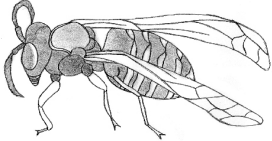
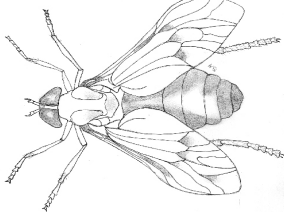
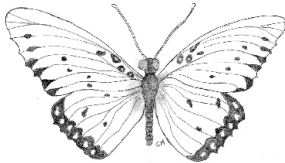
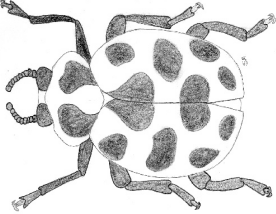
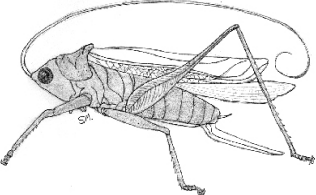


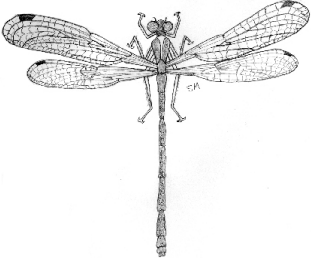
	Order	Example Insects	Common Characteristics	Illustration
1	The Membrane Wings (Hymenoptera)	Ants, Bees, and Wasps	<ul style="list-style-type: none"> -2 pairs of clear, membranous wings -Compound eyes -Sponge-like, sucking or biting mouthparts -Long legs -Stinger 	

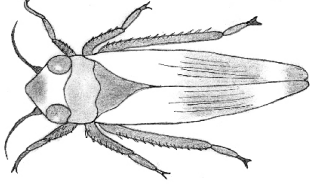
	Order	Example Insects	Common Characteristics	Illustration
2	The Two Wings (Diptera)	Flies, Mosquitos, and Gnats	<ul style="list-style-type: none"> -1 pair of regular wings & 1 pair of very small wings -Compound eyes -Sponge-like or sucking mouthparts 	

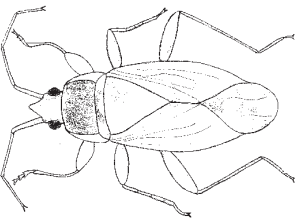
	Order	Example Insects	Common Characteristics	Illustration
3	The Scaly Wings (Lepidoptera)	Moths and Butterflies	<ul style="list-style-type: none"> -2 pairs of scaly wings -Antennae feathery, needle or pin-like -Compound eyes -Sucking mouthparts 	

	Order	Example Insects	Common Characteristics	Illustration
4	The Sheath Wings (Coleoptera)	Beetles	<ul style="list-style-type: none"> -1 pair of hard wings -Wings cover top of body & meet in straight line down center of back -Biting mouthparts 	

	Order	Example Insects	Common Characteristics	Illustration
5	The Straight Wings (Orthoptera)	Crickets, Grasshoppers, and Locusts	<ul style="list-style-type: none"> -1 pair of leathery wings in front (fold over body when not in use) -1 pair fan-like wings in back -Long legs/high hopper -Make rhythmic sounds -Chewing mouthparts 	

	Order	Example Insects	Common Characteristics	Illustration
6	The Toothed Wings "Born to Teeth" (Odonata)	Dragonfly and Damselfly	<ul style="list-style-type: none"> -2 pairs of wings -Most have thin legs & short antennae -Large compound eyes nearly cover small heads -Biting mouthparts 	

	Order	Example Insects	Common Characteristics	Illustration
7	The Same Wings (Homoptera)	Aphids, Cicadas, Treehoppers, and Leafhoppers	-Both (2) pairs of wings are same from base to tip -Wings held in tent-like position over body when resting -Piercing or sucking mouthparts	

	Order	Example Insects	Common Characteristics	Illustration
8	The Half Wings (Hemiptera)	True Bugs, Back Swimmers, and Water Striders	-2 pairs of wings: thick and leathery near the body and thin at tip -Wings fold on back forming a triangle behind the head -Snout on head is used for piercing and sucking	

Insect Charades

Activity Overview

Students play charades in small teams to learn more about the major categories of insects and to discuss unique characteristics of those eight orders.

Objectives

Students will:

- Learn how insects differ structurally from one another
- Identify major orders of insects
- Increase their understanding of insect structure

Subjects Covered

Science and Language Arts

Activity Time

30-45 minutes

Season

Any

Materials

Stopwatch, 1 insect order identification card per student team (1 set is 8 cards). See masters for making cards or have students create their own set of cards to represent each of the eight insect families represented.

