

SPHECODES IDENTIFICATION BWARS WORKSHOP

Steven Falk October 2019

Introduction

Sphcodes is regarded as a challenging genus by many. It is true that they are small bees that tend to all look similar in the field, and few can be identified reliably from a photograph. But as pinned specimens, some are probably easier to identify than people realise, especially where the female mouthparts (mandibles and labrum) or male genitalia are exposed. A number of species have a single unique morphological character or character set that can quickly be learned. With a little experience, most males can be identified purely from the genitalia in a matter of seconds.

Complications can arise from variation within individual species. This can involve considerable variation in size (notably in *S. monilicornis* and *S. ephippius*), the amount of red on the tergites (with smaller specimens often darker than large ones), the density of punctures on the thorax, face and tergites, and the precise pattern of sculpturing on the propodeum and pleurae. Allometry can complicate things further, with larger individuals of a species often looking rather different to small individuals in terms of proportions/robustness, punctures and colour pattern. There is also the real possibility that the 'generalist' *Sphcodes* currently regarded as using several host species (notably in *S. monilicornis* and *S. ephippius*) are species complexes comprised of 2 or more cryptic species. Careful DNA studies using material strictly associated with a host are required to investigate this and BWARS members are the obvious people for helping to pursue this.

Pinning *Sphcodes*

Always insert pin to one side of the midline of the scutum when top-pinning so that at least one side of the scutum (and the associated puncturation) is undamaged. Do not use an oversized pin as this creates unnecessary damage (I only ever use micropins for pinning small bees). It is important that the wings do not obscure the tergites as the punctures here can be critical. The mandibles should be open (to allow the two sickle-jawed species (*S. puncticeps* and *S. longulus*) to be distinguished from other species, and the labrum should be pulled out, especially in the smaller species (the longer labrum of *S. ferruginatus* and *S. crassus* can be a very helpful character). Make sure that the mouthparts are not obscured by pollen or other substances. The male genitalia can be extracted using a sharp pin (like pulling a wrinkle from its shell). You can either pull it completely off and use a fine (A1) micropin to pin the genitalia on to the same plastazote strip that the pinned bee is attached to, or pull it enough to ensure that it remains exposed but still attached to the specimen.

If you pin your material while it is still fresh and pliable, then it is very easy to produce a good specimen. Once your specimen has started to dry out, it will be impossible and bits will snap. You can often relax dry specimens in a warm tube with some damp tissue to make them pliable again but be careful that they don't get wet (which can ruin them) or leave them more than a few hours, otherwise they can start to decompose.

Collecting *Sphcodes*

Females are most frequently observed around host nesting areas (earth banks, footpaths, cliff faces etc.). Here you can catch them individually. You can also use a long-handled net to sweep low over more extensive areas of host nesting habitat or along cliff faces. On a good day, this can be very productive as a minute or two of sweeping can capture several dozen *Sphcodes* which can then be pootered up. Both sexes will also visit flowers. Again, you can net them individually, or use sweeping. Stands of thistles, umbellifers and Yarrow can often draw in large numbers of male *Sphcodes* and dandelions are good in spring. Using a combination of a long-handled net and a pooter, it can be possible to get large samples of *Sphcodes* during a site visit. Try to take big ones, small ones, thin ones, fat ones, males and females. A good bit of chalk grassland, coastal grassland or heathland in southern England can produce as many as 10 species in a day but you only ever get lists this good if you are prepared to take enough material because lots of it cannot be identified in the field, even if

you sense that several species might be flying. Pan trapping can also intercept *Sphecodes* but not many in my experience.

Identification resources

We are now blessed with a surprising amount of literature and online resources:

Falk (2015) *Field Guide to the Bees of Great Britain and Ireland* – good, user-friendly keys plus species accounts that provide useful supplementary information on identification.

Else & Edwards (2018) *Handbook to the Bees of the British Isles* – good keys but rather different to previous in terms of key structure, plus the choice and emphasis of certain characters.

Pauly (2019) *Abeilles de Belgique, Famille Halictidae* – a detailed and well-illustrated account of all the halictids of Belgium and surrounding area. Includes three extra *Sphecodes* species: *S. albilabris*, *S. majalis* and *S. rufiventris*. *Sphecodes albilabris* is a very large species (wing length 10mm) with a fully red gaster that attacks *Colletes cunicularius*. It could soon turn up in Britain mirroring the recent spread of its host but the other two are less likely to be found here given their hosts.

