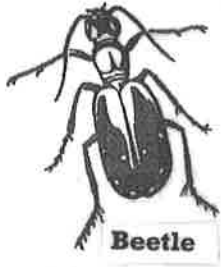


Name _____

Period _____

Due date _____



ARTHROPOD ID Project

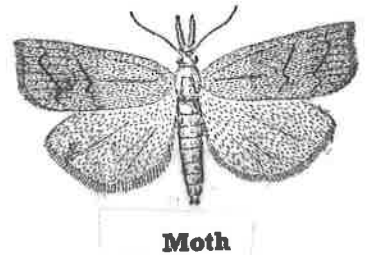
WHAT IS AN ARTHROPOD? Arthropods are animals with (1) A segmented body, (2) Jointed legs or limbs, and (3) An exoskeleton

The 3 major groups of arthropods are:

CRUSTACEANS (lobsters, crayfish, shrimp, crabs, sowbugs)

INSECTS (butterflies, moths, bees, beetles, grasshoppers, mosquitoes)

ARACHNIDS (spiders, daddy-longlegs, ticks, mites, scorpions)



In this project, you will go into the field to find 5 local arthropods (3 insects, 1 arachnid, 1 crustacean), and record your findings. You will also learn about the basic body plan of arthropods.

PART 1: IN THE FIELD

DIRECTIONS: Your team will work together to catch & release 5 arthropod species. You will need a butterfly net, white sheet, and this project form.

Each team member should select one job:

- HUNTER – Gently sweep the butterfly net over the field. Tap the specimens collected onto the white sheet
- RESEARCHER – Use the pages in the project “TYPES OF INSECTS” and “TYPES OF ARACHNIDS” to quickly identify each organism (before it crawls or flies away)
- WRITER – Write down the type of organism discovered by the Researcher in the table in the project form. Also write a brief description of the arthropod and sketch its picture.
- HELPER – Assist the other 3 team members as needed



Sowbug











Complete the following table using your field observations & the attached pages. You may also use the reference books in the classroom to help you.

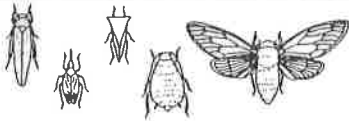
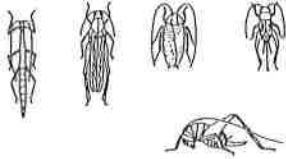
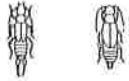





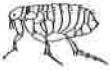
ARTHROPOD	TYPE of Organism (Ex. Moth, Ant)	GROUP # (From "Types of Insects")	DESCRIPTION (Size, color, characteristics)	SKETCH of Organism (Draw a Picture)
INSECT				
INSECT				
INSECT				
ARACHNID		N/A		
CRUSTACEAN	Pillbug* or Sowbug	N/A		

* The only local CRUSTACEANS are PILLBUGS and SOWBUGS. Look for one somewhere dark and moist like under a rock or log. When you see one, GENTLY touch it. If it rolls up, it's a PILLBUG. If it doesn't roll up, it's a SOWBUG.

