

Teacher's Guide

AG IN THE CLASSROOM—HELPING THE NEXT GENERATION UNDERSTAND THEIR CONNECTION TO AGRICULTURE

Resources

The Colorado State University Cooperative Extension Office is a great resource for information about Colorado pests and ways to control them. Check out two of their websites at:
<http://www.colostate.edu/Depts/CoopExt/4DMG/Pests> and
<http://www.colostate.edu/Depts/IPM/urban/hgins.html>

The Center for Disease Control (CDC) has an informative website about West Nile disease and how to prevent it at:
http://www.cdc.gov/ncidod/dvbid/westnile/prevention_info.htm#/

The City & County of Denver-Division of Animal Control has a website that discusses West Nile Virus and common Colorado pests at:
<http://www.denvergov.org/AnimalControl/424023template2jump.asp>

Other Reading:

What Lives Under the Carpet?
 by John Woodward
 published by Barrons Educational Series 2002
 For kids who are fascinated by bugs, the large and colorful books in this series describe insects, spiders, and an assortment of other creatures that all live somewhere nearby. Descriptions are accompanied by large color photos.

Insect Wars (First Books-Animals)
 by Sara VanDyck
 published by Franklin Watts, Inc. 1997
 The focus here is on beneficial insects and natural enemies of such crop-damaging pests as aphids, mites, caterpillars, beetles, etc. Clear, color photographs accompany the text on about every other page.

Comments, questions, suggestions and feedback about the Colorado Reader are welcome.
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Page 1

Hands-On Insect Activity...

Background: Students should understand that insects are all around them and are both helpful and harmful to the environment and to people.

Objectives: This activity will help students to become aware of the diversity and abundance of insects in the world as well as help them learn collecting skills. In addition, it will allow them to discover what foods insects prefer.

Materials: Containers (cups), Bait (Fruit, Bread, Meat, etc), Boards, Small rocks

Procedure:

1. Place students in groups of four or five and give each group a Styrofoam cup.
2. Have the students punch a few small holes in the bottom of the cup for water drainage.
3. Next, allow the students to dig a hole in the soil and set the cup into it with the top of the cup even with the soil surface.
4. Then have students choose from a selection of bait that they feel insects might eat. The bait should be placed in the bottom of the cup.
5. Place a few small rocks on either side of the cup and balance the board on top of them. This will create a lid for the trap but will still allow the insects to crawl under the board and fall into the trap.
6. The following day,









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Answer to Page 1 Classifying Game

Classifying Living Things

Many living things are alike in some way. Scientists put them into groups according to the ways they are alike. This is called classifying. For example, you can group things by whether they are a plant, animal or mineral. Animals can be grouped as insects, birds, fish or mammals. A mammal is a warm-blooded animal that has hair. In addition, female mammals nurse their young. People are classified as mammals.

On the line below each picture write the group or class each living thing belongs to. Your choices are: plant, insect, bird or mammal.

			
plant	insect	mammal	bird
			
mammal	insect	mammal	insect

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have students empty the contents of their cups into another container to count the number of insects and other organisms that they have collected.

7. Have students compare their insects with those of the other groups.

Assessment: Discuss with students the variety of insects that have been caught and what types seem to be attracted to what foods. Ask students to make drawings of each different type of insect that they have caught and compare them with the insects in the other groups.

from the Florida 4H Bug Club at <http://bugclub.ifas.ufl.edu/teachers.htm>

Answer to Page 2 Bad Guys/Good Guys Quiz

Add the insects found in the word bank to the list where they belong, either good or bad insects.

The Bad Guys or pest insects:

- | | |
|-----------------------|---------------------|
| carpenter ants | most flies |
| mosquitoes | black widow spiders |
| brown recluse spiders | boxelder bugs |
| cockroaches | earwigs |
| grasshoppers | leafcutter bees |
| miller moths | slugs |
| cutworms | termites |
| ticks | yellow jackets |
| <u>aphids</u> | <u>spider mites</u> |

The Good Guys or predator insects:

- | | |
|-----------------------|------------------------|
| butterflies | bees |
| bumble bees | daddy longlegs |
| <u>ladybugs</u> | <u>green lacewings</u> |
| <u>flower flies</u> | <u>stink bugs</u> |
| <u>ground beetles</u> | <u>hunting wasps</u> |
| <u>wolf spiders</u> | <u>crab spiders</u> |

