

## CA Naturalist Program Insect Collection

We are going to discuss San Diego as a “biodiversity hotspot”. There is no better way to see that diversity than to start looking at insects, which are hyper-diverse. I would like you to **collect 3-4 different insects** from your usual haunts (your backyard, the bushes around your work, etc.) and bring them to class. NO special equipment is needed – collect them in Tupperware, a glass jar, Ziploc bag – whatever works. Ideas of places to look for insects are below, but really all you need to do is look around anyplace where there is something for insects to eat – any place with green vegetation, flowers, etc. Please bring them to the next class, dead. The best way to kill insects is to put them in a freezer for 24 hours. Finally, when you collect, please pick an “ecological category” for each specimen from the list below (your best guess!). Don’t worry about identifications – we will do that in class.

### PLACES TO FIND INSECTS

*Flowers* – pollinators (bees, etc.) are very common at flowers. Tap a flower over a white tray, white paper plate, or white pad of paper to find thrips, spiders, and other species that lurk therein.

*Leaves* – look on the underside of leaves for plant sucking insects. Look for evidence of leaf chewing which suggests that herbivorous insects might be active. Galls are oddly shaped plant growths caused by the immature insect developing inside. Break open the gall to see if the insect is still there.

*Underneath logs* – turn over any object that creates damp, protected conditions - stones, logs, old lumber, or trash. You will be sure to find earwigs and other moisture-loving insects. Ants, termites, roaches, beetles, and bristletails are common. Spiders and snakes like these locations too, so use caution.

*Lights* – lots of insects are attracted to lights at night, especially moths and lacewings. Look around your porch light at night.

*Water* – look under stones in running streams for immature mayflies, stoneflies and the cases of caddisflies. Water striders are common walking on water, and look in the shallows along the edges of ponds for various aquatic beetles and immature dragonflies, midges, and mosquitoes.

*Basements* – look in old books and newspapers for silverfish and booklice which are primarily feeding on the mold that grows in humid conditions.

*Traps* – put out fruit, rotting or otherwise, as baits to attract insects. Try meat, cookies, or a soda. Create habitat by putting out pieces of wood.

*Pitfall traps* – are used to catch ground dwelling insects. Sink any sort of plastic jar or vial (such as a 50 mL Falcon tube) into the dirt so that the top is level with the ground. Fill with a preservative, such as 70% ethanol and leave overnight. Ants, bristletails, beetles, and others will be trapped.

*Bee bowls* – fill any sort of small disposable cup or bowl with soapy water (one squirt per gallon of water, Dawn dish soap is usually used). The soap breaks the surface tension of the water so that the insects sink. Bees are only abundant in the spring and the day must be sunny and warm for bees to be active (!), but when conditions are right you will get bees within seconds. Not all species of bees are attracted to bowls, however.

### IDENTIFYING INSECTS

There are many, many resources on-line to help you ID insects. Some good ones are:

<http://biokeys.berkeley.edu/inverts/> (key to orders, including wingless specimens)

<http://www.cals.ncsu.edu/course/ent425/> (go to *Resource Library*, then *Spot ID*)

