

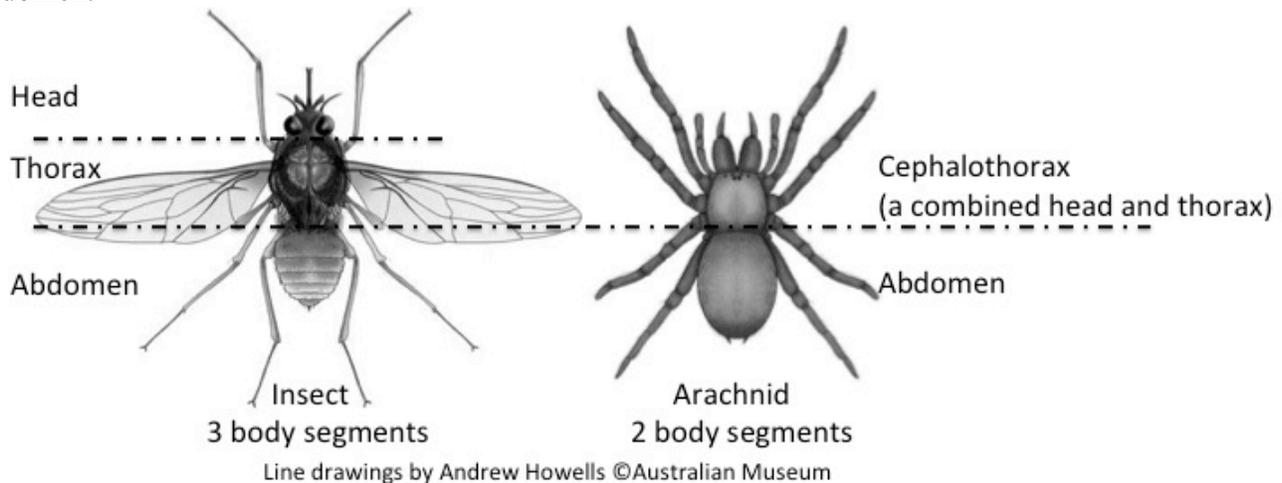


## Basic Entomology for Identification

There is a vast array of insects, spiders, mites and ticks found in residential landscapes and homes. Understanding their basic anatomy and life cycles will help you identify those you encounter. Proper identification is key to determining if it is a pest, and if management might be needed.

### Body Parts

The body of an adult insect has three parts: the head, the thorax and the abdomen. There is usually a waist between the thorax and abdomen. For some insects close inspection will be needed to observe the division between the thorax and the abdomen. Spiders, mites, and ticks are arachnids not insects. The body of an arachnid generally has two parts: the cephalothorax (a combined head and thorax) and the abdomen.

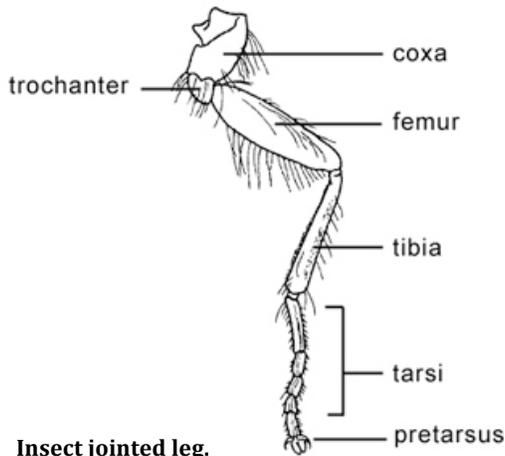


**The insect head includes the eyes, antennae, and mouthparts. Arachnids do not have antennae.**

*Eyes* -Most adult insects have a single pair of compound eyes. Additionally, they have simple light detecting organs called ocelli that are usually situated on top of the head. Unlike compound eyes, ocelli do not form a complex image of the environment. Arachnids have two kinds of eyes, the lateral and median ocelli.

