

## Investigating Insects with Young Children

Ellen Blinderman, Early Childhood Science Specialist  
ellenb@berkeley.edu



THE LAWRENCE  
HALL OF SCIENCE  
UNIVERSITY OF CALIFORNIA, BERKELEY

### Introducing Insects

Ask questions to encourage the children to think about insects.

- What insects can you name?
- Where have you seen insects?
- What is something exciting you've seen an insect do?

### The Insect Drama

Present a drama about a little girl who loves insects. Have the doll and animal puppets act out the drama as you tell the story.

- Say, "I'm going to tell you a story about a little girl named Kimi who loves insects."
- One beautiful spring day Kimi walked into her flower garden and sat down by a log.
- A bee buzzed by her and landed on a flower. What was it doing? (Respond to the children's answers. If they say getting pollen, then roll the bee around in the flowers and continue with the story.) Kimi yelled out, "Look! The bee is covered with yellow dust. She's collecting pollen to take home to feed her babies". (If the children say drinking nectar, stick the bee's tongue into the flower and say, "Yes, the bee is drinking sweet juices from the flower." If the children don't know, introduce either nectar or pollen, not both.)
- Kimi walked quietly toward the bee. She wasn't afraid of it, but she didn't want to disturb it. The bee buzzed to another flower. Then it flew back to its home.
- Suddenly something moved in the tree. Kimi looked again, but didn't see anything. Do you see something? What is it? (A praying mantis.)
- Just then a ladybug flew to the tree and landed on a branch.
- The praying mantis crept closer to the ladybug. Sometimes a praying mantis eats ladybugs. What do you think the ladybug did? (Flew away.) Often ladybugs get away from animals that like to eat them by falling on their backs and staying very still. (Make the ladybug fall onto its back, and have Kimi walk over to the tree.)
- The praying mantis looked on the branch and under the branch but couldn't find the ladybug. Why didn't it see the ladybug?

- Then Kimi decided to walk down to the pond. She sat watching the fish swimming near the pond plants when, all of a sudden, a dragonfly landed on the plants. It was a mother dragonfly and guess what it was doing. (Laying eggs.) Yes, she laid her eggs on the plants in the water. Then it flew away, and Kimi walked home looking for more beautiful insects, because she knew that insects are everywhere.

### **Materials For the drama**

- Animal puppets—dragonfly, praying mantis, ladybug, bee
- 1 doll
- 1 large bag or box to put puppets and doll in
- 1 sheet of blue vinyl
- Several plastic pond plants
- plastic fish
- 1 fake tree or large living plant
- 1 large piece of brown cloth to wrap around base of tree
- 2 green blocks with several fake flowers in each
- 1 log

### **Making the Paper Insect**

Although insects come in different shapes, sizes and colors, they are all alike in many ways. Tell the children that you are going to use their ideas to put together a paper insect. (Have the paper parts hidden nearby.) Tell them that it is a make-believe insect, but it has the same body parts as a real insect. Use suggestions from the children as you assemble the paper insect. Ask questions to inspire the children to think about an insect's body parts, such as:

- Does an insect have a head?
- What does it have on its head? (Eyes, antennae.)
- What does an insect do with its antennae? (Feel, smell.)
- What is the middle part called? (Thorax.) The end part? (Abdomen.)
- What is attached to the thorax? (Legs, wings.)

Once the insect is complete, ask, "Do insects have bones inside their bodies?" (No. They have a skeleton on the outside called an exoskeleton.) Have children say "exoskeleton."

## **What's Missing Game**

Have the children close their eyes. Remove one or two parts from the insect. Have the children open their eyes and guess what's missing

## **The Insect Song**

Have the children stand up, pretend to be insects, and indicate where the insect parts are on their bodies. Have them hold out three fingers from each hand to represent insect legs.

Along with the children, sing the song "Head, Thorax, Abdomen" to the tune of "Head, Shoulders, Knees, and Toes." Encourage them to indicate where the insect parts are on their bodies as they sing

### **HEAD, THORAX, ABDOMEN**

Head, thorax, abdomen

Abdomen

Head, thorax, abdomen

Abdomen

Antennae, eyes, mouth, and six legs

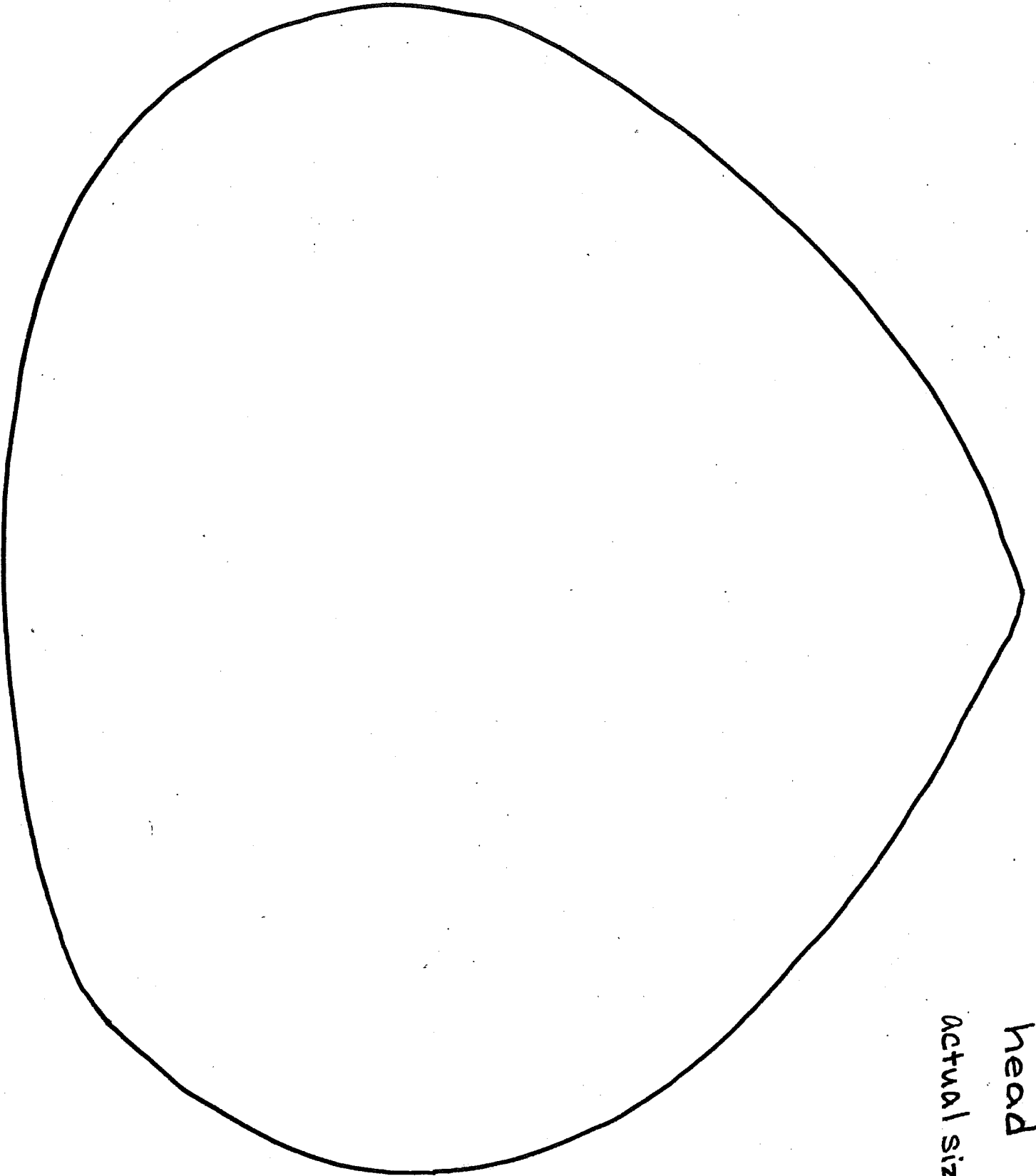
Head, thorax, abdomen

Abdomen

### **Other Ideas:**

- Collect pictures of insects from magazines and calendars. Have the children talk to their partner about the pictures.
- Have plastic insects available for the children to use in the sandbox, block area or with playdough.

