UPDATED 2025

Entomology Identification Contest Guidelines

Contest Rules and Information

Entomology contests introduce youth to the fundamentals of entomology, and help them develop skills in identification of common insects and their relatives. This document provides some basic information and an outline of materials that can be used to prepare for the contests. The basic entomological principles to be covered include: insect structure and function, metamorphosis, insect identification, and the importance of insects to humans.

4-H entomology identification contests consist of two parts: (1) a written examination; and (2) insect identification.
The written examination consists of true and false, multiple choice or completion questions prepared from the study material in this document. Actual specimens or photographs are used in the identification portion of the contest.

District Contests consist of three age divisions: junior, intermediate, and senior. The contests are prepared for those age groups. Material for junior, intermediate and senior contests are reflected in this document. Not all districts offer this contest. Be sure to contact your local county 4-H Agent to determine if your District offers an Entomology Identification Contest.
State Contests are non-qualifying and open to only seniors. They are similar to district contests, but are typically more challenging and made up of 50 examination questions and 50 insect specimens to identify. State contests may utilize scantron-type exams.
Spelling - may be used as a tie breaker for district contests and if applicable in state contests.. While exact spelling is not required at junior and intermediate levels, it should be close enough that judges can interpret what is being communicated. Seniors are required to spell correctly.

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Why Study Insects?

Insects are extremely diverse and make up more than half of the species on earth. It is estimated there are over 1 million species of insects. Less than 5% are considered harmful. Insects are important as decomposers, pollinators, predators, and pests. They are also fascinating organisms with a wide range of behavior and life styles. Many insects are admired for their beauty.

The significance of any insect to people in agriculture, medicine, etc., is of great practical importance. Not all insects are harmful. In fact, many are considered very beneficial. For this reason, people should know the difference between pest insects and beneficial insects. Some insects cannot be classified as either a pest or a beneficial. These insects are neutral or inconsequential. Insects classified as variable may be beneficial in one situation and harmful in another.

Beneficial Insects

95% or more of all insects are harmless or beneficial to man. Insects are important in food webs and are critical organisms in recycling materials in the environment.
Beneficial insects generally fall into one of three categories: **predators & parasitoids, pollinators, and recyclers.** It is estimated that honey bees (a pollinator) contribute up to 20 billion dollars to crop production each year.

Insect Management

Man's goal is to develop ways to regulate harmful insects without endangering the beneficial species, creating human hazards, or damaging our environment. Several tactics for insect control have been developed, including: insect-resistant crops, cultural practices, biological control, legal and regulatory measures, physical and mechanical controls, and chemical control.

Rarely is a single tactic satisfactory in controlling a pest species. A combination of tactics is usually used for effective management.

Using the best or most appropriate combination of control tactics is sometimes termed "integrated control" and has led to the concept of **Integrated Pest Management (IPM).**

Harmful Insects

Understanding insects and recognizing key species is important because some insects are harmful and compete with man. They can significantly affect crop production, livestock, human health, buildings, and our food. Also, some insects spread diseases affecting man and his animals.

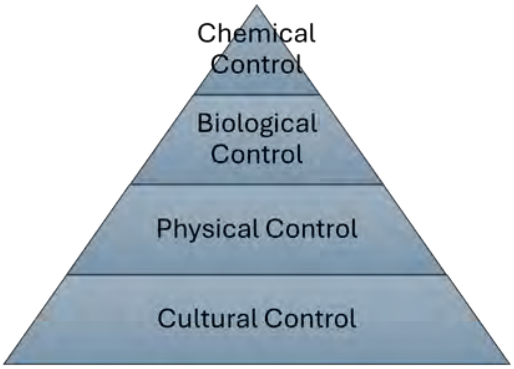


Figure 1. The IPM Pyramid is made up of four management tactics. The size of the section represents the emphasis and effort placed on the tactic. There will always be exceptions and special conditions, but in general, the most effort is placed on Cultural Control, and less as you travel up the pyramid.

Integrated Pest Management (IPM)

Integrated pest management is composed of several parts, cultural control, mechanical or physical control, biological control, and chemical control. All of these are utilized to manage pests after careful monitoring of the pest population.

Cultural Control may include sanitation, crop rotation, weed reduction, proper plant selection, plant resistance or genotype selection, and maintaining healthy plants.

Mechanical or Physical Control involves excluding pests from a building or environment. This can be accomplished through weed reduction, tillage to kill pests in the soil, or using machines or traps to kill pests physically. Other methods include the use of screens or rinsing insects off plants with water, hand picking, or other physical means.

Biological Control utilizes beneficial insects and arthropods to attack damaging insects. These may be predators that capture and consume or suck the body juices from other insects. Examples include lady beetles, praying mantids, green lacewings, dragonflies, certain wasps, certain flies, certain bugs, and others. Other beneficial insects are parasites. they have a developmental stage (usually the larva) which infests the host insect from which it obtains protection and nourishment, usually causing death of the host. Most parasitic insects that attack other insects belong to the orders Hymenoptera and Diptera. Some species attack host eggs, others attack larvae or nymphs, others attach to pupae, and still others attach to adults. Additional examples of biological control can include the use of insect diseases to target pest species.

Classification

Classification of living organisms is based on a scheme of grouping similar organisms together. In turn, each group is made up of smaller groups that share even more characteristics. The most precise group is a species. Individuals in a species are capable of interbreeding and reproducing additional members.

Multicellular animals are classified into the animal kingdom. The kingdom is further divided into lesser groupings. The names of groups in a typical complete classification of species are shown in Figure 2.

Sometimes additional groups are used that are intermediate to the groups listed. These groups often use a prefix of super (above) or sub (below) to indicate the position of the new group. Thus, superfamily falls between order and family, while subfamily falls between family and genus.

Scientists refer to a species with the genus name, the species name, and the name of the author or scientist who originally described the species. The genus and species names are formatted in italics, with the genus name capitalized but not the species name. The author's name is in plain type and will appear in parenthesis if the name was changed since it was first described. Including the author's name often avoids confusion when investigating proper names for species.

Example: *Apis mellifera* Linnaeus

Domain Eukarya - multicellular organisms
- fungi, plants, animals

Kingdom Animalia - multicellular animals
- mammals, birds, reptiles, fish, insects, mollusks and more

Phylum Arthropoda - animals with an exoskeleton, segmented bodies and jointed appendages
- arachnids, insects, crustaceans, millipedes, centipedes and more

Class Insecta - arthropods with 6 legs, 3 body regions, a pair of antennae, and possibly wings
- butterflies, beetles, flies, wasps, bees, and more

Order Hymenoptera - ants, bees, and wasps

Family Apidae - bees

Genus *Apis* - 11 species of honey bees

Species *mellifera* - Western Honey Bee

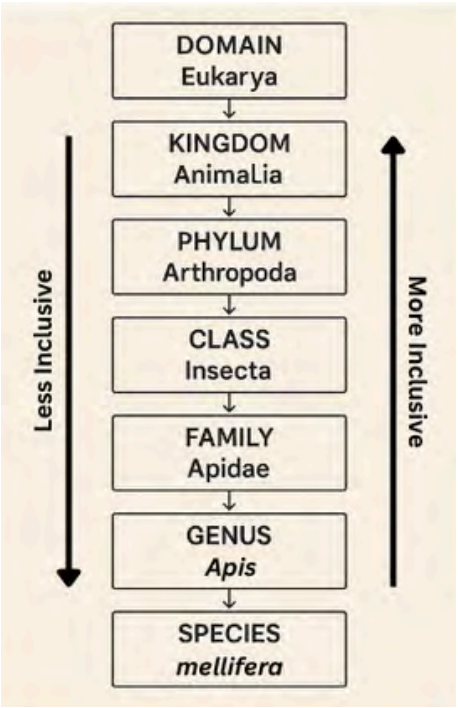


Figure 2. Taxonomic Heirarchy

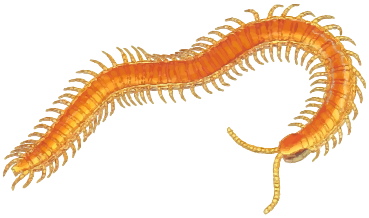
Classification

Classes of Arthropoda in Entomology

Technically, entomology is only concerned with the study of the class Insecta in the Phylum Arthropoda (all animals with segmented legs, segmented bodies, and exoskeletons). However, entomologists often study some members of other related classes in the Phylum Arthropoda such as: Arachnida, Chilopoda, Diplopoda, and Malacostraca.

Class Arachnida

Examples are **ticks, mites, spiders, scorpions, vinegarroons and psuedoscorpions.** Arachnids usually have two body regions (cephalothorax and abdomen), 4 pairs of legs, no antennae and no wings. Most species are predacious but some are parasitic or plant feeders.



Class Chilopoda

Centipedes are elongate, flattened animals with 15 or more pairs of legs. Each body segment has 1 pair of legs. They also possess a pair of antennae. Centipedes are predaceous.

Class Diplopoda

Millipedes are long, worm-like animals with many legs. Millipedes have 2 pairs of legs per body segment. Millipedes also have 1 pair of antennae. Most millipedes are scavengers and feed on decaying plant material.

Class Malacostraca

Malacostraca is the largest class in the Subphylum Crustacea. Examples are **sowbugs and pillbugs** in the order Isopoda. They have 7 pairs of legs, 1 pair of antennae, and no wings. Isopods are scavengers or omnivorous.

Class Insecta

Class Insecta is the largest class of Arthropods. Shared characteristics that all **insects** have include:

- A body divided into 3 regions: head, thorax, and abdomen;
- 3 pairs of legs;
- 1 pair of antennae;
- Usually 1 pair of compound eyes; and
- Usually 2 pairs of wings (not all insects possess wings).

Structure of Arthropods

Anyone studying entomology should have a basic knowledge of arthropod structure. The following diagrams label the basic structural parts of insects and spiders.

To identify insects and understand their role in the environment, one must be acquainted with basic anatomy. Important features include types of mouthparts; types of legs; and various modifications of wings, antennae, and other body parts. Anatomical features are useful in identifying habitat and food source. For example, we know that praying mantids are excellent predators because their front legs are modified to grasp prey, and they have strong, chewing mouthparts. Insects and other arthropods are covered in a hard outer layer called an **exoskeleton**. The exoskeleton is both protective and restrictive, preventing insects from growing large. We will learn more about the exoskeleton's role in growth in a future section.

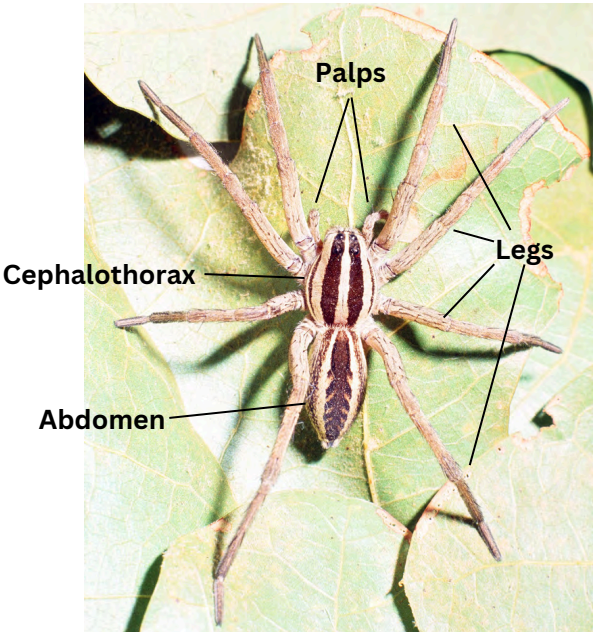


Figure 3. Body structure of a spider.

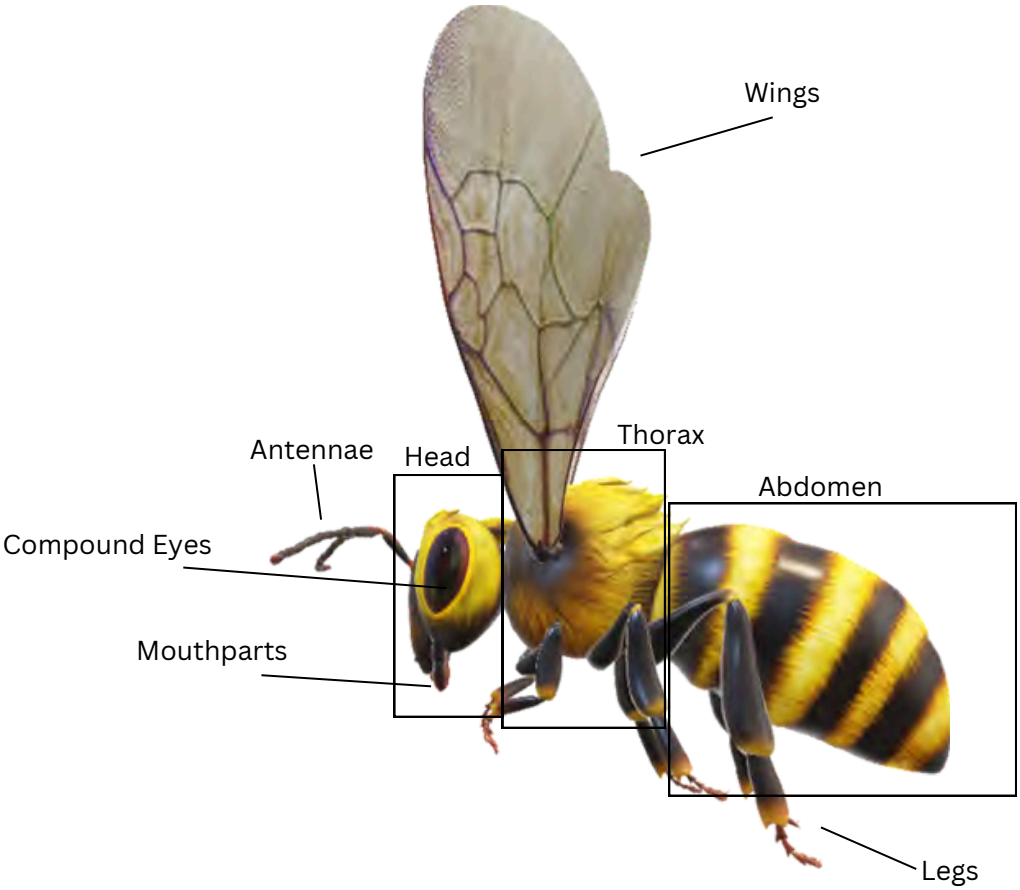
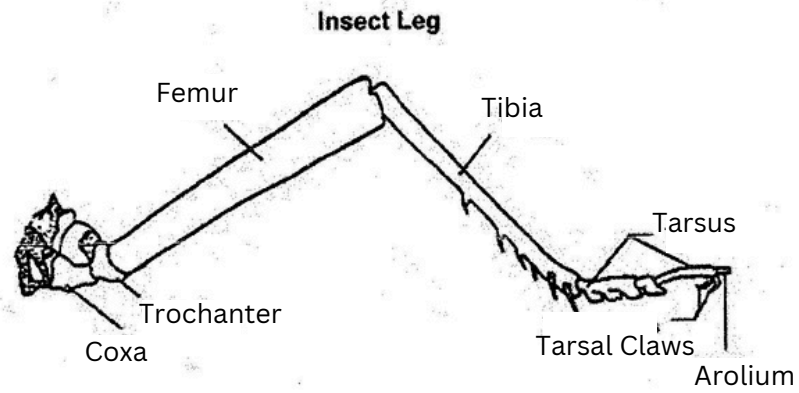


Figure 4. Body structure of an insect.

Insect Leg Parts



Coxa: The segment of the leg that attaches to the thorax.
Trochanter: Second segment of the leg.
Femur: Third segment of the leg, and may be enlarged or elongated for jumping.
Tibia: Fourth segment between the femur and tarsus.
Tarsus: Contains one of more segments.
Tarsal Claws: Claws at the end of the tarsus.
Arolium: Pad-like structure at the end of the last tarsal segment, between the tarsal claws.

Insect Leg Modifications

Insect legs are modified for various roles.

- Running or **cursorial** legs are long. Ex: Cockroaches.
- Raptorial legs are mostly found in predaceous insects and use modified forelegs to grasp their prey. Ex: Praying mantid.
- **Fossorial** or digging legs are front legs that are enlarged with shovel-like or strong "finger-like" projections for moving soil. Ex: Mole cricket.
- Swimming or **natatorial** legs are modified for movement in water. They are often oar-shaped with feather-like appendages for increased surface area. Ex: Giant water bug, predacious diving beetle.
- **Saltatorial** legs are modified for jumping. Hind legs have enlarged or elongated femurs to assist with jumping. Ex: Grasshoppers, fleas.

Photo Credit: Bryan Smith

Insect Mouthparts

All insects possess the same mouthparts, they are just modified to take on different roles. Insect mouthparts fall into three categories:

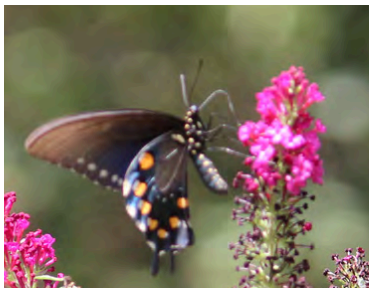
- **Mandibulate** or chewing
- **Haustellate** mouthparts may pierce and suck, siphon, or sponge; and
- **Rasping (asymmetrical).**

Chewing

Chewing insects have mouthparts modified for chewing on plant material, scavenging, predating, or feeding on other organic matter. Mandibles located on either side of the insect's head move side to side during feeding. Ex: Cockroaches, preying mantids, grasshoppers.

Piercing and Sucking

Piercing and sucking mouthparts are modified into tubes to pierce food sources and suck liquid food out. They may feed on liquid material such as plant fluids, blood, or fluids of other animals. Ex: Mosquitoes, aphids, assassin bugs.



Siphoning

These mouthparts are the sucking/haustellate type, that do not involve piercing. A long tube or proboscis is extended into flowers to siphon (suck) nectar. Ex: Butterflies, moths, skippers.

Paul Langlois, Museum Collections: Diptera, USDA APHIS PPQ, Bugwood.org

Sponging

These modified haustellate mouthparts sponge liquid food into the insect's body. In order to liquify solid food, they regurgitate and allow stomach acids to liquify food. Ex: House fly.

Photo Credit: Mark Arnold

Rasping

Rasping mouthparts are a combination of chewing and sucking. They are usually asymmetrical, with one half piercing plant or animal material, and the other half sucking up the released liquid. Ex: Thrips and mites.

Metamorphosis

All insects undergo metamorphosis, a change in body form, as they develop from egg to adult. Insects with simple metamorphosis undergo mostly changes in size, but insects with a more complex metamorphosis change in many ways. The most complex changes occur in such groups as flies, wasps, butterflies, and beetles. These insects have a larval stage that looks very different from the adult insect.
The best-known example is a worm-like caterpillar that changes to the pupal or cocoon stage and, after many changes occur within the pupa, a butterfly emerges.

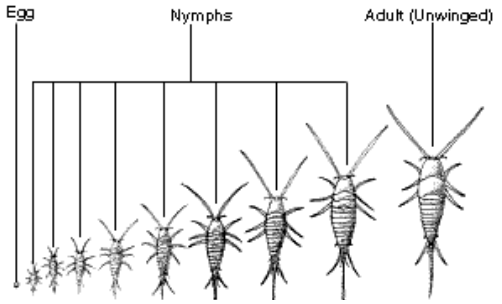
There are two general types of metamorphosis: simple and complete. Simple metamorphosis is made of three types: no metamorphosis/ ametabolous, incomplete metamorphosis/ hemimetabolous and gradual metamorphosis/ paurometabolous.

No Metamorphosis (Ametabolous)

Stages: Egg, immature, adult

The main difference between the immature and adult stages is size. Adults are never winged.

Examples: Bristletails, silverfish, springtails



amnh.org

Incomplete Metamorphosis (Hemimetabolous)

Stages: Egg, naiad, adult

Immatures are aquatic are often called **naiads** and differ considerably from adults in appearance.

Examples: Damselflies, dragonflies, mayflies, stoneflies

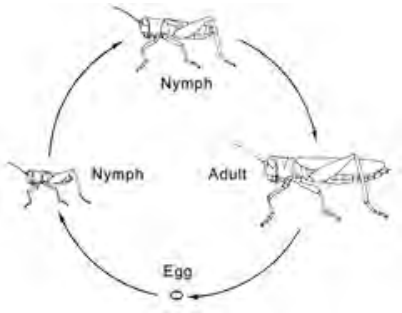
Australian Museum

Gradual Metamorphosis (Paurometabolous)

Stages: Egg, nymph, adult

Immatures are terrestrial and called nymphs.

Examples: Cockroaches, walking sticks, praying mantids, true bugs



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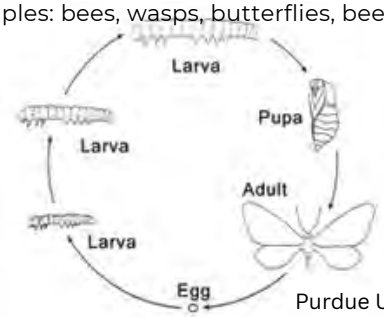
Complete Metamorphosis (Holometabolous)

Stages: Egg, larva, pupa, adult

Immatures and adults usually live in different habitats and feed on different foods.
the larval stage is for growth. The pupal stage is nonfeeding and often inactive. The adults mate and disperse.

