Science Learning Packet

Grade 8: Natural Selection, Lesson 3

science learning activities for SPS students during the COVID-19 school closure.

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Due to the COVID-19 closure, teachers were asked to provide packets of home activities. This is not intended to take the place of regular classroom instruction but will help supplement student learning and provide opportunities for student learning while they are absent from school. Assignments are not required or graded. Because of the unprecedented nature of this health crisis and the District’s swift closure, some home activities may not be accessible.

If you have difficulty accessing the material or have any questions, please contact your student’s teacher.
Hello Families,

We hope you and your family are well and safe during this time. During this unprecedented out-of-school time, the SPS middle school science team will be offering instructional opportunities for students that align with the district’s adopted middle school science instructional materials. This work is optional and non-graded.

This investigation packet is the first part in a series of district-aligned lessons about Natural Selection, an 8th grade life science unit developed by AmplifyScience. While AmplifyScience lessons are designed to be done in the classroom with peers, there are some activities that students can complete at home. In this packet you will find activities to accompany lesson 3 of the unit. Accompanying lesson videos will be aired on SPS TV and posted the SPS webpage under Grade 8, however this packet can be used with or without the accompanying video.
The videos can be accessed either online or through Seattle’s Public television programming, https://www.seattleschools.org/district/calendars/news/what_s_new/coronavirus_update/resources/spstv on SPS TV (local channel 26), social media (Facebook and Instagram: @SeattlePublicSchools, Twitter: @SeaPubSchools), and our SPSTV YouTube channel. KOMONews.com will also host on-demand videos under the tab “Lesson Plan” and broadcast on channel KOMO 4.3. These supplemental learning videos feature short segments supporting a variety of subjects and grade levels. All videos will be close captioned on YouTube. For more information regarding the SPS TV broadcast schedule and to find the videos, please visit the following website:
https://www.seattleschools.org/departments/media_operations_center__sps-tv/broadcast_schedule

For students who have access to the internet and the following devices and browsers may wish to log-in to their AmplifyScience account from home are welcome to do so. See below for guidance on which browser

- **Desktops and Laptops** (Windows 7+, Mac OS 10.11+) - *Suggested browsers: Chrome & Safari*
- **Chromebooks** - *Suggested browser: Chrome*
- **iPads that support iOS11.3+** (iPad5+) - *Suggested browser: Safari*

Additionally, we wanted to suggest that you make a schedule at home. A few parents have discovered after three or four days that their kids do much better with a set schedule, kind of like school, but certainly not as long each day. But this way they can keep some kind of order. For example, a student could do 30 minutes of math, followed by 30 minutes of science, followed by 30 minutes of reading and then an hour-long break to play outside. Certainly, these things are up to you, but if you are finding the lack of structure disruptive, this may help.

Sincerely,

Seattle Public Schools Science Department
Natural Selection Part 3 suggested materials to accompany the video:

- This packet
- A piece of paper and something to write with
- A person to share ideas with
- Optional: Computer logged into Amplify
1.5 Adaptive traits

Examining the Rough Skinned Newts

1. Which description matches the histogram of the population 50 generations ago? (check one)
   - Most of the newts had low-poison level traits; very few had high-poison level traits.
   - Most of the newts had high-poison level traits; very few had low-poison level traits.
   - All of the individuals in the population had high-poison level traits.
   - None of the individuals in the population had high-poison level traits.

2. Which description matches the histogram of the population today? (check one)
   - Most of the newts have low-poison level traits; very few have high-poison level traits.
   - Most of the newts have high-poison level traits; very few have low-poison level traits.
   - All of the individuals in the population have high-poison level traits.
   - None of the individuals in the population have high-poison level traits.

3. How has the rough-skinned newt population changed?

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Investigating Adaptive Traits in the Sim:

**Claim:** Yellow color is always an adaptive trait in a yellow environment.

Do you agree or disagree with this claim? (circle one)

- Agree
- Disagree

**Goal:** Gather evidence to support or refute the claim: Yellow color is always an adaptive trait in a yellow environment.

The histogram above represents the starting population of ostrilopes for both Environment A and Environment B.

- **Environment A:** Yellow 7 environment with Carnithons (predators)
- **Environment B:** Yellow 7 environment without Carnithons (no predators)

**Investigating Environment A and B in the Simulation**

Your teacher ran the sim twice. Once for **Environment A with predators** and once for **Environment B** without predators.

| Environment A Live in a Yellow 7 environment **with carnithons (predators)** | Environment B live in a Yellow 7 environment **without carnithons (predators)** |
Does the histogram for Environment A, when the ostrilopes were in a Yellow 7 environment with Carnithons (predators), support or refute the claim Yellow color is always an adaptive trait in a yellow environment.

<table>
<thead>
<tr>
<th>Support</th>
<th>Refute</th>
</tr>
</thead>
</table>

For Environment A, which ostrilopes were more likely to survive and became more common in the population? Which ostrilopes were less likely to survive and became less common in the population?

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Does the histogram for Environment B, when the ostrilopes were in a Yellow 7 environment without Carnithons (no predators), support or refute the claim Yellow color is always an adaptive trait in a yellow environment.

<table>
<thead>
<tr>
<th>Support</th>
<th>Refute</th>
</tr>
</thead>
</table>

For Environment B, when the ostrilopes were in a Yellow 7 environment without Carnithons (no predators), which ostrilopes were more likely to survive and became more common in the population? Which ostrilopes were less likely to survive and became less common in the population?