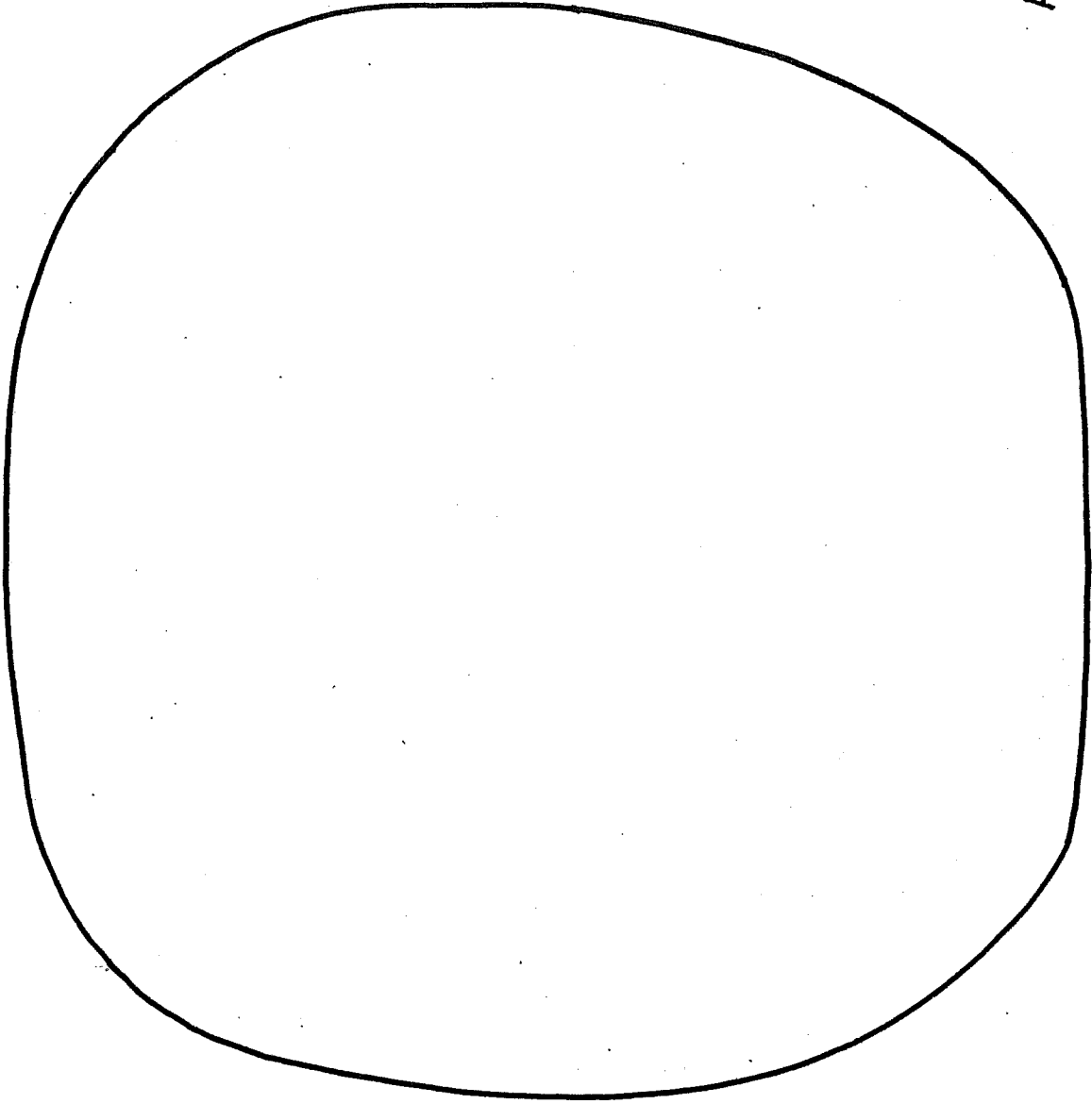




head  
actual size



Thorax

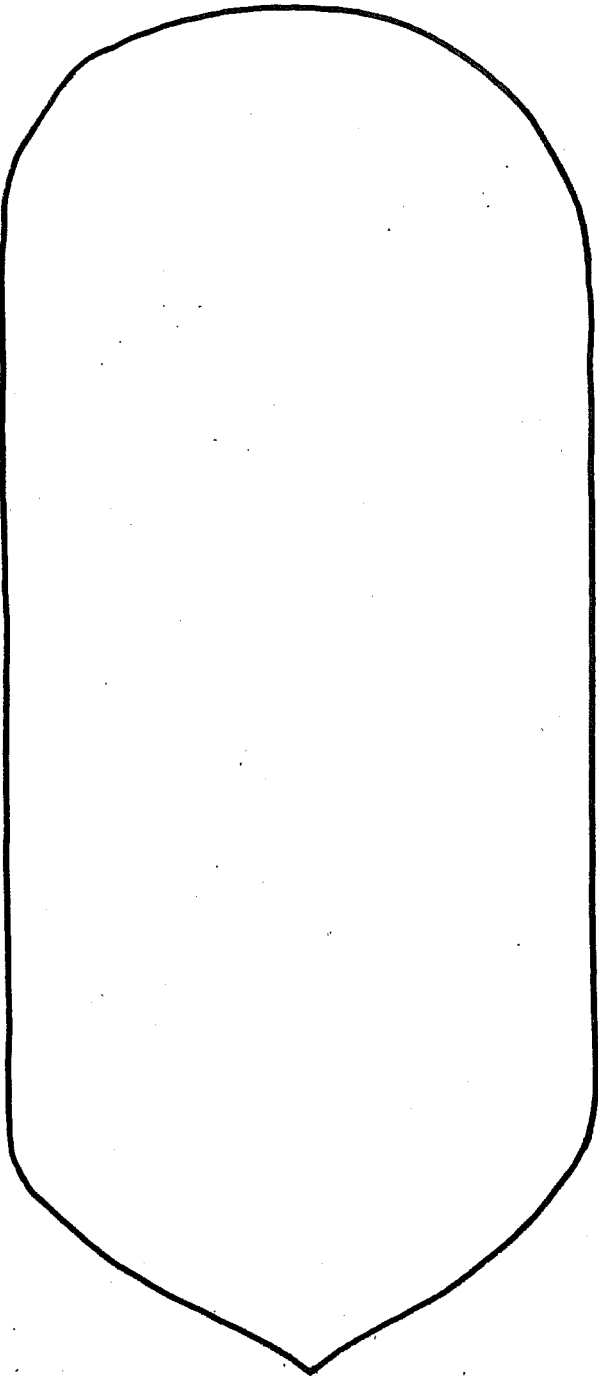


Actual Dimensions:  
8 1/2" x 8 1/2"