W O R D B A N K

ladybugs, green lacewings, aphids, flower flies, stink bugs, ground beetles, hunting wasps, wolf spiders, crab spiders, spider mites

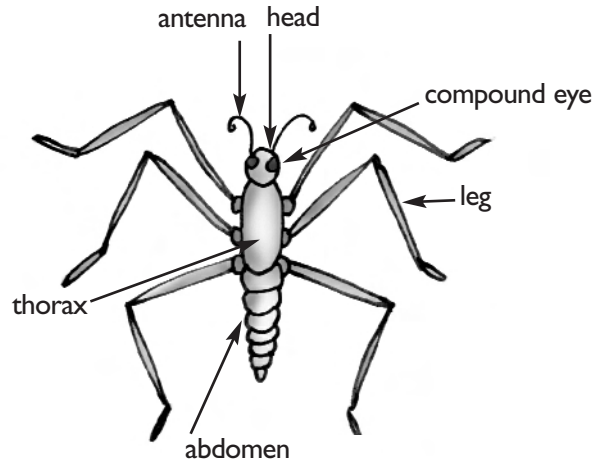
about a million different types of insects and many more that have not been discovered yet. Insects evolved a long time before dinosaurs appeared on earth. The biggest insect that ever lived was the ancient dragonfly called Meganeura. This predatory flying insect lived about 250 million years ago and had a wingspan of about 2 feet.

More about insects:

Insects are arthropods (a type of invertebrate). All insects have a hard exoskeleton, a three-part body (head, thorax, and abdomen), three pairs of jointed legs, compound eyes, and two antennae. The legs (and wings, if applicable) are attached to the thorax. Insects breathe through holes called spiracles. Insects hatch from eggs.

Insect means "segmented" in Latin. There are

Bug Pieces & Parts



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.

More About Assassin Bugs...

Assassin bugs are killer insects (predator insects) that eat other bugs. They lie in wait for insects and then stab the prey with their proboscis (the beak) injecting a toxin that dissolves tissue. The assassin bug then sucks up the other bug's tissues. Sometimes, when other food isn't available, assassin bugs even eat each other.

Like all insects, they have 6 jointed legs, two antennae, and an exoskeleton made of chitin (a material that also forms our hair and fingernails). Their three-part body consists of a head (with the mouthparts, eyes, and antennae), thorax (where the

legs and wings attach), and the abdomen (with the reproductive, and most digestive organs).

Find this and other insect information at:
<http://www.enchantedlearning.com/subjects/insects/printouts.shtml>

More about Lady Beetle Bugs:

Most adult lady beetles are round-oval in shape, brightly colored and often spotted. The immature or larval stages, however, appear very different and often are overlooked or misidentified. Lady beetle larvae are elongated, usually dark colored and flecked with orange or yellow. Lady beetles can rapidly control many developing insect problems, particularly if temperatures are warm.

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More about Metamorphosis...

Metamorphosis is a change in the form and often habits of an animal during normal development after the embryonic stage. Metamorphosis in insects, includes the transformation of a maggot into an adult fly, a caterpillar into a butterfly and in amphibians, the changing of a tadpole into a frog.

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More about IPM At School...

Most schools are interested in Integrated Pest Management because they want to minimize the use of pesticides where children eat, play and spend a great deal of time. IPM is an effective and environmentally sensitive approach that relies on common sense strategies.

Some examples of IPM Practices at School Include:

- First reduce sources of food, water and shelter for pests.
- Vegetation, shrubs and wood mulch should be kept at least one foot away from structures.
- Cracks and crevices in walls, floors and pavement are either filled or eliminated.
- Lockers and desks are emptied and thoroughly cleaned at least twice yearly.
- Food-contaminated dishes, utensils, surfaces are cleaned by the end of each day.
- Garbage cans and dumpsters are cleaned regularly.
- Litter is collected and disposed of properly at least once a week.

Learn more at: www.colostate.edu/Depts/So:/Crop/Extension/CEPEP/public.htm#IPM

Page 5 Cultural or Biological Control Q&A



Cultural, Mechanical or Biological Control?

