Jefferson Complex

Salamanders

By Alexandra Shipman

Above: A series of images of a Jefferson Complex salamander walking blended together using Photoshop. This salamander is about 10 centimeters long.

In the forests and wetlands on the Rochester Institute of Technology campus, in Western New York, lives a small, secretive creature. The Jefferson Complex salamander (*Ambystoma jeffersonianum x laterale),* is a common, but seldom encountered amphibian that has a fascinating life history and unique behaviors.

These salamanders are a parthenogenetic hybrid species, which means they exist as an all-female clonal species. This interesting reproductive mode is the result of the hybridization between Jefferson salamanders (*Ambystoma jeffersonianum*), Blue-Spotted salamanders (*Ambystoma laterale*), and possibly several other species.

Antipredator Defense

Salamanders are prey to fish, snakes, birds, and mammals. However, Jefferson Complex salamanders are not without the means to defend themselves and avoid being eaten. When threatened, they will either try to escape or display a wriggling tail.

Salamanders elevate and arch their spotted tails over their bodies, and wriggle them. This tail display is thought to distract potential predators, and warn that the salamanders have unpalatable toxins in their skin.

In some cases, salamanders may lose their tails during encounters with predators. Fortunately, Jefferson Complex salamanders have the ability to regenerate their tails. The regeneration process begins shortly after being damaged. Skin cells migrate around and multiply to cover the wound. This process is anatomically complicated. Researchers have studied regeneration to emulate this repair process in the hope that we might make discoveries relevant to the regeneration of human body parts.

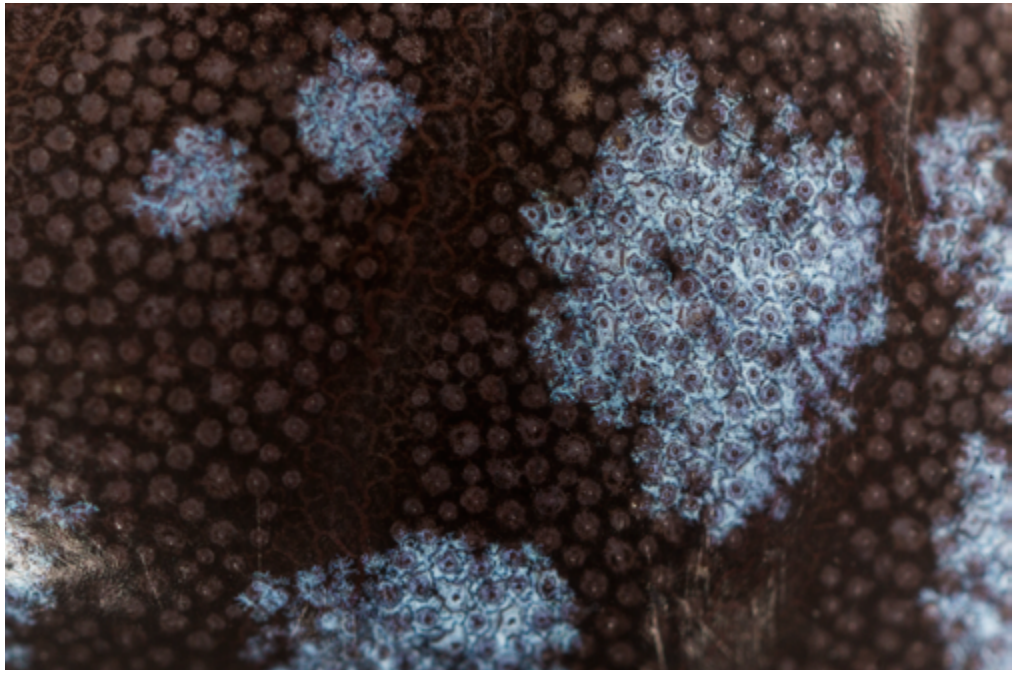
Above: a salamander displays and wriggles its tail as a warning to predators.

Role in Environment

Jefferson Complex salamanders prey on invertebrates, such as worms, insect larvae, and snails. These invertebrate prey are themselves detritivores who eat decomposing material in an environment, like fallen leaves, and other dead plant and animal matter. In this manner, energy is transferred from plants, through the detritivores, and to the salamanders. If the salamander antipredator tactics do not work, energy is then passed to larger predators.

This food chain also plays a role in a local environment's carbon cycle. Plants filter carbon out of the atmosphere and the carbon is then incorporated into their biomass. The detritivores feed on this biomass, which is then transferred to salamanders in the food chain.

Salamanders, though small, have a very important role in the environment and serve as indicator species. The presence or absence of indicator species indicates the health of an environment.
The permeable and sensitive skins of salamanders are sensitive to toxins and poor water quality in their environments. When an environment is polluted, salamander populations will decrease.



