

Teaching Guide for Odyssey: Poop! What a Waste!

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Objectives:

- * Students will gain an understanding of what can be learned by studying waste products.
- * Students will learn the water treatment process

Sloth Sleuths and Dung Balls: pages 6-9

Possible Vocabulary Words: *genetic, persist, snippets, piqued, gawk, masticated, extraction, spectrometer, postulated, paleofeces, intriguing, and coprolite.*

1. Draw/color a picture of a sloth and write five facts learned from the article.

Where Does it Go: pages 10-15

Possible Vocabulary Words: *debunks, scatological, millennia, cholera, crucial, influent, headworks, teeming, weir, flocculation, enzymes, anaerobic, aerobic, pathogens, and biosolids,*

1. Have the students create a water treatment diagram.
2. What is *black water*? (raw sewage) What is *gray water*? (water from showers, dishwashers and washing machines)
3. What diseases can be caused by unsanitary conditions? (cholera and yellow fever)
4. What causes sewage odor? (hydrogen sulfide)

The Clean Machines: Dung Beetles at Work: pages 22-24

Possible Vocabulary Words: *entomologists, encased, aerating, humus, infiltration, and spontaneously,*

1. How are dung beetles classified? (Roller beetles, tunneller beetles, and dweller beetles). Find two facts for each grouping.
2. Map a cluster map for a dung beetle's horn. Have students locate four facts to place on this map. Discuss.
3. Describe the process in which a dung beetle helps the environment.
4. Draw/color a picture of a dung beetle and write five interesting facts learned about them from the article.

Much a Doo-Doo About Dinosaur Poop: pages 26-28

Possible Vocabulary Words: *carnivores, coprolites, aerating, interacted, and analysis.*

1. Why has the coprolites of aquatic animals survived better than that of land creatures? (mud creates a sandwich like layer of protection)
2. What kinds of information have been learned by studying the a dinosaur's fossilized poop? (what they ate)
3. What was the most exciting discovery Dr. Karen Chin found while studying the fossilized poop of a tyrannosaurus? (muscle tissue)
4. What can determine the color of ancient poop? (minerals in the soil)
4. Pretend to be a paleontologist studying fossilized poop. Write a diary entry including 4 facts learned from the reading.

Mysteries of Ancient People Poop: Pages 29-31

Possible Vocabulary Words: *paleofeces,, stench, unleash,and chromograph*

1. What have scientists learned about the diet of prehistoric people?(ate insects, bird eggs, snails, fish, mice, seeds, nuts, flowers)
2. Describe what human paleofeces looks like and where has it been found? In which areas has such ancient poop not been found?(caves, deserts, frozen soil but not in wet areas such as the state of Maine)
3. What does an archaeologist studying paleofeces do to break down the substance in order to study it?(chemical bath of tri-sodium phosphate)
4. What can be learned from traces of blood found in the paleofeces?(blood type)

Bird Poop: 32-35

Possible Vocabulary Words: *guano,photosynthesis, proxy, indicator, calibrate, contaminated, concentrate, pollutants, and enzymes.*

1. Have groups of students read the article and make questions to ask other groups. After about 15 minutes, regroup as a class and have the teams ask other teams comprehension questions. Play Bluff. Students who know the answer stand as well as anyone that wants to pretend they know the answer. Ask the question of one of those standing. If correct, the team gets the number of points for those standing. If incorrect, subtract the number of points for those standing. The team with the most points wins the game. The team with the most points wins. Possible questions include: How was guano helpful to people?(provided fertilizer) What did the ancient Inca do to someone caught destroying guano?(stoned to death), etc.

The House Made of Gold: pages 38-40

Have groups of students create a comic illustration of the story in 8 panels.

Poop to the Rescue: pages 41-43

biosolids, sludge, composted, voila, geobacter, anode, polymers, and biodegradable.

1. What are three ways scientists are using poop?(energy, plastic and fertilizer)
2. What interesting idea do the people of Auckland, NZ, have for poop?(rebuilding the top of their volcano, Puketutu)

Trivia Safari:

Readings: pages 2-3,18-19,36-37,

Use the following readings to have students to a trivia safari.

1. What two comparisons were used to describe the length and weight of the crystals found below Naica Mountain?(long as school buses and as heavy as small herds of elephants)
2. What are the Chinese planning to turn tons of panda poo into for the 2008 Summer Olympic?(wrapping paper and photo frames)
3. True or False: Before birth, a baby's gut is squeaky clean?(T)
4. What happens to astronaut waste?(freeze-dried and brought back to earth for future study)
5. What does the European Space Agency hope to use human waste to produce for long voyages to Mars?(raise plants and algae, yielding oxygen, water and food)
6. What is a washiki?(Japanese squatting toilet)
7. Which creatures use their own dropping to build shelter?(termites)

8. What does one species of frog do to camouflage itself?(change its color to resemble droppings)
9. About how much waste does an elephant drop a day?(500 pounds)
10. How do some birds(such as storks and vultures) stay cool in hot weather?(squirt liquid poop)