Which did you find? (circle one) PILLBUG SOWBUG

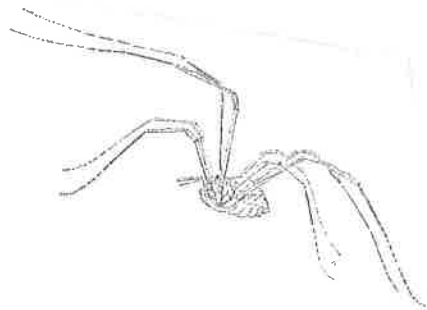
Types of Insects

<p>1</p> 	<p>Most of these insects have large, usually transparent wings that are conspicuous when folded.</p> <p>(1) Dragonflies and Damselflies, p. 20. Long, slender body. Two pairs of wings, almost equal in length. Dark mark (white in some dark-winged species) near the tip of each wing. Antennae very short, bristle-like. Wings do not cover body at rest. Nymphs never have long, hairlike "tails." Compare with groups 2, 4, and 6.</p>
<p>2</p> 	<p>(2) Mayflies, p. 17. Two pairs of wings (rarely one pair). Hind wings much shorter than forewings. Wings held vertically over the back at rest. Adults and nymphs have 3 (rarely 2) long, hairlike "tails" extending from the tip of the abdomen. Antennae very short and bristle-like. Compare with female ichneumon wasps (p. 111), and with groups 1 and 3.</p>
<p>3</p> 	<p>(3) Stoneflies, p. 32. Adults and nymphs have 2 pairs of "tails" extending from the tip of the abdomen. Adults have 2 pairs of wings that fold flat over the body and extend past the tip of the abdomen. Compare adults with group 4, nymphs with groups 1 and 2.</p>
<p>4</p> 	<p>(4) Dobsonflies, Lacewings, and Antlions, p. 52. Adults have a long, slender body and more or less transparent wings, held like a tent over the body when at rest. Antennae never short and bristle-like as in group 1. Never have "tails" like stoneflies (3). Lack hairy wings of caddisflies (7).</p>
<p>5</p> 	<p>(5) Flies, p. 94. One pair of wings. Short, bristle-like antennae and soft body. Many flies mimic bees and wasps (6), but these have 2 pairs of wings, longer antennae, and hard bodies.</p>
<p>6</p> 	<p>(6) Wasps, Ants, and Bees, p. 107. Two pairs of transparent wings. Usually a dark mark on the front edge of each forewing. Conspicuous antennae. Except for sawflies and horntails (p. 110), all are "wasp-waisted." Compare with flies (5) and flying termites (16).</p>
<p>7</p> 	<p>(7) Caddisflies, p. 73. Adults are small to medium-sized and dull colored, with long, threadlike antennae and hairy wings held like a tent over the body when at rest. Most larvae live in "houses" made of sticks, pebbles, and other materials. Compare with groups 1 through 4, and 8.</p>
<p>8</p> 	<p>(8) Butterflies and Moths, p. 75. Two pairs of wings, usually covered with fine, powdery scales. Sucking mouth parts long and coiled. Antennae often knobbed or plume-like. Day-flying sphinx moths (p. 84) may be mistaken for bumblebees or hummingbirds. Compare with group 7.</p>
<p>9</p> 	<p>Most of these insects are wingless or conceal their wings when at rest.</p> <p>(9) Beetles, p. 56. Wing covers meet in a straight line down the back. Wing covers have a distinctive texture over the entire surface; the texture varies among species. Chewing mouth parts. Compare with bugs (10) and group 12.</p>
<p>10</p> 	<p>(10) Bugs, p. 36. Forewings lie across each other at rest, forming a triangular back panel and a criss-cross pattern. Texture of back is divided into solid section at front and membranous section at rear. Sucking mouth parts in a beak that folds under the body. Usually fairly long antennae. Compare with beetles (9) and hoppers (p. 48).</p>

<p>11</p> 	<p>(11) Cicadas, Hoppers, Aphids, and Scale Insects, p. 46. Wings (when present) stand like a tent when at rest. Usually short, fine antennae. Some species hop. Female scale insects may look like a fungus. Compare with beetles (9), bugs (10), and group 12.</p>
<p>12</p> 	<p>(12) Grasshoppers, Crickets, Mantids, Walkingsticks, and Cockroaches, p. 23. Grasshoppers and crickets have large hind legs, bent with the "knee" held above the back. Antennae moderately to very long. Chewing mouth parts. Claspers or other "tails" at tip of abdomen. Never aquatic. Walkingsticks look like twigs; they have long antennae and short "tails." Crickets and cockroaches resemble some beetles, but wings are membranous and do not meet along center line down back. Mantids are usually seen in a characteristic pose, with their front legs held as if they were praying. Compare with beetles (9), bugs (10), and group 11.</p>
<p>13</p> 	<p>(13) Earwigs, p. 34. Large, clasping appendages at the tip of the abdomen. Certain rove beetles (p. 62) and roaches (p. 29) are similar, but lack claspers.</p>
<p>14</p> 	<p>(14) Bristletails, p. 16. Wingless, with long antennae and 3 long "tails" at the tip of the abdomen. Never aquatic. Compare with mayflies (2).</p>
<p>15</p> 	<p>(15) Springtails, p. 16. Tiny and wingless, with prominent antennae. Forked structure on underside of abdomen allows them to spring into the air.</p>
<p>16</p> 	<p>(16) Termites, p. 30. Soft-bodied. Usually pale-colored. Antennae short and straight, threadlike, or beadlike. Flying forms have 2 pairs of wings of equal length, often very long. Never "wasp-waisted." Rarely expose themselves to light. Compare with group 6.</p>
<p>17</p> 	<p>(17) Thrips, p. 36. Tiny, with a long, slender body. Usually 2 pairs of wings, fringed with long hairs. Compare with lice (18) and fleas (19).</p>
<p>18</p> 	<p>(18) Lice, p. 34. Tiny, usually with a rounded abdomen. Often with hooked forelegs. Compare with thrips (17) and fleas (19).</p>
<p>19</p> 	<p>(19) Fleas, p. 106. Very small and wingless, with hard, spiny bodies flattened side to side. Dark-colored. Can jump many times their length. Suck blood. Compare with thrips (17) and lice (18).</p>

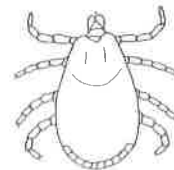
Types of Arachnids

Spiders

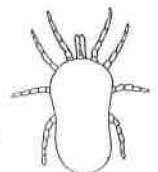


Daddy Longlegs, Harvestman

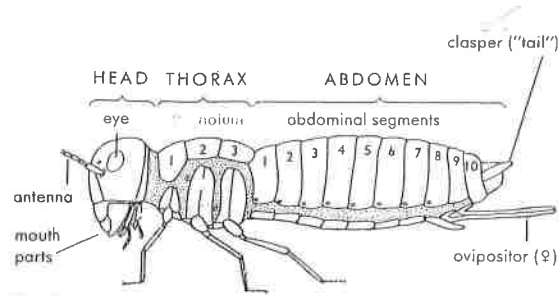
MITE



TICK



PART 2: PARTS OF INSECTS



Label the Insect

Read the definitions, then label the diagram below.

