

LESSON 1

GETTING READY FOR CATERPILLARS

OVERVIEW

Over the next few weeks, your class will observe the life cycle of a Painted Lady butterfly. Students will watch their own caterpillar grow, shed its skin several times, transform into a chrysalis (KRISS-uh-liss) and emerge as a black and orange butterfly - - all within less than a month.

OBJECTIVES

- ◆ Students look forward to the arrival of the caterpillars.
- ◆ Students express in words and drawings what they already know about caterpillars and butterflies for evaluation by the teacher.

BACKGROUND

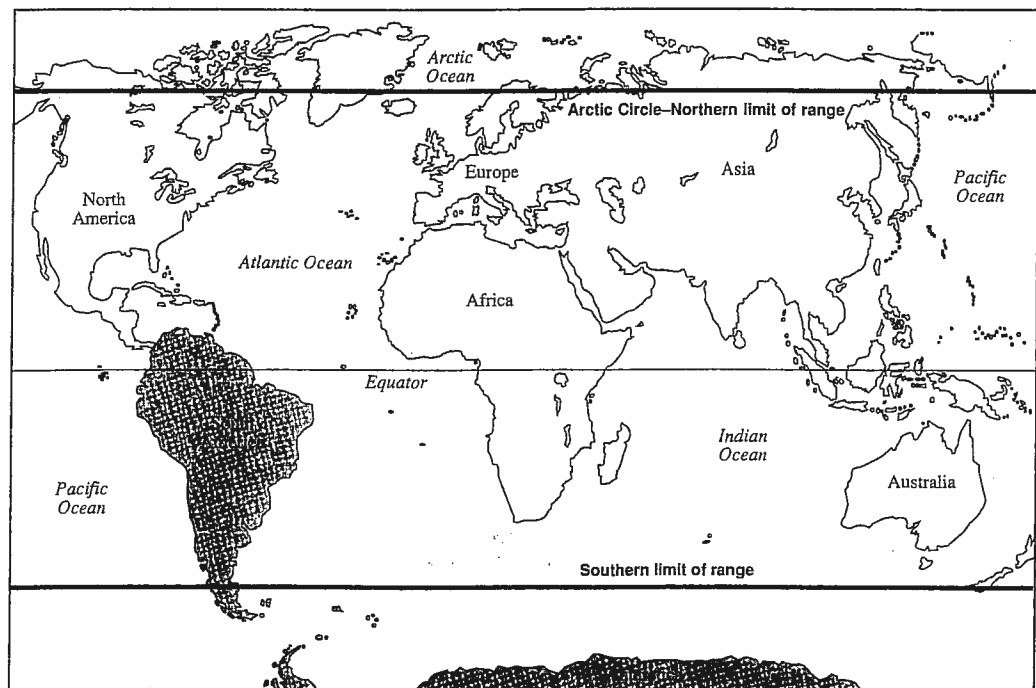
The Painted Lady butterfly (scientific name *Vanessa cardui*) has several characteristics that make it ideal for classroom use. It is the most widely distributed of all butterflies, it will eat and thrive on a commercially prepared food, and its development is rapid.

Because the Painted Lady butterfly is found at some time of year on every continent except South America and Antarctica, this species also is called the "Cosmopolitan butterfly." During yearly spring migrations, the butterflies move from warm tropical areas northward to the Arctic Circle and southward to the limits of the continents. The thousands of Painted Lady butterflies that flit across North America each spring have migrated from Mexico or Southern California. In the fall, the survivors will go South for the warm winter.

The common plant foods of the Painted Lady caterpillars include many that are considered weeds, such as mallow, thistle, plantain, and dandelion. The Painted Ladies you and your students will raise are easily maintained in the classroom when fed with a commercially prepared food. It is a mixture of plant materials plus vitamins and minerals. In the next lesson, you will learn more about the diet of the Painted Lady caterpillars and the possibility of gathering natural foods for them to eat.

Figure 1-1

Range map of the Painted Lady butterfly



During the course of this unit, you and the children will witness one of the marvels of nature, **metamorphosis** (meht-uh-MOR-fuh-sihs). Metamorphosis is defined as marked developmental changes in the form or structure of an animal as it matures. This means that the body of the young is completely different from the body of the adult. The butterfly goes

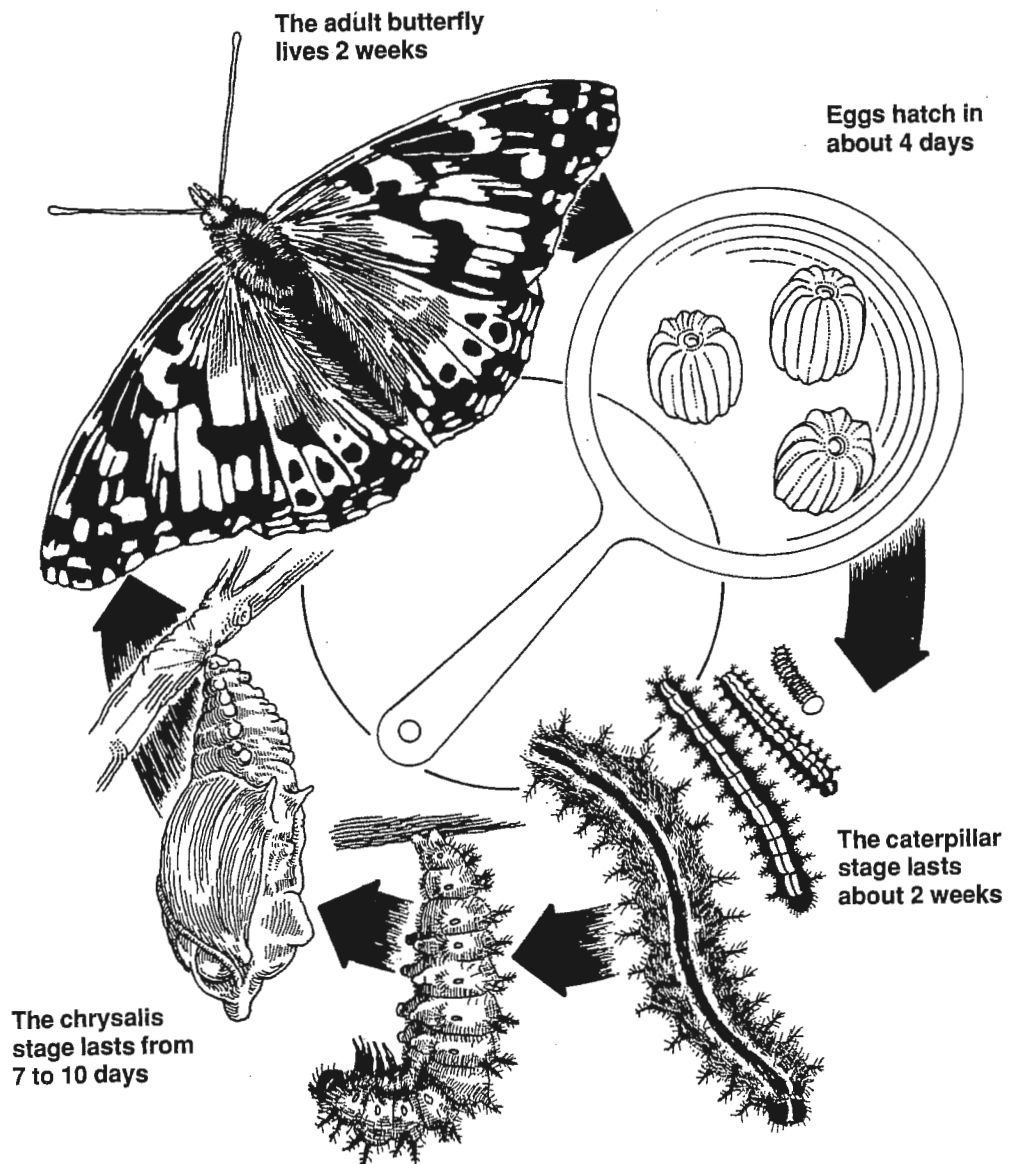
through what is known as **complete metamorphosis**, a life-cycle consisting of four distinct stages. These stages are:

- ♦ **The egg.** The egg of the Painted Lady is tiny and blue-green in color. The adult butterfly lays about 500 eggs at a time that hatch into caterpillars 3 to 5 days later.
- ♦ **The caterpillar.** Sometimes called the larva, the caterpillar lives to eat. This stage lasts from 12 to 18 days; during this time, the caterpillar grows very rapidly and sheds its nongrowing outer skin five times to accommodate its increasing size.
- ♦ **The chrysalis (KRIS-uh-liss).** Also called the pupa (PYOO-puh), this is a time when the animal goes through its most remarkable changes. Hanging nearly motionless and encased in a shiny hard covering for about one week, the animal emerges as a butterfly.
- ♦ **The butterfly.** The winged adult lives for about 2 weeks. It mates on the second or third day after it emerges, and the female lays eggs for several days thereafter, thus ensuening the continuation of the cycle.