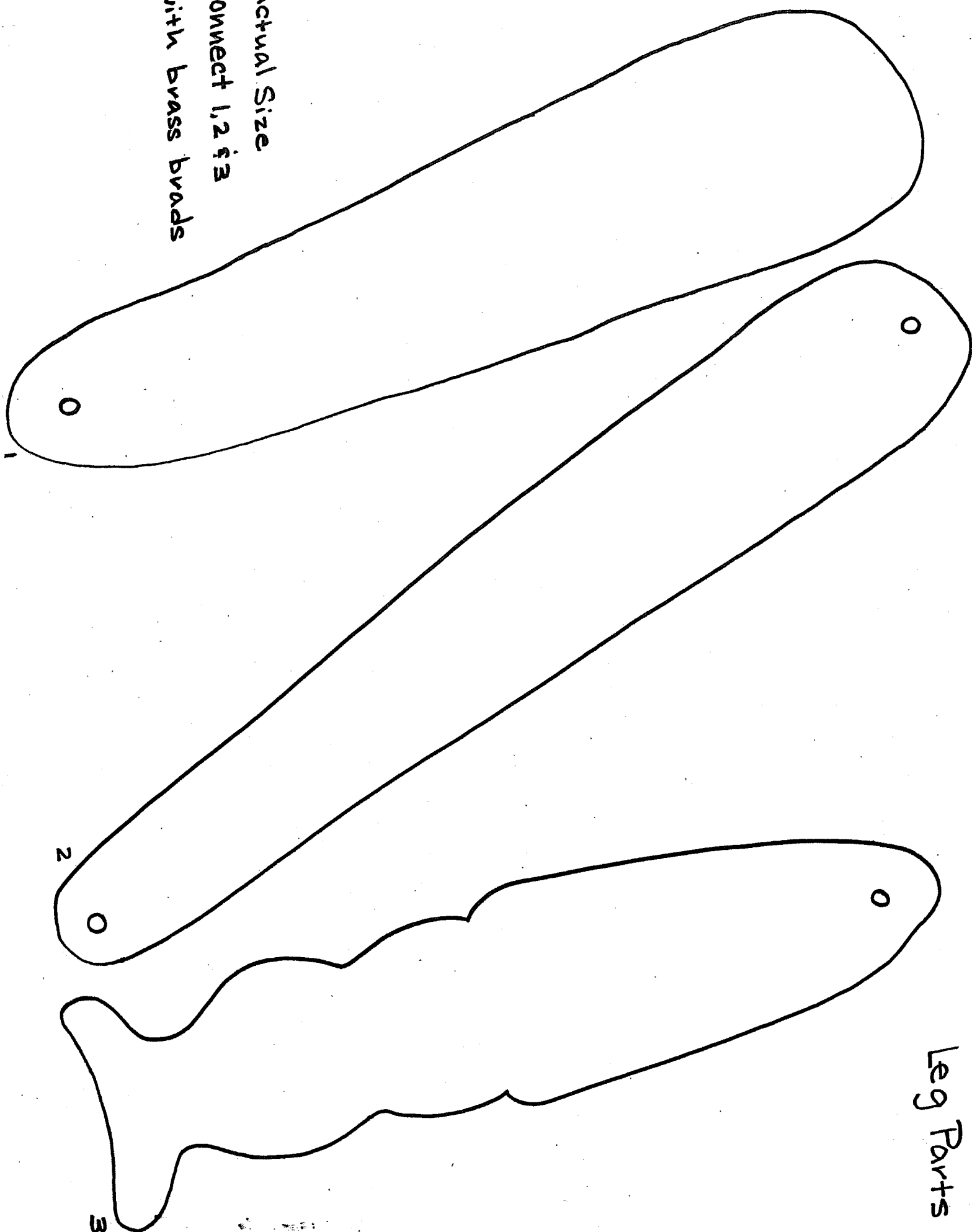
Abdomen



Actual Dimensions:  
14" x 8 1/2"

