckoo bee, with dirty white tail; short & even coat; tongue and head both short.

Female: Length 20-22mm. Head and thorax black, with deep yellow to brownish band in front; abdomen black with lemon-yellow edges to a black 3rd segment and 4th & 5th white, but a dark centre to the latter two, giving a distinctive dark line running down the bottom of the tail.

Male: Length 15-17mm. Colouring as female; some yellow hairs on top of head.

Nesting methods

Cuckoo on *Bombus terrestris*

Flight period

Females from mid-April to mid-June, new generation from mid-July to end of August; males from mid-July to end of August.

Abundance in UK

Common and widespread in southern half of Britain, largest numbers in the south-east; not known in Scotland or Ireland.

REFERENCES & FURTHER READING

- Alford, (1973)
Alford, (1975)
Alford, (1978)
Benton, (2000)
Benton (2005)
Edwards et al. BWARS 3 (2001), 4 (2002), 5 (2005), 6 (2006)
Edwards & Jenner (2009)
Free & Butler, (1959)
von Hagen, (1994)
Heinrich, (1979)
Prÿs-Jones, (1991)
Richards, 1927
Sladen, 1989 (original publication 1912)
Williams, (revised 2012)

Genus *Ceratina* (by David Baldock)

Number of British species

Ceratina cyanea (Kirby, 1802) is the only British representative of the genus of these small carpenter bees.

Size range

6-7mm.

Physical characteristics

Female: Length 6-7 mm. This species is a small, shiny, blue bee with the whole body covered in dense puncturation and very short hairs; the last segment of the quite long and narrow abdomen has a longitudinal keel in both sexes. Its flight is characteristic, slow and low over the flowers as it forages.

Males: Length 6-7mm. They have a distinctive small white mark on the face, and a white labrum.

Solitary or social

This is a solitary species, although up to ten individual bees may hibernate together in a bramble stem.

Flight period

It is single-brooded but with a very long flight period from May to mid-September. The bees can be found at any time of the year because both sexes hibernate as adults, mainly in hollowed-out bramble stems.

Nesting behaviour

The female excavates a burrow with her strong mandibles, mainly in dead broken bramble stems, but also in hollow stems of herbaceous plants such as Hemp-agrimony. The nest holes in bramble stems are easily recognised because she excavates all the pith leaving a large and very visible hole in the broken stem. The cells are separated by partitions made of compacted wood-dust. These cells are provisioned during May and June and the nest burrow is then used for hibernation by the adults which emerge from these summer nests. Overwintering is communal, unmated males and females packing into the excavated stem, following in the one that made the burrow. Up to ten adults have been found in one stem.

General abundance

It was considered to be a very rare bee in Britain until 1972, but it has now been found to be common and widespread in the restricted area of the western Weald of West Sussex, Hampshire and Surrey, with a few sites in north Kent and East Sussex. It occurs mainly in warm sunny sites on sandy heaths, on south-facing chalk slopes and open sunny rides in clay woodlands. It can be quite numerous at some sites.

Foraging plants

Various low-growing herbaceous flowers such as tormentil, speedwells, red campion, thyme, yellow composites, together with several garden flowers.

Method of transporting pollen

Pollen is carried on the pollen hairs on the hind legs.

Parasites or cuckoos:

None known.

Availability of Keys

Saunders (1896)

George Else, under preparation

REFERENCES & FURTHER READING

Edwards, BWARS 1 (1997)

Saunders (1896)

Genus *Epeolus* (by David Baldock)**Number of British species**

Only two species occur in Britain, *Epeolus variegatus* and *E. cruciger*.

Size range

Small to medium-sized bees, ranging from 5.5-9mm long.

Physical characteristics

Epeolus are robust, short bees with black and white striped abdomens, and red legs and mandibles. They have many areas of short, adpressed, pale hairs on the head, thorax, legs and abdomen. The females, being cleptoparasitic, have no pollen-collecting apparatus. The two species are difficult to separate.

Solitary or social

Solitary.

Nesting behaviour

Epeolus are cuckoos on various species of bees in the genus *Colletes*.

General abundance

Epeolus are generally fairly common where their hosts occur, especially in southeast England and in coastal areas. They occur less commonly in northern Britain but *E. variegatus* reaches southwest Scotland. Distribution maps for both species are given in Edwards (2002).

Foraging plants

Epeolus, being parasitic, do not collect pollen but visit a wide range of flowers for nectar and are most frequently seen at Ragwort.

Methods of transporting pollen

Pollen is not collected, as the bees are parasitic.

Parasites or cuckoos

None known.

Keys available

Saunders (1896)

George Else, in preparation

DESCRIPTIONS OF SELECTED SPECIES***Epeolus variegatus*** (Linnaeus, 1758)**Description**

Female 7-9mm, short and compact, dull black with pale patches, especially on the abdomen; head and thorax black with patches of short, pale, adpressed hairs especially on the sides of the thorax. Mandibles are reddish, as are the tibia and tarsi; axillae carry strong teeth; abdomen with many pairs of pale stripes and spots, these being composed of short, adpressed hairs. No pollen-collecting hairs beneath abdomen or on legs.

Male 6.5-8mm. Very similar to the female.

Labrum with a short tooth in the middle of a deep indentation, whereas *E. cruciger* has a prominent tooth in a feeble indentation on the labrum; pygidium usually black, whereas normally red in *E. cruciger*.

Nesting

As it is a cleptoparasite it does not make its own nest or collect pollen. It parasitises several species of bee in the genus *Colletes*; *C. daviesanus*, *C. fodiens*, *C. halophilus* *C. succinctus*; however, little work has

been done on rearing and some of these hosts have yet to be confirmed. All of them nest in burrows in the ground, mostly in sand. Its close relative *E. cruciger* parasitises *C. succinctus* and *C. marginatus* and is common on heaths and moors.

Flight period

From June to late August, another form associating with *C. halophilus* flying from mid August to mid October.

Distribution

It is generally distributed throughout England and Wales, being common only in southeast England and in coastal areas and becoming scarce in the north. There is only one record for Scotland, from Galloway in the southwest. A distribution map appears in Edwards (2002).

REFERENCES AND FURTHER READING

- Edwards et al., BWARS 4 (2002)
- Perkins (1920)
- Richards (1937)

Genus *Eucera* (By David Baldock)**Number of British species**

Only two species have been found in Britain, one of which may be extinct.

Eucera longicornis (Linnaeus, 1758).**Physical characteristics**

The sexes of *E. longicornis* are very different.

Female: Length 14-16mm. Have normal length antennae but a wider abdomen which is shiny black and mostly hairless except for distinctive white hair patches on the sides of the front three segments, a wide white hair-band on segment four followed by pale orange hair-bands on the last two segments.

Male: Length 14-16mm. They are very distinctive, with enormously long antennae which are as long as their whole bodies. They also have yellow marks on their face and labrum but are otherwise black with much pale orange hair on most of the body.

Solitary or social

This is a solitary species but it usually nests gregariously, in large numbers.

Flight period

It is single-brooded, flying from mid-May to mid-July.

Nesting behaviour

Females nest gregariously in sparsely-vegetated soil, typically in sunny south-facing banks, slopes or cliffs but sometimes on level ground. The nest sites are normally in sandy, flower-rich habitats but may also be in sunny woodland rides on clay. The female excavates a long burrow with lateral cells and she then lines these cells with a secretion that apparently prevents the nectar-moistened pollen from being absorbed into the surrounding soil. The males can be seen at these nest sites flying very fast and low over the ground, waiting for the new females to emerge.

General abundance

E. longicornis has declined dramatically in recent years. It used to be widespread and locally common over much of southern Britain but it is now rare inland and is almost confined to a few coastal nesting strongholds in the south-west, including South Devon, the Gower Peninsular, the Isle of Wight and Kent. It can be very common around these nesting aggregations.

Foraging plants

The female forages mainly from legumes such as kidney vetch and tufted vetch and bird's-foot trefoils.

Method of transporting pollen

It carries pollen, moistened with nectar, on the outer surface of the hind legs. On the hind legs the tibiae have stiff hairs on the outer surface and the basitarsi have stiff hairs on both sides.

Parasites or cuckoos

The bee *Nomada sexfasciata* is a cleptoparasite of this species but it is now confined to one population of *E. longicornis* on the south Devon coast.

Availability of Keys

Saunders (1896)

Else, (under preparation)

REFERENCES & FURTHER READING

Edwards et al. BWARS 6 (2006)

Saunders (1896)

Genus *Melecta* (by David Baldock)**Number of British species**

There were two species in the genus *Melecta* occurring in Britain, but one of these, *M. luctuosa*, has not been seen since 1912 and is presumed to be extinct. The only British species is now *M. albifrons*.

Melecta albifrons (Forster, 1771)**Physical characteristics**

Female: Length 14-16mm. A large distinctive spring bee with the head and body all black apart from pairs of small white hair patches on most segments of the abdomen. These white patches can be very small or even non-existent in melanic forms.

Male: Length 12-17mm.

Solitary or social

Solitary.

Flight period

This species is single-brooded and flies in the spring from April to early June.

Nesting behaviour

It is a cleptoparasite of the bee *Anthophora plumipes* and the female lays her eggs in the cells of her host. Female *A. plumipes* have been observed pulling this species out of their nest holes.

General abundance

This is usually a rather scarce species but can be common around a nesting aggregation of its host. Like its host it is found mainly on coastal, soft rock localities and in gardens, especially in large towns, including London. It is distributed widely but thinly over southern England and occurs as far north as North Yorkshire.

Foraging plants

As a cleptoparasitic species it does not collect pollen and so flower visits are for nectar only. A wide range of species has been recorded, such as: ground-ivy, rosemary, apple, cherry, crucifers.

Methods of transporting pollen

Pollen is not collected or carried, as the bees are parasitic.

Parasites or cuckoos

None recorded.

Keys available

Saunders (1896)

George Else, in preparation.

REFERENCES & FURTHER READING:

Edwards et al. BWARS 6 (2006)

Saunders (1896)

Genus *Nomada* (by Matt Smith)**Number of British species**

There are thirty three species of *Nomada* recorded from Britain, although five are restricted to the Channel Islands.

Size range

5-15mm

Physical characteristics

At first glance, bees of the genus *Nomada* are much more likely to be taken for solitary wasps rather than bees. Adults are almost hairless and are black, patterned with a mixture of red, brown and yellow bands and spots. In many species the wings have a slightly smoky tint.

Solitary or social

Solitary.

Nesting behaviour

Nomada species do not construct nests of their own. All the species in the Genus are cleptoparasites of other ground nesting bee species and make use of the nest of the host bee. In most cases the hosts are bees of the genus *Andrena*, with a few species using other genera such as *Melitta* and *Eucera*. Some species of *Nomada* are restricted to a single host species, others will use a range of hosts. Females can be found flying low over the ground searching for host nests, finding a group of females searching in the same small area is sometimes the first indication that you have found a nesting site for the host.

Female *Nomada* enter the nest of their hosts and lay one or two eggs into an open cell. The eggs are inserted into the wall of the host nest cell. First instar larvae of *Nomada* have very large, sickle shaped mandibles which they use to destroy the egg of the host and any other *Nomada* eggs in the cell. Once the cell has been cleared of potential competitors, the *Nomada* larva consumes the provision placed in the cell by the host bee.