Examples: bees, wasps, butterflies, beetles



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Guide to Insect and Non-Insect Arthropods

The Class Insecta is generally divided into about 30 orders. Some of the most important or common orders encountered in Texas are considered here. Many taxonomists (scientists who classify and describe species) disagree on the number of orders and their names. Thus, this scheme may vary, but for the purpose of the Texas 4-H Entomology Identification Contest, the orders and common names used in this guide will be used on all district and state contests.

Insect orders are groups of insects with a common ancestorthat are similar in body structure, type of wings, type of mouthparts and to some extent, habitats. With approximately 1 million insect species, it is impossible to become familiar with more than a small percentage of them. A fundamental step in insect identification is recognition of order. One should be able to assign nearly all insects to order with a little study. This categorization allows a person to conclude many things about the insect from known information about the order.

Level and list of required **insect** orders.

Juniors (13)

Zygentoma
Odonata
Blattodea
Mantodea
Orthoptera
Phasmatodea
Psocodea
Hemiptera
Megaloptera
Neuroptera
Coleoptera
Diptera
Lepidoptera
Hymenoptera

Intermediates (20)

Zygentoma
Ephemeroptera
Odonata
Plecoptera
Blattodea
Mantodea
Dermaptera
Orthoptera
Phasmatodea
Psocodea
Hemiptera
Thysanoptera
Megaloptera
Neuroptera
Coleoptera
Mecoptera
Siphonaptera
Diptera
Lepidoptera
Hymenoptera

Seniors (22)

Archaeognatha
Zygentoma
Ephemeroptera
Odonata
Plecoptera
Blattodea
Mantodea
Dermaptera
Orthoptera
Phasmatodea
Psocodea
Hemiptera
Thysanoptera
Megaloptera
Neuroptera
Coleoptera
Mecoptera
Siphonaptera
Diptera
Trichoptera
Lepidoptera
Hymenoptera

Level and list of required **non-Insect** orders and classes

Juniors (3)

Acari
Araneae
Scorpiones

Intermediates (6)

Acari
Araneae
Scorpiones
Solifugae
Collembola
Opiliones

Seniors (10)

Acari
Araneae
Scorpiones
Solifugae
Opiliones
Collembola
Uropygi
Isopoda
Class Dipoloda
Class Chilopoda

Quick Summary of Insect Orders

See the previous page to determine which orders are required for your level.

Domain Eukarya
Kingdom Animalia
Phylum Arthropoda
Class Insecta
Infraclass Apterygota: Primitive wingless insects (ametabolous metamorphosis)
Order Archaeognatha: Bristle-tails
Order Zygentoma: Silverfish, firebrats
Infraclass Pterygota: Winged insects (hemimetabolous metamorphosis)
Division Palaeoptera
Order Ephemeroptera: Mayflies
Order Odonata: Damselflies, dragonflies
Division Neoptera
Superorder Exopterygota (hemimetabolous and paurometabolous metamorphosis)
Order Plecoptera: Stoneflies
Order Blattodea: Cockroaches, termites
Order Mantodea: Mantids
Order Dermaptera: Earwigs
Order Orthoptera: Grasshoppers, crickets, katydids
Order Phasmatodea: Walkingsticks
Order Psocodea: Barklice, booklice, true lice
Order Hemiptera
Suborder Heteropera: True bugs
Suborder Auchenorrhyncha: Cicadas, planthoppers, leafhoppers
Suborder Sternorrhyncha: Aphids, psyllids, whiteflies, scales
Order Thysanoptera: Thrips
Superorder Endopterygota (holometabolous metamorphosis)
Order Megaloptera: Dobsonflies
Order Neuroptera: Lacewings, antlions, owlflies, mantispids
Order Coleoptera: Beetles
Order Mecoptera: Scorpionflies
Order Siphonaptera: Fleas
Order Diptera: Flies
Order Trichoptera: Caddisflies
Order Lepidoptera: Butterflies, moths, skippers
Order Hymenoptera: Wasps, bees, ants, sawflies, horntails

Infraclass Apterygota are wingless and have no metamorphosis (ametabolous), juveniles resemble adults except for size and sexual maturity, and molting continues until death.

Division Palaeoptera are relatively primitive insects that have hemimetabolous development but cannot fold their wings back over the abdomen horizontally.

Division Neoptera are insects that can fold their wings over their backs horizontally when at rest. The group is divided into those with hemimetabolous/paurometabolous or holometabolous development.

Superorder Exopterygota juveniles are called nymphs or naiads; wings develop externally; metamorphosis is incomplete (or simple); and life stages are egg, immature (nymph or naiad), and adult. There is no pupal stage.

Table 1. Insect Order, Metamorphosis, and Mouthparts

Insect Order	Common Name*	Metamorphosis	Adult Mouthparts	Immature Mouthparts
Archaeognatha	Bristletails	Ametabolous	Mandibulate	Mandibulate
Zygentoma	Silverfish, firebrats	Ametabolous	Mandibulate	Mandibulate
Ephemeroptera	Mayflies	Hemimetabolous	Mandibulate (adults do not feed)	Mandibulate
Odonata	Damselflies, dragonflies	Hemimetabolous	Mandibulate	Mandibulate
Plecoptera	Stoneflies	Hemimetabolous	Mandibulate	Mandibulate
Blattodea	Cockroaches, termites	Paurometabolous	Mandibulate	Mandibulate
Mantodea	Praying mantids	Paurometabolous	Mandibulate	Mandibulate
Dermaptera	Earwigs	Paurometabolous	Mandibulate	Mandibulate
Orthoptera	Grasshoppers, katydids, crickets	Paurometabolous	Mandibulate	Mandibulate
Phasmatodea	Walking sticks	Paurometabolous	Mandibulate	Mandibulate
Psocodea	Barklice, booklice, true lice	Paurometabolous	Mandibulate and haustellate	Mandibulate
Hemiptera	True bugs, cicadas, aphids, hoppers, scales, psyllids, whiteflies	Paurometabolous	Haustellate	Haustellate
Thysanoptera	Thrips	Paurometabolous	Rasping	Rasping
Megaloptera	Dobsonflies	Holometabolous	Mandibulate	Mandibulate
Neuroptera	Lacewings, antlions, owlflies, mantispids	Holometabolous	Mandibulate	Mandibulate
Coleoptera	Beetles	Holometabolous	Mandibulate	Mandibulate
Mecoptera	Scorpionflies	Holometabolous	Mandibulate	Mandibulate
Siphonaptera	Fleas	Holometabolous	Haustellate	Mandibulate
Diptera	Flies	Holometabolous	Haustellate	Mandibulate
Trichoptera	Caddisflies	Holometabolous	Mandibulate	Mandibulate
Lepidoptera	Butterflies, moths, skippers	Holometabolous	Haustellate	Mandibulate
Hymenoptera	Wasps, bees, ants, sawflies, horntails	Holometabolous	Mostly mandibulate, bees haustellate	Mandibulate

*Common names listed in this table may be abbreviated versions of common names required for the 4-H Entomology ID Contest

Archaeognatha
Bristletails

Photo Credit: Sherry

Name Derivation: Greek “ancient jaw”

Level: Senior
Metamorphosis: Ametabolous
Mouthparts: Chewing
Biology: Most species are found in moist soil, but some can be found in drier climates. Food consists of mainly decaying organic matter, mosses, lichens, or algae.
Key Characteristics: Mandibles are primitive in that they have only one point of articulation with the head. All other insects have two. They have **compound eyes** that meet at the top of the head, which separates them from Zygentoma. Archaeognatha can jump as far as 12 inches into the air by using their tail.

Zygentoma
Silverfish and Firebrats

Photo Credit: Johnny N. Dell, Bugwood.org

Name Derivation: Greek “bridge” (zyg); “insect” (entoma)

Level: Junior, Intermediate, Senior
Metamorphosis: Ametabolous
Mouthparts: Chewing
Biology: Silverfish and firebrats are usually found in moist locations in and around houses or outdoors under stones and boards. They run rapidly and hide in cracks and crevices. They are secretive and are usually most active at night. Silverfish can be a nuisance in houses. they occasionally damage book bindings, curtains, wallpapers, etc.
Key Characteristics: Zygentoma are wingless with long antennae and three thread-like filaments at the tip of the abdomen called **cerci**.

Ephemeroptera
Mayflies

Name Derivation: Greek, “day” or “short-lived” (ephemero); “wings” (ptera)

Level: Intermediate, Senior
Habitat: Near water
Biology: Aquatic **naiads** live in water and have chewing mouthparts. Adults are common around water, when they often emerge in large numbers. They are an important fish food. Fish eat both the nymphs and adults. Adult mayflies live only for 1 or 2 days. They have vestigial or reduced, nonfunctional mouthparts, and do not feed during their adult life. Their purpose is to mate and lay eggs for future generations of mayflies. Mayflies molt once after they have developed wings and are the only insect group that molts after the wings are fully developed. This life stage is called the “**subimago**.”
Key Characteristics: Mayflies are delicate insects with two pairs (rarely just one) of triangular wings with many veins. They have long front legs and two or three long tail-like appendages called **cerci**. Adults have reduced mouthparts and do not feed.

4-H Insect Orders

Name Derivation: Greek, “tooth” (odon)

Odonata

Dragonflies and Damselflies

Level: Junior, Intermediate, Senior
Metamorphosis: Hemimetabolous
Mouthparts: Chewing
Biology: The young live in water and do not look like adults. Adults are common around ponds, lakes, and streams. Both adults and aquatic nymphs feed on insects. They are beneficial because they feed, to some extent, on mosquitoes and other small flies. Dragonflies and damselflies can hover like a helicopter or fly and dart around rapidly. They have been called “mosquito hawks” and “snake doctors.”
Key Characteristics: Odonata are large insects with two pairs of membranous, many-veined wings. The hind pair is as large or larger than the front pair. They have large conspicuous eyes and bristle-like antennae.

Whitney Cranshaw, Colorado State University, Bugwood.org

Name Derivation: Greek, “plaited/woven” (pleco); “wings” (ptera)

Plecoptera

Stoneflies

Level: Intermediate, Senior
Habitat: Near water
Metamorphosis: Hemimetabolous
Mouthparts: Chewing
Biology: Aquatic **naiads** live under stones in clear, rapidly running streams, which limits their distribution in Texas to Central Texas or the Hill Country. Adults are found on stones or plants near streams and are attracted to lights. They are sometimes abundant in early spring near a stream, but generally difficult to find.
Key Characteristics: Plecoptera are large, soft-bodied insects of 1/2 to 2 inches long. They have four wings that fold flat over the back. The hind wings are much larger than the forewings and fold like fan. Antennae are long and there are two long tail-like appendages at the tip of the abdomen called **cerci**.

4-H Insect Orders

Name Derivation: Latin word for cockroach

Blattodea
Cockroaches and Termites

Level: Junior, Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Chewing
Biology: Cockroaches are somewhat general feeders, but prefer materials high in fats and starches. They deposit their eggs in a capsule called an **ootheca**. Several species invade homes where they can contaminate food and spread diseases. They have an unpleasant odor and can be a nuisance.

Termite colonies are established after swarmers leave their colonies to mate and search for new nesting sites. Termites are important to humans because they cause millions of dollars of damage to structures each year. They feed on cellulose, such as wood, and digest it with the help of microbes in their digestive systems. They are also important decomposers of wood in the ecosystem.

Key Characteristics: Cockroaches have **cursorial** legs, adapted for running. They have flattened bodies and a head concealed from above by the **pronotum**. They have two pairs of wings, but in some species the wings are greatly reduced.

Termites have bead-like antennae and live in colonies in wood. Colonies consist of three castes: workers, **soldiers**, and swarmers. Workers are small, soft-bodied, yellowish or whitish termites that lack wings. Soldiers and workers also lack wings and never leave the colony. Swarmers, or the reproductive forms, have darker bodies; and have four long, membranous wings similar in size, shape, and pattern.

Name Derivation: Greek word meaning “soothsayer”

Mantodea
Praying Mantis

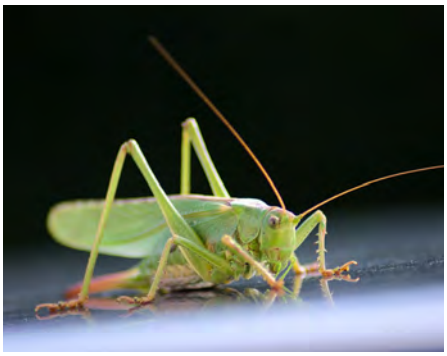
Level: Junior, Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Chewing
Facts: Mantises are predaceous on a large variety of insects. They usually wait motionlessly for their prey to venture within striking distance. Mantises are well-known as biological control agents. However, they do not distinguish between beneficialand destructive species, but feed on any prey that comes near.
Key Characteristics: Mantodea are large, elongate, and slow-moving insects. Their front legs are greatly modified for grasping prey.

4-H Insect Orders

Name Derivation: Greek, “skin” (derma); “wings” (ptera)

Dermaptera
Earwigs

Level: Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Chewing
Biology: Earwigs are usually found hiding under leaves, wood or in cracks outdoors, during the day. Earwigs can be destructive in greenhouses, but most species are considered inconsequential or beneficial. They release a bad-smelling substance when disturbed.
Key Characteristics: Dermaptera are medium-sized insects usually with four wings. The front pair is short, leaving the abdomen exposed. The hind wings are folded under the front wings. A pair of non-venomous pinchers is found at the end of the abdomen, which are modified **cerci**.



Name Derivation: Greek, “straight” (ortho); “wings” (ptera)

Orthoptera
Grasshoppers, Crickets, and Katydids

Level: Junior, Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Chewing
Biology: Nymphs resemble adults. Adults in several groups of this order never develop wings. These include such odd insects as cave crickets. The order Orthoptera is large. Some members of this group are quite destructive to crops (grasshoppers).
Key Characteristics: Orthoptera have long antennae and various leg modifications. They generally have two pairs of wings with many veins. The front pair is usually slender and the hind pair is broad and fan-like. Wings are reduced to small pads in some adult grasshoppers and crickets.

Name Derivation: Greek word meaning “phantom”

Phasmatodea
Walkingsticks

Level: Junior, Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Chewing
Biology: Walkingsticks are slow-moving and generally found on trees or shrubs. Some species are able to regenerate lost legs. These insects have chewing mouthparts and feed on foliage, but are rarely considered pests. Texas species are wingless as adults. However, many tropical forms are winged, and some are called leaf insects.
Key Characteristics: Walkingsticks are elongated insects with long legs. They are typically camouflaged to resemble branches or sticks.

Mohammed El Damir, Bugwood.org

Name Derivation: Greek, “gnawed: (psoco); “wings” (ptera)

Psocodea

Barklice, Booklice, and True Lice

Level: Junior, Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Chewing or piercing and sucking
Biology: Booklice are found around old books and in damp, dark rooms. Most live outdoors and are found in soil litter; around vegetation; or on stones, logs, and fences. Some booklice feed on stored grains while others are library pests. They are microscopic to 1/4 inch in size.
Barklice look very similar to booklice, but some species may be striped and/or have more noticeable coloration. Barklice may also be winged. Barklice feed on fungi, algae, and dead plant material; and some species wrap trees trunks with webbing.

True lice, often referred to as “Phthiraptera,” are divided into four suborders. The two covered in 4-H are Amblycera (chewing lice) and Anoplura (sucking lice). True lice are small, flat, wingless **parasites** of animals.
Chewing lice feed on bits of hair, feathers, or skin of their host and lay eggs on the hair or feathers of the host. Chewing lice are important pests of domestic birds and animals, but they do not live on humans. Their heads are wider than the thorax.
Sucking lice feed mainly on blood and have heads narrower than the width of their thorax. Mouthparts are formed for piercing and sucking. They are commonly found on mammals, including humans, but not birds. Eggs are laid on individual hairs and are often called “nits.” The human body louse has been responsible for millions of human deaths through the centuries because it spreads the organism that causes typhus.
Key Characteristics: Psocodea are tiny insects that have four wings or none at all. Booklice and barklice are small and soft-bodied with long, thin antennae.
True lice are wingless parasites that live on birds and mammals. They are small, flat, and wingless, with short legs and short antennae. They are about 1/6 to 3/16 inch long when mature.

Thysanoptera

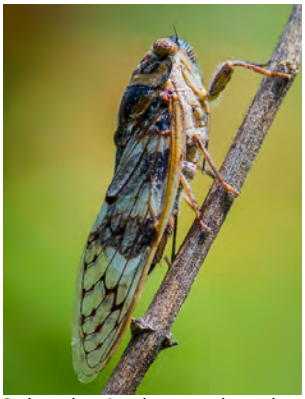
Thrips

Name Derivation: Greek, “fringe”: (thysano); “wings” (ptera)

Level: Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Rasping
Biology: Thrips feed by rasping or scratching at surfaces with their mouthparts and sucking up juices. Immature stages resemble the adults. Some species feed on plants, others prey on small arthropods and/or their eggs. Those that feed on plants are frequently injurious in greenhouses. or on vegetable crops or cotton. They will also bite humans but only cause momentary discomfort.
Key Characteristics: Thysanoptera are wingless or winged. If winged, wings are narrow, strap-like, and deeply fringed. They are tiny insects about 1/8 inch long.

4-H Insect Orders

Suborder Heteroptera



Suborder Auchenrorrhyncha

Suborder Sternorryncha

Hemiptera

True bugs, Cicadas, Hoppers, Aphids, Psyllids, Whiteflies, Scales, and more.

Level: Junior, Intermediate, Senior
Metamorphosis: Paurometabolous
Mouthparts: Piercing and sucking
Biology: Hemiptera are found on plants and animals, or in water. Some cause considerable plant damage by their feeding. Some are beneficial because they prey on other insects.
Key Characteristics: Hemiptera is broken into three suborders. Suborder **Heteroptera** are the true bugs and have a beak arising from the front of the head, long antennae, and two pairs of wings (in most adults). Members of this suborder usually have four wings held flat over the body. The fore wing is thickened or leathery at the base and membranous at the tip or end. This partially hardened wing is called **hemelytron** (plural: **hemelytra**).
Suborders Auchenorrhyncha and Sternorrhyncha have a beak that arises more toward the base of the head, further from the eyes. **Auchenorrhyncha** includes cicadas, splittlebugs, leafhoppers, treehoppers, and planthoppers. **Sternorrhyncha** includes psyllids, aphids, whiteflies, and scales.

Name Derivation:
Greek, “half” (hemi); “wings” (ptera)

4-H Insect Orders

Photo Credit: Salvador Vitanza

Name Derivation: Greek, “nerve” or net referring to the many wing veins (neuro); “wings” (ptera)

Neuroptera

Mantidflies, Lacewings, Antlions, and Owlflies

Level: Junior, Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts - Chewing
Biology: Neuroptera are considered beneficial because most adults and larvae are predaceous. Larvae of most species have long, sickle-like mandibles that suck fluids. Pupae form a silken cocoon. Adults are weak fliers and generally attracted to lights.
Key Characteristics: Neuroptera have two pairs of similarly-sized, membranous wings with a complex, net-like pattern of venation. They are rather fragile. Chewing mouthparts occur in adults, but most larval mouthparts are modified for piercing and sucking.

Name Derivation: Greek, “large” (mega); “wings” (ptera)

Megaloptera

Dobsonflies

Level: Junior, Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Chewing
Biology: Sometimes grouped as a suborder in Neuroptera, Megaloptera are large insects found near water. Their larvae are aquatic and usually live under stones in streams. Dobsonfly larvae are often called hellgrammites and are used as fish bait.
Key Characteristics: Dobsonflies are large insects with membranous wings held over the body like a tent. Males have sickle-shaped mandibles, used to hold the female during mating. Females have much shorter mandibles.

Name Derivation: Greek, “sheath” (coleo); “wings” (ptera)

Coleoptera

Beetles

Level: Junior, Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Chewing
Biology: Immature stages vary and may be grub-like, worm-like, caterpillar-like, or very active. Larvae pass through a pupal stage before becoming an adult. Food habits are also varied. Beetles can be herbivorous, predaceous, scavengers, and wood borers. This order includes some of the best-known and most important insect pests. Most of the members are terrestrial, but some are aquatic. Coleoptera is the largest order, including over 1/3 of all known insects (350,000+ different species). Famous members of this group include the lady beetles and cotton boll weevil.
Key Characteristics: Beetles have hardened front wings called **elytra** (singular: **elytron**).that cover membranous hind wings. Because beetles are such a diverse group of insects, larvae and adults greatly vary in appearance, color, and shape.

4-H Insect Orders

Name Derivation: Greek, “long” (meco); “wings” (ptera)

Mecoptera
Scorpionflies

Level: Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Chewing
Biology: Scorpionflies do not sting and are harmless. The structure that appears to be a stinger is an abdominal enlargement on the males. They are usually only found during a 2-to-3-week period in the fall, resting on plants that grow along the banks of streams and in damp woods. Larvae are caterpillar-like and live in damp soil. Adults feed on dead and dying insects, rotting fruit, and nectar, and are sometimes attracted to lights. Scorpionflies are uncommon.
Key Characteristics: Mecoptera are small- to medium-sized insects with four long, narrow wings and long antennae. They have chewing mouthparts located at the end of a broad, flat snout, which is two or three times as long as the head is wide.

Photo Credit: Salvador Vitanza

Name Derivation: Greek “tube” (siphon) “wingless” (aptera)

Siphonaptera
Fleas

Level: Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Piercing and sucking
Biology: Fleas are well-known as pests of domestic animals and humans. One species transmits the bacterium that causes plague. Plague has killed more than 125 million people during the past 3,000 years. These insects suck blood only as adults, and females must have a blood meal before they can reproduce. They usually feed on animals but will also attack humans. Larvae feed on organic matter and blood secreted by adults, and are often found in the nests of animals.
Key Characteristics: Siphonaptera are small, wingless, and laterally flattened (from side to side), and have jumping hind legs. Spines on the body point to the rear of the insect which allows them to move though the hair of the host easily. The larval stage is worm-like, which is quite different from the adults.

