

An introduction to Soldierflies and allies

Martin Harvey for Soldierflies and Allies Recording Scheme



Identifying soldierflies and allies

Identifying the group is fun and with a bit of experience most species can quickly be recognised to genus at least. But as with all insect groups, there is a range from 'easy' to 'difficult'. It is important that we check the records coming in to the recording scheme database to ensure that they are accurate. Everyone makes mistakes sometimes: flies can be difficult to identify, and errors can also occur when transcribing records.

Use the checklist handout to see which species are flagged as being difficult to identify. If you have found a rare species, or a common species at an odd time of year or in an unusual location, it is important to record it with as much supporting evidence as possible. Such evidence can include a comment with the record along the lines of "I realise this is an unusual time of year but checked the identification and can confirm it", but as well as that consider:

- Keeping the specimen ('voucher specimen') to pass on to the recording scheme or another expert recorder (a live specimen may do the job if it can be passed on quickly).
- Getting a good photo (preferably several photos from different angles, and record the size as well).
- Getting a second (and third, fourth ...) opinion from another experienced dipterist.

The most frequently encountered species

Never assume that the species you have found will be one of the common ones, always check! However, it is useful to know which species you are most likely to encounter, and the table below lists the 'top 28' species. These are species that have the most records since 1990, and/or have been recorded in the most 10km squares, in the recording scheme database.

| Family | Species | English name | Records | 10km squares |
|---------------|---------------------------------|--------------------------------|---------|--------------|
| Asilidae | <i>Machimus atricapillus</i> | Kite-tailed Robberfly | 2197 | 395 |
| | <i>Leptogaster cylindrica</i> | Striped Slender Robberfly | 2059 | 493 |
| | <i>Dioctria rufipes</i> | Common Red-legged Robberfly | 1199 | 362 |
| | <i>Dioctria atricapilla</i> | Violet Black-legged Robberfly | 1006 | 249 |
| | <i>Dioctria baumhaueri</i> | Stripe-legged Robberfly | 994 | 254 |
| | <i>Dioctria linearis</i> | Small Yellow-legged Robberfly | 641 | 241 |
| Bombyliidae | <i>Bombylius major</i> | Dark-edged Bee-fly | 6287 | 924 |
| Rhagionidae | <i>Chrysopilus cristatus</i> | Black Snipefly | 3937 | 847 |
| | <i>Rhagio scolopaceus</i> | Downlooker Snipefly | 2550 | 717 |
| | <i>Rhagio lineola</i> | Small Fleck-winged Snipefly | 1665 | 487 |
| | <i>Rhagio tringarius</i> | Marsh Snipefly | 1396 | 526 |
| | <i>Chrysopilus asiliformis</i> | Little Snipefly | 1271 | 349 |
| Stratiomyidae | <i>Chloromyia formosa</i> | Broad Centurion | 5117 | 984 |
| | <i>Beris vallata</i> | Common Orange Legionnaire | 3465 | 656 |
| | <i>Beris chalybata</i> | Murky-legged Black Legionnaire | 2072 | 586 |
| | <i>Oplodontha viridula</i> | Common Green Colonel | 1433 | 251 |
| | <i>Pachygaster atra</i> | Dark-winged Black | 1218 | 342 |
| | <i>Microchrysa polita</i> | Black-horned Gem | 1090 | 365 |
| | <i>Pachygaster leachii</i> | Yellow-legged Black | 1004 | 299 |
| | <i>Chorisops tibialis</i> | Dull Four-spined Legionnaire | 972 | 323 |
| | <i>Sargus bipunctatus</i> | Twin-spot Centurion | 636 | 245 |
| | <i>Microchrysa flavicornis</i> | Green Gem | 635 | 305 |
| | <i>Beris geniculata</i> | Long-horned Black Legionnaire | 479 | 247 |
| Tabanidae | <i>Haematopota pluvialis</i> | Notch-horned Cleg | 3340 | 772 |
| | <i>Chrysops relictus</i> | Twin-lobed Deerfly | 958 | 269 |
| | <i>Chrysops caecutiens</i> | Splayed Deerfly | 543 | 220 |
| | <i>Haematopota crassicornis</i> | Black-horned Cleg | 483 | 242 |
| Therevidae | <i>Thereva nobilitata</i> | Common Stiletto | 1018 | 331 |

