The WVU Insect Zoo presents

An Insect Hunt

For Grades 6-8

When you think about animals, what do you think of? Does a bear or a lizard come to mind? Did you know that out of all the animals on earth, HALF are insects? Insects not only pollinate the plants that we eat, they help prevent disease, keep pests from harming plants, and help solve murders! They are diverse wildlife that can be found all around you, if only you stop and look.

Directions: Look for the following insects and signs of insects. When you find one of them, create your own scientific illustration of the insect or a good quality picture. To get more detail, you may want to use a magnifying glass. As researchers do, identify what habitat you found the insect in. Was it a wetland, forest, open field?
Bonus: Challenge yourself by trying to find all the insect Orders included in the next section.

- ☐ True bug example
- ☐ Insect defending itself
- ☐ Insects on a plant
- ☐ Insects under rock/log
- ☐ Signs of insects (insect evidence)
- ☐ Insect relatives: Pillbug vs ant
- ☐ Pollination
- ☐ Predation

Introduction

Naming and identifying insects

There are millions of species of insects! How do we tell them apart? Well, the first thing to do is to identify their **Order**.

"Taxonomy" is a scientific term used to describe how organisms are classified. This classification, or **taxonomic**, system helps both professional and amateur scientists communicate with each other and quickly understand the evolutionary relationships between organisms. Insects are found in the Phylum **Arthropoda**, along with spiders, millipedes and even crabs and shrimp, all of which have exoskeletons and segmented bodies! Insects are more closely related to each other than they are to shrimp or spiders, so insects are in their own Class, **Insecta.** Within **Insecta,** insects can be split into different **Orders**, like Lepidoptera (moths), Hymenoptera (bees and wasps), Diptera (flies), Orthoptera (grasshoppers, crickets and katydids) etc. Scientists currently recognize ~28 Orders of insects, although as we learn more about genetics and discover new species, this number changes. Each Order is divided into **Families,** and further into **Genera** and **Species**. The scientific name of an organism includes both its genus and species.

Taxonomic categories

Tip: an easy way of remembering the order of classification is to say this line:

King Phillip Came Over For Good Spaghetti !

