Lesson 1.3
Animal and Plant Structures
Lesson Overview

Students observe and describe a variety of structures that living things use to meet their survival needs. The class revisits *Tortoise Parts* and uses a Structure-Function Language Frame to describe how a tortoise uses its structures to do what it needs to do to survive. Students observe their partners, two videos, and an image to learn more about how animals and plants meet their survival needs for air and water. The teacher then introduces the unit’s reference book, *Spikes, Spines, and Shells*, and partners browse the book to visualize how animals and plants use their structures to do what they need to do to survive. The purpose of this lesson is to build students’ understanding of how living things use their structures to meet their survival needs and to develop students’ foundational understanding of the crosscutting concept of Structure and Function.

**Anchor phenomenon:** Spruce the Sea Turtle will survive in the ocean.

**Investigative phenomenon:** A tortoise and other living things survive.

**Students learn:**

- Thinking about structure (such as the shape or hardness of something) and function (what something does) is useful to many scientists.
- Animals have structures that help them breathe.
- Animals and plants have structures that help them get water.
- Animals and plants have structures that help them do what they need to do to survive.
Describing Tortoise Structures

The teacher introduces the Structure-Function Language Frame, and students use it to describe tortoise structures depicted in *Tortoise Parts*.

Instructional Guide

1. **Revisit the Investigation Question.** Point to the Investigation Question on the board.

   We have been working as scientists to answer the question *How do animals and plants do what they need to do to survive?*

2. **Connect to prior learning.**

   To help answer this question, we observed our partners eating a carrot. How did our partners get the food they needed?
   
   [Our partners used their hands, their mouths, and their teeth.]

   Display the front cover of the *Tortoise Parts* big book.

   To help answer our question about how animals and plants do what they need to do to survive, we also read *Tortoise Parts*.

3. **Introduce the Structure-Function Language Frame.** Let students know that they are going to talk about what they observed in the book, just like scientists do. Point to the language frame you placed in a pocket chart or on the board and read it aloud.

   A ____ uses its ____ to ____.

   We can use these words to talk like scientists about how a tortoise does what it needs to do to survive.

4. **Introduce the Structure-Function Language Frame Cards set.** Turn over the cards you have placed beneath the language frame and read each one aloud.
We are going to use these cards to help us talk about the structures, or the parts, that a tortoise uses to do what it needs to do to survive.

Place the *tortoise* card in the first blank of the language frame.

5. Open to page 6 of *Tortoise Parts* and read it aloud. Place the *mouth* structure card in the second blank of the language frame.

What does a tortoise use its mouth to do?

• [Bite.]

Place the *bite* function card in the third blank of the language frame. Read the completed sentence aloud.

A tortoise uses its mouth to bite.

Have students repeat the sentence with you: *A tortoise uses its mouth to bite.* Invite students to repeat the sentence to a partner. Remove the *mouth* and *bite* cards from the frame.

6. Use *Tortoise Parts*, as well as the Structure-Function Language Frame and cards, to describe additional tortoise structures. Use the following routine to discuss each structure:

- Turn to a new page of the book (pages 8, 10, 12, and 14).
- Read about the structure on that page aloud.
- Place the structure card in the second blank of the language frame.
- Ask students to share what a tortoise uses that structure to do.
- Place the corresponding function card in the third blank of the language frame.
- Read the sentence aloud, and then have students repeat the sentence with you.
- Invite students to repeat the sentence to a partner.
- Remove the structure and function cards from the language frame.

Teacher Support

**Instructional Suggestion**

**Going Further: Extending Sentences**

If time allows, you could invite students to add more details to the sentences created with the Structure-Function Language Frame. For example, they might say *A tortoise uses its toenails to dig a hole for its eggs*, rather than simply *A tortoise uses its toenails to dig.*
Rationale

Pedagogical Goals: Structure-Function and Explanation Language Frames

This unit includes two kinds of language frames to support students in using scientific language to express their thinking. The Structure-Function Language Frame supports students in relating specific parts of living organisms to their corresponding functions and generally takes the form of The [living thing] uses its [part/structure] to [function]. The Explanation Language Frames support students in constructing complete scientific explanations that connect an observable phenomenon to the processes, or conditions, that cause the phenomenon or process by using the word because. In this unit, the Explanation Language Frames generally take the form of The [living thing and observable effect/outcome] because [cause]. For example, The sea turtle can survive because it uses its hard shell to keep sharks from biting it. The Structure-Function Language Frames provide a scaffolded step toward using the Explanation Language Frames because students use what they know about structure-function relationships to explain a living thing’s survival.
Structures in Spikes, Spines, and Shells

Partners are introduced to the reference book and visualize how living things in the book use their structures to meet their survival needs.

Instructional Guide

1. Display the front cover of the *Spikes, Spines, and Shells* big book.

   - Sometimes scientists read books to gather new information. Today, we will read a book to help us learn more about how animals and plants use their structures.

   - This book is a reference book. The purpose of a reference book is to provide a lot of information about a topic. Instead of reading the book from beginning to end, you can read parts of the book to find out about something you want to learn.