Flight periods

The majority of the group fly between May and August, but look out for these early and late species:

- ***Microchrysa polita* (Black-horned Gem)** can be found as an adult from March through to October, especially around warm compost heaps!
- ***Bombylius major* (Dark-edged Bee-fly)** is well-known for flying in early spring, from March through to June, but look out for ***Bombylius discolor* (Dotted Bee-fly)** which peaks in April and is a southern species that has been spreading in range.
- ***Lasiopogon cinctus* (Spring Heath Robberfly)** is known from scattered sites in many counties across England and Wales, but has rather few recent records. Look for it in sandy places (heaths and dunes) from mid-April to June.
- ***Odontomyia argentata* (Silver Colonel)** is a rare species of fens, marshes and ditches in the south-east, and flies from mid April to early June.
- By September most species are over, but through to October you can still find ***Rhagio tringarius* (Marsh Snipefly)**, ***Haematopota pluvialis* (Notch-horned Cleg)**, ***Choerades marginatus* (Golden-haired Robberfly)**, ***Machimus atricapillus* (Kite-tailed Robberfly)**, ***Machimus cingulatus* (Brown Heath Robberfly)**, ***Asilus crabroniformis* (Hornet Robberfly)** and several species of ***Sargus*** including the common ***Sargus bipunctatus* (Twin-spot Centurion)** which is usually the last species of the year and has been found into late November.

Size

Most of the soldierflies and allies can be described as medium-sized flies, with body lengths of between 5 and 15 mm. But there are some tiny species: *Spania nigra* (Liverwort Snipefly) is less than 2 mm long, *Phthiria pulicaria* (Flea Bee-fly) and the moss-snipeflies in genus *Ptiolina* are less than 4mm, and there are a number of soldierflies below 5 mm.

At the other extreme our largest species are *Asilus crabroniformis* (Hornet Robberfly) at up to 28 mm body length and *Tabanus sudeticus* (Dark Giant Horsefly) at up to 24mm. Several other robberflies and a few more horseflies come in at a few mm smaller.

Preparing specimens

Refer to the ID difficulty codes in the checklist to check which species are most likely to require voucher specimens for record verification. For most of the group all that needs to be done is to ensure that voucher specimens are arranged with legs and wings extended away from the body, so that all parts of the body and its appendages are visible. Specimens can be side-pinned (with the pin at a slight diagonal so that it doesn't impact the same part of the thorax on both sides) or pinned from the top. Legs and wings don't have to be arranged symmetrically, and in fact it can be helpful if they are not, as this also helps ensure that all features can be seen from at least one side of the insect. See notes below on Tabanidae and Therevidae.

'Difficult' species

Many species in the group are reasonably easy to key out, but there are some tricky areas to watch out for. The species have all been given "ID difficulty" codes (see checklist handout), but some groups to be aware of are:

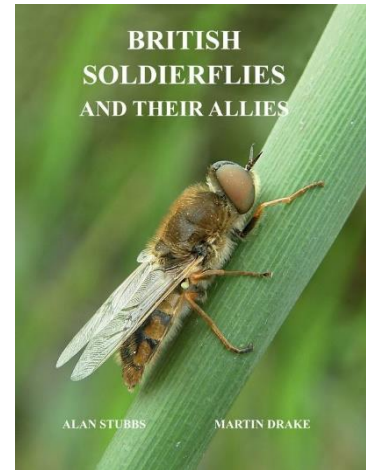
- Asilidae (robberflies): although mostly quite large, there are a number of rather similar looking black and grey species in several of the genera – take care with the genus key, and always double-check the descriptions in the text.
- Bombyliidae (bee-flies): genus *Villa* is tricky, especially with worn specimens, and may require dissection for certainty. Habitat and location can provide good clues to the most likely species.
- Scenopinidae (windowflies): main difficulty is in realising that you have a scenopinid to start with! These small, dark flies can easily be overlooked.
- Stratiomyidae (soldierflies): most species will key out with care, but there are some tricky ones e.g. in genera *Oxycera* and *Sargus*.
- Tabanidae (horseflies): some distinctive species but some challenging genera as well, especially *Haematopota*, *Hybomitra* and *Tabanus*. Location and habitat provide good clues. Some species have distinctive colour patterns on their eyes, which fade after death, so when preparing voucher specimens keep a note of the live eye-pattern.
- Therevidae (stiletto-flies): genera *Acrosathe* and *Thereva* are difficult, and often require dissection for certainty (in male *Thereva* it is usually the tip of the aedeagus that needs to be seen – sometimes this will be visible at the end of the abdomen, but if not it is worth using forceps to gently squeeze the tip of the abdomen and extend the aedeagus, while the specimen is still soft).

See the recording scheme web pages for tips on difficult species, and also the pages below on identifying soldierflies and allies from photos.

Resources for recording and identifying Soldierflies and allies

Books

- Stubbs, A.E., and Drake, M. 2014 (second edition). **British soldierflies and their allies: an illustrated guide to their identification and ecology**. British Entomological and Natural History Society. For details see: <http://www.benhs.org.uk/publications/british-soldierflies-and-their-allies-second-edition/> – substantial discount for members of BENHS or Dipterists Forum. This is the ‘bible’ for these flies, well-illustrated and covering all species in detail.
- Drake, C.M. (ed.) 1991. **Provisional Atlas of the Larger Brachycera (Diptera) of Britain and Ireland**. Biological Records Centre. Out of date now but still useful. Can be downloaded from: <http://nora.nerc.ac.uk/7447/>
- Baldock, D., and Early, J. 2015. **Soldierflies, their Allies and Conopidae of Surrey**. A substantial book with excellent photos that provides lots of useful information well beyond the borders of Surrey. Available from Surrey Wildlife Trust: <http://www.surreywildlifegifts.org.uk/collections/atlas-series/products/soldierflies-of-surrey>
- van den Broek, R., and Schulten, A. 2017. **Field guide to the Robberflies of the Netherlands and Belgium**. English-language version available, and covers all the British species.



Keys (to family level) you can download

- Unwin, D.M. 1981. **Key to the families of British Diptera**, Field Studies Council. Identifies flies to family level. Available as a free download from: http://fsj.field-studies-council.org/media/351875/vol5.3_143_a.pdf
- Ball, S.G. 2008. **Introduction to the families of British Diptera**. A more recent key to families, containing more information than the above. If you are a member of Dipterists Forum you can download a copy from: <http://www.dipteristsforum.org.uk/t34-British-families-Diptera.html>. For information about Dipterists Forum see: <http://www.dipteristsforum.org.uk/index.php>

Help with identification

- There is a **Facebook group** dedicated to British soldierflies and allies, where help is usually available. Once identified, please do send your record in – the recording scheme is not able to harvest record details direct from Facebook: <https://www.facebook.com/groups/633973796697869/>
- iSpot can provide identification help (but again please do send in your records to the scheme, we don't get access to data from iSpot): <http://www.ispotnature.org/>

[Photos can also be attached to records added to iRecord, see below for more details.]

Online recording

- **iRecord** is the preferred (but not the only!) option for sending records to the scheme – see further details below. <http://www.brc.ac.uk/irecord/>

Online keys and downloadable identification guides

- See the **recording scheme website's** resources page for details of online keys and downloadable identification guides: <http://www.brc.ac.uk/soldierflies-and-allies/resources>

There is good online coverage for many families in the group, but the keys are not all comprehensive, and most are from continental Europe (so include species that we don't get in the UK). The best identification resource for use in Britain and Ireland remains the book by Stubbs and Drake, listed above.

