A guide to common families of Coleoptera in the British Isles

Written by Katy Potts - Identification Trainers for the Future project - The Natural History Museum

1. Introduction

Beetles (Coleoptera) are one of the most successful group of organisms on the planet, in the UK there are 4000 described species and over 400,000 species described worldwide. This is an impressive number of species and is partly what makes them a fascinating group to study, there will always be something new to learn and scientists are continuing to discover new information. In Britain and Ireland there are 103 families of Beetle, this guide is designed to give you a beginners introduction to 10 of these families found in Britain. The selected families have been chosen with recommendation from museum experts.

How to use this guide

Each family is listed with a brief description of key characters that define its identification. Pictures of key features are added where appropriate and photographs of specimens from the Natural History Museum added to get a general feel for overall morphology. Some families are very characteristic, whereas others can be more variable.

C - Indicates a family which is characteristic

V - Indicates families that can be more variable

Some families can be identified in the field with or without a hand lens others require a microscope to look at microscopic characters.

F - can be identified in the field

M - microscope needed

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Figure 1. Illustrates two different forms of beetles in Britain: Apoderus coryli and Chrysolina graminis.
2. What is a Beetle?

Beetles are insects with forewings that are modified into hard wing cases (elytra) (Fig.2a) that cover and protect the hind wings and abdomen, they also have biting or chewing mouthparts (mandibles) (Fig. 2b). These are the key identification features in identifying beetles from other orders of insects.

3. What is NOT a beetle

The order Hemiptera can sometimes be misidentified as beetle. The key differences between these two groups are:

**Coleoptera** have elytra and biting mandibles.

**Hemiptera** do not have elytra, they have an X or Y shape on their wings and they have piercing mouthparts.
4. Ecology

Beetles have evolved over time to become adapted to a wide range of habitats and ecological niches. They can be found in some of the most extreme environments on earth. The Red flat bark beetle (*Cucujus clavipes*) survives in the extremes of Northern Alaska by adapting to the low temperatures. This beetle alters its blood to have high concentrations of glycerol, this enables it to avoid freezing in extreme temperatures. Beetles also occupy a wide range of extraordinary niches. The larvae of *Potosia cuprea* is a myrmecophile (lives with ants) living deep in the ants nest feeding off of decaying wood.

5. Anatomy

The anatomy of a Beetle (Fig. 4) is generally characteristic, they have a hard exoskeleton which is hardened into a cuticle. There are, however, some exceptions such as the Cantharidae that have a softer cuticle.

Beetles are insects and therefore have three body segments: head, thorax, abdomen, and 3 pairs of legs. When looking at a Beetle dorsally, the first pair of wings are hardened to form wing cases called Elytra, this feature is very characteristic of Beetles and the name ‘Coleoptera’ translates as sheathed wings. The thorax, also called the pronotum is the section between the head and the elytra. The antennae, palps and eyes are attached to the head. The legs are made up of the coxae (only seen from underneath), femur, tibia and tarsus and the tarsus is made up of small segments called tarsi.
6. Key features used in identification

Many Beetles can be identified on their general shape and size and some beetles are very characteristic, e.g. Carabidae and Staphylinidae.

**Tarsal formula** - count how many segments of the tarsi are there, some parts of a key that may ask you to count the number of segments in each leg (fore, mid and hind leg). Figure 5 shows a tarsal formula of 5,5,5, five tarsal segments on each leg.

![Figure 5](image.png)

**Tarsal shape**: the shape of the tarsal segments can be simple, lobed or bi-lobed.

**Simple tarsi**: segments of the tarsi are simple in shape, sometimes they can appear threadlike or elongated (Fig.6a)

**Lobed or bi-lobed tarsi**: segments of the tarsi are lobed in shape, sometimes they can be bi-lobed and look slightly heart shaped (Fig.6b)

**Antennae type** - are the antennae filiform or threadlike (Fig.7a), clubbed or gradually expanded (Fig.7b), lamellate or fanlike (Fig.7c).

![Figure 6](image.png)

![Figure 7](image.png)
7. Taxonomic order

Here is an example of the taxonomic hierarchy for a Longhorn beetle: *Doliops geometrica*.

**Kingdom:** Animalia  
**Phylum:** Arthropoda  
**Class:** Insecta  
**Order:** Coleoptera  
**Family:** Cerambycidae  
**Genus:** Doliops  
**Species:** geometrica
8. Super families…what are they?