Abdomen - The abdomen is the segmented tail area of an insect that contains the heart, Malpighian tubules, reproductive organs, and most of the digestive system.

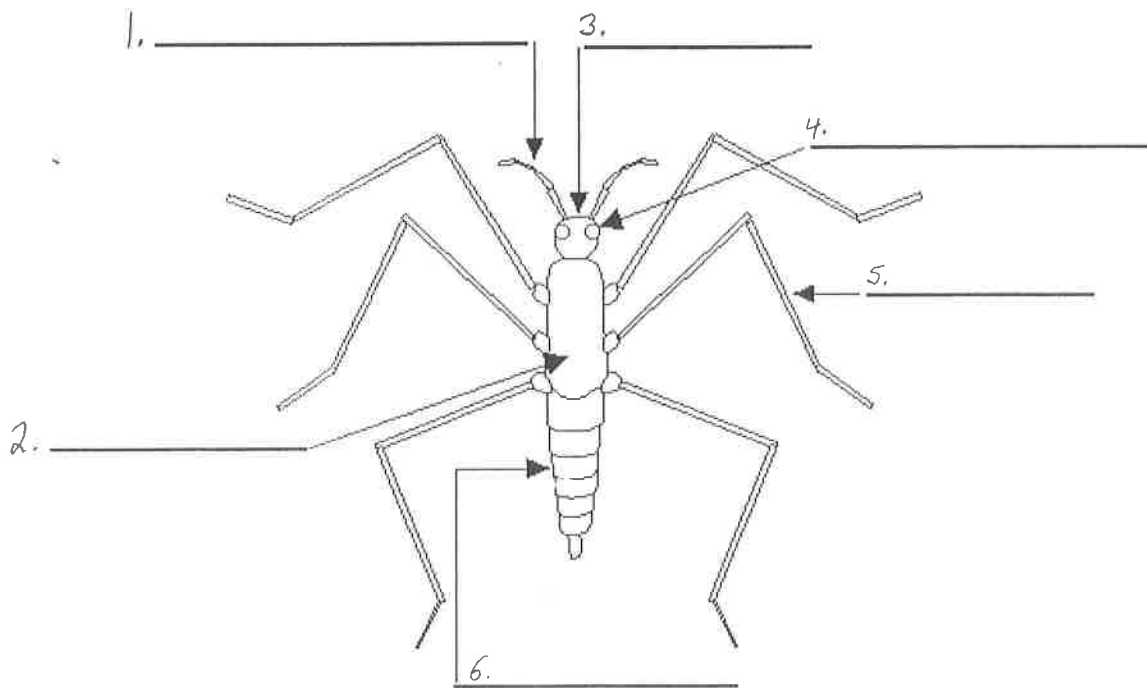
Antenna - An antenna is a sensory appendage that is attached to the head of adult insects. Antennae are used for the sense of smell and balance. Insects have two antennae.

Compound Eye - Insect compound eyes are made up of many hexagonal lenses.

Head - The head is the part of the insect that contains the brain, two compound eyes, the proboscis, and the pharynx (the start of the digestive system). The two antennae are attached to the head.

Leg - All adult insects have six legs.

Thorax - The thorax is the body section between the head and the abdomen. The legs attach to the thorax.



7. Name the 3 major body parts of insects: _____

8. Which of these body parts do the wings & legs attach to? _____

9. How many legs do all adult insects have? _____

10. The insect's skeleton is on its: (circle one) INSIDE OUTSIDE

PART 3: PARTS OF ARACHNIDS

Label the External Spider Anatomy Diagram

Read the definitions, then label the external spider anatomy diagram below.

abdomen - the belly, also called the opisthosoma. It contains the guts, heart, reproductive organs, and silk glands.

cephalothorax - the fused head and thorax, also called the prosoma. It contains the brain, jaws, eyes, stomach, and leg attachments.

eyes - tiny eyes (also called ocelli) that can only detect light and dark - they are located on top of the spider's cephalothorax. Most species of spiders have 8 eyes, but other species have 12, 6, 4, 2 or no eyes.