- **Steven Falk's** very well-organised and informative sets of photos on Flickr provides another excellent resource for the soldierfly group of families, along with many other Diptera families: <http://www.flickr.com/photos/63075200@N07/collections/72157629586945825/>

Fly morphology (body parts)

- The excellent **anatomical atlas**: <http://www.ento.csiro.au/biology/fly/fly.php>
- Some useful diagrams about parts of legs! (antero-ventral, postero-dorsal etc.): <http://www.insecte.org/forum/viewtopic.php?f=11&t=32333&sid=56768bb226ea38f7d609171490e6208d>

General news, discussion and advice

- All things dipteran are covered in the **Dipterists Forum** forums!: <http://www.dipteristsforum.org.uk/>
- You should **join** Dipterists Forum if you can!: <http://www.dipteristsforum.org.uk/viewtopic.php?id=3>
- **Diptera.info** provides an international perspective, with loads of resources and discussion with experts from many parts of the world: <http://www.diptera.info/news.php>

Entomological equipment suppliers

- **Anglian Lepidopterist Supplies**, Station Road, Hindolveston, Norfolk, NR20 5DE. Website: www.angleps.com.
Moth traps, generators, setting equipment, store boxes etc.
- **Brunel Microscopes Ltd**, Unit 12, Enterprise Centre, Bumpers Industrial Estate, Chippenham, Wiltshire, SN14 6QA. Tel: 01249 462655, website: www.brunelmicroscopes.co.uk. *Microscopes.*
- **B&S Entomological Services**, 37 Derrycarne Road, Portadown, Co. Armagh, BT62 1PT, Northern Ireland. Tel: 077 6738 6751 or 028 3833 6922, website: www.entomology.org.uk. *Nets and traps (supply designs previously made by Marris House nets).*
- **D.J. and D. Henshaw**, 34 Rounton Road, Waltham Abbey, Essex, EN9 3AR. Tel: 01992 717663, email: mdjhagro@aol.co. *Pins, chemicals, lenses, etc.*
- **Paradox Company**, Cracow, Poland. Website: www.insectnet.eu. *A wide range of entomological equipment.*
- **Watkins and Doncaster**, PO Box 5, Cranbrook, Kent, TN18 5EZ. Tel: 01580 753133. Website: www.watdon.co.uk/the-naturalists. *Sell a wide range of equipment, plastic containers, nets, moth traps, books etc.*
- See also the list on the Dipterists Forum pages: <http://www.dipteristsforum.org.uk/t585-Some-Entomological-Equipment-Suppliers.html>

Sending in records

The recording scheme is ready and waiting to receive your records! The essential information needed is: recorder name, name of person who identified the species (if different from the recorder), species seen, whether male or female (if known), what life stage (if not adult), date, location (with grid reference if possible). Other information can be useful as well, especially for rare or unusual species: habitat, trapping method (if applicable), any observations of behaviour, predator/prey links, flowers visits.

Records can be sent in various ways:

via iRecord

This is my preferred route for receiving records. The iRecord online recording system has been developed by the Biological Records Centre: <http://www.brc.ac.uk/iRecord/>

I'd suggest using the form to "Enter a list of records" or the form for "Enter a casual record". Please do say whether your record is of a male or a female fly wherever possible, and ensure that you have selected the stage as "adult" (unless of course you are recording a larva or other pre-adult stage). If you have kept a specimen add that to the comments. If you have a photo it can be attached to the record on iRecord.

via MapMate

If you use the MapMate database I can accept sync files or spreadsheet exports. If you want to send a sync file, set your filters to:

- Records - My Records (or All Records if you have received relevant data from other MapMate users)
- Sites - All
- Taxa - Insecta: Diptera: Larger Brachycera

and generate a sync file for Centre Unique Key "1pm". Contact me for further details.

