

Science & Literacy Activity

GRADES K-2

OVERVIEW

This activity, which is aligned to the Common Core State Standards (CCSS) for English Language Arts, introduces students to scientific knowledge and language related to how animals use poison to help them survive. Students will read content-rich texts, visit *The Power of Poison* exhibition, and use what they have learned to complete a CCSS-aligned writing task, creating an illustrated text about how animals use poison to help them survive.

Materials in this packet include:

- Teacher instructions for:
 - Pre-visit student reading
 - Visit to *The Power of Poison* and student worksheet
 - Post-visit writing task
- Text for student reading: "Look but Don't Lick!"
- Sample Concept Map for "Look but Don't Lick!"
- Student Worksheet for *The Power of Poison* visit
- Chaperone Group Worksheet
- Student Writing Guidelines
- Teacher rubric for writing assessment

SUPPORTS FOR DIVERSE LEARNERS: An Overview

This resource has been designed to engage all learners with the principles of Universal Design for Learning in mind. It represents information in multiple ways and offers multiple ways for your students to engage with content as they read about, discuss, view, and write about scientific concepts. Different parts of the experience (e.g. reading texts, or locating information in the exhibition) may challenge individual students. However, the arc of learning is designed to offer varied opportunities to learn. We suggest that all learners experience each activity, even if challenging. We have provided ways to adapt each step of the activities for students with different skill-levels. If any students have an Individualized Education Program (IEP), consult it for additional accommodations or modifications.

1. BEFORE YOUR VISIT

This part of the activity engages students in reading a non-fiction text about poisonous frogs found in rain forests of Colombia. The reading will prepare students for their visit by introducing them to the topic and framing their investigation.

Student Reading

Before reading, introduce students to the topic by having them surface all the associations they have with the word "poisonous." Either individually, in pairs, or as a class, have students write down as many words as they can that they associate with the word "poisonous." Once they've done this, create a class list as a group, discussing how students think their words relate to poison. Keep the list posted to refer back to throughout the pre- and post-visit activity.

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.*)

Common Core State Standards:

W.K-2.2, W.K-2.8
RI.K-2.1, RI.K-2.2, RI.K-2.4, RI.K-2.7, RI.K-2.10

New York State Science Core Curriculum:

LE 3.1a

Next Generation Science Standards:

PE 1-LS1-2
DCI LS1.A: Structure and Function
All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

- 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.)

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.

As a class, have students create a concept map about golden poison frogs, using information from the reading to illustrate what they learned.

After they have created their concept maps, go back to the list that the class generated before reading and decide as a group which words on the list relate the best to the frogs that they read about. Circle or highlight those words for later reference.

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.

2. DURING YOUR VISIT

This part of the activity engages students in exploring the exhibition.

Museum Visit & Student Worksheet

Explain to students that they will be focusing on the Chocó Forest area of the exhibition (see map in the Educator’s guide), and using worksheets to gather all the necessary information about how animals use poison to help them survive. Instruct them to choose a second animal other than poison frogs for their focus. Tell students that back in the classroom they will refer to these notes when completing the writing assignment.

SUPPORTS FOR DIVERSE LEARNERS: Museum Visit

- Review the Student Worksheet with students, clarifying what information they should collect during the visit.
- Have students explore the exhibition in pairs, with each student completing their own Student Worksheet.
- Encourage student pairs to ask you or their peers for help locating sources of information. Tell students they may not share answers with other pairs, but they may point each other to places in the exhibition where answers may be found.
- For those who may have trouble taking notes in the exhibition, teachers and chaperones may use the included worksheets to transcribe students’ observations; use as many worksheets as necessary to record all students’ observations. Teachers and chaperones may also take photos for students to refer to when back in the classroom.

3. BACK IN THE CLASSROOM

This part of the activity engages students in an informational writing task that draws on the pre-visit reading and on observations made at the Museum.

Writing Task

Distribute the Student Writing Guidelines handout, which includes the following prompt for the writing task:

Based on your reading, your visit to *The Power of Poison*, and your discussions, write an essay in which you describe how animals use poison to help them survive.

Be sure to:

- define the word “poison”
- include two examples of how poison helps animals survive
- include labeled illustrations of each animal

Support your discussion with evidence from the reading and notes from your visit to *The Power of Poison*.

Go over the handout with students. Tell them that they will use it while writing, and afterwards, to evaluate and revise their essays.