After each statement below write a "C" on the line for an example of cultural pest control, an "M" for mechanical control or a "B" for a biological pest control.

- | | |
|--|------------------|
| 1. A cat catching a mouse. | <u> B </u> |
| 2. Picking a pest insect off a plant. | <u> M </u> |
| 3. Covering garbage cans. | <u> C </u> |
| 4. A ladybird beetle eating aphids. | <u> B </u> |
| 5. Planting a different crop that pests don't like. | <u> C </u> |
| 6. Putting a fence around the garden to keep wildlife out. | <u> M </u> |

- The problem or pest is identified before taking action.
- Fertilizers should be applied several times (e.g., spring, summer, fall) during the year, rather than in one heavy application.
- If pesticides are necessary, use spot treatments rather than area-wide applications.

Page 6: More about West Nile Disease...

While mosquitoes aren't normally a problem in

Colorado in November, the lingering effects of West Nile will surely be affecting some families into the fall and winter. According to experts, 2003 was only the beginning of what we can expect to be a widespread epidemic in Colorado come spring and summer of 2004.

Colorado Mosquito Control director Michael McGuinnis said it may take another year or two before they can get a handle on the mosquitoes. It typically takes two or three years after the first year of a management program to understand where mosquitoes come from and how best to kill them.

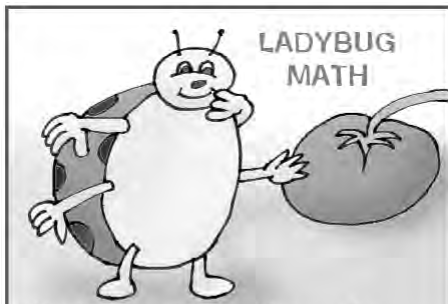
The bottom line is that the disease is preventable. If you can prevent yourself from getting bitten—you can't get it.

Discussion

Ask your students to come up with a list of potential breeding areas around their homes. Refer to page 6 of the Colorado Reader to find areas where mosquitoes breed. Talk about community areas outside their homes that also are mosquito breeding areas, e.g., gravel pits with water, ponds, irrigated

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Page 6 Ladybug Math Answers



Using the facts to the upper left, answer the following questions and show your work:

1. A lettuce plant has 600 aphids feeding on it. How many ladybird beetle bugs (ladybugs) ADULTS will it take to eat all the aphids in one day?

$$600 \div 50 = 12$$

2. How many ladybug LARVAE will it take to eat 600 aphids in one day?

$$600 \div 150 = 4$$

3. A ladybird beetle LARVAE can eat 3 times as many aphids in a day as a ladybird beetle ADULT can eat in one day.

$$150 \div 50 = 3$$

4. How many aphids can one ladybird beetle ADULT eat in seven days?

$$50 \times 7 = 350$$

(continued from page 3)

fields, etc. Have the students come up with an action plan for next spring including items such as: helping parents and neighbors eliminate standing water and wearing long sleeved shirts, long pants and insect repellent if they are going to be outdoors in the evening and morning. Also, research in your local paper and check with local health authorities to find out what strategies your community is going to use to reduce mosquitoes in 2004. Maybe the county will put larvacides in any standing water to kill mosquito larvae. Perhaps they will spray insecticide in areas where large numbers of adult mosquitoes can be found.

Take the initiative and organize a neighborhood cleanup day to pick up containers from vacant lots and parks. Encourage people to keep their yards free from standing water. Many children, particularly in Weld and Larimer counties will personally know people in their own families and community who have gotten sick or even died from West Nile disease. Talk about this and how it has impacted their lives. Bring home the message that they have the power to prevent this deadly virus.

Something to remember: The chance of any one person becoming ill from a mosquito bite remains low. Most people who are infected with the virus will not develop any symptoms at all. The risk of severe illness and death is highest for people more than 50 years old.

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More about How Insects and Animals Can Make You Sick...

Ticks are other little creatures that can carry diseases such as

Rocky Mountain spotted fever. Signs and symptoms may include fever, nausea, vomiting, severe headache, muscle pain and lack of appetite followed by rash, abdominal pain, joint pain and diarrhea.