Figure 1-2 shows the life cycle of the Painted Lady and the approximate number of days in each stage of the cycle.

Figure 1-2

*The life cycle of the
Painted Lady
Butterfly*



The time required for each developmental stage varies with the temperature. Development from larva to adult may take place as quickly as 19 days in warm weather or as long as 28 days in cool weather. You will have the same situation in your classroom. If room temperatures are exceptionally warm, development will be fast. If room temperatures are cool, the development of the insects will be slowed.

MATERIALS

For each student

- 1 sheet of drawing paper
- 1 sheet of lined paper

For the teacher

- 2 large sheets of newsprint and markers – or -
- 2 overhead transparencies and markers with a projector

PREPARATION

1. Let the school office know that you are expecting a package containing live caterpillars so they will inform you immediately when it arrives.
2. Obtain materials to record student ideas during the brainstorming session. Label one sheet “What we know about caterpillars.” Label the second sheet “What we would like to find out about caterpillars.”

PROCEDURE

1. Announce to the class that some caterpillars are coming to live in the classroom for a while. The class will watch them grow and change. When the caterpillars have become butterflies, you will set them free outdoors, where they belong.
2. Now, conduct a brainstorming session with the students to find out what they already know about caterpillars. Here are some guidelines for brainstorming. Discuss them with your students.
 - ◆ Accept all ideas without judgment.
 - ◆ Do not criticize or make unnecessary comments about the contributions of others.
 - ◆ Try to connect your ideas to the ideas of others.
3. Display the chart entitled “What we know about caterpillars.” Use it to record all student responses as objectively as possible. You may wish to use some of the following questions to help focus the discussion:
 - ◆ What are caterpillars?
 - ◆ What do they look like?
 - ◆ Where have you seen caterpillars?
 - ◆ What were they doing?
 - ◆ What happens to caterpillars? What do caterpillars look like when they are grown?
4. Display the second chart entitled “What we would like to find out about caterpillars.” Use it to record student questions.
5. Keep both charts. They will be useful as:
 - ◆ Pre-unit assessments. Through discussion and the asking of questions, students have shared important information about what they know about caterpillars and butterflies. Now you can build on their knowledge and experiences. As you teach each lesson, have students add new ideas to the list. Write the new information with a different colored pen.

- ◆ Post-unit assessments. When you have completed the unit, display the lists of the class's ideas as they have developed over time. Let students review the lists to evaluate their own progress.
6. Distribute pencils and paper. Ask students to:
- ◆ Draw a picture of what they think a caterpillar looks like.
 - ◆ Show in the drawings how a caterpillar changes during its life. These drawings and/or writings will be useful in later assessments of student learning.

NOTE: It is important that a drawing of a butterfly be included in the student's illustrations. If students don't include it spontaneously, prompt them to do so.

FINAL ACTIVITIES

Collect the drawings and keep them out of sight until the post-unit assessment. Tell students that at the end of the unit they will do another drawing of the life of a caterpillar. Then they will hang the two drawings side by side to assess for themselves how much they have learned.

EXTENSIONS

1. If you have set up a science learning center, direct students to the hand lenses and encourage students to use them.
2. For a creative writing exercise, try this topic: "Some caterpillars are coming. What problems might they have living in our classroom?"

EVALUATION

During the course of the unit, children will create drawings that you can use as an evaluation tool.

The children's first drawings and descriptions of a caterpillar will serve as a "before" picture to be used as a comparison with drawings made during and after completion of the unit. As you examine these first drawings, look for details in body structure. Do the students recognize a head, legs, body segments or other details of caterpillars and butterflies they may have seen in the past? Use these drawings to help you determine which new structures or details the students begin to notice as they make observations.

It will be useful to note, too, how much students understand about the relationship between caterpillars and butterflies and how much they already know about the life cycle.

Draw pictures to show how a caterpillar changes during its life

Draw a picture of what you think a caterpillar looks like

LESSON 2

OBSERVING CHANGE: GROWTH AND MOLTING

OVERVIEW

During this lesson, students will be watching closely for the caterpillars to molt. Two to four molts may occur while the caterpillars are in your classroom, and if you and the children are lucky, you will witness a molt. Even if you don't, you still will see evidence that a molt has occurred.

OBJECTIVES

- ♦ Students observe growth and change in the caterpillars and relate this to changes in their own bodies.
- ♦ Students notice evidence of changes, such as shed skin, the shed head capsule, or increases in frass and decreases in food.

BACKGROUND

Caterpillars eat large amounts of food and grow rapidly but because their skin is actually a rigid external skeleton, called an **exoskeleton**, they cannot increase in size without shedding the exoskeleton. All insects have an exoskeleton. As they consume food, their soft bodies grow inside their rigid exoskeleton, eventually filling up the available space. Molting is a term for the time when the insect sheds the exoskeleton and grows a new one.

Shortly before a molt, the caterpillar stops eating and becomes very still. Soon its body begins to pulse and seems to shorten and thicken. Then, much like the splitting of a seam in tight clothing, the exoskeleton near the caterpillar's head splits, and the soft insect inside wiggles out of its old exoskeleton. The last piece of exoskeleton to be shed is its head capsule. The illustrations in Figure 5-1 show a caterpillar molting.

You will be able to see evidence of the molting even if you do not witness the process. The discarded skin looks black and is in a wrinkled wad. The dark, shiny head capsule also will be lying in the cup. Sometimes this round head capsule is all you seek because a caterpillar may eat all or part of the shed exoskeleton. It usually is possible to determine the number of molts that have occurred by counting the number of head capsules in the cup.

Immediately after a molt, the caterpillar's bristles and exoskeleton are extremely soft and pale. Now is the best time to see the eyes and mouth parts because they retain their dark color and contrast sharply with the body, which will soon darken and harden.

To increase the likelihood of watching a molt, you may wish to look through the cups and pick out caterpillars that have no shed skins (or a lesser number of skins) and are exhibiting pre-molting behavior as described in the second paragraph of this section. You will have to watch the caterpillars closely. A molt happens in a matter of minutes.

MATERIALS

For each student

- 1 caterpillar in a cup
- 1 hand lens
- 1 Activity Sheet, My Caterpillar and Me

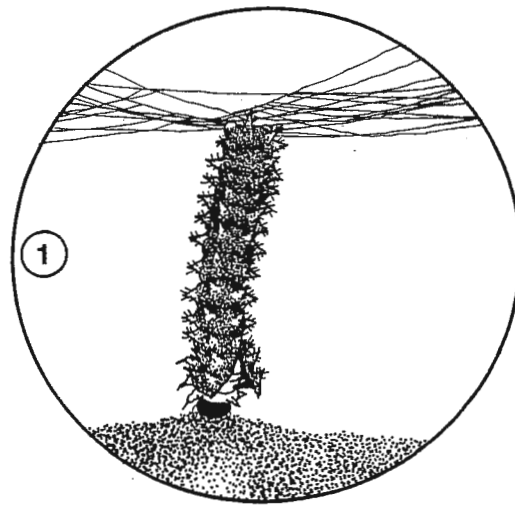
For the class

- Class Calendar (on bulletin board)
- Caterpillar molting (illustration for bulletin board or overhead projector)

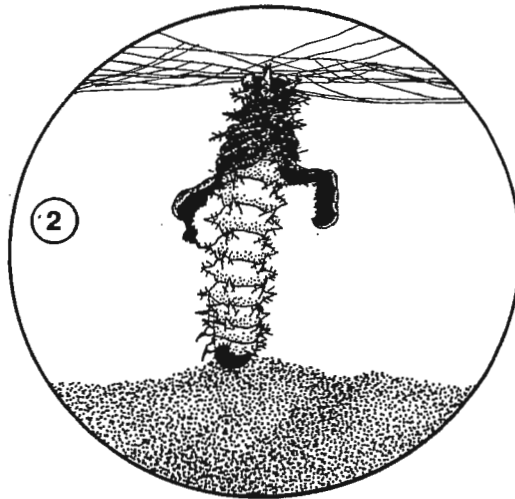
Figure 2-1

A caterpillar molting

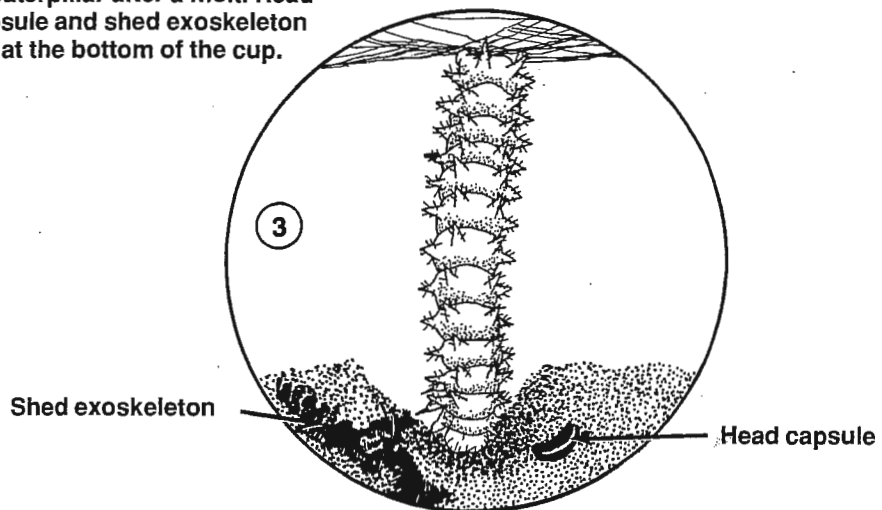
1. Skin splitting near the head.



