

Variation in Traits

Lesson 6a: Traits in Parents and Babies

Grade 3	Length of lesson: 47 minutes	Placement of lesson in unit: 6a of 7 two-part lessons on variation in traits
Unit central question: Do all of the mice living in the same environment, such as a field of forest, have an equal chance of surviving?		Lesson focus questions: Do babies of living things have the same traits as their parents? How do you know?
Main learning goal: Living things inherit many traits from their parents.		
Science content storyline: Some living things of the same kind survive longer in their environment than others. Living things that survive long enough can produce young and pass on their traits to the next generation. The traits these babies inherit make them look similar to, but not exactly like, their parents.		
Ideal student response to the focus questions: Living things inherit many traits from their parents. The traits babies inherit from their parents show variation, so the babies look similar to their parents, but not exactly like them.		

Preparation

<p>Materials Needed</p> <ul style="list-style-type: none"> • Science notebooks • Chart paper and markers • Data tables from lessons 3a, 5a, and 5b (from the desert simulations and the Changing Environments essay) <p>Student Handouts</p> <ul style="list-style-type: none"> • 6.1 Mouse Traits (1 per student) 	<p>Ahead of Time</p> <ul style="list-style-type: none"> • Review the content background document, especially sections 3 and 4 on variation. • The meaning of the phrase <i>survive long enough</i> in the lesson is both relative and context dependent, so how it applies in a given situation may be difficult for students to understand, particularly ELL students. Make sure to review this phrase and its contextual meanings with students in advance. • ELL support: This lesson is heavily language based, so ELL students will need strong support to succeed in understanding the content and participating in the activities. Consider engaging students in discussing similarities and differences in traits between parents and babies of living things they're familiar with (e.g., pet cats or dogs, their own families). Introduce students to the lesson materials, structure, and content in advance so they know what's expected of them and can follow along and participate. In particular, review key science ideas and orient students to the handout. Identify Tier 2 and 3 words in the lesson plan to review with students, including <i>inherit</i> and <i>inheritance</i>. Also review vocabulary words from previous lessons, including <i>variation(s)</i>, <i>produce young</i>, <i>more/less likely</i>, and <i>survive long enough</i>.
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Lesson 6a General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
5 min	Link to previous lesson: The teacher reviews key findings from the desert simulations showing how color variations in desert beetles affected which beetles were more likely to survive in their environment. Then the teacher highlights the new idea that living things can produce young if they survive long enough.	<ul style="list-style-type: none"> Some living things of the same kind survive longer in their environment than others because of trait variations that give them an advantage. Living things that survive long enough can produce young (babies).
1 min	Lesson focus questions: The teacher introduces the focus questions, <i>Do babies of living things have the same traits as their parents? How do you know?</i>	
10 min	Setup for activity: Students discuss the traits two green beetles might pass on to their babies. Then they make predictions about the color trait the babies will have.	<ul style="list-style-type: none"> The data we collect about living things of the same kind can help us predict traits in offspring (babies).
10 min	Activity: Students complete a data table showing which traits of a baby mouse match the traits of potential parents.	<ul style="list-style-type: none"> Offspring of living things of the same kind have some, but not all, of their parents' traits.
10 min	Follow-up to activity: Students use the data they collected to determine which set of mice are the parents of the baby mouse.	<ul style="list-style-type: none"> Offspring of living things, such as mice, inherit many traits that make them look similar to, but not exactly like, their parents.
10 min	Synthesize/summarize today's lesson: Students apply key science ideas about traits to the offspring of cacti. Then they write their initial ideas for answering the focus questions.	<ul style="list-style-type: none"> Offspring of both animals and plants have traits that are similar to the traits of their parents.
1 min	Link to next lesson: The teacher announces that in the next lesson, students will investigate why the babies of living things of the same kind have traits that are similar to, but not exactly like, their parents' traits.	

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5 min	<p>Link to Previous Lesson</p> <p>Synopsis: The teacher reviews key findings from the desert simulations showing how color variations in desert beetles affected which beetles were more likely to survive in their environment. Then the teacher highlights the new idea that living things can produce young if they survive long enough.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Some living things of the same kind survive longer in their environment than others because of trait variations that give them an advantage. Living things that survive long enough can produce young (babies). 	Summarize key science ideas.	<p>Show slides 1 and 2.</p> <p>In previous lessons, we used our desert model to investigate how trait variations would affect which beetles were more likely to survive in their environment and what would happen when their environment changed.</p> <p>For each desert simulation, we recorded our results on class data tables. What did we discover from our data?</p> <p>NOTE TO TEACHER: <i>Display the class data tables from the desert simulations during this discussion. If all of the beetles of any color were eaten up by the end of the simulation, mention that as well.</i></p> <p>Right! We learned that variation in the color trait explains why some beetles were more likely to survive in their environment than others.</p> <p>In our first simulation, we saw that more of the <i>[X color]</i> beetles survived than any of the other colors of beetles. What happened to the beetles when the environment changed?</p>	<p>Variation in the color trait of the beetles affected which beetles had a better chance of surviving than others.</p> <p>More <i>[X color]</i> beetles survived than any of the other beetles.</p>	<p>Why did more of a different color of beetle survive in</p>

