Introduction to Entomology Research

Developed by Ivette Soto

Grade Level: Middle School - 6th Grade
Subject Area: Biology / Entomology
Duration: 5-6 class periods (40 minutes each)
Objective:

- Understand the basics of entomology (study of insects).
- Learn different methods for identifying and studying insects.
- Create a simple entomological research slideshow.

Standards -NJSLS: MS-LS1-3

Day 1: Introduction to Entomology

Topic:
What is entomology and why is it important?

Learning Objectives:

- Define entomology.
- Discuss the role of insects in different ecosystems (US, Europe, Australia, Africa, Asia, etc. : specifically South Korea-based on personal experience), agriculture, and human health.

Materials:

- PowerPoint slides or visuals showing insect diversity. https://youtu.be/kdC7FHxi-Lg
- Specimens or insect models (optional).
- Digital worksheet on basic insect anatomy.[10–13]
- News articles/stories of insects that affect the health/agriculture in the world, specifically US and South Korea. [1–9]

Activities:

1. **Warm-Up Discussion:**
   Ask students to name insects they see regularly and discuss why they think these insects are important (e.g., pollinators, pests).
2. **Lecture/Presentation:**
   - Overview of entomology.
   - Importance of insects in ecosystems with a focus on US and South Korea (e.g., pollination, decomposition).
   - Explore current events related to insects in the world.
   - Basic insect anatomy.
3. **Activity:**
   Provide digital worksheets with diagrams of insects. Have students label key parts of insect anatomy (head, thorax, abdomen, wings, etc.).

Homework:
Ask students to observe and document the insects they encounter in their home or community (with basic descriptions like size, color, location).

Day 2: Insect Identification and Classification

Topic:
How do we identify insects?

Learning Objectives:

- Use dichotomous keys for insect identification.

Materials:

- Dichotomous keys or digital identification tools.
- Collected insect specimens (Madagascar Hissing Cockroach) or insect photographs from the US and South Korea.[17–18]

Activities:

1. **Lecture/Presentation:**
   - Introduce students to dichotomous keys and how they work.
2. **Activity:**
   Provide students with collected insect specimens or images and guide them through the identification process using a dichotomous key and digital worksheets.[14–16]
3. **Discussion:**
   Discuss the different insects and their ecological roles.

Homework:
Have students select one insect from their identification from the US and one insect from South Korea and complete research on its significance in agriculture, ecology, or medicine.

Day 3-Day 4 : Designing Entomological Research Slideshow

Topic:
How do we design a slideshow to present our research study in entomology?

Learning Objectives:

- Learn how to design a simple research slideshow.

Materials:

- Research slideshow template. https://docs.google.com/presentation/d/1V5s3t5dhy9N1Do88fLWmRe1r9QtaoLfZ_eJyqL6nYbo/edit?usp=sharing

Activities:

1. **Lecture/Discussion:**
    - Basics of scientific research design (Background, data collection, etc.).
    - Basics of slideshow creation.
2. **Activity:**
   Break students into groups and guide them through designing a simple research project. Topics could include:
    - Observing the feeding habits of insects.
    - Studying the behavior of insects.
    - Identifying the diversity of insects in the U.S. and in South Korea.
3. **Research/Slideshow development:**
   Allow students to collect data over a set period (in class or as homework) on the insect they chose from the U.S. and compare/contrast it with the insect they chose from South Korea. If time allows, create a 8 slide presentation.
4. **Wrap-Up:**
   Each group prepares for a slideshow presentation.

Homework:
Finish data collection (if necessary) and preparation for presentation in the next class.

Day 5 - Day 6

Presentation day.

-Each group will present their research slideshow to the class. (5-7 minutes each)

Resources :

1. Invasive Insect Species in the US - Website
https://cisr.ucr.edu/invasive_species/all

2. Invasive insects threaten African and Asian Farms - News Story
https://www.openaccessgovernment.org/2021-african-and-asian-agriculture/98500/

3. Cicadas come with an itchy pest - US News Story
https://www.cbsnews.com/news/cicadas-mites-itchy-pest-can-cause-rashes-travel-with-wind/