2. Skin continues to split.



3. Caterpillar after a molt. Head capsule and shed exoskeleton are at the bottom of the cup.



PREPARATION

1. Examine the caterpillars. Look for shed skins or the typical behavior that precedes a molt.
2. Reproduce Figure 2-1, either for a bulletin board or for an overhead projector.

PROCEDURE

1. The focus of this lesson is on how caterpillars grow and change. To spark discussion about the concept of growth and change, ask students how they have changed since they were in kindergarten. Can they wear the same shoes or clothes that they wore in kindergarten?
2. Continue the discussion by asking children to reflect on their own growth and development since they were babies. The children will probably mention that their bodies are bigger, they have more hair and teeth, and they are larger and stronger now.
3. Now, discuss the relationship between food and growth. Do students understand that food is responsible for their growth? Can students relate this concept to other animals, including caterpillars?
4. Distribute caterpillars for the students to observe. Give the children an opportunity to observe how caterpillars are growing and share discoveries with one another. Listen to the questions they ask. Keep a careful eye on any of the caterpillars that may be ready to molt so that you can seize the right moment to observe.
5. To help students focus their observations, you may want to circulate around the class and ask some specific questions, such as:
 - ♦ What do you see in the cup that was not there the last time you looked?
 - ♦ Where do you think it came from?
 - ♦ What do you think it might be?
 - ♦ Does the caterpillar seem larger?

Possible replies might include mention of frass, shed skins, or head capsules.

6. Put the caterpillars aside for a moment and hold a class discussion on the molting process. You may wish to use Figure 2-1 as an overhead or as a bulletin board display.
7. Distribute the Activity Sheet and preview it with the class. Allow students time to complete the sheet.

FINAL ACTIVITIES

1. Collect Activity Sheets to be added to the portfolio.
2. Record observations on the Class Calendar.
3. If appropriate, revisit the list of questions students generated in Lesson 1 and answer any that may pertain to this lesson.
4. Although the children have seen that they are like the caterpillars in some ways, they are also very different. For example, a caterpillar's skin is not able to grow and stretch like a person's skin. To emphasize this point, play a game of "What if?" What if, when the students were babies, they were sewn inside their clothes so that they could not take them off. What would happen to the clothes as the children began to grow bigger and bigger? Ask children to use words and pictures to tell a story of what would happen in a situation like this.

EXTENSIONS

1. Read a story to the class about human growth and development. You have already set the stage by asking the students to think about their own growth and development in the last 7 or 8 years. Help students relate the story to themselves in later years.
2. As a movement or dance exercise, ask children to dramatize how a caterpillar moves in order to shed its skin.

Activity Sheet – My Caterpillar and Me

Name:

Date:

In some ways, you are like your caterpillar.

In other ways, you are very different.

How many do you have?

- ___ Legs
- ___ Eyes
- ___ Mouth
- ___ Head capsule

How many of these does the caterpillar have?

- ___ Legs
- ___ Eyes
- ___ Mouth
- ___ Head capsule

When you grow, your skin grows with you.

A caterpillar's skin does not grow.

How does the caterpillar get bigger?

LESSON 3

FROM CATERPILLAR TO CHRYSALIS

OVERVIEW

The caterpillar is about to undergo an amazing transformation. Soon it will turn into a chrysalis, the third stage in its life cycle. Students will observe the characteristic J-shape the caterpillar assumes before the transformation. Also, students may have the opportunity to witness the final molt that results in the chrysalis. A few days later, they will transfer the chrysalises to the butterfly flight cages.

OBJECTIVES

- ♦ Students observe the J-shape that precedes the caterpillar's transformation into a chrysalis.
- ♦ If possible, students witness the final molt that results in the chrysalis.
- ♦ The teacher assesses student progress in learning caterpillar anatomy and finds out how much students know about butterfly anatomy.

BACKGROUND

The caterpillar is about to enter the third and most mysterious part of its life cycle. No one knows exactly how the next changes take place. Hidden within the thin shell of the chrysalis for about a week, the worm-like caterpillar body is changing into a graceful butterfly.

Six stumpy legs at the front of the caterpillar's body will become the long slender legs of the butterfly, and the prolegs will disappear. The leaf-chewing jaw will become a nectar-sucking organ called a proboscis (pro-BOSK-is). Four wings and the muscles to move them will develop. The insignificant lenses of the caterpillar's eyes will be replaced by hundreds of lenses in a compound eye, enabling the butterfly to see well enough to fly. These eyes also will seek a mate and then plants upon which to lay the fertilized eggs, because the adult butterfly's main job is to reproduce.

All of these dramatic changes are taking place inside a seemingly lifeless form. The chrysalis is not completely motionless, however, and you may observe it twitching from time to time. There are many excellent trade books illustrating the wide variety of chrysalis shapes, colors and textures that conceal and protect the animal changing inside. The word "chrysalis" (plural: chrysalides or chrysalises) comes from the Greek word *chrysos*, which means gold. The Painted Lady chrysalis glistens with spots that are the color of this precious metal.

Another name given to this third stage in the life cycle is *pupa*. In Latin, *pupa* means doll. Many of these developing insects, especially moths, do look like a baby in a blanket.

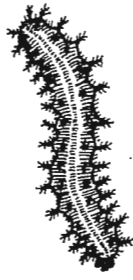
The Beginning of Pupation

Although the process of pupation is somewhat mysterious, the caterpillars will give you some clues that it is about to occur. When the caterpillars reach a length of 25 to 35 mm or about 1 to 1½ inches, watch for the following important signs. Also see Figure 3-1.

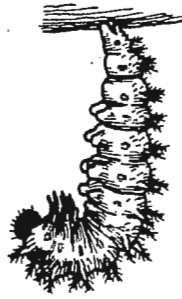
- ♦ The larvae stop eating and crawl to the lid of the cup.
- ♦ They spin a silk button on the lid.
- ♦ They hang head down from the silk button in a characteristic J-shape. This means that chrysalises will form in a matter of hours.

Figure 3-1

From caterpillar to chrysalis



A. Caterpillar at 25 to 35 mm (1 to 1½ inches)



B. Caterpillar hanging in a J-shape from a silk button



C. Chrysalis

MATERIALS

For each student

- 1 caterpillar or chrysalis in cup
- 1 hand lens
- 1 Activity Sheet – What Happens to the Caterpillar

For the class

- butterfly flight cage(s)
- twigs
- paper towels
- Class Calendar

Note: See Appendix A for ideas on how to construct free or low-cost butterfly cages.

PREPARATION

1. Two or three days after the transformation, you will need to move the chrysalises into the butterfly flight cages that you have prepared. Make free or low-cost cages from cardboard boxes or old lamp shades covered with nylon netting. Or construct a large hanging cage made of nylon netting. See Appendix A for details.
2. No matter which kind of flight cages you use, you will need to line the bottom with paper towels or absorb the fluids the butterflies expel as they emerge. Also, the lining provides them with a foothold.
3. Add a few twigs to each cage for the butterflies to use as perches.
4. Duplicate Activity Sheet – What Happens to the Caterpillar.

PROCEDURE

1. Distribute the caterpillars and hand lenses. Allow time for observations. To help students focus on the changing caterpillar, ask them to notice the size of their caterpillars (about 25 to 35 mm, or 1 to 1½ inches), their level of activity (relatively inactive), whether or not they have spun a silk button on the lid of the cup, and their position in the cup (may be hanging in J-shape from lid).

Chances are that you will find caterpillars in different stages of transformation, so allow children to observe one another's insects, too. There may be an opportunity for the class to witness a caterpillar going through its final molt and to see the chrysalis stage as it emerges from under the last exoskeleton.

2. Distribute Activity Sheet – What Happens to the Caterpillar to the class then give them time to complete it.

3. Hold a brief class discussion. Note that not all children will have the same observations because the caterpillars will transform over a period of several days. Discuss their different observations and add the important one to the Class Calendar.
4. Draw a box around the date on your calendar to indicate when the first chrysalises form. Continue the discussion by asking why some caterpillars have not yet become chrysalises. (Like people, they are individuals and develop at their own pace.) Ask those who still have caterpillars to predict what their insects will look like tomorrow. Emphasize again that predictions are not wild guesses, but are based on reasons. What reasons can children give for their predictions?

