Museum Mystery: Teacher’s Guide

Subject: Biology, Entomology
Grade Level: High School (adaptable to any grade level)

Case Summary
The museum is on lockdown! The American Civil War exhibit has been closed for weeks, but the head conservator has discovered a damaged textile. Security cameras have been checked and are clear. What could have caused the damage?

Credits
This case was written by Tiffany Smith (teacher, Cedar Grove High School).
This case was adapted using Bug Activity (Smith, Commander, Etre, & Stein, 2013).

Learning Objectives
1. Create a dichotomous key
2. Classify various insects based on external features
3. Define and describe binomial nomenclature
4. Identify characteristics common to all insects
5. Compare and contrast complete and incomplete metamorphosis

K-5th grade Science Georgia Performance Standards
SKL1. Students will sort living organisms and non-living materials into groups by observable physical attributes.
   a. Group animals according to their observable features such as appearance, size, motion, where it lives, etc. (Example: A green frog has four legs and hops. A rabbit also hops.)

SKL2. Students will compare the similarities and differences in groups of organisms.
   a. Explain the similarities and differences in animals. (color, size, appearance, etc.)

S2L1. Students will investigate the life cycles of different living organisms.
   a. Determine the sequence of the life cycle of common animals in your area: a mammal, such as a cat or dog or classroom pet, a bird such as a chicken, an amphibian such as a frog, and an insect such as a butterfly.

S5L1. Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.
   a. Demonstrate how animals are sorted into groups (vertebrate and invertebrate) and how vertebrates are sorted into groups (fish, amphibian, reptile, bird, and mammal).
7th grade Science Georgia Performance Standards

S7L1. Students will investigate the diversity of living organisms and how they can be compared scientifically.
   a. Demonstrate the process for the development of a dichotomous key.
   b. Classify organisms based on physical characteristics using a dichotomous key of the six kingdom system (archaebacteria, eubacteria, protists, fungi, plants, and animals).

9-12th grade Science Georgia Performance Standards

SCSh3. Students will identify and investigate problems scientifically.
   a. Suggest reasonable hypotheses for identified problems.
   b. Develop procedures for solving scientific problems.
   c. Collect, organize and record appropriate data.
   d. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.

SCSh6. Students will communicate scientific investigations and information clearly.
   e. Participate in group discussions of scientific investigation and current scientific issues.

SEN2. Students will investigate the reasons for insect success.
   a. Investigate the insect body plan and compare and contrast to other arthropods (e.g., Arachnida, Crustacea).
   b. Explain advantages of different insect life cycles (e.g., complete vs. incomplete).
   c. Use morphological characteristics (e.g., wing structure) to recognize major insect orders.
   d. Compare and contrast how insect structure and function are integrated and reflect evolved adaptations to different environments.

SB3. Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.
   a. Compare how structures and function vary between the six kingdoms (archaebacteria, eubacteria, protists, fungi, plants, and animals).
   b. Examine the evolutionary basis of modern classification systems.

Additional Materials
   Box charts
   Internet access
   Pictures of textiles and other artifacts with bug damage
   Create a Dichotomous Key sheet
   Bug cards
   Stereomicroscopes
   Bug traps
   Insect Investigative Report Notes sheet
   Group Presentation Rubric
Assessments
- Scene One: Use the facilitator questions to evaluate the box chart
- Scene Two: Create a dichotomous key and correctly identify insects on the bug traps
- Scene Three: Each group will be given an insect to complete an oral report with a visual aid. The report can be no longer than five minutes. The report must include the scientific name of the insect, habitat, favorite food, life cycle (complete or incomplete metamorphosis), adult body structure, and detailed colored picture (PowerPoint, Prizzi, poster, or video).
- Students must narrow the list of insects to likely suspects based on their insect investigations.

Implementation Guide
Scene 1 - 20 minutes
- Read scene one
- Brainstorm to fill in the box chart
- Allow students time to identify and research the learning issues using the internet
Scene 2 - 40 minutes
- Read scene two
- In groups, use insect cards to create a dichotomous key
- Survey the photos of insect damaged textiles and other artifacts
Scene 3 - 40 minutes
- Read scene 3
- Allow students to use a microscope to view bug traps
- Students use the dichotomous key they created to see if they can identify any of the bugs on the traps.

Facilitator Guide
Scene 1
- Where is the Michael C. Carlos Museum?
- What is a conservator?
- What are some examples of textiles?
- What are some ways an artifact could be damaged in a museum?
Scene 2
- Why did the conservator check the relative humidity meter and thermometer?
- Why did the conservator check the lighting on the blanket?
- Why did the conservator check for busted pipes and a leaky roof?
- What is a dichotomous key? What is it used for?
Scene 3
- What is binomial nomenclature?
Resources