via other databases

There are other good biological recording databases available, such as Recorder and Gilbert 21, both of which can produce spreadsheet exports that are fine for the recording scheme. Please do include the unique record IDs from the originating database if sending in data from these systems.

via spreadsheets

Records on a spreadsheet (such as Microsoft Excel, or the free Open Office Calc) are fine. I prefer one record per spreadsheet row. I can supply a spreadsheet template if required.

via email

For one-off records or occasional sightings then just sending an email is fine (although if you do start recording on a regular basis one of the above methods is preferable).

on paper

Paper records are not forbidden! I have to say that they're not my favourite thing, simply because they take more time to process, but where no other option is available paper records are of course welcome.

Checking the records

The scheme organiser (Martin Harvey), with help from others in Dipterists Forum, checks incoming records to ensure that accuracy is maintained, and we may sometimes contact you to ask for further details about a particular record. It is in everyone's interest to maintain the quality of our data, and we will try to do this politely and diplomatically! For some species photos or specimens may be requested, or confirmation from another recorder may be advisable.

Record sharing

Please note that records contributed to the recording scheme may be shared with other recorders, with local environmental records centres (<http://www.alerc.org.uk/>), with the National Biodiversity Network (<https://nbn.org.uk/>), with researchers and potentially with other recording schemes and conservation organisations.

In return we will try to provide information and support to you, e.g. if you want to know what has already been recorded at your site or in your area contact the scheme.

Photographing soldierflies and allies for identification and recording

Identification photography is different from traditional wildlife or landscape photography: if your photo is beautifully composed and aesthetically pleasing that's a bonus, but for identification what's needed is to see the features that distinguish the species. It does help to have things in focus though!

Between a third and a half of the 158 species in the soldierflies group stand a good chance of being confidently identified from a photo, if the right features can be seen (see the ID difficulty codes in the checklist for an idea of which species can and can't be identified from photos). It's not always easy to get the flies to cooperate of course, but here are some suggestions for getting photos that will stand the best chance of being identified.

General

- Take several photos, from different angles – you never know which one may contain the vital distinguishing feature. But try and include at least one from directly above, and exactly side-on, which will be easier to compare with images in books and keys.
- It's helpful to know the size of the fly – if there isn't anything in the photo to give a scale then keep a note of the size as accurately as you can. The most useful measurements are the length of the body (from head to tip of abdomen, excluding the antennae) or the length of one wing (from where it joins the thorax to its tip). Be wary of estimating size by eye – it's hard to do accurately, and people often perceive insects as larger than they really are.
- You'll probably want to take photos that are as close-up as possible, but try to take a few of the surrounding habitat as well.
- It's possible to catch flies and hold them gently between your fingers – this may allow close-up details to be seen from particular angles that wouldn't be possible otherwise.
- Early morning can be a good time to photograph flies, while it is still cool and the flies are waiting to warm up before becoming active.
- Some species can only be identified from photos if the photo shows exactly the right characters; some species cannot be identified from photos at all. It's best to accept these limitations, and only identify things to genus or group if that's all that can safely be done. You can then choose to concentrate only on those species that can be identified photographically, or you can proceed to collect specimens or other evidence in those cases where photos alone are not sufficient.

Some specific tips

Bombyliidae, Bee-flies

The common *Bombylius major* (Dark-edged Bee-fly) can usually be distinguished from the rarer *Bombylius discolor* (Dotted Bee-fly) in a photo, but it's much easier if the wings can be seen and are at rest; the flies can often be seen hovering, at which time the wings are a blur and it becomes difficult to tell them apart. A side view is not helpful for this pair of species. Accurate measurements of size are useful for the other *Bombylius* species. *Villa* species can rarely be identified confidently from photos.