FINAL ACTIVITIES

1. After several days, the chrysalises that have dried and hardened are ready to be moved to their new flight cages. Be prepared to help children remove the lid from the cup. Caution them to treat each chrysalis very gently.
2. Put a small piece of double-sided tape on the top of the tissue. Show the children how to stick the tissue carefully on the side of the box – the closer to the bottom, the better. This way if the chrysalises fall, they won't fall far.
3. If any chrysalises have become attached from the silk button, lay them gently on the paper towels near the side of the box. Then the butterflies can grasp the side of the box when they emerge. Be forewarned that the chrysalises that do not hang suspended may emerge with some deformity.

EXTENSIONS

1. Read a trade book to the students about the life cycle of another kind of living thing.
2. Practice making predictions. Have children suggest other situations where they could make predictions (weather, sports events, the lunch menu, which butterfly will emerge first). Ask students to give a reason for each prediction they make.

EVALUATION

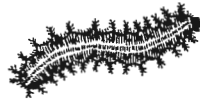
In Lesson 1, students made a drawing of a caterpillar. Now ask them to draw a caterpillar again. Ask them to label any parts they can. Both you and the children can compare these before and after drawings to see how much they have learned. Look for details such as a distinct head, eyes, bristles, body segments, true legs, and prolegs.

Activity Sheet – What Happens to the Caterpillar

Name:

Date:

Watch your caterpillar carefully when it gets to be this big.



The caterpillar will crawl to the top of the cup and spin a strong silk button.

Then it will hang upside down from the button. It will hang in a J-shape.

Draw your caterpillar hanging in a J-shape.

Next, the skin splits along the caterpillar's back. After the last molt, you will see the chrysalis.

Soon the chrysalis will become hard. Then it is time for you to put your chrysalis in a new cage. Write the date when the chrysalis appeared:

--

Draw a caterpillar. Label all of its parts.

LESSON 4

THE BUTTERFLY EMERGES

VIEW

An exciting event heralds the opening of this lesson. After 7 to 10 days in the chrysalis, the butterfly finally emerges. First, they “pump up” their wings and harden them. Then they are ready for flight.

OBJECTIVES

- ♦ Students observe the butterflies emerging from the chrysalis (or discover the butterfly and empty chrysalis case).
- ♦ Students observe some distinct butterfly body parts.

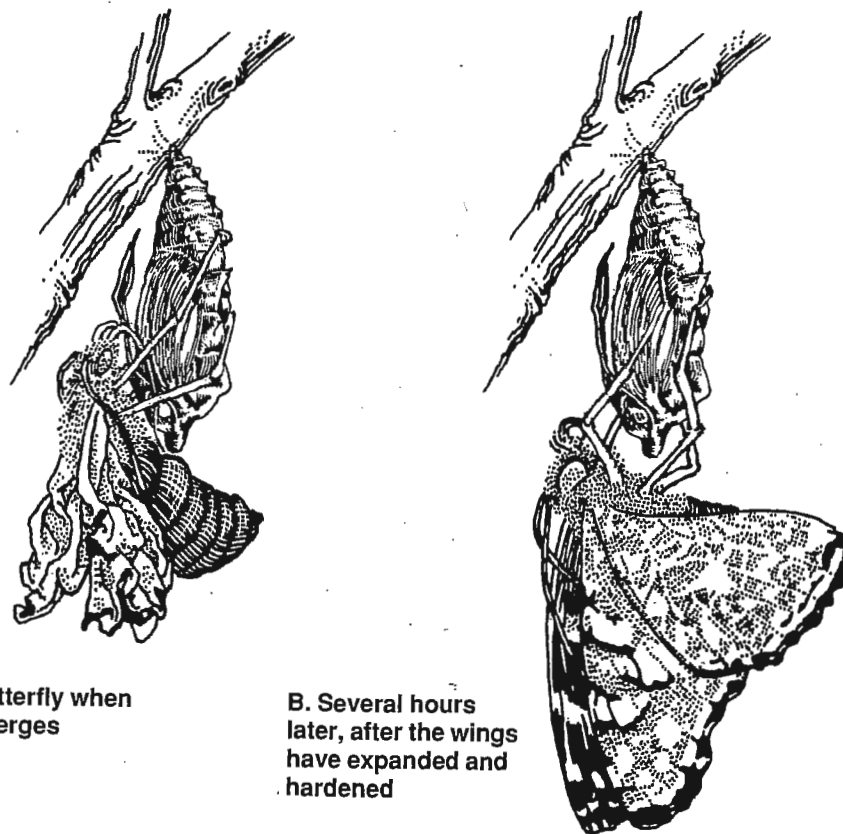
BACKGROUND

There have been signs that the butterfly is about to emerge: each chrysalis has darkened, and the orange and black wing patterns have become visible through the chrysalis. When it finally happens, the emergence takes only about 30 seconds. First, a small crack appears along the back of the chrysalis, followed by another crack along the side; these openings free the butterfly's back and six legs. Finally, the butterfly steps out of its chrysalis, pulling its wings and abdomen clear of its case.

When the butterfly first emerges, the wings are small and soft and slightly crumpled. The butterfly positions itself so that the wings hang downward. It then contracts its body, which forces fluids into the wings and makes them expand. In about 2 to 3 minutes, the wings will be fully expanded and hardened and ready to fly. The drawings in Figure 4-1 show the butterfly emerged and expanding its wings.

Figure 4-1

The butterfly emerges



A. The butterfly when it first emerges

B. Several hours later, after the wings have expanded and hardened

While the wings are hardening, the butterfly begins the important task of joining the two sections of its proboscis – the coiled, straw-like tongue used to siphon nectar from flowers. While the Proboscis is still soft and pliable, the butterfly rhythmically works the two halves from side to side as a way of connecting the interlocking spines. Once a connection has

been made at the head, the butterfly quickly zips together the remainder of the spines, down to the tiny delicate tip. For the first day or two after emerging, the butterflies do not require food and probably won't accept any. (See Lesson 5 for complete information on feeding.)

You will notice a red liquid coming from the tail end of the butterfly. This is **meconium**, or waste tissue, that is left over from metamorphosis. Assure your class that this is not blood; the butterflies simply are getting rid of some waste.

Once in a while, a butterfly emerges with deformed wings that will not expand and straighten out. This is unfortunate, but it is also one of those teachable moments. If questions arise, take the opportunity to discuss the butterfly's deformity and perhaps relate it to human disabilities.

If a butterfly escapes, be sure that you can pick it up without doing too much damage to it. Try to avoid capturing a butterfly in a small container or in cupped hands. Instead, gently pinch the front edge of the butterfly's wings together over its back. If you wait until the butterfly is alighted, sometimes you can get it to walk on your finger.

MATERIALS

For each student

- 1 Activity Sheet – The Life Cycle of a Butterfly

For the class

- Butterfly flight cage(s)
- Class Calendar
- Art Materials

PREPARATION

1. Duplicate Activity Sheet – The Life Cycle of a Butterfly.
2. Obtain any art supplies you may need.
3. If you decide to have students make a life cycle wheel as described in Procedure #6, duplicate one set of the black line masters included.

PROCEDURE

1. Enjoy the wonder of this miraculous transformation along with your class! There will be considerable excitement when the first butterfly is discovered and all the children will rush to see it. Because of the high level of excitement, the children will probably be unable to make any careful observations right now, but listen for any comments they make or the mention of any body parts.
2. Ask if anyone observed where the butterfly came from. The empty chrysalis case is quite noticeable. Often the newly emerged butterfly will be hanging from the case or will be nearby. Later, remove the empty chrysalis from the box for the children to see. Have them observe how it is split from end to end.
3. As butterflies emerge over the next several days, encourage your students to continue making frequent observations. Specifically ask them to look for:
 - ♦ Newly emerged butterflies pumping up their wings.
 - ♦ Butterflies in the process of joining the two halves of the proboscis
 - ♦ Empty chrysalises.
 - ♦ Differences in coloration between the tops of the wings and their undersides.
 - ♦ How the butterfly uses its feet, wings, antennae, and proboscis.
4. Pass out copies of Activity Sheet - The Life Cycle of a Butterfly, and let students conduct a sequencing activity with the pictures of the butterfly in various stages of its

life cycle.

5. Students can also use the Activity Sheet to make headbands or necklaces that they can wear home to explain the life cycle of the butterfly to their families. Or, save the headbands for your class to wear during the release of the butterflies ceremony in Lesson 6.

Instructions for making headbands and necklaces.

