Ultimate Guide: Crocodiles: Teacher’s Guide

Program Description

They can live for a century, wait a year between meals, and deliver 16 tons of crushing force with their jaws. Is it any wonder the ancient Egyptians revered the crocodile? Examine the unique talents — including infrasonic communication and suspended animation — that make the world’s largest reptile such a tenacious predator and survivor.

Video Comprehension Questions

- What special features help crocodiles sense their environment? (Crocodiles’ eyes periscope above the surface of the water and can see in both day and night. They also have hidden ears and nostrils that remain above the water as they float. Their skin can sense vibrations in the water.)

- What special features protect a crocodile when it dives underwater? (When a crocodile dives underwater, a flap at the back of its mouth closes to prevent water from entering its lungs. Its ears and nostrils also shut, and a see-through membrane covers its eyes.)

- What are two main distinctions between crocodiles and alligators? (Alligators have broad heads and snouts and can only live in freshwater. Crocodiles have narrower, pointed snouts, and some species are adapted to survive at sea. For example, crocodiles have glands in the tong that shed excess salt.)

- What must crocodiles do in order to digest their food? (In order to digest their food, crocodiles, which are cold-blooded, must raise their body temperature by basking in the sun.)

- What special structure helps crocodiles absorb heat from the sun? (The raised bumps along a crocodile’s back have special bony disks laced with blood vessels that absorb heat from the sun and then transfer that heat to their blood stream.)

- Why is a crocodile’s heart considered so specialized? (A crocodile’s heart is specialized in its ability to adjust a unique set of valves to divert blood away from the lungs and recycle it straight to the brain and other vital organs when the crocodile is underwater. A crocodile can also slow its heart down to one to two beats per minute, allowing it to remain underwater for up to two hours.)

- How does the mother crocodile try to protect her young both before and after they are born? (The mother crocodile guards her nest day and night for two months until her babies hatch. After they hatch, she ferries them to the water in her mouth.)

- How has the over-hunting of adult crocodiles in Australia actually helped the juvenile population thrive? (Because the greatest predator of baby crocodiles is the adult crocodile, the over-
Lesson Plan

Student Objectives

Students will understand:

• Changes in the environment have important effects on the way many types of animals evolve over long periods of time.

• Crocodiles have survived and changed very little in the hundreds of millions of years they have survived on earth, in spite of the global catastrophe that caused the mass extinction of the dinosaurs and many other animal species 65 million years ago.

• Crocodiles have specific characteristics that make them a highly successful animal, able to survive harsh conditions and radical environmental changes.

Materials

• Ultimate Guide: Crocodiles video and VCR, or DVD and DVD player

• Computer with Internet access

• Research materials on crocodiles

• Art materials for simple illustrations

Procedures

1. Make sure students realize that the crocodile is one of the oldest animals on Earth. Explain that crocodiles survived even the extreme global environmental changes that caused the extinction of the dinosaurs.

2. Let students know that they will be discussing why crocodiles were able to survive conditions that killed off so many other animal species. To prepare for their discussion, they will be doing research on crocodiles.

3. Allow time for students to use the research materials you have provided, go to the library, or use the Internet to become crocodile experts. Tell them to concentrate on discovering the physical and behavioral attributes that allowed the crocodile to survive for so long.

4. Invite students to share what they have found out about crocodiles from their research. Keep a list on the chalkboard of physical and behavioral attributes that make the crocodile such a successful animal. Just a few examples are:

   • Crocodiles can live for a century.

   • They can wait a year between meals.
• They can float just beneath the surface of the water, where they are almost invisible to other animals, making them highly successful predators.

• Their eyes, ears, and nostrils remain just above the surface of the water so that they can sense their surroundings at all times.

• Their hearts are equipped to slow down and to divert blood away from the lungs while the animal is underwater.

5. Briefly discuss with the class how environmental changes can affect the way life on Earth evolves over long periods of time. For example, the change from forest to grasslands in Africa (caused by the rise of mountains) made animals that could walk upright more successful than those that lived mainly in trees, possibly altering the course of human evolution.

6. Continue the discussion by asking why crocodiles have not changed over hundreds of millions of years.

7. Challenge students to speculate about how future environmental changes, such as increased water pollution, global warming, and a growing human population, might affect how crocodiles adapt and survive in the next 200 million years. (You might point out that the overhunting of crocodiles in Australia has actually increased the crocodile population, as the primary predator of the baby crocodile is the adult crocodile!)