<http://bugguide.net/node/view/15740>

<http://tolweb.org/Insecta>

### INSECT ORDERS

**Collembola** - springtails

**Protura** - proturans

**Diplura** - diplurans

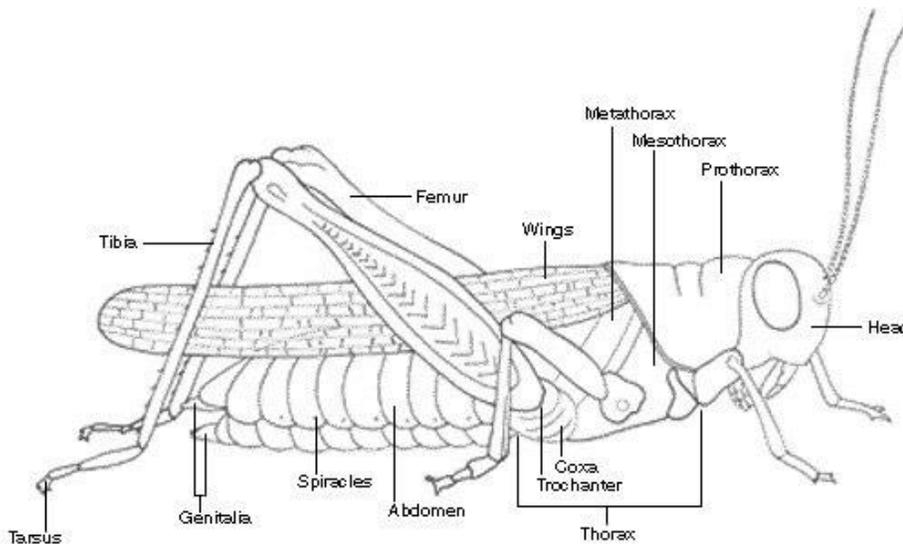
**Archeognatha** - bristletails

**Zygentoma** - silverfish

**Ephemeroptera** - mayflies

**Odonata** – dragonflies and damselflies

**Plecoptera** - stoneflies  
**Dermaptera** - earwigs  
**Embioptera** - webspinners  
**Zoraptera** - zorapterans  
**Orthoptera** - grasshoppers, locusts, katydids, and crickets  
**Phasmatodea** - walkingsticks  
**Mantodea** - mantids  
**Blattodea (cockroaches)** - cockroaches  
**Blattodea (termites)** - termites  
**Psocodea (psocids)** - bark lice and book lice  
**Psocodea (parasitic)** - chewing and sucking lice  
**Thysanoptera** - thrips  
**Hemiptera** - bugs, cicadas, leaf and planthoppers, spittle bugs, treehoppers, aphids, scale, whitefly  
**Neuroptera** - lacewings, owlflies, antlions  
**Megaloptera** - dobsonflies, alderflies, fishflies  
**Raphidioptera** - snakeflies  
**Coleoptera** - beetles  
**Strepsiptera** - twisted-wing parasites  
**Diptera** - flies  
**Mecoptera** - hangingflies, scorpionflies  
**Siphonoptera** - fleas  
**Trichoptera** - caddisflies  
**Lepidoptera** - butterflies and moths  
**Hymenoptera** - ants, bees, sawflies, wasps



## INSECT EXTERNAL ANATOMY

### ECOLOGICAL CATEGORIES OF INSECTS

**Acoustic** (sound producing)

**Agricultural pest** (include what it is a pest of)

**Ant nest** (at least 2 life stages (egg, larva, pupa, adult))

**Aposematic** (warning coloration)

**Aquatic adult**

**Aquatic immature**

**Beneficial** (beneficial to humans in a way not covered by other category, i.e. no pollinators, honey producers, parasites, predators, detritivores, research spp., or food for other organism/humans)

**Case maker** (include insect and case, pupae in cases do not count)

**Chemical defense**

**Cryptic coloration** (camouflage)

**Dimorphic sexes** (different in ways other than genitalia)

**Dung/carrion**

**Edible** (what culture commonly eats these?)

**Eusocial** (true sociality - parental care, division of labor, & overlapping generations living together)

**Fungus** (feeding on or inhabitant of)  
**Gall** (inhabitant – include insect and gall)  
**House pest**  
**Invasive** (known to be non-native and invasive)  
**Leaf biting**  
**Leaf mining** (include insect and leaf with mine)  
**Leaf roller** (include insect and rolled leaf)  
**Litter**  
**Mimic**  
**Mutualists** (with what other species?)  
**Nocturnal**  
**Parasitoid** (parasite of insects)  
**Plant sucking**  
**Pollinator**  
**Predator**  
**Research species**  
**Seed pest**  
**Soil dweller**  
**Stem borer** (stem of herbaceous plant, not wood, not gall maker)  
**Subsocial** (exhibits parental care but no division of labor)  
**Territorial**  
**Vertebrate parasite**  
**Wood**  
**Xylem feeding** (exclusively)