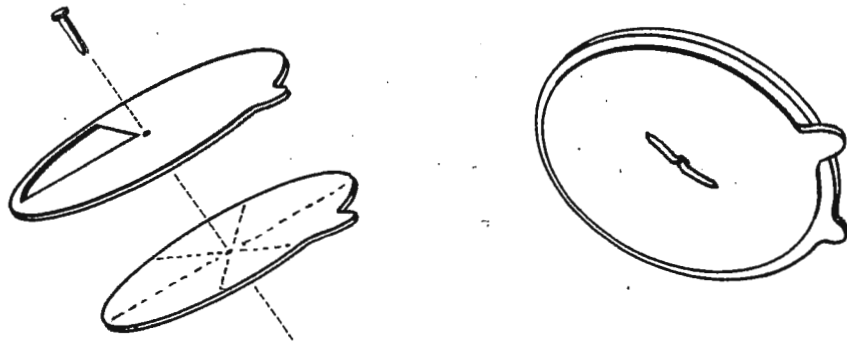
- ♦ ***To make a headband.*** Glue the pictures from the Activity Sheet to a long (3" x 20") strip of paper.
 - ♦ ***To make a necklace.*** Punch a hole at the top of each picture and string the pictures on a piece of yarn.
6. Another way to use the pictures from the Activity Sheet is in a lifecycle wheel. The following illustrations and instructions will help students make a wheel.

Instructions for making the Life Cycle Wheel:

- ♦ Cut out Section A.
- ♦ Cut out the life cycle pictures and paste in the correct sequence to the life cycle wheel (Section A).
- ♦ Cut out Section B, then cut out the window on the cover wheel.
- ♦ Assemble the two wheels by pushing a brass fastener through the dot marked in the center of each wheel (Figure 4-2).
- ♦ Rotate the handles. You should see each stage of the butterfly's life cycle through the window on the cover wheel.

Figure 3-1

How to make a life cycle wheel



FINAL ACTIVITIES

1. Hold a brief class discussion about what students observed today.
2. Record the important observations on the Class Calendar.

EXTENSIONS

Some classes have enjoyed handing out butterfly-shaped crackers as “emergence announcements” to the principal, other teachers, or other classes in the school.

EVALUATION

The life cycle headband may be used to evaluate a student’s ability to sequentially order the life stages of the butterfly. If you choose to help students make the life cycle wheel, it too may be used for this purpose.

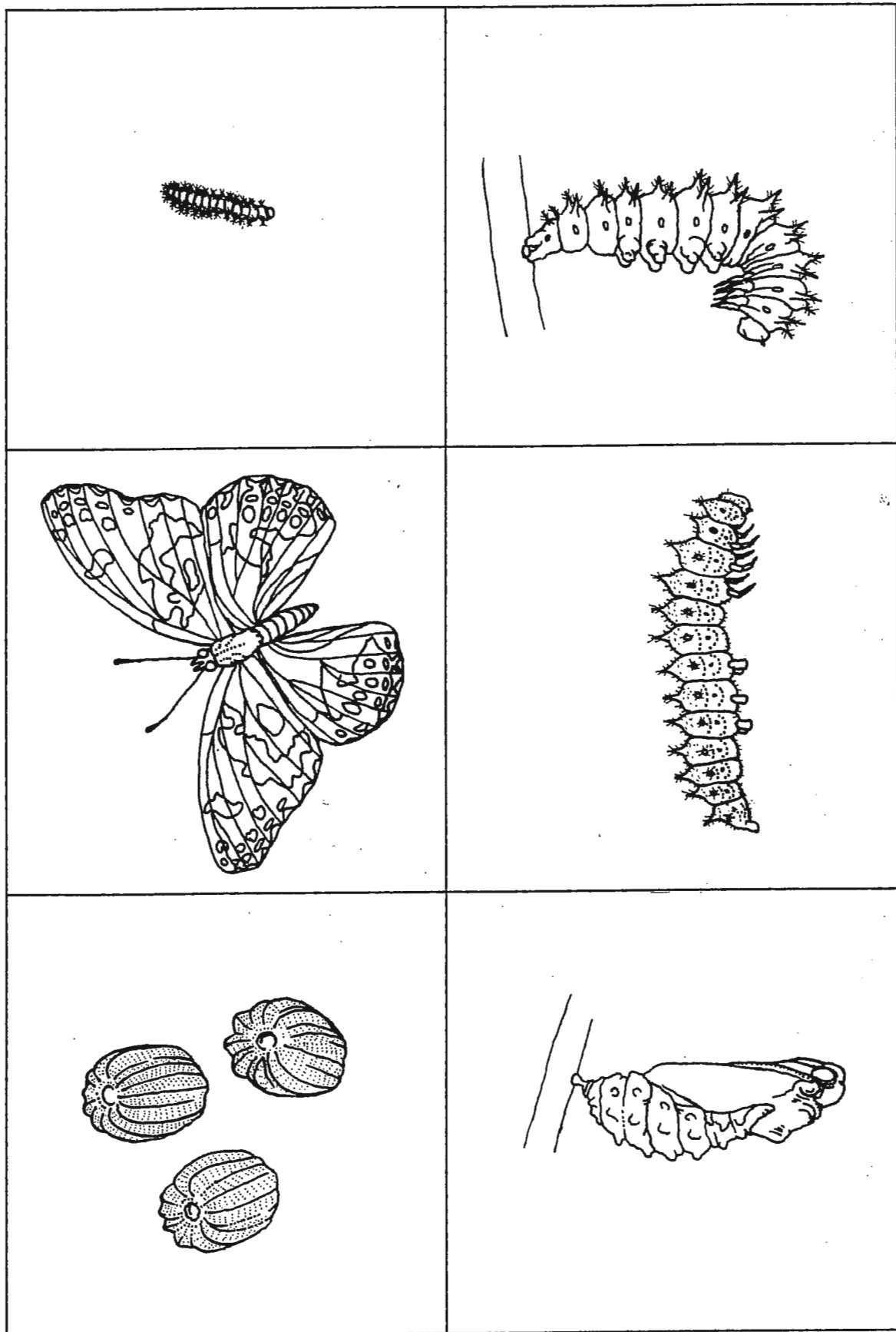
Activity Sheet – The Life Cycle of a Butterfly (p.1)

Name: _____

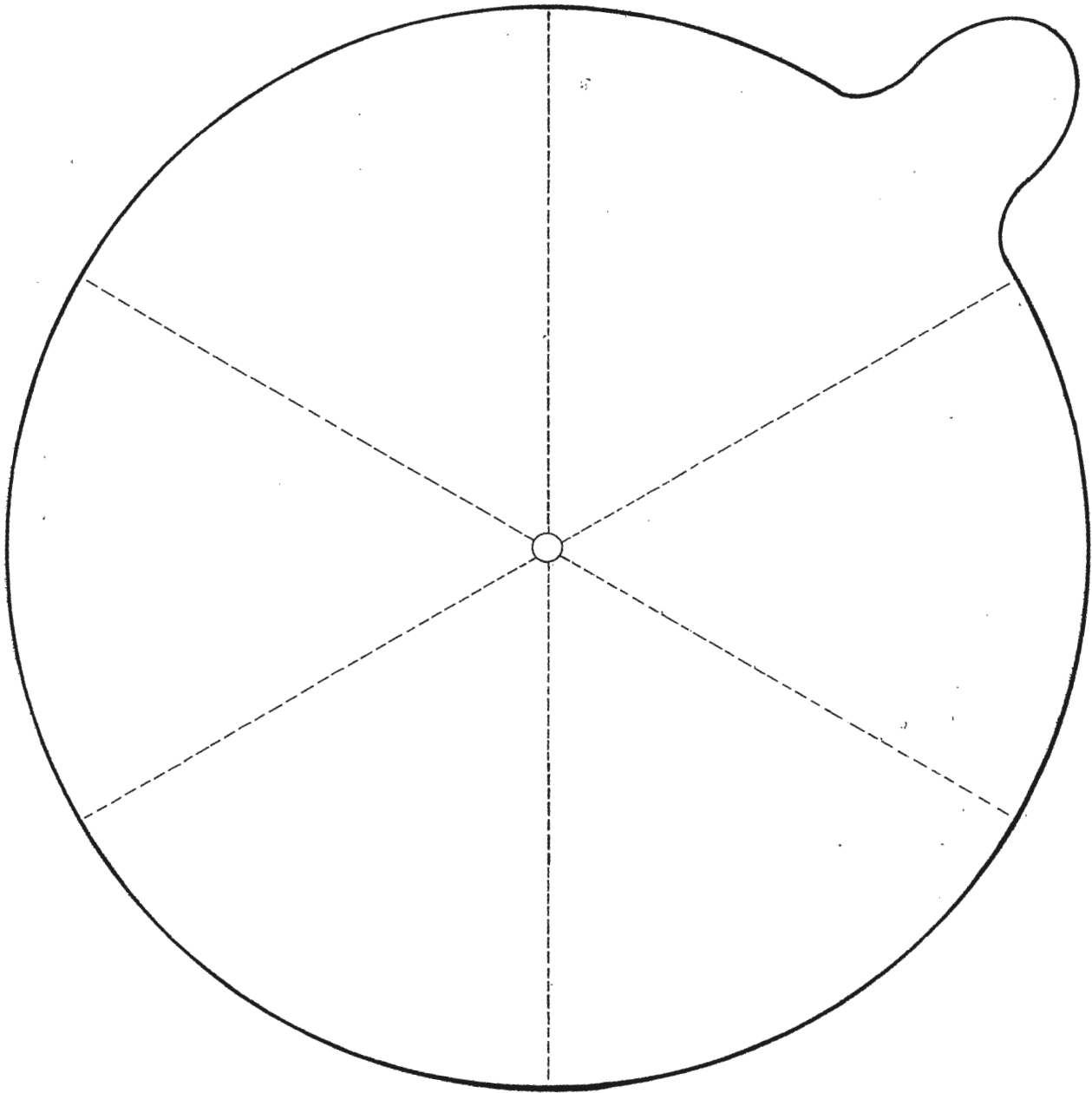
Write the date the butterflies emerged:

1. Color the pictures of the butterfly's life on the second page.
2. Cut out the pictures you colored.
3. Paste the pictures in the correct order below to show the butterfly's life.