Before they begin to write, have students use the prompt and guidelines to frame a discussion around the information that they gathered in *The Power of Poison*, and compare their findings. They can work in pairs, small groups, or as a class. Referring to the writing prompt, have students underline or highlight all relevant passages and information from the reading and their notes from the exhibition, that can be used in their response to the prompt. Instruct each student to take notes on useful information that their peers gathered as they compare findings. Students should write their essays individually.

SUPPORTS FOR DIVERSE LEARNERS: Writing Task

- Re-read the “Before Your Visit” assignment with students. Ask what they saw in the exhibition that helps them understand how poison helps animals survive.
- Allow time for students to read their essay drafts to a peer and receive feedback based on the Student Writing Guidelines.

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 interested in tiny, brightly colored frogs that could be spotted dotting the plants and rocky streams of the jungle.



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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.

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.



© AMNH

Phyllobates 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: *Phyllobates terribilis*. The common name for the species is less scary: the golden poison frog.

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.



© Reptiland

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.

Getting the Poison

How do these frogs get their poison? It actually comes from their diets!

Recent studies have found that insects like certain mites, ants, beetles, and millipedes in the frogs' diets contain chemicals that the frogs can turn into poisons after eating them.

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 same chemicals that are found in the frogs' wild prey, so the frogs can't produce poison.



© 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.

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

Sample Concept Map for "Look But Don't Lick!"



Student Worksheet

Sketch a poisonous animal that is not a frog. Label its poisonous parts.

Animal's name:

How does this animal use poison?

Chaperone Group Worksheet

Instructions: Record students' observations about poisonous animals below. Use one section for each animal; some students may require multiple sections if they observe different animals.

Student's name:

Animal's name:

How does this animal use poison?

Student's name:

Animal's name:

How does this animal use poison?

Student's name:

Animal's name:

How does this animal use poison?

Student's name:

Animal's name:

How does this animal use poison?

Student's name:

Animal's name:

How does this animal use poison?

Student's name:

Animal's name:

How does this animal use poison?

Student Writing Guidelines

Based on your reading, your visit to *The Power of Poison*, and your discussions, write an essay in which you describe how animals use poison to help them survive.

Be sure to:

- define the word “poison”
- include two examples of how poison helps animals survive
- include labeled illustrations of each animal

Support your discussion with evidence from the reading and notes from your visit to *The Power of Poison*.

Use this checklist to ensure that you have included all of the required elements in your essay.

- I introduced the topic of poison.
- I defined “poison.”
- I clearly named two animals and described how they use poison to survive.
- I included an illustration of two poisonous animals.
- I labeled my illustrations.
- I used information from “Look but Don’t Lick!” to explain how animals use poison to help them survive.
- I used information from *The Power of Poison* exhibition to explain how animals use poison to help them survive.
- I included a conclusion at the end.
- I proofread my essay for grammar and spelling errors.

Assessment Rubric

Scoring Elements		1 Below Expectations	2 Approaches Expectations	3 Meets Expectations	4 Exceeds Expectations
RESEARCH	Reading	Does not reference information from the text.	Presents information from reading materials using facts, vocabulary, examples, or other references but may lack accuracy or relevance.	Presents information from reading materials using facts, vocabulary, examples, or other references but may lack relevance.	Presents accurate and relevant information from reading materials to inform or explain using facts, vocabulary, examples, or other references.
	AMNH Exhibit	Does not reference information from the exhibit.	Presents information from Museum exhibit content using examples, quotes, or other references but may lack accuracy.	Presents information from Museum exhibit content using examples, quotes, or other references relevant to the purpose of the prompt.	Accurately and effectively presents important information from Museum exhibit to inform or explain content using examples, quotes, or other references.
WRITING	Focus	Does not address the prompt.	Addresses the prompt, but significant sections of writing are off topic.	Addresses the prompt with minimal distractions.	Addresses the prompt with no distractions.
	Development	No detail is included to explain the topic	Informs or explains by presenting details.	Informs or explains using accurate details.	Informs or explains by providing accurate and relevant information.
	Conventions	Lacks cohesion and control of grammar, usage, and mechanics appropriate to grade level	Demonstrates an uneven command of standard English conventions appropriate to grade level.	Demonstrates a command of standard English conventions, with few errors as appropriate to grade level.	Maintains a well-developed command of standard English conventions, with few errors. Response includes language and tone appropriate to the audience, purpose, and specific requirements of the prompt.
SCIENCE	Content Understanding	Content is irrelevant, inappropriate, or inaccurate.	Shows uneven understanding of disciplinary content related to the prompt	Presents generally accurate disciplinary content related to the prompt.	Presents accurate and relevant disciplinary content to enhance understanding of the topic.