General abundance

As a parasite, numbers of *Nomada* are usually much lower than those of their hosts. One or two species of this genus are rare, but other species are regularly encountered in the field. It is unusual to find a nesting aggregation of any of the *Andrena* species without a few *Nomada* in attendance. Sheltered, sunny areas along hedgerows are also another favoured spot, males patrol the vegetation, presumably looking for females.

Foraging plants

As these bees do not need to collect pollen to provision their nest cells, they can be found visiting a wide range of flowers. Dandelion flowers seem to be a favourite flower in spring, together with Sallow and Field Maple flowers. In woodland clearings, the flowers of Wood Spurge are regularly visited.

Methods of transporting pollen

These bees lack any sort of pollen collecting and transportation apparatus.

Parasites or cuckoos

None.

Keys available

Perkins (1919)

Saunders (1896)

George Else, in preparation

DESCRIPTIONS OF SELECTED SPECIES

Nomada leucothalma (Kirby, 1802)

Description

Length: females 9-13mm. A black, brown and yellow bee, with both sexes looking very similar in appearance. This is usually the first species of *Nomada* to be encountered in early spring and is often found flying around nesting aggregations of the host.

Male: 8-13mm.

Nesting methods

Cuckoos on other bees.

Flight period

From March to May.

Abundance in UK

Widely distributed and generally locally common across much of the UK, though not recorded from the Channel Islands.

Hosts

The hosts of this species are *Andrena clarkella* and *A. apicata*, both of which specialise in collecting pollen from Sallows in early spring.

Nomada fucata Panzer, 1798.

Description

Female: 9-12mm. Both sexes are very similar in appearance. The top of the thorax is black with a single yellow spot towards the rear. The first tergite of the abdomen is red, the rest of the abdomen is patterned with yellow and black stripes.

Male: 8-11mm.

Nesting methods

Cuckoos on other bees.

Flight period

Like its host, a double brooded species, on the wing April to June and again from July to August.

Abundance in UK

This species used to be regarded as uncommon and restricted to sites on the south coast of England. It has since spread widely throughout south-east England and can usually be found wherever *A. flavipes* is nesting.

Hosts

Andrena flavipes.

Nomada fabriciana (Linnaeus, 1767)

Description

Female: 7-11mm. Both sexes are very similar in appearance. A small, red and black species with two small yellow spots on the abdomen. The labrum is black and the mandibles are bifurcated at the tip.

Male: 6-11mm.

Nesting

Cuckoo on other bees.

Flight period

Like its host, this species is double brooded and can be found on the wing from March to August.

Abundance in UK

A common and widespread species, though possibly sometimes overlooked because of its small size.

Hosts

Andrena bicolor and *A. chrysoseles*.

Nomada goodeniana (Kirby, 1802)

Description

Female: 9-13mm. Both sexes are very similar in appearance. A large black and yellow species.

Male: 6-11mm.

Nesting methods

Cuckoo on other bees.

Flight period

From March to August, double-brooded.

Abundance in UK

Common and widespread throughout southern England.

Hosts

This bees uses *Andrena nigroaenea* and other *Andrena* species as hosts.

Nomada flava, Panzer, 1798.

Description

Female: 10-12mm. A black, brown and yellow bee, with both sexes looking very similar in appearance, though males tend to have more yellow on the face

Male: 7-12mm. Males of this, and the closely related *N. panzeri*, cannot be told apart, females may be separated by the hairs on the clypeus (yellow in *N. flava*, black in *N. panzeri*).

Nesting methods

Cuckoos on other bees.

Flight period

From April to June.

Abundance in UK

Can be found in most parts of England and Wales south of Yorkshire and is one of the most frequent species of *Nomada*.

Hosts

A cleptoparasite of *Andrena carantonica*.

REFERENCES & FURTHER READING

Edwards et al. BWARS 3 (2001), 4 (2002), 5 (2005), 6 (2006)
Perkins (1919)
Saunders (1896)

Colletidae

Genus *Colletes* (by George Else)

Number of British species

Nine.

Size range

Medium-sized bees, body lengths 7-18mm.

Physical characteristics

Colletes species are of similar appearance to each other, microscopic examination usually being necessary to identify species. They much resemble certain *Andrena*, but are distinguished primarily by the short, bilobed tongue, absence of facial foveae, a single subantennal suture to each antennal socket and differences in wing venation. In common with *Hylaeus*, the brood cell is lined with a semi-transparent membrane, much resembling cellophane, which retains the semi-liquid provision for the larva and prevents the ingress of water from the nest substrate. However, unlike *Hylaeus*, this membrane is secreted by the abdominal Dufour's gland and not the enlarged salivary glands.

Nesting behaviour

Typical "mining bees", the females excavating their nest burrows in the soil, and without the cooperation of other individuals of the same species. Most nests occur in aggregations.

General abundance

In the British Isles, the majority of *Colletes* species occur in southern Britain, with the number of species steadily declining northwards. Four species are found in both Scotland and Ireland. All species are locally common in the vicinity of their nest burrows and often at the flowers with which they are most strongly associated.

Foraging plants

Many *Colletes* collect pollen from a narrow range of closely related species. Thus *C. fodiens* visits certain Asteraceae and *C. succinctus* visits heather and heaths. *C. floralis* is unusual, as it forages from the flowers of a range of unrelated plants. *C. hederæ* only collects pollen from ivy flowers.

Methods of transporting pollen

Pollen is transported to the nest amongst groups of specialised hairs, the scopa, on the ventral surface of the hind femur and the lateral surfaces of the propodeum. Other hairs on the hind leg, thoracic sternum and ventral surface of the abdomen also retain pollen.

Parasites or cuckoos

The two species of the cuckoo bee genus *Epeolus* found in Britain, *E. cruciger* and *E. variegates*, are cleptoparasites of *Colletes*. Usually, a nest of a particular species of *Colletes* is attacked by one *Epeolus* species and not the other. The cuckoo bee *Sphcodes pellucidus* is a known cleptoparasite of *C. cunicularius*. The bee-fly *Bombylius minor* has been reared from the nests of *C. daviesanus* and *C. succinctus*. Other nest parasites include the fly *Miltogramma punctata*.

Keys available

Guichard (1974). 195-199

Richards (1937)

Saunders (1896)

George Else, in preparation.

DESCRIPTIONS OF SELECTED SPECIES

Colletes daviesanus Smith, 1846

Description

Female: Length 9-11mm. There is no obvious sexual dimorphism (other than the presence, for example, of a scopa in the female). In common with most other species of *Colletes*, the posterior hair bands of the dorsal surface of the abdomen are white and the remaining surface clothed with sparse, mainly erect, hairs, permitting a clear view of the surface punctures. The outer, more strongly chitinized (thickened) portion of the galea is very narrow, about as wide as the adjacent maxillary palp. In other British species it is considerably wider than these palps. This character is unique to *daviesanus*.

Male: Length 8-9mm.

Nesting methods

Generally nests gregariously in the soil, mainly preferring vertical surfaces, such as cliff faces and the sides of sand pits. However, it is often a nuisance by excavating its burrows in soft mortar joints, occasionally posing a serious risk of structural damage to walls.

Flight period

Univoltine, both sexes from mid June to mid September.

Abundance in UK

A very common species in southern Britain. The distribution is sporadic in Scotland (confined to the south-east) and Ireland (mainly in the east of the country).

Colletes hederæ Schmidt & Westrich, 1993

Description

Female: Length 11-18mm. Both sexes are virtually identical in general appearance, there being no obvious sexual dimorphism. This species is a very close relative of both *Colletes halophilus* and *C. succinctus*. The bee is usually larger than its two congeners and the posterior hair bands of the dorsal segments of the abdomen (gaster) are pale yellow in freshly emerged specimens, not white (as in other British and Irish species in the genus).

Male: Length 8-15mm

Nesting methods

The species nests gregariously in the soil.

Flight period

Univoltine, both sexes from early September to late October, occasionally early November.

Abundance in UK

C. hederæ has recently colonized southern England, having been first found on the Dorset coast in 2001. Since then it has been recorded also from Devon, South Hants, East Sussex, South Wilts [CHECK] and South Somerset. However, this range is predicted to increase in the future. Where found it is usually very common, especially at ivy flowers and in the vicinity of the nest burrows.

REFERENCES & FURTHER READING

- Edwards et al. BWARS 1 (1997), 3 (2001), 4 (2002)
- Guichard (1974)
- Perkins (1920)
- Richards 1937
- Saunders (1896)
- Schmidt & Westrich (1993)

Genus *Hylaeus* (by Graham Collins)

Number of British species

The genus *Hylaeus* contains 11 species in the British Isles. A further species, *H. punctulatissimus*, has been included in the past, but is now considered to be only doubtfully British.

Size range

British species of *Hylaeus* are mostly rather small bees, averaging 6-7 mm long. A couple of species can be as small as 4 mm, while others can reach 8 mm.

Physical characteristics

Hylaeus are predominantly black, short-tongued, hairless bees variously marked with yellow on the legs and face; males of most species have the face completely yellow while the females have two yellow spots, the size and arrangement of which are usually characteristic. The generic term “yellow-faced bees” has been applied to them. There is no specialised pollen-collecting apparatus, although the hairs around the thorax are strongly plumose – a feature which should enable separation from otherwise similar black-and-yellow wasps.

Solitary or social

Solitary.

Nesting behaviour

Hylaeus are usually aerial nesters. Many species nest in the broken stems of bramble, burrowing down into the pith, but others will use other hollow stems such as dock or thistles, old beetle holes in wood, or, in the case of *H. pectoralis*, old cigar-galls caused in the stem of common reed by the fly *Lipara lucens*. *H. signatus* has been recorded nesting in clay banks and in the mortar of a wall.

Within its chosen cavity, the female constructs a small number of cells which are lined with a salivary secretion. This secretion produces a membrane that allows the cell to hold the larval food, which is a semi-liquid mixture of nectar and pollen. Cells constructed first, from which the bees are last to emerge, usually contain females, while later-built cells will give rise to male bees.

General abundance

About half of the species of *Hylaeus* are generally distributed, occurring in a variety of habitats. The currently published National Status account (Falk, 1991) shows three species – *H. cornutus*, *H. gibbus* (now known as *H. incongruus*) and *H. euryscapus* (now known as *spilotus*) – to be RDB3 (rare), and a further two species to be Notable. *H. pectoralis*, because of its specialised nesting behaviour, is confined to wetlands in south-east England, and would also qualify for Notable status. *H. spilotus* (= *euryscapus*) is confined to the south coast of England, possibly as a result of temperature requirements. *H. signatus* is found on chalk downland, but also on ‘waste ground’, following the distribution of its host plants. *H. incongruus* (= *gibbus*) usually occurs on or around heathland.

Foraging plants

The short tongue of *Hylaeus* restricts the range of plants that may be visited for nectar and pollen. Bramble flowers seem to be particularly favoured, especially as the nest-site may be nearby, but other flowers such as hogweed, wild carrot, yarrow, cinquefoil, wood spurge, heather and thistles are also visited. *H. signatus* specialises in the genus *Reseda* (weld and wild mignonette).

Methods of transporting pollen

The females are devoid of a pollen-collecting apparatus, and instead carry pollen, mixed with quantities of nectar, in the crop. This is regurgitated in the nest cell. The female of *H. cornutus* has paired flanges on the face, which form a concavity in which a mixture of pollen and nectar is carried.

