

Look But Don't Lick!

GRADES 3-5

NOTES FOR EDUCATORS

Have students read the article "Look but Don't Lick!" Have them write notes in the large right-hand margin. For example, they could underline key passages, paraphrase important information, or write down questions that they have. If it is not possible to create color handouts, use a computer projector to display the reading so that students can see the colorful frog photos. You may also have them color their black and white copies to match the actual colors.

Ask:

- What does it mean for an animal to be poisonous? (*A: An animal is poisonous if its body contains a substance that is harmful or fatal to other animals.*)
- How does being poisonous help the frogs in this article survive? (*A: Predators will not eat an animal that is poisonous to them. The frogs signal that they are poisonous by their bright colors, which warn predators not to eat them. The frogs can be active during the day and do not need to hide because they are not in danger of being eaten.*)

Have students complete the Student Vocabulary Chart to define these vocabulary words from the reading and explain how these attributes benefit poison frogs: poisonous, diurnal, aposematic.

They can work in pairs, small groups, or as a class. During discussion, remind students to use evidence from the text to explain their thinking, and to use specific examples.

SUPPORTS FOR DIVERSE LEARNERS: Student Reading

- "Chunking" the reading can help keep them from becoming overwhelmed by the length of the text. Present them with only a few sentences or a single paragraph to read and discuss before moving on to the next "chunk."
- Provide "wait-time" for students after you ask a question. This will allow time for students to search for textual evidence or to more clearly formulate their thinking before they speak.
- For the charting activity, have students locate and circle the key vocabulary words in the text and underline where the word is defined to help them with the definitions.

Common Core State Standards:

W.3-5.2, W.3-5.8, W.3-5.9
RI.3-5.1, RI.3-5.2, RI.3-5.4, RI.3-5.10

New York State Science Core Curriculum:

LE 3.1a

Next Generation Science Standards:

PE 4-LS1-1
DCI LS1.A: Structure and Function
Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Student Reading

Look But Don't Lick!

In the 1970s and early 1980s, Museum scientists made a few trips each year to the Colombian rain forest. They were herpetologists, people who study reptiles and amphibians. The scientists were interested in tiny, brightly colored frogs that could be spotted dotting the plants and rocky streams of the jungle.

Although they're beautiful, many of these Central and South American frogs are also very poisonous. The visiting scientists noticed that people who live in the Colombian rain forest – the Emberá – used the poisons that ooze out of the frogs to make their blowgun darts deadly. They rubbed dart tips along the animals' backs to transfer the toxins to their weapons, and hunted for animals using the poisoned darts.

The Emberá used three frog species to poison their darts. One of these species was a bright yellow or sometimes orange frog that the scientists had not seen before. Over several years, they collected hundreds of this new-to-science species. The frogs were about two inches long, larger than any other species of poison frog.



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Dendrobates tinctorius
(blue poison frog)

Size: 1 to 1.75 inches

Range and habitat: forests in northern South America

Frog Fact: Some blue poison frog "morphs" combine white, black, yellow-and, of course, brilliant blue.



© AMNH

Phylllobates terribilis
(golden poison frog)

Size: About 2 inches

Range and habitat: tropical rainforests in Colombia

Frog Fact: The most poisonous dendrobatid, golden poison frogs are also excellent "tongue hunters," rarely missing a strike.

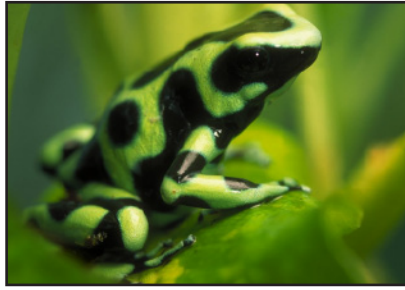
The scientists found that these frogs were also 20 times more toxic than any other kind of frog. Each of them oozed enough poison to kill up to 10 people. The scientists gave this frog species a frightening name: *Phylllobates terribilis*. The common name for the species is less scary: the golden poison frog. It's one of about 180 poison frog species that have been identified so far. New poison frogs are still being discovered today.

