Young Naturalists

Teachers Guide

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"Special Delivery" Multidisciplinary Classroom Activities

Teachers guide for the Young Naturalists article "Special Delivery," by Mary Hoff. Published in the March–April 2004 *Volunteer*, or visit www.dnr.state.mn.us/young_naturalists/eggs.

Young Naturalists teachers guides are provided free of charge to classroom teachers, parents, and students. Each guide contains a brief summary of the article, suggested independent reading levels, word count, materials list, estimates of preparation and instructional time, academic standards applications, preview strategies and study questions overview, adaptations for special needs students, assessment options, extension activities, Web resources, copy-ready study questions with answer key, and a copy-ready vocabulary sheet. Users are encouraged to provide feedback through an online survey at www.dnr.state.mn.us/education/teachers/activities/ynstudyguides/survey.html.

Summary

"Special Delivery" takes readers inside the egg, where the embryos of most animals on Earth develop. Characteristics of eggs and egg production are described across a variety of phyla, including insects, invertebrates (snails, spiders, crayfish, clams, and nightcrawlers), amphibians, fish, reptiles, and birds. The text is accompanied by photographs of animals and their eggs, as well as by illustrations of egg anatomy across phyla. Note: High school biology teachers may find "Special Delivery" a useful resource for the study of embryology.

Suggested reading levels: Upper elementary through high school

Total words: 1,501

Materials: One dozen eggs (six hard-boiled, six raw), paper, pencils, pens, incubator, and resources from your media center

Preparation time: One to two hours, not including time for extension activities

Estimated instructional time: Two 50-minute class periods (not including extensions)

Minnesota Academic Standards applications: "Special Delivery" may be applied at the upper elementary through 12th grades to the following strands (I, II, III) and substrands (A-E):

I. Reading and Literature
   A. Word Recognition, Analysis and Fluency
   B. Vocabulary Expansion
   C. Comprehension
II. Writing
   A. Types of Writing
   B. Elements of Composition
   C. Spelling
   D. Research
   E. Handwriting and Word Processing
III. Speaking, Listening and Viewing
   A. Speaking and Listening
   B. Media Literacy

Standards for science and social studies are currently in draft form and may be viewed on the Minnesota Department of Education Web site (www.education.state.mn.us). Young Naturalists articles have proven to be excellent resources for interdisciplinary collaborations. When social studies and science standards are approved by the Legislature, we will highlight strands and substrands to which various articles apply.

Preview

Hard-boil six eggs and bring them to class with six raw eggs. Cut the hard-boiled eggs in half lengthwise so students can examine both the shells and interior contents. Peel away the shell to reveal the shell membrane. Crack the remaining eggs into shallow bowls so students can see the chalazae. Ask the class what kinds of animals develop inside eggs. Make a list as students brainstorm. Tell the class that the vast majority of animals on Earth develop inside eggs.

Vocabulary preview

The vocabulary in "Special Delivery" is more challenging than that found in previous Young Naturalists articles. Please review the italicized words as well as the vocabulary sheet at the end of this guide. Your vocabulary preview strategy will depend on the age and background knowledge of your students. All terms specific to egg anatomy are defined in a highlighted box on page 41. Other terms necessary for good comprehension are listed on the vocabulary preview sheet. You may decide to preview all or some of these words; however, extended vocabulary preview may discourage some readers or frustrate other readers who are anxious to begin reading. Some words may be displayed on poster board, where they may be referred to while you read the article. Vocabulary flashcards may also be a useful study aid.

Study questions overview

Study questions parallel the story (the answer to the first question appears first in the article, followed by the second, and so on). This is an important organizational tool for students and should be emphasized **before** you begin working on the study questions. **Preview the entire guide with your class before you read the article.** You may wish to read the story aloud and complete the study questions in class or in small groups. The questions may be assigned as homework, depending on the reading ability of your students. Inclusion teachers may provide more direct support to special needs students (see Adaptations section). The study questions may be also used as a quiz.

Adaptations

Read aloud to special needs students. Abbreviate the study questions or highlight priority items to be completed first. If time allows, remaining items may be attempted. For example, items 1, 2, 3, 4, 5, 6, 12, and 15 will give students some basic knowledge of egg development. Peer helpers, paraprofessionals, or adult volunteers may lend a hand with the study questions. With close teacher supervision, cooperative groups can also offer effective support to special needs students, especially for extension activities.

Assessment

You may use all or part of the study questions, combined with vocabulary, as a quiz. Other assessment ideas: (1) Students may create a chart comparing and contrasting the eggs of animals described in the article. While all eggs have some features in common, each has evolved unique characteristics. (2) Students may draw, color, and label eggs from different taxonomic groups. (3) Assign an essay exam comparing egg anatomy of amniotes (birds and reptiles) and anamniotes (amphibians and fish), including explanations for their differences.