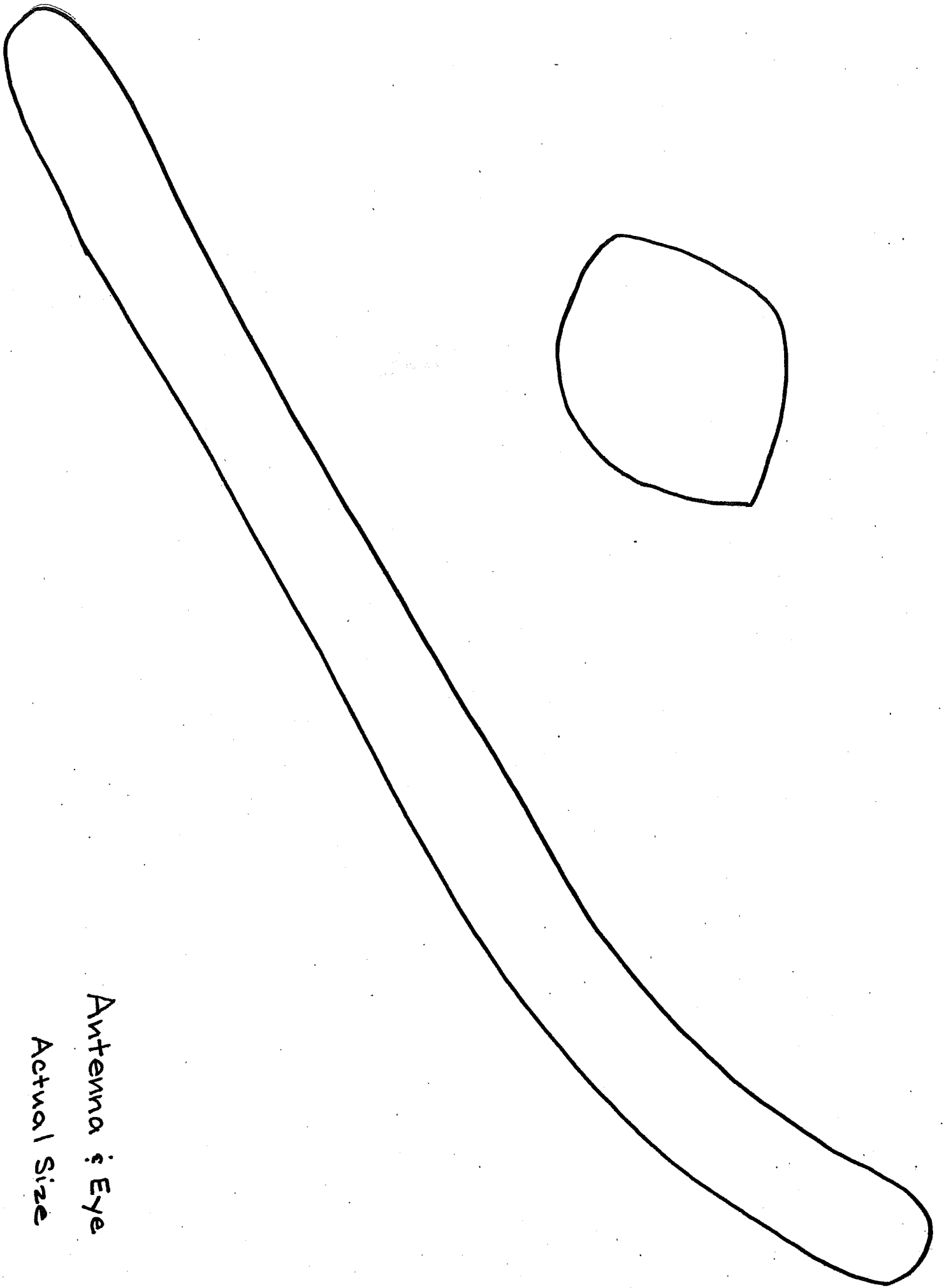


Actual Size  
Connect 1, 2 & 3  
with brass brads



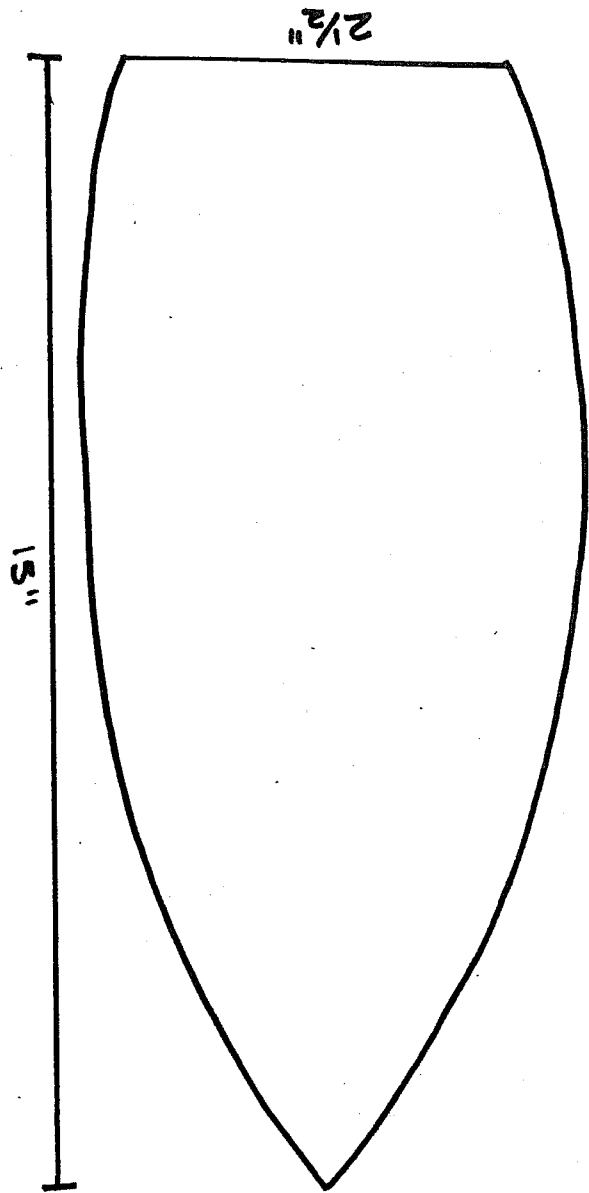
Leg Parts





Antenna & Eye  
Actual Size





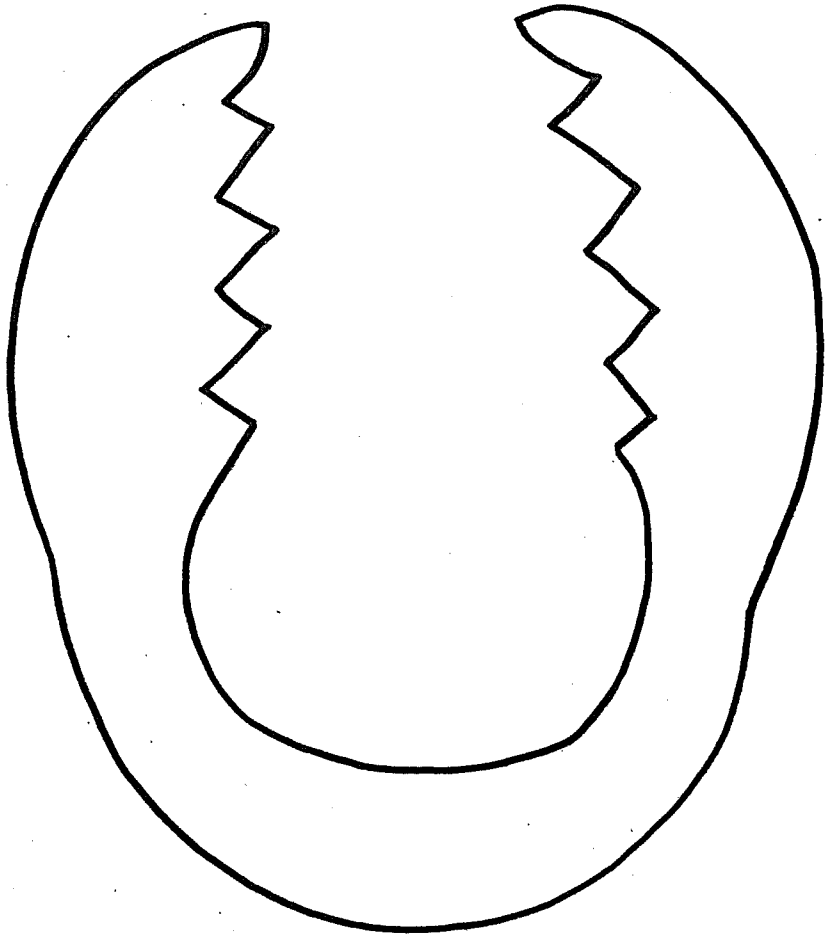
Wing



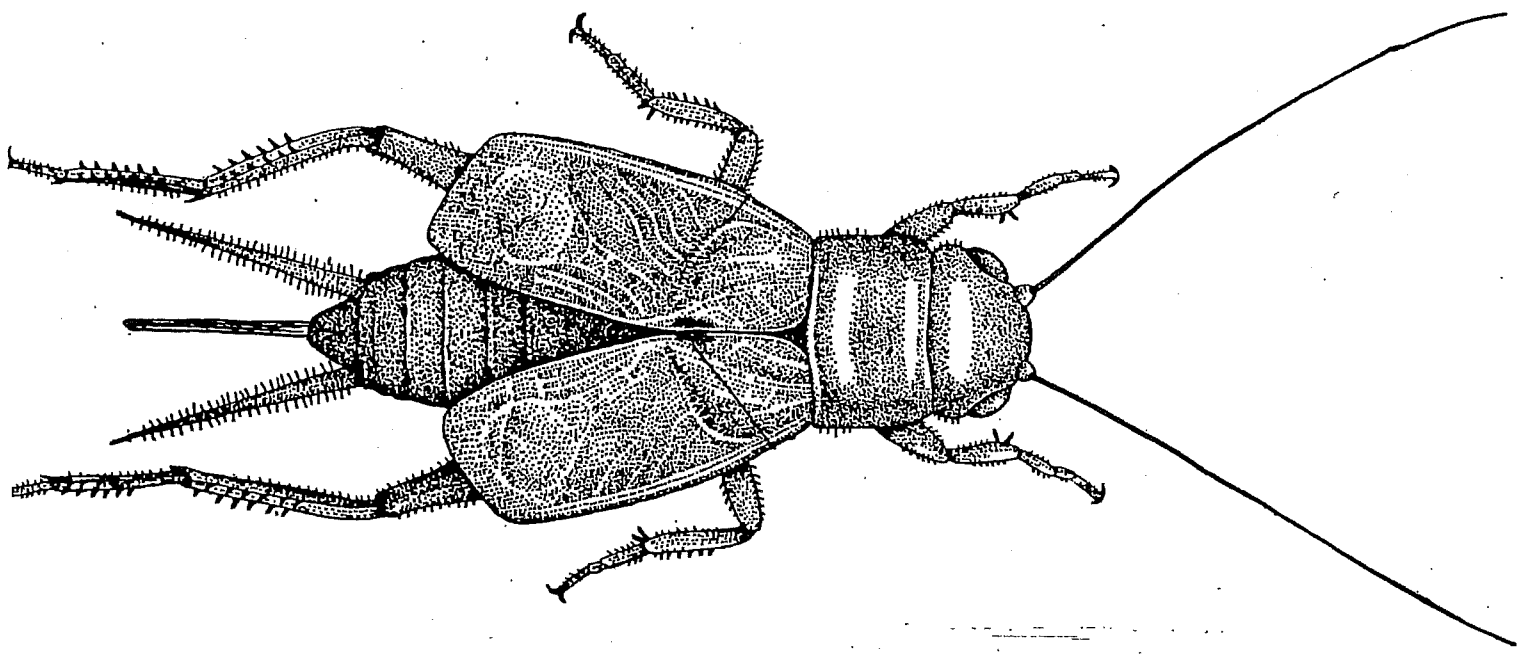
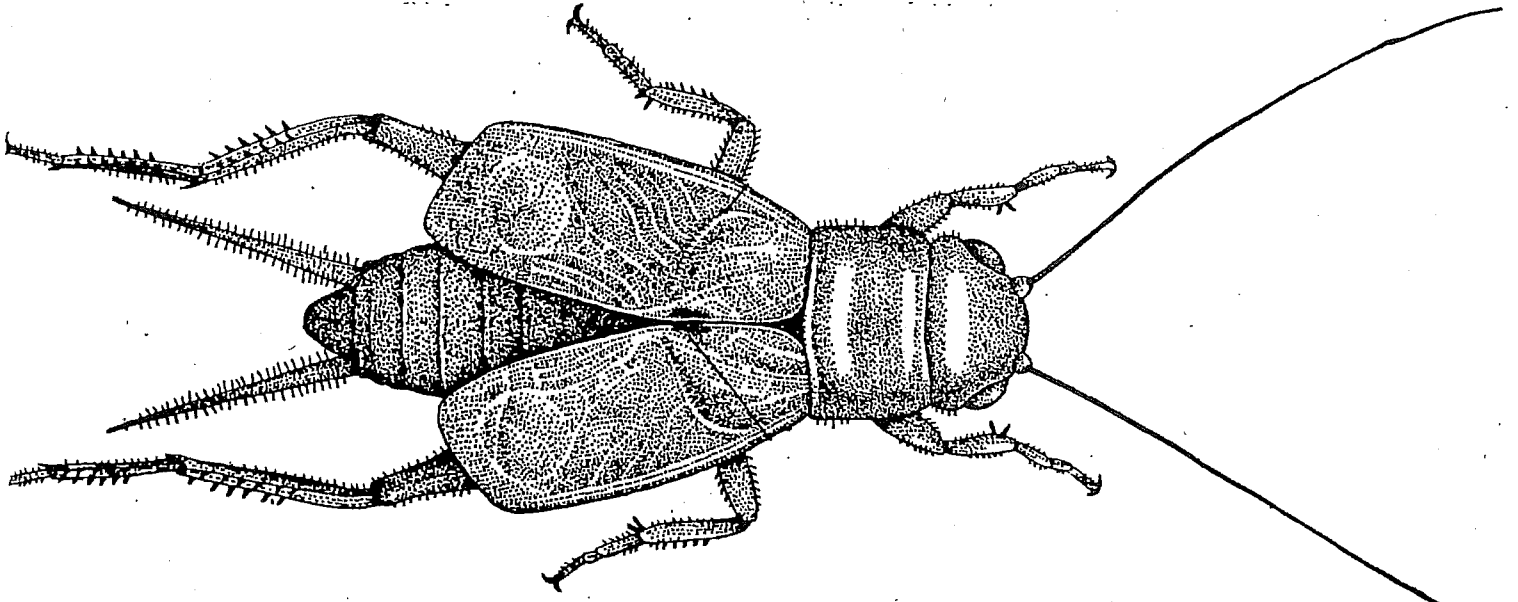


mouthparts

actual size









## Crickets

### **Background:**

Of the several kinds of crickets that live in North America, the black field cricket is the most familiar. It lives in grassy fields, vacant lots, gardens, roadsides and lawns. Another, the house cricket (sometimes called the gray cricket) is brown in color and live in similar places, but it is somewhat less common. Except for the difference in color and the house cricket's slightly longer wings, these two are similar in appearance. A third kind, the cave or camel cricket (which is actually not a true cricket), resembles the other two but has a distinct hump on its back. The cave cricket favors cool, moist, dark places and is generally found under rocks and logs.

Crickets live in cracks in the ground, in small chambers they dig in the soil or under objects such as rocks or boards. Their food is mostly green plant material or some plant derivative such as fruit or seeds. They need some moisture but usually obtain enough from their food. Because they prefer warm temperatures, they are most active during late summer and early fall; and being primarily nocturnal, they are more often heard than seen.

The chirp of a cricket is an insect equivalent of a birdcall: its primary purpose is to attract a mate or mark the cricket's territory. Only the male's call, and the sound are made by rubbing their wings together (not the hind legs as sometimes thought). The front wings have rough rasp like surfaces that when rubbed rapidly together produce the chirping sound. Crickets perceive this sound and others with "ears" located on the side of their front legs. (The ears consist of membranes that function like an eardrum to sense vibrations.)

Since the cricket is an ectothermic or cold-blooded organism, its metabolism, and its rate of calling, is affected by the ambient temperature. As a result, one can make a rough approximation of the temperature in degrees Fahrenheit by counting the number of chirps every 15 seconds and adding 40. To calculate the temperature in degrees Celsius, one would divide the number of chirps in 1 minute by 7 and add 4. Crickets are trying to change from English to metric, but they are presently operating under both systems.)