4-H Insect Orders

Name Derivation: Greek, “two” (di); “wings” (ptera)

Diptera

Flies, Midges, Gnats, and Mosquitoes

Level: Junior, Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Variable
Biology: Diptera includes forms that are **parasitic**, predaceous, and other forms that live on either living or dead plant or animal material. Some Diptera cause significant damage to crops, while others can act as pollinators. Many harmful flies, such as mosquitoes, spread diseases (yellow fever, dengue fever, West Nile virus, and malaria) and are responsible for millions of human deaths. Because many of the species carry diseases, this is one of the most important orders from the standpoint of human health.
Key Characteristics: Diptera are usually winged but have only one pair of true wings with few veins. Hind wings are reduced in size and sensory function. They are represented by a pair of slender, knobbed structures called **halteres**, usually utilized for precise movement in controlled flight. Mouthparts in adults are **haustellate** and modified for biting/sucking or sponging. Fly larvae are usually known as **maggots** and are entirely unlike the adults. Flies occur in many shapes and sizes.

Jessica Louque, Smithers Viscient, Bugwood.org

Name Derivation: Greek, “hair” (tricho); “wings” (ptera)

Trichoptera

Caddisflies

Level: Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Chewing
Biology: Adults are common around streams. Adults do not feed and have reduced, non-functional mouthparts. Larvae live in water and most build cases to enclose their bodies. Larvae are **scavengers**, **herbivores**, or predators with chewing mouthparts. Their presence or absence can be an indicator of water quality.
Key Characteristics: Trichoptera have long antennae, four hairy wings (folded tent-like over the body) and resemble small, dull-colored moths. They are soft-bodied insects as adults and larvae. Larvae resemble caterpillars with few hairs.

4-H Insect Orders

Lepidoptera
Butterflies, Moths, and Skippers

Name Derivation: Greek, “scale” (lepido); “wings” (ptera)

Level: Junior, Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Chewing as larvae, siphoning as adults
Biology: This is one of the best-known orders of insects and contains some of our most important pests, such as the codling moth, armyworm, clothes moth, and cabbageworm. Larvae are called caterpillars and most feed on the leaves of plants, while others bore into plant stems or fruit, and still others are leaf miners or stored products pests.
Key Characteristics: Lepidoptera usually have four, well-developed wings covered with overlapping scales. Mouthparts of the adults are formed for sucking through a tube called a **proboscis**. The larvae are worm-like. Some are also known as cutworms or hornworms, and their mouthparts are for chewing.

Hymenoptera
Ants, Bees, Wasps, Sawflies, Horntails

Name Derivation: Greek “membrane” (hymeno); “wings” (ptera)

Level: Junior, Intermediate, Senior
Metamorphosis: Holometabolous
Mouthparts: Chewing and lapping
Biology: Habits of these insects are varied: some are predaceous, some are parasitic, some cause plant galls, and some feed on plant foliage. Others, such as bumble bees and honey bees eat plant pollen and nectar. This order includes some of our most harmful, as well as some of our most beneficial insects. The abdomen in the females is usually furnished with a stinger. Many of these insects have a painful sting and should be avoided, if possible.
Key Characteristics: Hymenoptera have membranous wings with few veins and the forewings larger than the hindwings. Some individuals are wingless. Mouthparts are formed for chewing or for both chewing and sucking. The body is usually constricted greatly between the abdomen and thorax. Immature stages are maggot-like or caterpillar-like and are entirely different from the adults.

The Non-insect Orders of Phylum Arthropoda

See page 9 to determine which orders are required for your level.

Arthropods are invertebrates that have an exoskeleton (external skeleton), a segmented body, and jointed appendages. The name of the Phylum Arthropoda derives from the Greek “arthron” (joint) and “podos” (foot). It has been estimated that more than 80 percent of species on Earth are Arthropods. The following table lists living Subphyla, Classes, and Orders of arthropods that are covered in this 4-H unit. Table items in bold text may be included in the 4-H Entomology ID Contest.

Domain Eukarya
Kingdom Animalia
Phylum Arthropoda
Subphylum Chelicerata
Class Arachnida
Order Araneae (Spiders) Order
Opiliones (Harvestmen) Order
Scorpiones (Scorpions) Order
Thelyphonida (Vinegaroons)
Order Solifugae (Sun spiders)
Subclass Acari (Ticks, mites, chiggers)
Subphylum Myriapoda
Class Chilopoda (Centipedes)
Class Diplopoda (Millipedes)
Subphylum Crustacea (Crustaceans) partial list:
Class Branchiopoda (Brine shrimp and others)
Class Maxillopoda (Barnacles and copepods)
Class Malacostraca
Order Isopoda (Pillbugs, sowbugs)
Order Decapoda (Crayfish, crabs, lobsters, shrimp)
Subphylum Hexapoda
Class Insecta (Insects)
Group Entognatha
Class Collembola (Springtails)
Class Protura (Proturans)
Class Diplura (Diplurans)

Non-insect Orders and Sublasses

Subclass Acari

Ticks, Mites, and Chiggers

Level: Junior, Intermediate, Senior
Metamorphosis: None or incomplete
Mouthparts: Piercing and sucking
Biology: There are usually four stages: egg, larvae, nymph, and adult. The terms larva and nymph are not used the same here as for insects. No metamorphosis is present because adults resemble young but are bigger, and no wings are present. Ticks only feed on the blood of animals. Ticks are responsible for spreading disease-causing organisms such as the organisms that causes Rocky Mountain spotted fever in humans and cattle fever in cattle.
Key Characteristics: Ticks and mites are wingless, lack antennae and usually have flat or round bodies. Adults have eight legs, although some immature stages have only six legs. Many are microscopic.

Order Araneae

Spiders

Level: Junior, Intermediate, Senior
Metamorphosis: Simple
Mouthparts: Pair of chelicerae
Biology: Mouthparts are a pair of **chelicerae**, each with a piercing fang. Chelicerae are used to manipulate captured prey, but all food intake is liquid. **Pedipalps** are used much like antennae in insects, and males use them during mating. All spiders are beneficial predators. A few, such as the widow and recluse spiders, are extremely venomous and should be avoided. There are about 1080 species of spiders in Texas and only a few are mentioned here.
Key Characteristics: Spiders are wingless and lack antennae. Most have six or eight eyes and bodies variable in size and shape. immatures and adults have eight legs and a pair of pedipalps by the mouth. Size ranges from 1/8 inch to more than 4 inches.

Order Opiliones

Harvestmen

Level: Intermediate, Senior
Metamorphosis: Simple
Mouthparts: Weak chewing
Biology: Worldwide, there are over 40 families of harvestmen. Eighteen species are reported in Texas. Harvestmen are commonly also called daddy long legs.
Key Characteristics: Harvestmen have globular bodies and one body unit, which separates them from spiders. The abdomen is distinctly segmented, and two eyes are mounted on a dorsal tubercle on the top surface of the body (carapace). While most species have extremely long spindly legs, there are species with shorter legs.

Non-insect Orders and Classes

Order Scorpiones

Scorpions

Level: Junior, Intermediate, Senior
Metamorphosis: Simple
Mouthparts: Chewing
Biology: Scorpions are easily recognized by the pincers on the first set of appendages (pedipalps), the long tail with a stinger at the end, and the flattened appearance of the body. They have four pairs of walking legs. Scorpions have two eyes on the top of the head region and usually two to five along the sides of the head. They do not see well and rely more on the sense of feel for most of their activities. Between the last pair of legs is a comb-like structure, called pectines, used to identify substrate structures and for chemoreception of pheromones. There are about 18 species of scorpions in Texas, and many of these are uncommon or are known only locally. *Centruroides vittatus* (Say) is the only species found in the eastern half of the state. The number of species increases in the western parts of the state, with most species (14) reported in the Big Bend region.
Key Characteristics: Scorpions are wingless, have no antennae, and have bodies that are broad near the front and taper to the tail. The tail has a stinger at the tip and is often held over the body. All scorpions can sting, but only a few are deadly venomous. Front **pedipalps** are enlarged into pincers. They are often found under loose bark of logs or under trash piles. Size ranges from 1 to 3 inches.

Order Solifugae

Sun spiders, also called Wind spiders, Sun scorpions, and Wind scorpions

Level: Intermediate, Senior
Metamorphosis: Simple
Mouthparts: Chelicerae
Biology: The mouthparts (**chelicerae**) of Solifugae are formed into large jaws that work vertically and project forward from the mouth. The shape of the head with its enormous jaws is quite distinctive.
Key Characteristics: Solifugae are 3/8 to 2 inches long. Most are yellowish to brown and have four pairs of legs. The **pedipalps** are thin and used like feelers. The first pair of legs are slenderer than others and act as sense organs. The males often have a slenderer body and are often longer than females. With their longer legs, males appear bigger.

Non-insect Orders and Classes

Order Thelyphonida

Vinegaroon or Whipscorpion

Level: Senior
Metamorphosis: Simple
Mouthparts: Pedipalps
Biology: The only vinegaroons that occur in Texas are in the genus *Mastigoproctus*. Texas specimens are nearly black. Bodies of adults are 1 to 3 inches long. They are found primarily in west Texas, especially in the Trans-Pecos region, but have been reported as far north as the Panhandle and in south Texas.
Key Characteristics: Vinegaroons have heavy mouthparts (**pedipalps**) that are formed into pincers. The first pair of legs is long and thin, and is used like antennae to feel their way around. The next three pairs of legs are used for walking. The abdomen is attached widely to the head-thorax region (**cephalothorax**). The tail is long and thin, suggesting a whip, which is where the common name, "whipscorpion" originates. They are called "vinegaroons" because they can emit acetic acid from the base of the tail.

Class Chilopoda

Centipedes

Photo Credit: Salvador Vitanza

Name Derivation: Latin, "hundred" (centi); "foot" (pedis)

Level: Senior
Metamorphosis: Simple
Mouthparts: Piercing and chewing
Biology: Centipedes are generally predators which feed on insects and other arthropods. They are active mostly at night and they can move quickly. One large species in Texas belongs to the genus *Scolopendra*, and is large enough to be a hazard to humans.
Key Characteristics: Centipedes can easily be distinguished from millipedes by counting the number of pairs of legs arising from the body segments. Centipedes have one pair of legs per body segment, with the first pair modified into venomous fangs. Centipedes are generally flattened and have a pair of well-developed antennae on the head.

Non-insect Orders and Classes

Class Diplopoda

Millipedes

Name Derivation: Latin, “thousand” (milli); “foot” (pedis)

Level: Senior
Metamorphosis: Simple
Mouthparts: Chewing
Biology: Millipedes are usually **scavengers** on dead arthropods and organic matter (**detritivores)**. They are active mostly at night and usually are slow-moving. Millipedes can be a nuisance when they enter homes. There are a few species that may damage field crops or greenhouse plantings.
Key Characteristics: Millipedes have two pairs of legs per body segment. Their bodies are generally rounded. Some species emit a foul-smelling defensive fluid through openings along the sides of the body. The fluids can cause brown discoloration on skin, and in some cases, is strong enough to kill insects that are placed in the same container. Some of these fluids contain hydrogen cyanide.

Order Isopoda

Sowbugs and Pillbugs

Level: Senior
Metamorphosis: Simple
Mouthparts: Chewing
Biology: Sowbugs and pillbugs are generally **scavengers**. They prefer moist habitats with organic matter. They hide during the day under rocks, wood, or other structures.
Key Characteristics: Adults grow to about 3/8 inch, have a number of rounded body segments and several pairs of legs. Sowbugs possess a pair of tail-like structures on the back end of the body. Pillbugs lack these structures, and are able to roll into a tight ball when disturbed, a behavior that results in their common name “roly-pollies.”

Order Collembola

Springtails

Photo Credit: Susan Ellis, Bugwood.org

Level: Intermediate
Metamorphosis: Simple
Mouthparts: Chewing
Biology: Springtails used to be classified as insects, but because they have internal mouthparts (not external like insects), they are included in the subphylum Hexapoda, but not in class Insecta. Some species are important pests in greenhouses, mushroom cellars, and earthworm beds. Springtails are abundant on the soil surface, but are easily overlooked because of their size.
Key Characteristics: Collembola are tiny and wingless, with a spring-like apparatus on the abdomen. They jump using this tail-like appendage that folds under their body, called a **furcula**. The body is elongate or globular, and usually microscopic but sometimes larger than 1/8 inch. They are usually white, yellowish, brown, or gray.

Study List of Common Arthropods in Texas

Students should also study images from the 4-H Entomology Study Guide at https://agrilifeinsectimages.smugmug.com.

This list provides the accepted common names, host or location and significance of each species required for the identification portion of the 4-H Entomology ID Contest. These are also the accepted common names for the 4-H Entomology Collection Contest.

Host or location is also indicative of habitat. Host designation is not necessarily descriptive of all species within that group of insects, but may represent the majority of species or most commonly encountered.

Significance. The significance designated in this guide may not apply to each and every species using that common name. Therefore, significance was assigned based on the most common species or where they are most commonly encountered. An explanation of significance is:

- **Pest** - species that can cause economic loss, be a nuisance, or pose a medical threat. Many species listed as pest can also have some beneficial qualities.
- **Beneficial -** species that are beneficial to the environment or agriculture and are generally considered pollinators, predators, or recyclers.
- **Inconsequential** - species that do not pose a great risk as a pest insect or are considered especially beneficial.
- **Variable -** species that can be a pest in certain situations, but beneficial in others. The situation makes the pest and visa versa.

Level	Common Name	Order	Host or Location	Significance
J	Silverfish	Zygentoma	House	Pest
I	Mayflies	Ephemeroptera	Near water	Inconsequential
J	Black-winged damselfly	Odonata	Stream	Beneficial
J	Green darner	Odonata	Slow moving water	Beneficial
I	Stoneflies	Plecoptera	Near water	Inconsequential
J	American cockroach	Blattodea	House	Pest
I	German cockroach	Blattodea	House	Pest
I	Smokeybrown cockroach	Blattodea	House	Pest
I	Termites	Blattodea	Wood, stumps	Pest
J	Praying mantids	Mantodea	Shrubs, vegetation	Beneficial
I	Earwigs	Dermaptera	Leaf litter	Inconsequential
I	Banded-winged grasshopper	Orthoptera	Pasture	Pest
J	Differential grasshopper	Orthoptera	Pasture	Pest
J	Long-horned grasshoppers	Orthoptera	Shrubs/grass	Pest
J	Field cricket	Orthoptera	Outdoors,	Pest
I	Mole crickets	Orthoptera	Sandy soil	Pest
I	True katydid	Orthoptera	Trees	Pest
J	Walkingsticks	Phasmatodea	Shrubs, vegetation	Inconsequential
I	Barklice, booklice	Psocodea	Tree trunk	Pest
I	Chewing louse	Psocodea	Animals	Pest
J	Head louse	Psocodea	Humans	Pest
I	Hog louse	Psocodea	Swine	Pest
I	Short-nosed cattle louse	Psocodea	Cattle	Pest

Level	Common Name	Order	Host or Location	Significance
I	Thrips	Thysanoptera	Flowers	Variable
S	Ambush bug	Hemiptera (Heteroptera)	Flowers	Beneficial
S	Assassin bug	Hemiptera (Heteroptera)	Field crops	Beneficial
J	Backswimmer	Hemiptera (Heteroptera)	Pond	Beneficial
J	Bed bug	Hemiptera (Heteroptera)	Humans	Pest
S	Big-eyed bugs	Hemiptera (Heteroptera)	Field crops	Beneficial
S	Boxelder bug	Hemiptera (Heteroptera)	Boxelder trees	Pest
S	Burrower bug	Hemiptera (Heteroptera)	Grasses, peanuts	Pest
I	Chinch bug	Hemiptera (Heteroptera)	Grass	Pest
I	Cotton fleahopper	Hemiptera (Heteroptera)	Cotton	Pest
S	False chinch bug	Hemiptera (Heteroptera)	Sorghum	Pest
J	Giant water bug	Hemiptera (Heteroptera)	Water, ponds	Pest
J	Green stink bug	Hemiptera (Heteroptera)	Plants	Pest
J	Harlequin bug	Hemiptera (Heteroptera)	Cole crops	Pest
I	Kissing Bug	Hemiptera (Heteroptera)	Animals	Pest
S	Large milkweed bug	Hemiptera (Heteroptera)	Milkweed	Beneficial
I	Leaffooted bug	Hemiptera (Heteroptera)	Plants, weeds	Pest
S	Minute pirate bugs	Hemiptera (Heteroptera)	Insects	Beneficial
J	Squash bug	Hemiptera (Heteroptera)	Squash	Pest
S	Tarnished plant bug	Hemiptera (Heteroptera)	Plants, weeds	Pest
J	Toad bug	Hemiptera (Heteroptera)	Shoreline	Beneficial
S	Water boatman	Hemiptera (Heteroptera)	Pond	Beneficial
S	Water scorpions	Hemiptera (Heteroptera)	Ponds, lakes	Beneficial
I	Water striders	Hemiptera (Heteroptera)	Pond, streams	Beneficial
S	Wheel bug	Hemiptera (Heteroptera)	Vegetation	Beneficial
J	Cicadas	Hemiptera (Auchenorrhyncha)	Trees	Inconsequential
J	Leafhoppers	Hemiptera (Auchenorrhyncha)	Grasses, plants	Pest
S	Planthoppers	Hemiptera (Auchenorrhyncha)	Various plants	Pest
S	Spittlebugs	Hemiptera (Auchenorrhyncha)	Alfalfa, plants	Pest
S	Treehoppers	Hemiptera (Auchenorrhyncha)	Trees	Pest
J	Aphids	Hemiptera (Sternorrhyncha)	Plants	Pest
I	Greenbug	Hemiptera (Sternorrhyncha)	Small grains	Pest
S	Pecan phylloxera	Hemiptera (Sternorrhyncha)	Pecans	Pest
I	Psyllids	Hemiptera (Sternorrhyncha)	Potato	Pest
I	Scales, armored	Hemiptera (Sternorrhyncha)	Trees, shrubs	Pest
I	Scales, soft	Hemiptera (Sternorrhyncha)	Ornamental Trees	Pest
S	Whiteflies	Hemiptera (Sternorrhyncha)	Vegetables, cotton	Pest

Level	Common Name	Order	Host or Location	Significance
J	Dobsonflies	Megaloptera	Stream	Beneficial
J	Antlions	Neuroptera	Plants	Beneficial
S	Brown lacewings	Neuroptera	Insects	Beneficial
I	Green lacewings	Neuroptera	Insects	Beneficial
S	Mantispids (Mantisflies)	Neuroptera	Woodlots	Beneficial
S	Owlflies	Neuroptera	At lights	Beneficial
S	Alfalfa Weevil	Coleoptera	Alfalfa	Pest
J	Blister Beetle	Coleoptera	Plants, alfalfa, weeds	Pest
I	Boll Weevil	Coleoptera	Cotton	Pest
S	Carpet beetle	Coleoptera	Wool carpets	Pest
S	Carrion beetle	Coleoptera	Dead animals	Beneficial
J	Caterpillar Hunter	Coleoptera	Woodland	Beneficial
S	Click Beetle	Coleoptera	Corn, field crops	Pest
I	Colorado potato beetle	Coleoptera	Potatoes	Pest
J	Cottonwood borer	Coleoptera	Cottonwood trees	Pest
S	Elm leaf beetle	Coleoptera	Elm trees	Pest
J	Fireflies (lighteningbug)	Coleoptera	Weeds	Inconsequential
S	Flat-headed borer (Metallic wood borer)	Coleoptera	Trees	Pest
S	Flea beetles	Coleoptera	Weeds	Pest
J	Lady beetles	Coleoptera	Aphids	Beneficial
I	Lesser grain borer	Coleoptera	Stored grain	Pest
S	Locust borer	Coleoptera	Black locust trees	Pest
I	Maize weevil (rice weevil)	Coleoptera	Stored grain	Pest
J	May beetle (June beetle, Junebug)	Coleoptera	Shrubs	Pest
S	Mealworm	Coleoptera	Stored grain	Pest
I	Plum curculio	Coleoptera	Peaches	Pest
S	Red flour beetle	Coleoptera	Stored grains	Pest
S	Rove beetle	Coleoptera	At lights	Inconsequential
S	Sawtoothed grain beetle	Coleoptera	Stored grain	Pest
S	Soldier beetles	Coleoptera	Flowers	Inconsequential
J	Spotted cucumber beetle	Coleoptera	Cucurbits	Pest
I	Sweet potato beetle	Coleoptera	Sweet potatoes	Pest
J	Tiger beetles	Coleoptera	Shady trails	Beneficial
S	Tumbling flower beetles	Coleoptera	On flowers	Inconsequential
S	Water scavenger beetle	Coleoptera	Stream	Inconsequential
S	Whirlygig beetle	Coleoptera	Stream, ponds	Inconsequential