*Antennae* – Adult insects have a pair of antennae usually located between or in front of the compound eyes. They can be short or long and of a variety of shapes. Touch is the most common function of antennae. Though antennae may also detect odors and function as humidity sensors. Mosquitoes detect sounds with their antennae, and many flies use theirs to gauge air speed while they are in flight.

*Mouthparts* – Insect mouthparts are designed for feeding in the two broad categories of chewing or sucking. These may be further broken down into rasping-sucking (thrips), chewing-lapping (honeybees, wasps and bumblebees), biting-sucking (mosquitos and biting flies) and sponging-lapping (houseflies and fruit flies). The shape of the mouthparts will vary based on the type of feeding. Arachnids do not have chewing mouthparts. Arachnids have chelicerae for crushing their food, which they then liquefy and suck up.



**Insect jointed leg.**  
How to Make an Awesome Insect Collection  
T. J. Gibbs and C. Y Oseto

**The insect thorax is where the legs and wings attach. Arachnids do not have wings.**

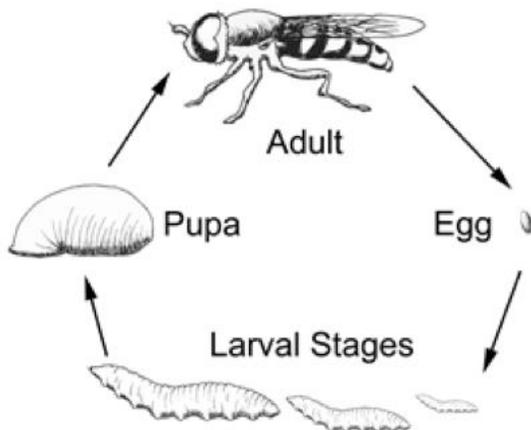
*Wings* – Adult insects are the only invertebrates that fly. They typically have one or two pairs of wings. The arrangement of veins in the wings is a distinguishing characteristic of insect groups and used in identification.

*Legs* – Spiders, mites, and ticks (Arachnids) have eight legs while adult insects have six legs. There are large variations among insect multi-jointed leg anatomy making it a critical characteristic in identification.

**The abdomen is the hind region of adult insect and arachnids.** For identifying unknown species, the genitalia found at the tip of the abdomen or internally will sometimes need to be examined.

## Insect Life Cycle

Most insects exhibit a striking developmental change in their life cycle called **metamorphosis**.



*Complete metamorphosis* includes the life stages: egg, larva, pupa, and adult. The appearance in the larval stages is very different from the adult. The majority of the feeding and growth takes place in the larva stages. The most voracious feeders may cause enough damage to be considered a serious pest if what they are feeding on is valuable to humans. In the pupal stage, insects are non-feeding. Most adult insects continue to feed but no longer grow and often only focus on reproduction. Food sources for the different stages may vary widely. Ants, butterflies, beetles, moths and wasps are examples of insects with complete metamorphosis.

*Incomplete metamorphosis* includes the life stages: egg, immature (nymph) and adult. There are many immature (nymph) stages as the insect molts its exoskeleton. Nymphs will sometimes look like adults and exhibit similar feeding habits. Wing buds may be present on nymphs. Full wings develop in the adult stage. Crickets, cockroaches, termites, lice, and aphids are examples of insects with incomplete metamorphosis.

### Learn more

Find factsheets and information on submitting a sample for diagnosis at [gardening.cornell.edu/insects](http://gardening.cornell.edu/insects)

**Published:** January 2013

**Authors:** Jason J. Dombroskie, Department of Entomology, Cornell Insect Diagnostic Lab  
Steve Gabriel, Department of Horticulture, Cornell Garden-Based Learning Program  
Lori Brewer, Department of Horticulture, Cornell Garden-Based Learning Program

**Reviewers:** Colleen Cavagna, Elizabeth Lamb, Betsy Leonard, Abby Seaman