



Silkworms and Charles Cheney



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Lesson Length: 1 week

Subject: Science

Grade Level: Fifth/Sixth

Topic: Arthropods

Objectives-

The students will be able to:

1. Properly classify silkworms as arthropods.
2. Identify different parts of arthropods.
3. Identify, explain, and apply the significance of silkworms in their community and in the anti-slavery movement.

Connections-

National Science Education Standards

Life Science Grades 5-8

- Structure and Function in Living Systems
 - Living systems at all levels of organization demonstrate the complementary nature of structure and function.
 - All organisms are composed of cells, the fundamental unit of life.

This unit plan meets these structure and function in living systems standard through students using their previous knowledge of life to solve the posed question.

- Reproduction and Heredity
 - Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species.
 - Every organism requires a set of instruction for specifying its traits. Heredity is the passage of these instructions from one generation to another.

- The characteristics of an organism can be described in terms of a combination of traits. Some traits inherited and others result from interactions with the environment.

This unit plan meets these reproduction and heredity standard through the students exploring how adaptations are passed from parents to offspring.

- Regulation and Behavior

- All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
- An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger are based in the species' evolutionary history.

This unit plan meets these regulation and behavior standard by discovering why animals adapt to their environments.

- Populations and Ecosystems

- A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

This unit plan meets this population and ecosystem standard by determining what in the ecosystem causes the adaptation to take place.

- Diversity and Adaptations of Organisms

- Millions of species of animals, plants, and microorganisms are alive today. Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry.
- Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

- Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Fossils indicate that many organisms that lived long ago are extinct. Extinction of a species is common; most of the species that have lived on the earth no longer exist.

This unit plan meets this diversity and adaptation standard by determining what in the ecosystem causes the adaptation to take place and the importance of the adaptation to the organism.

State of Ohio Science Benchmarks (by the end of the 6-8 program)

Life Sciences:

A. Explain that the basic functions of organisms are carried out in cells and groups of specialized cells form tissues and organs; the combination of these cells make up multicellular organisms that have a variety of body plans and internal structures.

D. Explain how extinction of a species occurs when the environment changes and its adaptive characteristics are insufficient to allow survival.

Scientific Ways of Knowing

A. Use skills of scientific inquiry processes.

B. Explain the importance of reproducibility and reduction on bias in scientific methods.

This unit plan meets these benchmarks through the process of group problem solving and through presentations of solutions followed by a class discussion.

State of Ohio Science Content Standards (grade six)

Life Sciences

6. Describe that in sexual reproduction an egg and sperm unite and some traits come from each parent so the offspring is never identical to either of its parents.

7. Recognize that likenesses between parents and offspring are inherited. Other likenesses, such as table manners are learned.

8. Describe how organisms may interact with one another.

Scientific Inquiry

1. Explain that there are not fixed procedures for guiding scientific investigations; however, the nature of an investigation determines the procedures needed.

Scientific Ways of Knowing

1. Identify that hypotheses are valuable even when they are not supported.
2. Describe why it is important to keep clear, thorough and accurate records.
3. Identify ways scientific thinking is helpful in a variety of everyday settings.
4. Describe how the pursuit of scientific knowledge is beneficial for any career and for daily life.

This unit plan meets these standards through the process of group problem solving and through presentations of solutions followed by a class discussion.

Archdiocese of Cincinnati Graded Course of Study for Science

Program Goal I: Attitudes and Skills of Scientific Inquiry

10. Compares and contrasts objects. Level – d
15. Records data. Level – d
25. Makes inferences. Level – d

This lesson meets these requirements in the Graded Course of Study through the completion of the assignment with group members.

Program Goal III: Life Science

184. Knows that in all classification schemes, things are grouped together on the basis of common characteristics. Level – M
182. Validate solution(s) obtained. Level – D
186. Knows that structural characteristics of organisms may vary in shape, color, size, composition, location in the organism, etc. Level – M
187. Identifies the external and internal structures of an organism which enables it to live, move, and obtain food in its environment. Level - M
188. Lists ways in which various organisms can adapt for survival. Level - D

This lesson meets these requirements in the Graded Course of Study through the presentation and discussion of all the small groups' solutions.

Context:

This is a lesson which is part of a thematic study on arthropods.

Materials/Technology:

- Live Silkworms (1 per student)
- 1 Habitat for each student's silkworm (plastic cup with a lid)
- Mulberry Tree Leaves
- Objects made from silk (cloth, shirts, etc.)
- Copies of silkworm anatomy worksheet (1 per student)
- Copies of silkworm information sheet (1 per student)
- Pictures of Underground Railroad sites in the city of Mount Healthy

Procedures:

Engage

1. Students will be assigned a silkworm that will be used for the duration of the lesson. Each student will be required to keep a detailed journal/log of the changes their silkworm goes through.
2. The teacher will read aloud the story, *The Empress and the Silkworms*
3. The teacher will summarize what will be discussed and completed during the entirety of the lesson.

Explore

1. The teacher will hand out different pictures of arthropods and the students will group the pictures according to similarities.
2. The students are asked to complete a form (worksheet A) discovering facts and hypothesizing what the selected part is used for in relation to silkworms.

Explain

1. The teacher will classify what a silkworm is.
2. The teacher will give students an opportunity to guess what uses a silkworm may have, using its picture as a guide.
3. The teacher will give examples, using the silkworm, of what uses they have and why they are important.
4. The students will complete an anatomy worksheet on silkworms, elaborating on the purpose of each part.
5. The teacher will talk about the early history of Mount Healthy, Ohio.

Elaborate

1. Students will be given a more detailed explanation of the Underground Railroad and the importance of it during the mid to late Eighteen hundreds, especially in the Cincinnati area.
2. The teacher will review the uses of silkworms, abolitionists, slavery, etc.
3. Students will take a walking field trip to 6 of the 8 locations in Mount Healthy that had importance in the Underground Railroad. As the students arrive at each location, the teacher will give a detailed explanation of its importance.

4. The teacher will go into intense detail on how the silk industry in the Mount Healthy area helped support Charles Cheney's abolitionist movement.

Evaluate

1. Students will be required to give a brief presentation explaining what they have learned and on what location discussed is closest to their home.
2. The teacher will check to see that proper behavior has been used for all parts of this unit, especially concerning the live silkworms.
3. Students will be observed for proper terminology.
4. Students will be required to turn in the factual silkworm worksheet and the silkworm anatomy worksheet.
5. Students will be required to turn in their journal/log on the growth of their assigned silkworms.

Student Assessment:

Students will be graded according to participation and by completion, rather than by traditional paper and pencil, right and wrong assessments. Students are expected to participate equally and respectfully with all group members and with the rest of the class. A grade of 50 will be awarded to all students who participate and actively complete the problem (correctly or incorrectly). For each incident during the group work and previous warm-up activities that are disrespectful or the student opts not to complete the assignment, the student will lose 10 points. There will be no warning before points are subtracted from the final grade.

Adaptation/Modification for a student that is legally blind:

The LCD projector will be used for all parts of classroom lecture and participation.

Impact – Reflection/Analysis of Teaching and Learning

This was a fantastic, enjoyable lesson for both the students and myself!!! I am looking forward to using this unit in February with an after school enrichment class, during the celebration of Black History Month in our community.

Refinement – Lesson Extension/Follow-Up

The search for connections to the Underground Railroad in the Mount Healthy area is just beginning for me. I will certainly adapt this lesson as new information is discovered. I would also have the students see if they could find more information from grandparents or long-time residents of Mount Healthy. Extra credit will also be given to students who took their families to the Mount Healthy Historical Society or on the same journey as we did in class.