State Standards

Science:

Use scientific sources & resources (B.4.1)

Select multiple information sources (C.4.3) (Extension)

Use data to answer questions (C.4.5)(Extension) Communicate results (C.4.6)

Ask questions, build hypotheses, design investigations (C.12.1)

Identify issues, questions, research; design & conduct investigations (C.12.2)

Language Arts (Extensions):

Create or produce writing (B.4.1, B.8.1, B.12.1)

Plan, revise, edit, & publish writing (B.4.2, B.8.2, B.12.2)

Understand forms, structures, & punctuation marks (B.4.3, B.8.3, B.12.3)

Conduct then communicate research (E.4.1, F.8.1, F.12.1)

Background

Insects have been incredibly successful at surviving and have been around at least 350 million years, which is even before dinosaurs came into existence! Many insect species are beneficial because they eat harmful insects, recycle nutrients by breaking down plant matter, and are a food source for other species. If you look closely, insects can be found nearly anywhere: you can find crickets under a rock, beetles in rotting plant materials, grasshoppers in an open field, mayflies and dragonflies along a lakeshore or skimming the water's surface, a walking stick on a tree stem, termites under bark, and moth larvae in roots, among a myriad of other insect habitats that surround you. Knowing more about the structure of insects, how to identify them, and where to look for them can be a key to understanding the diversity of your school's habitat restoration.

Insects are part of the Arthropoda phylum (grouping) in the kingdom of animals that also includes spiders, ticks, mites, crayfish, and millipedes. True insects are part of the Insecta class and have three major body characteristics:

- 1) Head: mouth, eyes, and antennae
- 2) Thorax: adults have three pairs of jointed legs; many insects have one or two pairs of wings full of large muscles. Wings are only present in the adult stage of some insect types. The Latin word for wing is "ptera," which is a useful word to know when learning the scientific Latin names for different insects.
- 3) Abdomen: heart, digestive, and breathing organs

Insects also have a hard covering on the outside of their bodies called an exoskeleton, which is made of a plastic-like material ("chitin"). This tough outer skeleton keeps the insect from drying out and serves to protect them from surrounding environmental hazards. As they grow and the exoskeleton becomes more confining, insects have to molt. Once they become adults, insects stop molting and growing. On the inside, insects are very different from humans. They have no lungs, a primitive nervous system, and a poor circulatory system with no veins or arteries. Although their organ system works well for a small creature, these internal features generally prevent insects from getting larger than 3-4 inches long by 2 inches wide and 2 inches high.

Although some people consider spiders insects, they are not. Rather, spiders belong to the class Arachnida and have two body parts, four pairs of legs, and no wings or antennae. Ticks and mites also differ from true insects and have four pairs of legs and only one major body division.

Insects change through their lives by way of a process called metamorphosis. Some insects go through a "complete metamorphosis, which involves four

Insect Charades (cont.)

stages of development from egg to larva (caterpillar) to pupa (moths—cocoon and butterflies—chrysalis) to adult. Common orders of insects that experience complete metamorphosis include beetles, caddisflies, moths, butterflies, flies, fleas, wasps, bees, and lacewings. Other insects go through incomplete or gradual metamorphosis, which involves three stages of development: egg to nymph (resembles adult but lacks wings and is smaller) to adult. Common insect orders that go through gradual metamorphosis include aphids, grasshoppers, true bugs, dragonflies, cockroaches, and leafhoppers.

Activity Description

This is a useful warm-up activity to become familiar with eight of the major orders of insects by playing charades. Charades is a game of pantomimes where players have to “act out” a word or phrase without speaking, while the others try to guess what the word or phrase is. The objective is for the other teams to guess the phrase as quickly as possible.

1. Divide the players into groups of 3-4 students per teams, preferably of equal size.
2. Review the eight major categories of insects with all the students and share the identification cards with each team. Have the 8 insect orders also written on slips of paper and have each team choose one family from a hat, which they will then represent when they play charades.
3. Review acceptable gestures and hand signals and invent any others group members deem appropriate.
4. Provide the following instructions for the insect charades:

Every team member must play a role in acting out their team’s insect order.

- No talking while acting out your team’s insect order.
 - Teams will be given 1 minute to perform their insect charade.
 - Whichever team (or team member) identifies the insect order first by voicing the correct identification receives 1 point
5. Teams temporarily adjourn to separate rooms (or areas within the same room), to decide how they will physically represent the insect order they’ve chosen. Once they have decided how they want to represent their insect family, the teams come back to the same room to play charades.

Discussion

Review as a class the eight major insect orders and how the teams were able to identify them through charades. Discuss what some threats to these insects’ survival might be. Emphasize there are a wide variety of ways insects adapt to survive in different ecosystems. Have students visit the library to research insects that live in prairies, wetlands, woodlands, and other ecosystems. How have those insects adapted to survive in a particular habitat? Encourage class members to expand on the charades to include different insect orders, plants, and/or other animals that might be found in the natural area they are restoring on their school grounds.

