Muse® Teacher Guide: April 2024

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Great Apes

Primates have been used in research over the past hundred years as a tool for learning more about our shared evolutionary history. This issue of MUSE explores the traits and behaviors of our biological ancestors and discusses the plight of the rainforests that apes call home.

CONVERSATION QUESTION

Why do scientists study apes?

TEACHING OBJECTIVES

- **Students will learn about evolutionary changes in *Homo sapiens*.**
- **Students will learn how different primates have the ability to treat their own injuries.**
- **Students will learn how drone technology is helping scientists to study orangutans in the rainforest.**
- **Students will construct explanations based on evidence for how natural selection leads to the adaptations of populations.**
- **Students will collect evidence to support a claim.**
- **Students will obtain information from a nonfiction text.**
- **Students will write a brief theme-based essay.**
- **Students will calculate equivalent ratios.**
- **Students will complete and share mini-research projects on the rainforests.**

In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

SELECTIONS

- **The Leftovers**
  Expository Nonfiction
- **Dr. Ape Will See You Now**
  Expository Nonfiction
- **Guardians of the Rainforest**
  Expository Nonfiction

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The Leftovers

pp. 10–13, Expository Nonfiction

This article explores how physical attributes and even certain behaviors of animals may change over multiple generations due to natural selection.

RESOURCES

- Adaptation of Populations: Not Necessary

OBJECTIVES

- Students will learn about evolutionary changes in *Homo sapiens*.
- Students will construct explanations based on evidence for how natural selection leads to the adaptation of populations.
- Students will write a brief theme-based essay.

KEY VOCABULARY

- ***vestige* (p. 11)** a trace, mark, or visible sign left by something vanished or lost
- ***receded* (p. 12)** moved back or farther away from a previous position
- ***reflex* (p. 13)** an action that is performed as a response to a stimulus

ENGAGE

Conversation Question: Why do scientists study apes?

Have students consider the images brought to mind when they hear the term "leftovers." Once they've discussed meals, guide them to expand their thinking. For example, left-over pieces of a model kit, left-over time after taking a test, etc. Inform the class that the title of the article they will be reading is "The Leftovers." Display the title page and ask for predictions regarding the content.

INTRODUCE VOCABULARY

Display the following statements and underline the key vocabulary terms. Review how to infer the meanings of new words by using context clues and background knowledge. Then have partners work together to determine the meaning of each word. Reveal definitions.

- The boulders were determined to be vestiges of the last ice age.
- When the floodwaters receded, the cleanup began.
- Blinking his eyes in the dust storm was a reflex action.

READ & DISCUSS

Pose the following questions to prompt meaningful discussion. Students should use complete sentences and details to answer each question.

1. Explain natural selection.
2. What does the term, "selectively neutral" mean?
3. How is a human's left-over "tail" useful to modern *Homo sapiens*?
4. What is the function of a nictitating membrane?
5. How could technology be a factor in the physical or behavioral traits of future humans?

SKILL FOCUS: Construct Explanations

INSTRUCT: Advise students to review the article and to study the different "left-over" human body parts. Distribute the graphic organizer, *Not Necessary,* and tell the class that they will use information from the article to explain the ancestral use of each part as well as the modern-day adaptation.

ASSESS: Review the chart. Give students a few moments to work in small groups to discuss other vestiges in humans or animals. Why did the change take place?

EXTEND

Creative Writing: The first two paragraphs of the article discuss what changes are in store for *Homo sapiens* over the next couple of million years. Scientists have many theories as to which physical or behavioral trait will be our next leftover. Have students write a short essay expressing their thoughts on the subject. Essays should include the specific loss/adaptation, why it will be beneficial to future humans, and should include supporting details. Invite students to read completed essays aloud. Pose the questions: *Do some ideas seem more credible than others? Why?*

Not Necessary

Adaptation of Populations Record the information on the chart using information from the article.

Leftover	Ancestral Use	Modern-Day Adaptation
wisdom teeth		
tail		
appendix		
third eyelid		
Palmar Grasp Reflex		

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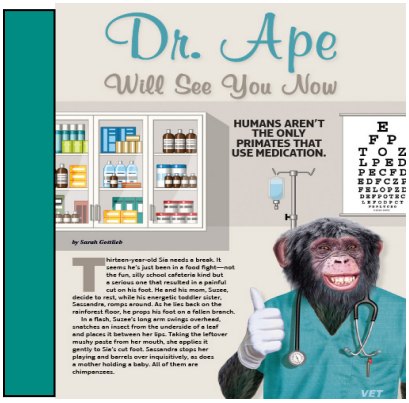
Dr. Ape Will See You Now

pp. 26–27, Expository Nonfiction

Humans aren't the only primates that show compassion. Readers will learn how evidence suggests that apes and orangutans have a working knowledge of natural remedies and applications for treating illnesses and injuries.



RESOURCES

- Collecting Evidence: Amazing Apes

OBJECTIVES

- Students will learn how different primates have the ability to treat their own injuries.
- Students will collect evidence to support a claim.
- Students will calculate equivalent ratios.

KEY VOCABULARY

- ***inquisitively* (p. 26)** with curiosity; tending to ask questions
- ***extracts* (p. 27)** substances taken from a plant or flower and used in food or medicine
- ***monitoring* (p. 27)** maintaining regular surveillance over

ENGAGE

Conversation Question: Why do scientists study apes?

Read aloud the sentence under the title that states, "Humans aren't the only primates that use medication." First, discuss medications and methods that are used to treat pets and why. Next, ask the class to contemplate how animals in the wild tend to illnesses and injuries without the help of a human. Reveal the title and distribute the article.