### **Characteristics:**

Crickets show the typical insect attributes. They have three body parts: head, thorax and abdomen. The head is equipped with eyes and antennae for sensing the environment and a mouth. Two pairs of wings and three pairs of legs are attached to the thorax. The abdomen contains the reproductive organs and most of the digestive system. A row of small holes on the thorax and abdomen called *spiracles* are openings to the respiratory system. All crickets have two projections about one-half the length of the body extending rearward from the abdomen. These are called *cerci* (singular *circus*) and are used to detect vibrations. Females have a third, longer projection called the *ovipositor* between the cerci.

### **Reproduction:**

After mating the female pushes her ovipositor into the soil and releases a single egg: this process may be repeated over 2000 times in her brief lifetime. Crickets exhibit gradual (incomplete) metamorphosis. Each egg hatches into a tiny nymph, which only superficially resembles an adult in appearance. The nymph molts several times, each time becoming more like an adult in appearance. With the final molt, the cricket becomes fully developed and sexually mature. The entire life cycle requires from two to four months depending on the temperature. Warmer temperatures speed the process.

Most adult crickets do not survive the winter, so the size of the summertime population is largely a function of the eggs that over-wintered in the soil. The population reaches its peak in autumn as more and more crickets hatch. Since, the length of the average life cycle is temperature dependent, the higher the average summer temperature, the larger the cricket population.

### Crickets (cont)

In nature, crickets are preyed on by many animals, including birds, toads, and insect-eating snakes. Human beings have also learned to use crickets for a variety of purposes. In China and Japan, crickets are sometimes kept as house pets for the pleasure of hearing their song. They are excellent fish bait and pet food for lizards and larger aquarium fish. Crickets are also widely used in schools to study ecology, animal behavior, physiology and entomology. House crickets are usually used for these purposes, as they are easier to raise in captivity than field crickets.

#### **Crickets in the Classroom:**

Crickets are easy to keep in the classroom-if one is prepared to tolerate a little chirping. Their needs are simple, and they can be kept in two ways, depending on the outcome desired. If the goal is to keep the crickets for a short time, a covered jar is satisfactory. A breeding colony, however, requires more space and a little additional care. Either case, field crickets or house crickets can be used, but house crickets are superior for rearing and breeding.

#### **How to Obtain:**

Live crickets can either be collected from their environment or purchased from a local fish bait dealer or pet shop. Or they can be ordered from a biological supply company.