Kingdom

Phylum

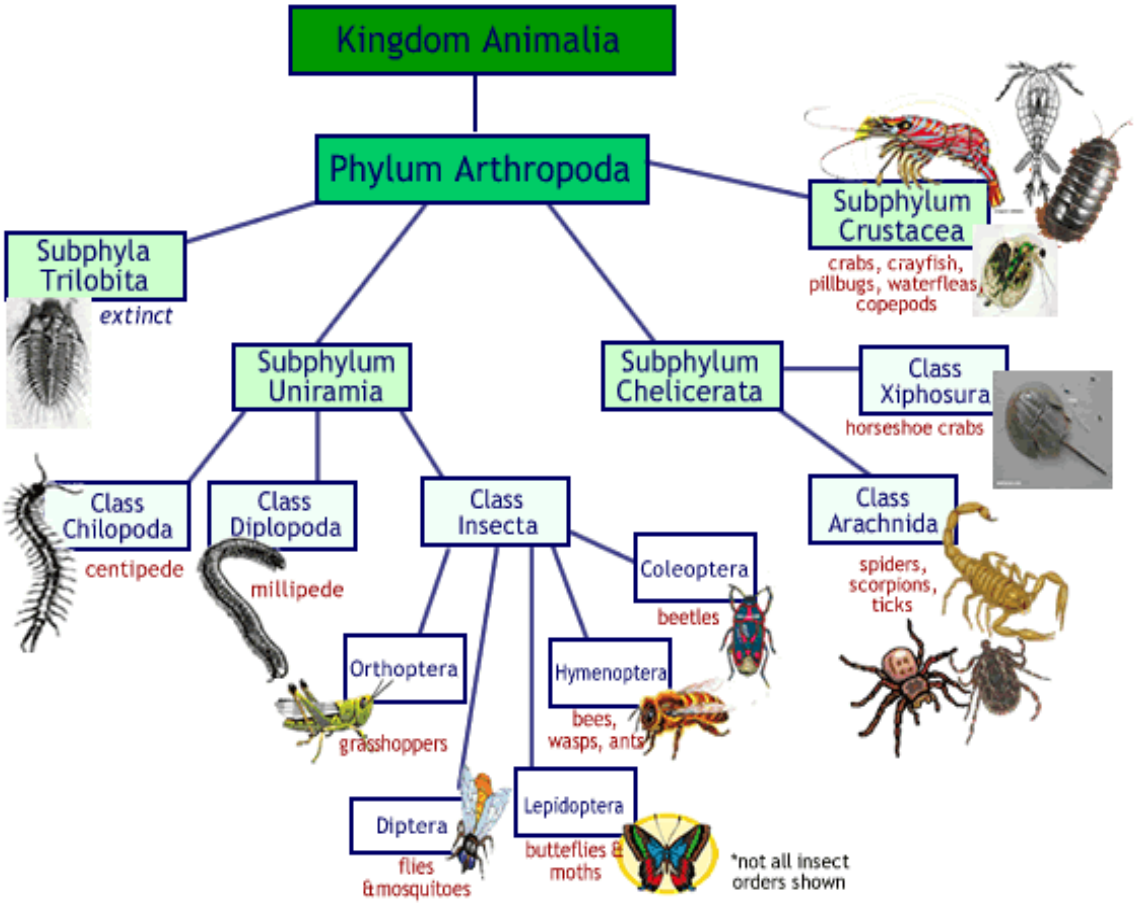
Class

Order

Family

Genus

Species



Common Orders you may find

Coleoptera: Beetles are a type of insect that have especially hardened outer wings also called elytra (*el-i-truh*). Some examples of beetles are ladybugs, click beetles, ground beetles.

Tiger Beetle by Unknown Author is licensed under CC BY-SA

Japanese Beetle by Unknown Author is licensed under CC BY-SA-NC

Black Blister Beetle by Unknown Author is licensed under CC BY-SA-NC

Diptera: Flies are an insect that have one pair of wings. They also have two small organs called halteres on either side that vibrate as they fly to help them stabilize themselves. Some examples of Dipterans are house flies, mosquitos, crane flies.

Cranefly by Unknown Author is licensed under CC BY-SA

Robber fly by Unknown Author is licensed under CC BY-SA

Mosquito by Unknown Author is licensed under CC BY-SA

Hymenoptera: This order includes bees, wasps, and ants. They can have four transparent wings and normally a very thin waist to separate the abdomen and the thorax.

Wasp by Unknown Author is licensed under CC BY-SA

Carpenter Bee by Unknown Author is licensed under CC BY-SA

Ant by Unknown Author is licensed under CC BY-SA

Hemiptera: True Bugs can be identified by their beak-like mouth parts that resemble a straw. The word “Hemiptera” means “half-wing”, referring to how many true bugs have a forewing that starts off harder and then becomes soft towards the bottom of the wings. Some examples of hemipterans include cicadas, leaf hoppers, and stink bugs.

Red-Banded Leafhopper by Unknown Author is licensed under CC BY-SA

Brown Marmorated Stink Bug by Unknown Author is licensed under CC BY-SA

Cicada by Unknown Author is licensed under CC BY-SA-NC

Lepidoptera: This Order includes butterflies and moths. They can be identified by the scales that cover their bodies and wings, which gives them dynamic coloring and patterns. The difference between moths and butterflies is that butterflies are often brightly colored, day flying, and hold their wings upright when resting. Moths are often, though not always, dull in color and hold their wings at their sides when at rest.

Luna Moth by Unknown Author is licensed under CC BY-SA

Monarch Butterfly by Unknown Author is licensed under CC BY-SA

Snowberry Clearwing Moth by Unknown Author is licensed under CC BY-SA

Orthoptera: You can identify orthopterans by their large hind legs that they use for jumping. Grasshoppers, katydids, and crickets are the most recognizable members of this order. They can have fully developed wings or short wings. They can often be seen jumping out of your way in the grass or calling in the evenings.

House Cricket Unknown Author is licensed under CC BY-SA

Mantodea: This is the order of mantids. They can be identified by their triangular heads, large, spiked forelegs they use to catch prey, and a long slender body. They lay their eggs in a hardened casing called and ootheca which can be seen in shrubs or trees.

Chinese Mantis by Unknown Author is licensed under CC BY

Carolina Mantis by Unknown Author is licensed under CC BY-SA

European Mantis by Unknown Author is licensed under CC BY-SA

Note: Spiders are in a different class called Arachnida and their order is Araneae

Scavenger Hunt

1. Find a true bug (Hemiptera)

Did you know that bugs are actually an Order of insect? Good examples of bugs are stink bugs, bed bugs, cicadas, aphids, and leafhoppers. Now that you have some examples of this Order**, find and draw or photograph a member of the order Hemiptera**. Flip it over. What do you observe about their mouthparts? _____

_____

2. Insect defenses

Moth Mimicking a Stick by Lauren Cheshire

Like all animals, insects must hide or defend themselves from predators like birds, rodents, and other insects. They do this by hiding, running away, fighting back, or advertising that they are poisonous. See if you can find an insect that is either 1) blending in with its background, like a katydid that looks like a leaf, 2) using physical defenses, like a caterpillar with protective hairs, or 3) advertising to predators that it is toxic by using bright red, yellow, and orange colors, like monarch butterflies advertising they are full of toxic cardenolides from milkweed.

