

# New York State Department of Environmental Conservation

## Five Rivers Environmental Education Center

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Erin M. Crotty  
Commissioner

Dear Teacher,

We're glad you have scheduled your students for a **Stream Life** class at Five Rivers. This is an exciting, hands-on lesson, and we hope your "Stream Scientists" will enjoy it. During this class your students will take measurements of the stream and discuss how a stream affects the land, plants and animals around it. They will wade in the stream to collect small aquatic organisms, and study them close up with magnifying lenses before releasing them unharmed. We will close with a hands-on activity that examines the effects of pollution on a stream, and how people can help clean it up.

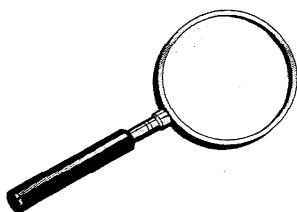
Here are a few suggestions for a successful visit:

Students will be wading in the stream, and then getting out of the water to record data and participate in discussions. We will be out-of-doors for the entire two-hour lesson. We ask you to copy and hand out the enclosed "Stream scientist letter" which advises students on the proper boots and clothing to wear. Please encourage students to wear plastic or rubber **waterproof boots** (not winter or hiking boots) and to bring a **warm jacket**. Please have the students wear **nametags**.

Encourage students to bring a **change of clothes**, including shoes, socks, and pants. Students will not be changing clothes until the end of the lesson. Please bring a **snack** if the students' normal lunch hour will be delayed.

When you arrive at Five Rivers, please check in with the School Program Coordinator in our bus parking area. **Please do not dismiss the bus**, since students must be transported from the parking lot to the stream sites, and back to the picnic area when the lesson is completed.

Please contact us if you have any questions or concerns about the class, and we will be happy to talk with you. If there is anything we can do to help your visit be a great experience, or if your class has special needs, we'd like to hear about it! We look forward to seeing you at Five Rivers.



## TEACHERS!

Please copy this letter and give one to each of your students so that they will be prepared to study the ecology of the Five Rivers stream—up close!

Thanks!

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Dear Stream Scientist,

You're about to begin an outdoor adventure. During the Five Rivers stream class you'll be studying the ecology of a stream up close—so close that you'll actually be wading knee deep in the stream, taking measurements and searching for living creatures such as crayfish, mayflies, and snails. But like any adventure, you'll enjoy it more if you're prepared.

### What the well-dressed scientist wears in the stream:

1. Best choice is rubber or plastic **waterproof boots** that will keep your feet dry. Winter boots or hiking boots will only absorb water and make you feel like you're standing in a cold wet sponge. Old sneakers that you can get wet are the next best thing to waterproof boots.

2. **Wool socks** will keep your feet warm even if they get wet. Or you could put a plastic bag (bread loaf bags work well) over each sock before you put your shoes on. Water shoes are good in warm weather. No bare feet, please! The stream rocks can be slippery or sharp.

3. Bring a warm **jacket**--you'll feel chilly when you get out of the stream even if it's a warm day. A hat can help keep you warm, too.

4. Bring **rain gear** if the weather looks rainy-- we go wading rain or shine. No kidding!

5. Bring a **change of clothes—shoes, socks, pants**. We don't recommend shorts since you might encounter mosquitoes or poison ivy in the forest.

6. There's no need to drench yourself in bug repellent. It will just wash off you and into the stream, harming the insects like mayflies who live in the stream. Bring bug repellent if you wish, then wait to see if you need it. Or choose one of the non-toxic or organic brands of insect repellent.

We look forward to seeing you at Five Rivers!

Sincerely,

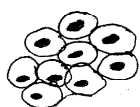
**Your Fellow Scientists at Five Rivers**

## METAMORPHOSIS

A newborn puppy, as it grows, just gets bigger and bigger and bigger until as an adult it looks like a big version of the puppy it once was. But many aquatic animals grow up in a very different way. They change as they grow into several different shapes. Often one shape doesn't look anything like the next one--for example, a tadpole doesn't look much like a frog.

The process by which one shape changes itself into another shape is called metamorphosis. It works a little differently for each species.

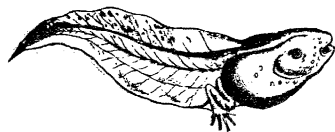
Amphibians, like frogs and salamanders, go through metamorphosis.



egg



larva (also called a tadpole or pollywog)



adult



Many aquatic insects go through metamorphosis. It works a little differently for each species, but there are two basic kinds.

**Complete Metamorphosis** includes four stages. A mosquito is an example of an insect that undergoes complete metamorphosis:



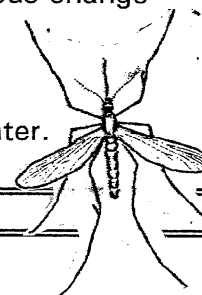
An adult female insect lays an egg underwater. Out of the egg hatches a larva.