4. Cicadas in summer in South Korea - News Story
https://www.donga.com/en/article/all/20190806/1809817/1

5. Bedbug Sniffing Dogs in NY - News Video
https://youtu.be/S8UiAwPXX5I

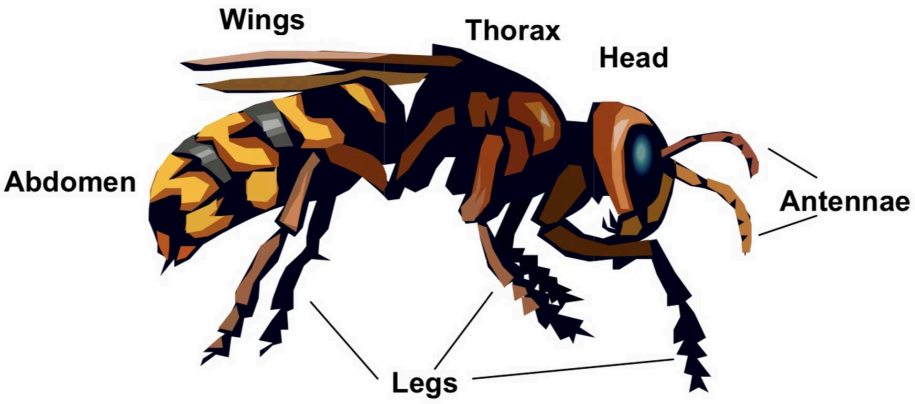
6. Bedbug Sniffing Dog in South Korea- News Story
https://www.voanews.com/a/south-korea-deploys-sniffer-dog-to-screen-for-bedbugs-after-paris-games-/7739770.html

7. Larvae contamination in tap water in South Korea - News Story
https://www.koreaherald.com/view.php?ud=20200721000822

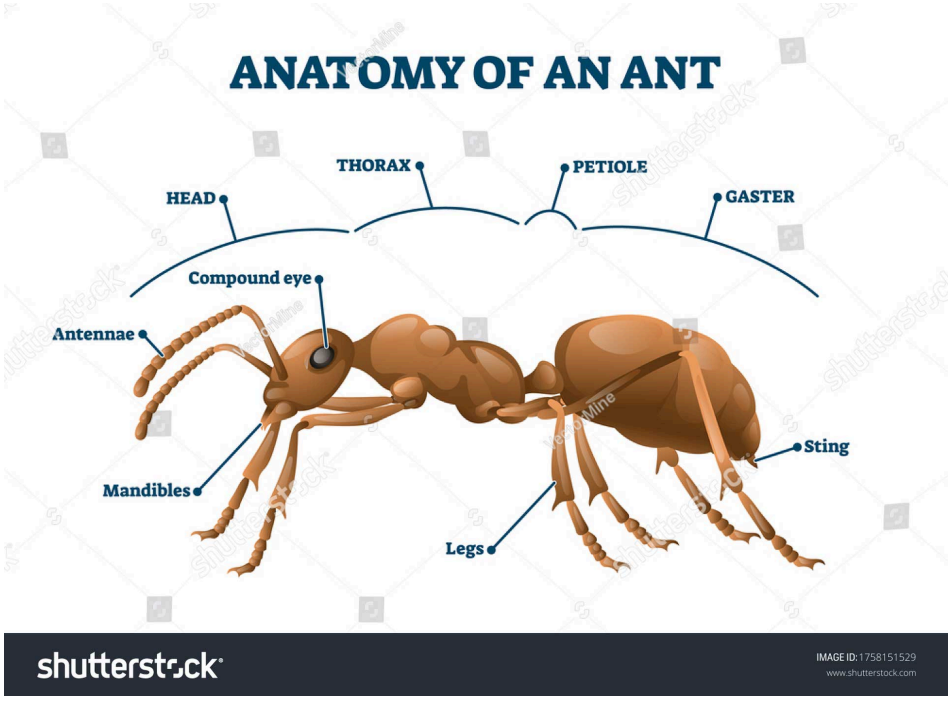
8. Mosquito borne disease in UK - News Story
https://www.bbc.com/news/health-67654008

9. Mosquito population increasing in South Korea - News Story
https://www.koreaherald.com/view.php?ud=20240528050585

10.

