

Cichlid Daily Lesson Plan

Lesson Title: Cichlid Adaptations

Overview

This lesson will observe and analyze the differences and similarities between cichlid species. The students will observe characteristics of classroom cichlids and picture/videos of other types of cichlids. They will organize the cichlids into different groups, explain their organization, and hypothesize how the different kinds of cichlids developed over evolutionary time.

Following the discussion, the students will take part in a classroom activity which involves acting out the cichlid evolutionary adaptations in Lake Victoria, Africa.

Process Standards

Develop explanations based on reproducible data and observations gathered during laboratory investigations.

Recognize that their explanations must be based both on their data and other known information from investigations of others.

Clearly communicate their ideas and results of investigations **verbally** and in written form using tables, graphs, **diagrams** and **photographs**.

Use analogies and **models** (mathematical and **physical**) to simplify and represent systems that are difficult to understand or directly experience due to their size, time scale or complexity. Recognize the limitations of analogies and models.

Explain how scientific knowledge can be used to guide decisions on environmental and social issues.

Literacy Standards

11-12.RS.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

11-12.WS.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

11-12.WS.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow

of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

11-12.WS.9 Draw evidence from informational texts to support analysis, reflection, and research.

9-10.WS.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Content Standards

B.8.3 Use anatomical and molecular evidence to establish evolutionary relationships among organisms.

B.8.4 Understand that molecular evidence supports the **anatomical** evidence for these evolutionary relationships and provides additional information about the order in which different lines of descent branched.

B.8.5 Describe how organisms with beneficial traits are more likely to survive, reproduce, and pass on their genetic information due to genetic variations, environmental forces and reproductive pressures.

B.8.6 Explain how genetic variation within a population (i.e., a species) can be attributed to mutations as well as random assortments of existing genes.

Essential Questions

How did so many kinds of cichlid fishes evolve?

Why do they greatly vary in certain traits?

Could these concepts apply to other living things, and if so, what are some examples?

Objectives

The students will be able to:

1. Explain how cichlids evolved to have many varying kinds of adaptations (including at least three different factors affecting variation).
2. Compare and contrast three varying kinds of cichlids.
3. Apply similar concepts affecting variation to other species.
4. Analyze how variation in animals affects environmental issues (eg. how a certain species of endangered wolf is defined and how that affects hunting laws).

Co-Teaching Model

If this lesson was taught in a co-teaching model, I would have both teachers involved in guiding small group discussion and have back and forth with discussion leading.

Procedures

ENGAGE/Introducing the lesson (Describe how you will engage students in the lesson, assess prior knowledge, or present the question/problem/challenge for the day)

Student instructions for students

Activities or teacher presentations (Procedures/Plans)

Productive Questions you anticipate using

How/when will you assess learning

Closure: concept recap, preview, assignment

Preparing before:

- 1. Move desks into position (divisions and in periphery)*
- 2. Tape topographical lines on floor*
- 3. Place foods and adaptations in bags*
- 4. Prepare the power point (and potential hand outs. I am still debating if there will be worksheets because I do not want to give too much instruction or format)*

The lesson:

- 1. I will highlight the classroom fish (cichlids) in the fish tank, or I will show pictures and videos of them. I would prefer to have a fish tank with cichlids because it would be present throughout the school year, and students would have seen them and have that prior connection. This will be my engagement to the activity.*
 - a. Ask students about their observations of the fish in our class tank.*
 - b. Have students record similarities and differences in the fish*
 - c. Have students in small groups discuss their observations and make a hypothesis on their evolution and produce a clade*
 - d. Come back into large group and have small groups do a mini-presentation on their hypothesized clade*
 - e. Then the teacher will pose the question: what if all these fish evolved at the same time?*

Activity:

- 1. Have students stand up and act out the cichlids while the teacher explains the evolution of cichlids in Africa*
 - a. Stage1: high water levels and few types of cichlids*
 - b. Stage 2: low water levels and physical barriers*
 - c. Stage 3: evolutionary time and influences for adaptations*
 - d. Stage 4: adaptations*
 - e. Stage 5: high water levels and reunited cichlid populations*

Resources/Materials

List presentation materials, lab equipment, handouts,

Classroom fish tank and/or pictures and videos of cichlids

Power point to guide lesson

Pencil and paper for students to write their observations

Desks oriented in the classroom to make rock barriers or pushed to parameter of room

Tape to make a topographical map on the floor of the classroom to indicate the deeper lake regions

Different kinds of “food” for the different regions when water levels are low

Goldfish crackers

Gummy worms

Pudding

Shelled nuts

Apples

Tools the students must use to eat

Serrated butter knife for apple (symbolizing sharp teeth to cut)

Straw for pudding (symbolizing mouth parts for bottom feeding)

Materials to show different coloration

Hats

Felt / paper

Assessment/Evaluation

Explanation of presentation:

For this presentation, you will be working with the other “fish” (students) in your group from the class activity on cichlid evolution in three main lakes in Africa: Malawi, Victoria, or Tanganyika. Research the evolutionary characteristic of cichlids you had in your group to teach to the class.

Presentation Rubric:

Criteria	Unsatisfactory	Basic	Proficient	Distinguished
(1) Introduction	No or poor introduction included	Vague introductory statement included	Introduction addresses an important aspect of cichlids evolution	Introduction outlines a complex and important topic in the cichlid evolutionary development
	< 2 points	2 points	3-4 points	5 points

(2) Understanding of Cichlid Evolution in relation to their Cichlid Adaptation	No or poor explanation included	Vague explanation given	Clear explanation and its relevance is touched upon	Clear explanation and relevance is thoroughly explained
	<6 points	6-7 points	8-9 points	10 points
(3) Citations	No or poor citations included	One citation included	Two citations included	Four citations included
	0 points	1 point	2 points	3 points
(4) Mechanics (writing, spelling, grammer on presentation media)	Frequent errors	3 errors	1 or 2 errors	No errors
	0 points	1 point	2 points	3 points