Asilidae, Robberflies

Although there are a number of rather similar-looking species in this family, the recent Dutch photographic ID guide shows what can be done with high-quality photos of this family. One difficulty is that the wings are often held overlapping above the abdomen, so side views can be very useful. Leg colour is important, but difficult to show clearly unless the lighting is good. The colour and distribution of hairs and bristles on the body and legs is useful as well. A good close-up of the tip of the abdomen is sometimes needed for both males and females, and a view of the front legs taken from in front of the insect is the best way to distinguish *Machimus atricapillus* from the rarer *M. cingulatus*.

Stratiomyidae, Soldierflies

There are some very brightly-coloured species in this family, but even so they may require close examination to separate correctly. As with robberflies, the wings are often held over the back, making it hard to photograph the patterns on the abdomen – side views or shots from an angle may give the best chance of checking the abdominal markings, or you can catch the insects and gently hold them in your fingers, pushing the wing to one side for a quick photograph.

Tabanidae, Horseflies

Genus *Chrysops* has reasonably distinctive wing and abdomen markings, but otherwise this is one of the more difficult families, and often impossible to confirm from photos. The markings on the abdomen can be useful, but are variable often appear different under different lighting conditions. For some species (especially the clegs in genus *Haematopota*) side views of the antennae are needed, and the view should be exactly side-on, not angled. For some *Tabanus* it's helpful to see the underside of the abdomen (try putting the specimen in a glass tube and photographing its underside through the glass). Try to record size accurately, as that can help to rule species in or out. One area where photography comes into its own is in capturing images of the colourful eyes that many horseflies have – the eye patterns can narrow down the identification, but do not last after death.

Location and habitat also provide very good clues to which horsefly species are likely to be seen – many are coastal or confined to particular areas and habitat types.

Rhagionidae, Snipeflies

Key characteristics include wing markings, leg colour and body colour, and views from several angles are often needed to ensure that all these can be seen. In some cases good close-ups of the antennae and/or palps will be needed.

Acroceridae, Hunchback-flies

If you are lucky enough to find one of these elusive flies, make sure you get photos showing the head from side-on, and also a good view of the legs.

Getting help with photo IDs

These days there are lots of ways of sharing photos on the web and asking for help and advice, but some sites go about this in a more organised way than others. My suggestions are:

- There is a friendly and helpful **Facebook group** dedicated to British soldierflies and allies, where identification advice is usually available: <https://www.facebook.com/groups/633973796697869/>
- **iSpot** (<http://www.ispotnature.org/>): online support for wildlife identification, usually providing a quick response from the very active and friendly iSpot community. All suggested IDs and agreements are stored so that it is easy to judge which is the most likely ID. Intended to provide identification help and is not an online recording system (records from iSpot do not reach the recording scheme automatically).
- **Diptera.info** (<http://www.diptera.info/>): international site for Diptera enthusiasts. Excellent site with some very expert people involved. Does not store biological record data with the photos.
- **Dipterists Forum** (<http://www.dipteristsforum.org.uk/>): the society's web forum has an identification site, and usually gets a good response. Does not store biological record data with the photos.
- Others: many people share wildlife photos via **Twitter**, **Flickr**, **Instagram** etc., all of which have a role to play and can be fun and informative, but don't go so far towards turning photos into records.
- **iRecord** (<http://www.brc.ac.uk/irecord/>): this is the recording scheme's preferred route for receiving records, and photos can be uploaded with the records. iRecord is really designed for records that have already been identified, but it's fine to add a photo with your 'best guess' as to the species name, or you can just use a genus, and the photo will be checked eventually (but not as quickly as will happen on Facebook or iSpot). Can store all your records (for all species groups), whether you have photos or not.

If you add your photo observations to iRecord the details will reach the recording scheme without you having to do anything else. If you use any of the other sites please do remember to send your records in to the recording scheme as well (including a link to the photo if possible).

Lots more news and information is available via the **recording scheme website**:

<http://www.brc.ac.uk/soldierflies-and-allies/>