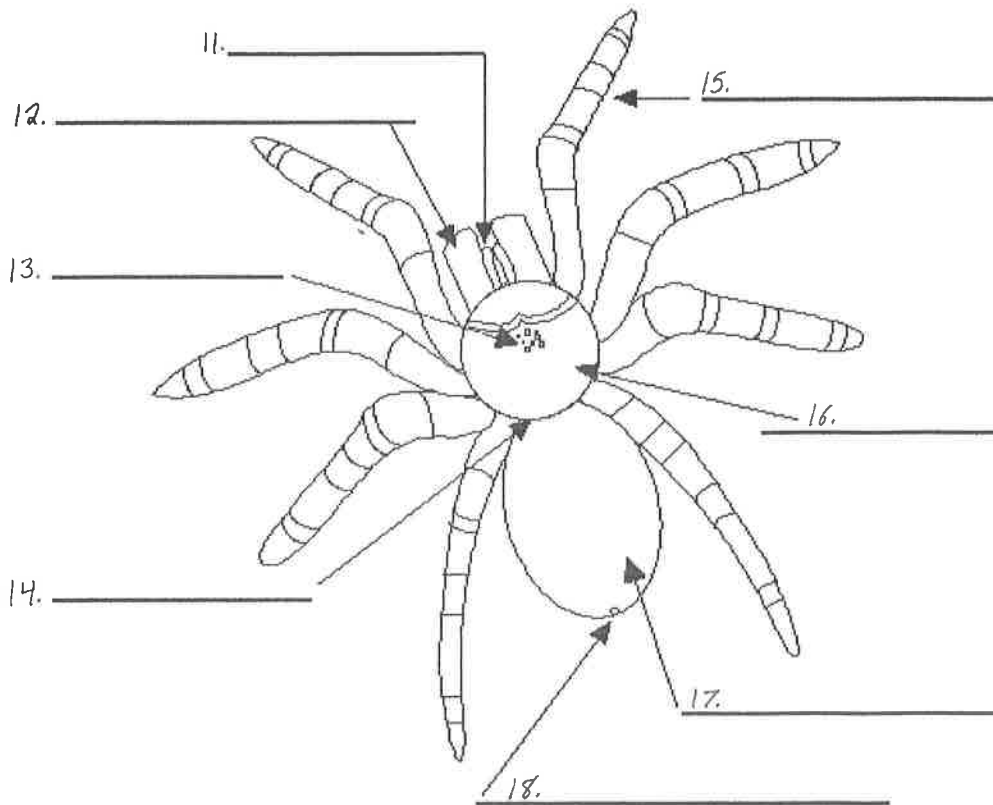
jaws - also called chelicera, they are located below the eyes. The jaws are tipped with fangs that can inject poison.

leg - spiders have 8 legs. Each leg is made of seven segments and has 2 or 3 tiny claws at the tip. If a leg is lost, it will grow back.

pedicel - the spider's waist - it connects the cephalothorax and the abdomen.

pedipalps - also called palps, these two sensory feelers look like very short legs attached to the front of the spider - they taste food.

spinnerets - where the spider's silk is released - they are located at the tip of the abdomen.



19. How many legs do spiders have? _____

_____ 20. What 2 body parts are fused together to form the "cephalothorax?"

- A. Legs and arms
- B. Abdomen and eyes

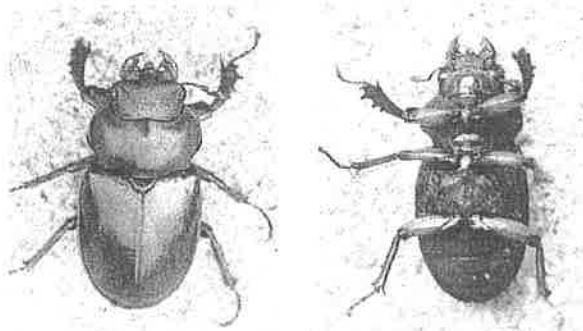
- C. Antennae and fangs
- D. Head and thorax

PART 4: READING & QUESTIONS

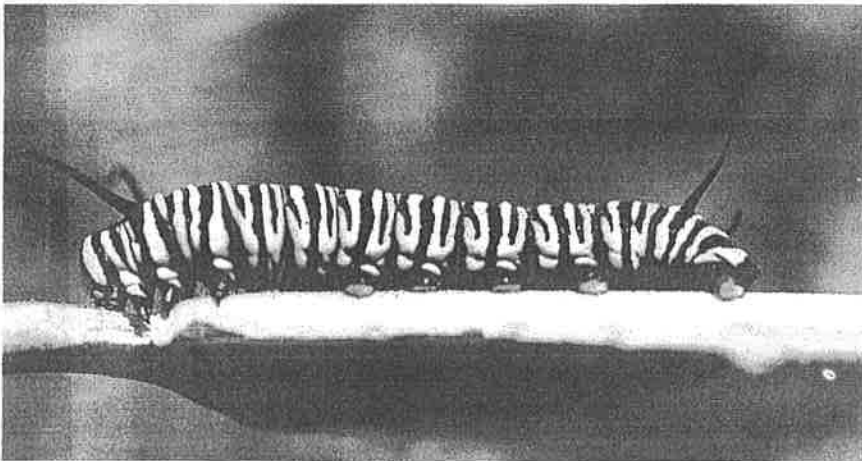
The basic body plan

All insects have **segmented bodies** made up of many small sections.

Insects have three major body divisions, the **head, thorax, and abdomen**. Mouthparts, eyes, and antennae are found on the head, while legs and wings grow from the thorax. In some insects these body divisions are easy to see. In others they are not so apparent.



The wings of this beetle cover its abdomen, but when you turn it over, segments are visible on its underside.

