

## Lesson 4. Why Do Piloses Have Thinner Trunks Nowadays?

### Plan Lesson 4

In the last class, students learned that the trait variants in a population of radish plants – hairier or less hairy plants – could be easily described by counting hairs and graphing the data.

Today, students see an animation of a storybook about a population of animals called piloses and focus on the key trait variants of wider or thinner trunks. The storybook explains how a thinner trunk became the most prevalent trait variant over time through a process that, by the end of today, we will name “**natural selection.**”

In this lesson, students add three important new ideas to their developing understanding of natural selection – that (i) depending on environmental conditions, individuals within a population that possess a beneficial trait variant are healthier (“differential survival”); (ii) those healthier individuals have more offspring (“differential reproduction”), and thus (iii) over many generations the proportion of individuals in the population that have a beneficial trait variant increases.

### Learning Targets in this Lesson

- Depending on environmental conditions, a trait variant, such as a thinner trunk, may be beneficial, harmful, or neither.
- Individuals with a beneficial trait variant (piloses with a thinner trunk) are usually healthier and have more offspring.
- Offspring tend to have the same trait variant as their parents, so in future generations individuals with the beneficial trait variant (offspring with thinner trunks) will become more common.

Sequence of Experiences		
1. Introduction	 All class	 5 Minutes
2. Watch <i>How the Piloses Evolved Skinny Noses</i>	 All class	 10 Minutes
3. Retell the Piloses Story	 Pairs	 15 Minutes
4. Make Meaning	 All class	 10 Minutes

<b>5. Wrap Up</b>	 All class	 5 Minutes
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**Materials**

For the class

Slide deck for this lesson

Copy of *How the Piloses Evolved Skinny Noses*

The class wide 6 Key Steps poster

A paper 6 Key Steps for the class to complete in the lesson. Keep and post after completion.

For each student

Notebook page 9

A set of story strips (black text)

A set of labels that highlight the “key steps” in natural selection (blue text)

Glue sticks

**Preparation**

- Become familiar with the animation of the storybook *How the Piloses Evolved Skinny Noses*: <https://youtu.be/15Y3TShzGQw>
- Prepare a set of story strips and a set of key steps labels for each student.
- Prepare glue sticks for the students to use when matching the story strips/key steps to the blank 6 Key Steps chart in their notebooks
- Locate the 6 Key Steps chart template in the L4 section of your crate with the “Story” column to be filled in during the lesson
- Become familiar with the investigation activity by reviewing the filled-in 6 Key Steps chart (pictured below):

Story Strips		Key Steps
	Long ago, many piloses had wider trunks and only some had thinner trunks but all of them could get bugs to eat.	Variation in traits
	It got hot and dry, so the bugs went under the ground.	Environmental change
	Piloses with wider trunks could not reach the bugs underground, so they were less healthy. Piloses with thinner trunks could reach the bugs underground, so they were more healthy.	Depending on the environment, certain trait variants may be beneficial.
	Healthier piloses could have more offspring, and offspring usually looked like their parents.	Individuals with beneficial trait variants are healthier and can have more offspring.
	This process happens again and again over many generations. Eventually, piloses with thinner trunks become more common than piloses with wider trunks.	This process happens again and again over many generations.
	Nowadays, the population looks very different. Now most of the piloses have thinner trunks.	Over time, populations look different than they used to look.

## The Lesson

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### 1. Introduction



All class



5 minutes

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Remind students that in the last class they counted hairs on radish plants. They discovered a graph is a useful way to describe the trait variants in a population. A population is a group of individuals of the same kind in the same environment.

Today they will meet a different population of organisms, animals called piloses. They will see an animation of a storybook about this population, and then they'll get to retell the story themselves.

Today's investigation question is:

*Why do piloses have thinner trunks nowadays?*

Tell students that they will be seeing if they can find evidence in the animation that provides an answer to this question.

*Note: Students may ask if piloses are real. They are not, but it is best to avoid focusing on this point in discussion. This is because piloses are based on a number of real species and the process of natural selection that they undergo is very real indeed (see Front Matter for explanation of why we introduce natural selection using piloses).*

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### 2. Watch *How the Piloses Evolved Skinny Noses*



All class



10 minutes

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Show the video.

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### 3. Retell the Piloses Story



Pairs



15 minutes

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To help students clarify and consolidate the information presented in *How the Piloses Evolved Skinny Noses*, ask students to get into pairs for a story-retelling activity and turn to page 9 in their notebooks.

Lesson 4: Why do piloses have thinner trunks nowadays?

	Story Strips	Key Steps
		
		
		
		
		
		

Explain to them that their task is to retell the story by putting the sentences in the same order as the events in the story. They will use the pictures on the chart to guide them. Here are the steps:

1. Look at the pictures in the chart.
2. Sort the sentence strips into the right order.
3. Match the strips to the pictures using glue sticks.

Hand out the *story strips* (black text) to each student and circulate among pairs to guide students and respond to their questions.

After 10 minutes, hand out the *key steps* (blue text) to each student. Tell students that these are steps in a model that they are building in this unit to tell the story of change over time. Now that they have retold the piloses story, their next task is to match the key steps to the story strips in the chart and glue the key steps next to the story strips.

Circulate among pairs to guide students and respond to their questions. After 5 minutes, you will have a sense if there is consensus. Regardless of whether all pairs have completed the task, move on to the discussion.

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**4. Make Meaning**



All class



10 minutes

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Gather students in a discussion circle.

**The purpose of this discussion** is to consolidate the sequence of events in the piloses story, and to go from the details of this specific story to a more abstract sequence of key steps in natural selection.

Part 1 (5 min)

Ask students if they think the storybook provided evidence that answered the investigation question:

*Why do piloses have thinner trunks nowadays?*

*Do you think the story book provided evidence to show how this happened?*

Point to the blank 6 Key Steps chart. Ask for student volunteers to tell you where to write the phrase from each story strip.

Part 2 (5 min)

Next, ask for student volunteers to explain how they ordered the **key steps**. Ask for student volunteers to tell you where to write the phrase from each key step so that it matches the piloses story strip.

Listen for consensus on the order of **key steps in natural selection**:

1. Variation in traits
2. Environments change
3. Depending on the environment, certain trait variants may be beneficial
4. Individuals with beneficial trait variants are healthier and have more babies
5. This process happens again and again over many generations
6. Over time, populations look different than they used to look

Tell students that they have created a scientific model called “**natural selection.**”

**Be sure to save the filled-in 6 Key Steps chart – you'll use it again in Lesson 8!**

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**5. Wrap Up**



All class



5 min

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Hang the 6 Key Steps poster near the Takeaways Chart, in a place where students can see it. You'll have this up for the remainder of the curriculum.

Tell students that they now have a general framework that will help them test the evidence that natural selection (or change over time) happens the same way for **any** population.

In the next lesson, we will be exploring natural selection in the piloses in more detail.

Our question for the next lesson is:

*How can we show that it takes many generations for a pilosa population to change?*