Parasites or cuckoos

The principle parasitoids of *Hylaeus* are wasps of the family Gasteruptiidae. These are medium-sized slender wasps, the females of which have elongate ovipositors, superficially resembling ichneumons but

differing from them by the insertion of the abdomen being high up on the thorax rather than between the hind legs. The female uses her ovipositor to penetrate a cell and lays an egg on the food store. The wasp egg hatches before that of the bee and the larva first eats the *Hylaeus* egg and then consumes its food store, thus being considered cleptoparasitic. British Gasteruptionidae comprises five species of the genus *Gasteruption* which may be identified using Crosskey (1951).

Keys available

Saunders (1896) – under *Prosopis*

George Else, in preparation.

Hylaeus species, although superficially rather similar, are not too difficult to identify. They should be set with the jaws open, so that the teeth on the mandibles can be seen. It is useful to examine males while still fresh so that the sculpturing of the sternites can be appreciated; these will often telescope as the abdomen dries and contracts.

DESCRIPTIONS OF SELECTED SPECIES

Hylaeus communis Nylander, 1852

Description

Female: 5-7mm. Black with the following parts yellow: sides of face, pronotal tubercles, a small spot on the tegulae and bases of tibiae (a small spot, sometimes absent, on those of front and mid legs, basal one third or more of hind tibiae). Rather hairless except around the propodeum where there is a moderately dense covering of short, plumose hairs. Head black with distinct yellow spots either side of the face, these reach the eye margins but do not extend as far as the lateral borders of the clypeus. Clypeus with fine punctures, which are obscured by a longitudinally striate surface sculpture. Mandible with a single, broad inner tooth. Thorax rather strongly and densely punctate, the surface dull due to microreticulation. Abdomen with a covering of very short, sparse, pale hairs. First tergite with sparse punctures, most evident at the sides of the marginal area, with the intervening integument smooth. The following tergites are more densely punctured and microreticulate. Hind margin of the first tergite lacking patches of adpressed plumose hairs at the sides.

Male: 5-7mm. Largely black with extensive yellow facial markings, these extending dorsally and curving round the antennal sockets. Small, impunctate, polished spots present above the antennal sockets. The underside of the antennae is obscurely yellow, contrasting with the dorsal surface. The legs are black with yellow bases to the tibiae and bases of the tarsi.

Nesting

Nesting occurs in old bramble stems, the females burrowing into the pith. Females, and males, predominantly visit bramble flowers and, like other members of the genus, probably collect a mixture of pollen and nectar. This is carried in the crop since they have no scopa.

Flight period

Females have been recorded from late May to the end of August; the males are also present throughout this period.

Distribution

Hylaeus communis is a common and fairly widespread species in England. It also occurs in south Wales, but does not appear to have been recorded in Scotland.

Hylaeus cornutus Curtis, 1831

Description

Female: 6-8mm. Black with the following parts yellow: pronotal collar, front half of tegulae and base of tibiae (a small spot on those of front and mid legs, about basal one third of hind tibiae); the under-surface of the antennal flagellum is also orange-marked. Rather hairless except around the propodeum where there is a moderately dense covering of short, plumose hairs. Head black, lacking the usual yellow facial

markings of the genus. The clypeus concave, the outer, lower corners produced into outstanding, triangular processes or flanges and the upper margin also raised as a ridge; the whole producing a depression in which a mixture of nectar and pollen is transported. Mandible with three distinct teeth of similar size. Thorax rather strongly and densely punctate, the surface dull due to microreticulation. Abdomen virtually hairless, moderately punctate with the intervening integument polished on the first tergite and very delicately transversely microreticulate on the remaining segments. Hind margin of the first tergite lacking patches of adpressed plumose hairs at the sides.

Male: 6-7mm. Largely black. Like the female, the male has a completely black face. The central area of the face is produced as a boss. The antennal scape is very dilated, its apex being several times wider than the basal segments of the flagellum.

Nesting

Nesting has only rarely been observed, but females are known to use dead hollow stems such as dock and wild parsnip. Several cells are likely to be constructed and lined with salivary secretions. The type of pollen collected is not known, but on the continent a range of flower species are used. The females are often found on flowers of white umbellifers (Apiaceae), but may be visiting just for nectar.

Flight period

Females have been recorded from June to August. Males are apparently short-lived and found only at the beginning of the flight period.

Distribution

H. cornutus is an uncommon species, restricted to southern and eastern England, favouring open sites such as chalk downland and ruderal habitats. In the British Red Data Book (Shirt, 1987) it was classified as RDB3, a status revised to Notable A by Falk (1991). However, it appears to have increased in recent years (e.g. Edwards & Telfer, 2001) and a reappraisal of its status is due.

Hylaeus signatus (Panzer, 1798)

Description

Female: Length 6-8mm. Black with the following parts yellow: face, pronotal collar and tubercles, front half of tegulae and a very small spot at the base of each tibia. The underside of the antennal flagellum and the inner surface of the front tibiae are a very dull orange-red. Head black with somewhat triangular yellow facial marks on each side of the clypeus adjacent to the inner border of the eye. Mandible with a broad tooth subapically. Head rather elongate; thorax rather strongly and densely punctate, the surface dull, due to microreticulation. Front margin of side (the epicnemial carina) strongly raised and blade-like. Abdomen with first tergite centrally with small and remote punctures, the underlying surface delicately, transversely microreticulate. The hind margin has patches of dense white adpressed hairs laterally. Remaining tergites more heavily and densely punctured.

Male: Length 6-8mm. Black with the whole of face below antennal sockets yellow. It resembles the female in the extent of markings and structure of the thorax. The abdomen has the third sternite with a basally placed raised semicircular area, the anterior face of which is highly polished.

Nesting methods

While most *Hylaeus* nest in cavities in plant stems, *signatus* is also known to burrow in the soil and in mortar in walls. The nest cells are lined with a waterproof membrane and provisioned with a semi-liquid mass of pollen and nectar. *H. signatus* collects pollen from a single plant genus – *Reseda* (weld and wild mignonette).

Flight period

This species has been recorded from May to September, males being present throughout this period.

Abundance in UK

H. signatus is an uncommon species but widely distributed throughout southern England and recorded as far north as Yorkshire. It is a species of open sites where its host plant occurs, principally chalk grassland and ruderal habitats.

REFERENCES AND FURTHER READING

- Crosskey (1951) 247-301.
Edwards et al. BWARS 1 (1997), 3 (2001).
Else (1995) 43-7.
Falk (1991)
Morris (1992) 186-7.
Shirt (1987)
Saunders (1896)

Halictidae

Genera *Halictus* /*Lasioglossum* (by Geoff Allen)

These two genera are treated together here, as they are closely related and can appear very similar in the field. Under the microscope, the two are separated by the characters in the generic keys in this book. These species, particularly the smaller ones, are sometimes called sweat bees but are not to be confused with the tropical, social *Trigona* which are also known by this name. The species of *Halictus* and *Lasioglossum* are often said to be structurally monotonous, uniform and non-descript, with few good distinguishing characters, but they are richly varied in behaviour.

Number of British species

There are seven species of *Halictus* and thirty-three of *Lasioglossum* in Britain, with one of each confined to the Channel Islands.

Size range

Two species of *Lasioglossum* (*L. minutissimum* and *L. semilucens*) measure about 4 mm in length and are among the smallest bees on the British list. The very rare *L. sexnotatum* is the largest British halictine, with a length of 12mm. However, a continental species recently found in the Channel Islands, *Halictus quadricinctus*, dwarfs this at 15mm. There is a complete size range of species between the smallest and largest.

Physical characteristics

The bees are short-tongued, with the tongue pointed, and in both genera there are three submarginal cells in the forewing, while the basal vein of the forewing is strongly curved or arched. Although their appearance is sometimes likened to *Andrena*, these bees are generally not very hairy compared with many species of the latter genus. However, the head and thorax are occasionally rather hairy and densely so in a few species. The females, even of the small species, have a fully functional sting capable of penetrating human skin. The effect is not as severe as that of the honey bee. The males, of course, do not sting. Females are distinctive in the British bee fauna in having the preapical tuft of hairs (on tergite 5) specialised in the following manner: the hair is short and adpressed, and has a median longitudinal parting, which may be an aid to mating. This hair structure is called the "rima". Males tend to be rather narrow, elongate insects, and about the same length as their females. *Halictus* has the gastral hair bands or spots at the back margins of the tergites, whilst in *Lasioglossum* these are at the base of the segments or absent. In both *Halictus* and *Lasioglossum* a few small species are metallic green to bronze in colour. Important characters used in the identification of groups within *Lasioglossum* are: normal pigmentation versus only slight pigmentation in the second submarginal cross vein in the forewing of the female, and the presence or absence of a carina delimiting the hind face of the propodeum. Species characters in these bees can be subtle and often include those of puncturation, sculpturing and head proportions.

Social or solitary

Halictus and *Lasioglossum* cover the spectrum from completely solitary to primitively eusocial in behaviour - having a distinctly defined worker caste. Interestingly, a few species are social in warm temperate regions but solitary in the north of their ranges; an example being *L. calceatum*.

Nesting behaviour

The vast majority of species nest in the ground, often in bare, sandy soil but two British species, *L. smeathmanellum* and *L. cupromicans*, will nest in soft mortar between bricks or stones in walls. A few subterranean species, including some solitary, construct relatively complex earthen cell clusters containing the first brood cells. These clusters are often started by digging cells directly off the main burrow, lining them with earth and then hollowing out around the cluster to form a vertical cylinder accessed by the central burrow. Most species build much less complex nests, with cells excavated at places along the main burrow or branch burrows off this.

General abundance

Halictus and *Lasioglossum* both have common species in the British fauna. Species such as the small *L. morio* are among the most common British bees in the south; in contrast, *L. laticeps* is found in Britain only on one small stretch of coastline while *L. sexnotatum* was thought extinct here until a few were found in the 1990's and 2000's.

Foraging plants

As with all bees with long flight periods, a range of suitable foraging plants need to be present and in flower through the flying season, to sustain the females and enable successful breeding. Many species will forage on a wide variety of plant families, including Asteraceae, Brassicaceae, Rosaceae and many others.

Method of transporting pollen

The pollen is carried on scopal hairs which arise not only from the trochanter, femur and tibia of the hind leg but also in fringes from the underside of the gaster.

Parasites or cuckoos

Rarely, adult halictines can be found carrying strepsipteran parasites of the genus *Halictoxenus*, which is related to the more common *Stylops* found on *Andrena*. *Halictus* and *Lasioglossum* are the hosts of most British species of *Sphecodes* while *Nomada sheppardana*, is found on *L. parvulum* and *L. nitidiusculum*.

Keys available

Perkins (1922)
Saunders (1896)
Else, in preparation.

DESCRIPTIONS OF SELECTED SPECIES**Halictus rubicundus (Christ,1791)****Description**

Female: length 9-11mm. Much larger than *H. tumulorum*, and non-metallic black. Fairly dense, reddish-brown hairs are found on the thorax. The hind tibia and tarsi are reddish-orange beneath the golden scopa. There are narrow, white, adpressed hair bands on the marginal areas of tergites 2 to 4, which abrade to become lateral streaks. Worn, faded specimens may be difficult to identify.