After order level (e.g. Beetle) and before family level (e.g. Carabidae/Ground Beetle) there is another taxonomic level called superfamily. Sorting species into super families and families is largely based on similarities in morphological characteristics and genetics.

So we can think of different species that are grouped together as a superfamily (lets say it’s called X) as being similar to one another, species in another superfamily called Y are more similar to other members of Y than X. Then, at family level those similarities become even more defined. This then carries on to genus and then finally species level is reached. One easy way to recognise these different levels of taxonomy is as follows: all super family names end in ‘dea’ and families end in ‘dae’, e.g. Curculionoidea and Curculionidae.

On the following page there is a list of all the beetle super families and the beetle families that belong in them. For now, this can be somewhat ignored, but it may make understanding beetle taxonomy easier in the long run. For example, there are a number of beetle families that are commonly called the Weevils, the most easily indefinable families are Curculionidae and Apionidae as they have long rostrums. The weevil families are grouped into a super family called Curculionoidea. Within this super family there are the weevil families Curculionidae, Apionidae, Anthribidae, Rhynchitidae… and so on.

Two key points to remember:

Names ending in **dea** = super family level
Names ending in **dae** = family level
### 9. List of super families and corresponding families

<table>
<thead>
<tr>
<th>Caraboidea</th>
<th>Elateroidea</th>
<th>Tenebrionoidea</th>
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<tr>
<td>Carabidae</td>
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<td>Filiform and serrate</td>
</tr>
<tr>
<td>Hydrophilidae</td>
<td>Yes</td>
<td>Clubbed</td>
</tr>
</tbody>
</table>

*Hydrophilidae: Remember that palps only consist of 3 segments, whereas, antennae are more than 3 segments. Species in the family Hydrophilidae have palps that are longer than the antennae. Information taken from Unwin’s key to British Beetles.*
Carabidae (Ground Beetles) - C/F

The Carabidae are one of the largest families in Britain with around 350 British species described. They are a nice family to begin studying as there are many well developed guides and keys.

Ground beetles are skilled predators, often hunting other invertebrates both in the day and at night, the Green Tiger Beetle (*Cicindela campestris*) (Fig 8.) is a prime example of this. As the name suggests ground beetles spend much of their time hunting on the ground and only a small number of Carabidae can fly. Many species, (both larvae and adults) feed on slugs and snails, other insects, carrion and some species attack aphids.

Ground Beetles can be found all year round and many over winter as adults. This makes them a nice group to begin studying as they are often easy to find. *Carabus intracatus* (Blue Ground Beetle) is a particularly rare ground beetle that occurs in isolated populations in South Devon, particularly on Dartmoor. This species is nocturnal and is highly predatory, feeding on slugs.

**Key family features:**

- Large trochanters
- Forward protruding head and mouthparts
- Tarsi are 5,5,5, mostly simple.
- Antennae are filiform.

Figure 8. *Cicindela campestris*

Figure 9. *Nebria brevicollis*
Staphylinidae (Rove Beetles) - C/F

The Rove Beetles (commonly called the Staphs) are another predatory family of beetles that are extremely species rich, with around 1,134 species in Britain. Many Staphs are predatory but there are also a wide number of species that feed on decaying vegetation, fungi and algae. Some species are also parasitic on other insects.

*Ocypus Olens* (Fig. 10) is one of the largest staphs in Britain and it is very characteristic due to its large size and the way in which it rears it abdomen when threatened. This beetle is commonly known as the Devils Coach Horse and it is incredibly predatory and can be found in a wide variety of habitats from woods, gardens and meadows.

Key family features:

- Truncate shortened elytra (with at least 3 abdominal segments exposed)
- Filiform antennae
- Generally elongate beetles that are very characteristic to identify to family level.
Chrysomelidae (Seed and Leaf beetles) - V/F/M

Chrysomelidae are another large family of beetles that can be variable in form. However, many species are characteristic in their form and colouration such as The Bloody Nosed Beetle (*Timarcha tenebricosa*) and many species in the genus *Crysolina*. Many are oval to round in shape and rather convex. They are also often brightly coloured or metallic.

These beetles can be found commonly on plants and flowers, particularly the larvae which can be found within stems and under roots of host plants. Two pictures of *Chrysolina herbacea* have been included here to highlight the variation of colour within a species. Although colouration can be a useful feature for identification, try to air on the side of caution as it can still vary within and between species. This idea should also be taken into consideration when looking at older specimens or beetles in the field at the end of the season.

