Only the Strong Survive

Natural Selection

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Grade Level	9th – 10th Grade	**Time Frame**	130-150 minutes
Subject	Science	**Duration**	2-3 class periods
Course	Biology I		

Essential Question

How does natural selection contribute to the expansion of some species and the decline of others?

Summary

In this lesson, students will learn about the four points of natural selection and how they drive the evolutionary patterns of a species. Students will determine how to answer evolutionary questions through interpreting graphs and making connections among natural selection concepts. Students also will discover how advantageous traits can increase the survival rate of a species, while unfavorable traits can lead to extinction. This is a multimodality lesson, which means it includes face-to-face, online, and hybrid versions of the lesson. The attachments also include a downloadable Common Cartridge file, which can be imported into a Learning Management System (LMS) such as Canvas or eKadence. The cartridge includes interactive student activities and teacher's notes.

Snapshot

Engage

Students watch a video of a competition between two moose and make predictions about what its outcome means for the moose involved. Students also predict whether one species can influence the evolution of another species.

Explore

Students complete a natural selection lab, collect data, and interpret results. Students add the main ideas to a brainstorming document as they prepare to create a Mind Map.

Explain

Students read an article and watch a video to learn more about the four points of Darwin's natural selection. Students add the main ideas to their brainstorming document and then use the document to develop a Mind Map.

Extend

In groups, students create a comic strip about the four points of natural selection and share it with their peers.*

Evaluate

Students reflect on the lesson and write a summary on the effects of natural selection.

**The online version does not include the comic strip assignment. Instead, the instructions for developing a virtual Mind Map can be found in the Extend section rather than the Explain section*.

Standards

Oklahoma Academic Standards (Biology)

B.LS4.5 : Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
B.LS4.5.1: Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species.
B.LS4.5.2: Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' adaptation over time is lost.

Attachments

- (Online) Natural Selection Choice Board—Only the Strong Survive - Spanish.pptx
- (Online) Natural Selection Choice Board—Only the Strong Survive.pptx
- (Online) Peppered Moth Lab Grid—Only the Strong Survive - Spanish.pptx
- (Online) Peppered Moth Lab Grid—Only the Strong Survive.pptx
- (Online) Peppered Moth Lab Instructions and Data Sheet—Only the Strong Survive - Spanish.docx
- (Online) Peppered Moth Lab Instructions and Data Sheet—Only the Strong Survive - Spanish.pdf
- (Online) Peppered Moth Lab Instructions and Data Sheet—Only the Strong Survive.docx
- (Online) Peppered Moth Lab Instructions and Data Sheet—Only the Strong Survive.pdf
- Cognitive Comic Instructions—Only the Strong Survive - Spanish.docx
- Cognitive Comic Instructions—Only the Strong Survive - Spanish.pdf
- Cognitive Comic Instructions—Only the Strong Survive.docx
- Cognitive Comic Instructions—Only the Strong Survive.pdf
- Cognitive Comic Template—Only the Strong Survive - Spanish.docx
- Cognitive Comic Template—Only the Strong Survive - Spanish.pdf
- Cognitive Comic Template—Only the Strong Survive.docx
- Cognitive Comic Template—Only the Strong Survive.pdf
- Comic Strip Examples—Only the Strong Survive.pdf
- Common Cartridge—Only the Strong Survive.zip
- How I Know It—Only the Strong Survive - Spanish.docx
- How I Know It—Only the Strong Survive - Spanish.pdf
- How I Know It—Only the Strong Survive.docx
- How I Know It—Only the Strong Survive.pdf
- Lesson Slides—Only the Strong Survive.pptx
- Mind Map Instructions and Brainstorming Document—Only the Strong Survive - Spanish.docx
- Mind Map Instructions and Brainstorming Document—Only the Strong Survive - Spanish.pdf
- Mind Map Instructions and Brainstorming Document—Only the Strong Survive.docx
- Mind Map Instructions and Brainstorming Document—Only the Strong Survive.pdf
- R.E.R.U.N. Rubric—Only the Strong Survive - Spanish.docx
- R.E.R.U.N. Rubric—Only the Strong Survive - Spanish.pdf
- R.E.R.U.N. Rubric—Only the Strong Survive.docx
- R.E.R.U.N. Rubric—Only the Strong Survive.pdf