The larva is a small creature that looks a little like a caterpillar. It lives underwater, eats, and grows bigger.

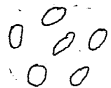


When the larva is fully grown it changes into a pupa. While it's in the pupa shape it doesn't eat or move around. Inside the pupa a miraculous change happens. The insect's body reorganizes itself into an adult.

The adult looks different from the larva. It has wings and lives out of water.



**Incomplete Metamorphosis** includes three stages, as in the dragonfly:

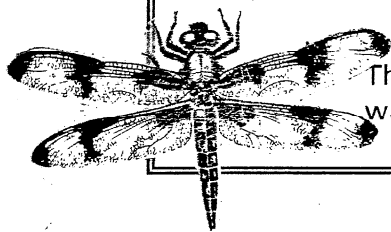


Out of the egg hatches a small creature called a nymph.

The nymph grows and gets bigger but its skin doesn't. So every now and then, the animal sheds its skin--just splits its skin open down the back and leaves it behind. Finally the body changes inside the skin, and when the nymph sheds its skin for the last time, out comes a winged adult.



The adult doesn't look like the nymph. It has wings and lives out of the water, breathing air and eating different food than the nymph did.



## METAMORPHOSIS WORKSHEET

Please answer these questions using the information on the other side of this sheet.

A monarch butterfly is an example of an insect that undergoes complete metamorphosis. Draw a picture of each of the stages in a butterfly's life.

Which stage lays eggs?

Draw and label the stages of incomplete metamorphosis.

What does a larva turn into?

How many legs does an adult insect have?

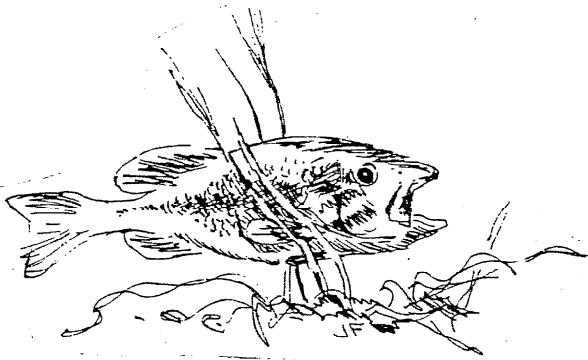
How does a nymph change into an adult?

Many creatures spend their larva or nymph stage in water. Can you think of some reasons why a stream might be a good place for a young insect to live?

## WATER WORDS

### Definitions:

1. **Aquatic** - of, or living in, water. An aquatic animal is one that lives in the water.
2. **Current** - the flow of water.
3. **Habitat** - the place where a plant or animal lives; its home.
4. **Larva** - the wingless, worm-like form of an insect; the second stage in complete metamorphosis. For example, the caterpillar is the larva of a butterfly.
5. **Metamorphosis** - a change of form from egg to adult. Most insects and amphibians undergo metamorphosis. There are two types: complete (egg-larva-pupa-adult) and incomplete (egg-nymph-adult).
6. **Nymph** - an insect undergoing metamorphosis that has not yet reached its adult stage. Looks similar to an adult but is smaller in size. The second stage in incomplete metamorphosis.
7. **Pollution** - harmful or poisonous materials added to a stream or other habitat that make it unfit for living things.
8. **Predator** - a hunter; an animal that eats other animals for its food. For example, a frog is a predator of flies.
9. **Prey** - the hunted; an animal that is food for another animal. For example, worms are prey for fish.
10. **Pupa** - the resting stage in an insect's life; the third stage in complete metamorphosis. If the insect spins a weblike sac around the pupa, it is called a cocoon.



Please fill in the blanks using the words on the other side of the sheet:

1. Turtles live in an \_\_\_\_\_ environment.
2. The young dragonfly looks a lot like the adult, but smaller and without wings, in its \_\_\_\_\_ stage.
3. The flow of water that moves a leaf down a stream is called the \_\_\_\_\_.
4. The raccoon is a hunter or \_\_\_\_\_ of crayfish.
5. The stream is the home or \_\_\_\_\_ of many aquatic plants, such as algae. These plants are often eaten by aquatic animals.
6. Insects that look like caterpillars are often found in the stream. They are in the \_\_\_\_\_ stage of metamorphosis.
7. The cocoon is the resting stage or \_\_\_\_\_ of an insect.
8. Insects start as eggs and go through changes before becoming adults; this process is called \_\_\_\_\_.
9. Frogs are sometimes the \_\_\_\_\_ of great blue herons.
10. People can help clean up \_\_\_\_\_ from aquatic habitats.

Give an example of each of these categories that might be found in an aquatic habitat.

Example: Amphibian: \_\_\_\_\_

Reptile: \_\_\_\_\_

Bird: \_\_\_\_\_

Mammal: \_\_\_\_\_

Insect: \_\_\_\_\_

Plant: \_\_\_\_\_