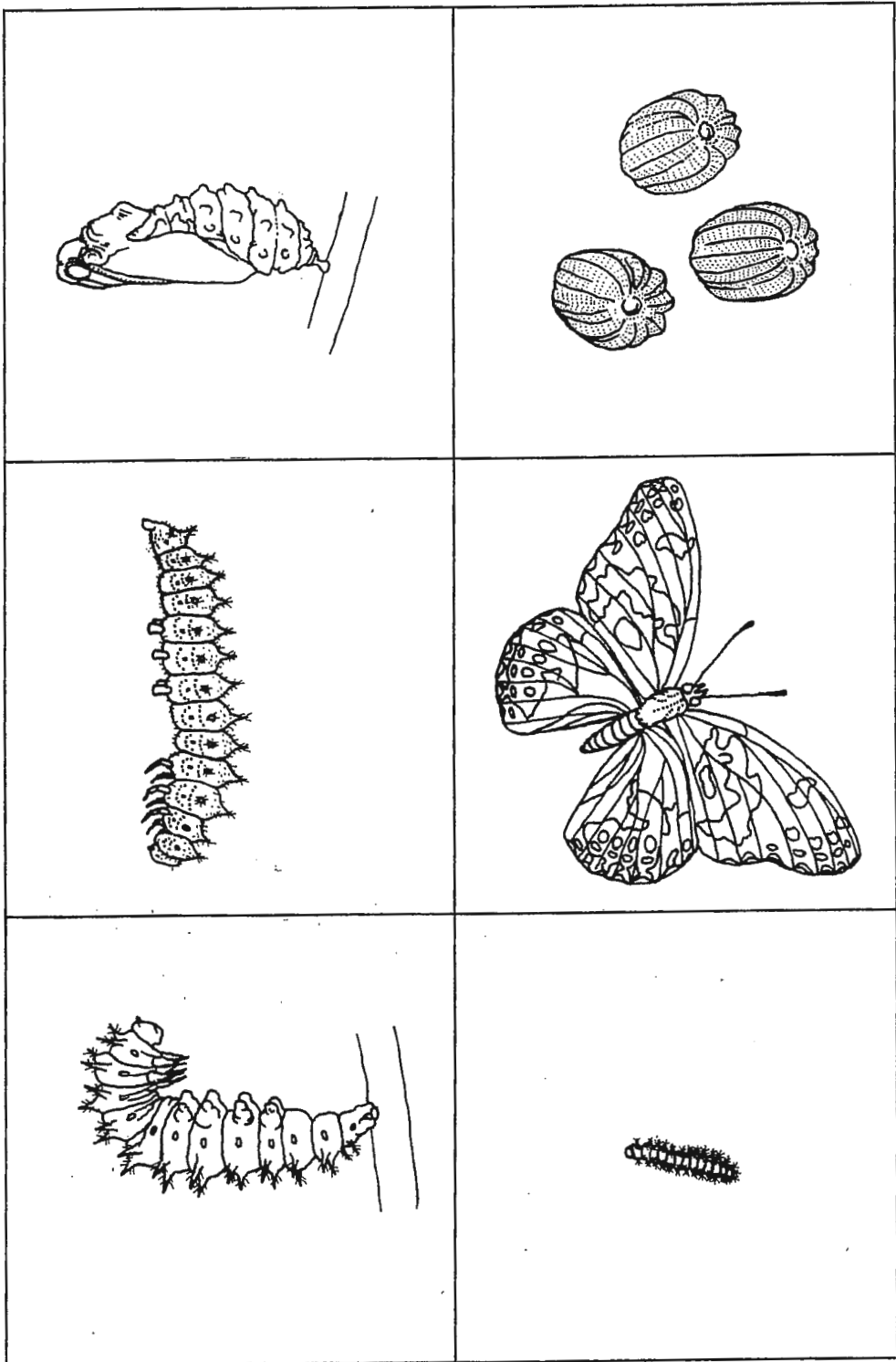
Activity Sheet – The Life Cycle of a Butterfly (p.2)



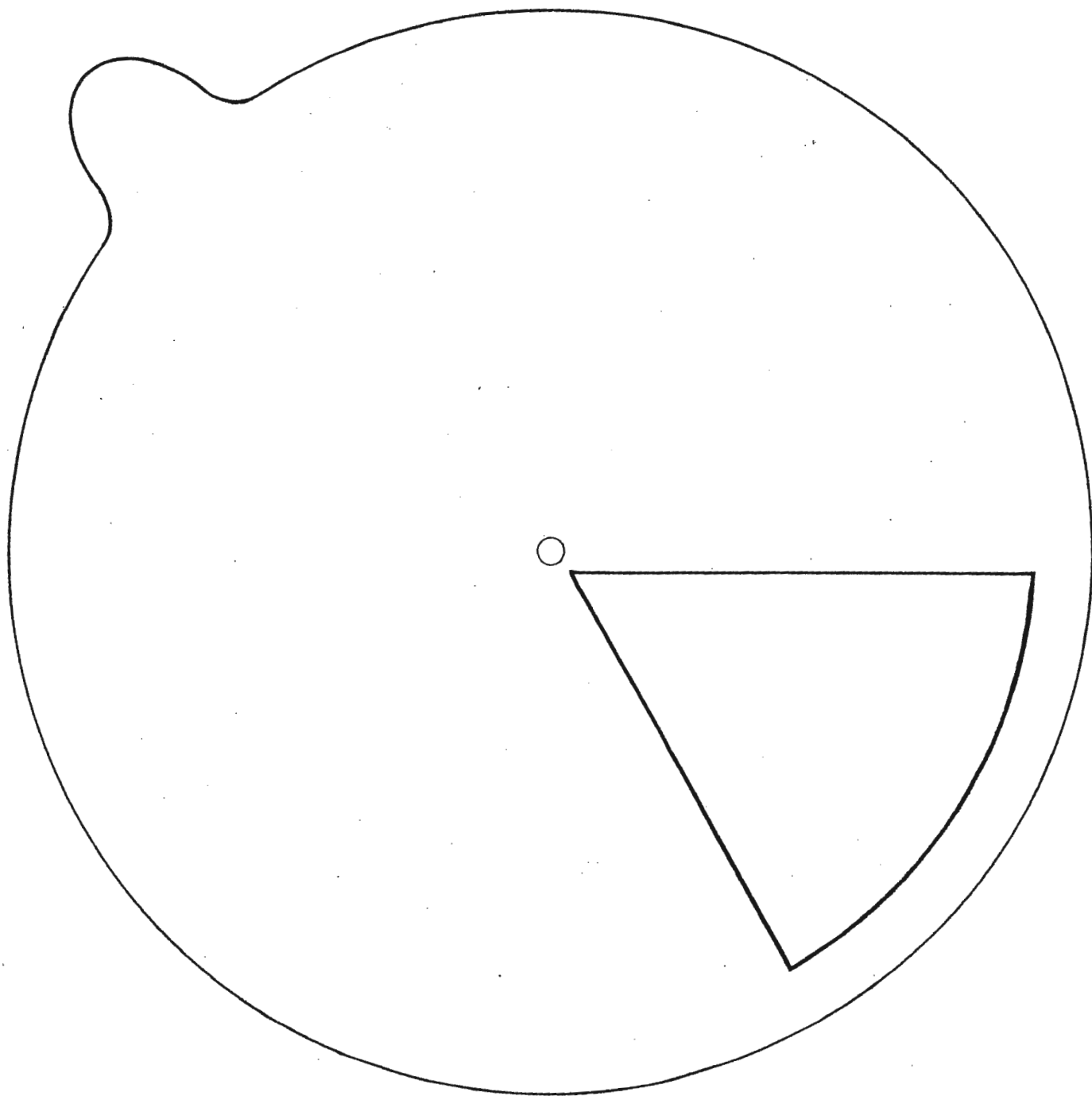
Life Cycle Wheel – Section A



Life Cycle Wheel – Pictures



Life Cycle Wheel – Section B



LESSON 5

FEEDING THE BUTTERFLIES

OVERVIEW

A day or two after emerging, the butterflies will need food. The children will find it satisfying to answer this need. They also will have ample opportunity to observe the butterfly's specialized proboscis in action.

OBJECTIVES

- ◆ Students compare the way a butterfly eats with the way a caterpillar eats.
- ◆ Students observe how the butterfly uses the proboscis to eat.