Materials

- Lesson Slides (attached)
- Mind Map Instructions and Brainstorming Document (attached; one per student)
- R.E.R.U.N. Rubric (attached; optional; one per student)
- Cognitive Comic Strip Instructions (attached; one per student)

- Cognitive Comic Strip Template (attached; optional; one per group)
- Comic Strip Examples (attached)
- How I Know It handout (attached; one per student)
- Toothpicks, plastic forks, spoons, and knives (one of each per group)
- Large paper plates (two per group)
- Bag of beans (one handful per group)
- Raisins/marshmallows (one handful per group)
- One paper cup (one per student)
- Stopwatch or timer (for timekeeper)
- Sticky easel pad paper or butcher paper (one per group)
- Markers (Mr. Sketch, Sharpie, etc.)
- Colored pencils
- Pencils/pens
- Large screen with a classroom setup that allows videos and slides to be displayed for everyone to view

15 minutes

Engage

Introduce the lesson using the attached **Lesson Slides**. Display **slide 3** to read aloud the essential question: *How does natural selection contribute to the expansion of some species and the decline of others?* Display **slide 4** to go over the lesson objectives. Review these slides with students to the extent you feel necessary.

Go to **slide 5**. Have students watch the following video: "Watch Moose Fight in a Quiet Alaska Suburb." After the video, move to **slide 6** and pose the following discussion questions for students to write down and then answer verbally or via Mentimeter (see notes below):

- What do you think caused the two moose to battle?
- What do you think will be the outcome for the moose that lost the fight?

Teacher's Note: Procedure

Be sure to ask each question separately and call on random students to share their opinions in between questions.

Optional Technology Integration

Mentimeter: To use Mentimeter for the Engage section, visit the site and create an account (or log in to your account) before class. Using the questions listed in this section, create three open-ended questions for students to respond to in Mentimeter. For more detailed instructions on how to create your own Mentimeter, see the K20 Center's Mentimeter Tech Tool resource.

Next, go to **slide 7**. Place students in groups of four. Then, have students get out a piece of paper and answer the following prompt:

- Do you believe an organism from one species can cause a different species' genes to mutate into a different physical feature?

When students are done writing, display **slide 8**. Using the Chain Notes strategy, have students pass their papers clockwise. Each paper's recipient should choose one of the points their peer made and add an additional fact, idea, or correction to it through words or a drawing. Repeat this process of passing clockwise and writing until the papers get back to their original writers.

After the original writers review the comments their peers made on their paper, have each group come up with a summary of their ideas to share with the class. Select one student from each group to share their summary.

After the discussion, move to **slide 9** and have students watch the video titled "The Evolution of Dogs." After the video, ask students if their original opinion has changed and why or why not.

30 minutes

Explore

Teacher's Note: Preparation

Before beginning this section of the lesson, print out copies of the bird beak lab, linked here, for each student pair or student group. Have the lab supplies on hand and ready to distribute to each group, or have members of each group come up to collect the supplies they need.

Additionally, open the attached **Mind Map Instructions and Brainstorming Document** and decide whether you would like students to use the table or the Venn diagram for their brainstorming document. Edit the instructions to reflect your preference and, in the rubric at the end, set how many points you expect students to have for each activity.

Display **slide 10**. Explain to students that, later in the lesson, they must create a Mind Map about natural selection. In this section, they must complete several activities to prepare for the creation of their maps.