Key family features:
- Tarsi appear 4,4,4 but are actually 5,5,5 as they have a 5th hidden segment that is often missed.
- Tarsi with some bilobed segments.
- Often metallic and colourful

![Figure 12. *Chrysolina herbacea*](image)
The weevils - C/F

The weevils are a wonderful group of beetles and they are one of my favourite groups. There are a number of families within the ‘Weevils’ or Curculionoidea (this is the superfamily that holds all of the weevils). Key features for weevils in general are that many have scale like structures on the body (Fig. 13a) and a rostrum, a snout like projection (Fig.13b).

Curculionidae
(True Weevils)

Key family features:
• The first segment of the antennae which is called the scape is long. This makes the antennae look ‘elbowed’.

Apionidae (Weevils)

Key family features:
• No scape, this means the first segment of the antennae is short, as apposed to Curculionidae where the first segment is a long scape. Apionidae antennae appear straight.

Figure 13. Curculionidae

Figure 14. Apionidae

Figure 15. Shows the difference in antennae between Curculionidae and Apionidae
Cerambycidae (Longhorn Beetles) - C/F

Longhorn beetles are a wonderful family that are largely associated with wood, where the larvae develop and then the adult beetles emerge out of their burrows in spring and summer (timing is species dependant). Many species are saproxylic (associated with deadwood) but some species also feed on plant matter. Many species are also pests within forestry and thus have another common name of timber beetles. Longhorn beetles can also be found in summer sitting on Hogweed and a number of other umbellifers.

Key family features:

- The second antennal segment is shorter than the first and third segments (see image below). This segment is often called the pedicel.

- Elongate beetles that can vary greatly in size between and within species.

- Elytra is generally wider than the thorax (as seen in both pictures to the right).

- Long antennae, hence the name longhorn beetles
Cantharidae (Soldier Beetles) - C/F

Cantharids or Soldier Beetles are often very colourful and soft bodied beetles that are common in summer on flowers. The larvae develop in the soil and often in moss.

The family can be spilt into two subfamilies by looking at their colour. The Cantharinae are larger and brightly coloured and Malthininae are generally darker and much smaller.

Key family features:

- Elongate beetles with 5,5,5 tarsi.
- Filiform antennae
- Soft bodied
- Slight rectangular in shape
Scarabaeidae (Dung and Scarab beetles) - C/F

There are around 87 species in this family in Britain that are dung feeders, detritivores (feeding on dead organic material) and other species are phytophagous (feeding on plants). This family includes the Rose chafer (Fig. 20) and the Cockchafer (Fig. 22). The genus Aphodius (Fig. 21) are among the most common dung feeders, they can be found in horse and cow dung.

Key family features:

- Antennae have a lamellate club (fan-like) are 9 or 10 segmented. You may need a microscope to count antennal segments.
- They have flattened and spinney tibia for burrowing.
- Generally very heavily built beetles.
Geotrupidae (Dor Beetles) - C/F/M

These beetles are in the same superfamily as the Scarabaeidae, where the key feature that unites them is the lamellate antennae. However, the Dor beetles have morphological differences as described below. These beetles are also associated with dung and they create dung lined burrows in the soil to rear their larvae.

Key family features:

- Antennae with a lamellate club and are 11 segmented. You may need a microscope to count antennal segments.

Then, if you find any of the following features plus the above antennal features:

- Thorax protrudes forwards into points.
- The head with a backwards pointing horn.
- Large protruding mandibles.

Figure 23. Typhaeus typhoeus

Figure 24. Typhaeus typhoeus
Silphidae (Carrion beetles) - C/F

This family of beetles includes 21 British species and they are a very distinctive family. Some species feed on carrion and others fungi. This family includes species with interesting behaviours and some species are important indicators for forensic entomology.

The genus *Nicrophorus* (Sexton or Burying beetles) includes some of my favourite beetles that have the most interesting parental behaviours. The males and females work together in a cooperative manner to create a nursery for their young in carrion.

Key family features:

- Relatively large beetles that can be easily identified in the field.
- The genus *Nicrophorus* can be easily identified by the characteristic red bands on the elytra.
- Antennae are mostly clubbed or expanded filiform.

Figure 25. *Nicrophorus vespillo*

Figure 26. *Silpha atrata*
Elateridae (Click Beetles) - C/F

The clue is in the name with these beetles, they have the ability to spring their body in defence causing a clicking sound. There are a number of very common click beetles, however many species are actually rather scarce. The larvae are commonly known as wireworms and they can be found either in soil or deadwood.