Ticks are most commonly found in grassy, wooded areas and on dogs. The best way to protect yourself is to wear insect repellent, long sleeves and long pants if you're going to be walking through grass or the woods, or if you spend a lot of time around dogs. When you get home, you should check your hair, neck, armpits, groin, navel and the back of your knees, since these are places where ticks like to hang out.

Most ticks don't carry Rocky Mountain spotted fever. If you find a tick use tweezers to grasp the tick and slowly pluck it out.

Page 8 Answers to Cat's Away Word Game

The cat decided it needed a winter vacation somewhere warmer than Colorado. Circle the higher number on each object in the attic. Match that number with the one on the code at the bottom of the page to find the correct letter to write on each line. Now, you know the answer to this question...

When the cat's away...

T H E M I C E
 W I L L P L A Y

497	199	875	222	767	520	973	671	963	377	954
A	C	E	H	I	L	M	P	T	W	Y

Additional Web Resources

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<http://www.mda.state.mn.us/ipm/IPMPubs.html> Pest Patrol: A Backyard Activity Book For Kids - An Adventure in IPM - Minnesota Department of Agriculture.

<http://paipm.cas.psu.edu/schools/schoolEduc.htm> From the School IPM Program in Pennsylvania - this site provides IPM principles and activities for the K-12 curriculum as an example of interdisciplinary, environment-oriented problem solving.

<http://paipm.cas.psu.edu/schools/courseguide.html> List of materials given to participants in the Pennsylvania IPM Program's summer course "IPM for Teachers: Meeting New Academic Standards". Includes the actual curriculum which has many activities to use in the classroom along with supplemental materials.

<http://paipm.cas.psu.edu/pdf/insectmodels.pdf> Insect Models (PDF file) - Fly, butterfly, dragonfly, and cockroach for kids to cut, color, and fold.

http://www.entm.purdue.edu/entomology/outreach/schoolipm/pdfs/Act_book.pdf IPM in Schools Activity Book (PDF) - Elementary level activity book on insect pests, from Purdue University.

<http://www.apsnet.org/education/K12PlantPathways/TeachersGuide/Activities/PlantPartsLab/Top.htm>
Plant Parts and Their Diseases by Wade H. Elmer and James A. LaMondia. This exercise is designed for young children (K to 3) to teach the different parts of a plant (root, stems, leaves, flowers, fruit, and seeds), the basic functions of each part, and to show that tiny microscopic organisms (germs) can cause each part of a plant to become diseased. The lesson shows children the importance of understanding what causes plants to be sick and the need for scientists called plant pathologists to keep plants healthy. It requires easily available materials and minimal preparation time.

<http://www.pested.psu.edu/urban/games/> D.B. Pest - Interactive web-based pest control game for kids K-12, along with crossword puzzles and D.B. puzzle. From Pennsylvania State University Pesticide Education Program.

<http://www.enchantedlearning.com/subjects/insects/printouts.shtml> EnchantedLearning.com Insect Printouts - Good handouts and worksheets for kids with insect anatomy and life cycle information on many different insects, also "label me" printouts.

[http://school.ipm.iastate.edu/stories/storyReader\\$8](http://school.ipm.iastate.edu/stories/storyReader$8) Lesson Plans for Teaching IPM Principles - Links to lesson plans divided by grade made available by the Iowa State University School IPM Pilot Program.

<http://schoolipm.ifas.ufl.edu/index.html> National School IPM Web Site - Information for teachers, parents, administrators on the use of IPM in schools to reduce pesticides.

<http://www.ipminstitute.org/school.htm> The 128 page document on this website lists more than 700 IPM practices for use in school buildings and on school grounds, as well as more than 250 resources for information on how to implement those practices, model legislation, school pest management practice surveys, IPM curricula and project ideas for teachers, directory of organizations with resources for school IPM, school IPM-related headlines from US newspapers and other resources.

<http://www.fightthebitecolorado.com> for adults and children-you can learn fun facts about mosquitoes and you can also help eliminate those pesky insects around your house and school.

<http://schoolipm.ifas.ufl.edu/montana.htm> Montana State University has a website with School IPM lesson plans, materials and an internet course.

<http://llamar.colostate.edu/~gec/4Hman/contents.htm> 4-H Entomology Project Page includes cool entomology projects.

<http://www.epa.gov/pesticides/kids/> EPA interactive kid's page