Eye of Newt and Toe of Frog

Amphibians have fascinated people for millennia. They have the marvelous ability to regenerate lost limbs, a characteristic not shared by mammals and birds. In addition, many amphibians undergo a dramatic metamorphosis during which they may change from an aquatic plant-eater to a terrestrial carnivore. All of them have some amphibious element of their life cycle living both in water and on land.

Back in the days of the ancient Greeks, the word “salamandra” meant fire lizard. The salamanders were thought to originate in fire. This may be because some salamanders live in damp hollow logs. Using wood as the principal source of fuel, many Greeks and their contemporaries may have seen a salamanders scurrying out of a fire. They were running for their lives, but they gave the appearance of having been born in the flames. Today the word salamander is the name of a kitchen implement known to some cooks. It is an iron plate or disk that is heated and then placed on top of a casserole or pastry or other food to brown the top.

More recently, relatively speaking, the English language used the word “newt” which in turn was derived from an even older word “eft.” Shakespeare used the word “newt’ in his famous play Macbeth. The witches in that play called for an “eye of newt and toe of frog” and added a variety of other weird an unpalatable items.

Today we use these words, newt and eft, to describe particular types or life stages of salamanders. While all newts are salamanders, not all salamanders are newts. A newt is similar to most other salamanders in having a long tail, four equal sized legs and skin with glands. One difference is that newts have bumpy skin while other salamanders have smooth or glossy skin; and most newts are aquatic as adults. An example is the Red-spotted Newt, one of the most widely distributed salamanders in the eastern United States. As an adult, the Red-spotted Newt lives in water and is a rather drab speckled olive-green color with muted red spots. However it spends several years of its early life entirely on land as an immature, bright orange creature known as a Red Eft.

The bright orange color of the Red Eft serves to warn predators. Its glandular skin secretes a toxin called tetrodotoxin that is a neurotoxin which is also found in puffer fish and several other toxic animals. The eft stage secretes ten times as much of this toxin as the adult stage. Most of the toxin is released from glands located on the eft’s back. Raccoons are their major predator and the raccoons apparently have learned to skin the Red Eft prior to eating it to avoid the toxins in the skin.

Red Efts transform into adults and then move to the water where they will mate. Females lay hundreds of eggs. The eggs hatch into larvae that are aquatic and resemble tadpoles with external gills. Eventually the larvae shed their external gills, their legs grow larger, and they transform into the eft stage. In a few populations the eft stage in absent and the larvae become aquatic adults, skipping the terrestrial stage.

The Red-spotted salamander, unlike many of the other salamanders in the world, is neither endangered nor threatened. Perhaps the demand by witches for “eye of newt” has diminished.

PHOTO: A Red Eft, the immature terrestrial stage of the Red-spotted Newt, scurrying to find cover. This salamander was far from water in a ridge-top forest in West Virginia in late June. Photo by C. McClougherty