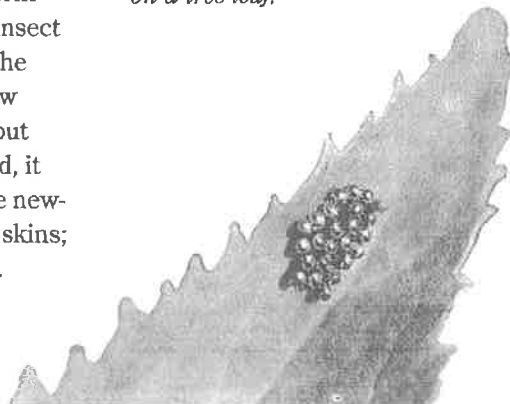


Segments are easy to see on the body of this monarch caterpillar. Can you distinguish this caterpillar's jointed legs from other appendages?

All insects have **exoskeletons**, or hard skins on the outside of their bodies. The exoskeleton gives an insect shape, gives muscles a place to attach to, protects internal organs, and keeps moist internal structures from drying out. An insect's exoskeleton does not grow. As the rest of the insect's body grows, a new skin begins to form under the old one. When the insect **molts**, the old skin splits and the insect crawls out. The soft, new exoskeleton expands at first, but once it has dried and hardened, it will not grow any larger. Some newly molted insects eat their old skins; others just leave them behind.

All insects have three pairs of **jointed legs**. Many insects have other leg-like structures projecting from their bodies as well, so simply counting what look like legs may not be enough to separate insects from other, similar looking, animals.

These stink bug eggs were found on a tree leaf.



An Insect Checklist

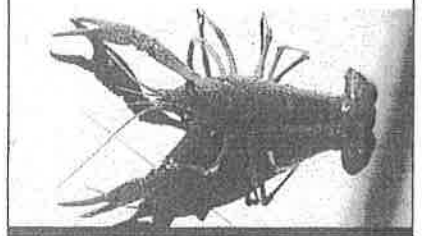
- ✓ segmented bodies
- ✓ exoskeletons
- ✓ three pairs of jointed legs
- ✓ eggs

If you find an animal and you can only check off one or two of these characteristics, it is probably not an insect.

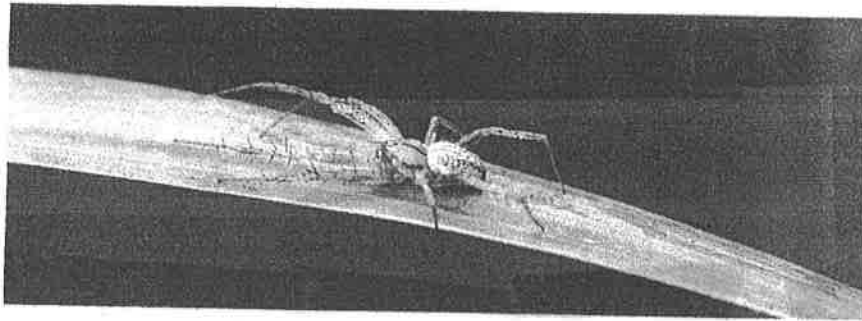


This earthworm has a segmented body like insects do, but no legs or exoskeleton. It is an annelid, not an insect.

This crayfish has an exoskeleton like insects do, but it has more than six jointed legs. It is a **crustacean**, not an insect.



All insects develop from eggs. In a few cases, the eggs develop inside the female's body, and she gives birth to live young. Most insects, however, lay their eggs in soil or water, on plants, or even on other insects.

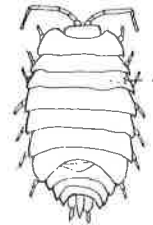


**Confusing relatives:
Why a spider is not
an insect**

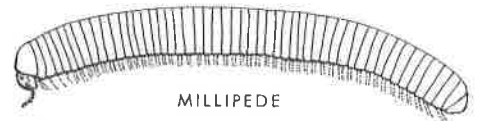
Insects belong to the phylum **Arthropoda**. In addition to insects, this group contains spiders, lobsters, and many other animals that are similar in some ways to insects. Many are often confused with insects.

Spiders and ticks are found in many of the same places as insects, and like insects they have jointed legs and bodies that are divided into parts. But if you look closely you will see that spiders have eight jointed legs instead of six, and only two major body parts. Adult ticks have one body part and eight legs. Both belong to the class **Arachnoidea**.

Pillbugs and sowbugs have segmented bodies, but more than three pairs of legs. They are isopods, and belong to the class **Crustacea**, as do crabs and lobsters.

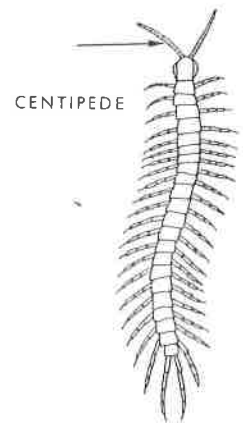


SOWBUG



MILLIPEDE

Centipedes and millipedes have segmented bodies and jointed legs. Though they don't actually have hundreds or millions of legs, they do have more than the insect's six. They lack the three body divisions characteristic of insects. Centipedes are in the class **Chilopoda**, and millipedes belong to the **Diplopoda**.