Level	Common Name	Order	Host or Location	Significance
I	Scorpionflies	Mecoptera	Plants	Inconsequential
I	Fleas	Siphonaptera	Cat, dog	Pest
S	Bee flies	Diptera	Flowers	Beneficial
S	Black flies/Buffalo gnats	Diptera	Stream	Pest
S	Blow flies	Diptera	Carrion	Variable
I	Common cattle grub	Diptera	Cattle	Pest
J	Crane flies	Diptera	Meadow	Inconsequential
S	Deer fly	Diptera	Woodlands	Pest
S	Flesh flies	Diptera	Carrion	Variable
I	Horn fly	Diptera	Cattle	Pest
J	Horse fly	Diptera	Woodlands	Pest
J	House fly	Diptera	Barn	Pest
J	Mosquitoes	Diptera	Yard and meadow	Pest
S	Robber flies	Diptera	Woodlands	Beneficial
S	Sheep keds	Diptera	Sheep	Pest
I	Sorghum midge	Diptera	Sorghum	Pest
S	Stable fly	Diptera	Cattle	Pest
J	Syrphid fly (flower/ hover fly)	Diptera	Flowers	Beneficial
I	Caddisflies	Trichoptera	Near stream	Inconsequential
I	Alfalfa caterpillar (orange sulfur, alfalfa butterfly)	Lepidoptera	Alfalfa	Pest
S	Armyworm	Lepidoptera	Grasses	Pest
I	Bagworm	Lepidoptera	Trees	Pest
J	Black swallowtail	Lepidoptera	Carrot family	Beneficial
J	Bollworm or corn earworm	Lepidoptera	Cotton, corn, others	Pest
S	Buckeye	Lepidoptera	Plantain family	Inconsequential
S	Cabbage butterflies	Lepidoptera	Cole crops	Pest
I	Cabbage looper	Lepidoptera	General feeder	Pest
S	Cecropia	Lepidoptera	Oak	Inconsequential
S	Cutworms	Lepidoptera	Grass, plants	Pest
J	Fall armyworm	Lepidoptera	Grasses	Pest
S	Fall webworm	Lepidoptera	Trees	Pest
S	Forest tent caterpillar	Lepidoptera	Broad-leaved trees	Pest
I	Giant swallowtail	Lepidoptera	Citrus	Beneficial
J	Gray hairstreak (Cotton square borer)	Lepidoptera	Cotton	Pest
S	Great leopard moth	Lepidoptera	Variety of plants	Inconsequential
I	Greater wax moth	Lepidoptera	Honey bee hive	Pest
S	Indianmeal moth	Lepidoptera	Stored grain	Pest
S	Io moth	Lepidoptera	Trees, corn	Inconsequential
J	Luna moth	Lepidoptera	Oak	Inconsequential

Level	Common Name	Order	Host or Location	Significance
J	Monarch	Lepidoptera	Milkweed	Beneficial
S	Mourningcloak butterfly	Lepidoptera	Willow	Inconsequential
S	Peachtree borer	Lepidoptera	Peach trees	Pest
S	Pecan nut casebearer	Lepidoptera	Pecans	Pest
I	Pink bollworm	Lepidoptera	**Cotton**	Pest
J	Polyphemus	Lepidoptera	Oaks	Inconsequential
S	Question mark	Lepidoptera	Elms	Inconsequential
J	Red admiral	Lepidoptera	Nettles	Inconsequential
S	Saltmarsh caterpillar	Lepidoptera	Grasses, weeds	Variable
I	Silverspotted skipper	Lepidoptera	**Black locust**	Inconsequential
S	Sorghum webworm	Lepidoptera	Sorghum	Pest
S	Southwestern corn borer	Lepidoptera	Grain crops	Pest
S	Eastern tiger swallowtail	Lepidoptera	Cherry trees	Beneficial
I	Tomato hornworm	Lepidoptera	Tomatoes	Pest
J	Underwing moths	Lepidoptera	Trees	Inconsequential
S	Viceroy	Lepidoptera	Poplar	Inconsequential
J	Wood nymph	Lepidoptera	Thick woods	Inconsequential
J	Bumblebees	Hymenoptera	Meadow	Beneficial
S	Carpenter bees	Hymenoptera	Fence posts	Pest
J	Cicada killer	Hymenoptera	Soil	Beneficial
J	Honeybee	Hymenoptera	Flowers	Beneficial
S	Horntails	Hymenoptera	Logs	Inconsequential
S	Ichneumon wasps	Hymenoptera	Flowers	Beneficial
S	Leaf-cutting bees	Hymenoptera	Flowers	Beneficial
J	Mud daubers	Hymenoptera	Buildings	Beneficial
J	Paper wasps	Hymenoptera	Houses	Pest
J	Red harvester ant	Hymenoptera	Pastures	Inconsequential
J	Red imported fire ant	Hymenoptera	Pastures, lawns	Pest
S	Sawflies	Hymenoptera	Plants	Pest
S	Tarantula hawk	Hymenoptera	Woodlands	Beneficial
S	Texas leafcutting ant	Hymenoptera	Woodlands	Pest
J	Velvet ants	Hymenoptera	Soil	Pest
J	Yellow jackets	Hymenoptera	Ground nests	Pest

Level	Common Name	Order	Host or Location	Significance
S	Brown dog tick	Subclass Acari	Dog	Pest
J	Lone star tick	Subclass Acari	Cattle	Pest
I	Spider mites	Subclass Acari	Plants	Pest
I	Crab spiders	Araneae	Flowers	Beneficial
S	Jumping spiders	Araneae	Garden	Beneficial
I	Recluse spiders	Araneae	Board piles	Pest
S	Tarantulas	Araneae	Soil	Beneficial
J	Widow spiders	Araneae	Woodlots	Pest
J	Wolf spiders	Araneae	Under rocks	Beneficial
J	Yellow garden spider	Araneae	Garden	Beneficial
I	Harvestmen	Opioliones	Caves	Inconsequential
J	Scorpions	Scorpiones	Log piles	Pest
S	Vinegaroons	Uropygi	Arid regions	Inconsequential
I	Sunspiders (windscorpions, camelspiders)	Solifugae	Arid regions	Inconsequential
S	Centipedes	Class Chilopoda	Ground	Inconsequential
S	Millipedes	Class Diplopoda	Leaf litter	Variable
S	Sowbugs and pillbugs	Isopoda	Compost	Variable
I	Springtails	Collembola	Surface of puddles	Variable

Zygentoma (Silverfish)

Photo Credit: Salvador Vitanza

Silverfish

Lifecycle - Ametabolous
Status - Pest

Mouthparts - Chewing
Host - House

Silverfish are considered very primitive insects. They are flattened from top to bottom and have a scale-like covering that gives them a silvery appearance. These insects are a pest in homes and libraries, where they can damage books. They require very little water but do need a source of sugar or starch in their diet. Silverfish have long antennae and three long tail-like structures (**cerci**) on the end of the abdomen. This species is the most commonly seen member of the order Zygentoma.

Level: Junior, Intermediate, Senior

Ephemeroptera (Mayflies)

Mayflies

Lifecycle - Hemimetabolous
Status - Inconsequential

Mouthparts - Chewing
Host - Near water

Mayflies are an important part of the diet for many species of fish. The adults are delicate, soft-bodied insects and range in size from 1/4 inch to over 2 inches long. When at rest, the wings are held over the back. Immature stages develop in water for a period of a few weeks to a few years, depending on the species and water conditions. When the last aquatic stage leaves the water, it **molts** into a cloudy-winged stage called a **subimago**. The subimago soon molts into the true adults or **imago** stage. This stage has clear wings. Mayflies are the only insects to molt after they are able to fly.

Level: Intermediate, Senior

Odonata (Dragonflies and Damselflies

Black-winged Damselfly

Calopteryx maculata (Beuvois)
Family: Calopterygidae

Lifecycle - Hemimetabolous
Status - Beneficial

Mouthparts - Chewing
Host - Stream

The black-winged damselfly can be readily identified because it is the only species in Texas that has solid black wings. Males and females differ somewhat in coloration with males being darker-winged. **Naiads** are typically found in flowing streams. All damselflies are effective predators as naiads and adults. A wide variety of damselflies occur throughout Texas. Most of these cannot be accurately identified by anyone except damselfly experts. Damselflies can be distinguished from dragonflies because damselflies hold their wings over their back when at rest.

Level: Junior, Intermediate, Senior

Odonata (Dragonflies and Damselflies

Green Darner

Anax junius (Drury)
Family: Aeshnidae

Lifecycle - Hemimetabolous
Status - Beneficial

Mouthparts - Chewing
Host - Near slow-moving water

Dragonflies come in a variety of colors. Many have patterns on the wings. Dragonflies hold their wings flat when at rest. The green darner is a dragonfly species. Darners are large, high-flying dragonflies which can be difficult to collect. They are occasionally a problem around bee hives when they prey on bees, but are considered effective predators as **naiads** and adults.

Level: Junior, Intermediate, Senior

Plecoptera (Stoneflies)

Stoneflies

Lifecycle - Hemimetabolous
Status - Inconsequential

Mouthparts - Chewing
Host - Near water

Adult stoneflies have long antennae and wings folded over the back. Stoneflies have aquatic immatures which prefer clear, flowing streams. This limits their distribution in Texas. The few species found in Texas (about 20) are usually in Central Texas or the Hill Country.

Level: Intermediate, Senior

Blattodea (Cockroaches and Termites)

American Cockroach

Periplaneta americana (Linnaeus)
Family: Blattidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Chewing
Host - House

This speices is one of the largest cockroaches, reaching about 2 inches long. They are reddish-brown with the margins of the **pronotum** light brown or yellowish. American cockroaches live in wood piles, decaying trees, sewer systems and inside buildings. They can be common household pests and eat a wide variety of foods. Adults can fly.

Level: Junior, Intermediate, Senior

Blattodea (Cockroaches and Termites)

German Cockroach

Blattellā germanica (Linnaeus)
Family: Ectobidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Chewing
Host - House

The German cockroach is about 5/8 inch long and light brown in color. Wings of adults cover the abdomen. The **pronotum** has two prominent dark stripes. Nymphs are smaller, wingless, and have a pale stripe that runs lengthwise down the middle of their darker brown body. This household pest can be a real nuisance and may be found in colonies.

Level: Intermediate, Senior

Smokybrown Cockroach

Periplānta fuligínosa Serville
Family: Blattidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Chewing
Host - House

Adult smokey brown cockroaches are dark brown to black. Bodies range from 1 1/4 to 1 1/2 inches long. Adults have wings longer than the length of their body. The pronotum is solid dark brown. They require high humidity to survive. Outdoors they are found in wooded areas with moisture and shade. Indoors, they are commonly found in attics or near fireplaces.

Level: Intermediate, Senior

Termites

Family: Termitoidae (formerly Order: Isoptera)

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Chewing
Host - Wood, stumps

Subterranean termites are structural pests of buildings and tunnel into wood. They have **protozoans** in their gut that digest the cellulose in wood. Termites are important recyclers of dead wood. Termites live in social colonies made up of workers, soldiers, and reproductives. Reproductive males and females can be winged or wingless. Reproductive females lay eggs and produce offspring. Workers and soldiers, of most species, are creamy white and very soft-bodied. Workers make up most of the colony and feed on wood and are responsible for damage. Soldiers have hardened heads that are usually darker than the body and defend the colony.

Level: Intermediate, Senior

Mantodea (Praying Mantids)

Praying Mantids

Lifecycle - Paurometabolous
Status - Beneficial

Mouthparts - Chewing
Host - Shrubs, vegetation

Praying mantids have **raptorial** forelegs, for grasping prey. They slowly stalk their prey or sit and wait. They can move extremely fast to capture their prey. The head of the praying mantis can be rotated in nearly a circle. They usually have an elongated **pronotum** and long, thin antennae. The Carolina mantid, *Stagmomantis carolina*, is a common species that is widely distributed. The female lays a frothy egg case that hardens after it is laid. Egg cases of some mantids are sold for biological control.

Level: Junior, Intermediate, Senior

Dermaptera (Earwigs)

Earwigs

Photo Credit: Salvador Vitanza

Lifecycle - Paurometabolous
Status - Inconsequential

Mouthparts - Chewing
Host - Leaf litter

Earwigs have shortened, leathery front wings. The hind wings are folded under the forewings. They can fly even though the wings are hidden, and are rarely seen flying. **Cerci** (pinchers) at the end of the abdomen are important characteristics of recognition. Some earwigs are nearly 1 to 1.5 inches long, but other species are smaller. Earwigs are occasional pests in gardens and crops. However, they are best known as a nuisance in and around homes, although they cause no damage. They emit an odor when crushed. Common Texas species are **predaceous**, capturing small arthropods with their cerci and devouring them with chewing mouthparts.

Level: Intermediate, Senior

Orthoptera (Grasshoppers, Crickets, Katydids)

Banded-winged Grasshopper
Family Acrididae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Chewing
Host - Pasture

There are several species of banded-winged grasshoppers. They are conspicuous when they fly because of the brightly colored hindwings. Hindwings can be red, pink, or orange with dark bands. Some, like the Carolina grasshopper have yellowish bands on dark wings. When they land they tend to disappear because they blend in with the grass and soil. Some of the males in this group fly in circles with a loud snapping noise as part of the courtship ritual.

Level: Intermediate, Senior

Orthoptera (Grasshoppers, Crickets, Katydids)

Differential Grasshopper
Melanoplus differentialis (Thomas)
Family: Acrididae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Chewing
Host - Pasture

The differential grasshopper is a short-horned grasshopper with a spine on the prosternum (underneath the **prothorax**, behind the head). These generalist feeders eat grasses, crop plants and fruits.

Level: Junior, Intermediate, Senior

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Long-horned Grasshopper
Family: Tettigoniidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Chewing
Host - Shrubs/grass

Long-horned grasshoppers have very long, thin antennae. Most are cryptically colored (blend in with foliage), are active at night and are noisy.

Level: Junior, Intermediate, Senior

Field Cricket
Family: Gryllidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Chewing
Host - Outdoors

Field crickets are common throughout Texas. There are over 2,000 species of crickets in the world. Only male crickets "chirp" and there are four types of chirping songs for different purposes. The chirping sound is made by rubbing the left hind leg against the right hind leg. Crickets are **omnivorous**; meaning they eat many different types of organic matter and they are **scavengers**. Crickets can carry human diseases and transmit through mechanical transmission.

Level: Junior, Intermediate, Senior

Mole Cricket
Family Gryllotalpidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Chewing
Host - Sandy soil

Mole crickets have robust front legs that are highly modified for digging and called **fossorial**. They tunnel rapidly just below the soil surface and make trails of pushed-up soil similar to that of a mole, only much smaller. Mole crickets can run very rapidly when on the soil surface. They are attracted to lights and are occasionally pests of vegetables.

Level: Intermediate, Senior

Orthoptera (Grasshoppers, Crickets, Katydids)

True Katydid

Family: Gryllidae

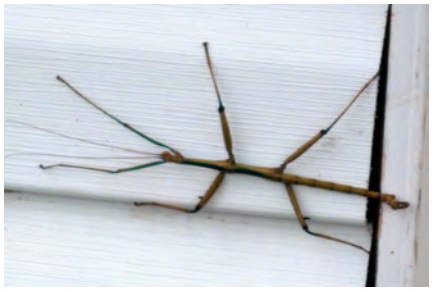
Lifecycle - Paurometabolous
Status - Inconsequential

Mouthparts - Chewing
Host -Trees

The family Tettigoniidae is called longhorned grasshoppers due to their long, thin antennae. However, the name katydid is often applied to any member of the family. The "true" katydids are members of the genus Pterophylla. The species in this genus can be difficult to separate so the name best applies to the genus. "True" katydids are some of the heaviest and largest specimens in the family in Texas. They have wide bodies and typically are found in trees. Their singing at night is characteristic.

Level: Intermediate, Senior

Phasmatodea (Walkingsticks)



Walkingsticks

Lifecycle - Paurometabolous
Status - Inconsequential

Mouthparts - Chewing
Host -Shrubs, vegetation

Walkingsticks are slow-moving, camouflaged insects. Their long bodies, legs, antennae and color make them appear to be sticks. They feed on plants and sometimes **defoliate** trees. The twostriped walkingstick, *Anisomorpha buprestoides* (Stoll), is relatively short and stocky compared to other species and is known to ooze a milky secretion from between body segments that can burn skin temporarily. The longest insect in the United States is a walkingstick, *Megaphasma dentricus* (Stal), which reaches 7 inches in length.

Level: Junior, Intermediate, Senior

Psocodae (Barklice, booklice, true lice)

Barklice & Booklice

Lifecycle - Paurometabolous
Status - Inconsequential (barklice)

Mouthparts - Chewing
Host -Tree trunk (barklice)

Barklice and booklice are softbodied insects commonly found in litter, soil on bark and in tree foliage. They feed on fungi and molds. Some species, commonly called booklice, can be found indoors feeding on paper and grain products that are moldy and out of condition. Outdoors, barklice are considered harmless, but may wrap trees with webbing, although this does not hurt the tree.

Level: Intermediate, Senior

Psocodae (Barklice, booklice, true lice)

Photo Credit: Amy Murillo, University of California Riverside

Chewing Louse

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Chewing
Host -Animals

Chewing lice are small, flat, and wingless with a head that is wider than the thorax. They usually feed on feathers of birds, but some species will feed on mammals. Examples of chewing lice include the chicken head louse and chicken body louse.

Level: Intermediate, Senior

Head Louse

Pediculus humanus capitis (De Geer)

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Humans

Head lice are sucking lice. They are small, flat, wingless **parasites** with a head narrower than the thorax and mouthparts formed for piercing and sucking and they get up to 3.5mm long. There are two subspecies; the body louse and the head louse. Head lice are usually only found on the head.

Level: Junior, Intermediate, Senior

Hog Louse

Haematopinus suis

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Swine

The hog louse is yellowish in color and quite large for a louse, up to 1/4 inch long. This sucking louse has a narrow head. it is a well-known pest of hogs. Hog louse numbers can build up, especially in confined animal operations.

Level: Intermediate, Senior

Short-nosed Cattle Louse

Haematopinus eurysternus (Nitzsch)

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Cattle

The short-nosed cattle louse lives on a sucks blood from cattle. These wingless insects are only 1/20 to 1/16 inch long.

Level: Intermediate, Senior

Thysanoptera (Thrips)

Thrips

Lifecycle - Paurometabolous
Status - Variable

Mouthparts - Rasping
Host - Flowers

Thrips often feed on flowers, plants, pollen and sometimes other insects and mites. They can be found by tapping a flower head over a piece of white paper or into a box. Thrips are so small they look like a hyphen that moves. The western flower thrips, *Frankliniella occidentalis*, is one of the more common pest species.

Level: Intermediate, Senior

Hemiptera, Suborder Heteroptera (True Bugs)

Ambush Bug

Family: Reduviidae

Lifecycle - Paurometabolous
Status - Beneficial

Mouthparts - Piercing & Sucking
Host -Flowers

Ambush bugs are predators which normally lie in wait for their prey. They have **raptorial** front legs for grasping, much like that of a praying mantis. They commonly sit on a flower, waiting for insects attracted to flowers.

Level: Senior

Assassin Bug

Family: Reduviidae

Lifecycle - Paurometabolous
Status - Beneficial

Mouthparts - Piercing & Sucking
Host -Field Crops

Assassin bugs are predators which feed on other insects. There are many species. Some of them are brightly colored with orange and black. Others are cryptically colored with greys and greens. If you trap one on your skin, it may poke it's beak into you as a defense. When that happens, the result is a quick, sharp pain that usually subsides within hours. They are usually found on plants, feeding on other insects, but are especially important in field crops as a predator.

Level: Senior

Backswimmer

Family: Notonectidae

Lifecycle - Paurometabolous
Status - Beneficial

Mouthparts - Piercing & Sucking
Host -Ponds

Backswimmers are predators that can inflict a strong bite. They swim upside-down through the water. Their hind legs are very long and modified to be used as oars. Their body is shaped similar to a boat with the upper surface of the body being keel shaped. Another adaptation is a darker **ventral** surface and lighter **dorsal** surface, which is advantageous when they are upside-down in the water.

Level: Junior, Intermediate, Senior

Hemiptera, Suborder Heteroptera (True Bugs)

Bed Bug

Cimex lectularius (Linnaeus)
Family: Cimicidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Humans

Bed bugs feed primarily at night on the blood of warm-blooded hosts, especially humans. Their preferred habitat is bedding with seams or crevices, such as box springs, sofas, and other furniture. Adults are 1/4 inch in length, reddish brown, flattened, oval and wingless. Bed bugs feed at 5 to 10 day intervals with their feeding periods lasting about 12 minutes. They are not known to transmit diseases. They are moved from one place to another by humans, but will move from one unit to another in multi-unit buildings on their own.

Level: Junior, Intermediate, Senior

Big-eyed Bug

Geocoris sp.
Family: Geocoridae

Lifecycle - Paurometabolous
Status - Beneficial

Mouthparts - Piercing & Sucking
Host -Field Crops

Big-eyed bugs are predators that tend to stay on vegetation near the ground. They are important beneficial insects in cotton and other field crops. They large eyes and round bodies are characteristic of this group.

Level: Senior

Boxelder Bug

Boisea trivittata (Say)
Family: Rhopalidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host - Boxelder Trees

Boxelder bugs feed only on boxelder trees. They seem to do little damage to the trees. They are a nuisance when they get abundant and try to enter homes as shelter for the winter.

Level: Senior

Burrower Bug

Pangaeus sp.
Family: Cydnidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Grasses, peanuts

Burrower bugs are pests of various crops especially peanuts. They burrow into the soil and suck on roots and nuts in peanuts. Damage shows up as deformed and poorly flavored peanuts.

Level: Senior

Hemiptera, Suborder Heteroptera (True Bugs)

Chinch Bug

Blissus spp.
Family: Lygaeidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host -Grass

Chinch bugs adults are about 1/16 inch long. They have white wings, folded flat on the back, which are marked with a triangular black patch at the middle of their outer edges. Legs are reddish to reddish-yellow. Chinch bugs feed on turf causing brown patches to form.

Level: Intermediate, Senior

Cotton Fleahopper

Pseudatomoscelis seriatus (Reuter)
Family: Miridae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Cotton

Cotton fleahopper adults are small yellowish-green bugs about 1/8 inch long with black specks on the upper surface of their body. Their piercing-sucking mouthparts are used to feed on leaves of cotton.