Male: length 9-11mm. Similar in length and general appearance to female, but more elongate; the flagellar segments are paler beneath than above. The tibiae and tarsi of all legs are extensively yellow and the tips of the femora partly so.

Nesting methods

An eusocial species except in northern Britain, where it is solitary; burrows in the ground.

Flight period

Females from March to September; males from July to September.

Abundance in UK

Fairly common, found from southern Britain north to Inverness.

Halictus tumulorum (Linnaeus, 1758)**Description**

Female: length 6-7mm. A small, robust, metallic green bee with strong, white, adpressed hair bands on the marginal areas of tergites 2 to 4. These give an easily-lost species character, rare in metallic *Halictus*, and so care must be taken not get the specimen wet when collected. The punctures are quite dense on all

the three main body sections and the close, fine puncturation on the marginal area of tergite 1 is a group character. The hairs on the head and thorax are pale in colour and not conspicuous.

Male: length 6-8mm. A more elongate insect than the female, but equally metallic green in colour, while the flagellar segments are paler beneath than above. The tibiae and tarsi of all legs are extensively yellow and the femora partly so, while the coxae and trochanters are dark.

Flight period

Females from March to September; males from June to September.

Nesting methods

Sometimes eusocial, sometimes solitary. Nests in the ground.

Abundance in UK

Very common in southern Britain.

Lasioglossum calceatum (Scopoli, 1763)

Description

Female: length 8-10mm. Less robust than *L. leucozonium*. As with many other *Lasioglossum* species, the hairs on head and thorax are not particularly visible to the naked eye, but in this species have a ginger appearance. The mesoscutum is well punctured with distinct microsculpture between the punctures while the propodeum has a well defined carina. There are pale hair bands on the gaster, which largely disappear when the segments telescope, and the marginal areas of the tergites are pale orange and semi-transparent. *L. albipes* is a very similar species, which has a longer face, a slightly narrower gaster, and often a plum-like "bloom" on the integument of the tergites.

Male: length 8-11mm. With very elongate, cylindrical form, but otherwise it is similar in most respects to the female. The base of the gaster is sometimes extensively red, giving a superficial resemblance to *Sphcodes*. Darker, less red, specimens are common. Usually with a black labrum (but variable, sometimes a little yellow); in the similar *L. albipes* this is pure yellow. Unlike the female, the tibiae are dark with basal and apical yellow rings and the tarsi are mainly yellow.

Nesting methods

Eusocial, although queens and workers are poorly defined; solitary in the north; burrows in the ground.

Flight period

Females from March to September; males from June to September.

Abundance in UK

Very common in southern Britain; north to near Inverness.

Lasioglossum fulvicorne (Kirby, 1802)

Description

Female: length 6-8mm. In general appearance, much like a very small *L. calceatum* though the hairs on the head and thorax are paler than those of that species. The puncturation of the mesoscutum is closer and finer than *L. calceatum* and there is clear microsculpture. There is a rather large tomentose hair spot at each side of the front of the second tergite and the marginal areas of the tergites are pale orange and semi-transparent. The legs are dark.

Male: length 6-8mm. Very much as the female, but more elongate and less robust. The scutellum has a roughened sculpture rather than being punctured. The antennae are very long for the size of the insect; the flagellar segments are pale beneath and dark above. The labrum is at least partly yellow and the mandibles extensively so. Rarely, the integument of the base of the gaster can be quite red but a darker appearance is much more usual. The mid and hind tibiae have pale yellow basal and apical rings, whilst the fore tibia sometimes has a yellow line joining these two areas. The tarsi are mainly yellow.

Nesting methods

Solitary; burrows in ground.

Flight period

Female from March to September; male from June to September.

Abundance in UK

Common in the south but mainly on calcareous soils.

Lasioglossum leucozonium (Schrank, 1781)**Description**

Female: length 8-10mm. Robust in form and non-metallic. The hairs of head and thorax are pale, and the gaster is sparsely haired apart from conspicuous, broad, white, basal bands, which can all but disappear when the segments telescope inwards in death. The integument of the hind margins of the gastral segments is black. Can be separated from the very similar *L. zonulus* by the puncturation and sculpturing of tergite 1.

Male: length 7-9mm. Less robust but otherwise similar to the female. The hind tibia is dark apart from a pale basal ring and the hind basitarsus is usually pale yellow. The flagellum of the antenna is dark beneath.

Nesting methods

Solitary; burrows in ground.

Flight period

Female from March to September; male from July to September.

Abundance in UK

Common in south, north to Yorkshire and Cumbria.

Lasioglossum minutissimum (Kirby, 1802)**Description**

Female: length 5-6mm. A tiny, dark bee with inconspicuous pale hair on head and thorax. In general appearance, the female is rather elongate compared with other small *Lasioglossum* and the main distinguishing feature is a slight impression at the base of the second tergite, best seen from the side. There are small tomentose spots at the base of the second tergite and the marginal areas are semi-transparent with an orange tinge.

Male: length 4-6mm. In general, resembling the female but slightly more elongate. The male head appears proportionately larger. The impression at the base of the second tergite is clearly visible under the microscope. The antennae are of medium length for a *Lasioglossum* and the flagellum is only inconspicuously paler beneath. The hind tarsi are dark.

Nesting methods

Solitary; burrows in ground.

Flight period

Female from March to October; male from June to October.

Abundance in UK

A widespread species, fairly common in the south and extending north to Lincolnshire.

Lasioglossum morio (Fabricius, 1793)**Description**

Female: length 5-6mm. A small species with metallic green to bronze head and thorax, and sub-metallic gaster. The propodeal carina is absent. There are small basal spots of pale tomentose hair on the sides of tergite 2 and narrow hair bands at the bases of tergites 3 and 4. The marginal areas of the tergites are semi-transparent with an orange tinge. The bee is separable from three other, rather similar, British species by the distinctly microsculptured appearance under the microscope. One of the similar species, *L. smeathmanellum*, has a more metallic gaster in both sexes.

Male: length 5-7mm, Similar but much more elongate than female, with long antennae that are pale beneath. The tarsi are dark, whilst in the related but more robust, male *L. leucopus* the hind basitarsus is whitish.

Nesting methods

Eusocial; burrows in ground.

Flight period

Female from March to October, male from June to October.

Abundance in UK

Very common in southern England ranging north to Cumberland.

Lasioglossum parvulum (Schenck, 1853)**Description**

Female: length 6-7mm. In the field, this appears a small dark species with little visible hair. The mesoscutum is slightly microsculptured between the punctures. The base of tergite 2 has a small, white, tomentose hair patch each side. The hind margins of the tergites are usually pale.

Male: length 6-7mm. Rather similar to the female, but very elongate in appearance. The antennae are very long for the size of the insect and the underside of the flagellum is pale. The legs, including the hind tarsi, are dark.

Nesting methods

Solitary; burrows in the ground.

Flight period

Female from March to October, male from June to October.

Abundance in UK

Common in southern Britain, extending north to Yorkshire, its upper range limit in Britain. It is rare there, possibly extinct and is replaced by the similar *L. rufitarse*.

Lasioglossum xanthopus (Kirby, 1802)**Description**

Female: length 10-12mm. Superficially similar in general appearance to *Halictus rubicundus*, but with hair bands at the bases of tergites 2 to 4. These bands can partly vanish as the segments telescope inwards in death. The hind margins of the tergites are black, the same colour as the rest of each segment. The hind tibia and tarsus are yellow to pale orange beneath the golden scopal hairs.

Male: length 9-12mm. Rarely seen, due to its late flight period but similar in general appearance to female, though slightly less robust. The fore and mid tibiae are dark and the hind, pale orange. The tarsi are ivory white, darkening towards the claw joint.

Nesting methods

Solitary; burrows in the ground.

Flight period

Female from April to September, male from August to October.

Abundance in UK

Scarce but widely distributed in the southern Britain, north to South Lincolnshire.

REFERENCES & FURTHER READING

Edwards et al. BWARS 3 (2001), 4 (2002), 5 (2005), 6 (2006)

Perkins (1922)

Saunders (1896)

Genus *Sphecodes* (by Graham Collins)

Number of British species

The genus *Sphecodes* contains sixteen species in the British Isles. A further species, *S. marginatus*, can be found on the Channel Islands but is not, of course, part of the British fauna.

Size range

British species range from very small (4mm in length) to medium sized (up to 12mm).

Physical characteristics

A parasitic lifestyle, relatively unusual amongst British bees, has a considerable bearing on the physical appearance and behaviour of the members of the genus. Because the females have no need to collect pollen, they are devoid of a pollen-collecting apparatus; indeed they are extremely sparsely haired species. They share a common colour-pattern, remarkably constant across the genus, of black and red. The red colour is the colour of the integument rather than hair-patterns and is confined to the basal three or four segments of the gaster. A few species, especially in the males, have the red coloration reduced, and in one species, the aptly named *Sphecodes niger*, the usual form of the male is entirely black. This red and black pattern, together with the sparse hairing, causes *Sphecodes* to resemble wasps more than bees. Under a microscope the branched hairs characteristic of bees can be seen. Additionally, the second discal cell of the forewing is in extensive contact with the third submarginal cell – in similar wasps the second discal cell meets the second submarginal. Males, especially dark forms, can resemble males of the genus *Lasioglossum* but have antennae with short, rather knobby segments.

Solitary or social

Solitary.

Nesting behaviour

Unlike most bees, which are considered paragons of industry, members of this genus make a living by cleptoparasitism; that is to say the females lay their eggs in the nests of other bees and kill the host's egg or young larva, the *Sphecodes* larvae then utilise the pollen stored by the original female. This destruction of the host's progeny by the adult parasite is unusual – in other British cleptoparasitic genera this task is carried out by the parasite's larva. The host chosen is a member of the genus *Lasioglossum*, *Halictus* or *Andrena*. Each species of *Sphecodes* parasitises either one, or a small range of, species, as host. The full range of host species is not known in every case - tentative associations can be made by observation of *Sphecodes* behaviour, but confirmed rearing records are less easy to secure; this is a field ripe for investigation by the amateur hymenopterist. In most species, mating occurs in the late summer. The males then die off and the females hibernate appearing again in the spring, often quite early. The exceptions to this strategy are *Sphecodes spinulosus* and *rubicundus*, in which adults of both sexes do not emerge until the spring.

General abundance

Because of their habit of flying over areas of bare ground searching for the burrows of their hosts, female *Sphecodes* bees are one of the most readily seen of bee species. Away from host nest sites they are much less frequently seen. All the specific host-associated species are generally much scarcer than the multi-host species. For instance, the very variably sized *S. ephippius* is associated with a range of hosts and is very commonly found over much of the country, whilst the very small *S. longulus*, has just one host, in this case, *Lasioglossum minutissimum* and is much scarcer, with a rather smaller geographical range than its host, although both are southern species. *Sphecodes hyalinatus* is specific to two closely related *Lasioglossum* bees; these are found in different habitats and geographical ranges. On calcareous substrates and the more southerly areas of the UK it is associated with *Lasioglossum fulvicorne*; on acidic substrates and the more northerly areas, with *L. fratellum*. Clearly, if both *Lasioglossum* species are found together the *Sphecodes* may use either host. However, even where the required host bee species are common, the associated *Sphecodes* may be rarely found; clearly there are more factors than just host abundance which influence the abundance of the various *Sphecodes* species.