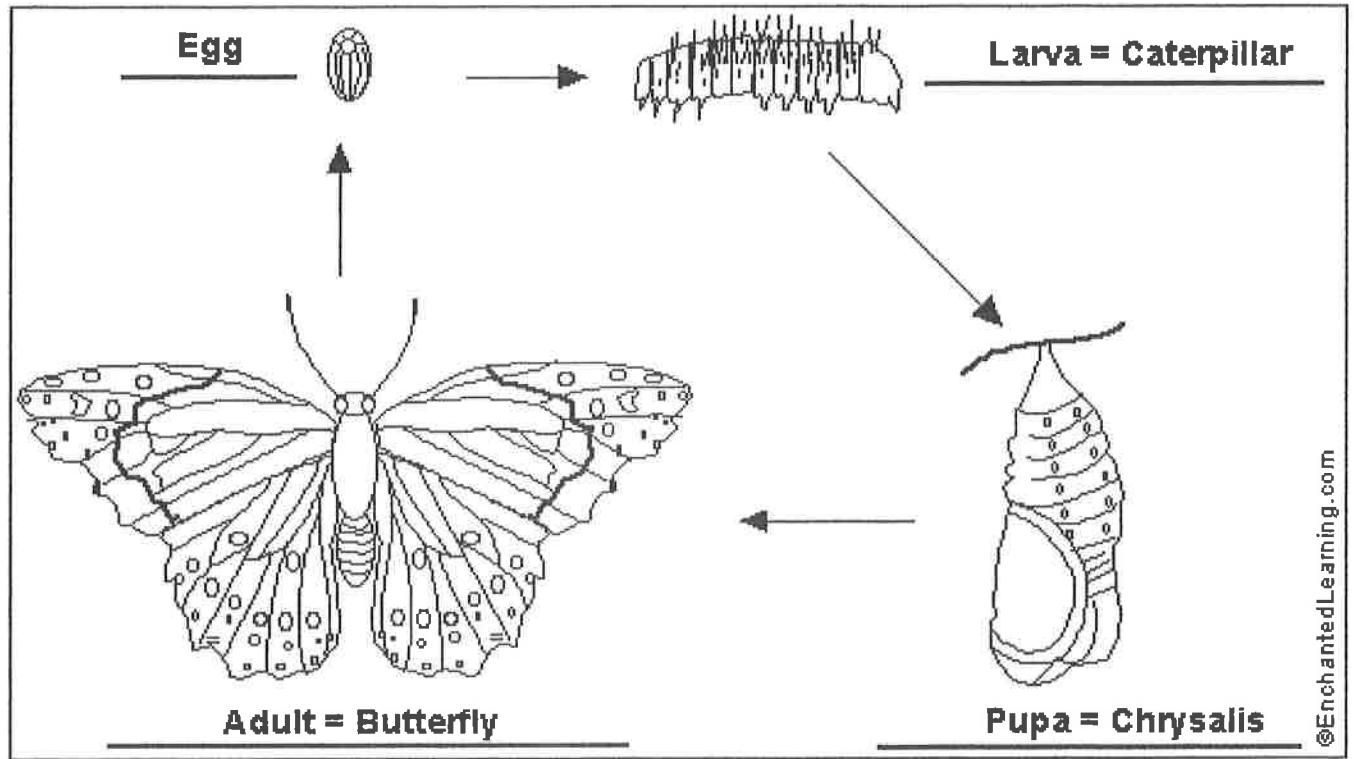


CENTIPEDE

SUMMARY QUESTIONS:

21. How many legs do insects have? (circle one) 6 8 more than 8
22. How many legs do arachnids have? 6 8 more than 8
23. How many legs do centipedes & millipedes have? 6 8 more than 8
24. Why are annelids, like earthworms, not arthropods? Because they have no _____ or _____
25. What happens when an insect "molts?" _____
- _____
26. What surprised or impressed you most about the ARTHROPOD ID PROJECT?
- _____

PART 5: COLOR THE BUTTERFLY



The diagram above shows the the stages of metamorphosis of a butterfly. Color the diagram according to the following key: (You may use crayons or colored pencils.)

<u>EARLY STAGES</u>		<u>ADULT BUTTERFLY</u>			
Egg	=	BLUE	Abdomen	=	GREY
Larva	=	GREEN	Antennae	=	BROWN
Pupa	=	PURPLE	Eyes	=	BLACK
			Head	=	RED
			Thorax	=	YELLOW
			Wings	=	ORANGE

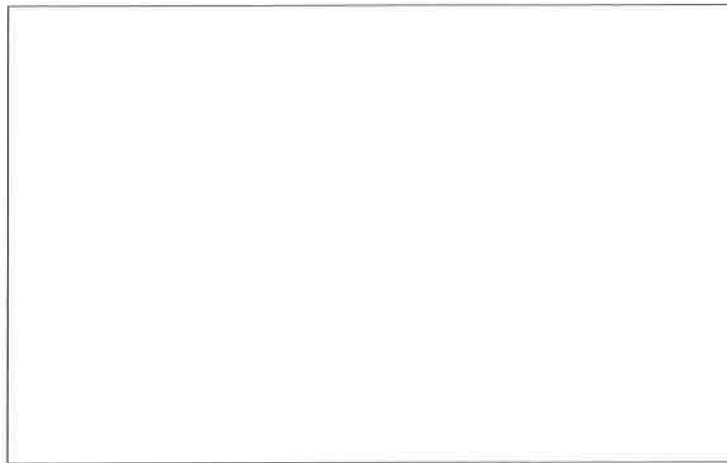
PART 6: FIELD GUIDES

A. Kaufman Field Guide to Insects of North America

Page 7 1st Paragraph Finish-the-statement:

If variety is indeed the _____ of life, then insects are the _____ creatures on earth.