Level: Intermediate, Senior

Photo Credit: Salvador Vianza

False Chinch Bug

Nysius spp.
Family: Lygaeidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Sorghum

False chinch bugs are sucking bugs that resemble the chinch bug but are less strikingly marked. They are usually a dull shade or gray brownish-black and have a wider head and larger eyes. They are about 3/16 inch long as adults. When large swarms enter sorghum fields they can be very damaging. They may also feed on lawns.

Level: Intermediate, Senior

Photo Credit: Jeff Sparks

Giant Water Bug

Family: Belostomatidae

Lifecycle - Paurometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host - Water, ponds

Giant water bugs are commonly attracted to lights and are very large, approximately 3 inches long. They are sometimes called “electric light bugs” because of their habit of flying to lights or “toe biters” because they’ll pierce toes with their beak if stepped on. They are predators and occasionally feed on small fish, but more commonly on insects. They have piercing-sucking mouthparts and can give a painful bite if not carefully handled by a collector.

Level: Junior, Intermediate, Senior

Hemiptera, Suborder Heteroptera (True Bugs)

Photo Credit: Kate Crumley

Green Stink Bug

Nezara viridula (Linnaeus)
Family: Pentatomidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Plants

The southern green stink bug is one of the largest stink bugs in the US. It can be found in gardens, field crops and roadside flowers. Adults are up to 3/4 inch long and solid green in color.

Level: Junior, Intermediate, Senior

Harlequin Bug

Murgantia histronica (Hahn)
Family: Pentatomidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Cole crops

The harlequin bug is a red/orange and black, spotted bug of the stink bug family. It is flat and shield shaped and as long as 3/8 inch. They are damaging to cole crops such as broccoli, cauliflower, kale and cabbage.

Level: Junior, Intermediate, Senior

Kissing Bug

Family: Reduviidae
Subfamily: Triatominae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Animals

Kissing bugs are blood feeding insects that may vector the **parasite** that causes Chagas disease. Kissing bugs are more active at night and feed on anything that has blood, including mammals, reptiles, and birds. They are common found under wood piles and other debris during the day. They resemble other assassin bugs but are set apart by the orange/red and black stripped pattern bordering the abdomen and wings that do not span the width of the abdomen.

Level: Intermediate, Senior

Large Milkweed Bug

Oncopeltus fasciatus (Dallas)
Family: Lygaeidae

Lifecycle - Paurometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host - Milkweed

The large milkweed bug is an attractive black and yellow, sucking insect that feeds on milkweeds and related plants. It is usually not harmful to milkweed and considered an important part of the ecosystem. It has been used extensively in laboratory work in entomology because it can easily be reared in the lab on milkweed seeds and water.

Level: Senior

Hemiptera, Suborder Heteroptera (True Bugs)

Leaffotted Bug

Leptoglossus phyllopus (Linnaeus)
Family: Coreidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Plants, weeds

The dark brown color with a conspicuous whitish line across the the wings is characteristic of the species pictured here. Other species in this family may lack this, but all leaffooted bugs have hind legs flattened and expanded, almost leaf-like. They feed on tomatoes, southern peas, soybeans and many other plants. Adults are 3/4 inch long in this species, longer in others.

Level: Intermediate, Senior

Minute Pirate Bug

Orius sp.
Family: Anthocoridae

Lifecycle - Paurometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host - Insects

Minute pirate bugs are predators that feed on small insects and insect eggs. They are common in cotton and other field crops where they are considered beneficial.

Level: Senior

Squash Bug

Anasa tristis (De Geer)
Family: Coreidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Squash

The squash bug is an elongate-flattened, oval, blackish brown bug about 2/3 inch long. Squash bugs are serious pests of squash and pumpkins.

Level: Junior, Intermediate, Senior

Tarnished Plant Bug

Lygus lineo (Beuvois)
Family Coreidae

Lifecycle - Paurometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Plants and weeds

Adults are oval, flattened, and about 1/4 inch long. They are coppery-brown with whitish-yellow markings. Nymphs are similar but smaller. Tarnished plant bugs feed on a wide variety of plants including cotton and alfalfa. They are sometimes pests. There are several similar related species.

Level: Senior

Hemiptera, Suborder Heteroptera (True Bugs)

Toad Bug
Family Gelastocoridae

Lifecycle - Paurometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host -Shoreline

Toad bugs are very easily overlooked. They are brownish and about 1/2 inch long. They hop much like toads and are typically found along rocky shores of freshwater lakes or ponds.

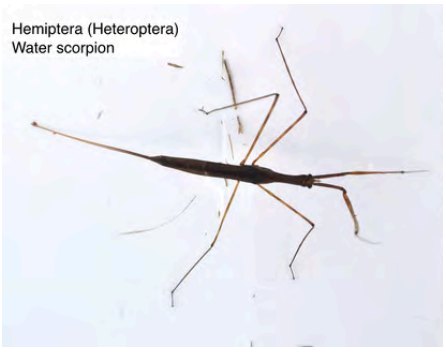
Level: Junior, Intermediate, Senior

Water Boatman
Family Corixidae

Lifecycle - Paurometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host - Pond

Water boatmen are commonly confused with backswimmers since they superficially resemble them. All water boatmen have a striped pattern across the back and they swim wing side up. Water boatmen are generally smaller than backswimmers. They are algae feeders and are unlikely to bite collectors.

Level: Senior



Water Scorpion
Family Nepidae

Lifecycle - Paurometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host - Ponds, Lakes

Water scorpions are not true scorpions, but predatory insects found common in slow moving or still water. They have long legs and a thin body and are confused with walkingsticks by some. Water scorpions do have wings and occasionally fly but are seldom seen doing so. They are often found among vegetation.

Level: Senior

Water Strider
Family Gerridae

Lifecycle - Paurometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host - Ponds, Streams

Water striders actually skate on the water surface. Water surface tension combined with hydrophobic hairs on the water strider's feet, allow water striders to walk on water. They can fly or skate across the water surface very rapidly and are often found on flowing streams.

Level: Intermediate, Senior

Hemiptera, Suborder Heteroptera (True Bugs)

Wheel Bug

Arilus cristatus (Linnaeus)
Family: Reduviidae

Lifecycle - Paurometabolous
Status - Beneficial

Mouthparts - Piercing & Sucking
Host -Vegetation

The wheel bug is a predator and a representative of the assassin bug family. They are large and conspicuous which causes concern when they occur around homes. The name refers to the elevated ridge on the pronotum which resembles a cogged wheel.

Level: Senior

Hemiptera, Suborder Auchenorrhyncha (Cicadas, Planthoppers and Leafhoppers)

Cicadas

Family: Cicadidae

Lifecycle - Paurometabolous
Status - Variable

Mouthparts - Piercing & Sucking
Host -Trees

Cicadas make the loud buzzing noise in the trees during summer months. They sometimes are incorrectly called locusts but the name locust should only be used for certain migratory grasshoppers. Immature cicadas live in the soil where they suck sap from tree roots. There are many species and some live 17 years in the soil before emerging as adult cicadas. These periodical cicadas can cause damage to trees and shrubs from feeding and laying eggs.

Level: Junior, Intermediate, Senior

Leafhoppers

Family: Cicadellidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Grasses

Leafhoppers are small, very active, greenish to brownish, slender, wedge-shaped, jumping insects. Sizes range from 1/8 to almost 1/2 inch long. They suck plant juices with their piercing-sucking mouthparts.

Level: Junior, Intermediate, Senior

Planthoppers

Family: Fulgoroidea

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Various Plants

Planthoppers are a diverse and large group. They are camouflaged to resemble or blend in with leaves. They are all plant feeders, but are not always damaging to the plant.

Level: Senior

Hemiptera, Suborder Auchenorrhyncha (Cicadas, Planthoppers and Leafhoppers)

Spittlebug
Family: Cercopidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Alfalfa and grasses

Spittlebugs are usually noticed as nymphs because they form a mass of spittle around their body for protection. Adults are normally brown or green and dull colored. However there are a few forms which are bright and attractively colored. All spittlebugs have a ring of spines on the apex (or tip) of the hind tibia which distinguishes them from leafhoppers
.

Level: Senior

Treehoppers
Family: Membracidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Trees

Treehoppers come in a variety of colors and patterns. Some are camouflaged and may appear as spines or twigs. All treehoppers have a **protnotum** extending over their back in the adult stage. The three-cornered alfalfa hopper, *Spissistilus festinus*, is a pest of soybeans and alfalfa. They feed near the base of small plants and can damage the stems enough to gridle them. The nymphs have the same general shape but a short pronotum and a row of spines down the back.

Level: Senior

Hemiptera, Suborder Sternorrhyncha (Aphids, Psyllids, Scales, Whiteflies)

Aphids
Family: Aphididae

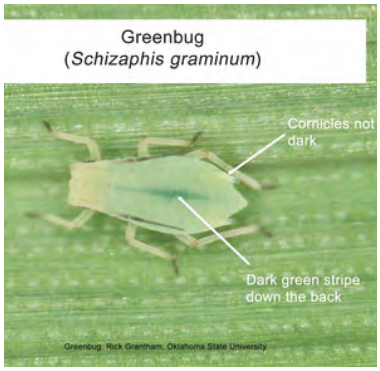
Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Plants, Row Crops

Aphids are generally under 1/8 inch long with only a few species that are larger. They are soft-bodied, with rounded or elongate bodies, long legs, and long antennae. The distinguishing feature is a pair of extension on the abdomen called **cornicles**. Adults may be winged or wingless. They can be almost any color: green, reddish, yellow or black. Some aphids produce a waxy secretion that covers their body, making them appear wooly and white. Aphids can produce live youth without mating or egg laying, but may also mate and lay eggs. Aphids suck plant juices and excrete liquid called **honeydew** which drops on whatever is below them. Honeydew is sticky and provides a strutrate for black tooy mold to grow. Aphids are sometimes called plant lice and allmost every kind of plant has an aphid species that feeds on it.

Level: Junior, Intermediate, Senior

Hemiptera, Suborder Sternorrhyncha (Aphids, Psyllids, Scales, Whiteflies)



Greenbug

Schizaphis graminum (Rondani)
Family: Aphididae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Small grains

The greenbug is an aphid. It is small, bright green, and has black tips on the legs, cornicles, and antennae. These soft-bodied insects are about 1/2 inch long. Note the darker green stripe down the center of the body, which serves as another identification aid. It has piercing-sucking mouthparts like all other aphids and feeds on rye, sorghum, barley, wheat and other small grains and grasses.

Level: Intermediate, Senior

Pecan Phylloxera

Phylloxera spp.
Family: Phylloxeridae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Pecan

Pecan phylloxera are an aphid-like insect responsible for **gall** formation on pecans. Phylloxera galls are wart-like growths on leaf stems or blades. Heavy infestations can result in crop loss or **defoliation**.

Level: Senior

Psyllids

Family: Psyllidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Plants

Psyllids are sometimes called “jumping plant lice”, but they are not lice at all. Psyllids can carry several plant diseases and are known as **vectors** (capable of transmitting disease from one host to another). There are many species and they may vary in appearance with transparent or pale wings. Psyllids species are very host-specific. The insects pictured are the Asian citrus psyllid (above) and potato psyllid (below). The potato psyllid is the same species as the tomato psyllid, but is called the potato or tomato psyllid depending on which host it is infesting.

Level: Intermediate, Senior

Armored Scales

Family: Diaspididae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Trees, shrubs

Females of this family are very small and conceal their bodies with a hard covering formed by the wax they secrete and cast skins from earlier **instars**. The shape of the covering is species-specific and may be elongate, smooth or rough and variable in color. Female bodies are flattened and disk-like with no eyes or legs. Males are winged and have well-developed legs and antennae. Armored scales include several serious orchard tree, shade tree, and ornamental plant pests. They usually feed on woody plants.

Level: Intermediate, Senior

Hemiptera, Suborder Sternorrhyncha (Aphids, Psyllids, Scales, Whiteflies)

Soft Scales

Family: Coccidae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Ornamental Trees

Female soft scales are elongate and usually convex. They have a smooth, hard exoskeleton or are covered in wax. Females usually have reduced or absent legs and antennae. Males may be winged or wingless. The brown soft scale, wax scales and tortoise scales are included in this family.

Level: Intermediate, Senior

Whiteflies

Family: Aleyroididae

Lifecycle - Paurometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host -Vegetables, cotton

Whiteflies are generally small, under 2mm even as adults. The adults are usually white, as the name implies, and fly slowly around plants. Their lifecycle is complex with the nymphs laying closely on the plant surface. The last nymphal stage is more like a pupal stage than a nymph. Eggs and nymphs look very different from adults. Whiteflies can be severe plant pests and some strains are resistant to insecticides. They are pests often pests in greenhouses, but can be pests in field crops and vegetables too. The silverleaf whitefly, *Bemisia argentifolii* (Bellows & Perring), is one of the worst pests in this family.

Level: Senior

Megaloptera (Dobsonflies)

Dobsonfly

Corydalus spp.
Family: Corydalidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Chewing
Host -Streams

Dobsonflies are large (some are over 3 inches long) insects with long **membranous** wings. The wings are typically held flat over their back when they are at rest. Adults are often attracted to lights but usually only near flowing rivers. The male (pictured above) has extremely long mandibles, which are not particularly good for biting. However, these mandibles are used to grasp the female during mating. The adult female (no pictured) can be an effective biter if given the opportunity. Dobsonflies are the adult form of a common aquatic immature called a hellgrammite. Hellgrammites are aggressive predators found in flowing streams. They are good fish bait and are very often used as such.

Level: Junior, Intermediate, Senior

Neuroptera (Antlions, Lacewings, Mantipids, & Owlflies)

Antlion

Family: Myrmeleontidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Chewing
Host -Plants

Antlions have long clear wings with many veins and long delicate bodies. Some of them have dark markings or spots of color in the wings. They are usually over an inch long. Antlions may look similar to damselflies at first, but antlions have short but conspicuous antennae that are enlarged at the end. Antlions are likely to be found at lights at night but can be found in the daytime usually at rest on foliage. Immature antlions are often called doodlebugs. They make pits in sandy areas and wait for ants and other insects to fall into the pits. Look for their pits under eaves of houses, under bridges, or in other sheltered areas. Adults are sometimes attracted to lights.

Level: Junior, Intermediate, Senior

Brown Lacewing

Family: Hemerobiidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Chewing
Host -Insects

While they are in different Families, brown lacewings and green lacewings have similar habits. Adults feed on pollen, nectar and honeydew and can also feed on aphids, spider mites or other prey. The larvae are voracious predators and can feed on any insect that is small enough. Brown lacewings are especially good at eating aphids.

Level: Senior

Photo Credit: Salvador Vitanza

Green Lacewing

Family: Chrysopidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Chewing
Host -Insects

Adult green lacewings feed on pollen, nectar and honeydew and can also feed on aphids, spider mites or other prey. The larvae are voracious predators and can feed on any insect that is small enough. Larval lacewings are key predators and often provide good biological control of many pests. The next time you see a pecan tree or rose bush covered with honeydew (indicating an aphid infestation), look around for lacewing larvae on the leaves. the potato or tomato psyllid depending on which host it is infesting.

Level: Intermediate, Senior

Photo Credit: Winfield Sterling

Mantispid (Mantisfly)

Family: Mantispidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Chewing
Host -Woodlots

Mantispids, or mantisflies, superficially resemble preying mantids because they have raptorial front legs. They can also resemble wasps and the wings are sometimes marked like a wasp. Some immature mantispids feed on spider egg masses.

Level: Senior

Neuroptera (Antlions, Lacewings, Mantipids, & Owlflies)

Owflies

Family: Mymeloentidae
Subfamily: Ascalaphidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Chewing
Host -At Lights

Owlflies are rather large insects and resemble dragonflies or damselflies. The long-clubbed antennae are key characters that separate this group from Odonata. The wing **venation** is also more like lacewings than dragonflies. The larvae do not dig pits like antlions but lie on the surface of the ground and wait for prey to move past.

Level: Senior

Coleoptera (Beetles)

Alfalfa Weevil

Hypera postica (Gyllenhal)
Family: Curculionidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing
Host -Alfalfa

The alfalfa weevil is an important pest of alfalfa in most of the U. S. The larvae and adults feed directly on foliage and can reduce the yields.

Level: Senior

Blister Beetle

Family: Meloidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing
Host -Plants, Alfalfa, Weeds

Blister beetles can cause blisters on skin if they walk on it because of a substance that they produce called **cantharidin**. This substance is very toxic, and a horse can be killed if it ingests two or more blister beetles. The toxin is still active even after the beetles die. There is more than one species of blister beetles that is striped in Texas. Blister beetles come in many colors including black, gray, yellow, and metallic blue. They can also have a variety of markings especially spots and stripes. They feed on a variety of plants, including alfalfa, weeds, and vegetables such as tomatoes.

Level: Junior, Intermediate, Senior

Coleoptera (Beetles)

Boll Weevil

Anthonomus grandis grandis (Boheman)

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Cotton

The boll weevil is a hard-shelled, grayish to brown, long- legged beetle. It is about 1/4 inch long with a slender snout, and two spurs on the inside of each front leg. Larvae are white crescent- shaped grubs found exclusively inside cotton fruit (squares and young bolls). Adults feed and lay eggs in cotton fruit, causing the plant to shed any damaged young fruit and damaging the fiber lint of older bolls. Boll weevils are not native to Texas and are arguably the most historically impactful pest on record. They feed naturally on wild cotton trees in Central America, but found cultivated cotton fields as an excellent host. Boll weevils were first discovered in south Texas in 1892 and quickly spread through the cotton growing regions. Through the late 20th century multiple local, regional, and national eradication programs targeting the weevil were enacted with good impacts. The current Texas “Boll Weevil Eradication Program” was started in the 1990’s and successfully eradicated boll weevils from all but the southern tip of Texas. The Boll Weevil Eradication Program remains active in control efforts, preventing the re-infestation of areas of cotton production and maintaining an observation system to detect any weevils moving into Texas.

Level: Intermediate, Senior

Carpet Beetles

Family: Dermestidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host -Wool carpets

Carpet beetle adults are small, mottled brown to solid black, oval-shaped beetles about 1/8 inch long. Larvae are carrot-shaped, hairy or bristly, brownish, and about 1/4 inch long. Larvae can damage textiles, even synthetic materials, but are particularly attracted to items high in protein such as wool, fur, felt, silk, feathers, and leather. Adults feed on pollen and are often found on window ledges indoors or outdoors on flowers in the early spring.

Level: Senior

Carrion Beetle

Family: Staphylinidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Dead animals

Carrion beetles are typically found in decaying animal carcasses. Some carrion beetles are very attractively colored and are beneficial by helping to break down animal carcasses.

Level: Senior

Coleoptera (Beetles)

Caterpillar Hunter
Family: Carabidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host -Woodland

The caterpillar hunter is one of the largest beetles of the ground beetle family in the US. They are active predators. They make attractive specimens because they are large and some species have green metallic coloration across their backs.

Level: Junior, Intermediate, Senior

Click Beetle
Family: Elateridae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host -Corn, field crops

Click beetles are generally brown or black in color. They are elongated and flattened and quite similar in shape. Many are rather small and under 1/2 inch in length while a few are over two inches long. The eyed click beetle, *Alaus oculatus*, and others of this genus have conspicuous eye spots on the pronotum. Click beetles get their name from the behavior they exhibit when placed on their back. They tense the body and thrust the pronotum downward with a sharp clicking sound. This action flips the beetle into the air for several inches and they usually land right side up after this maneuver. The click beetle genus *Pyrophorus* has eye spots that bioluminesce. The eye spots stay glowing for long periods and can be seen for over a hundred feet away on a dark night. The ability to bioluminesce is well known in the firefly family, Lampyridae, but is uncommon in other insect groups.

Level: Senior

Colorado Potato Beetle
Leptinotarsa decemlineata (Say)
Family: Chrysolmelidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Potatoes

The Colorado potato beetle has a convex body shape, is about 3/8 inch long and yellow and has five black stripes on each forewing. Larvae are red to yellow, humpbacked, and as long as 3/5 inch. Both adults and larvae feed on potato foliage

Level: Intermediate, Senior

Cottonwood Borer
Plectrodera scalator (Fabricius)
Family: Cerambycidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Cottonwood trees

Cottonwood borers are robust, large beetles about 1 1/4 inch long. The long antennae make them appear even larger. They are black and white in color but there is a lot of variation in the pattern with some specimens being almost entirely black. The larvae are wood borers that feed in cottonwood and willow. They generally infest trees that are weak or dying but sometimes attack trees that are quite healthy. Adults also feed on the same trees and can sometimes be found in large numbers near the base of a tree.

Level: Junior, Intermediate, Senior

Coleoptera (Beetles)

Elm Leaf Beetle

Xanthogaleruca luteola (Mueller)
Family: Chrysomelidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Elm trees

Elm leaf beetle adults are about 1/4 inch long, and yellow to brownish-green in body color, and marked with black spots on the head and thorax. They have broad black stripes following the outer **elytra** margins. Larvae grow to about ½ inch and are yellowish with black spots and broad stripes along the sides. Pupae are 1/4 inch long and are bright orange-yellow with scattered black bristles. This insect is a foliage-feeding pest on elms especially in the High Plains.

Level: Senior

Firefly (Lighteningbug)

Family: Lampyridae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Chewing
Host - Weeds

Fireflies are well known for their nighttime light displays. The light-producing organs of these soft-bodied beetles are located in the yellowish-green areas on the undersurface of the abdomen. The production of light (bioluminescence) is found in relatively few other insect families.