#### **Caring for Crickets**

##### **Housing:**

To keep crickets a few days, place 1 to 2 inches of sand or soil in a jar with a ventilated cover. Add a dry leaf or a crumpled paper towel and the enclosure is complete. The soil will provide a medium in which the cricket can dig, and the leaf will give it a surface on which it can climb and a place to hide.

##### **Diet:**

Crickets will eat a variety of foods, but a slice of apple, carrot, potato or celery or a piece of lettuce is a good-short term food, as it will also provide the crickets with the moisture they need. The food should be replaced every day or two so it will not decay or mold.

Assuming that they are given sufficient food and an appropriate environment, crickets can go unattended over weekends.

##### **A Breeding Colony**

A breeding colony of crickets can be kept in much the same way, except that a larger container is needed and two seemingly inconsistent requirements have to be met. First, the environment must be kept dry to prevent disease. And, second the crickets must have moist soil or sand in which to lay their eggs.

Meeting these two requirements is the real secret of raising crickets.

A standard aquarium is an excellent container for housing a breeding colony. The crickets cannot climb the smooth glass walls and the sides are tall enough to prevent them from jumping out-but a screen is recommended. Place 1-2 inches of dry sand or soil in the aquarium. Also, add a shallow dish of moist sand or soil (a plastic margarine tub is perfect) for egg laying. Crumpled paper towels will provide a hiding place and a surface for climbing, but empty egg cartons with a few holes punched in them are even better. If the cartons are put into the aquarium open side down, the crickets will climb inside and out.

### Crickets (cont)

Crickets will consume almost anything including, each other if they run out of food. Dry dog food is a well-balanced diet and is easy to provide, but crickets can also be well nourished on oatmeal, cornflakes, bran or any other grain cereal. Any dry food however should be supplemented occasionally with leafy or succulent vegetables. Water should be available continuously, but crickets will fall into an open container and drown. The best way to provide water is to invert a small jar or vial of water in a shallow dish with a few thicknesses of paper towel between the jar and the dish. The crickets will be able to get their water from the moist towels.

A small colony of 20-40 females can lay several eggs each day, and these can be collected in a shallow dish of moist sand or soil (a plastic margarine tub is perfect). The dish should be slightly recessed in the sand so the crickets can climb in. Adult crickets will eat some of the eggs (and will also cannibalize newly hatched young), so the dish should be removed after a few days and replaced with a fresh one if more eggs are to be collected. Put the dish with the eggs in another escape proof container (a small aquarium or plastic shoebox) for incubation and hatching. It is essential that the eggs not dehydrate. This can be prevented by lightly sprinkling the soil with water as needed to keep it slightly moist. The eggs will hatch in three to four weeks depending on the temperature. (Cooler temperatures will prolong the hatching time). The tiny nymphs will come to the surface of the soil and out of the dish. At this time they can be fed, watered and cared for just as the adults are. After about three weeks they can be kept with the adults with less risk of their being eaten.

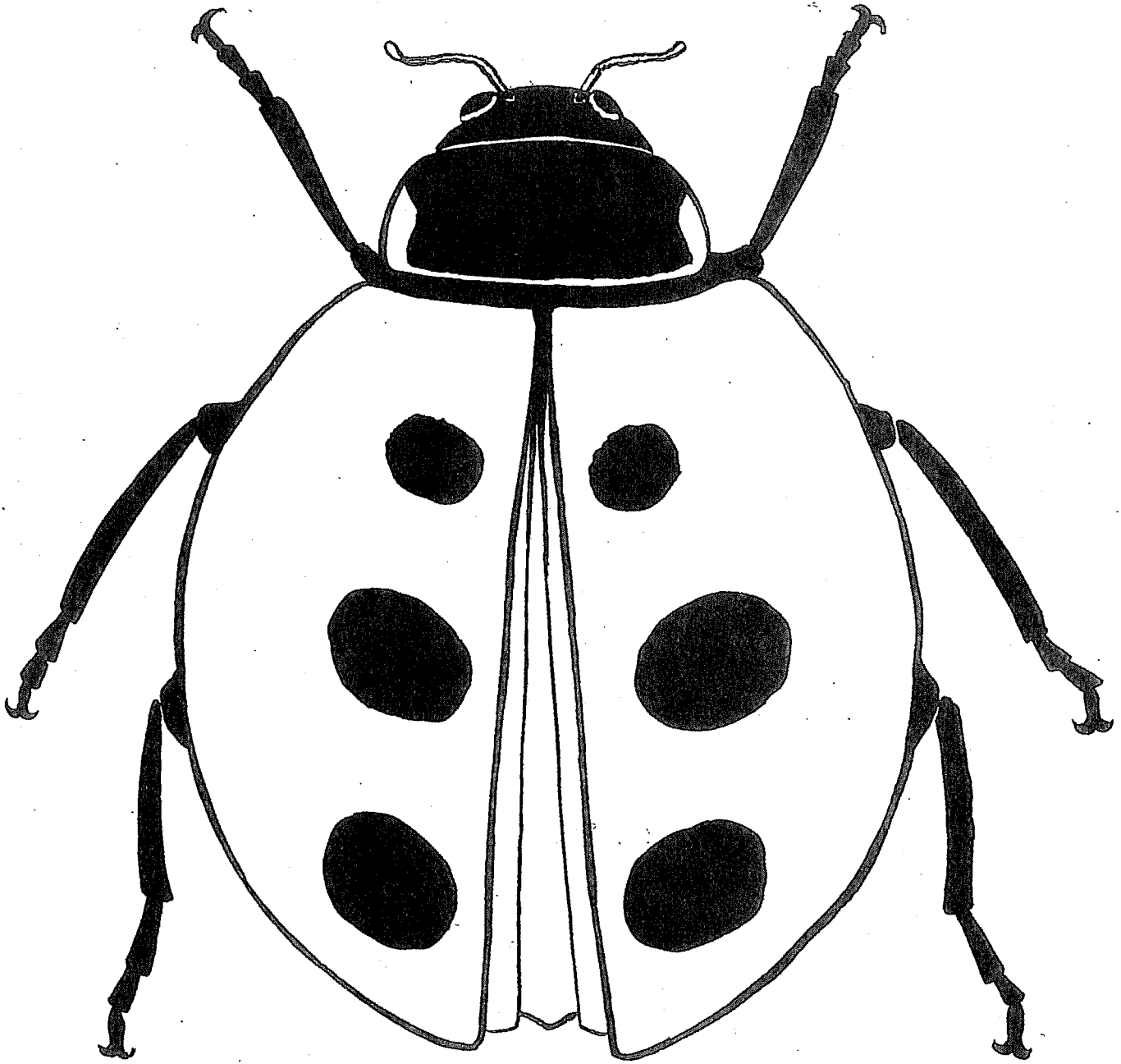
Cricket will survive at room temperature, but they will be considerably more active and reproduce better at temperatures 80°-85° F is about right. A light bulb in the cage is a good heat source. Keep the cage clean. Remove accumulated droppings, any dead crickets and uneaten food. And, remember to keep the colony dry.

#### **Observation, Activities and Questions:**

- Observe and describe a cricket. Find the three body parts. How many legs does a cricket have? How many antennae? How many abdominal projections? Is this cricket a male or a female?
- How does a cricket move? Jump? Walk?
- Observe and describe a cricket when it chirps. Do all crickets chirp?
- Try to determine the temperature by counting a cricket's chirps. For degrees Fahrenheit, count the number of chirps per 15 seconds and add 40. For degrees Celsius, divide the number of chirps in one minute by 7 and add 4.
- Observe and describe a cricket laying eggs
- Observe and describe baby crickets. How do crickets change as they grow?

