Lesson 2: Are you going to eat that? Understanding how insects eat

Overview: To develop an understanding of the basic anatomical structure of insects and the changes in body form from larval stage to adult stage.

Objectives: Students will: 1) recognize the three basic body parts of insects; 2) relate the larval form of some common insects to their adult forms; and 3) identify the body forms, habitats, and food webs of the insects found at the Cove River Site.

Key Concepts: Anatomy, Lifecycles, Food Webs, Habitats
Subjects: Biology, Anatomy, Physical Education
Duration: 1 class period (40 minutes)
Setting: In the field, outdoor natural landscape
Season: Any season
Interdisciplinary Connections   ***Frameworks:*** None

Environmental Education @ the Cove River Site, and other coastal Connecticut settings.

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Introduction (background): Insects come in a variety of shapes and sizes, but all insects share the same basic anatomy structure. As stated in Lesson 1, insects have three basic body parts – a head, thorax, and abdomen, as well as three pairs of legs, and usually two pairs of wings. It can be difficult at times to identify all these structures, especially with insects that change from their larval, or immature, structure to their adult form. Many immature insects do not look like their adult forms, and it can be difficult to connect them without prior knowledge or assistance.

Materials:

- Insect Matching Game (found at the end of this activity)
- Immature Insect cards (found at the end of this activity)
- Orange cones (optional)

Preparation / Set Up: The Immature Insect cards and the Insect Matching Game will need to be cut into the individual squares of the insects. You may wish to laminate the cards to keep them safe, especially if you plan to use them only in the field.

Engagement: The major purpose of this activity is for the students to gain an understanding of the body structures that all insects share, especially when those structures change from larval to adult forms.

1. Begin by asking the students to recall from lesson one what defines an insects, or if this is the first time with this subject, ask the students what all insects have in common – a head, thorax, abdomen, three pairs of legs, and two pairs of wings.
2. As with Lesson 1, break the class into five groups of students. Each group should be given a large envelope that contains color photos of immature insects found at the Cove River Site: the larvae of a ladybug, ant, butterfly, dragonfly, and grasshopper. Show the pictures to the class before they are allowed to open their envelopes.
3. Tell the students they are going to look at photos of immature or larval forms of some common insects found at the Cover River site. At this time, do not identify the insects to the students, and if asked, tell the students that that will be revealed later. Ask the students to remove the pictures from their envelopes and locate the major anatomical structures common to all insects.

Exploration: After all the students have completed their task, assign each group one of the insects to share their findings with the class. Each group should identify all the structures of the insects, including the head, thorax, abdomen, six legs, and wings. Some parts may be more difficult to find or confused with other structures. Please refer to the labeled photos of the insects found at the end of this activity for the correct structures. After you have helped the students label all the structures, some students may ask why there are no wings, as the definition states. Ask the students for ideas of why there are no wings and why, if these immature insects do not have them, why wings are included in the definition. The answer is that the definition applies to the insects completely, so that if they have all the characteristics at *some point* in their lifecycle, they are an insect. Many immature insects do not have wings until their adult stage, but that counts as having wings.

To explore this concept further, the next activity asks the students to match the larval or immature form of insects to their adult forms. The goal of this activity is to not only show the students that some insects change dramatically while others do not, but also to familiarize them with the different insects they may see at the Cove River site.

1. Give each group of students the twenty Insect Matching Cards. Ask them to pair the larval/immature form to the adult form of the insect.
2. When the students are done, hold up the adult forms of common insects, and ask the students to hold up the larval form of the pair. Continue like this until all the insects have been identified with their immature form.
3. Ask the students why they think some insects change dramatically from their immature form while others do not.
4. Tell the students that some insects go through a metamorphosis to complete change their form while others simply grow larger until they reach their adult size.
5. Quickly review each of the insects discussed today, as well as the basic anatomy of insects.

Explanation: After the brief review of the lesson, tell the students that they will now demonstrate all the have learned in a game called "Buggy, Buggy, Cross my Field". This game asks the students to think about a particular insect, its body form, lifecycle, habitat, and food web.

1. Tell the students to line up, shoulder to shoulder, facing you in an open space or field. If you brought orange cones you can place them at the ends of the line, or you may use natural markers, such as lining up between trees, sticks, or rocks. Place markers/cones at the opposite end of the open space as well, parallel to the line of students and of equal size. Stand in the middle of the area, and ask 1-2 students to join you in the center.
2. Inform the students that they need to choose an insect, either adult or larval form. They are *not* to tell anyone which insect they have chosen, but keep it in their minds. They need to think about all things about their insect, such as what it eats, how it looks, and where to find it.
3. Rules: All animals need to be insects, nothing imaginary (giant fire breathing bugs), and the students are not allowed to change their insect once they have chosen it and the game begins.
4. Explain that you and the students in the center are "Bug Catchers." (You can make just the students catchers and you are the Referee) You will call out a characteristic or trait of insects, and all those students whose insect has that characteristic or trait need to run across the field/space to the other line. The "Bug Catchers" will attempt to "catch" the insects by tagging them. Please make sure to tell all students that there is no pushing, shoving, or hurting anyone. If the catchers tag an insect, that student becomes a Bug Catcher, and they continue to another trait.
5. What you call out can either bring all students or only a few. It is best to vary them. Examples of traits to call out:
    a. All insects with 6 legs
    b. All insects with wings
    c. All insects with elytra
    d. All (color) insects
    e. All insects that fly
    f. All insects that hop
    g. All insects with an abdomen

h. All insects that live in the forest
i. All aquatic insects
j. All insects that are herbivores
k. All predatory insects

6. It is best to remind the students if they do not move to traits that all insects have, or to provide examples of insects that have the trait you just said (example: fly: butterfly, predatory: ladybug, aquatic: caddisfly, forest: cicada, etc)
7. Continue this game until 1-3 students remain, and they are declared the new Bug Catchers for the next game. For the next game, the students may choose new insects. Now that they know how to play and what will be asked of them, usually the second game is faster and more specific about the traits of insects.
8. (Optional) At the end of the game, ask all students to line up again at the first line. Ask them to tell you what one thing they learned today about the anatomy of insects and their lifecycles. It is up to you how in depth you wish the students to go.