Extensions

- Create your own cards for charades. Draw other insects, plants, animals that are representative of the ecosystem being restored on your school site. Use a field guide or other reference to draw the organisms accordingly and then play another round of charades based on these new additions.
- Write a short story describing the eight major orders of insects.
- As a class, do insect sweeping (see Earth Partnership for Schools activities, “Sweeping Discoveries”) or other types of insect collecting during different times of year on your school restoration site and record

Insect Charades (cont.)

your findings.

- Create a computer database to record insect observations.
- Research an insect order, describe its characteristics, and the life history of at least one genus within that order.

Additional Resources

- Borror, Donald and Richard White. *Field guide to the insects of America north of Mexico*
- Covell, Charles V., Jr. (1984). *Field guide to the moths of Eastern North America*. Houghton Mifflin.
- Fleischman, Paul. (1988). *Joyful noise: Poems for two voices*. Harper and Row.
- Legler, Karl, Dorothy Legler, Dave Westover. (1996). *Guide to common dragonflies of Wisconsin*. Self Published: Karl Legler, 429 Franklin St., Sauk City, WI 53583.
- Mitchell, Robert and Herbert Zim. (1987). *Golden guide: Butterflies and moths*. Golden Press.
- Pyle, Robert M. (1985). *The Audubon Society handbook for butterfly watchers*. Charles Scribner's Sons.
- Pyle, Robert Michael. (1981). *National Audubon Society Field Guide to North American Butterflies*. Knopf, New York..
- Opler, Paul A. (1994). *Peterson first guide to butterflies and moths*. Houghton Mifflin Co.

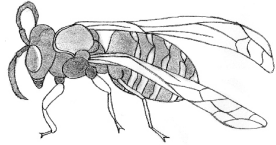

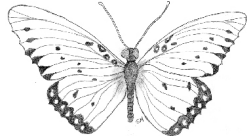
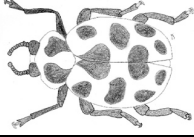
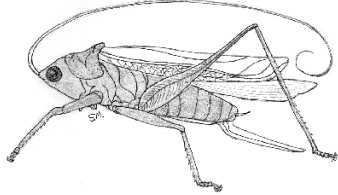

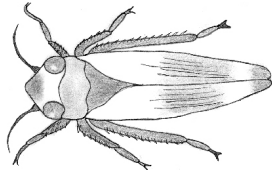
Websites

- UW Entomology Dept.: <http://www.entomology.wisc.edu>
- Entomology on World wide web: <http://www.colostate.edu/Depts/Entomology>
- The University of Florida Book of insect records: <http://ufbir.ifas.ufl.edu/>

Assessments

- Name and describe at least 2 insect orders and/or the parts of a true insect.
- Compare a true insect to a spider.
- Create a mobile with drawings illustrating various insect orders and their unique physical characteristics.
- Make an oral report to the class about an insect order you researched and conduct peer reviews of these reports.
- Develop a web page on a specific insect order using photos, drawings, and life history information.
- Conduct research in your school restoration site related to insects and record observations for a specific time frame.

Insect Charades: The Big Eight

	Order	Example Insects	Common Characteristics	Illustration
1	The Membrane Wings (Hymenoptera)	Ants, Bees, and Wasps	--2 pairs of clear, membranous wings --Compound eyes --Sponge-like, sucking or biting mouthparts --long legs --stingers	
2	The Two Wings (Diptera)	Flies, Mosquitoes, Gnats	--1 pair of regular wings & 1 pair of very small wings -- Compound Eyes --Sponge-like or sucking mouthparts	
3	The Scaly Wings (Lepidoptera)	Moths, Butterflies	--2 pairs of scaly wings --Antennae feathery, needle- or pin-like --Compound Eyes --Sucking mouthparts	
4	The Sheath Wings (Coleoptera)	Beetles	--1 pair of hard wings --Wings cover top of body & meet in straight line down center of back --Biting mouthparts	
5	The Straight Wings (Orthoptera)	Crickets, Grasshoppers, Locusts	--1 pair leathery wings in front (fold over body when not in use) --1 pair fan-like wings in back --Long legs/ high hopper --Make rhythmic sounds --Chewing mouthparts	
6	The Toothed Wings “Born with Teeth” (Odonata)	Dragonfly, Damselfly	--2 pairs of wings -- Most have thin legs & short antennae -- Large compound eyes nearly cover small heads --Biting mouthparts	
7	The Same Wings (Homoptera)	Aphids, Cicadas, Treehoppers, Leafhoppers	--Both (2) pairs of wings are same from base to tip --Wings held in tent-like position over body when resting --Piercing or sucking mouthparts	
8	The Half Wings (Hemiptera)	True Bugs, Back Swimmers, Water Striders	--2 pairs of wings: thick and leathery near the body & thin at tip --Wings fold on back forming a triangle behind the head --Snout on head is used for piercing and sucking	