Level: Junior, Intermediate, Senior

Flatheaded Borer (Metallic Wood Borer)

Family: Buprestidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Trees

Flatheaded borers are larvae of metallic wood borers. They range in length from 1/10 to over 1 1/4 inches. Larvae are called flat-headed borers because the thorax is flattened and the head retracted. They tunnel just below the bark of dead or dying wood, but some species are attracted to healthy trees and are considered pests. Many adults, especially the larger species, can be found on freshly cut wood. The smaller species can be collected on leaves in the sunlight or on flowers, they are especially active in the spring and are more common in small twigs with some being root borers. The smallest species are leaf miners in oaks, certain legumes and other plants. s larvae.

Level: Senior

Flea Beetle

Family: Chrysomelidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Weeds

Flea beetles range in size from minute to more than 1/4 inch long. Most are dark with a smooth, shiny surface. However, some are striped. Their hind legs are enlarged, enabling the beetles to jump vigorously when disturbed. They damage a wide range of vegetables, riddling the leaves with small holes.

Level: Senior

Coleoptera (Beetles)

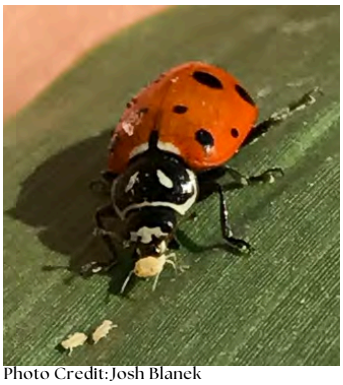


Photo Credit: Josh Blanek

Lady Beetle

Family: Coccinellidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Chewing
Host - Aphids

There are many species of lady beetles in Texas. The convergent lady beetle, *Hippodamia convergens* (Guérin-Méneville), is one of the most common and easily recognized species. It is called convergent because the white bars on the pronotum converge. Lady beetles are recognized as beneficial insects because both the adults and larvae feed on aphids and other small insects.

Level: Junior, Intermediate, Senior

Lesser Grain Borer

Rhyzopertha dominica (Fabricius)
Family: Bostrichidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing
Host - Stored grain

The lesser grain borer both in the larval and adult stages is a serious pest of stored grain. The adult feeds on whole or cracked grain, and larvae develop inside kernels, destroying the internal contents. The adult is about 1/8 inch long and has powerful chewing mouthparts. Note how the head is turned down under the thorax, a distinguishing characteristic of many species in the family to which this insect belongs.

Level: Intermediate, Senior

Locust Borer

Megacyllene robiniae (Forster)
Family: Cerambycidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing
Host - Black Locust Trees

Locust borer larvae feed in living black locust trees. Locust borers are a species of longhorn beetle. There are other similar beetles in the same genus with a wide range of variation in color and size. Long antennae and bright color patterns make these favorites for collectors.

Level: Senior

Maize Weevil (Rice Weevil)

Family: Curculionidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing
Host - Stored grain

Th maize weevil (rice weevil) is a small weevil only a few millimeters long. It is a serious pests in stored grain especially corn and rice. Adults are dark brown to black in color with four lighter spots on the corners of the **elytra** (forewings). This weevil also has an elongated “snout”. The larva like most weevil grubs are more or less "C- shaped".

Level: Intermediate, Senior

Coleoptera (Beetles)

May Beetle
Family: Scarabaeidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Shrubs

May beetles in the genus *Phyllophaga* and *Cyclocephala* include over 200 species in the US. Identification to species is difficult and they can be very similar in appearance. Larvae feed on roots of grasses and other plants and some (but not all) species can cause damage in lawns and crops. Even though the genus name *Phyllophaga* means "leaf feeding" the adults do not cause damage very often. These common insects are easily collected under lights in the spring and early summer.

Level: Junior, Intermediate, Senior

Mealworm
Tenebrio molitor (Linnaeus)
Family: Tenebrionidae

Lifecycle - Holometabolous
Status - Variable
Mouthparts - Chewing
Host - Stored grain

Mealworms are pests of stored grain. However, this species is best known as a pet food for lizards, frogs, and snakes. The larvae are also used as fish bait. Because this insect is relatively easy to grow, it has been used in many experiments and scientific studies.

Level: Senior

Plum Curculio
Conotrachelus nenuphar (Herbst)
Family: Curculionidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Peaches

Plum curculio adults are weevils about 1/4 inch long with projections on the wing covers. Larvae are white C-shaped grubs which feed in fruit. They are a serious pest of peaches, but also feed on plums, apricots, and apples.

Level: Intermediate, Senior

Red Flour Beetle
Tribolium castaneum (Herbst)
Family: Tenebrionidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Stored grain

The red flour beetle is a shiny, reddish brown beetle about 1/7 inch long with antennae that have a 3-segmented club. It is a common pest of stored products. Both larvae and adults feed on starchy materials such as flour or cracked kernels of grain. Adults can fly, allowing them to spread from stored grain to homes and other structures, causing major nuisances.

Level: Senior

Coleoptera (Beetles)

Rove Beetle
Family: Staphylinidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Chewing
Host - At lights

Rove beetles are a large family in terms of species. Most of them lead rather secret lives and are easily overlooked. They are most commonly found under bark, logs or rocks and at lights at night. Some superficially resemble earwigs because of the short elytra. The larvae and adults are generally considered to be predators or decaying organic matter feeders.

Level: Senior

Sawtoothed Grain Beetle
Oryzaephilus surinamensis (Linnaeus)
Family: Sylvanidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Stored grain

These small beetles are pests in food like cereal, corn meal, flour and other processed grains. They can enter your house in infested products from the grocery store or they could move in from the surrounding habitat. They get their name from the jagged saw-like edges on the pronotum of the adults.

Level: Senior

Soldier Beetle
Family: Cantharidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Chewing
Host - Flowers

Some soldier beetles are common on flowers, where they feed on nectar and pollen. Most are **carnivorous**. They come in a variety of shapes and sizes. Some species can be confused with fireflies.

Level: Senior

Spotted Cucumber Beetle
Diabrotica undecimpunctata howardi (Barber)
Family: Chrysomelidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Cucurbits

Spotted cucumber beetle larvae are also known as the southern corn rootworm. Adults are yellowish or yellowish-green with 12 black spots on the back and are about 1/4 inch long. Adults are active and commonly found. A wide variety of plants are attacked by the larvae.

Level: Junior, Intermediate, Senior

Coleoptera (Beetles)

Sweet Potato Weevil
Cylas formicarius (Fabricius)
Family: Brentidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Sweet potatoes

Sweet potato weevil grubs are legless and white, with pale brown heads, and are as long as 1/3 inch. Adults are red and blue-black beetles, about 1/4 inch long, and have their snout projected forward. Eggs are laid on stem or sweet potato and larvae mine into tubers (potato) or vines, causing damage to the plant and making the sweet potato inedible.

Level: Intermediate, Senior

Tiger Beetle
Family: Carabidae*
Subfamily: Cicindelinae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Shady trails

Tiger beetles are fast, agile predators and are a challenge to collect. They are found often in sandy areas and along trails in wooded areas. They are one of the favorite groups for beetle collectors and some collectors specialize only in this group.
* Some authorities place the tiger beetles in a separate Family: called Cicindelidae.

Level: Junior, Intermediate, Senior

Tumbling Flower Beetle
Family: Mordellidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Flowers

Tumbling flower beetles can be very abundant on flowers especially those in the carrot family (Apiaceae) and aster family (Asteraceae). The larvae feed in stems and dead wood. Adults feed on pollen and can be pollinators. The pointed tip of the abdomen gives the family a second common name, the spine-tailed beetles. Their name comes from bouncing way they move to avoid predators.

Level: Senior

Water Scavenger Beetle
Family: Hydrophilidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Stream

Water scavenger beetles are found in a wide range of sizes and are generally brown or black in color. Adults usually feed on decaying organic matter. Llarvae are usually **predaceous**. To breathe, water scavenger beetles hold an air bubble on the undersurfaces of their bodies. These beetles come to the water surface head first.

Level: Senior

Coleoptera (Beetles)

Whirlygig Beetle

Family: Gyrinidae

Lifecycle - Holometabolous
Status - Inconsequential

Mouthparts - Chewing
Host - Stream

Whirligig beetles are found on ponds and streams. They can congregate in large numbers and scurry about the water surface in a random pattern. When handled, these beetles give off an apple-like odor. Whirligig beetles are unique in that their **compound eyes** are divided, giving them a four-eyed appearance. This eye division allows them to see above and below the water surface at the same time.

Level: Senior

Mecoptera (Scorpionflies)

Scorpionfly

Lifecycle - Holometabolous
Status - Inconsequential

Mouthparts - Chewing
Host - Plants

Scorpionflies are attractive insects with patterned wings. They get the name scorpionfly since the male genitalia is held over the back of the abdomen in the typical defensive posture of scorpions. However, they are harmless and cannot sting. Females lack the conspicuous genitalia. They are predators and capture other insects as food using their legs.

Level: Intermediate, Senior

Siphonaptera (Fleas)

Fleas

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host - Cat, dog

Adult fleas are legendary for their jumping ability. The cat flea, *Ctenocephalides felis* (Bouché), is the most common flea pest of dogs and cats in Texas. Adults can be found on the pet and sometimes move to humans for a blood meal. Flea larvae are small, elongate, and thin. The larvae are found in the yard or around the pet bedding area and they feed on skin flakes, hair and other organic matter.

Level: Intermediate, Senior

Diptera (Flies)

Bee Fly
Family: Bombyliidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Flowers

Bee flies are commonly found on flowers. They are fuzzy bodied flies that feed on nectar. You can differentiate them from bees by counting wings (flies have 2, bees have 4).

Level: Senior

Black Flies (Buffalo Gnats)
Family: Simuliidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Biting & Lapping
Host - Stream

Buffalo gnats are small humpbacked biting flies. They are persistent biters and even crawl into the hair to bite the scalp. They use scissor like mouthparts to bite the skin and lap the blood. Bites are generally worse than mosquito bites and the bite can bleed long after the flyhas left. They are a nuisance and sometimes a serious pest of humans, pets, and livestock. The larvae are found in flowing water where they attach to rocks, sticks, and other structures and sift food from the water as it floats by. Adults are strong fliers so they can be found long distances from water.

Level: Senior

Blow Flies
Family: Calliphoridae

Lifecycle - Holometabolous
Status - Variable
Mouthparts - Sponging (Adults)
Host - Carrion

These flies are about the size of a house fly or a little larger, but many of them are brightly colored in green, blue or bronze. Adults arrive at a dead carcass where they lay eggs. **Maggots** feed on the dead flesh of the carcass with hook-like mouthparts that tease apart tissues. Most blow flies are **scavengers** and some of the larvae can also feed on excrement. A few species in this family have been reared under septic conditions and the larvae are used for treating certain diseases.

Level: Senior

Common Cattle Grub
Hypoderma lineatum (Villers)
Family: Oestridae

Lifecycle - Holometabolous
Status - Pest
Host - Cattle
Mouthparts - Chewing/Hook-like (larvae)

The common cattle grub or heel fly is a hairy fly that is 1/2 inch long, or about the size of a honey bee. The front, sides, and back of the head are covered with yellowish white hairs. Adult mouthparts are small (reduced) and nonfunctional. Larvae have hooks as mouthparts for tearing flesh. Larvae tunnel through the bodies of cattle and form lumps in the backs of the cattle before adult flies emerge.

Level: Intermediate, Senior

Diptera (Flies)

Photo Credit: Dhanushka Devarajan

Crane Flies
Family Tipulidae

Lifecycle - Holometabolous
Status - Inconsequential

Mouthparts - Reduced
Host - Meadow

There are literally thousands of species of crane flies in North America. They are conspicuously long legged and commonly attracted to lights. Larvae of crane flies generally grow in damp or wet habitats. Many people think that these are large mosquitoes, however, this is incorrect and they cannot bite.

Level: Junior, Intermediate, Senior

Deer Flies
Chrysops sp.
Family: Tabanidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Biting & Lapping
Host - Woodlands

Deer flies are biting flies of yellow black coloring. They have stripes on the abdomen and patterned wings. They are larger than a house fly but smaller than most horse flies. They can bite human, pets, and livestock. Larvae are large **maggots** usually in slow moving water where they feed on organic matter. Adult flies can be found around lakes and ponds. However, they are also a pest of livestock in rangeland where the adults like to roost in cedar trees. In Texas, they are sometimes called "cedar flies."

Level: Senior

Flesh Flies
Family: Sarcophagidae

Lifecycle - Holometabolous
Status - Variable

Mouthparts - Sponge-like (Adults)
Host - Carrion

These flies look much like a house fly and most are greyish with black stripes, but some have a red tip on the abdomen. Larvae usually feed on some sort of animal material with hook-like mouthparts they use to tear tissue. There are **scavengers** on dead animals, **parasites** of other insects, and a few are parasites of vertebrates.

Level: Senior

Horn Fly
Haematobia irritans (Linnaeus)
Family: Muscidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host - Cattle

The horn fly looks like the house fly but is only about half as large. Adults have piercing-sucking mouthparts and suck blood. Adults rest with their heads pointed downward on the backs of livestock. Larvae have hooks in their mouthparts and feed on cattle manure.

Level: Intermediate, Senior

Diptera (Flies)

Horse Fly
Tabanus sp.
Family: Tabanidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Biting & Lapping
Host - Woodlands

Horse flies lap blood from livestock, using scissor-like mouthparts to cut skin. Some species are only 3/4 inch long. The common black horse fly attains a length of 1 1/4 to 1 1/2 inches. Horse flies are black to dark brown and have green or black large, **compound eyes**.

Level: Junior, Intermediate, Senior

House Fly
Musca domestics (Linnaeus)
Family: Muscidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Sponging
Host - Barn

House fly adults are 1/4 to 5/16 inch long. The top part of the thorax is dusty gray and contains four equally broad stripes running from front to back. The fourth wing vein makes a sharp bend to the outside and almost meets the third at the wing tip. Adults have sponging and sucking mouthparts, while larvae have hooks in their mouthparts for tearing.

Level: Junior, Intermediate, Senior

Mosquito
Family: Culicidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Piercing & Sucking
Host - Yard, meadow

Mosquitoes are slender-bodied, long-legged insects, less than 1/2 inch long, with delicate wings fringed with scales. Males have bushy antennae. Mosquitoes have long, slender sucking mouthparts. Only adult females suck blood. Males feed on nectar.

Level: Junior, Intermediate, Senior

Robber Fly
Family: Asilidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Piercing & Sucking
Host - Woodlands

Robber flies are very common insects especially in the summer. They are active predators that catch insects on the wing. They often sit on a conspicuous perch and fly out to catch insects passing by. A few of the robber flies mimic bumble bees and wasps are very difficult to distinguish without a close inspection. Of course, they have only two wings like all flies while bees and wasps have four wings.
Robber flies also have a concave area on the top of the head between the eyes.

Level: Senior

Diptera (Flies)

Sheep Keds
Family: Hippoboscidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host - Sheep

Sheep keds are wingless, even as adults, and have legs that are widely spread to the sides of the thorax. They feed on sheep, taking blood meals with piercing-sucking mouthparts. They can be found deep in the wool right next to the skin.

Level: Senior

Sorghum Midge
Contarinia sorghicola (Coquillet)
Family: Cecidomyiidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host - Sorghum

Sorghum midge adults are reddish and smaller than a sorghum seed. Their eggs are deposited in sorghum seed at the time that heads bloom. The larvae develop inside of and feed on sorghum seeds.

Level: Intermediate, Senior

Stable Fly
Stomoxys calcitrans (Linnaeus)
Family: Muscidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Piercing & Sucking
Host - Cattle

Stable fly adults are about 1/4 inch long and have grayish- colored bodies and piercing-sucking mouthparts. Except for a pointed, stiff, slender beak sticking out from under the head, a stable fly adult resembles a house fly. Seven dark, rounded spots are on the upper side of the abdomen. Larvae have hooks in their mouthparts and feed in manure.

Level: Senior

Syrphid Fly (Flower Fly, Hover Fly)
Family: Syrphidae

Lifecycle - Holometabolous
Status - Beneficial

Mouthparts - Sponging
Host - Flowers

Syrphid flies are sometimes called flower or hover flies. They are normally brightly colored in yellows and blacks. Many people mistake these for bees. Larvae of syrphid flies have hook-like mouthparts and occur in a variety of habitats. Many of them feed on aphids, some occur in sewage, and others occur in decaying wood.

Level: Junior, Intermediate, Senior

Trichoptera (Caddisflies)

Caddisflies

Lifecycle - Holometabolous
Status - Inconsequential

Mouthparts - Chewing (larvae)
Host - Near streams

Caddisflies are an important component of the aquatic insect community. Larvae live in water, especially flowing streams. Larvae look much like a caterpillar with few hairs. Some larvae make small cases to hide in made out of sticks, leaves, sand, or pebbles. However, some larvae do not make any case at all. They feed on organic matter on the bottom of the stream. Adults are alive for only a day or two, do not feed and are attracted to lights at night. The adults look like small moths with long antennae and most of them are drab brown or gray.

Level: Intermediate, Senior

Lepidoptera (Butterflies, Moths, Skippers)

Be able to identify with wings closed and spread

Alfalfa Caterpillar (Orange Sulfur, Alfalfa Butterfly)

Colias eurytheme (Boisduval)
Family: Pieridae

Lifecycle - Holometabolous
Status - Pest
Host - Alfalfa

Mouthparts - Siphoning (adult)
Chewing (larvae)

The larvae of this species is referred to as the alfalfa caterpillar and adult as the orange sulfur or alfalfa butterfly. The alfalfa caterpillar is a representative in a group of butterflies known as yellows or sulphurs. The alfalfa caterpillar has at least two-color forms as an adult, one yellow and one nearly white. Intermediates between these colors also occur. Alfalfa caterpillars can become exceedingly numerous in alfalfa and are sometimes pests of that crop.

Level: Intermediate, Senior

Armyworm

Mythimna unipuncta (Haworth)
Family: Noctuidae

Lifecycle - Holometabolous
Status - Pest
Host - Grasses

Mouthparts - Siphoning (adult)
Chewing (larvae)

Armyworm moths are a medium gray in color. They are distinguished by a single small white spot which always occurs in the front wing. Armyworm larvae are dark green to greenish-brown with three stripes on each side: first a pale orange white-bordered stripe, next a dark brown almost blackish stripe, and below another pale orange stripe edged with white on the upper side. They are about 1 1/2 inches long when full grown. Armyworm larvae prefer grasses, corn and small grains.

Level: Senior

Lepidoptera (Butterflies, Moths, Skippers)

Bagworm
Family: Psychidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Trees

Bagworms are brownish, rather fat-bodied worms which live within tough silken bags. The bags, when full grown, are up to 2 inches long and hang from leaves and twigs of the trees they attack. There are multiple species of bagworms, this particular species attacks trees which they attack. Species in this family feed on oaks, junipers, elms and various other trees. The species *Thyridopteryz ephemeraiformis* is well known in Texas, attacking junipers.

Level: Intermediate, Senior

Female

Black Swallowtail
Papilio polyxenes asterius (Stoll)
Family: Papilionidae

Lifecycle - Holometabolous
Status - Beneficial (adult)
Host - Carrot family
Mouthparts - Siphoning (adult)
Chewing (larvae)

Larvae of the black swallowtail feed on celery, carrots, parsley and dill. These caterpillars are yellow with black stripes across the back. Adults are pollinators of nectar producing, flowering plants. Males are black with a yellow band across the fore and hind wing. Females are black with a blue band across the hind wing and yellow spotting on the forewing.

Level: Junior, Intermediate, Senior

Bollworm (Corn Earworm)
Helicoverpa zea (Boddie)
Family: Noctuidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Cotton, corn, others

Bollworm larvae can feed on over 250 plant species. It is a pest on cotton, corn, tomatoes, sorghum, soybeans, and other crops.. Adult moths are attracted to lights at night. This is one of the worst pests in cotton. There are artificial pheromone traps that are used to trap male moths to monitor their populations.

Level: Junior, Intermediate, Senior

Buckeye
Junonia coenia (Hubner)
Family: Nymphalidae

Lifecycle - Holometabolous
Status - Pest
Host - Plantain Family, snapdragons
Mouthparts - Siphoning (adult)
Chewing (larvae)

The buckeye is a widely distributed butterfly and the larvae feed on plants in the plantain family, Plantaginaceae such as snapdragons and foxglove. The eye spots on the upper surface of the wings are one of the conspicuous characteristics of the buckeye.

Level: Senior

Lepidoptera (Butterflies, Moths, Skippers)

Cabbage Butterflies
Pieris rapae (Linnaeus)
Family: Pieridae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Cole crops

The cabbage butterfly, is the common white butterfly found throughout most of the eastern US. The larvae of this species is a pest when it feeds on cabbage, broccoli, and related crops but it also feeds on many wild host plants. There are several other white butterflies that also share the name as cabbage butterflies.

Level: Senior

Cabbage Looper
Trichoplusia ni (Hubner)
Family: Noctuidae

Lifecycle - Holometabolous
Status - Pest
Host - Generalist feeder
Mouthparts - Siphoning (adults)
Chewing (larvae)

The cabbage looper is a green caterpillar with white stripes down the back. They have only three pairs of fleshy prolegs (legs on the abdomen) and loop when crawling. They grow to 1 1/4 inches long. Caterpillars have a wide range of hosts that include broccoli, cabbage and cauliflower. Adults are brown moths with siphoning mouthparts.

