Clark Fork Watershed Education Program
Activity: Who is My Mommy?

Clark Fork Watershed Education Program

Prep time: 20-25 minutes

Class time: 55 minutes

Grade: 3

Teacher Lesson Plan Outline:

Objectives: Students will be able to:

- Describe that young aquatic insects are very different in how they look and how they behave compared to the adult form.
- Discuss the life cycle stages of aquatic insects (from egg to adult).
- Describe the differences between complete and incomplete metamorphosis.
- Compare the length of time aquatic insects spend as young versus as adults to the length of life cycle stages displayed by humans.

Materials:

- ✓ Laminated pictures of young and adult forms of aquatic insects
- ✓ Wooden skewers or chopsticks for pictures of young forms
- ✓ Clear tape
- ✓ Answer key (for instructor)
- ✓ If creating your own pictures, a coding system for answer key

Correlations to NGSS Standards → For grade 3:

3-LS-1 From Molecules to Organisms: Structures and Processes

Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

Lesson Topic: Insect Life Cycles and Metamorphosis

This lesson is an introductory or 'engage' lesson designed to help students discover that aquatic insects are juveniles during the portion of their lifecycle spent in the water. Teachers wishing to expand upon this lesson can build the lesson to include modeling of an insect lifecycle and compare/contrast to human life cycle.

Students will be able to:

- Describe that young aquatic insects are very different in how they look and how they behave compared to the adult forms.
- Discuss the life cycle stages of aquatic insects (from egg to adult).
- Describe the differences between complete and incomplete metamorphosis.
- Compare the length of time aquatic insects spend as young versus as adults to the length of life cycle stages displayed by humans.

Materials:

- Laminated pictures of aquatic insects – young and adult forms
  - Plan for each team (2 students) to work with a picture of one young form and the matching adult form
- Wooden skewers or chopsticks for each picture of the young forms
- Clear tape (*to attach skewer or chopstick to picture of young form, and to post picture of adult forms on wall*)
- Answer key (for instructor)

  If creating your own pictures, a coding system for answer key (colored or numbered stickers for each macro picture)

Directions:

1. **Download and print the aquatic insect pictures from CFWEP website** (http://www.cfwep.org/education/k-4/bugs.html). (To make it easier to do this lesson more than once, we highly recommend that the insect pictures be **laminated**.)
2. Securely tape skewers/chopsticks onto the backs of the pictures of the young insects. (*If skewers are used, we recommend cutting off the sharp tips of the skewers. The skewers are best cut with pruning shears*.)
3. Prior to arrival of students, **post/tape pictures of the adult forms** on the walls all around your room.
4. **Distribute pictures of young forms with the sticks** to each pair of students (teams of two are recommended).

5. Tell the students that they will be answering the question, "Who is My Mommy?" and explain that they will be trying to find the adult form that created the young form.
6. Before they begin, tell them to look carefully at the pictures they are holding and then to look around the room at the pictures that are posted. Ask them:
    - **Question:** What is the biggest difference between the insects you are holding in your hands and the ones that are hung up?
        - **Answers:** In addition to any observations that they may make, try to lead them to the answer *WINGS*.
    - **Question:** What are some things that are similar between the two sets of pictures?
        - **Answers:** This will depend on the picture, but they may list such features as: eyes, antenna, tails, etc.
            - ✓ **NOTE:** At this point, you are just trying to get them to practice *observations*, as well as *compare and contrast* skills.
7. Next, have them go about the room to look for their "mommy."
8. This may take anywhere from 15 to 20 minutes – as long as the kids are having fun with it, let it go on as long as needed.
9. Once several teams have made a decision, ask them:
    - **Question:** What features did you use to make your decision?
        - **Answers:** They will likely state that they based their decision on color, presence of legs, wing buds, eyes, etc. (This is great! It is exactly the types of cues scientists use, in addition to features pertaining to genetics, physiology, behavior, etc.)
10. It is okay for other teams that have not yet made their decision to hear these discussions.
11. When a team gets a correct match, have them stand next to their "mommy" as an aid for others to find their moms.
12. Stress the point that the young really look very different from the adults.
13. End the game and begin lecture/explanation lesson on aquatic insect life cycles, and complete and incomplete metamorphosis.

Notes:

- This is not going to be an easy activity for the kids insofar as getting the right answers immediately. That's okay – the 'right' answer does not matter – it is the processes of observation and compare-and-contrast that matters.
- Frequently reassure the kids that they are doing a great job and keep them focused on what criteria they are using to make their decisions.