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Explain what happened to the populations in both environments and why that supports or refutes the claim that yellow color is always an adaptive trait in a yellow environment.

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Modeling Trait Distribution in Thornpalms

Goal: Predict how and why higher levels of water storage can become more common in a thornpalm population. Water storage is the ability of a thornpalm to store water for later use.

This is a thornpalm with low water storage.
This is a thornpalm with medium water storage.
This is a thornpalm with high water storage.

On the above histogram, the starting population had many thornpalms had (circle one)

Low water storage    medium water storage    high water storage

The starting population was probably in a climate with (circle one)

a lot of rain    a little rain.

If the climate changed to be the opposite of what you said above, how would the thornpalm distribution change? Draw your answer in the “population after 50 generations” histogram.
Explain why the population would change in the way you predicted when the climate changes. Use at least three words from the word bank.

**Word Bank:**

- environment
- survive
- adaptive
- non-adaptive

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Simulation Changes to Water-Storage Trait in Distribution of Thornpalms

Once again, your teacher has run the SIM for you. This time they ran it twice, once with a lot of rainfall and once with very little rainfall. They observed what happened to the thornpalms from the starting distribution on the previous page.

**Change in thornpalm distribution when environment changed to have medium rainfall.**

**Change in thornpalm distribution when environment changed to have low rainfall.**

Explain the changes in thornpalm distribution when the environment changed to have low rainfall.

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Did the results agree or disagree with your prediction in the “modeling trait distribution in thornpalms”? Why or why not?

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1.6– Explaining Changes in Trait Distribution

Today you will be putting together everything you have learned in the chapter and summarizing your findings. Remember to use the vocabulary and key concepts that you have written down throughout the previous lessons.

Warm up

Read the cartoon and respond to Sherman below.

Sherman’s Stories #1: Black and White Moths

Look at these peppered moths, Sherman. If you look closely, you can see hundreds of them!

Look at that! At first, I just saw white moths with black specks, but look at all the black moths. They blend right in with the trees!

Why do you think there are so many more black moths than white ones?

I think the moths want to blend in with their environment, so they each got darker to match the trees.

Actually Sherman, there are more black moths than white ones because...

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Review of Previous Work

These are two histograms from earlier in the chapter.

Based on the information given, how can you explain why the distribution of traits change in each population? Use at least four words from the word bank.

Word bank
adaptive trait distribution environment non-adaptive trait variation
Explaining Changes in the Newt Population

Analyze the histograms below, consider the facts, and then answer the questions.

Consider these two facts:

- Since the time when the data was collected 50 generations ago, the distribution of traits in the population has shifted significantly (a lot). Now, many more individuals have poison level 10.
- Since the time when the data was collected 50 generations ago, snakes became part of the newts’ environment.

How could these facts be related? Create a statement about how these facts might be related in a cause-and-effect relationship. You might want to use the sentence frame: I think...probably caused...because....
Writing About the Rough-Skinned Newts

In the space below, answer the chapter 1 question: *What cause this newt population to become more poisonous?*

Use what you have learned so far to consider these claims:

**Claim 1:** Individual newts became more poisonous because they wanted to.

**Claim 2:** The newt population became more poisonous because of something in the environment.

**Revised Claim 2:** The newt population became more poisonous because the snakes in the environment caused poison to be an adaptive trait.

Choose one or more claims to support with evidence and reasoning. You may also choose to explain why one or more of the claims is definitely not correct.

Use at least two key concepts and five of the words in the word bank.

<table>
<thead>
<tr>
<th>Word Bank:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adaptive trait</strong></td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
</tr>
<tr>
<td><strong>Environment</strong></td>
</tr>
<tr>
<td><strong>Non-adaptive trait</strong></td>
</tr>
<tr>
<td><strong>Population</strong></td>
</tr>
<tr>
<td><strong>Trait</strong></td>
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<tr>
<td><strong>Variation</strong></td>
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</tbody>
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Check Your Understanding

This is a chance to reflect on what you have learned so far. Be open and truthful when you respond to the questions below. If you feel that you are not understanding a certain part of the chapter, use the answer key to help you review certain lessons and concepts.

Scientists investigate in order to figure things out. You have been investigating why the newt population in a Pacific Northwest State Park became more poisonous over time in order to share your ideas with biologists. Are you getting closer to figuring out why the trait for high-poison level became more common in the newt population?

1. I understand how a histogram can be used to represent and describe the traits in the newt population. (circle one) yes no

2. If you said yes, explain how a histogram can be used to describe traits. If you said no, explain what is confusing to you.

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3. I understand why high-poison levels are adaptive in one environment, but not adaptive in another. (circle one) yes no

4. If you said yes, explain why poison levels could be adaptive only in certain environments. If you said no, explain what is confusing to you.

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5. I understand how the number of high-poison newts increased over time.
   (circle one) yes  no

6. If you said yes, explain how the number of high-poison newts increased over time. If you
   said no, explain what is confusing to you.

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7. I understand why a new trait may or may not become more common in a population.
   (circle one) yes  no

8. If you said yes, explain whether adaptive or non-adaptive traits will become more
   common. If you said no, explain what is confusing to you.

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9. What do you still wonder about how the trait for high poison levels became more
   common in the newt population over time?

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