Foraging plants

Flowers are visited for nectar only, and a variety of species are involved. White flowered umbellifers such as carrot, hogweed and hedge parsley are very productive, and composites such as mayweed, oxeye daisy and, particularly for males in late summer, thistles and knapweed are all important too. Males are usually taken at flowers, but some species can be found flying around bushes searching for females. Females spend most of their time in the vicinity of nests or colonies of their respective hosts, often being more in evidence than the host, which is either collecting pollen or provisioning the nest.

Methods of transporting pollen

Being parasitic, the females do not collect their own pollen.

Parasites or cuckoos

No information seems to be available. It is possible that *Sphecodes* larvae could be parasitised by species that normally parasitise the host.

Keys available

Perkins (1922)

Else, in preparation

DESCRIPTIONS OF SELECTED SPECIES

Sphecodes are not the easiest of bees to identify, some of the smaller species being particularly tricky. It is important that males are pinned with the genitalia extracted, as the differences between species are often larger than in some other genera.

Table ** British species of *Sphecodes* and their probable host associations

<i>Sphecodes</i>	Host(s)
<i>crassus</i>	<i>Lasioglossum parvulum</i> , <i>L. nitidiusculum</i>
<i>ephippius</i>	<i>Lasioglossum leucozonium</i> , <i>L. calceatum</i> , <i>L. lativentre</i> , <i>L. quadrinotatum</i>
<i>ferruginatus</i>	<i>Lasioglossum fulvicorne</i> , <i>L. fratellum</i>
<i>geoffrellus</i>	<i>Lasioglossum parvulum</i> , <i>L. nitidiusculum</i>
<i>gibbus</i>	<i>Halictus rubicundus</i>
<i>hyalinatus</i>	<i>Lasioglossum fulvicorne</i> , <i>L. fratellum</i>
<i>longulus</i>	<i>Lasioglossum minutissimum</i>
<i>miniatus</i>	Probably <i>Lasioglossum</i> sp.
<i>monicornis</i>	<i>Halictus rubicundus</i> , <i>Lasioglossum calceatum</i> , <i>L. malachurum</i> , <i>L. xanthopus</i>
<i>niger</i>	<i>Lasioglossum morio</i>
<i>pellucidus</i>	<i>Andrena barbilabris</i>
<i>puncticeps</i>	<i>Lasioglossum lativentre</i> , <i>L. villosulum</i> , <i>L. quadrinotatum</i>
<i>reticulatus</i>	Possibly <i>Lasioglossum prasinum</i> , <i>Andrena argentata</i> , <i>A. dorsata</i>
<i>rubicundus</i>	<i>Andrena labialis</i> and possibly <i>A. flavipes</i>
<i>scabricollis</i>	<i>Lasioglossum zonulus</i>
<i>spinulosus</i>	<i>Lasioglossum xanthopus</i>

Sphecodes ephippius (Linnaeus, 1767)

Description

Female: 5-10mm. Black with the abdomen red basally. Head black. The top, behind the ocelli, transversely wrinkled and lacking punctures; thorax black, moderately densely punctate, the surface between the punctures polished. Propodeum dorsally and laterally strongly reticulate with polished interspaces; abdomen red on the basal three segments, otherwise black. Marginal areas of first three

tergites smooth and polished. The hairs on the front of the first tergite are distinctly shorter and sparser than those on the back of the propodeum; in most species of *Sphcodes* these two sets of hairs are similar.

Male: 6-8mm, sharing the colour pattern of the female except that the red tergites are usually marked with black in the form of central oval spots or transverse bars. The face has a dense covering of silvery hairs and can appear pale from some points of view. The antennae have short, rounded segments, each with a narrow band of pubescence on the base of the underside. The main point of difference from similar species is in the structure of the genitalia.

Nesting methods

S. ephippius is a cuckoo parasite of several medium-sized *Lasioglossum* species.

Flight period

Adults occur from March to September, or even later. Examples seen in the spring and early summer are females that have overwintered, and these peak in May and June. These produce a brood in late summer, comprising both sexes. Mating occurs at this time, but only the females survive until the following year.

Distribution

A widespread and often common species in England and Wales. Because it parasitises a range of hosts, it can occur in a wide variety of open habitats.

***Sphcodes monilicornis* (Kirby, 1802)**

Description

Female: Length 8-12mm. Black with the abdomen red basally. Head with vertex extended posteriorly, parallel-sided and thus appearing somewhat rectangular viewed from above. Frons and vertex densely punctate, the punctured area extending behind the ocelli. Hairs on margins of clypeus and mandibles silvery-white. Thorax black, dorsally, especially the scutellum, sparsely punctured on a polished ground. Lateral faces of propodeum with a series of regular, concentric ridges resembling the whorls of a fingerprint. Abdomen with the basal three segments red, otherwise black. Marginal areas of red tergites rather strongly punctate.

Male: Length 7-10mm. Black and red. The antennae are elongate with very narrow bands of pubescence at the base of flagellar segments below. The abdomen is red-marked but less extensively than the female; black markings extend over the base of the first and apex of the third tergites. The marginal areas of the first and second tergites are punctate, but that of the third scarcely so.

Nesting methods

A parasitic cuckoo bee.

Flight period

Sphcodes monilicornis has been recorded from April to September. The females fly from July and overwinter to appear again, and nest, in the spring. The males occur only in the late summer and early autumn.

Abundance in UK

This species is a rather widespread and common one.

Host

Several of the larger halictine bees, *Halictus rubicundus*, *Lasioglossum calceatum* and *L. xanthopus* are probable host species.

***Sphcodes niger* von Hagens, 1874**

Description

Female: Length 5-6mm. Black with abdomen red marked basally. Head black, labrum and mandibles dull orange-red, the latter with an inner sub-apical tooth. Thorax black, rather shining; boss below wing base

smooth and shining, not sculptured. The dorsal surface of the propodeum has strong longitudinal costulae at the front; these not reaching the posterior border, but leaving a polished area. Abdomen with basal two tergites red, third usually red marked with black (red in most species), black beyond; marginal areas of red tergites smooth and polished.

Male: Length 5-6mm. Entirely black. Unusually for a *Sphecodes* the male is black, lacking the red on the gaster. It shares with the female the character of the punctured but highly polished hypopimeral area. The genitalia are distinctive.

Nesting methods

Sphecodes are cuckoo parasites and *niger* is parasitic upon *Lasioglossum morio*. Both parasite and host occur in open habitats, but the *Sphecodes* is most frequent on chalk downland.

Flight period

The adults occur from August to October, males die before the winter but females hibernate and can be found again in April and May.

Abundance in UK

Sphecodes niger has been considered a rare bee, being given RDB3 status by both Shirt (1987) and Falk (1991). However, in some parts of south-east England (the North Downs and the Thames corridor of Essex and Kent) it is quite widespread. It may have increased in recent years or it may be being found more often as the number of recorders increases; its host is certainly a widespread and common species.

***Sphecodes spinulosus*, von Hagens, 1875**

Description

Female: 10-11mm, one of our largest *Sphecodes*. Black with the abdomen red basally. Head black. The top and back are separated by a sharp raised keel or carina, in front of which there is a shallow groove. Thorax black, densely punctate, the surface between the punctures polished. Propodeum dorsally and laterally strongly reticulate with polished interspaces. Abdomen red on basal three segments, otherwise black. Marginal areas of second and third tergites smooth and polished. Base of second sternite deeply impressed and forming a distinct angle where it meets the rest of the surface.

Male: 10-11mm, sharing the colour pattern of the female. The characters of the head and second sternite that serve to distinguish the female are also present in the male. The hind tibia has on its dorsal surface a row of spines, a character unique in British *Sphecodes* males.

Nesting

S. spinulosus is a cuckoo parasite of *Lasioglossum xanthopus*.

Flight period

Both sexes fly in May and June. It is one of only two British *Sphecodes* that have males flying in the spring.

Distribution

It is a rare bee confined to chalk grassland and coastal grassland. Records are few and restricted to southern England and Wales. The host is rather more widespread.

REFERENCES & FURTHER READING:

- Edwards et al. BWARS 3 (2001), 5 (2005), 6 (2006)
 Falk (1991).
 Perkins (1922). 46-52, 94-101, 167-174.
 Shirt (1987).
 Saunders (1986)

Megachilidae

Genus *Anthidium* (by David Baldock)

Number of British species

Anthidium manicatum (Linnaeus, 1758) is the sole British species.

Size

A. manicatum is a medium to large-sized bee. Unusually in bees, males are larger than females, ranging from 11-17 mm long, whereas the smaller females are from 9 -12 mm long.

Solitary or social

Solitary.

Description

This is a strikingly robust, black bee with pairs of yellow spots along the sides of the very broad abdomen in both sexes. They both also have extensive yellow markings on the face and mandibles and smaller ones on the back of the head and on the legs. The female has a brush of white pollen-collecting hairs beneath the abdomen. The male has five black backward-pointing spines at the end of its abdomen. The reason for these spines and the larger size of the males is that these males occupy and defend against all intruders a territory around plants which the females favour for pollen gathering, mainly labiates. They patrol this territory ceaselessly, and any other male *Anthidium* or other bee entering the territory is driven off or attacked using the spines to inflict damage, and the larger the male the more likely he is to be the victor.

Nesting

Females use existing cavities as nest sites, such as hollow stems, old insect burrows in wood and burrows in the soil. The cell walls and closing plug are made from layers of long silky hairs which are shaved from leaves by the female's many-toothed mandibles. These hairs are taken from plants, often garden ones, such as woundwort, stachys and mullein and are brought to the nest in the mandibles and then teased out. Because of this, the bee is one of few to have acquired a common or English name, 'the wool-carder bee'.

Foraging plants

Not much is known about its pollen sources and females may well collect pollen from many different plants. However they seem to favour labiate flowers, such as Black Horehound.

Method of transporting pollen

Being a member of the subfamily Megachilinae, the female has a brush of pollen-collecting hairs on the underside of her abdomen.

Flight period

This bee is single-brooded, flying from late May to early August, with a peak in June/July.

Distribution

Widespread in southern England and Wales, plus some in north Wales and south-west Scotland.

Parasites or cuckoos

The cleptoparasitic black bee *Stelis punctulatissima* is a cuckoo of *A. manicatum*.

Keys:

Saunders (1996)

George Else, in preparation

REFERENCES & FURTHER READING:

Edwards BWARS 1 (1997)

Saunders (1896)

Genus *Chelostoma* (by Mike Edwards & Raymond Uffen)**Number of British species**

Two

Size range

5-11mm long.

Physical characteristics

Chelostoma is like a thick pencil lead in overall shape, the abdomen being elongate. The head is robust, being relatively deep from front to back; the thorax is twice as long as wide. The overall colour is black, while one species has distinct bars of white on the apices of the abdominal segments, the other is unmarked. The cuticle is strongly punctate throughout. The pollen-collecting scopa is underneath the abdomen of the female bee. The males have a distinctive two-pronged peg on the last abdominal segment. This is used to pinch the bee to a support, often part of a flower, when it roosts for the night or in bad weather

Solitary or Social

Chelostoma females are solitary nesters. However, where conditions are suitable, very large numbers may nest in close proximity.