- Wrapping up: Repeat again that the adult forms are very different in appearance than the young forms. Ask them:
  - **Question:** How do you think scientists figured out who the 'mommy' of these young insects were?
    - **Answer:** Enjoy the responses! Guide them towards experimentation.
- This then leads into metamorphosis and aquatic insect life cycles discussion and exploration activities.
- If using a science notebook, have students record their observations and rationale for matching their creatures.

Inquiry Suggestions:

This activity can be used both for an "engage" activity in order to help assess what students know or can infer about metamorphosis.

Engagement	Object, event or question used to engage students. Connections facilitated between what students know and can do.
Exploration	Objects and phenomena are explored. Hands-on activities, with guidance.
Explanation	Students explain their understanding of concepts and processes. New concepts and skills are introduced as conceptual clarity and cohesion are sought.
Elaboration	Activities allow students to apply concepts in contexts, and build on or extend understanding and skill.
Evaluation	Students assess their knowledge, skills and abilities. Activities permit evaluation of student development and lesson effectiveness.

To develop the lesson further and build into the other E's of the inquiry continuum, visit our teacher resource website at http://www.sciencepartners.info/module-8-macroinvertebrates/an-introduction-to-macroinvertebrates/

Students who demonstrate understanding can:

3-LS1-1. **Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.** [Clarification Statement: Changes organisms go through during their life form a pattern.] [*Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.*]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop models to describe phenomena. (3-LS1-1) --- ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** • Science findings are based on recognizing patterns. (3-LS1-1)	**LS1.B: Growth and Development of Organisms** • Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)	**Patterns** • Patterns of change can be used to make predictions. (3-LS1-1)

Connections to other DCIs in third grade: N/A

Articulation of DCIs across grade-levels:
MS.LS1.B (3-LS1-1)

Common Core State Standards Connections:

ELA/Literacy —

RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). *(3-LS1-1)*
SL.3.5	Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. *(3-LS1-1)*

Mathematics —

MP.4	Model with mathematics. *(3-LS1-1)*
3.NBT	Number and Operations in Base Ten *(3-LS1-1)*
3.NF	Number and Operations—Fractions *(3-LS1-1)*

* The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

The section entitled "Disciplinary Core Ideas" is reproduced verbatim from *A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas*. Integrated and reprinted with permission from the National Academy of Sciences.

NGSS Lead States (2013). *Next generation science standards: For states, by states.* Washington, DC: The National Academies Press.

Answer key

For laminated pictures used in *Who is My Mommy* Game.

Class *Insecta*: The insects			
Common name	**Adult #**	**Young #**	**Order**
Midge	**1**	**15 or 22**	Diptera (true flies)
Mayfly	**2**	**16 or 23**	Ephemeroptera
Stonefly	**3**	**17 or 24**	Plecoptera
Crane fly	**4**	**18 or 25**	Diptera (true flies)
Caddisfly	**5**	**19 or 26**	Trichoptera
Dragonfly	**6**	**20 or 27**	Odonata
Damselfly	**7**	**21 or 28**	Odonata
Midge	**8**	**15 or 22**	Diptera (true flies)
Mayfly	**9**	**16 or 23**	Ephemeroptera
Stonefly	**10**	**17 or 24**	Plecoptera
Crane fly	**11**	**18 or 25**	Diptera (true flies)
Caddisfly	**12**	**19 or 26**	Trichoptera
Dragonfly	**13**	**20 or 27**	Odonata
Damselfly	**14**	**21 or 28**	Odonata

RESOURCES (for images)

1. www.bugguide/net
2. www.stroudcenter.org/about/funk.htm
3. Hafele R, Hughes D. (1981) The Complete Book of Western Hatches: An angler's entomology and fly pattern field guide. Frank Amato Publications. Portland OR.
4. http://www.pbase.com/michellemahood/damsels_and_dragonflies
5. www.mostreamteam.org/Images/insects
6. www.streamcare.org.nz/streams.htm

Class *Insecta*: The insects		
Resource #	**Resource**	**Image #'s**
1	www.bugguide/net	4, 5, 11, 15, 18, 22
2	www.stroudcenter.org/about/funk.htm	9, 10, 16, 17, 19, 23, 24, 25, 26
3	Hafele R, Hughes D. (1981) The Complete Book of Western Hatches: An angler's entomology and fly pattern field guide. Frank Amato Publications. Portland OR.	1, 2, 3, 8
4	http://www.pbase.com/michellemahood/damsels_and_dragonflies	6, 7, 13, 14, 20, 21, 27
5	www.mostreamteam.org/Images/insects	28
6	www.streamcare.org.nz/streams.htm	12