What is an Insect?

Before getting into the specifics of identifying insects you have to know what an insect is. An insect is an invertebrate with several distinguishing characteristics. These include: segmented bodies with paired, many jointed legs; 3 major body sections; 6 legs; and 2 antennae. After you have identified an organism as an insect you then must classify to its order and family.

Head

The head is the anterior oval-shaped body region that hold the antennae, eyes, and mouth parts.

Insects generally have two types of eyes, simple and compound eyes. Most have three simple eyes,also known as ocelli, located on the upper front part of the head. Several insects lack ocelli or only have two. Compound eyes are situated on the upper portion of an insects head and are composed of many facets. In some insects compound eyes occupy most of the head.

The antennae are usually located on the front of the head below the simple eyes. These are great for identification. Some of the types of antennae include aristate (are pouch-like with a bristle), capitate (ends in a club), clavate (saw-like), filiformis (threadlike), geniculate (elbowed), monoliform (beaded), pectinate (comb-like), plumose (feather-like shape), serrate (sawtooth shape), and setaceous (bristlelike). See [1] for pictures.

The mouth parts of an insect are located on the ventral or anterior part of the head. The mouth part structures typically present are the labrum (upper lip), jaw-like mandibles, jaw-like maxillae, a labium (lower lip), and the hypopharynx which acts as a tongue. Mouth parts are generally sucking or chewing. Insects with chewing mouth parts have lateral moving mandibles and chew their food, while insects with sucking mouth parts have parts like a beak which is called the proboscis through which liquid is sucked.

Thorax

This is the middle section of the body and is divided into 3 segments called the prothorax, mesothorax, and metathorax. Each segment bears a pair of legs, and the mesothorax and metathorax usually bear a pair of wings if the insect is not wingless. Each of the thoracic segments bear 4 groups of sclerites, or platelike areas. These are the notum (dorsally), pleuron (there's one on each side), and sternum (ventrally). These segments are then divided into even smaller segments.

The wings are located dorsolaterally (they're near the top) on the mesothroax and/or the metathorax. The muscles that move wings are attached to the walls of the thorax most of the time. Insect wings vary in number, size, shape, texture, venation, and in position held at rest making them a great assist in identification. Most insect wings are membranous, though some are thickened or leathery. Some are covered in hair and others in scales. Most insects fold their wings over the abdomen at rest, but others hold them vertically over the body or hold them outstretched. Here's a picture of wing venation:

Abdomen

The abdomen typically consists of 11 segments, but the last segment is usually represented by appendages only. Many insects have fewer abdominal segments because of fusing of some insects. Each abdominal segment generally contains 2 sclerites (or hardened body wall plate), a dorsal tergum and ventral sternum. The terga usually extend down the sides of most segments and overlap the sterna. Most insects lack appendages on the abdomen other than at the posterior end. This appendages may be lacking or drawn into the body and hidden. When these terminal appendages are present, they usually consist of a pair of cerci, a median dorsal epiproct (appendage above anus), a pair of paraprocts (pair of lobes located below and on each side of anus), and genitalia. The anal opening is on the posterior end of the abdomen, right under the epiproct. The sexes in many groups can be identified by the genitalia at the end of the abdomen.

Insect Taxonomy

Kingdom: Animalia

Phylum: Arthropoda

Subphylum: Mandibulata

Superclass: Hexapoda

Class: Insecta

| Insect Identification | | |
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| **Order Name (nickname)** | **Metamorphosis** | **Characteristics** |
| Blattodea (Roaches) | Simple | flattened oval bodies, long laid back antennae, wings (almost never used) |
| Isoptera (Termites) | Simple | small, soft-bodies, usually pale-colored, antennae generally short and thread- or bead-like |
| Dermaptera (Earwigs) | Simple | slender flattened bodies, large pincers at end |
| Mallophaga (Chewing lice) | Simple | bristly body, toothed mandibles, small compound eyes, abdomen more wide or as wide as head |
| Orthoptera (Grasshoppers & crickets) | Simple | usually 2 pairs of wings, antennae many-segmented, cerci present, has ovipositor, FW is long, narrow, and many veined |
| Plecoptera (Stoneflies) | Simple | 4 membranous wings, elongate, flattened, cerci present, long antennae, mouthparts chewing |
| Odanata (Dragonflies & damselflies) | Simple | two pairs of elongate membranous wings, compound eyes large, abdomen long and slender, antennae very short |
| Ephemeroptera (Mayflies) | Simple | distinguished easily by their two large, triangular wings |
| Thysanura (Bristletails) | Simple | spindle shaped, flat bodies with 3 long, bristly tail like appendages |  |
| Diplura (same) | Simple | 1-segmented tarsi, chewing mouthparts, 2 cerci on head |  |
| Collembola (Springtails) | Simple | wingless, long bodies, 4-6 abdominal segments, multicolored, tube protrudes from abdomen, microscopic |  |
| Protura (Telsontails) | Simple | conical head, piercing mouthparts, lacks eyes and wingless, 12 segments in abdomen, .6-1.5mm |  |
| Homoptera (cicadas and more) | Simple | beak short and rising at back of head (different from Hemiptera), wings held rooflike over body, tarsi 1- to 3-segmented, antennae sometimes short and bristlike or sometimes long and threadlike |  |
| Anoplura (Sucking lice) | Simple | flattened and wingless, sucking mouthparts, abdomen thiner than head |  |
| Thysanoptera (Thrips) | Simple | slender bodies, short antennae, short legs, feathery wings |  |
| Hemiptera (True bugs) | Simple | FW (front wing) thickened at base and membranous at tip, HW (hind) shorter than FW, wings held flat on body, tips of FW overlap, mouthparts sucking, antennae of 5 or fewer segments (long and conspicuous or short and concealed) |  |
| Neuroptera (dobsonflies, lacewings, antlions) | Complete (finally) | FW and HW almost same size, four membranous wings, wings held rooflike over body at rest, wings with many veins, antennae long, cerci absent, mouthparts chewing |  |
| Hymonoptera (Bees, Ants, Wasps, and more) | Complete | wings are sometimes present, FW a little larger than HW, antennae usually fairly long |  |
| Coleoptera (beetles) | Complete | FW horny or leathery, FWs meet in straight line on back, HW membranous and are usually longer than FW, wings rarely absent or reduced, antennae usually with 11 segments (sometimes with 8-10), antennae variable in form |  |
| Mecoptera (Scorpianflies) | Complete | slender, soft bodies; long legs and elongated, snout like heads |  |
| Trichoptera (Caddisflies) | Complete | shaped or colored like certain moths, antennae long and threadlike, antennae usually long as body or longer, HW a little shorter than FW |  |
| Lepidoptera (Moths & Butterflies) | Complete | 4 membranous wings, usually have proboscis in form of coiled tupe, wings covererd in scales |  |
| Diptera (True flies) | Complete | one pair of membranous wings (you can identify them instantly from this), have knoblike projections called haltares |  |
| Siphonaptera (Fleas) | Complete | laterally flattened abdomens, tough skin, enlarged coxae, mouthparts with 3 piercing stylets for blood sucking |  |