Top: a Jefferson Complex salamander with two potential prey species, an overturned isopod and an earthworm. Bottom: Closeup of Jefferson Complex salamander skin, showing mucous and granular glands. The mucous appear as pores and are about 50 microns in diameter.

Capture, Photograph, and Release

The average person may not come across a salamander unless he or she is purposefully looking for one. A salamander will spend most of its time in shelter under rocks, logs, or leaf litter, typically in or near bodies of water such as streams, ponds, or lakes. Though a salamander may seem hidden and hard to find, they often make up the majority of vertebrate biomass, outweighing the biomass of larger vertebrates like the white-tailed deer. Biomass is the total weight of a given population of living organisms in an environment.

When capturing a salamander it is important to grab it by its mid-section, between its front and hind legs. Place the salamander in a ventilated, clear plastic bag filled with damp leaves and twigs. A salamander can be held in captivity for a couple of weeks in a refrigerator. Keeping the salamander in the refrigerator will put it in a hibernation-like state until it is ready to be photographed. A cold salamander will move less. This is a good time to capture macro images before the salamander warms up and becomes active again. Keep the salamander's skin wet as it is being handled and photographed.

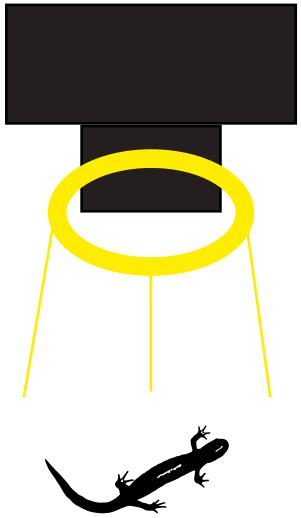
The red box shows the area between the front and hind legs where one should grab the salamander.

When the salamander is done being photographed, return it back to the same area, or at least somewhere close by. Do not place the salamander directly under a rock or a log or else it will be crushed. Instead, set the salamander down next to the rock or log. Be sure to follow all of the local state and federal laws regarding the capture and use of wildlife.

Below: Most species of salamanders have four toes on the front feet and five toes on their hind feet. The toes are about 0.06 centimeters wide and 0.5 centimeters long.

Photography Set-ups

Outdoor Set-up (natural background)

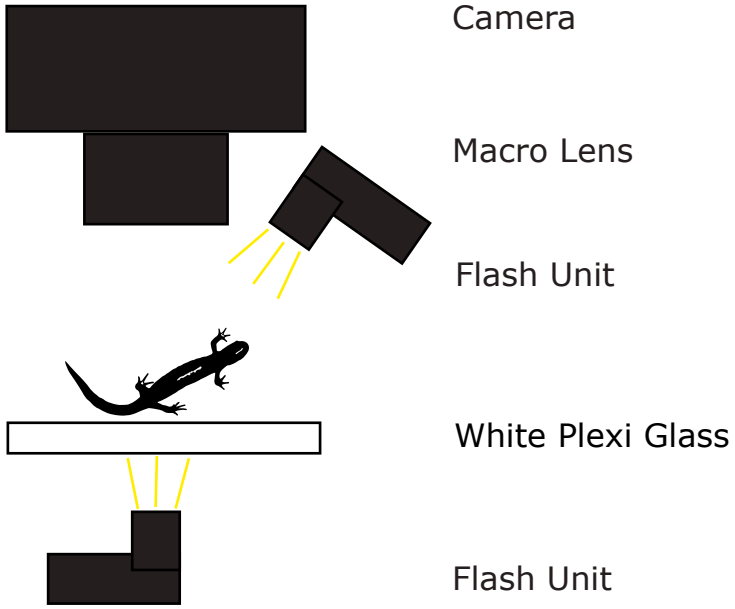


Camera

Macro Lens

Ring flash

Field Studio Set-up (white background)



Camera

Macro Lens

Flash Unit

White Plexi Glass

Flash Unit

Top: Close-up of a Jefferson Complex salamander's head which is about 1 centimeter wide using the field studio set-up.
Bottom: Another example of a field studio set-up image.

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School of Photographic Arts and Sciences, RIT

Sources

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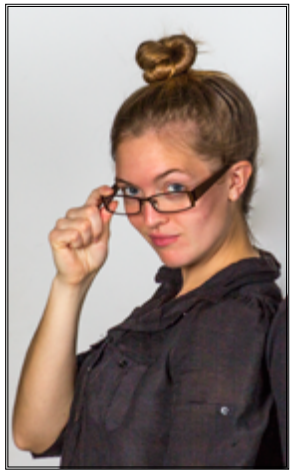
About Me



I am a third year Biomedical Photographic Communications major at Rochester Institute of Technology. I am interested in photography to illustrate field research and to promote science and research through social media.

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