Nesting behaviour

Both species use pre-existing cavities in firm timber or stems. As far as is known, they do not excavate their own burrows. Old straw and reed stems, often in thatch, are used, as well as old beetle burrows. Cells are made in line and separated by thin partitions of mud. There may be empty, dummy cells, which are thought to fool parasitic wasps into thinking that the nest is empty. The burrow is plugged with a thick layer of mud.

General abundance

C. campanularum is widespread in the southern half of England and particularly frequent in gardens, *C. florisomne* is a less frequently observed species, which appears to have undergone cycles of abundance in the past.

Foraging plants

C. campanularum likes to visit flowers of the family Campanulaceae and collects a large proportion of its pollen from the plants, it is possible that it uses a wider range of plant species than this. *C. florisomne* seems totally dependent upon the flowers of the Ranunculaceae.

Methods of transporting pollen

Females carry their pollen in a stiff brush of hairs under the abdomen - the scopa.

Parasites or cuckoos

The wasp *Monospyga clavicornis* is parasitic on *C. florisomne*.

Keys available

Amiet et al. (2004) in French & German

Banaszak et al. (1988) in English

Saunders (1896)

George Else (in preparation)

DESCRIPTIONS OF SELECTED SPECIES

Chelostoma florissomne (Linnaeus, 1758)

Description

Female: 8-11mm. A narrow, parallel-sided bee, generally black with narrow bands of short white hairs on the ends of abdominal segments 1-5. The scopa is white.

Male: 7-11mm. Very similar to the female, but with no scopa and less obvious hair bands. Instead, the end of the abdomen has a forked peg which is used to support the bee from a leaf or flower while it sleeps overnight or in bad weather.

Nesting methods

The females create linear cells in pre-existing cavities, typically in beetle burrows in dead timber, but may also use straw in thatch. The female collects her pollen exclusively from Buttercups *Ranunculus* species.

Flight period

Females and males from May to July.

Abundance in UK

Widespread, but not often abundant, in a number of habitats where buttercups are flowering. Most associated with open woodland glades. It is known from Southern and Central England as far north as Yorkshire. Also known from Wales.

REFERENCES & FURTHER READING

Saunders (1896)

Genus *Coelioxys* (by David Baldock)

Number of British species

There are six species occurring in mainland Britain, with a further two species in the Channel Islands.

Size range

British species of *Coelioxys* are small to large bees ranging from 7-16mm long.

Physical characteristics

Coelioxys are mostly black with prominent white hair bands on the upper and lower sides of most of the segments of the abdomen. The strong thick integument of the whole body is densely and coarsely punctate, the head and thorax are covered in longish, off-white hairs but the abdomen is almost hairless apart from the obvious white hair-bands, and even the eyes are covered in dense short hairs. Most species have two sharp spines produced at the back of the thorax. However, perhaps the most striking characteristic is the difference between the sexes. The last lower segment of the female abdomen is finely pointed at the end (used for slitting open the host's cell) and the sides of this segment have different shapes and projections according to the different species. Males have a rounded end to the abdomen and the last segment has one to four pairs of sharp or blunt spines sticking out backwards. All species in the genus are very similar and difficult to separate.

Solitary or social

Solitary.

Nesting behaviour

Coelioxys are cuckoos on leaf-cutter bees in the genus *Megachile*, certain bees in the genus *Anthophora* and possibly *Anthidium manicatum*. Little is known about the exact hosts of most species. Being parasitic they do not make their own nests but the female uses her sharply pointed tail segment to cut a slit in the wall or cap of the host cell, through which she inserts her egg. On hatching, the *Coelioxys* larva has a pair of short mandibles but, on reaching its second instar, these become much longer and finer and are used to churn the surface of the pollen/nectar provision which disorients the host egg or larva and causes its death. Later instars have normal mandibles and consume the provision.

General abundance

Coelioxys bees are generally difficult to find and never frequent, except one species, *C. conoidea*, which can be locally common around its host's nesting aggregations. On the other hand most species are widely distributed and are not classified as Nationally Scarce or Red Data Book species. Two species, *C. mandibularis* and *C. quadridentata*, are classified as Red Data Book species.

Foraging plants

As cleptoparasitic species *Coelioxys* have no need to collect pollen and so flower visits are for nectar only. A wide range of flower species has been recorded but they are rarely found at flowers.

Methods of transporting pollen

Pollen is not collected or carried, as the bees are parasitic.

Parasites or cuckoos

No information is known.

Keys available

Saunders (1896)

George Else, in preparation

Table of British species of *Coelioxys* and their probable host associations

Coelioxys	Host(s)
conoidea	Megachile maritima
elongata	Megachile centuncularis, M. circumcincta, M. ligniseca, M. maritima, M. willughbiella
inermis	Megachile versicolor, M. centuncularis, M. maritima
mandibularis	<i>Possibly</i> Megachile dorsalis, M. maritima
quadridentata	Anthophora furcata, A. quadrimaculata
rufescens	Megachile circumcincta, Anthophora bimaculata,

DESCRIPTION OF SELECTED SPECIES**Coelioxys conoidea** (Illiger, 1806)**Description**

Female: Length 11-15mm. The abdomen has particularly large and prominent white scale-like hair patches, rather than bands, on all except the last segment, both above and below. The pointed last lower segment has simple sides and is lance-shaped. The whole body, including the legs, is coarsely and densely punctate, both above and below. The eyes have dense short hairs. The thorax has two blunt spines at the back.

Male: Length 11-14mm. Very different looking from, and slightly smaller than, the female because the male has a rounded end to the abdomen instead of being pointed. The last rounded segment has three pairs of backward-pointing spines. Otherwise it is similar to the female.

Nesting methods

The species is a cleptoparasite of the large Leaf-cutter bee *Megachile maritima*, and does not therefore make its own nest or collect pollen. The female slits open the cap of the host cell and inserts an egg, the larva then destroys the host larva and consumes the provision, later overwintering as a pre-pupa in a cocoon.

Flight period

The bee is single-brooded and flies from mid-June to late August.

Abundance in UK

This species is widespread in southern England and Wales as far north as North Norfolk but it is found mainly on coastal dunes and landslips. There are a few inland localities where it occurs on dry heaths in the western Weald and the East Anglian brecks.

REFERENCES & FURTHER READING

Edwards et al. BWARS Part 3 (2001)

Genus *Heriades* (by David Baldock)**Number of British species**

Two

Heriades truncorum (Linnaeus, 1758)**Physical characteristics**

Female: Length 5-9mm. A small black bee with an abdomen that is almost hairless, except for weak white hair bands. The female has long, very pale orange pollen hairs underneath the abdomen. However, it is not shiny black because the whole body is covered with very dense punctation. The head is stout with massive mandibles. On close examination it will be seen that both sexes have a keel or carina on the front of the first segment of the abdomen, separating the declivity from the rest of the segment. This character is unique to the genus *Heriades*.

Male: Length 5-8mm. As the female, but without the orange pollen brush.

Solitary or social

Solitary.

Flight period

It is single-brooded but has a long season, flying from June until September.

Nesting behaviour

This species nests in old beetle burrows in dead wood, especially fence posts, and occasionally in pithy stems of plants such as bramble; it may also use holes in walls. It uses resin to make plugs between cells.

General abundance

Rare and almost restricted to the western Weald of West Sussex, Sussex coast, North Hampshire and Surrey where it occurs on sandy heaths, on chalk and in clay woodlands. It is widespread in Surrey, even occurring in London at the Wetland Centre, and in some sites it can be numerous, especially where ragwort grows near old fence posts. It may be expanding its range as it has recently been found for the first time at Bushy Park and at new sites in Essex and Kent.

Foraging plants

Oligolectic on composites. It is almost always seen on ragwort flowers but occasionally also on other smaller yellow composites such as Hawkbits and Cat's-ears. When foraging the female has a distinctive habit of wiggling her abdomen up and down very fast on the flower head.

Method of transporting pollen

It carries pollen on the long hairs below the abdomen.

Parasites or cuckoos

An almost identical-looking black bee, *Stelis breviscula*, is a cleptoparasite of *Heriades truncorum*, entering its burrows and laying its egg in a cell. This cleptoparasite was only first found in Britain in 1984 and is considered to be very rare but may possibly have been overlooked.

Availability of Keys

Saunders (1896)

George Else, in preparation

REFERENCES & FURTHER READING

Saunders (1896)

Genus *Hoplitis* (by Mike Edwards & Raymond Uffen)**Number of British species**

One, and one doubtfully native (not dealt with here).

Size range: 6-10 mm.

Physical characteristics

Hoplitis bees are very similar in appearance to the genus *Osmia*, in fact there is considerable dissent as to whether this genus should be included within the genus *Osmia*. They are also cylindrical bees, without a great deal of hair on the top of the abdomen. The quoted distinction between the two genera is the presence of two smooth lines on the top of the thorax. These run parallel to the sides of the thorax, one on each side and just in from the point of attachment of the wings. In *Osmia* these marks are more spot-like. The species considered here is distinctive, especially in the male.

In common with other Megachilid bees the females have a pollen-collecting brush on the underside of the abdomen. The males have a distinctive flattened peg which projects underneath and downward, running transversely across the second segment of the abdomen.

Solitary or social?

Solitary.

Nesting behaviour

H. claviventris hollows out the pith in the centre of old bramble stems, creating a gallery with a distinctive barrel-like first chamber.

General abundance

H. claviventris is a scrub-edge species extending as far north as Cumbria. It tends to be found in ones and twos only.

Foraging plants

H. claviventris visits a wide range of flower species for its pollen.

Methods of transporting pollen

This species has a pollen-brushes on the underneath of the abdomen. The hairs of these are greyish-white.

Parasites or cuckoos

H. claviventris is cuckoo-ed by the bee *Stelis ornatula*. *Stelis* is a completely cleptoparasitic genus of bees. It is also attacked by several Parasitica which generally parasitise stem-nesting aculeates.

Keys available

Saunders (1896) – see *Osmia*
George Else, in preparation

DESCRIPTIONS OF SELECTED SPECIES

Hoplitis claviventris (Thomson, 1872)

Description

Female 6-10mm: A dark, elongate, cylindrical, bee with well-marked bands of white hair on the tips of the abdominal segments.

Male 7-10mm: The male is of similar shape and size to the female, but less clearly marked with white hair bands on the abdomen. When looked sideways, however, a strong flattened spine is usually readily visible pointing downwards on the underneath of the second abdominal segment.

Nesting methods

The nest is excavated inside the pith of dead bramble stems, occasionally rose stems. The cells are separated inside the shell by walls made of chewed plant material. The cells nearest the entrance produce males, which emerge several days before the females deeper inside the stem.

Active during

May-September.

Abundance in UK

Local, but may be abundant in a wide range of habitats, as long as old bramble stems in sunny places are present.

Keys available

Saunders (1896) – see *Osmia*

George Else, in preparation

REFERENCES & FURTHER READING

Edwards BWARS 2 (1998)

Saunders (1896)

Genus *Megachile* (by Mike Edwards & Raymond Uffen)

Number of British species

Seven - with two doubtfully native species which have been included in the past (*M. ericetorum*, *M. lapponica*)

Size range

6-18 mm.