Steven Falk Flickr Apoidea - a very detailed online resource that provides photos and text for all our bees, acting both as a virtual field experience and a virtual museum collection. Pinned specimens and their critical features have been carefully photographed to help you interpret the above literature. If you keep clicking on the pictures, they zoom up large to show great detail. If you click on the 'Show More' text tab at the top of each species album, you get a drop-down species account with hyperlinks e.g. the BWARS species account. The link to *Sphecodes* is here:

<https://www.flickr.com/photos/63075200@N07/collections/72157638184988454/>

This genus page also has hyperlinks to other non-British *Sphecodes*-related web pages e.g. keys by Warncke.

Sexing *Sphecodes*

It is vital to know the sex because females and males have to be keyed out separately. This is really easy. Males are much slimmer, with much longer antennae (comprised of 11 longer flagellar segments rather than 10 short ones, and often with zones of microscopic pubescence on the individual flagellar segments), slimmer legs, smaller mandibles and faces with a much denser covering of white hairs. The sculpturing and puncturation of the body parts also varies considerably between the sexes, and males tend to be hairier than females.

The following two crib sheets provide user-friendly short-cuts and groupings to complement the above cited resources.

Female crib sheet

Group 1 - females quickly distinguished by one or more unique character:

S. spinulosus – ridge along back of head (unique); groove and step across base of sternite 2 (unique); antennae unusually long with most flagellar segments slightly longer than wide (unique amongst females); averages as our largest *Sphecodes* (wing length to 8mm).

S. monilicornis – box-shaped head in top view (to a unique extent) with many clean punctures behind the ocelli (as with *S. gibbus* and *S. reticulatus* which lack a box-shaped head).

S. scabricollis – ridge along hind margin of each gena (unique) and scutum with large, densely-packed punctures (to a unique extent).

S. niger – shiny hypoepimeral area beneath the wing bases (unique) – a tiny species (wing length to 4mm) with tergite 3 mostly black.

Group 2 – numerous distinct punctures behind the ocelli:

S. monilicornis (see Group 1) – box-shaped head, reddish dorsal spines on hind tibiae; pygidium broad.

S. gibbus – area behind ocelli deeper with 5-6 transverse rows of punctures; basal section of tergite 4 with sparse punctures; wings rather infuscated.

S. reticulatus - area behind ocelli shallower with only 2-3 transverse rows of punctures; basal section of tergite 4 with dense punctures; wings not unusually infuscated.

Group 3 – basal slope of tergite 1 with only short, sparse hairs:

S. ephippius – tergite 4 entirely or almost entirely black; basal section of tergite 2 with sparse punctures, especially in centre; hind tibiae with reddish dorsal spines; scutum less densely punctate; smaller (wing length to 6mm).

S. rubicundus – tergite 4 mostly or entirely red; basal section of tergite 2 with dense punctures; hind tibiae with blackish dorsal spines; scutum densely punctate; larger (wing length 6.5-7mm).

Group 4 – mandibles without any apical tooth or emargination:

S. puncticeps – front of scutum with a conspicuous median groove; head in front view much broader than high; legs mostly dark (tarsi dark); larger and more robust (wing length usually 4.5mm).

S. longulus – front of scutum without a conspicuous median groove; head in front view almost round; legs (including tarsi) extensively brown; tiny and slim (wing length to 4mm).

Group 5 – the rest:

S. pellucidus – sharply-angled pronotal collar above front coxa (unique within this group); medium-sized with densely-punctate scutum; head very transverse in top view; broad pygidium; medium-sized and rather hairy.

S. ferruginatus – a bit smaller than *S. pellucidus* but typically larger and more robust than the following species with a densely punctate scutum and head/face; head dulled by additional microsculpture; extended labrum as long as wide (as with *S. crassus*); upper sides of propodeum rather smooth plus tergites 2 & 3 without strong or especially dense punctures (both as with *S. hyalinatus* but underside of thorax less furry).

S. crassus – a small species with base of hind femora bulbously swollen (to a unique extent within this group); scutum sparsely punctate (like *S. geoffrellus*); labrum as long as wide (as with *S. ferruginatus*); top part of propodeum with a reticulate pattern of ridges (as with *S. miniatus*).

S. hyalinatus – averaging a little larger than *S. crassus* and the next three species; underside of thorax unusually furry; upper sides of propodeum relatively smooth plus tergites 2 & 3 without dense punctures (both as with *S. ferruginatus* but averaging smaller with shinier head and a less densely punctate scutum); top part of propodeum with radiating ridges and few cross struts (as with *S. geoffrellus*).