Find and draw or photograph an insect protecting itself. What adaptations does it have to help it protect itself? _____

_____

_____

3. Insects and plants

Aphids on plant stem by Lauren Cheshire

Insects and plants often share a close relationship. Insects can eat plants (herbivores), help plants reproduce (pollinators), protect plants from herbivores (predators), and live in plants for protection.

Select a plant and illustrate below or photograph what insects are using the leaves or pollinating the flowers. Be sure to study all parts of the plant from the ground to the tips of leaves and draw all insects you see. If you can, name the orders of the insects you found

4. Insects under rocks and logs

Let's do a little field observation! Find a rock or log in your yard or somewhere nearby and flip it over. **Draw or take a picture of everything you see.**

Insects use the shelter and increased humidity under objects for protection and to build homes. It's also a great place to find dead material that some insects eat. Many insects are decomposers, meaning they eat dead and decaying plants and animals. Without insects, we would be buried under dead stuff!

Are there ants carrying eggs? Are there tunnels worms have made in the dirt? Be sure to be as detailed as possible in capturing everything you see. If you draw it, label everything you find in the space below. If you take a picture, write a description.

5. Signs of Insects

Insects may not always be seen but, the evidence of their activities can be found all around. Many insects eat plants, some leave holes in plants, while others may damage the inside of the leaves causing discolored lines. Some insects or mites can cause galls. Insects stimulate plants to make galls that can house and feed the insects – good for the insects, not so good for the plants! Galls can look like warts, bumps, and balls often seen on the leaves of trees.

Here are some examples of insects in action- **find an example of your own and draw it below**

Willow Leaf Gall by Unknown Author is licensed under CC BY

Leafminer Damage by Unknown Author is licensed under CC BY-SA

Japanese Beetle Damage by Unknown Author is licensed under CC BY

6. Insects and their relatives

Pill bugs, also known as Roly Pollies, are not actually a bug or insect at all. Pill bugs are in the phylum Arthropoda but are in a different class than insects. Arthropoda comprises organisms that are invertebrates (no backbone), have a segmented body, and an exoskeleton. Find a pillbug and compare it to the ant below. What are some similarities and differences you see? Draw a pillbug or an ant below and circle body parts that you notice are different.

7. Pollination

Pollination happens when pollen reaches the pistil of a flower so that the plant can produce seeds. Some plants can self-pollinate, while others need to cross-pollinate. Cross pollination increases the genetic diversity of plant populations and can help make the species evolve more quickly and be more robust to stress. Pollinating insects carry pollen from one flower to another. In exchange, plants will produce nectar filled with sugar to fuel insect pollination.

Insect pollination is a type of mutualism, a symbiosis in which both organisms benefit from the interaction. Other types of symbiosis include commensalism (when one organism benefits, and the other is neither harmed nor benefits) and parasitism (one organism benefits, the other is harmed).

Find an example pollination and document it. Look for pollen grains on the legs or body of the insect at a flower.

8. Predation

Predation is when one organism kills and consumes another for food. **Find an example of an arthropod predator and draw it below**. What adaptations do you observe that may make them better at catching prey? (Ex. Dragonflies have large eyes to seek out prey, spiders spin a web)

Orb weaver wrapping a Japanese beetle by Elizabeth Rowen

Turning-in the scavenger hunt

To turn in your child's scavenger hunt, please send us a picture of the front page with all the insects checked off.

Send to:

elizabeth.rowen@mail.wvu.edu

or mail to

Elizabeth Rowen
3313 Agricultural Sciences Building
Morgantown WV, 26501

If you would like to receive a sticker and coloring book as a reward for completing the hunt, include your name and address.

We'd also love any pictures of you completing the scavenger hunt to feature on the insect zoo website! We will send you a **media release** form for your photos.

For Teachers

The objective of this scavenger hunt is to increase observation and critical thinking skills of students about the natural world. It aims to primarily fulfill the 3 dimensions of Next Generation Science Standards including the Scientific Practice (2) "developing and using models", the Crosscutting Concept (6) "structure and function", and the Life Science Core Idea of (LS1) "structures and processes".

The WVU insect zoo

The WVU Insect Zoo opened in 2007 at WVU. The Zoo is part of the WVU Entomology under the Division of Plant and Soil Science, Davis College of Agriculture, Natural Resources, and Design. It is located in the Agricultural Sciences Building in the Evansdale campus of WVU.