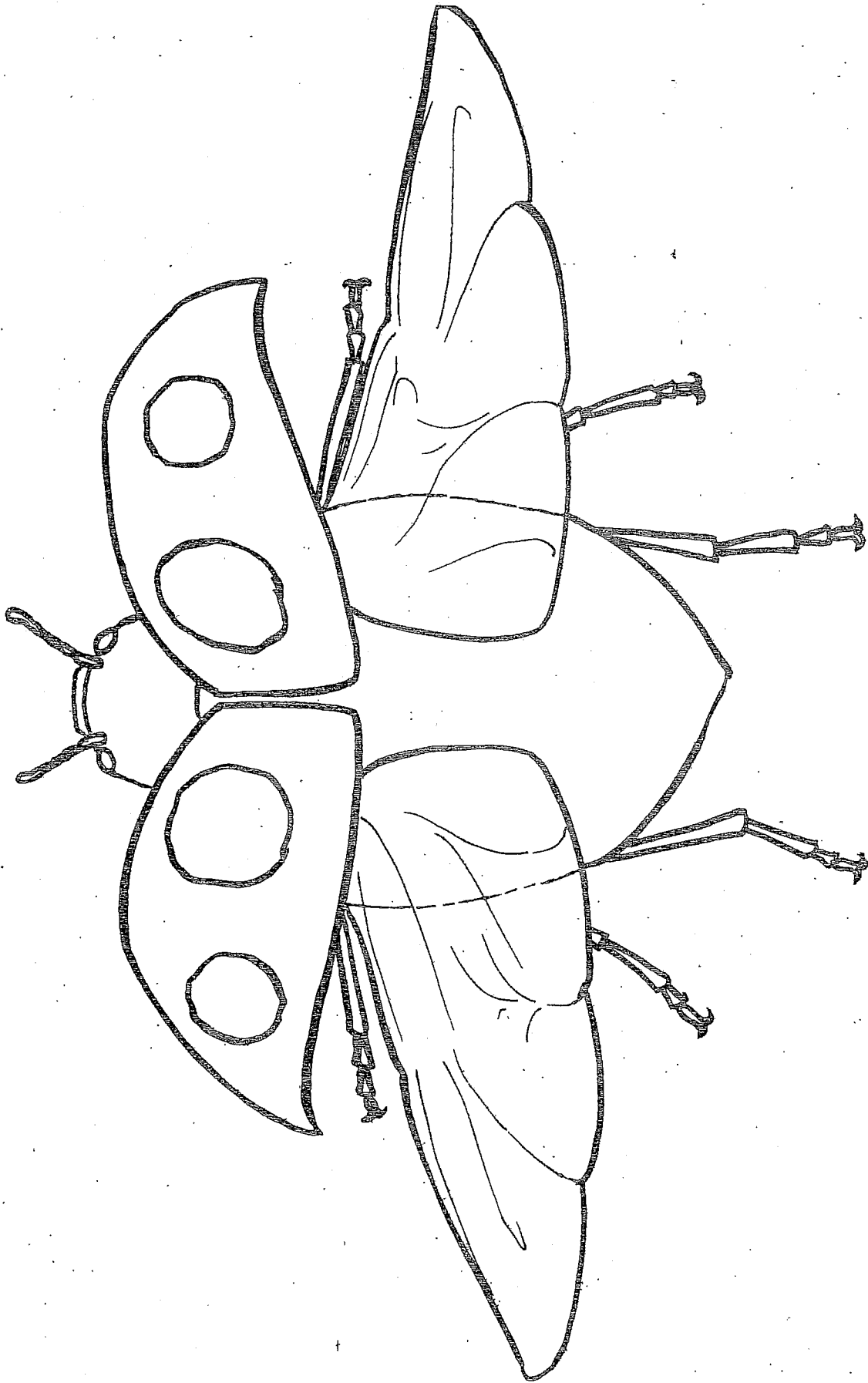






LADYBUG

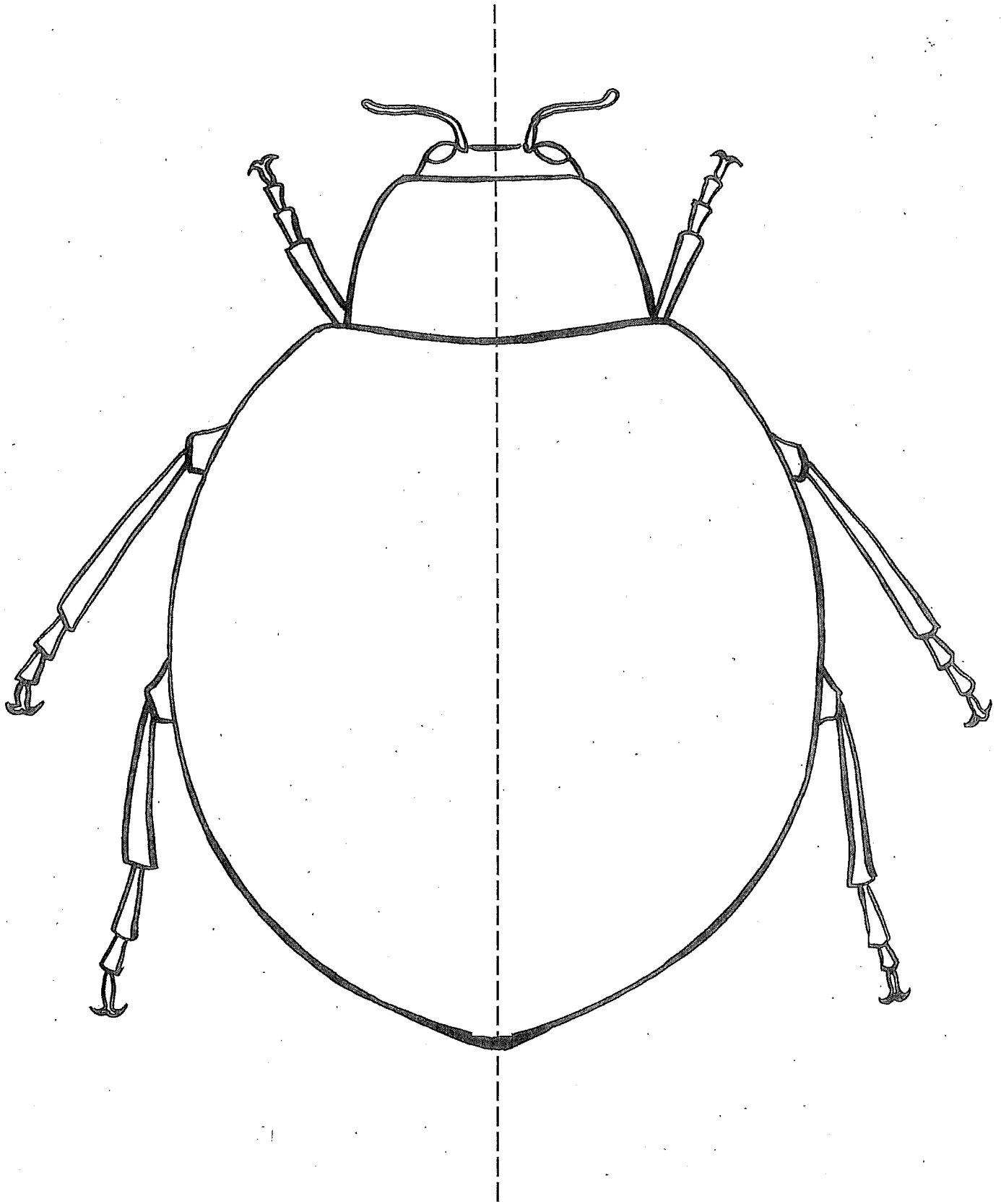




# FLYING LADYBUG

May be duplicated for classroom use.  
© 1993 Regents of the University of California  
LHS GEMS—*Ladybugs*





# LADYBUG SPOTS

May be duplicated for classroom use.  
© 1993 Regents of the University of California  
LHS GEMS—*Ladybugs*.