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			<p>Show slide 3.</p> <p>Last time, we also talked about a new science idea: <i>If some living things survive long enough, they can produce young, or babies.</i></p> <p>In today’s lesson, we’ll explore what happens when living things have babies.</p> <p>NOTE TO TEACHER: <i>If appropriate and as time allows, have students review the Changing Environments Data Table from lesson 5b, describing living things other than beetles that survived long enough in a changed environment to produce offspring (babies).</i></p>	<p>Because that color of beetle blended into the environment better.</p>	<p>the second simulation?</p>
1 min	<p>Lesson Focus Questions</p> <p>Synopsis: The teacher introduces the focus questions, <i>Do babies of living things have the same traits as their parents? How do you know?</i></p>	<p>Set the purpose with a <u>focus question</u> or goal statement.</p>	<p>Show slide 4.</p> <p>In this unit, we’ve investigated variation in traits among animals and plants of the same kind.</p> <p>But what happens when living things of the same kind have babies? Do the babies show variation in their traits, or do they look exactly like their parents?</p> <p>That’s what we’ll investigate today as we think about the focus questions, <i>Do babies of living</i></p>		

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			<p><i>things have the same traits as their parents? How do you know?</i></p> <p>Write these questions in your science notebooks and draw a box around them.</p> <p>NOTE TO TEACHER: <i>Write the focus questions on the board for students to refer to throughout the lesson.</i></p>		
10 min	<p>Setup for Activity</p> <p>Synopsis: Students discuss the traits two green beetles might pass on to their babies. Then they make predictions about the color trait the babies will have.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> The data we collect about living things of the same kind can help us predict traits in offspring. 	<p>Make explicit links between science ideas and activities before the activity.</p> <p>Ask questions to elicit student ideas and predictions.</p>	<p>In our desert simulations, we started off with five colors of pom-pom beetles. We listed these colors on our class data tables, and then we recorded how many of each color of beetle survived at the end of each round and how many were eaten.</p> <p>Now think about our new science idea: <i>If living things survive long enough, they can produce young, or babies.</i></p> <p>I wonder how that idea relates to the key science ideas of <i>traits</i> and <i>variation in traits</i>. Let's find out!</p> <p>Show slide 5.</p> <p>Consider this scenario: A green mother beetle and a green father beetle have a baby beetle. What color do you think the baby beetle will be?</p> <p>NOTE TO TEACHER: <i>Write this question on the board or on chart paper.</i></p>		

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			<p>Turn and Talk: Talk about this question with an elbow partner and share your predictions. Make sure to explain your reasoning. Then write your predictions and explanations in your science notebooks.</p> <p>NOTE TO TEACHER: <i>Students’ predictions may be correct even if they don’t understand why. Be prepared to engage students in extended sensemaking during the activity and in subsequent activities to ensure that they understand the science concepts.</i></p> <p>Remember, we’re talking about the beetles in our desert simulations that survived, not those that were eaten.</p> <p>NOTE TO TEACHER: <i>Point to the columns on the simulation data tables that show the total number of beetles that survived after the six hunts.</i></p> <p>Whole-class discussion: Let’s hear your predictions. What color do you think the baby beetle will be and why?</p>		
10 min	<p>Activity</p> <p>Synopsis: Students complete a data table showing which traits of a baby mouse match the traits of potential parents.</p>	<p>Make explicit links between science ideas and activities during the activity.</p>	<p>Show slide 6.</p> <p>Now look at the picture of a baby mouse.</p> <p>Which pair of adult mice in the picture do you think might be the baby mouse’s parents? Why do you think so?</p>		

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	<p>Main science idea(s):</p> <ul style="list-style-type: none"> • Offspring of living things of the same kind have some, but not all, of their parents' traits. 		<p>Notice that all of the mice have some of the same traits, but some of their traits are different. For example, all of the mice have four legs, but other traits, like fur color, are different.</p> <p>ELL support: Throughout this activity, make sure to compare differences as well as similarities. Emphasize both in your teacher talk and the questions you ask ELL students.</p> <p>In today's investigation, we'll compare the traits of this baby mouse with the traits of each pairs of adult mice and see if we can figure out which mice are the parents.</p> <p>Show slide 7.</p> <p>To help you keep track of the mouse traits, you'll record your observations on a data table.</p> <p>NOTE TO TEACHER: <i>Distribute handout 6.1 (Mouse Traits) and orient students to the data table and instructions. Make sure students understand what they're comparing and how to mark the shared traits on the table.</i></p> <p>Complete this handout on your own by comparing the traits of the baby mouse with the traits of the pairs of adult mice. Then mark on the data table which traits are the <i>same</i>, or match.</p> <p>Be prepared to share your results in a small-</p>		