INTRODUCE VOCABULARY

Post and discuss the key vocabulary. Provide groups of students with Scrabble tiles, or print out a letter/value sheet online. Have students list the point value for each word and total the sum. Then, instruct them to put the three words in order from lowest value to highest value. During a quiet period allow students to revisit the issue to locate and define the word that has the highest point value.

READ & DISCUSS

Reinforce comprehension of the concepts presented in the article by using the following questions to direct discussion.

1. How does Suzee treat Sia's foot?
2. What evidence did the team gather to conclude that the orangutans are self-medicating?
3. Where do orangutans spend most of their lives?
4. How do scientists confirm which plant apes choose and what cures them?
5. What is "reduced gut transit time"?

SKILL FOCUS: Collecting Evidence

INSTRUCT: This article presents the reader with detailed information about the self-care of apes in the wild. Instruct students to review the article and highlight sentences that provide evidence to support each of the claims listed on the *Amazing Apes* organizer. They will record and cite the information with details.

ASSESS: Revisit the discussion in the introductory activity, and have students acknowledge what they have learned about the self-care of wild animals. Collect the worksheet to assess the students' ability to collect supporting evidence.

EXTEND

Mathematics: Review the paragraph on *reduced gut transit time* at the bottom of page 27. Emphasize the fact that states, "Worms come out at a rate of one worm per two leaves." Have students express that information as a ratio. (1:2) Next, have students calculate the missing numbers of these equivalent ratios.

a) _____:26 b) _____:138 c) 54:_____ d) 17:_____

Answers: a) 13 b) 69 c) 108 d) 34

Challenge students to create five additional equivalent ratios.

Amazing Apes

Collecting Evidence Gather evidence from the text to support each claim. Include details, examples, and cite your findings by using page numbers.

Claim: Chimpanzees use natural resources to treat open wounds.
Supporting evidence (p._____)
Claim: Orangutans are able to successfully treat their sore muscles.
Supporting evidence (p._____)
Claim: Chimpanzees have discovered a way to rid themselves of intestinal worms.
Supporting evidence (p._____)

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Guardians of the Rainforest

pp. 33–35, Expository Nonfiction

This article explores the role of primitive drones in the detection and protection of orangutans. In the constant effort to monitor and protect critical rainforests the animals that call them home, drones can be our eyes in the sky.

RESOURCES

- Obtain Information: Droning On

OBJECTIVES

- Students will learn how drone technology is helping scientists study orangutans.
- Students will obtain information from a nonfiction text.
- Students will complete and share mini-research projects on the rainforests.

KEY VOCABULARY

- ***cobbled* (p. 33)** made or put together roughly or hastily
- ***encroaching* (p. 35)** advancing gradually beyond usual or acceptable limits

ENGAGE

Conversation Question: Why do scientists study apes?

Engage students in a game of "20 Questions" in which they will try to guess the central animal of the article (orangutans). In this game, players are allowed to ask yes/no questions one by one, in order to unravel the mystery. Instead of calling out the answer, have students write their guess on a piece of paper after each question. At the end of the questions, did all students write the word "orangutan"?

INTRODUCE VOCABULARY

Post and discuss the three vocabulary words and definitions. Have students Think-Pair-Share with a partner. Give them the following directives, one at a time:

- What materials might you use to **cobble** together a lemonade stand?
- Why must you be careful not to **encroach** on an animal's territory? Why would the animal most likely react aggressively?

READ & DISCUSS

Read the article aloud with the class. Have students reread the article in small groups to answer the questions below. Share responses.

1. Why are the orangutans' forests under siege?
2. Why are the apes being hunted?
3. How do researchers estimate how the orangutan population is faring?
4. What were the drawbacks of the early drones?
5. How is orangutans' reddish orange color an adaptation that helps to camouflage them?

SKILL FOCUS: Obtain Information

INSTRUCT: Guide students to obtain information from the text, captions, and photos in the article. Remind them that the article was written to teach readers about the plight of the orangutans and the use of drones to protect and study the rainforests. Introduce the *Droning On* worksheet and instruct students to underline the word from the answer choices that accurately completes the sentence.

ASSESS: Review and discuss the answers that students chose to complete each sentence. Have them make corrections if necessary.

EXTEND

Research: The forests of Borneo and Sumatra are among the most biologically diverse habitats on Earth. They possess an incredibly high number of unique plants and animals. Display a world map and have students locate these two Southeast Asian islands, located on the Equator. Divide the class into four groups and assign each group an area to study: *animal species, plant species, people & communities, and threats.* After brief research, have the groups come together to share their information so that all students have a better understanding of the Borneo and Sumatra rainforests.

Droning On

Obtain Information Read through the sentences and note the choice of answers. Revisit the article and then underline the correct answer to complete the sentence.

1. Orangutans eat mostly **(seeds/fruit/leaves)**.
2. Female orangutans give birth in **(dens/caves/nests)** every seven to nine years.
3. Every year since 1990, the number of orangutans has declined by several **(thousand/hundred/million)**.
4. Male orangutans can weigh more than **(300/200/100)** pounds.
5. The early drones didn't fly well in **(mist/snow/rain)** or with strong winds.
6. The research team incorporated **(thermal/radioactive/delta)** imaging technology into drones to monitor the orangutans at night.
7. Sensors on the drones measure temperature, pressure, and **(height/distance/air speed)**.
8. To reduce vibration and prevent blurry images, scientists packed the camera in **(paper/foam/plastic)**.
9. The original drone could soar over the forest at **(10/16/20)** miles per hour.
10. The mapping software installed also displays the **(temperature/structure/elevation)** of the land.