Page 10 Draw the SAWFLY and label: ABDOMEN FOREWING HINDWING
ANTENNA HEAD THORAX



Page 22 Fill-in-the-blanks

SPIDERS (order Araneae) are not _____; they belong to a separate class, the _____. Spiders have _____ body regions (insects have _____), eight _____ (insects have _____), and _____ (insects have _____). Spiders lack antennae and _____. Most spiders have eight _____. All spiders are _____, but the vast majority are _____ to humans.

Page 26 Read the information on CENTIPEDES and MILLIPEDES, then classify each statement as

CENTIPEDE (C) or MILLIPEDE (M):

- | | |
|-------------------------------------|------------------------------------|
| _____ Slow-moving | _____ Fast-moving |
| _____ Feed on decaying vegetation | _____ Have "fangs" with venom |
| _____ Two pairs of legs per segment | _____ One pair of legs per segment |

TRUE or FALSE: The HOUSE CENTIPEDE is harmless to humans _____

B. National Audubon Society – Field Guide to Insects & Spiders

Page 11 INTRODUCTION: Fill-in-the-blanks

Insects are found _____ - from the tropics to the tundra, in water, in _____, plants, _____, and even inside the bodies of _____ animals. Over a _____ different species have been identified, more than all other animals _____.

Nearly _____ species live in North America.

Many insects are _____, pollinating flowers, fertilizing the soil, and providing such commercially valuable products such as _____, beeswax, and silk.

Others are _____ that cause considerable _____ to crops and trees.

Observing insects as they go about their daily _____ can be as _____ as watching birds.

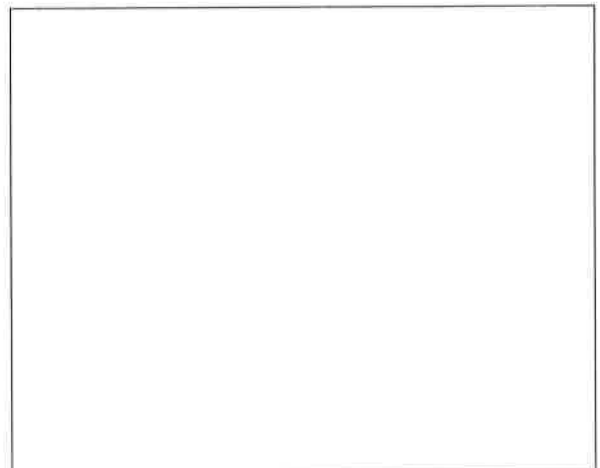
(1) HARMFUL INSECTS

APHIDS

Read Page 504 "Rose, Pea, and Potato Aphids"

PLATE 63- Sketch the picture of the aphid giving birth and a few babies

- _____ 1. Aphids are shaped like
- A. Apples B. Pears C. Zucchini
- _____ 2. The food preference of aphids is
- A. Plant juices B. Plant stored starch
- _____ 3. In autumn, eggs are laid on
- A. Woody stems B. Herbaceous stems



WHITEFLIES

Read Page 501 "Greenhouse Whitefly"

1. Fill-in-the-blanks:

1/16" (1-2 mm). Body _____, resembling white _____. Wings _____, unspotted. Nymph is oval, flat, almost transparent whitish green with white waxy _____ underneath.

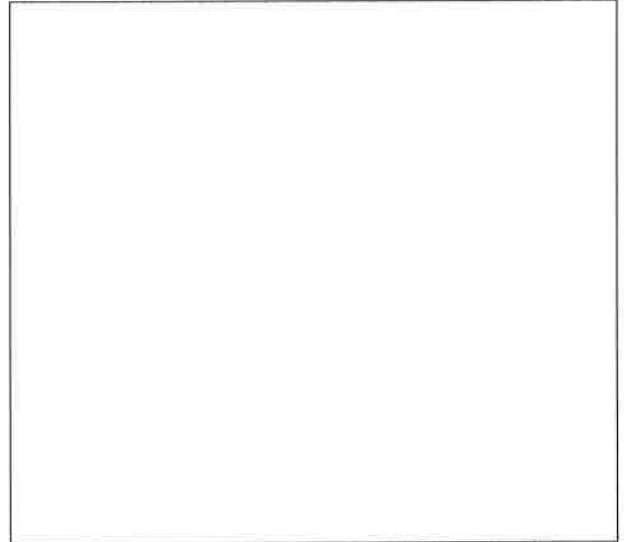
_____ 2. The food preference of whiteflies is