Key family features:

- The prosternum extends on the underside of the thorax, this feature can also be seen from the side (Fig.28).
- The general shape and form of click beetles is very characteristic.
- Elongate thorax and slightly tapering elytra.
- Some what ‘bullet shaped’.

Figure 28. Shows the clicking mechanism of a click beetle. The beetle catches the prosternal spine on the mesothorax to create the jumping/clicking effect.
How to find Beetles

Beetles begin to emerge in the spring and are then highest in abundance in the summer months. However, some beetles do over winter as adults and larvae can be found all year round but particularly in the winter as they go through larval and pupal stages.

Beetles can be found in a wide variety of habitats from woodlands, grasslands, and heathlands to sand dunes and rocky shores. Searching amongst deadwood piles, under bark and in moss will produce Ground beetles and Burying beetles. Leaf beetles, soldier beetles. Weevils can be found by using sweep nets in meadows and grassy tussocks during summer. Using a beating tray on bushes and trees is also very good for finding beetles. For long term collecting of beetles, traps such as a Lindgren funnel trap can be used. This type of trap can be left in a tree for months at a time, allowing the surveyor to see the beetle diversity through a season.

Figure 29. *Oedemera femorata* over winters as an adult.

Figure 30. A beating tray used to collect beetles. A stick can be used to hit branches and shrubs to catch beetles and other insects.

Figure 31. A Lindgren funnel trap
How to keep specimens

One of the most important aspects of biological recording is specimen preservation. Ensuring the specimen you have collected is preserved in the correct method can determine how long it lasts and whether it can be used as a valid biological record. Recording beetle slighting's is invaluable for their conservation and understanding of their ecology and distributions over time. Always make sure you label your specimens with the appropriate data: name of collector, date of collection and collection locality.

After a specimen has been collected the first thing to do is to think about how you will preserve it. The two main rules to think about when preparing a specimen are:

1. Safety of the specimen - make sure the specimen is protected
2. Make sure key identification features are visible

There are three main methods to preserve beetles:

- **Direct pinning** - inserting a pin through the right elytron. This method is for larger beetles.

- **Carding** - gluing the specimen to small pieces of card. For large and small beetles, this tends to be a preferred method of preservation. One negative is that this hides any identification features on the ventral side.

- **Point mounting** - the specimen is glued to small triangle point cards. One negative is that specimens can fall off the points if very small.

For very small or soft bodied specimens (e.g. tiny feather wing beetles (Ptiliidae) and some small Staphylinids) preservation in alcohol is best as they are more likely to be damaged if card or point mounted.
Useful websites and resources

The following links and books are great resources to begin studying beetles.

**Identification**

Mark Telfer's website. This for me is one of the most useful websites, Mark has put together a truly wonderful resource that includes information of beetle identification, specimen preparation and specific resources for family identification. http://markgtelfer.co.uk/

Royal Entomology Society. Out of print handbooks to Coleoptera and a number of other insect groups. http://www.royensoc.co.uk/content/out-print-handbooks

Mike Hackston’s website. Online keys to family and species level, text is illustrated with stacked photographs of the beetles and key features. https://sites.google.com/site/mikesinsectkeys/


John Walters website. John has worked with Mark Telfer to create some fantastic guides to British Beetles, mainly Carabids. His website offers a whole load of other natural history wonders. http://johnwalters.co.uk/publi.../guide-to-british-beetles.php

**Recording beetles**

When you find a beetle please submit the record to iRecord! You can get help with identifications on iSpot and on social media sites; on Facebook there are group pages for beetle identification help.

iRecord can be used to upload wildlife records, this can be good for the recorder to keep track of their records, but it also makes the records available to recording schemes. http://www.brc.ac.uk/irecord/

iSpot is great to get identification help, you upload a record and it will get verified. http://www.ispotnature.org/communities/uk-and-ireland

**Facebook groups:** Beetles of Britain and Ireland Ladybird Recording Scheme Longhorn Beetle Recording Scheme

**Twitter:** Longhorn Beetle Recording Scheme Weevil Recording Scheme

Records can also be submitted directly to local or national recording schemes. Details of the schemes can be found on the Biological records centre website: http://www.brc.ac.uk/recording-schemes
This guide has been produced as part of the **Identification Trainers for the Future Project**. Identification Trainers for the Future is led by the Museum in partnership with the Field Studies Council and National Biodiversity Network Trust. The scheme is generously supported by the Heritage Lottery Fund Skills for the Future programme. [www.nhm.ac.uk/idtrainers](http://www.nhm.ac.uk/idtrainers)