BACKGROUND

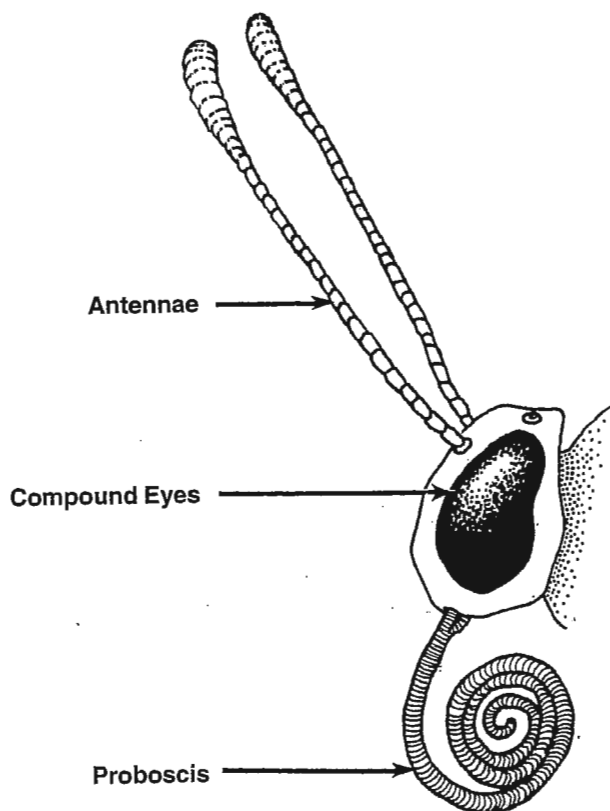
Different types of insects have different types of mouths. Insect mouth parts are highly specialized structures that determine what food the insect can eat. In the course of metamorphosis, the mouth parts of the Painted Lady changed from the chewing mandibles of the caterpillar stage to the sucking proboscis of the butterfly. While a caterpillar can chew only leafy food with its laterally moving jaws, the butterfly can suck only liquid foods through its tube like proboscis.

A butterfly carries its long proboscis coiled up close to its head, as shown in Figure 5-1. It is nearly as long as the butterfly's body and is easily seen. In nature, this long tube serves the butterfly well, allowing it to reach down deep into a flower to sip nectar.

In Step 1 of the Preparation section, there is a recipe for a sugar-water feeding solution and instructions on how to set up a feeding station. The food supply needs to be replenished every day, so keep the sugar water recipe handy. The children also might want to bring in natural foods for the butterflies (suggestions are given in Step 3 of the Preparation section). Natural foods allow you to underscore once again the idea that these butterflies are wild creatures and that they will be returning to nature.

Figure 5-1

The butterfly's head



MATERIALS

For each student

- 1 Activity Sheet – Butterflies Need Food

For the class

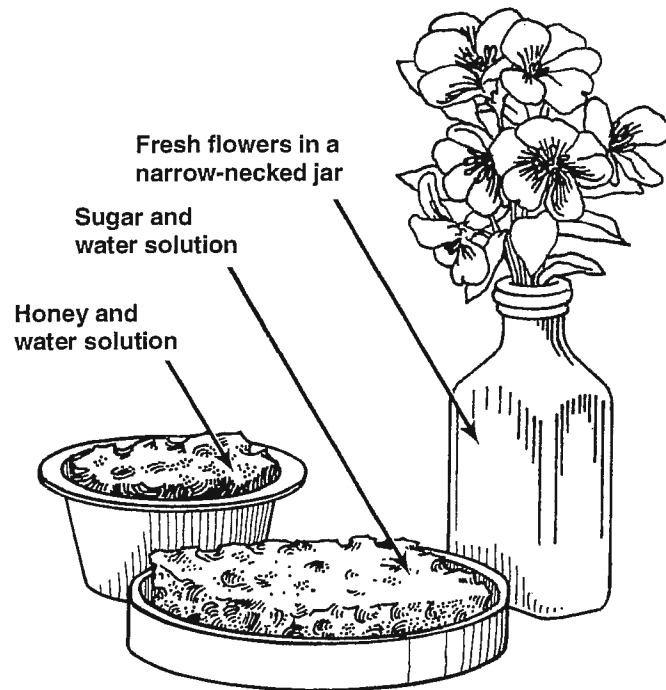
- 2 Feeding stations per cage consisting of:
 - sugar, water, sponge pieces and petri dishes or shallow jar lids.
- 1 Paper cups
- 1 Spoon
- 1 Class Calendar

PREPARATION

1. To make a feeding solution, for the adult Painted Lady, **mix together 1 teaspoon of sugar and $\frac{1}{2}$ teaspoon of water** in the paper cup. Cut the sponge into two equal pieces and saturate a piece of the sponge with the sugar-water solution. Place the sponge in a petri dish or a shallow jar lid. Put the setup on the floor of the butterfly cage.
2. Be sure to replenish the food supply at least once a day.
3. The butterflies will accept a wide variety of natural foods. You might try a solution of 1 part water to 1 part honey, a small chunk of fresh melon, or an apple. Fresh flowers of almost any kind will work too. They should be placed in a *narrow-necked* bottle of water so the butterflies won't drown. (See Figure 5-2). Some of the Painted Lady's favorite flowers are thistle, rose of Sharon, hollyhock, marsh mallow and buddleia.

Figure 5-2

Food for the butterflies



PROCEDURE

1. Ask students to name some different ways that people eat. Examples include biting, chewing, sipping, sucking and licking.
2. Review how the caterpillar ate (biting and chewing), then ask students for their ideas on how butterflies eat (sipping, sucking and drinking). Accept all student responses for now.

3. Tell students that today they will observe the butterflies eating. Describe the sugar-water solution you have prepared. Ask students to imagine how they would “eat” the sugar water. Would it be the same way they would eat a leaf?
4. Gather the class around the butterfly cage(s) and place feeding stations inside the cage(s). Allow students time to observe what happens.
5. Ask students what the butterflies are doing. Typical responses might include:
 - ◆ Flying or walking to the food.
 - ◆ Walking on the food (butterflies taste with their feet!)
 - ◆ Moving the antennae (to smell), touching things with the antennae.
 - ◆ Uncoiling the proboscis.
6. Ask students how they think the butterfly is uncoiling its proboscis (to eat). Ask how can you eat through a long tube like that? (by sipping as people do through a straw).

FINAL ACTIVITIES

1. Talk with the class about where they have seen butterflies feeding outside. Have they seen that butterflies suck the sweet nectar from deep inside the flowers, using their long proboscis?
2. Encourage students to bring in other foods for the butterflies to try. Caution them not to pick flowers without permission.
3. Read through Activity Sheet – Butterflies Need Food with the class. Give students time to complete it, and then collect the student work.
4. Record today’s observations on the Class Calendar.

EXTENSIONS

1. Hold a Lepidopterist Lunch! (A lepidopterist is someone who studies butterflies.) You could have a leafy green salad to crunch like a caterpillar and sweet juice to sip through a straw like a butterfly.
2. As a language arts activity, write a good-bye message or poem in preparation for the release ceremony. You could also write invitations to the ceremony to other classes, parents or teachers.

EVALUATION

Ask students to compare the way a caterpillar eats with the way a butterfly eats. They should mention these differences.

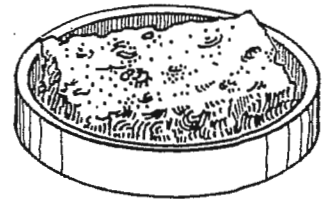
- ◆ A caterpillar chews its food but a butterfly sips it.
- ◆ A caterpillar eats leaves (solid) but a butterfly drinks nectar (liquid).

Activity Sheet – Butterflies Need Food

Name: _____

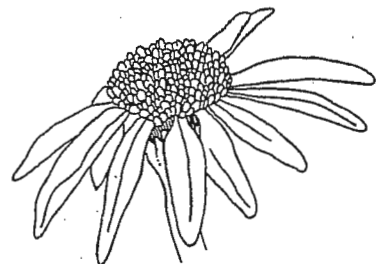
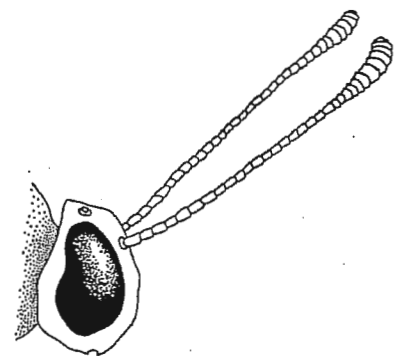
Date: _____

The butterflies will want to eat.
They will stand on the sponge and drink the sugar water.
The sponge will get dry.
Add more sugar water to the sponge every day.



What will the butterflies eat outside?

The butterfly has a long tube for a mouth.
The tube is called a proboscis.
Draw the proboscis on this butterfly.



LESSON 6

THE BUTTERFLIES GO FREE

OVERVIEW

In this lesson, the children release the butterflies. They come to understand that as wild creatures, the butterflies are part of the natural world and belong out in it.