8. After your discussion, ask each student to write and illustrate a description of how he or she thinks crocodiles might look after 200 million more years of evolution. Will they change at all? If so, what will they look like? What are the reasons for the student’s predictions?

Discussion Questions

1. Compare the basic qualities of mammals and reptiles. How are each suited to live in certain environments? What advantages and disadvantages does each type of animal have?

2. Approximately 65 million years ago, dinosaurs became extinct. The most widely accepted theory as to what caused this mass extinction suggests that a giant asteroid struck the earth and caused long-term global cooling and darkness. This climate change killed off many plants, which then starved the herbivores, which in turn starved animals higher up in the food chain. Speculate about how crocodiles survived this global catastrophe. What do we know about modern crocodiles that might explain their ability to survive such harsh conditions?

3. Crocodiles have a very complicated heart that is capable of bypassing the lungs and sending oxygenated blood directly to the brain and other vital organs when the animal is underwater. This ability is being studied by cardiologists and medical researchers, who want to be able to use this ability to help humans. Debate whether animals should be studied—and often killed—in order to further our knowledge of psychology, medicine, animal behavior, and the safety and usefulness of certain products, foods, chemicals, and drugs. Should animal research be limited to “vital” scientific knowledge? If so what qualifies as “vital”?

4. Explain why different types of animals produce such varying numbers of young. Why, under normal circumstances, don’t animals that produce a great number of young overpopulate their environment? Why don’t animals that produce very few young die out? Consider the following
factors: whether the young are born live or as eggs; the gestation period of the young; the parenting tactics of the adults; the readiness of the young to survive on their own; the predators and hardships facing the young; and the age at which the young reach sexual maturity.

5. Throughout the world, crocodiles kill hundreds of humans annually. Considering this threat, should countries, especially those with the greatest crocodile problems, try to eradicate their crocodile populations?

6. In ancient Egypt, crocodiles were respected and even worshipped. Discuss how people across the planet view animals today. Do some societies still elevate some animals to the status of spirits or gods? Which animals are highly prized and revered in our society? Which are looked upon as merely food animals, laboratory animals, or pests? How do you explain this varied view toward different animals?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Student's description well written; reasons for prediction convincing and based on facts; sketch accurately reflects all details of written description.
- 2 points: Student's description adequate; includes some reasons for prediction; sketch adequately reflects written description.
- 1 point: Student's description poorly written; reasons for prediction lacking; sketch vaguely reflects written description.

Vocabulary

caiman

*Definition:* Any of several Central and South American reptiles that are similar to alligators but that often resemble crocodiles in their appearance.

*Context:* Alligators abound in the United States, while their close cousins, the caimans, reach south as far as Argentina.

cold-blooded

*Definition:* Having a body temperature not internally regulated but approximating that of the environment.

*Context:* It's a misnomer to call them cold-blooded. Crocodilians, as we now know, are adept at keeping warm.

gharial

*Definition:* A large crocodilian native to India.

*Context:* Neither croc nor alligator, the gharial basks on the banks of an Indian river.
periscope
Definition: An optical instrument that allows an observer to obtain an otherwise obstructed view, usually above the level of the observer’s eyes.
Context: A vanishing act leaves only a highly sensitive periscope—the crocodile’s eyes—above the surface.

predator
Definition: An animal that depends on the killing of other animals for its food.
Context: Dinosuchus, the ancestor of the crocodile, was seven tons of pure predator.

Sobek
Definition: An ancient Egyptian crocodile god.
Context: The ancient Egyptians bowed down before Sobek.

Academic Standards

Mid-continent Research for Education and Learning (McREL)
McREL’s Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit http://www.mcrel.org/compendium/browse.asp.

This lesson plan addresses the following national standards:

- Science—Life Science: Understands biological evolution and the diversity of life.
- Science—Life Science: Understands the structure and function of cells and organisms.
- Science—Life Science: Understands relationships among organisms and their physical environment.

National Academy of Sciences
The National Academy of Sciences provides guidelines for teaching science in grades K-12 to promote scientific literacy. To view the standards, visit this Web site: http://books.nap.edu/html/nses/html/overview.html#content.

This lesson plan addresses the following national standards:

- Life Science: Populations and ecosystems; Diversity and adaptations of organisms
Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- [http://school.discovery.com/teachingtools/teachingtools.html](http://school.discovery.com/teachingtools/teachingtools.html)