Level: Intermediate, Senior

Photo Credit: Hayat Qurunful

Cecropia
Hyalophora cecropia (Linnaeus)
Family: Saturniidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Chewing (larvae)
Host - Oak

The cecropia moth is one of our largest moths. This reddish charcoal moth can typically be found in wooded areas in the spring and summer. Male moths have feathery antennae and are strongly attracted to unmated females. The huge larvae feed on leaves of various broad- leafed trees. Adults do not have functioning mouthparts.

Level: Senior

Cutworms
Family: Noctuidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Grass, plants

The cutworms are a group of Noctuidae that share the habit of hiding in the soil and usually feed on plants near the soil. A few of the species also climb plants to feed. The adults are typically drab moths usually colored from nearly black to gray or brown. The larvae are typically grey, brown, or green with short hairs and few markings. Often the damage is seen much easier than the caterpillars.

Level: Senior

Lepidoptera (Butterflies, Moths, Skippers)

Fall Armyworm

Spodoptera frugiperda (Smith)
Family: Noctuidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Grasses

Fall armyworm larvae are tan or green to nearly black caterpillars with three very thin yellow lines down the back and a wider one on each side. Prominent white markings form an upside-down Y on the front of the head readily distinguishing it from other armyworms. Full-grown larvae may attain a length of 1 to 1 1/2 inches.

Level: Junior, Intermediate, Senior

Fall Webworm

Hyphantria cunea (Drury)
Family: Erebidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Trees

The fall webworm makes webs in pecan and other trees. Larvae reside inside in a mass within the web. These larvae are very hairy, pale-yellow caterpillars with black spots about 1 inch long when full grown. Adult moths are medium sized and generally white with black markings. The markings are quite variable and some moths will be heavily marked. Several generations occur each year.

Level: Senior

Forest Tent Caterpillar

Melacosoma disstria (Hubér)
Family: Lasciocampidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Broad-leafed trees

Despite the name, the forest tent caterpillar does not make a tent. This species is common and widespread for a few weeks in the spring when it feeds on many species of broad-leaved trees, especially elms and oaks. Caterpillars can be identified by a series of white key-hole shaped markings with one per segment down the back. The adults are rather drab, fuzzy moths that are only out for a few weeks in late spring or early summer. The eastern tent caterpillar, *Malacosoma americanum*, makes a tent where branches meet and feeds mostly on peaches, plums, cherries, and hawthorns. The caterpillars have a single white dash on each segment of the back.

Level: Senior

Giant Swallowtail

Papilio cresphontes (Cramer)
Family: Pompilidae

Lifecycle - Holometabolous
Status - Beneficial
Host - Citrus
Mouthparts - Siphoning (adult)
Chewing (larvae)

The giant swallowtail is the largest butterfly in North America. It is easily recognized by the conspicuous yellow pattern on a black background. Adults are pollinators of nectar producing, flowering plants. Larvae feed on citrus and are called orange dogs. Caterpillars in the north feed on other plants such as prickly ash.

Level: Intermediate, Senior

Lepidoptera (Butterflies, Moths, Skippers)

Gray Hairstreak (Cotton Square Borer)

Strymon melinus (Hubner)
Family: Lycinidae

Lifecycle - Holometabolous
Status - Pest
Host - Cotton

Mouthparts - Siphoning (adult
Chewing (larvae)

The gray hair streak is an attractive little butterfly with minute tails on its hind wings, although these tails are often broken off. Larvae of the gray hair streak are known as cotton square borers and attack cotton squares and hibiscus buds.

Level: Junior, Intermediate, Senior

Photo Credit: Ian Scarr

Great Leopard Moth

Hypercompe scribonia (Stoll)
Family: Arctiidae

Lifecycle - Holometabolous
Status - Inconsequential

Mouthparts - Chewing (larvae)
Host - Variety of plants

This moth can be quite common under lights in some years. Adults do not have fully formed mouthparts. Larvae feed on a wide variety of plants such as deciduous trees, shurbs, wildflowers and garden plants. The fuzzy caterpillars are often seen migrating across roads. They have black hairs with a pink body underside. There is confusion with the common name "leopard moth" which is also used for a moth in the carpenter moth family, Cossidae.

Level: Senior

Greater Wax Moth

Galleria mellonella (Linnaeus)
Family: Pyralidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing (larvae)
Host - Honey bee hives

The greater wax moth is a pest in beehives. Caterpillars of this species tunnel through the comb, feeding on wax, honey and pollen. They are not usually a problem in healthy hives. However, if not controlled, they can be extremely damaging to weakened hives or to combs placed in storage.

Level: Intermediate, Senior

Indian Meal Moth

Plodia interpunctella (Hubner)
Family: Pyralidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing (larvae)
Host - Stored Grain

The Indianmeal moth is a common stored product pest. Adults often appear to have the front wing very dark. In some specimens most of the dark wing scales are lost and they appear very light in color. There are actually several species of caterpillars that feed on grain products, nuts, dried fruit and other foods. Caterpillars in this group have few hairs and usually spin webbing in the food where they feed.

Level: Senior

Lepidoptera (Butterflies, Moths, Skippers)

Io Moth

Automeris io (Fabricius)
Family: Saturniidae

Lifecycle - Holometabolous
Status- Inconsequential
Mouthparts - Chewing (larvae)
Host - Trees, Corn

Io moths are smaller than most silk moths with a wingspan of only 2 to 3 inches. They also have large eye spots on the hind wings. Io moths are yellow in color with females being darker colored than males. The larvae have clusters of hairs on conspicuous raised areas on each segment. These hairs can be very irritating to humans. Larvae occasionally attack corn and roses in large numbers.

Level: Senior

Luna Moth

Actias luna (Linnaeus)
Family: Saturniidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Chewing (larvae)
Host - Oak

The luna moth is a very elegant looking silk moth. Adults are often green in color with long “tails” extending from the hindwing. Larvae feed on trees such as oak, sweet gum, hickory, walnut and persimmon. Some individuals will show darker colorations tending toward purple.

Level: Junior, Intermediate, Senior

Monarch

Danaeus plēxíppus (Linnaeus)
Family: Nymphalidae

Lifecycle - Holometabolous
Status - Beneficial
Host - Milkweed
Mouthparts - Siphoning (adult)
Chewing (larvae)

The monarch is a very attractive orangish-brown and black butterfly. Larvae of this butterfly incorporate a toxin into their body from feeding on milkweed which makes them taste bad to birds and other predators. The orange and black color pattern is a warning to predators indicating that the butterfly tastes bad. Monarchs migrate north in the spring and the following generation(s) migrate south in the fall. They **overwinter** in Mexico. Monarchs are the Texas State Butterfly.

Level: Junior, Intermediate, Senior

Lepidoptera (Butterflies, Moths, Skippers)

Mourningcloak Butterfly

Nymphalis antiopa (Linnaeus)
Family: Arctiidae

Lifecycle - Holometabolous
Status - Inconsequential
Host - Willow

Mouthparts - Siphoning (adult)
Chewing (larvae)

Mourningcloak butterflies are one of the few butterflies that **overwinter** as adults. Consequently, they can be found early in the season before most butterflies are on the wing. They get their name because the drab black color of the wings appears like a cloak that was used to cover a casket or was worn by the mourners, in past times.

Level: Senior

Photo Credit: Joseph Berger, Bugwood.org

Peachtree Borer

Synanthedon exitiosa (Say)
Family: Sesiidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing (larvae)
Host - Peach Trees

Peachtree borer adults are moths. Females are blue-black with clear hind wings and an orange crossband on the abdomen.
Adult male moths have wings nearly clear and several narrow yellow bands across the abdomen. Larvae are about 1 inch in length, are whitish in color with a dark brown head and have a plate behind the head. Larvae tunnel in trunks of peach trees and produce a mass of **frass** in the process.

Level: Senior

Photo Credit: Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org

Pecan Nut Casebearer

Acrobasis nuxvorella (Neunzig)
Family: Pyralidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing (larvae)
Host - Pecans

The pecan nut casebearer is an important pest of pecans. The adult moth has a siphoning mouth tube. Larvae have chewing mouthparts. Several generations occur each year. The first generation is usually the most damaging in pecans since it damages terminal growth as nuts are first formed.

Level: Intermediate, Senior

Pink Bollworm

Pectonophora gossypiella (Saunders)
Family: Gelechiidae

Lifecycle - Holometabolous
Status - Pest

Mouthparts - Chewing (larvae)
Host - Cotton

Pink bollworm are pinkish-white, brown-headed caterpillars up to 1/2 inch long and are found in cotton bolls. They are easily distinguished from boll weevil grubs by having 8 pairs of legs and prolegs.

Level: Intermediate, Senior

Lepidoptera (Butterflies, Moths, Skippers)

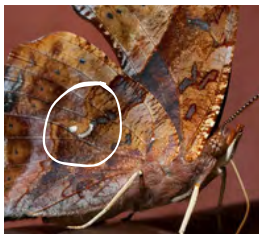
Polyphemus

Antheraea polyphemus (Cramer)
Family: Saturniidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Chewing (larvae)
Host - Oaks

The polyphemus is another one of the giant silk moths. It is generally a medium brown color with conspicuous eye spots in the wings. The larvae feed on various broad-leafed trees. They usually form pupae on the ground where they roll leaves into a cocoon. Adults do not have fully functioning mouthparts.

Level: Junior, Intermediate, Senior



Question Mark

Polygonia interrogationis (Fabricius)
Family: Nymphalidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Siphoning (adult) Chewing (larvae)
Host - Nettles

The question mark has a pair of silver spots on the lower surface of the hind wing. This is quite conspicuous against the leaf brown pattern of the hind wing. Its name is derived from the similarity of these silver spots to the form of a question mark. There are several closely related species to the question mark and care must be taken in their identification.

Level: Senior

Red Admiral

Vanessa atalanta rubria (Fruhstorfer)
Family: Nymphalidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Siphoning (adult) Chewing (larvae)
Host - Nettle

The red admiral occurs across the northern hemisphere. The larvae feed on nettles and male adults are known to be territorial, defending a particular nettle patch against other males. Adults are pollinators of nectar producing, flowering plants.

Level: Junior, Intermediate, Senior

Saltmarsh Caterpillar

Plodia interpunctella (Hubner)
Family: Pyralidae

Lifecycle - Holometabolous
Status - Variable
Mouthparts - Chewing (larvae)
Host - Grasses, weeds

Saltmarsh caterpillar adult males and females differ. Females have white hind wings and males (pictured here) have yellow hind wings. The caterpillars have a very fuzzy appearance and attack a wide variety of plants including cotton. It is a sporadic pests that rarely requires management.

Level: Senior

Lepidoptera (Butterflies, Moths, Skippers)

Silverspotted Skipper

Epargyreus clārus (Cramer)
Family: Hesperiidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Siphoning (adult) Chewing (larvae)
Host - Black locust tree

The silverspotted skipper is one of our larger skippers. Its name comes from the large silver spots that are visible on the underside of its hindwings. Skippers form an intermediate group between butterflies and moths. They are more thick-bodied than typical butterflies, yet resemble butterflies in other ways such as in being active during the day. The antennae of most skippers are hooked. The name skipper comes from the characteristic fast and bouncy flight of these butterflies.

Level: Intermediate, Senior

Sorghum Webworm

Nolā cereellā (Riley)
Family: Nolidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Sorghum

Sorghum webworm larvae attack grain sorghum heads. The larvae are greenish-yellow to tan with four darker stripes down the back and are covered with closely spaced hairs and spines. The older larvae are about 1/2 inch long and have chewing mouthparts with which they consume the developing grain.

Level: Senior

Southwestern Corn Borer

Diatraea grandiosellā (Dyar)
Family: Cramidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (larvae)
Host - Grain Crops

The southwestern corn borer is an important pest of corn especially in the High Plains. This pest often borers into corn stalks causing yield loss or lodging (falling over) of the corn plants. The adult is a whitish moth. 4-Hers should know larval and adult forms.

Level: Senior

Eastern Tiger Swallowtail

Papilio glaucus (Linnaeus)
Family: Papilionidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing (larvae)
Siphoning (adults)
Host - Cherry, trees

The eastern tiger swallowtail is nearly as large as the giant swallowtail. The yellow background with black stripes are the obvious reason for their name. Some females are black and can be mistaken for black swallowtails. Adults are pollinators of nectar producing, flowering plants.

Level: Senior

Lepidoptera (Butterflies, Moths, Skippers)

Tomato Hornworm

Manduca quinquemaculāta (Haworth)
Family: Sphingidae

Lifecycle - Holometabolous
Mouthparts - Siphoning (adult) Chewing (larvae)
Status - Pest
Host - Tomatoes

Tomato hornworms are large (some as long as 4 inches), green caterpillars with diagonal white bars on the sides and a slender horn at the end of the body. Adults have long, sucking tubes for mouthparts, while larvae have chewing mouthparts. Larvae and adults often are confused with the tobacco hornworm which it closely resembles. The tobacco hornworm feeds on the same plants and sometimes is more common than the tomato hornworm. Adult tomato hornworms have a spindle shaped body with five yellow-orange markings along each side of the abdomen.

Level: Intermediate, Senior

Underwing Moth

Family: Erebidae

Lifecycle - Holometabolous
Mouthparts - Siphoning (adult) Chewing (larvae)
Status - Inconsequential
Host - Trees

Underwing moths include a wide variety and large number of species. The forewings of underwing moths are generally dull colored and form effective camouflage while they are at rest. The hind wings are conspicuously marked, normally with a yellow or red and black pattern. Some species have black, or black and white hindwings. Larvae normally feed on trees and are common on walnut and hickory. Species identification of underwing moths should not be attempted by anyone except experts in this group.

Level: Junior, Intermediate, Senior

Viceroy

Limenitis archippus (Cramer)
Family: Nymphalidae

Lifecycle - Holometabolous
Mouthparts - Siphoning (adult)
Status - Inconsequential
Host - Poplar

The viceroy closely resembles the monarch butterfly. This relationship of resemblance is known as Mullerian mimicry. When different species of butterflies that look similar and taste bad, they all benefit by having predators avoid eating them. Viceroys are distinguished from monarchs by their smaller size and an additional black line across the hind wing. Viceroys usually have a single row of white dots on the outer margin of the wing and monarchs typically have a double row.

Level: Senior

Wood Nymph

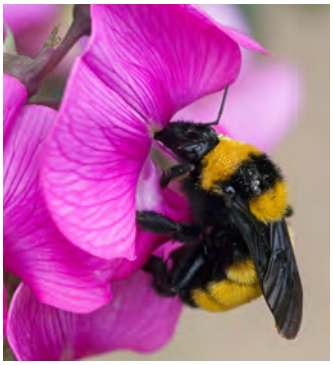
Family: Nymphalidae

Lifecycle - Holometabolous
Mouthparts - Siphoning (adult)
Status - Inconsequential
Host - Thick Woods

There are many species of wood nymphs in the United States. They are all basically brown and have some form of eye spot on their wings.

Level: Junior, Intermediate, Senior

Hymenoptera (Ants, Bees, Wasps, Sawflies & Horntails)



Bumble Bee
Bombus spp.
Family: Apidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Lapping (adult)
Host - Meadow

Bumble bees have a hairy or fuzzy thorax and abdomen black and yellow. They nest in the ground or hollow trees and stumps, making colonies of up to a few hundred individuals. Bumble bees are important pollinators of many native plants and vegetables.

Level: Junior, Intermediate, Senior

Carpenter Bee
Xylocopa spp.
Family: Apidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing (adult)
Host - Fence posts

Carpenter bees resemble bumble bees but can be distinguished by the shiny surface on the top of the abdomen. They nests in hollows of wood and sometimes excavate into cedar and other wood used in buildings.

Level: Senior

Cicada Killer
Sphecius spp.
Family: Crabronidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Soil

Cicada killers are a soil-nesting wasp. It is very large with a reddish-brown thorax and a yellow and black abdomen. This beneficial insect captures cicadas and carries them to a nest where they are fed upon by the wasp larvae.

Level: Junior, Intermediate, Senior

Honey Bee
Apis mellifera (Linnaeus)
Family: Apidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Lapping
Host - Flowers

Honey bees are about ½ inch long, yellow and black in color with fuzzy bodies. They are social insects that live in colonies called hives, with a single queen and tens of thousands of female workers. The honey bee is extremely valuable for its pollination of crops, but also produces wax and honey.

Level: Junior, Intermediate, Senior

Hymenoptera (Ants, Bees, Wasps, Sawflies & Horntails)

Horntails
Family: Siricidae

Lifecycle - Holometabolous
Status - Variable
Mouthparts - Chewing
Host - Logs

Horntails are an unusual because their biology is not typical of most Hymenoptera. Larvae feed in dead logs much like wood- boring beetle larvae. Adults resemble wasps but they have a broadly joined waist and therefore a cylindrical body, placing them in the suborder Symphyta. Most other Hymenopterans have a thin waist, placing them in the suborder Apocrita. Adults are often found **ovipositing** (laying eggs) on logs. Some species are known to be pests in pines.

Level: Senior

Ichneumon Wasp
Family: Ichneumonidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Flowers (adults)

Ichneumon wasps are very common but easily overlooked. They range in size from about 1/4 inch to over an inch. They come in many colors but often are black with yellow markings or brown. They can often be found around light at night or near wood piles where they are searching for borers that they use as food for their larvae. Adults feed on sap or nectar. They are **parasitic** wasps that sting prey and leave eggs in the prey. Larvae develop inside the host and emerge later. Ichneumon wasps have a cell in their front wing that looks like a witch's hat (or the sorting hat from Harry Potter).

Level: Senior

Leaf-cutting Bees
Family: Megachilidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Flowers

Leaf-cutting bees are generally beneficial because they aid in pollination. However, they can cause minor damage to plants (particularly roses) by cutting oval or circular holes in the leaves. They use the leaf cuttings to line their nests, which are constructed in soil, rotten wood, hollow stems, or other cavities. They are solitary bees and do not live in colonies.

Level: Senior

Mud Daubers
Family: Sphecidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Buildings

Mud daubers build their nests with mud, which they may carry for a considerable distance. Mud nests are formed on various surfaces, such as buildings, and can become a nuisance or distraction in some areas. Adult mud daubers are about ¾ of an inch long, various colors, and have a thin, threadlike waist.

Level: Junior, Intermediate, Senior

Photo Credit: Joe White

Paper Wasps

Polistes spp.
Family: Vespidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Houses

Paper wasps are 3/4 to 1 inch long, slender, narrow-waisted wasps. Body coloration varies with species from brown and yellow or reddish brown. Paper wasps are semi-social insects, building nests of hexagonal cells with wood fiber. Nests are facing down and suspended by a single filament. While generally considered pests, they are beneficial predators of many insects, such as caterpillars.

Level: Junior, Intermediate, Senior

Red Harvester Ant

Pogonomyrmex barbatus (Smith)
Family: Formicidae

Lifecycle - Holometabolous
Status - Inconsequential
Mouthparts - Chewing
Host - Pastures

Red harvester ants are reddish-brown and 1/4 to 1/2 inch long. They have two nodes on their **petiole** and a row of hairs under their mandibles. They build nests which are clear of vegetation and typically covered with small gravel near the entrance hole at the center. These ants may sting if disturbed. They forage around the mound for seeds. They are considered a major food source for the Texas Horned Lizard.

Level: Junior, Intermediate, Senior

Red Imported Fire Ant

Solenopsis invicta (Buren)
Family: Formicidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Pastures, lawns

The red imported fire ant is well known to most Texas at least in the eastern and southern parts of the state. These ants have two nodes, a reddish-brown head and thorax, and a black abdomen with a stinger. The antennae end in a 2 segmented club.

Level: Junior, Intermediate, Senior

Sawflies

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Plants

One can tell the difference between adult sawflies and most other Hymenopterans by the fact that sawflies have a very broad connection between the abdomen and thorax (placing them in the suborder Symphta). Larvae look very much like caterpillars, and this is uncommon in the Hymenoptera. Sawflies occasionally become quite numerous and can cause significant damage to forests and horticultural plants.

Level: Senior

Tarantula Hawk
Family: Pompilidae

Lifecycle - Holometabolous
Status - Beneficial
Mouthparts - Chewing
Host - Woodlands

Tarantula hawks some of the largest species of wasps in Texas. They sting tarantulas, bury them in holes in the ground and lay eggs on them. The larvae of the wasp then feeds on the provided tarantula. These large wasps are bright metallic blue-black in color with reddish-brown wings. They are generally harmless to humans because they seldom sting. However, they can be provoked to sting.

Level: Senior

Texas Leafcutting Ant
Atta texana (Buckley)
Family: Formicidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Woodlands

Texas leafcutting ant is also known as the town ant or cut ant. They are reddish-brown in color with spines on their head and thorax. The workers come in different sizes. They form large colonies with numerous entry holes preferring sandy soils in East and South Texas. They carry foliage from trees back to the colony to grow fungus on which they feed their young.

Level: Senior

Velvet Ant
Family: Mutilidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Soil

Velvet ants are actually wasps. Females are wingless and shaped like ants but are hairy or fuzzy. They are usually red, orange, yellow or white with black. One of the larger species is called the "cow killer" because of the severe sting they give, but they do not kill cows. Males of this group are winged and fly slowly over grass or weeds in search of a female to mate with. Females crawl rapidly on the ground and attack nests of other ground dwelling insects.