- A. Plant juice B. Plant stored starch

_____ 3. A clear sign you have a whitefly infestation in your greenhouse is

- A. Foliage turns red and falls off
B. Foliage has large holes in it
C. Foliage is covered in white specks

PLATE 58 – Sketch the picture of whiteflies and their nymph



WEEVILS

Read Page 614 "Black Oak Acorn Weevil"

_____ 1. The habitat of this weevil is

- A. Tropical forests B. Deciduous forests

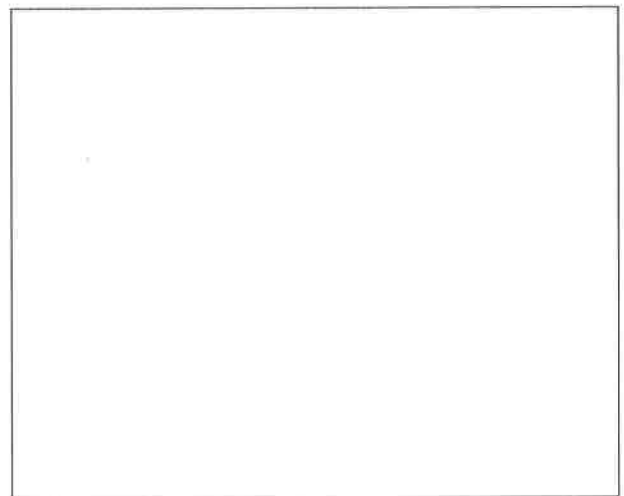
_____ 2. The food preference of this weevil is

- A. Tomatoes B. Grasses C. Acorns

_____ 3. How does the female put her eggs inside the acorn?

- A. She bores a small hole in it
B. She crushes the covering of the acorn

PLATE 134 – Sketch the picture of the Black Oak Acorn Weevil



(2) HELPFUL INSECTS

LADYBUG BEETLES

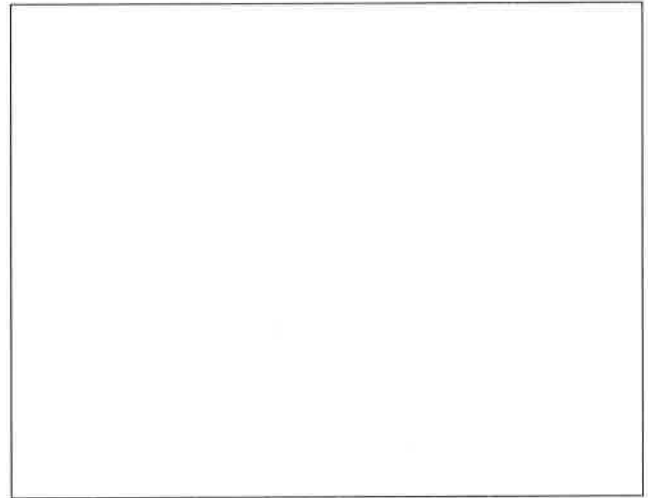
Read Page 579 "LADYBUG BEETLES"

PLATE 148 – Sketch the picture of
the Convergent Ladybug Beetle

1. Fill-in-the-blanks:

Ladybugs are among the most familiar
_____, easily recognized by their
round, often _____ bodies...

Both adults and larvae are
_____, mostly of _____.



PRAYING MANTIS

Read Page 397 "Praying Mantis"

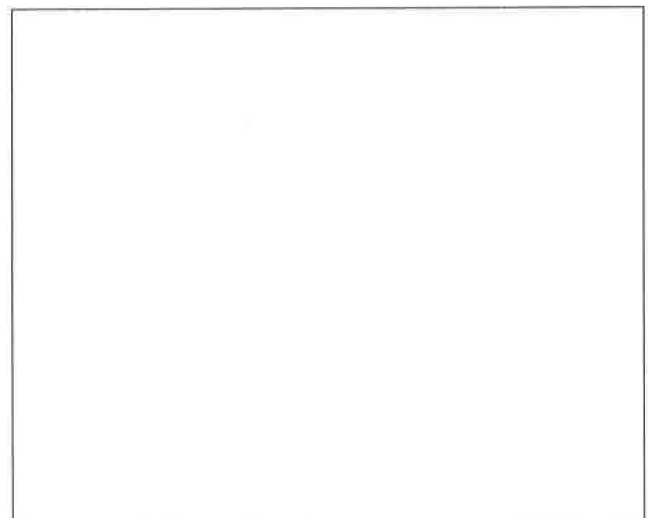
PLATE 300 – Sketch the picture of the
Praying Mantis

_____ 1. What color are praying mantises?

A. Orange to red B. Green to tan

_____ 2. The habitat of the praying mantis is

A. Meadows, on foliage and flowers
B. Forests, on twigs and branches



LACEWINGS

Read Page 528 "GREEN LACEWINGS"

PLATE 336 – Sketch the picture of the Green Lacewing

1. Fill-in-the-blanks:

Green lacewings are _____ insects often seen in weeds and _____ or on the _____ of trees and shrubs... The flat larvae are sometimes called aphid _____ because they _____ on aphids and other soft-bodied _____.