S. geoffrellus – small species with a very sparsely-punctate scutum (like *S. crassus* which has bulbous bases to hind femora and a longer labrum); top part of propodeum usually with neatly radiating ridges without obvious cross struts; few if any punctures on tergite 1; rather fine and sparse puncture bands across basal section of tergites 2 and 3; antennal segment 3 clearly shorter than 5, the latter being almost as long as wide.

S. miniatus – very similar to *S. geoffrellus* but top part of propodeum with a coarse reticulate pattern of ridges (more like *S. crassus*) and very coarsely sculptured on the sides and rear face outside of this area; scutum with denser and stronger punctures than *geoffrellus*, antennal segments 3-5 of similar length (like *S. marginatus*); tergites like *S. geoffrellus*.

S. marginatus – very similar to *S. geoffrellus* but with a narrow band of distinct punctures across tergite 1, broad bands of strong punctures across base of tergites 2 and 3, and antennal segments 3-5 all short and of similar length (with segment 5 about 1.5 times as wide a long).

Revised key to the females of *S. geoffrellus*, *S. marginatus* and *S. miniatus*

1. Top area of propodeum rugose, with a reticulate pattern of ridges enclosing numerous cells of integument, and lacking any long radiating striae; this area bound by a relatively strong semi-circular ridge, and with the sides and back of the propodeum outside of this semi-circular ridge coarsely rugose and enclosing numerous integument cells as with the top area. Scutum with somewhat denser, stronger punctures.....**miniatus**
- Top area of propodeum with long radiating striae, this area bound by a relatively weak semi-circular ridge, and with the sides and back of the propodeum outside of this ridge less coarsely rugose. Scutum with sparser, weaker punctures.....2
2. Tergite 1 without an obvious band of strong punctures two-thirds of distance between the base and hind margin (only some sparse, tiny punctures here). Puncture bands across the base of tergites 2 and 3 comprised of relatively sparse and weak punctures. Antennal segment 5 much longer than segment 3 and almost as long as wide. Top area of propodeum typically with neatly radiating striae of similar distance to one-another and without obvious cross struts between them.....**geoffrellus**
- Tergite 1 with an obvious (though narrow) band of strong punctures two-thirds of distance between the base and hind margin. Puncture bands across the base of tergites 2 and 3 comprised of relatively dense and strong punctures. Antennal segments 3-5 all short and of similar length with segment 5 about 1.5 times as wide as long. Top area of propodeum usually with less neatly radiating striae and with some cross struts between them.....**marginatus**

You can find supporting images here:

<https://www.flickr.com/photos/63075200@N07/collections/72157638184988454/>

Male crib sheet

If the genitalia are visible you can ignore this and go to the figures on p 224 of my field guide (appended here).

Group 1- males quickly distinguished by one or more unique character:

S. spinulosus – ridge along back of head (unique); groove and step across base of sternite 2 (unique); hind tibia with about 10 dark spines dorsally (unique amongst males), antennal flagellar segments flattened (as in Group 2 below), very large (wing length to 8mm).

S. gibbus – numerous distinct punctures behind the ocelli (unique amongst males); antennal flagellar segments flattened (as in Group 2 below).

S. scabricollis – ridge along hind margin of each gena (unique) and scutum with large, very densely-packed punctures (to a unique extent).

S. niger – shiny hypoepimeral area beneath the wing bases (unique); tergites completely black (unique except for rare melanics of other species); legs entirely black; hair zones of flagellar segments up to half as long as the segment (as in Group 4 below) – a tiny species (wing length to 4mm).

Group 2 – flagellar segments of antennae longer, slightly flattened and with shiny, bulbous fronts.

S. spinulosus – see Group 1.

S. gibbus – see Group 1, plus scutum with unusually sparse punctures.

S. monilicornis – hind margin of tergites 1-3 with few punctures; trochanters with a dense white pubescence like the undersides of the adjoining femur.

S. reticulatus – hind margin of tergites 1-3 densely punctate; trochanters without a dense white pubescence and thereby contrasting with the densely-haired undersides of the adjoining femur.

Group 3 – antennal flagella with hair zones occupying three-quarters or more of anterior face of some segments.

S. geoffrellus – few if any punctures on tergite 1 and relatively sparse punctures across basal section of tergites 2 and 3; gonostyli triangular with basal angle less than 90 degrees; hair zones of flagellar segments not extending to tip of those segments.

