Lesson 4.1
Scorpion Scientist
Lesson Overview

In this lesson, students are introduced to a new question from the students at Graystone Elementary School about another organism that lives in the park—the White-Crowned Sparrow. Before they conduct their own investigation of the sparrows, students read *Scorpion Scientist*, a book that models how a scientist asks and investigates questions. As students read, they record the different ways the scientist in the book investigates her questions. At the end of the lesson, the class discusses the patterns of traits they noticed in the book about Valley Scorpions compared with other scorpions, reinforcing the idea that scientists investigate questions by looking for patterns in data. The purpose of this lesson is for students to develop a deeper understanding of how scientists ask and investigate questions and to see a model of this scientific practice in use in the real world.

**Predicted Phenomenon:** The traits of the White-Crowned Sparrow offspring

**Investigative Phenomenon:** Valley scorpions have traits different from other scorpions.

**Students learn:**

- Scientists can investigate questions by looking for patterns in data.
- The methods scientists use are determined by the questions they are investigating.
- Scientists use a variety of methods, tools, and techniques when they conduct investigations.
- Science theories are based on a body of evidence and many tests.
Partners read *Scorpion Scientist* to think about how scientists ask and investigate questions.

### Instructional Guide

1. **Hold up Scorpion Scientist** and remind students about asking questions.

   - Today, we are going to read the book *Scorpion Scientist*. This is a book about a scientist who discovers a group of scorpions in a valley. These scorpions look different than other scorpions she is familiar with. She asks and investigates her questions in order to learn more about the Valley Scorpions.

2. **Introduce the notebook pages.** Have students turn to pages 80–81, *How Scientists Investigate Questions: Scorpion Scientist*. Read aloud the directions and remind students that in previous lessons, they have asked and recorded their own questions when reading.

   - Today, you will focus on the questions the scientist in the book asks. You will read to find out how she investigates her questions.

   Explain that Lauren Esposito, the scientist in the book, asks a series of questions and investigates to find the answers. Read aloud the question on page 15.

   - For example, one question she asks is *Are the Valley Scorpions a new species?*

   - As you read about each question in the book, record on page 80 in your notebooks how the scientist investigated each question.

   - Then, use the information in the book to answer the question on page 81 about patterns between the Valley Scorpions and other scorpions.

3. **Distribute copies of Scorpion Scientist.** Distribute one copy of the book to each pair of students.

4. **Partners read.** Provide students with time to read the book with their partners. Remind them to record on page 80, Column 2, how Esposito investigated each of her questions and then answer the question on page 81.
5. **On-the-Fly Assessment**: Students share their ideas about how Esposito investigates her questions. Call on a few students to share their ideas. Connect how Esposito investigated her questions to the ways that students have investigated different organisms throughout the unit. As students share their ideas, listen for how they are comparing their own experiences to those of the scientist in the book.

   How were the ways Esposito investigated her questions similar to how you as wildlife biologists have investigated your questions?

   Accept all responses.

### Embedded Formative Assessment

**On-the-Fly Assessment 12: Practices of Science**

**Look for**: As students share their ideas about how the scientist in *Scorpion Scientist* investigates questions, listen for how students are relating their own experiences to those of Esposito. Are students identifying the practices of science in which they’ve engaged throughout the unit? In particular, are they connecting the kinds of questions they have been asking to those asked by Esposito? Are they noting that Esposito conducted investigations to answer her questions, just as students themselves did?

**Now what?** If students are not connecting their own experiences engaging in scientific practices with those of the scientist in the book, return to *Scorpion Scientist* and reread portions with the class. Point out where Esposito asks questions, investigates her questions, and answers her questions with data. As you point out each instance in the book, pause and have students reflect on their own activities throughout the unit. Have students share their ideas about connections they notice. On the board, record examples of instances during which students engaged in scientific practices, such as asking or investigating questions.

### Teacher Support

**Background**

**About the Book**: *Scorpion Scientist*

*Scorpion Scientist* follows an arachnologist, Lauren Esposito, as she discovers an unknown scorpion and identifies it as a new species. Esposito asks a series of questions and investigates to find the answers. She asks whether the scorpion has different genes from similar scorpions, whether its behavior and other traits are different, and whether it lives in a different environment. The answers to all these questions are evidence that it is a new species of scorpion. This book models the practice of asking investigable questions and gives students a real-life example of a scientist investigating variation to make a claim. It also helps students understand that scientists investigate their questions by looking for patterns.
Rationale

**Literacy Note: Asking Questions**

Rather than students asking their own questions when reading, they are provided with questions that the scientist in the book asks as she investigates scorpions. Several ways the scientist in the book investigates her questions (e.g., making observations of traits, learning about the environment in which the organism lives, analyzing data, and looking for patterns) are similar to the ways that students have investigated questions during the unit. Be sure to point out these similarities and connect back to students’ role as wildlife biologists. The purpose of reading this book at this point in the unit is to frame students’ own investigation of White-Crowned Sparrows and to allow students to reflect on how scientists investigate questions.