Physical characteristics

Although closely related to *Osmia* bees, this group have a quite different look about them, being wider and flatter in the body and less massive front-to-back in the head. None the less, they are all very robust-looking bees in both males and females. Males of several species have flattened and widened front tarsi which are cream in colour, but other species are perfectly normal, thin and cylindrical. All females have a ventral pollen brush which, in most species, is orange-red. The large jaws, which give the genus its name, are distinctive. In the female, they are used to cut pieces of leaf to make the cell in which the pollen, nectar and egg are placed - hence Leaf-Cutter Bees.

Solitary or social

Each female makes her own cells, but several females may nest in close proximity if plenty of cavities are available.

Nesting behaviour

Megachile bees draw more attention from gardeners than almost all other solitary bees because of their habit of cutting neat elliptical and circular pieces out of the leaves of shrubs to construct the multi-layer side and end walls of their nest cells. Up to 40 pieces have been noted from a single cell. Each cell looks like a small cigar which has been rolled from pieces of leaf. Those which make the ends are circular, while the sides are made from oval sections. Most species nest in existing cavities, cells being stacked in contact when in line, but a few burrow in firm sandy soil or in wood.

General abundance

Most species are very widely distributed over the whole of the British Isles and Ireland. Several are typical bees found in gardens.

Foraging plants

Some species are polylectic, visiting a wide variety of plant flowers for their pollen, whilst others show clear preference for one or two particular families of plants; Fabaceae and Asteraceae are much favoured.

Methods of transporting pollen

All *Megachile* females have a stiff brush of hairs on the underneath of their abdomens where they carry their pollen. A female megachile which is collecting pollen may be seen to point the end of its abdomen up into the air as it pushes pollen onto the pollen-brush with its hind legs.

Parasites or cuckoos

Coelioxys bees are specialists on *Megachile*. The last two segments of the abdomen in females of most species of these bees form a pair of scissors which are used to cut an opening in the completed *Megachile* cell and introduce the *Coelioxys* egg. Several generalist Parasitica are known to attack the cells of *Megachile* bees.

Keys available

Perkins (1925)

Saunders (1896)

George Else, under preparation

DESCRIPTIONS OF SELECTED SPECIES

Megachile willughbiella (Kirby, 1802)

Description

Female: 12-15mm. One of our largest solitary bees, often over 14mm long. The general colour is dark brown, with thin lines of pale hairs on the ends of the abdominal segments. The thorax is covered with fairly dense ginger-brown hair, those on the head being dark brown. Underneath the abdomen the orange-red scopa is clearly visible, although when this is full of pollen this colour may not be apparent.

Male: 10-14mm. Although they may be almost as large as the female, males are often rather smaller. The general colouration is similar to the female, but without the orange-red scopa underneath. The expanded front tarsi, which are creamy-white, are very readily noticed. These are used to cover the eyes of the female when mating, preventing her flying off! Males patrol rapidly between a numbers of vantage points. Sit and wait where one has just been resting and it may well be back in a few minutes.

Nesting methods

The cells are made of pieces of leaf. *M. willughbiella* is extremely adaptable in where it will make its cells. It may use large beetle galleries in dead wood; tunnels in hard sand faces (which it may excavate itself); hollow dead stems and, to the annoyance of many gardeners and the delight of others, in plant pots in greenhouses, especially if the soil inside is kept on the dry side as with succulents and cacti.

Flight period

From June to August.

Abundance in UK

Widespread in Britain and Ireland, although not upland areas; often common in city gardens and parks.

Megachile dorsalis, Perez, 1879

Description

Female: 9-11mm. Our smallest British megachilid. General colour dark brown, with a thin covering of silver-grey hairs and noticeable bands of fine white hairs on the ends of the abdominal segments. The pollen brush is unusual in British megachilids in being white. The most noticeable thing about this species is the noise it makes as it approaches - a very high-revving motor-bike - and then you see the large green eyes. This eye colour disappears in dead specimens, but is very distinctive in live ones.

Male: 6-10mm. Rather less robust in general build than the female, with the whiteness over the dark brown body more accentuated as the hairs are denser. The eyes are also green and the white bands on the ends of the abdominal segments are particularly strong.

Nesting methods

M. dorsalis only nests in fine sands; most often on coastal dunes, although it is also found in the Norfolk Brecks and the heaths of Surrey. The cells are made of cut leaves.

Flight period

From June to August.

Abundance in UK

Although restricted to the southern coasts of England and Wales (with the exceptions noted above), this bee can be very abundant where it occurs, filling the air with its miniature motorbike noises.

REFERENCES & FURTHER READING

- Edwards et al. BWARS 3 (2001)
- Perkins (1925)
- Saunders (1896)

Genus *Osmia* (by Mike Edwards & Raymond Uffen)

Number of British species

Eleven, plus one in Channel Islands.

Size range

Length 7-14mm.

Physical characteristics

The general appearance of an *Osmia* bee resembles a short length of cylindrical pencil, which has been narrowed in two places to make the three major body parts, head, thorax and abdomen. The females of many species are distinctly hairy, and brightly coloured, although two widespread garden species, *O. caerulescens* and *O. leaiana* are much less so. All female bees in this genus have a distinctive pollen brush or scopa underneath the abdomen, the hairs which form this are either bright red-orange or black. Males are less obviously hairy in all species, the overall appearance is of a dowdier female without the pollen brush. Again *O. caerulescens* and *O. leaiana* are the least hairy and the bodies of these two species are distinctly metallic to the naked eye. The genera *Hoplitis* and *Chelostoma* are very similar and are included within *Osmia* by many taxonomists.

Solitary or social

All female *Osmia* bees provision their own nest cells and do not share provisioning duties, and they are therefore classed as solitary. However, females of the montane species *Osmia inermis* may share the same nest site with many other females (under flat stones on the ground or in crevices in cliffs) and large aggregations of nesting females may be found. In gardens *Osmia rufa* females may use a common entrance to a larger cavity. Such behaviour is called colonial nesting.

Nesting behaviour

Females nest in a variety of ready-made cavities, such as those in the mortar of walls or bricks, old beetle burrows or empty snail-shells. The exact location varies between species. The females construct cells within the cavity in which to place the pollen and nectar supplies required by the developing larva. Cells are either made from mud or chewed plant material, according to species.

General abundance

A few species are particularly common in gardens in England and Wales, particularly in the southern areas. Most species occur at much lower densities and several are extremely scarce, even within their characteristic habitat.

Foraging plants

There are a variety of pollen-collecting strategies within the genus. Some species are specialist on particular plant families, such as Asteraceae or Fabaceae, others collect pollen from a wide range of flower types.

Methods of transporting pollen

Females of all species carry their pollen in a stiff brush of hairs under the abdomen - the scopa. The colour of these hairs is important in identification.

Parasites or cuckoos

Osmia bees have both parasites and cuckoos associated with them. The generalist Chalcid genus *Melittobia* often infest the nests, preying on the developing larva. Sarcophagid flies are also major parasites of the colonial nesting *Osmia rufa*, and probably infest nests of the other species when they can find them. Among other aculeates, the wasp *Sapyga quinquepunctata* preys on the pre-pupa, although it gains entrance to the cell by the adult wasp laying an egg in an *Osmia* cell as it is being provisioned. The *Sapyga* egg does not hatch until the bee larva has consumed all the provisions and turned into the resting pre-pupal stage. Two species of Chrysidid wasp are specialised on *Osmia*, this time eating the provisions laid up for the bee, after eating the egg or young larva.

Keys available

Amiet et al (2004) in German & French.
 Banaszak et al. (1988). In English
 Saunders, (1896)
 George Else, in preparation,

DESCRIPTIONS OF SELECTED SPECIES***Osmia bicornis* (= *rufa*) (Linnaeus, 1758)****Description**

Female: Length 9-14mm. The surface of the head and thorax is black, contrasting with the bronzy sheen on the abdomen, which is covered with long, erect orange-red hairs. This hair becomes more reclined towards the tips of the segments of the abdomen, giving an impression of denser hair bands. The thoracic hair is mixed pale and dark, but paler beneath. The facial hair is black. Very faded bees with tattered wings occur late in the season. The lower corners of the clypeus each project forward as a fixed tooth or horn. The scopa is orange. Only confusable with the smaller *Osmia aurulenta* and the more elongate mining bee *Andrena fulva*.

Male: Length 7-13mm. Similarly coloured to the female for the most part, but the facial hairs are pale. The hairs quite rapidly fade to dirty-white. The antennae are long, reaching to the end of the thorax if laid back from the head.

Nesting methods

It nests in any sort of cavity in buildings, especially in fissures in mortar joints, even blocking door locks with groups of up to 50 mud cells. It also uses a range of natural cavities, from holes in timber to spaces between stones in earth banks.

Osmia bicornis collects mud at the edge of puddles or springs, often creating short tunnels into the plastic mud. Balls of mud are carried beneath the head. This is one of the most frequent colonists of tubular trap nests, such as bamboo canes. The new generation bees overwinter within tough reddish-brown silken cocoons. She collects pollen from many families of plants.

Flight period

March to July. Single brood.

Abundance in UK

Common throughout lowland England and Wales. Uncommon in Scotland and Ireland (only recently recorded).

Osmia caerulea* (Linnaeus, 1758)*Description**

Female: Length 7-11mm. The body is steel-blue with a black scopa underneath the abdomen. There are thin lines of white pubescence on the apices of the abdominal segments. These are more noticeable on the last two segments. Otherwise, there is a thin covering of pale, inconspicuous hairs on the head and thorax. The head appears relatively robust for the general size of the insect

Male: 7-10mm. The body is overall coppery in hue, with a thin covering of golden-brown hairs, most noticeable on the head and thorax. Males vary considerably in size. Distinguishing males of this species from those of *O. leaiana* requires careful microscopic examination.

Nesting methods

O. caerulea makes lines of cells in old stems or beetle burrows in wood, in cavities in stones, walls and thatch. The cells are made with mastic created by chewing plant leaves with the mandibles. They are provisioned with pollen from a wide variety of plants.

Flight period

Males emerge first, but are followed within a week by the females. There are two generations in the south of the UK but only one in more northerly locations. The bees may therefore be seen from mid-April to September, but are commonest between April and July.

Abundance in UK

Common, especially in gardens in southern England and Wales. This species is known from the Central Lowlands of Scotland, but not from Ireland.

REFERENCES & FURTHER READING

Edwards et al. BWARS 1 (1997), 2 (1998), 4 (2002), 5 (2005)
Else & Edwards (1996)
Saunders (1896)

Genus *Stelis* (by Graham Collins)

Number of British species

Four species in the genus *Stelis* occur in Britain.

Size range

British species of *Stelis* are small to medium-sized bees ranging from 5 to 11mm long.

Physical characteristics

Stelis are black, hairless, compact bees. One species has yellow spots on the abdomen and another has cream-coloured marginal bands. The integument is rather thick and strongly sculptured. There are two submarginal cells in the forewing, the labrum is elongate, and the axillae (either side of the scutellum) are acutely pointed apically. The females, being parasitic, have no pollen-collecting apparatus.

Solitary or social

Solitary.

Nesting behaviour

Stelis are cleptoparasitic on megachiline bees such as *Osmia*, *Hoplitis*, *Anthidium* and *Heriades*. The hosts nest in hollow stems, such as of bramble or rose, and in mortar in walls. There appears to be little information available on the exact mechanism of the parasitism, but occupied nests can be identified as the *Stelis* cocoons are densely opaque with an apical nipple.