S. miniatus – similar to *S. geoffrellus* but gonostyli larger and trapezoidal.

S. marginatus – numerous strong punctures on tergite 1 and many strong punctures across basal section of tergites 2 and 3; gonostyli triangular like *S. geoffrellus* but with basal angle more than 90 degrees; hair zones of flagellar segments extending to actual tip of most segments.

Group 4 – antennal flagella with hair zones occupying up to one-half of anterior face of some segments.

S. niger (see see Group 1) – tiny and all-black.

S. pellucidus – legs mostly black; underside of thorax conspicuously furry; ventral surface of hind femora with hairs as long as width of femora; face with a particularly dense covering of long white hairs.

S. hyalinatus – legs extensively yellow; underside of thorax not conspicuously furry; ventral surface of hind femora with hairs no more than half width of femora; face with shorter, sparser hairs.

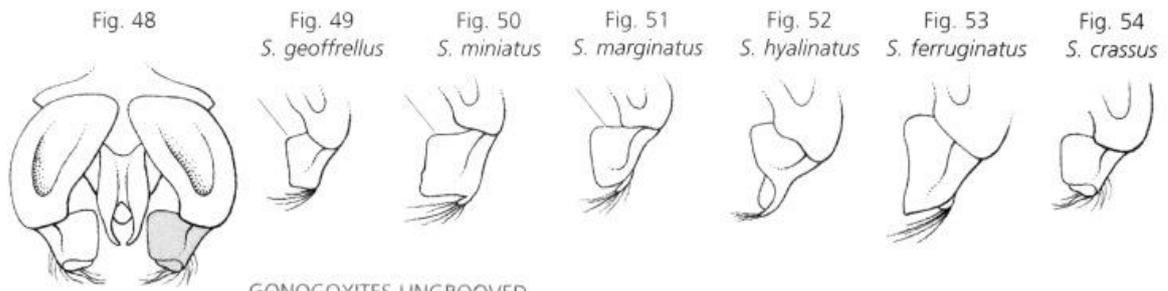
Group 5 – antennal flagella with hair zones occupying at most one-third of anterior face of any segment.

S. scabricollis – see Group 1.

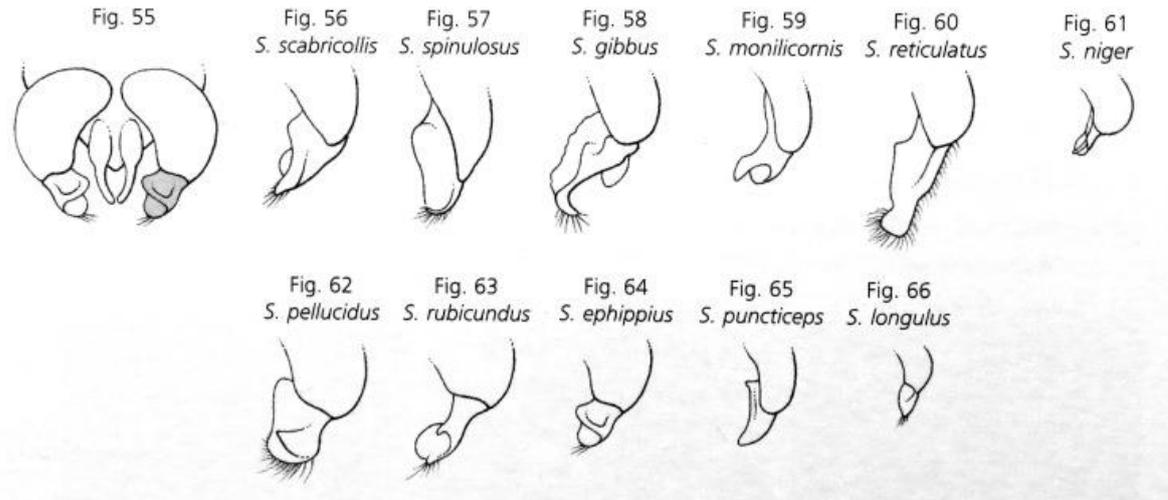
S. rubicundus – tergites conspicuously punctate along hind margin of tergite 1 and much of tergites 2 and 3; scutum much more densely punctate than species below; much larger than species below (wing length 6-7.5mm).

S. crassus*, *S. ehippius*, *S. ferruginatus*, *S. longulus* and *S. puncticeps - safest to use genitalia for these but males of *S. longulus* are particularly small with extensively pale legs, *S. ferruginatus* and *S. hyalinatus* males are often quite stoutly-built with entirely red tergites 1-3.

GONOCOXITES GROOVED



GONOCOXITES UNGROOVED



You can find more supporting images here:

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