Pass out a copy of the attached **Mind Map Instructions and Brainstorming Document** to each student. Let students know their task is to complete a lab, read an article, and watch a video clip about natural selection to brainstorm ideas for their Mind Map. Review the instructions with students to the extent you feel necessary.

Move to **slide 11**. Pass out copies of the Teacher Institute of Evolutionary Science's "This Lab is for the Birds." Then, have each student pair or student group gather supplies for the lab.

Students should collect data and answer the analysis questions on their lab worksheets. After completion of the lab, ask students to add the main points they have learned to their Mind Map Brainstorming Document.

Teacher's Note: Timekeeping

Consider being the timekeeper for this lab to ensure that all students start and end at the same time. This also can help you monitor each group.

Optional Lab Report

You may choose to have students do a write-up of the lab using the attached **R.E.R.U.N. Rubric**. If so, go over the instructions and rubric with the whole class to make sure students know what is expected of them.

30 minutes

Explain

Display **slide 12**. Have students read Khan Academy's "Darwin, Evolution, & Natural Selection" article and add notes to their brainstorming document. Next, have students watch Amoeba Sisters' "Genetic Drift" video and again add notes to their brainstorming document.

Move to **slide 13**. Using their lab data analysis and their brainstorming notes from the article and video, have each student create a Mind Map.

Optional Bonus Points

For bonus points, you could have students add five additional words or examples to their Mind Map and/or add drawings to at least three different parts of their Mind Map to represent their understanding of natural selection.

40 minutes

Extend

Teacher's Note: Grouping and Monitoring Students

Be sure to group students yourself for this activity instead of having students choose their groups. Walk around and monitor students to address any questions that may arise. Make sure students cite where they are getting their information from about their chosen species.

Emphasize the importance of students' working together to research their species, come up with the storyline, and delegate frames for drawing and coloring on the butcher paper.

Display **slide 14** and place students in groups of four. Have students use the Cognitive Comics strategy to create a comic strip about the four points of natural selection.

Pass out a copy of the attached **Cognitive Comic Strip Instructions** to each student. Review the instructions with students and display examples from the attached **Comic Strip Examples**. Provide each group with a large piece of butcher paper to create their comic strip.

Optional Handout

If you would like an alternative to butcher paper, you may provide each group with a copy of the attached **Cognitive Comic Strip Template**.

After students have completed their comic strips, have them hang up their comic strips around the classroom or in the hallway.

15 minutes

Evaluate

Display **slide 15**. Give each student three sticky notes and invite students to participate in a Gallery Walk of one another's work.

Ask students to leave a question or comment next to at least three comic strips of their choosing (preferably ones that do not already have three or more feedback notes). Then, have students return to their comic strip to read their peers' feedback.

Finally, have students return to their seats and invite them to reflect on the natural selection activities they completed. Pass out the attached **How I Know It** handout and have students use the "How I Know It" strategy to write a summary that explains their understanding of the essential question:

- How does natural selection contribute to the expansion of some species and the decline of others?

Teacher's Note: Vocabulary

You may want to emphasize to students that they should include vocabulary they have learned in their summaries.

Have students share out their summaries. Be sure to provide them with feedback individually.

Resources

- Amoeba Sisters. (2017). Genetic Drift [Video]. YouTube. https://www.youtube.com/watch?v=W0TM4LQmoZY&list=PLwL0Myd7Dk1FuT0l6icE7octRIgJqMBhS&index=7
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- National Geographic. (2015, October 8). Watch Moose Fight in a Quiet Alaska Suburb | National Geographic [Video]. YouTube. https://www.youtube.com/watch?v=M26ug8MGYlY
- Nearpod Original. (2020). The Evolution of Dogs [Video]. Nearpod. https://nearpod.com/t/science/8th/the-evolution-of-dogs-L53964953
- Teacher Institute of Evolutionary Science. (2019, May 28). This lab is for the birds. Center for Inquiry. https://tieseducation.org/resource/this-lab-is-for-the-birds/