Level: Junior, Intermediate, Senior

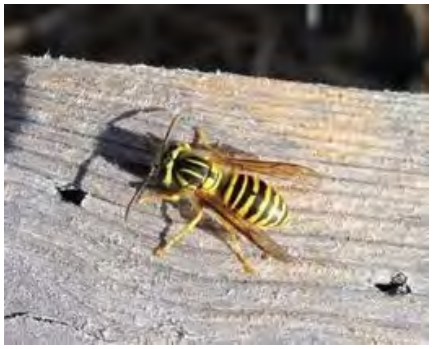


Photo Credit: Gary Johnson

Yellow Jackets
Family: Vespidae

Lifecycle - Holometabolous
Status - Pest
Mouthparts - Chewing
Host - Ground nests

The name yellowjacket causes confusion because it is sometimes applied to any yellow and black wasp. Yellowjackets typically nest in the ground but they may nest in trees or structures. They collect caterpillars and other insects as a protein source for their larvae. They also forage for sweet substances like fruit and nectar. Their sting is painful. Adults are yellow and black in color and create enclosed paper nests out of chewed wood fiber.

Level: Junior, Intermediate, Senior

Class Arachnida, Subclass Acari (Ticks, Mites, Chiggers)

Brown Dog Tick

Rhipicephalus sanguineus (Latreille)
Family: Ixodidae

Mouthparts - Piercing & Sucking Status - Pest
Host - Dog

The brown dog tick is a pest primarily on pets. They can build up in big numbers especially in kennels and other areas where pets are confined. These ticks are light to dark brown in color with no noticeable markings. They have a hard shield on their back called a **scutum**, which classifies them as hard ticks.

Level: Senior

Lone Star Tick

Amblyomma americanum (Linnaeus)
Family: Ixodidae

Mouthparts - Piercing & Sucking Status - Pest
Host - Cattle

Female lone star ticks are reddish-brown with a white spot on the back. This tick species is a member of the hard tick family because it has a shield- shaped plate (**scutum**) on its back. Piercing-sucking mouthparts help this pest take blood from the host. Ticks that take in a lot of blood enlarge and are called engorged.

Level: Junior, Intermediate, Senior

Spider Mites

Family: Tetranychidae

Mouthparts - Piercing & Sucking Status - Pest
Host - Plants

Spider mites are sometimes called red spiders. They are pale-greenish to reddish in color, are soft-bodied and get up to about 1/60 inch long. They are six-legged in the immature stages and eight-legged as adults. Piercing-sucking mouthparts are often used to feed on plant tissues. Some species of spiders mites are predatory. Mites cannot be identified to species without very high power microscopes and special preparation of specimens (slide-mounted)

Level: Intermediate, Senior

Class Arachnida, Order Araneae (Spiders)

Crab Spiders

Family: Thomisidae

Mouthparts - Chelicerae
Host - Flowers

Status - Beneficial

Crab spiders have the first two pairs of legs projecting forward. This gives them a crab-like appearance and thus the name. Some crab spiders are yellow or white and sit up on flowers where they wait for prey. Other species are dull colored and are commonly found under bark.

Level: Intermediate, Senior

Jumping Spiders

Family: Salticidae

Mouthparts - Chelicerae
Host - Garden

Status - Beneficial

Jumping spiders have large eyes and usually a chunky, fuzzy body. They come in many colors from black and grey to bright red with many having a distinct color pattern. Some species mimic ants and are difficult to tell from them at a glance. Jumping spiders are very active hunters during the day. Their excellent eyesight is used for stalking prey. Before pouncing on a victim, jumping spiders attach a line of silk from which they can dangle if they fall.

Level: Senior

Recluse Spider

Loxosceles spp.
Family: Sicariidae

Mouthparts - Chelicerae
Host - Board Piles

Status - Pest

Recluse spiders live in undisturbed areas. The body of an adult is 3/10 to 1/2 inch long, but much larger if legs are included. Adults have a violin-shaped spot on the **cephalothorax** (head and thorax combined) and six pairs of eyes on the front of the cephalothorax. The bite can result in a severe wound that may require two months to heal. Usually, the internal reaction to a bite is less severe than is the reaction to the bite of a black widow spider. The brown recluse spider, *Loxosceles reclusa,* is the species that is often mentioned. However, there are about six species in Texas and they are difficult to distinguish.

Level: Intermediate, Senior

Tarantulas

Aphonopelma spp.
Family: Theraphosidae

Mouthparts - Piercing
Host - Soil

Status - Beneficial

Tarantulas are widespread throughout Texas and are our largest spiders. Most of our species are in the genus *Aphonopelma*. They inhabit burrows, usually excavating it themselves. They spend most of the day in the burrow and move out at night to hunt. They line the burrow with webbing and extend the webbing out on the soil surface. The extended web is used to sense prey that is walking by.

Level: Senior

Class Arachnida, Order Araneae (Spiders)

Photo Credit: Leigh Redwine

Widow Spider

Latrodectus spp.
Family: Theriidae

Mouthparts - Chelicerae
Host - Woodlots

Status - Pest

Widow spiders are shy, secretive and found in seldom- disturbed areas. Mature females have a characteristic hourglass- shaped, reddish-orange marking on the underside of the abdomen. However, there are four species of this genus in Texas and the markings on the abdomen can be highly variable. It is often difficult to distinguish between the species. Not all species are all black and males and juveniles can have red, green, white or other colored markings. Widow spiders are **predaceous**, devouring small arthropods trapped in their irregular cobwebs. Their bite is relatively painless, but may be followed in about an hour by intense pain and swelling. The venom causes nausea, cramps, lack of coordination, and difficulty breathing by interference in nervous functions. Death is rare but has occurred in individuals hypersensitive to the venom.

Level: Junior, Intermediate, Senior

Wolf Spiders

Family: Lycosidae

Mouthparts - Chelicerae
Host - Under rocks

Status - Beneficial

Wolf spiders are brown to grey in color, often with various markings on the body. They are usually active at night. They capture prey by actively hunting rather than by waiting in a web. One common species is *Rabidosa rabida* (Walckenaer) which is marked with chevrons (sergeant stripes) down the back.

Level: Junior, Intermediate, Senior

Yellow Garden Spider

Argiope aurantia (Lucas)
Family: Araneidae

Mouthparts - Chelicerae
Host - Garden

Status - Beneficial

The yellow garden spider or black-and-yellow argiope is a particularly attractive and large species of orb-weaving spider. It is also known as the yellow garden orb-weaver and the "writing spider". This spider has a white **cephalothorax** yellow abdomen with black markings, and black and yellow legs. Orb weaver spiders are some of our more conspicuous spiders. Many people think of a typical orb weaver web when they think of a spider.

Level: Junior, Intermediate, Senior

Class Arachnida, Order Opiliones (Harvestmen)

Harvestmen

Mouthparts - Chelicerae
Host - Caves

Status - Inconsequential

Harvestmen are also often called Daddy-Longlegs. Some species are found in caves. They have a rounded body with long, slender legs. Most species in this group are predacious or plant feeders. There is an urban legend that daddy long legs are venomous but their mouthparts are too small to inject venom, however, this is untrue.

Level: Intermediate, Senior

Class Arachnida, Order Scorpiones (Scorpions)

Scorpions

Mouthparts - Chelicerae
Host - Log piles

Status - Pest

Scorpions are arachnids, however, they are usually included in entomology. They are important because of their painful sting. Texas species rarely cause problems when they sting except in young children or those hypersensitive to their venom. The striped bark scorpion, *Centruroides vittatus* (Say), occurs throughout the state and is the only scorpion in the eastern half of Texas. Scorpions have 8 legs, “claws” or “pinchers” on the front of the body, and a long tail with a stinger at the tip.

Level: Junior, Intermediate, Senior

Class Arachnida, Order Thelyphonida (Vinegaroons)

Photo Credit: Salvador Vitanza

Vinegaroons

Mastigoproctus giganteus (Lucas)

Mouthparts - Chelicerae
Host - Arid regions

Status - Inconsequential

Vinegaroons are large arachnids of 40 to 80 mm in length. They have forward projecting mouthparts enlarged and formed into pinchers. They are predators with forward projecting claws. They are called vinegaroons because they can emit acetic acid (a main component of vinegar) from the base of the tail, as defense against predators. They are also called whip-scorpions because of the thin tail. They do not sting. Vinegaroons are found only in the western parts of Texas.

Level: Senior

Class Arachnida, Order Solifugae (Sunspiders)

Photo Credit: Bill Hauser

Sunspider (Windscorpion, Camelspider)

Mouthparts - Chelicerae
Host - Arid regions

Status - Inconsequential

Sunspiders are also known as camelspiders and windscorpions. They can run very fast - "like the wind" - which is the source for the common name. Sun spiders are found primarily in drier parts of the state. They have strong jaws that protrude forward that are used to capture and tear apart their prey.

Level: Intermediate, Senior

Class Chilopoda (Centipedes)

Photo Credit: Salvador Vitanza

Centipedes

Mouthparts: Chewing and Sucking Status - Inconsequential
Host - Ground

Centipedes have elongated, worm-like bodies and a pair of antennae. They have one pair of legs per body segment and a pair of appendages on the end of the abdomen that mimic stingers and lure prey to the head. They are fast moving predators and usually active at night. They are typically flattened from top-to-bottom (dorso-ventrally). Some centipedes are hazardous because they can bite and pinch with the legs and cerci and produce venomous compounds which are injected by fangs or dropped into a wound from between the leg segments. When feeding they masticate (chew) and then suck the juices of their prey. The largest centipedes in Texas are in the genus *Scolopendra*. They can be over 6 inches long.

Level: Senior

Class Diplopoda (Millipedes)

Millipedes

Mouthparts - Chewing Status - Variable
Host - Leaf litter

Millipedes have elongated wom-like bodies and a pair of antennae. They have two or more pairs of legs per body segment. Most millipedes have round cylindrical bodies. However, some of them have flattened extensions on the side of each segment. They are generally slow moving and active mostly at night. They tend to hide under rocks or stones and in organic debris.

Level: Senior

Order Isopoda (Sowbugs, Pillbugs)

Sowbugs & Pillbugs

Mouthparts - Chewing Status - Variable
Host - Compost

Sowbugs and pilllbugs are crustaceans which is a group that includes shrimp, crawfish and lobsters. Isopods are some of the few crustacea that are terrestrial. Sowbugs and pillbugs have 7 pairs of legs and 2 pair of antennae. Pillbugs can roll their bodies into a tight ball when disturbed and this behavior gives them the name. Other names are "roly-pollies" and "ball bugs". Sowbugs have two tail extensions and do not roll into a ball. Both are found together especially in moist habitats with lots of organic matter.

Level: Senior

Class Collembola (Springtails)

Springtails

Mouthparts - Chewing Status - Variable
Host - Surface of puddles

This class contains small (usually under 2 mm), soft-bodied insects that leap using an appendage on the end of the abdomen called a **furcula**. They prefer moist habitats. and can build in large numbers. Springtails used to be classified as insects, but because they have internal mouthparts (not external like insects), they are included in the subphylum Hexapoda, but not in Class Insecta.

Level: intermediate, Senior

GLOSSARY

alate - winged form of insect

aphid - an insect in the family Aphididae, order Hemiptera, sometimes called a plant louse

beneficial insect - any insect that has a life style that is advantageous to man. Insects that preserve the balance of nature by feeding on others, pollinators, and recyclers are examples of beneficial insects.

cantharidin - a toxic, blistering compound produced by certain beetles, most notably blister beetles

carnivore - an insect that feeds on a living animal

caterpillar - the immature stage of any Lepidoptera (butterflies and moths)

cephalothorax - e.g. spiders, a single body segment with the head (ceph) and chest (thorax) areas fused together

cerci - paired appendages on the end of the abdomen of many insects which are used for sensing, defense, or mating

chelicerae - front pair of appendages of an arachnid often specialized with fangs

chewing (mouthparts) - any mouthpart that is used to break up food into smaller pieces to aid in digestion; other mouthpart types are piercing-sucking and sponging

clavate - Clublike antennae enlarged at the tip.

collophore - a tube-like structure on the underside of the first abdominal segment of Collembola

compound eyes - the large multi-faceted eyes of insects

coreids - a member of the family Coreidae, order Hemiptera

corium - the elongate, thickened basal portion of the forewing of Hemiptera

cornicles - tubular structure on each side of the abdominal region of aphids from which pheromones are expelled.

coxa (pl. = coxae) - basal portion of the leg

crepuscular - having activity periods during low light levels at dawn and evening

cursorial - adapted for running

dactyl - literally a finger or finger-like projection on an insect body part

dealate - winged form that has shed its wings, like a reproductive termite or ant

defoliate, **defoliation** - removal of foliage from plants, often by chewing insects

detritivore - any organism that eats decaying organic matter

diapause - an insect resting stage, usually induced by environmental signals or extreme conditions like winter or summer

dimorphic - having two distinct forms

dorsal - relating to or situated near the back

elytra - hardened forewings of beetles and some other insects that serve as protective covers for the more delicate hindwings and the dorsal side of the abdomen.

estivation (**aestivation**) - a resting stage (quiescence) resulting from continued high temperature or xeric conditions; diapause; hibernation

exoskeleton - the outer portion of an insect body which may be relatively soft like a caterpillar or hardened like many beetles

femur (plural: femora) - a segment of an insect leg; the third and usually the largest segment

filiform - linear shaped as the antennae of ground beetles

frass - solid larval insect excrement; plant fragments made by wood-boring insects, usually mixed with excrement

furculum (plural: **furcula**) - the elongate fork-like appendage on the end of the abdomen (folds under the body) of Collembola which is used as a spring action for leaping

gall - an abnormal growth or swelling of plant tissue caused by various organisms such as insects

genera - plural of **genus**; a genus is a group of plants or animals with similar characteristics

girdle, **girdling** - damage of a plant that encircles the stem or branch and cuts off the transportation system of the plant

gradual metamorphosis - see metamorphosis

halteres - small, knob-like structures found in flies and some other two-winged insects that are modified hind wings

harmful insect - an insect pest that destroys homes, buildings, crops, or hurts animals

haustellate - a type of mouthpart in insects that is adapted for sucking or piercing and sucking liquids.

hemelytron (pl. = hemelytra) - the front wing of a Hemipteran which has the base more thickened than the membranous outer portion

herbivore - an insect that feeds on living plants

honeydew - a sugary liquid excreted by certain plant-sucking insects, such as aphids, whiteflies, and scale insects

imago - the adult stage of an insect

instar - an insect stage between molts. The term applies to juvenile stages only.

larval stage (larva, plural: larvae) - an immature insect, sometimes used to include all immature stages, even eggs. Usually this term refers more specifically to the feeding stages of insects with complete metamorphosis like grubs, caterpillars, and maggots.

lateral - relating to or situated near the side of the body rather than the upper or lower surfaces

maggot - in most Diptera, legless larva lacking a distinct head, with cephalic (head) end pointed and caudal (rear) end blunt

mandibulate - insects that have chewing mouthparts, specifically mandibles, which are jaw-like structures used to bite, cut, and grind solid food.

membranous - thin and semi-transparent; like a membrane

mesothorax - the second section of the insect thorax which includes the attachment points for the second pair of legs and the first pair of wings

metamorphosis - change in form during an insect's growth and development

complete metamorphosis (holometabolous) - This type of metamorphosis includes a pupal stage. Immature insects are called larvae and usually look very different from adults. The stages are egg, larva, pupa, and adult. Complete metamorphosis is the most advanced type of metamorphosis and is found in Superorder Endopterygota. This group includes lacewings, beetles, butterflies and moths, fleas, bees and wasps, and several other orders.

gradual metamorphosis (paurometabolous) - This type of metamorphosis does not include a pupal stage and has three stages: egg, immature and adult. Immature insects are called nymphs and are terrestrial. Nymphs are look similar to adults, but do not have fully developed wings or reproductive organs. Gradual metamorphosis is less advanced than complete metamorphosis. This group includes cockroaches, grasshoppers, true bugs, and several other orders.

incomplete metamorphosis (hemimetabolous) – This type of metamorphosis does not include a pupal stage and has three stages: egg, immature and adult. Immature insects are called naiads and are aquatic. This group includes dragonflies, damselflies, mayflies and stoneflies.

no metamorphosis (ametabolous)- There is no metamorphosis except for the gradual development of adult reproductive structures. Insect groups with no metamorphosis include the Archaeognatha and Zygentoma. The ametabolous insects are considered to be the most primitive insects.

metathorax - the third section of the insect thorax which includes the attachment points for the third pair of legs and the second pair of wings

mite - a member of the order Acarina (ticks and mites)

molt, molting process - in insects, the process of shedding the exoskeleton

naiad - a term for immature insects that are aquatic from the orders Plecoptera, Odonata, and Ephemeroptera. This term is now being replaced by the more general term "immature" insect.

nasute (plural: nasuti) - a (type of) soldier in certain termites in which the head narrows into an anteriorly pointing “nozzle” through which sticky defensive liquids are squirted.

necrosis - death of tissue in plants or animals

nymph - an immature stage of hemimetabolous insects (those with incomplete metamorphosis)

ootheca (plural: oothecae**)** - a bean-like hardened egg capsule produced by female cockroaches

omnivorous - an organism that eats both plant and animal matter

osmeterium (pl. = **osmeteria**) - scent- producing area behind the tibia

overwinter - time spent during the winter months. Insects are often in hibernation or at least rather immobile in colder temperatures.

ovipositor - the egg-laying apparatus of an insect. The stinger of a bee is actually a modified ovipositor.

parasitic insect (**parasite**) - an insect that feeds on a host but does not kill it. Some insect parasites live on large hosts like dogs, cows or man, and usually do not kill them; however, most parasites, like fleas and lice, keep an animal from being in "top condition." Some parasitic insects are good, since they destroy harmful insects; others are harmful. In entomology we often misuse the term "parasite" when we are talking about an insect that lays its eggs in or on another insect and the developing larva usually kills it. This common usage of the word is actually incorrect because, by definition, parasites do not directly kill their hosts. In this case the insect would correctly be called a parasitoid (see below).

parasitoid - an insect that spends a significant portion of its life history within a host and causes the death of the host, usually before it can reproduce.

parthenogenesis - egg development without fertilization

pedipalps - second pair of appendages of the cephalothorax corresponding to the mandibles of insects

petiole - the stalk that attaches the leaf blade to a stem

phytophagous - plant eating; an insect using plants as a food source

phytotoxemia - a toxic reaction in plants

predaceous insect (**predator**) - an insect that attacks, kills, and eats other insects

proboscis - a nose, or in the case of butterflies the coiled sucking mouthpart

pronotum - the plate on top of the prothorax

prothorax - the front part of an insect thorax which includes the attachment points for the front legs

protozoan - a microorganism in the kingdom Protozoa

pseudergate (plural: pseudergates) - literally means "false worker" because the pseudergate has at each molt four differentiation possibilities, including: 1) remaining a pseudergate, 2) passing through two nymphal stages and become a winged adult, 3) passing through a presoldier stage or white soldier to a soldier, or 4) molting directly to a supplementary (teritary) reproductive

psocids – booklice and bark lice insects in the order Psocodea

pupal stage (**pupa**) - the stage in complete metamorphosis between larva and adult. For example, the cocoon in butterflies

pustulate - covered with small, blister-like swellings

raptorial – limbs that are adapted for grasping or seizing prey, typically seen in predatory insects.

rosetting - malformation of a plant resulting in a bunched irregular growth of the leaves

scavenger - an insect that feeds on dead plants or animals

scutellum - a triangular shaped section on the back of Hemiptera and some Coleoptera and Diptera. It is often the identifying characteristic of Hemipterans.

secondary reproductive - a caste of subterranean termite; also called supplemental reproductives. When reproductive termites develop from nymphs, they are called secondary reproductives (primary reproductives are the king and queen). If they develop from pseudergates, they are called tertiary reproductives. Supplemental reproductives may be responsible for most of the egg production in the colony.

soldier termite - see termite.

spinneret - a small tubular appendage from which silk threads are exuded by spiders and many larval insects

stadium (pl. = stadia) - the period between molts in a developing arthropod. An insect with an egg, three larval stages, and a pupal stage would have 5 stadia; egg (1), larva (3) and pupa (1). Some authorities count the adult stage as a stadium.

subgroup - a subset of a group with related characters. The term group is a general and non-specific collection of similar organisms regardless of taxonomic hierarchy.

subimago - the first winged stage of a mayfly. This is the only order to have a winged stage that molts. The final stage is the imago, or adult.

tarsi (plural) (singular is **tarsus**) - a foot. Insect feet are made of several segments and may have pads, hairs, or hooks.

tegmen (plural: tegmina), a hardened covering like the forewing of many Orthoptera and Hemiptera

termite - any eusocial, small, soft-bodied, wood-eating insect in the order Blattodea

soldier termite - a caste of termites with specific structures to defend the colony, such as large mandibles or nasute heads with nozzles that produce sticky defensive substances.

worker termite - a caste of termites that do most of the work in the colony. Worker termites can all be immature termites and formd that do not develop into reproductive forms or soldiers.

tertiary reproductive termite - supplementary reproductives forming from pseudergates

Tettigoniidae - a family of Orthoptera often called long-horned grasshoppers which includes katydids

thorax - the second body segment of an insect. The thorax has all wings and legs attached to it.

true bugs - insects in the order Hemiptera. They are usually characterized by a scutellum, a triangular-shaped section on the back.

vector - an organism that transmits a pathogen from one host to another, often without being affected by the disease itself. Examples are mosquitoes and ticks, but many insects can vector diseases among plants

venation - the pattern of veins in the insect wing

ventral – the underside of belly of an organism

vestigial - small, poorly developed, degenerate, nonfunctional

wing pads - incomplete wing structures like those formed on immature grasshoppers

This 2025 revision was created by Molly Keck, Blayne Reed, Pat Porter, Kerry Siders and Ryan Selking. This 2025 version used material developed during prior years by Noel Troxclair, John Jackman, Bonnie Pendleton, Scott Armstrong and Mark Muegge