Extension activities

1. Incubating and hatching eggs in the classroom has long been an effective way to introduce students to embryology and reproduction. Finding homes for the chicks can be challenging, however, especially in urban areas.
2. Several excellent interdisciplinary activities are available from Education World (see Web Resources).
3. The McClung Museum (see Web Resources) provides an interactive Web site on dinosaur eggs.
4. "Special Delivery" can be used to introduce students to the science of embryology (see Web Resources).
5. Research the impacts of DDT or other environmental pollutants on eggs.
6. Your students can study frogs. Check out A Thousand Friends of Frogs (cgee.hamline.edu/frogs) or Frogwatch USA (www.nwf.org/frogwatchUSA).

Web resources

Education World: Lesson planning article, "Why all the EGGS-citement About Eggs?"
www.education-world.com/a_lesson/lesson058.shtml

McClung Museum: Hatching the Past: Dinosaur Eggs.
mcclungmuseum.utk.edu/specex/hatching/hatching.htm

The Inquiry Page offers several units on hatching chicken eggs.
www.inquiry.uiuc.edu

The University of Wisconsin offers an excellent tutorial for high school students on amphibian embryology:
worms.zoology.wisc.edu/frogs/welcome.html

Study Questions

"Special Delivery," by Mary Hoff
Minnesota Conservation Volunteer, March–April 2004
www.dnr.state.mn.us/young_naturalists/eggs

Name_____Period _____Date_____

1. Eggs come in many colors, shapes, and sizes. What do all eggs have in common?

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_____

2. Give three examples of animals that hatch from eggs:

_____

3. Describe the egg's journey from its formation inside the mother's body until it is deposited in the outside world. _____

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4. For most eggs, what must happen for a new animal to begin to grow? _____

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5. How does this process differ in birds and fish? _____

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6. Why do insects lay their eggs only in certain locations? _____

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7. Some insects, such as grasshoppers and cockroaches, enclose their eggs in an egg case. Why?

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8. Why are some insects' eggs compared to time capsules? _____

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9. Invertebrates have many strategies for protecting their eggs. Describe two. _____

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10. You are planting your garden and you find a lemon-shaped egg case about the size of a pea. What might it be? _____

11. How do you think the jelly coat that surrounds an amphibian's eggs acts like a greenhouse?

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12. Where do all Minnesota frogs lay their eggs? _____

13. Why don't baby fish (fry) have to eat for a few days after they hatch? _____

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14. Which animal lays eggs about the size of ping-pong balls? _____

15. Some eggs hatch inside the mother's body. Give two examples.

_____

16. Why do you think birds' eggs have different colors? _____

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Study Questions Answer Key

"Special Delivery," by Mary Hoff
Minnesota Conservation Volunteer, March–April 2004
www.dnr.state.mn.us/young_naturalists/eggs

1. Eggs come in many colors, shapes, and sizes. What do all eggs have in common? **They contain everything the developing animal needs to grow.**

2. Give three examples of animals that hatch from eggs: **turtles, spiders, birds (others)**

3. Describe the egg's journey from its formation inside the mother's body until it is deposited in the outside world. **The egg (ovum) forms in the mother's ovary as a single cell. The mother's body makes food (yolk) for the developing animal. The ovum travels down the oviduct and as it does the shell is formed. Finally, the egg is laid or deposited outside the mother's body.**

4. For most eggs, what must happen for a new animal to begin to grow? **The egg must be fertilized by the male.**

5. How does this process differ in birds and fish? **Bird eggs are fertilized inside the mother's body. Fish eggs are fertilized outside the mother's body.**

6. Why do insects lay their eggs only in certain locations? **A food source must be nearby for the baby insects once they hatch from their eggs.**

7. Some insects, such as grasshoppers and cockroaches, enclose their eggs in an egg case. Why? **The egg case protects the eggs from predators and keeps the eggs from drying out.**

8. Why are some insects' eggs compared to time capsules? **If conditions are poor for the survival of the young, the eggs can sit for many years until conditions improve.**

9. Invertebrates have many strategies for protecting their eggs. Describe two. **Answers may include: pond snails attaching eggs to underwater plants, spiders encasing eggs in silk and hiding or carrying them, crayfish carrying their eggs under their abdomens, and clams keeping their eggs in their gills.**

10. You are planting your garden and you find a lemon-shaped egg case about the size of a pea, what might it be? **Nightcrawler eggs.**

11. How do you think the jelly coat that surrounds an amphibian's eggs acts like a greenhouse? **The clear coating traps heat from the sun.**

12. Where do all Minnesota frogs lay their eggs? **In water.**

13. Why don't baby fish (fry) have to eat for a few days after they hatch? **They carry the yolk from the egg inside their bodies.**

14. Which animal lays eggs about the size of ping-pong balls? **Painted turtles.**

15. Some eggs hatch inside the mother's body. Give two examples. **Some snakes and lizards.**

16. Why do you think birds' eggs have different colors? **Camouflage to protect the eggs from predators.**

Vocabulary

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capsule	membrane or shell
cavity nest	hollowed out space, usually in a tree
clitellum	a ring around a nightcrawler that produces an egg case
intriguing	interesting
mango	yellowish–red tropical fruit about the size of a large orange or small grapefruit
membrane	thin layer or skin
miniature	smaller copy
oviduct	a tube inside the mother along which the egg travels
ovum	the cell from which the egg is formed
predator	animal that eats other animals