General abundance

Stelis are generally rather scarce bees. All have been classified as either Notable/A or Red Data Book species (Shirt, 1987; Falk, 1991). *Stelis phaeoptera* has decreased alarmingly during the 20th Century. *Stelis breviscula*, on the other hand, appears to be a recent colonist and is currently spreading, although its host, *Heriades truncorum*, is itself a Red Data Book species. Distribution maps for the four species are given in Edwards (1997 and 1998).

Foraging plants

As cleptoparasitic species *Stelis* have no need to collect pollen and so flower visits are for nectar only. A wide range of species has been recorded, such as: bird's-foot trefoil, ragwort, fleabane, bramble, thistles, scabious and germander speedwell.

Methods of transporting pollen

Pollen is not collected or carried, as the bees are parasitic.

Parasites or cuckoos

As the species are mostly rare and seldom reared there is little information available. The chalcidoid wasp *Pteromalus apum* has been reared from the cocoons of *Stelis ornatula*.

Keys available

Saunders (1896) includes three of the four British species, George Else, in preparation;

Table ** British species of *Stelis* and their probable host associations

Stelis	Host(s)
breviuscula	Heriades truncorum
ornatula	Hoplitis claviventris
phaeoptera	possibly <i>Osmia leaiana</i>
punctulatissima	<i>Anthidium manicatum</i> , <i>Osmia leaiana</i> , <i>O. aurulenta</i>

DESCRIPTION OF SELECTED SPECIES

Stelis punctulatissima (Kirby, 1802)

Description

Female: Length 7-11mm. Rather compact, shiny black with posterior margins of abdominal segments pale. Head and thorax strongly and densely punctured, thinly covered with yellowish hairs. Mandibles broad with three sharp teeth. Antennae with last segment obliquely truncate. Wings with marginal cell with strong brown smudge. Axillae triangular with strong tooth projecting beyond outline of scutellum. Abdomen shining black, well punctured but less deeply and densely than thorax. First four tergites with straw-coloured, translucent, posterior margins. No scopal hairs on abdomen or legs.

Male: Length 7-11mm. Very similar to the female. Abdomen with third and fourth sternites concave and fringed at the apex with long, stiff, golden hairs. The seventh tergite is hidden beneath the sixth, so antennal segments should be counted to confirm the sex.

Nesting methods

The species is a cleptoparasite, so doesn't make its own nest or collect pollen.

Flight period

The bee flies from mid-June through July and August.

Abundance in UK

Writing over a hundred years ago Saunders (1896) described this species as “the least rare species of the genus but far from common”, a situation which holds today. Most frequently recorded south of a line from the Severn estuary to the Wash, there are also a couple of records from the Lake District and from southern Scotland. It appears to be a declining species with comparatively few recent records. A distribution map appears in Edwards (1997).

Host

Anthidium manicatum, *Osmia leaiana*, and *O. aurulenta* have been recorded as hosts. The first two species nest in holes in wood and in walls, while *O. aurulenta* nests in old snail shells. *Anthidium manicatum* frequently occurs in gardens, and *punctulatissima* is the most likely *Stelis* to be seen there.

REFERENCES AND FURTHER READING

Edwards, BWARS 1 (1997), 2 (1998).
 Else (1998) 214-216.
 Falk (1991)
 Saunders (1896)
 Shirt (1987)

Melittidae

Genus *Dasygaster* (by David Baldock)

Number of British species

One.

Dasygaster hirtipes (=altercator) (Fabricius, 1793)

Physical characteristics

Female: Length 12-15mm. She is one of the most attractive and distinctive bees in Britain. She is large and has a shiny black abdomen with conspicuous white hair bands, but most striking are her hind legs which carry very long, bright orange pollen hairs.

Male: Length 12-15mm. He is much duller and slightly smaller and of course lacks the bright pollen hairs. He is covered all over with long, dull orange hairs, soon fading to off-white and looks nothing like the female.

Solitary or social

Solitary.

Flight period

Single-brooded; flying from late June to late August.

Nesting behaviour

Females excavate very long, oblique burrows in hard-packed, sandy, level soil and create characteristic fans of spoil on one side of the entrance. She uses her long pollen hairs as a rake to throw out the excavated sand. The burrows are made in sparsely vegetated or bare soil, often in sandy car parks. They usually nest in aggregations, sometimes in enormous numbers, and often in company with the wasp *Philanthus triangulum*.

General abundance

Widely but locally distributed over southern England and Wales in sandy localities, mainly on coastal dunes with a few inland sites on heathlands or very dry hot sandy areas. It occurs as far north as the Merionethshire coast in North Wales and on the Norfolk coast. It is most common in the south-east corner of England especially around the Thames estuary and on the heaths of the western Weald.

Foraging plants

Females are mainly found on common ragwort, thistles and smaller yellow composites.

Method of transporting pollen

On the very long pollen hairs on the hind legs.

Parasites or cuckoos

None known

Availability of Keys

Saunders (1896)

George Else, in preparation

REFERENCES & FURTHER READING

Edwards, BWARS 2 (1998)

Saunders (1896)

Genus *Macropis* (by David Baldock)**Number of British species**

The genus *Macropis* is one of the few genera in the subfamily Melittinae. Only one species is found in Britain, but two more occur in Europe, both of which also forage from loosestrife. This species is unique in this country because the females provision their nests with fatty floral oils mixed with pollen.

Macropis europaea, Warncke, 1973**Physical characteristics**

Female: Length 8-9mm. A small-medium black bee having a strikingly shiny abdomen with narrow white hair bands and large white pollen brushes, giving her a striking pied effect. In both sexes the hind legs are extremely wide. The female also has special pads on the front and middle feet for collecting floral oils from yellow loosestrife.

Male: Length 8-9mm. He has a distinctive yellow face.

Solitary or social

Solitary.

Nesting behaviour

Nests are excavated in banks, on level ground or at the base of root-plates, often concealed by vegetation. The cells are lined with a yellowish waterproof lining, probably made from floral oils collected from yellow loosestrife; this is presumably to protect the nests from water in the damp habitat that they inhabit. The cells are filled with a mixture of pollen and floral oils (rather than nectar), both collected from yellow loosestrife which does not produce nectar.

General abundance

Its range is restricted to that of its forage plant, yellow loosestrife, which is southern England. Here it is very local in damp habitats but only where its forage plant grows. It is found mainly in the south-east but it occurs as far west as Devon and as far north as the Norfolk Broads. It is occasionally common at some sites. The males are also almost only found around the flowers of yellow loosestrife.

Foraging plants

Almost certainly restricted to yellow loosestrife. Females are sometimes seen on gypsywort and both sexes on alder buckthorn, but these are probably only nectar sources.

Flight period

Single-brooded, flying in July and August to coincide with the flowering of its forage plant.

Methods of transporting pollen

The female collects floral oils from yellow loosestrife with its specially adapted front and middle feet and mixes these with the pollen, which it transports on the brushes on its hind legs.

Parasites or cuckoos

None known in Britain.

Keys available

Saunders (1896)

George Else, in preparation.

REFERENCES & FURTHER READING:

Edwards BWARS 2 (1998)

Saunders (1896)

Genus *Melitta* (by Graham Collins)**Number of British species**

Four.

Size range

Melitta are medium-sized to large bees, ranging from 8-15 mm long.

Physical characteristics

Bees of the genus *Melitta* are fairly hairy, long-tongued species somewhat resembling *Andrena*. The forewings have three submarginal cells, but the jugal lobe of the hindwing is short. The last segment of the antenna is obliquely truncate, with a flattened, polished area, and in the males the antennae have a rather knobbly appearance. The female has a scopa on the hind legs.

Solitary or social

Solitary.

Nesting behaviour

Nesting occurs in soil, although both Saunders (1896) and Falk (1991) were unable to provide direct evidence. No nests of the rarest, but probably most studied, British species, *Melitta dimidiata*, have yet been found in Britain (Else & Roberts, 1994). In view of this it is likely that the nests are concealed beneath vegetation and are non-colonial. Nests of the three other species have been found only occasionally; some in bare soil and some concealed by plants, some widely scattered and some in aggregations of at least 20 per m² (Edwards, 1998).

General abundance

All four species are more or less restricted to the southern half of Britain. Two presently have no scarcity status, one (*M. tricincta*) is Notable and one (*M. dimidiata*) RDB1 (Shirt, 1987). Current knowledge suggests that these statuses should be revised; *M. dimidiata* occurring over quite a wide area of Salisbury Plain, Wiltshire and therefore less endangered, and *M. leporina* and *M. haemorrhoidalis* both occurring less widely than previously thought and thus meriting Notable status.

Foraging plants

The species of *Melitta* are all mono or oligolectic; that is they collect pollen from a single or very narrow range of plant species. *Melitta dimidiata* and *M. tricincta* are monolectic on sainfoin and red bartsia respectively. *Melitta haemorrhoidalis* is restricted to bellflowers, but in addition to the native species will also visit cultivated species such as Canterbury-bell growing in gardens. The final species, *M. leporina*, is perhaps less restricted; pollen sources are thought to be clovers and vetches (Fabaceae), especially white clover, although it appears that no actual pollen analysis has been done in Britain.

Methods of transporting pollen

All four species of *Melitta* have the pollen-collecting apparatus on the tibiae of the hind legs.

Parasites or cuckoos

The cleptoparasitic bee *Nomada flavopicta* is probably a cuckoo of *Melitta tricincta* and *M. leporina*, and possibly also affects *M. haemorrhoidalis*.

Keys available

Saunders (1896) was only aware of two British species, and so his key will not work. Else, in preparation.

DESCRIPTION OF SELECTED SPECIES

Melitta haemorrhoidalis (Fabricius, 1775)

Description

Female: Length 10-12mm. Black covered with pale golden hairs, the tail (i.e. tergites 5 and 6) with dense golden-red hairs. The hind legs with a golden-yellow scopa and a patch of similarly coloured hairs at the end of the femur (above the “knee”); the latter serving to distinguish it from the other species of the genus in which it is blackish. Head with golden-yellow hairs on the frons and clypeus and black hairs on the vertex. Antennae fairly short, black above, tinged orange below, and with the last segment obliquely truncate. Thorax covered with long golden-yellow hair that grades to black on the mesonotum. Abdomen with an even covering of short hairs, nowhere forming bands. The tail bright reddish-orange.

Male: Length 10-12mm. Similar to female but with red tail less obvious, the hairs paler and confined to the last tergite. Antennae fairly long, each flagellar segment excavated below, giving a knobby appearance.

Nesting methods

Nesting occurs in soil, but like most members of the genus is rarely observed. A small aggregation of burrows was noted in a sandy hedge bank (O’Toole in Edwards, 1998). Pollen is collected from various species of bellflower; nettle-leaved bellflower, clustered bellflower and harebell being used in natural situations and Canterbury-bell in gardens.

Flight period

This bee flies in July and the first half of August. The males fly fast around the flowers utilised by the females and location and observation of the host plants provides the best means of locating the bee.

Abundance in UK

The bee is almost restricted to southern and eastern England, occurring on chalk grassland, open woodland and in gardens. Outlying populations have been recorded in North Wales, the Lake District and Northumberland, and there are older records for southern Scotland and the Isle of Man. A distribution map appears in Edwards (1998).

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