Warning Colors

Many small animals in the rainforest are nocturnal, which means active at night. This may help them avoid predators that are active and hunting during the day. But poison frogs are diurnal instead, which means active during the day. You'd think predators like snakes, birds or other hungry animals could easily spot one in the forest where it lives.

As it happens, however, powerful colors and patterns are often used in the natural world to tell hungry predators to stay back. The bright colors advertise that species – from butterflies to berries – are not tasty, and perhaps are even poisonous. Animals with this coloration are called aposematic (Ah-poe-sehm-AH-tick), which is the opposite of camouflage. Because bright colors are a warning, sometimes creatures that are not poisonous at all will have the same bright colors as creatures that are truly toxic. This copycat adaptation may deter would-be hunters.

It has long been thought that the poison frogs' bright colors ward off animals that hope to eat them. In 2007, an experiment in Costa Rica provided evidence to back up that belief. Researchers created 400 life-size clay models of a bright red poison frog species. They also made 400 models of a small, dull-brown frog species. Then the researchers placed the red frog and brown frog models in similar places outdoors. During the study, predators attacked about 100 of the models, but the brown frog models were attacked twice as often as the bright red ones. So brighter coloration in poison frogs does seem to keep some potential predators away.



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Dendrobates auratus
(green and black poison frog)

Size: 1 to 2 inches

Range and habitat: rain forests and plantations, Nicaragua to Colombia

Frog Fact: Like most dendrobatids, green and black poison frogs are diurnal and are active all day long.



© AMNH

Dendrobates leucomelas
(bumble bee poison frog)

Size: 1 to 1.5 inches

Range and habitat: western Venezuela to Guyana

Frog Fact: Native to dry forests, this species often hides away until the rains come, after which it ventures forth to forage.

Getting the Poison

How do these frogs get their poison? Many poisonous animals create poisons through processes in their own bodies, but these poisonous frogs get the necessary chemicals from their diets.

Recent studies have found that insects like certain mites, ants, beetles, and millipedes in the frogs' diets contain compounds called alkaloids. The frogs are able to concentrate and in some cases modify the alkaloids into poison that oozes out of glands in their skin. The poison comes out of the glands when the frogs are frightened or attacked.

In captivity, poison frogs' natural foods are easily replaced by non-toxic foods. They are fed different types of live fruit flies, crickets and beetles, because the frogs need to see the prey moving in order to catch it. These insects don't contain the alkaloids that are found in the frogs' wild prey, so the frogs can't produce poison.



© AMNH

Because of their diet, frogs in captivity, like those in the Museum's *The Power of Poison* exhibition, are perfectly harmless.

Passing on Poison

Now we know how these wild adult frogs get their poison. But how do frog tadpoles protect themselves with poison? Taran Grant is a poison frog expert and research associate at the Museum. He says that some tadpoles may get their poisons directly from their parents.

In at least two species of frog, the tadpoles are fed the mother's unfertilized eggs. Since the eggs contain the same poisons found in the skin of the adult frogs, these chemicals eaten by the tadpoles may protect them, until the growing frog is able to produce its own poison.

This article first appeared in the Fall 2013 issue of Rotunda, the member magazine of the American Museum of Natural History.

Student Vocabulary Chart

Instructions: Fill in the blank boxes below to define key vocabulary from the reading and explain how it helps poison frogs survive.

Vocabulary Words	Definition of the vocabulary word	How does this help the frog survive?
Poisonous		
Diurnal		
Aposematic		

Student Vocabulary Chart

ANSWER KEY

Instructions: Fill in the blank boxes below to define key vocabulary from the reading and explain how it helps poison frogs survive.

Vocabulary Words	Definition of the vocabulary word	How does this help the frog survive?
Poisonous	<i>(harmful or fatal to another animal)</i>	<i>(predators avoid poisonous prey)</i>
Diurnal	<i>(active during the day)</i>	<i>(it is easier to find food during the day than at night*)</i>
Aposematic	<i>(brightly colored as a warning that it is poisonous)</i>	<i>(other animals know the frog is poisonous and that they should avoid it)</i>

**Note to teachers: This is not explicitly stated in the text; students may need to brainstorm the advantages with each other and as a class*