**Rationale**

**Pedagogical Goals: Understanding the Nature of Science**

One goal set forth by the Next Generation Science Standards (NGSS) is for students to understand the nature of science as a discipline and how scientific knowledge develops over time. The NGSS calls out eight understandings about the nature of science that are woven throughout the Amplify Science curriculum. This unit gives students an opportunity to experience two understandings. Students can experience the understanding that Scientific Investigations Use a Variety of Methods. Specifically, in the book *Scorpion Scientist*, students identify, discuss, and reflect upon the idea that depending on the specific question scientist Lauren Esposito is investigating about the Valley Scorpion, the methods she uses to answer her question may be very different. For example, she may be looking at scorpion DNA evidence, analyzing mapping data about where the scorpions live, comparing scorpion photographs, or observing scorpion behavior in the lab. Students can also experience the understanding that Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena. In the conclusion of the book, students read that in order for Esposito to determine if the Valley Scorpion is a separate species, she must continue to ask new questions and collect a growing body of evidence.

**Possible Responses**

**Investigation Notebook**  
**How Scientists Investigate Questions: *Scorpion Scientist*** (pages 80–81)

*Are the Valley Scorpions a new species? (page 15)*  
Asked smaller questions.  
Began thinking about the genes that the Valley Scorpions inherited.

*Are the genes that the Valley Scorpions inherited different from other scorpions’ genes? (page 16)*  
Got DNA about Valley Scorpions.  
Got DNA about other scorpions from other scientists.  
Compared the data to notice similarities and differences.
Do the Valley Scorpions live in a different environment from other scorpions? (page 17)
Looked at maps where the Valley Scorpions were found.

Do the Valley Scorpions have different traits from other scorpions? (page 18)
Observed close-up photos of Valley Scorpions and compared them to other scorpions.
Observed hissing sounds of the scorpions in her lab and compared the sounds to other scorpions.

What patterns did Esposito notice about Valley Scorpions compared with other scorpions? To help you think about patterns, think about the observations Esposito made about the genes, environment, and traits of Valley Scorpions.
Esposito observed patterns of variation. The genes, the environment, and the traits of the Valley Scorpions were different than other scorpions.
Cómo los científicos investigan las preguntas: 
Científica de escorpiones

Instrucciones:
1. Lee cada pregunta en la columna 1 y piensa en cómo Esposito investiga cada pregunta.
2. En la columna 2, apunta las diferentes maneras en las que Esposito investiga sus preguntas.
3. Responde la pregunta en la página siguiente.

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Partners read *Scorpion Scientist* to think about how scientists ask and investigate questions.

### Instructional Guide

1. **Hold up *Scorpion Scientist*** and remind students about asking questions.

   *Hoy vamos a leer el libro *Científica de escorpiones*. Este es un libro acerca de una científica que descubre un grupo de escorpiones en un valle. Estos escorpiones se ven diferentes a otros escorpiones con los que ella está familiarizada. Ella hace preguntas e investiga para aprender más acerca de los escorpiones del valle.*

2. **Introduce the notebook pages.** Have students turn to pages 80–81, How Scientists Investigate Questions: *Scorpion Scientist*. Read aloud the directions and remind students that in previous lessons, they have asked and recorded their own questions when reading.

   *Hoy se enfocarán en las preguntas que la científica en el libro hace. Leerán para averiguar cómo investiga sus preguntas.*

   Explain that Lauren Esposito, the scientist in the book, asks a series of questions and investigates to find the answers. Read aloud the question on page 15.

   *Por ejemplo, una pregunta que hace es: ¿Los escorpiones del valle son una especie nueva?*

   *Mientras leen cada pregunta en el libro, apunten en la página 80 en sus cuadernos cómo investigó la científica cada pregunta.*

   *Luego, usen la información en el libro para responder la pregunta en la página 81 sobre patrones entre los escorpiones del valle y otros escorpiones.*

3. **Distribute copies of *Scorpion Scientist***. Distribute one copy of the book to each pair of students.

4. **Partners read.** Provide students with time to read the book with their partners. Remind them to record on page 80, Column 2, how Esposito investigated each of her questions and then answer the question on page 81.
5. **On-the-Fly Assessment:** Students share their ideas about how Esposito investigates her questions. Call on a few students to share their ideas. Connect how Esposito investigated her questions to the ways that students have investigated different organisms throughout the unit. As students share their ideas, listen for how they are comparing their own experiences to those of the scientist in the book.

¿De qué manera eran similares las maneras en que Esposito investigó sus preguntas a cómo ustedes como biólogos y biólogas de la vida silvestre han investigando sus preguntas?

Accept all responses.

### Embedded Formative Assessment

#### On-the-Fly Assessment 12: Practices of Science

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