# How to Keep Ladybugs in a Classroom

By Christy Maxwell, eHow Contributor

Ladybugs are fascinating for children to watch. Something about their colorful spotted bodies can enchant students of all ages. Raising ladybugs can be a terrific classroom project. However, creating a proper environment and feeding them correctly is important to help your ladybugs thrive.

Difficulty: Moderately Easy

## Instructions

### Things You'll Need

- Rectangular glass tank or fish bowl
- Soil
- Foliage
- Sponge
- Plastic Lid
- Aphids
- Raisins
- Banana
- Pantyhose or fine netting
- Large rubber band
- Ladybugs

### Creating an environment

- 1 Get a rectangular glass tank or fish bowl. Soak a small sponge in water until damp and place in a shallow plastic lid. Place this in the bottom of the tank. Ladybugs prefer a moist environment to a dry one.
- 2 Add a layer of soil to the bottom of the tank. Also add different types of foliage according to preference. Ladybugs often hide in crevices in wood, so including some pieces of branches would make an inviting area for ladybugs to rest.
- 3 Insert ladybugs into the tank. Use a sweep net to gather them in the warmer months from areas of lush plant growth. Ladybugs can be found in colder months hibernating together on the south side of logs, rocks, trees or homes.
- 4 Cover the top of the tank with any type of fine netting. A piece of pantyhose could be used to cover a fish bowl. Secure the netting over the tank or bowl with a large rubber band.

## Feeding Your Ladybugs

- 1 Feed ladybugs aphids, which can often be seen on roses. If aphids cannot be easily acquired, ladybugs enjoy sweet, non-acidic fruits like raisins and bananas.
- 2 Cut small bits of banana and place in the bottom of the tank.
- 3 Soak raisins in warm water for five minutes and cut raisins to reveal the soft, sticky inside. Place raisins in the bottom of the tank.

## Tips & Warnings

- There are hundreds of species of ladybugs, and not all ladybugs like the same type of aphids. Further, a ladybug can eat as many as 50 aphids a day; this makes them valuable to farmers and gardeners as they provide natural protection from pests.
- Ladybugs excrete a small amount of yellow liquid that smells and tastes bad. This protects them from predators. However, this liquid can stain walls and fabrics, so it is best to keep ladybugs contained or left in an area on their own.



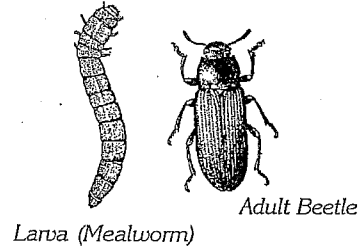
# Darkling Beetle/Mealworm Information Sheet

## IDENTIFYING FEATURES

### Appearance

#### Adult Beetle

- \* Black with hardened front wings
- \* Antennae arise under ridge near eyes
- \* Antennae many-segmented, enlarging near tip
- \* Shape quite variable, from almost parallel-sided to round
- \* Mealworm averages an inch in length
- \* They have a tough yellowish brown exoskeleton and are cylindrical



Larva (Mealworm)

Adult Beetle

### Adult Males and Females

It is difficult to tell the difference between the males and females without a microscope and dissection.

### Immatures (different stages)

The larval stage (referred to generally as mealworms) is worm-like and somewhat hardened for burrowing. The egg is white. The pupa is 1/2 to 3/4" long, white initially then darkening just before the beetle emerges. Length of life cycle is 3-5 months. The larval stage may molt 9-20 times.

## NATURAL HISTORY

### Food

The beetles and larvae eat decaying leaves, sticks, grasses and occasionally new plant growth. As general decomposers, they also eat dead insects, feces and stored grains.

### Habitat

Mealworms live in areas surrounded by what they eat under rocks, and logs, in animal burrows and in stored grains. They clean up after plants and animals, and therefore can be found anywhere where "leftovers" occur.

### Predators

Many animals eat mealworms including rodents, lizards, predatory beetles, spiders and birds.

### Interesting Behaviors

When disturbed, some beetles assume a defensive posture in which they stand on their head and release chemicals from a scent gland in the rear that produces noxious odors and turns skin brown. Mealworms prefer darkness and to have their body in contact with an object.

## IMPACT ON THE ECOSYSTEM

### Positive

Clean up organic materials not readily used by others. Mealworms are food for other animals.

### Negative

Sometimes mealworms feed on seedlings and clip plants off near soil line. Mealworms can be pests to stored grain.

# Building a Mealworm Habitat

## Getting Started

### Rearing Habitat

- \* A clear plastic cup with a cover, or a margarine tub or deli container.
- \* 1/8" wheat bran or crushed wheat flakes in bottom of container.
- \* A crumpled piece of paper, pinecone or empty film canister and a piece of apple or potato. Replace before it becomes moldy.
- \* Small air holes in the lid since a dry climate is important.

### Food

Wheat bran, crushed wheat flakes, oatmeal and a piece of apple or potato.

### Water

Mealworms do not need water. They will obtain all the of the water they need from the piece of potato or apple.

## Care & Handling Techniques

### Handling

To pick up a mealworm, use a plastic spoon or a folded 3X5 card to scoop it up. If you choose to pick it up with your fingers, use your thumb and forefinger on either side of the worm and gently squeeze. Use a firm hold since they are very smooth and may squirm and wiggle the tip of their abdomen. When holding mealworms, keep your hand over the container or table to avoid dropping the mealworm on the floor.

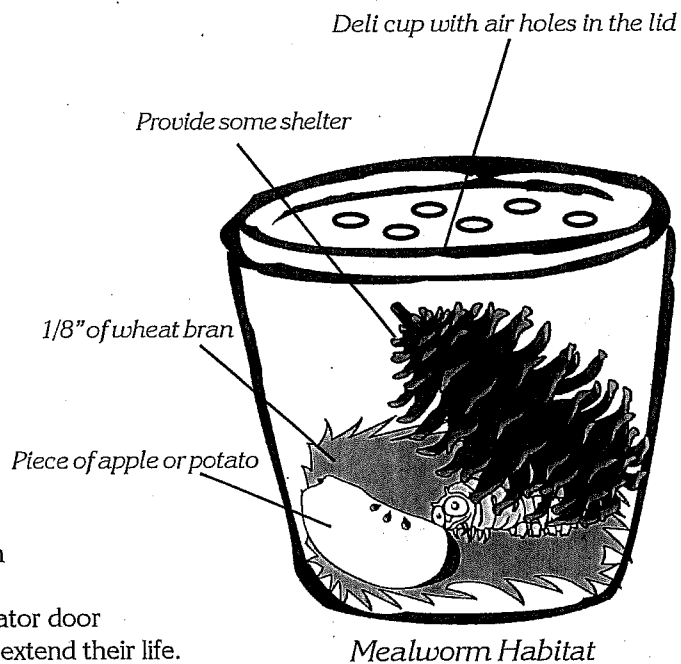
### Raising Young

Mealworms are very easy to rear in the classroom. The larvae grow to 25 mm before pupating. After pupating, the adults emerge in two to three weeks. In seven to ten days, the females may lay eggs. In about fourteen days, the eggs hatch and the larvae begin to eat and develop.

### Other Concerns

#### Precautions

Mealworms will not bite. Dead mealworms are stiff and dark brown and should be removed from the container. Provide plenty of room for the large mealworms since they will eat each other in a constrained container. Small mealworms can be stored in the refrigerator door for several weeks to delay pupation or to extend their life.



egg

larva

pupa

adult



