Classification of insects

LEC 2

There are over one million species have been described to date. The classification of insects can be complex but it is very important to group and identify insects so that they can be studied reliably. Insects, like all animals, are classified using a hierarchical system of classification.

MAIN TAXA

Kingdom: Animalia (all animals)

Phylum: Arthropoda (all arthropods)

Class: Insecta (only the insects)

Order: Diptera (only the true flies)

Family: Syrphidae (only the hoverflies)

Genus: Episyrphus (only a sub-set of the hoverflies)

Species: balteatus

From this hierarchy we derive the scientific name for the marmalade hoverfly – *Episyrphus balteatus*. This **'binomial nomenclature'** allows there to be a two-word, universally recognized name for each species, which avoids the confusion that might arise from using a common name in one particular language or from a particular region. Traditionally, the genus and species should be written in italics.

There are also groupings that fit between the traditional ranks of the hierarchy which are often included because they are evolutionarily important. For example, insects in the wider sense constitute the subphylum Hexapoda, which separates the arthropods with six legs from others such as centipedes and spiders. Hexapoda is then divided into two classes: the Entognatha includes primitively wingless hexapods such as springtails, while all the 'true' insects are subdivided into five major groups also known as **superorders**, the Apterygota, Palaeoptera, Polyneoptera, Paraneoptera and Endopterygota and some Orders shown in the table below:

Table 2. Some Orders of the Class Insecta

Order	Common Name	Meta-morphosis	Mouth-parts	Wings
Collembola	Springtails	none	chewing	none
Orthoptera	Crickets Grasshoppers	gradual	chewing	2 pair
Isoptera	Termites	gradual	chewing	2 pair
Thysanoptera	Thrips	gradual	rasping-sucking	2 pair
Hemiptera	True Bugs	gradual	piercing-sucking	2 pair
Homoptera	Aphids, Scales	gradual	piercing-sucking	2 pair
Coleoptera	Beetles, Weevils	complete	chewing	2 pair
Lepidoptera	Butterflies, Moths	complete	chewing or siphoning	2 pair
Hymenoptera	Bees, Wasps, Ants	complete	chewing	2 pair
Diptera	Flies	complete	various	1 pair
Siphonaptera	Fleas	complete	sucking	none
Dermaptera	Earwigs	gradual	chewing	2 pair
Thysanura	Silverfish	gradual	chewing	none

SOME IMPORTANT FACTS ABOUT THE INSECTS

1) Over one million species of insects have been discovered and described but it is estimated that there may be as many as 10 million species on earth.

2) There are approximately 1.4 billion insects for every person on Earth. The total weight of all the insects is about 70 times more than all the people.

3) It takes bees about 10 million nectar-collecting trips to make one pound of honey

4) The only insect indigenous to Antarctica is the wingless midge, Belgica antarctica

5) Scientists estimate that insects make up to 90% of all species of animals on the planet and more than half of all living things.

6) Insects can be found in almost every habitat, from mountain ranges covered in snow to sthe hottest deserts on the planet.

7) Insects have been around for more than 350 million years, longer than the dinosaurs and flowering plants.

8) The largest known order of insects is Coleoptera (beetles), some 300,000 to 400,000 species of beetle have been described to date. The next largest is the Lepidoptera (butterflies and moths), followed by the Diptera (true flies) and then the Hymenoptera (ants, bees and wasps).

1- Apterygota

The Apterygota, which formerly included the other primitively wingless insects currently placed in the class Entognatha, are now restricted to the two orders Archaeognatha and Zygentoma, which in turn were formerly united as the Thysanura. Despite the superficial similarity of the two groups, it is now clear that they are not closely related, mainly because of fundamental differences in the mouthparts.

The Archaeognathous mandibles are **monocondylic**, having a single articulating point with the head so that the mandible can rotate; Zygentomous mandibles are **dicondylic**, with two articulating points that restrict the motion to a single plane yet enable the development of a much stronger biting action; this is the type found in all the higher insects, and the Zygentoma may well be the sister group of the Pterygota, or winged insects.

Clearly the 'Apterygota' is **not a monophyletic group** and is simply retained for convenience in grouping these two orders that superficially resemble each other and have similar life histories.

Bristletails (Archaeognatha or Microcoryphia)

The Archaeognatha are active, cylindrical insects up to 18 mm long, with long flagellate antennae, and the abdomen bears a long terminal filament flanked by a pair of cerci, giving a three-tailed appearance. The ectognathous mouthparts are notable for the seven-segmented maxillary palps, which are longer than the legs. Much of the body is covered with flat scales, including the caudal appendages, giving the bristletails a shiny appearance. They have a well-developed pair of eyes, which are conspicuous by being positioned dorsally on the head and touching in the mid-line; there are also three ocelli, the lateral ones being below the main eyes. As well as running, the bristletails also have the ability to jump several centimetres into the air, probably to avoid predators. Although sometimes found in leaf litter and detritus, the members of this group often live under or among stones and the genus Petrobius is particularly well-known for living on the seashore; they probably feed mainly on algae and lichens. Worldwide there are around 500 known species in 2 families; in Britain there are 7 species in 1 family.

Any Question?