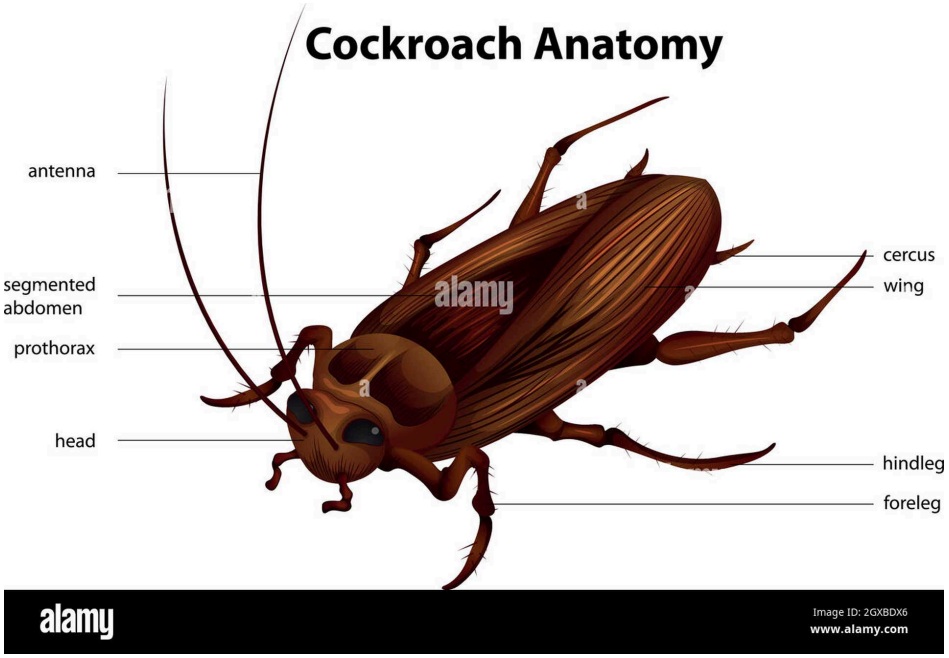

Wings
Thorax
Head
Abdomen
Antennae
Legs

11.

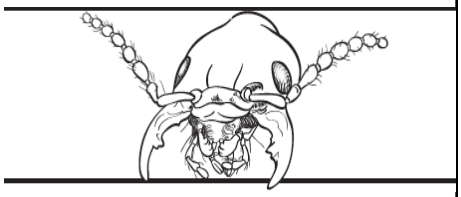
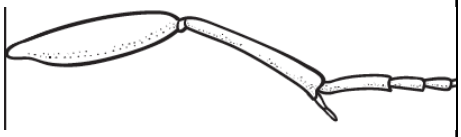

ANATOMY OF AN ANT
THORAX
PETIOLE
HEAD
GASTER
Compound eye
Antennae
Sting
Mandibles
Legs
shutterstock
IMAGE ID: 1758151529
www.shutterstock.com

12.

13.


Cockroach Anatomy
antenna
segmented abdomen
prothorax
head
cercus
wing
hindleg
foreleg
alamy
alamy
Image ID: 2GXBDX6
www.alamy.com

14. Structure/Behavior/Function Summary of Madagascar Hissing Cockroach

Structure or Behavior	Function(s)
Compound Eye	
	
	
	
Hissing	
Pulling antenna through mouth	
Choosing dark damp places	

15. Insect Observations A

Part 1: General insect structure

Read the introduction to "Insect Structure and Function."

1. Make three drawings of the hissing cockroach: one from the side, one from the top, and one from the front. Label the head, thorax, and abdomen in your drawings. Label the drawing as male or female.

Double-click on the image to draw on it.

2. Observe the hissing cockroach for several minutes. Describe what behaviors you observe.

Part 2: Head (eyes, antennae, and mouthparts)

Read about insect heads.

3. Label the compound eyes on one of your drawings.
4. What type of antennae do the cockroaches have? Double-click the image to circle your choice.

5. Hide a piece of food near the cockroach and observe its antennae. What do they do? What is the function of the antennae?

6. Use a toothpick to very carefully place a tiny bit of honey or syrup on one of the cockroach's antennae. What does the cockroach do? Why do you think this behavior is important?

7. What type of mouthparts does the cockroach have? Double-click the image to circle your choice.

8. What kind of food do you think the cockroach eats? Put two or three different kinds of food in one of the dishes. Describe what you observe. Remove the food after your observations.

16. Insect Observations B

Part 3: Thorax (wings and legs)

Read about insect thoraxes.

9. Look for wings on the cockroach. Double-click the image to circle your choice.

10. What does this tell you about the lifestyle of the cockroach?

11. Describe how the cockroach moves.

12. Circle the kind of legs the cockroach has.

13. What part of the cockroach are the wings and legs attached to?

Part 4: Abdomen

Read Section 4 of “Insect Structure and Function.”

14. What is contained in the abdomen?

15. What are the functions of those structures?

Part 5: Behavior

16. Note the fourth segment on the abdomen of the cockroach.
Can you notice the spiracles? Why do cockroaches hiss?

17. What questions do you have about the Madagascar hissing cockroach? List at least two.

1)
2)

17. South Korean insects

Jewel Beetle

Long-Horned Beetle

Asian Comma

Cicada

Russian Grayling

18. US Insects

Bumble Bee

Carpenter Ant

Monarch Butterfly

Fruit Fly

European Mantis