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			group discussion following the activity.		
10 min	<p>Follow-Up to Activity</p> <p>Synopsis: Students use the data they collected to determine which set of mice are the parents of the baby mouse.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Offspring of living things, such as mice, inherit many traits that make them look similar to, but not exactly like, their parents. 	<p>Make explicit links between science ideas and activities after the activity.</p> <p>Engage students in analyzing and interpreting data and observations.</p> <p>Highlight key science ideas and focus question throughout.</p>	<p>NOTE TO TEACHER: <i>After students have completed the handout, divide the class into small groups. Direct students to discuss their data and, as a group, come up with a sentence that explains which pair of adult mice they think might be the baby mouse’s parents.</i></p> <p>Show slide 8.</p> <p>Small-group discussion: Share your data in your small group and discuss which pair of adult mice might be the baby mouse’s parents.</p> <p>Talk about which of the baby mouse’s traits are the same as the traits of each pair of adult mice, and which are different. As you share your ideas, you may change the check marks on your data tables if you think someone else’s ideas are better or more accurate.</p> <p>As you talk about the data, keep our focus questions in mind: <i>Do babies of living things have the same traits as their parents? How do you know?</i></p> <p>As a group, come up with a sentence that explains which pair of adult mice might be the baby mouse’s parents and why you think so.</p> <p>Whole-class discussion: Let’s have one group share the sentence you came up with.</p>		

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		Engage students in communicating in scientific ways.	<p>As your classmates share their ideas and explanations, listen carefully and think about whether you agree or disagree. Practice communicating in scientific ways by saying things like “I agree with this idea because ...” or “I disagree with this idea because” You can ask questions or add on to the ideas as well.</p> <p>NOTE TO TEACHER: <i>Make sure students reach the conclusion that the baby mouse has more traits in common with the brown mice. The only different trait appears to be nose color. The key science idea that offspring have traits similar to, but not exactly like, their parents will be developed more fully in lesson 6b.</i></p> <p><i>Groups should develop a sentence that’s similar to this one: The brown adult mice are most likely the parents of the baby mouse because most of the baby mouse’s traits are the same as the traits of the brown mice.</i></p>		
10 min	<p>Synthesize/Summarize Today’s Lesson</p> <p>Synopsis: Students apply key science ideas about traits to the offspring of cacti. Then they write their initial ideas for answering the focus questions.</p>	<p>Highlight key science ideas and focus question throughout.</p> <p>Engage</p>	<p>Show slide 9.</p> <p>Today’s focus questions are <i>Do babies of living things have the same traits as their parents? How do you know?</i></p> <p>We know from our investigation that baby animals, like the baby mouse, have traits that make them look like their parents.</p> <p>But what about baby plants? Do you think they</p>		

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	<p>Main science idea(s):</p> <ul style="list-style-type: none"> • Offspring of both animals and plants have traits that are similar to the traits of their parents. 	<p>students in making connections by synthesizing and summarizing key science ideas</p>	<p>have the same traits as their parents?</p> <p>Show slide 10.</p> <p>Believe it or not, plants have parents too. Look at this picture of two cacti. The word <i>cacti</i> means more than one cactus.</p> <p>If these two adult cacti have a baby, what traits do you think the baby cactus might have?</p> <p>In your science notebooks, draw a picture of what you think the baby cactus would look like. Label your drawings to show which of the baby's traits might be the same as the parents' traits.</p> <p>Individual work time.</p> <p>Whole-class share-out: Let's have a few of you share your drawings and ideas about whether the baby cactus would look like its parents.</p> <p>NOTE TO TEACHER: <i>Help students begin to connect the science idea that babies inherit some but not all of their parents' traits with more familiar contexts. For example, if students have seen kittens or puppies with their parents, ask them to describe any similarities and differences in traits they observed. Or ask students to describe how their own physical characteristics are similar to or different from their parents' traits.</i></p>		

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			<p>We'll continue exploring our focus questions in the next lesson, but take a moment now and write down your initial ideas for answering these questions. Make sure to include evidence from your data table to support your explanations.</p>		
1 min	<p>Link to Next Lesson</p> <p>Synopsis: The teacher announces that in the next lesson, students will investigate why the babies of living things of the same kind have traits that are similar to, but not exactly like, their parents' traits.</p>	Link science ideas to other science ideas.	<p>Show slide 11.</p> <p>Today we investigated whether babies of living things have the same traits as their parents.</p> <p>The data we collected showed that a baby mouse shared most of its traits with the pair of brown mice we think are its parents.</p> <p>Next time, we'll talk about why the babies of living things have traits that are similar to, but not exactly like, their parents' traits.</p>		