

# *It's Not Magic – It's Metamorphosis*

## Background Information for Teachers

The life cycle of the ladybug, or ladybird beetle, is a complete metamorphosis. The life cycle is as follows:

- Eggs (laid on leaves and hatch in 3-7 days)
- Larva (hatches from eggs and eats aphids, small plant sucking insects, for 2-4 weeks)
- Forms a pupa (chrysalis formed around the larva while it undergoes metamorphosis for 5-7 days)
- Larva emerges as an adult beetle, which lives for a few months and lays eggs.

Ladybug or ladybird comes from the Middle Ages, when the beetles were associated with the Christian Virgin Mary and called, "beetles of Our Lady." Not all ladybugs are ladies though: there are both male and female ladybugs.

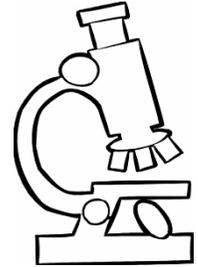
Ladybugs are adept predators, feeding on aphids during most of their lifetime as a larva and adult. Aphids are harmful to most plants because they suck out the sap from the plant. Aphids attempt to escape from their ladybug predators by moving to the top of the leaf, then jumping off and using gravity to leave the area entirely.

Ladybugs were first sent into space in 1999 on the first NASA space shuttle commanded by a woman, Eileen Collins. They were monitored to see if they could survive and capture their prey - aphids - in the zero-gravity of space, where the aphids couldn't use gravity to escape. However, even in zero gravity, both species survived.

Image Credit <http://www.stevespanglerscience.com/product/1645>

## Time to Experiment: LADY BUG BOOGIE -

**Materials:** (you must provide materials unless otherwise noted)  
None – just some space to move about and students.



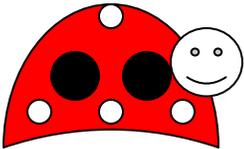
### **Procedure:**

Have the students simulate the life cycle of the ladybug:

1. Show your students the life cycle pieces of the ladybug (in the kit)
  - a. Eggs - baby ladybugs waiting to hatch (what else hatches from eggs? **other insects, birds, reptiles like lizards and alligators, and fish, even 2 mammals in Australia---the duck-billed platypus and the spiny anteater**)
  - b. Larva - the eggs hatch into baby ladybugs (**doesn't look like a beetle does it?**)
  - c. Pupa - the larva eats, and grows, eats and grows! When it's had enough, it wraps itself in a warm hard blanket and begins to change (**called metamorphosis - also happens in butterflies**).
  - d. Adult - this is how most of us see the ladybug in her bright red and black wing coverings, flying around helping plants by eating the animals (aphids) that eat plants.
2. Have the students line up in two rows and hunch down low like the eggs of the ladybug (show them the egg rack)
3. Have the students hatch out slowly and move apart, crawling on all fours like a larva (show them the larva)
4. Now right where they are, have them "freeze" and bend over and reach for their toes to form the chrysalis of the pupa stage and get ready to metamorphose
5. Have your students stay in this position for a few seconds, and then they may emerge from their chrysalis and fly away home (like in the old poem - *Ladybird, ladybird fly away home*).

### **Extensions:**

1. Have your students create their own stages of metamorphosis.
  - a. Fold and cut a white paper plate in half
  - b. Draw a ladybug design on the plate (either a two-spotted, six-spotted, or no spot ladybug) and attach a head.
  - c. Punch 4 holes in the plate - 1 on top and 3 on the ends on the bottom.
  - d. Attach a string through top hole of the ladybug (to hang up).
  - e. Have students draw eggs, larva, and chrysalis (using the models from the trunk).
  - f. Have the students cut out the eggs, larva, and chrysalis
  - g. Using a short piece of yarn or string, attach their pictures to the bottom of the ladybug.



### **Conclusions:**

Your students will be able to understand and identify some of the elements of the ladybug life cycle and understand metamorphosis.

# Benchmarks and Grade Level Expectations

## Benchmarks K-4

### Science as Inquiry

- A. Abilities Necessary to do Scientific Inquiry
  - SI-E-A1 asking appropriate questions about organisms and events in the environment.
  - SI-E-A2 planning and/or designing and conducting a scientific investigation.
  - SI-E-A3 communicating that observations are made with one's senses.
  - SI-E-A6 communicating observations and experiments in oral and written formats.
  - SI-E-A7 utilizing safety procedures during experiments.
- B. Understanding Scientific Inquiry
  - SI-E-B5 presenting the results of experiments.
  - SI-E-B6 reviewing and asking questions about the results of investigations.

### Life Science

- A. Characteristics of Organisms
  - LS-E-A2 distinguishing between living and nonliving things;
- B. Life cycles of organisms
  - LS-E-B1 observing and describing the life cycles of some plants and animals (1, 3);
  - LS-E-B2 observing, comparing, and grouping plants and animals according to likenesses and/or differences (1, 2, 4);
  - LS-E-B3 observing and recording how the offspring of plants and animals are similar to their parents (1, 2, 3, 4);

### Language Arts: Reading

- ELA-1-E1 Gaining meaning from print and building vocabulary using a full range of strategies (e.g., self-monitoring and correcting, searching, cross-checking), evidenced by reading behaviors using phonemic awareness, phonics, sentence structure, and meaning
- ELA-1-E2 Using the conventions of print (e.g., left-to-right directionality, top-to-bottom, one-to-one matching, sentence framing)
- ELA-1-E3 Adjusting speed of reading (e.g., appropriate pacing, intonation, expression) to suit the difficulty of materials and the purpose for reading (e.g., enjoying, learning, problem solving)
- ELA-1-E5 Reading, comprehending, and responding to written, spoken, and visual texts in extended passages (e.g., range for fiction passages-450-1,000 words; range for nonfiction-450-850 words)
- ELA-1-E6 Interpreting (e.g., retelling, summarizing) texts to generate connections to real-life situations