OBJECTIVES

- ◆ Students realize that butterflies have their place in the environment.

BACKGROUND

In many ways, you have been preparing your students for this day ever since the caterpillars first arrived. Although it may be difficult for the children to say good-bye to the butterflies, the butterflies are better off in their natural environment, where they have room to fly, can find a variety of foods, and can mate then lay eggs to produce the next generation. Butterflies also are beneficial to their environment. Not only are they beautiful, but they pollinate flowers and provide food for birds and other animals.

An adult Painted Lady butterfly only lives for about two weeks even under the best of conditions, so you will want to select a time for the release that takes this into account. Allow about 5 to 7 days for student observation, and then let the butterflies go. If they are indoors much longer, the possibility of tattered wings, injuries and even death become more likely. If one of the butterflies dies, the children may become upset. You will want to recognize and be sensitive to these feelings. You also may want to use this opportunity to discuss death as a natural part of the life cycle.

Plan to release the butterflies when the outside temperature has reached 60°F (15°C) or higher. In planning where the release should take place, survey your schoolyard for possibilities. Ideally, the location should provide leaves for a resting place and cover and flowers for a food source. Butterflies compete very well in the natural environment, and often are seen in the vicinity for several days after their release.

Materials

For each student

- 1 Headband or necklace made in Lesson 4
- Writing paper

For the class

- Butterfly flight cage(s)
Class Calendar

PREPARATION

1. Select a date and time of the day for the release of the butterflies
2. Take the class outside to survey the schoolyard and select a site for the release.
3. Consider inviting guests to the release ceremony. Send invitations to other classes, parents or the principal.
4. Recruit several other adults to help.
5. Read the Extensions section in this lesson and obtain materials for any of the projects you plan to do.

PROCEDURE

1. Before releasing the butterflies, hold a brief discussion indoors about it. Ask the class, "Do you think we should keep the butterflies in the box or let them go? Try to give a reason for your answer." Typically students will respond that they want to keep the butterflies because they are pretty and interesting to watch. Some may also express concern that the butterflies will not be able to fend for themselves.

But most students will recognize that the butterflies can survive in the outside world because that is their natural home. The advantage of letting them go are that they will have more space, they will be able to find flowers, and they will mate and produce eggs, thus ensuring that there will be more butterflies.

2. Take the cage(s) outside and have students sit around them. This might be a good time to recite a butterfly poem. Reciting poems or telling stories written by the students or singing a song would also be appropriate.
3. Open the cage(s) and wait patiently. It will take some time for the butterflies to find their way out of the cages and fly off. Ask children to notice where they land and how their coloring helps camouflage them. Observe, too, how they fly. Is it in a straight line, up and down, or zigzag?
4. After a final farewell, return to the classroom to talk and write about the experience.

FINAL ACTIVITIES

1. Ask children to imagine how different their butterfly's life is now that it is free. Either record their thoughts for them or ask them to write their ideas.
2. Record today's release ceremony on the Class Calendar.



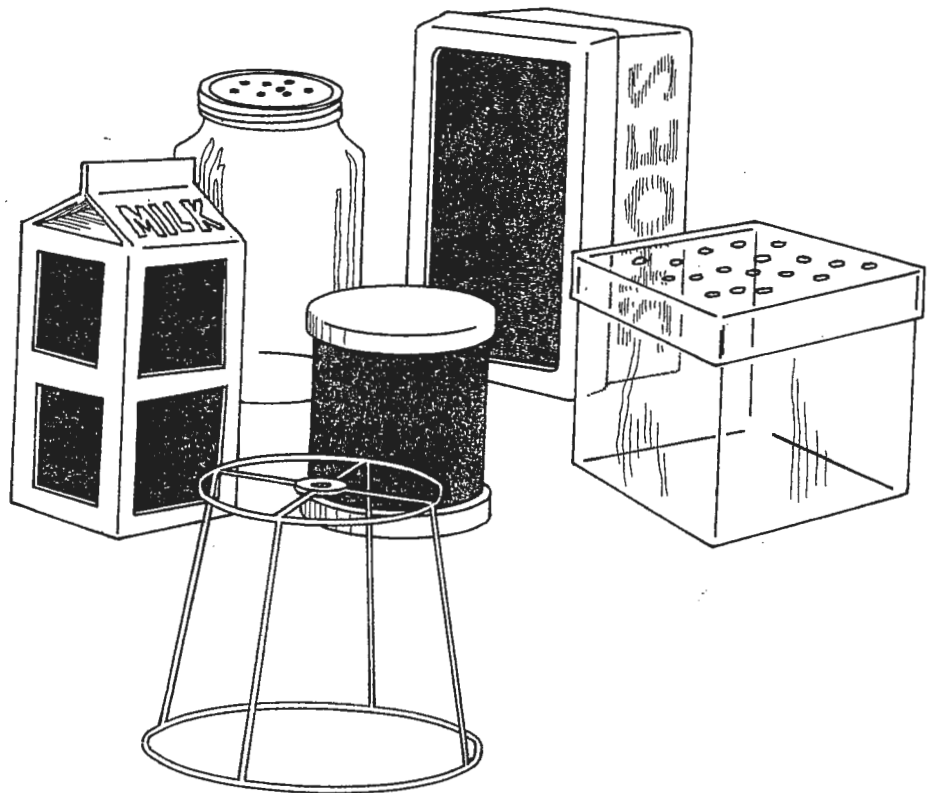
**HOW TO MAKE FREE OR LOW COST
BUTTERFLY CAGES**

If you would like to make cages, here are some suggestions of how to make some fairly easily and inexpensively. Different possibilities are shown in Figure A-1.

1. Replace the fabric on a big old lap shade frame with dark-colored nylon netting.
2. Cut a large window in a cardboard box, leaving about a 1-inch frame around the edges. Cover the window openings with dark-colored nylon netting, taped or stapled into place.
3. Punch holes in the lid of a large glass jar or plastic box.

Figure A-1

Materials for building butterfly cages



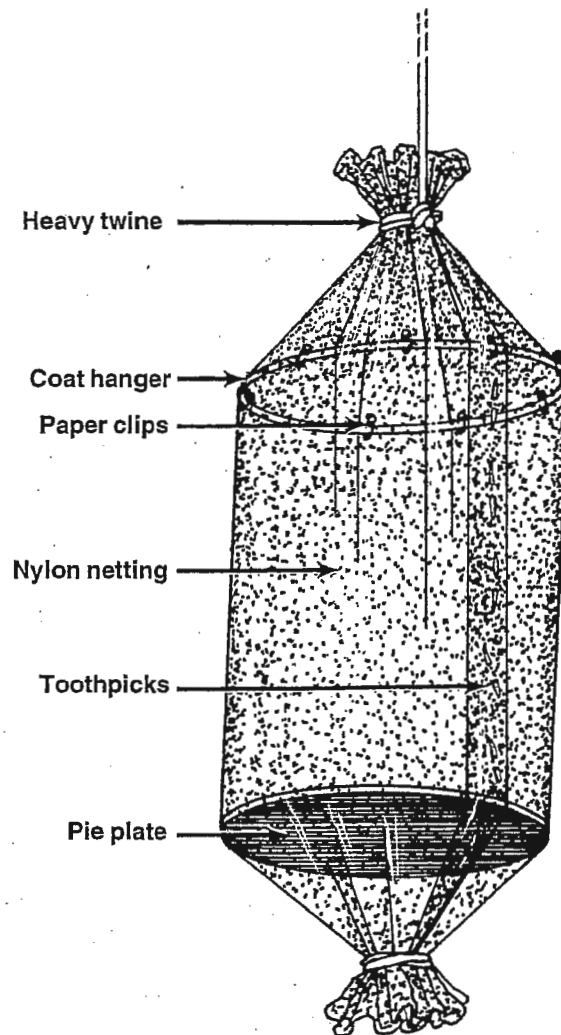
4. For a hanging cage, try the one illustrated in Figure A-2.

Materials for one cage include:







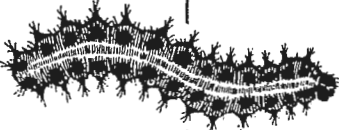





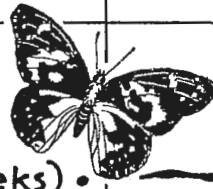
- 1 Wire coat hanger
- 5 Feet of nylon netting in a dark color
- Heavy cardboard or an aluminum pie plate for the floor
- Heavy twine
- Paper Clips
- Needle and thread or toothpicks to close up the side seam

Figure A-2

A completed hanging cage



The Life Cycle of the Painted Lady Butterfly

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						
—		EGG (3 to 5 Days)		—		CATERPILLAR
						
....	—		CATERPILLAR (12 to 18 Days)		
						
....	—		CATERPILLAR		
....						
....	CATERPILLAR	—		CHRYSALIS (7 to 10 Days)....	
..					
..	CHRYSALIS	—		ADULT BUTTERFLY (2 Weeks)	