### Language Arts: Writing

- ELA-2-E3 Creating written texts using the writing process
- ELA-2-E4 Using narration, description, exposition, and persuasion to develop compositions (e.g., stories, letters, poems, logs)
- ELA-2-E5 Recognizing and applying literary devices (e.g., figurative language)
- ELA-2-E6 Writing as a response to texts and life experiences (e.g., journals, letters, lists)
- ELA-3-E1 Writing legibly, allowing margins and correct spacing between letters in a word and words in a sentence
- ELA-3-E2 Demonstrating use of punctuation (e.g., comma, apostrophe, period, question mark, exclamation mark), capitalization, and abbreviations in final drafts of writing assignments
- ELA-3-E3 Demonstrating standard English structure and usage by writing clear, coherent sentences
- ELA-3-E4 Using knowledge of the parts of speech to make choices for writing
- ELA-3-E5 Spelling accurately using strategies (e.g., letter-sound correspondence, hearing and recording sounds in sequence, spelling patterns, pronunciation) and resources (e.g., glossary, dictionary) when necessary

### Language Arts: Critical Thinking

- ELA-7-E1 Using comprehension strategies (e.g., sequencing, predicting, drawing conclusions, comparing and contrasting, making inferences, determining main ideas) to interpret oral, written, and visual texts
- ELA-7-E2 Using basic reasoning skills, life experiences, and available information to solve problems in oral, written, and visual texts
- ELA-7-E3 Recognizing an author's purpose (reason for writing), and viewpoint (perspective)
- ELA-7-E4 Using basic reasoning skills to distinguish fact from opinion, skim and scan for facts, determine cause and effect, generate inquiry, and make connections with real-life situations

## Grade Level Expectations K-4

### Science as Inquiry

#### Abilities Necessary to do Scientific Inquiry

K 1 2 3 4

1 1 1 1 1	Ask questions about objects and events in the environment
2 2 2 2 2	Pose questions that can be answered by using students' own observations, scientific knowledge, and testable scientific investigations
4 5 6 6 7	Use the five senses to describe observations
6 7 8 8 9	Select and use developmentally appropriate equipment and tools (e.g., magnifying lenses, microscopes, graduated cylinders) and units of measurement to observe and collect data
7 8 9 9 10	Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate
8 9 10 11 12	Use a variety of appropriate formats to describe procedures and to express ideas about demonstrations or experiments (e.g., drawings, journals, reports, presentations, exhibitions, portfolios)
9 10 11 12 13	Identify and use appropriate safety procedures and equipment when conducting investigations (e.g., gloves, goggles, hair ties)

#### Understanding Scientific Inquiry

K 1 2 3 4

13 14	Identify questions that need to be explained through further inquiry
14 15	Distinguish between what is known and what is unknown in scientific investigations
20	Determine whether further investigations are needed to draw valid conclusions

### Life Science

#### Characteristics of Organisms

K 1 2 3 4

22 28	Classify objects in a variety of settings as <i>living (biotic)</i> or <i>nonliving (abiotic)</i>
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### Physical Science

#### Properties of Objects and Materials

K 1 2 3 4

16	Observe and describe common properties of solids, liquids, and gases
17	Sort and classify objects by their state of matter
22	Investigate and explain conditions under which matter changes physical states: heating, freezing, evaporating, condensing, boiling

### Earth and Space Science

#### Properties of Earth Materials

K 1 2 3 4

37	Illustrate how water changes from one form to another (e.g., freezing, melting, evaporating)
35	Examine soils to determine that they are often found in layers
39	Identify the characteristics of soil, according to color, texture, and components, including <i>living (biotic)</i> and <i>nonliving (abiotic)</i> substances
36	Observe and record the properties of rocks, minerals, and soils gathered from their surroundings (e.g., color, texture, odor)
45	Recognize and describe that rock is composed of different combinations of minerals
46	Describe earth processes that have affected selected physical features in students' neighborhoods (e.g., rusting, weathering, erosion)
55	Recognize that sedimentary rocks are composed of particles that result from weathering and erosion (e.g., sandstones, conglomerates)

### Language Arts

#### Standard 1 – READING

K 1 2 3 4

1,5	1-5	1,2,4,5	1-6	1-3	ELA-1-E1
6,7	9				ELA-1-E2
9,10	15	10	10	5,7	ELA-1-E5
11	16	11	11	6	ELA-1-E6

#### Standard 2 – WRITING

K 1 2 3 4

19,20	26				ELA-2-E1
21	27		23	22	ELA-2-E2
23	28				ELA-2-E3
25	29	25			ELA-2-E4
	30	26			ELA-2-E5
27	31	27	26		ELA-2-E6

#### Standard 3 – GRAMMAR

K 1 2 3 4

28-30	32	27	28	27	ELA-3-E1
31	33,34	28,29	29,30	28	ELA-3-E2
	35-38	30	31	30,31	ELA-3-E3
	39	31,32	32		ELA-3-E4
32	40-43	33-35,37	33,34,36	32	ELA-3-E5

#### Standard 7 – CRITICAL THINKING

K 1 2 3 4

	22	17	14		ELA-7-E1
		22	18	15	ELA-7-E2
	24		19,20	16	ELA-7-E3
	25	24	21	19	ELA-7-E4