   Read the title of the reference book aloud.

   - *Spikes, Spines, and Shells*. Spikes, spines, and shells are different animal and plant structures.

2. Set the purpose for exploring the reference book.

   - You and your partner will work together to observe the pictures in this book. You and your partner will think about how the animals and plants in the book use their structures to do what they need to do to survive.

3. Introduce Partner Reading. Let students know that they will work with partners. Point to the Partner Reading Guidelines on the wall. Explain that these guidelines will help students make sense of the book as they browse.

4. Model the Partner Reading Guidelines. Invite a volunteer to be your reading partner. Read each guideline aloud and model the corresponding behavior with a partner.

   - Sit next to your partner.
5. Revisit visualizing.

Remember that an important way that readers learn from a book is to visualize. When you visualize, you make a picture or movie in your mind. As you and your partner look through the book, you can visualize how the animals and plants are using their structures to do what they need to do to survive.

6. Model visualizing with your partner. Point to the picture of the crab on the front cover.

I know that this crab needs food to survive. I want to figure out how the crab uses its structures to get the food it needs. The crab is not eating in this picture, but I can see it has big claws and mouthparts.

Close yours eyes.

I am visualizing the crab grabbing food with its claws and bringing the food to its mouth.

Turn and share with your partner:

I think the crab uses its claws to eat.

Invite your partner to find another animal or plant on the cover of the book and to visualize how that animal or plant uses its structures to do what it needs to do to survive.

7. Distribute copies of *Spines, Spikes, and Shells*. Distribute one copy of the book to each pair of students and have partners begin browsing. Remind students that they are looking for structures that animals and plants use to do what they need to do to survive.

8. On-the-Fly Assessment: Students browse the reference book and discuss structures. Provide students time to search for structures. Circulate and observe as they talk.

9. Gather students back together in the discussion area.

10. Invite students to share ideas. Invite students to share a living thing they observed in the book and how they visualized to think about how that living thing uses its structures to do what it needs to do to survive.

11. Connect student ideas to the crosscutting concept of Structure and Function.

We’ve been learning about what structures living things use to get what they need to survive.

We have also been thinking about what these structures are like. For example, an elephant’s trunk is long so it is good for reaching water and a tortoise has big toenails to help the tortoise dig.
12. **Summarize the discussion and post the new key concept.** Post the key concept on the wall and read it aloud to students.

   Animals and plants have structures that help them do what they need to do to survive.

13. **Add the read card to the What Scientists Do chart.** Point to the chart and read the title aloud. Remind students that this chart will help them remember and think about the important things that scientists, like them, do to answer their questions.

   Scientists do many different things to answer their questions. We have been working as scientists when we observe.

   Post the prepared read card to the What Scientists Do chart.

   One of the most important things that scientists do is read to figure out information that helps them answer their questions.

   How did we read like scientists today?
   [We read parts of *Tortoise Parts*. We looked at the pictures in *Spines, Spikes, and Shells* and visualized how the animals and plants use their structures.]

   As scientists, we read books and looked at the pictures to gather information that helped us answer our question about how animals and plants get what they need to survive.

14. **Conclude the lesson.** Let students know that, in the next few lessons, they will continue working as scientists to figure out what additional things animals need to do to survive.
Embedded Formative Assessment

On-the-Fly Assessment 2: Finding Examples of Structures

Look for: Students’ paired discussion of structures in the reference book presents an opportunity to informally assess their initial understanding of how structure supports function. In general, students should be starting to identify different body parts and hypothesizing about what the parts do. It is not important that they accurately infer the function, just that any function they describe is reasonable given the structure’s shape. For example, suggesting that a crab uses its claws to climb and escape predators is reasonable given the shape of the claws, but suggesting that a crab uses its claws to drink water is generally not reasonable.

Now what? If you notice many students suggesting functions that are not a good fit with the structures’ shapes, you could take time during the subsequent class discussion to briefly model thinking about function in relation to a structure’s shape through visualization. Model both figuring out a reasonable function and rejecting an unreasonable one. For example, The crab uses its claws to climb away from things that might eat it. I can visualize those claws opening and closing to help the crab hold on when it climbs away, and The crab uses its claws to get water to drink is hard to visualize. Water would drip right off its claws and none would get to its mouth! The claws would not be good for that. You could also suggest both a reasonable and somewhat ridiculous function for a structure, asking students to try to visualize and evaluate each one.

Teacher Support

Background

About the Book: Spikes, Spines, and Shells: A Handbook of Defenses

Spikes, Spines, and Shells is the reference book for this unit. It’s full of striking photos of various animals and plants whose defenses fall into four categories: camouflage, armor, spikes and spines, and poison and venom. It provides a place for students to find more information about defensive structures and food-web relationships for many different organisms. The entries provide information about the organisms’ habitats, defensive structures and their functions, defensive behaviors, and animals that eat them. Spikes, Spines, and Shells is used as a Shared Reading throughout the unit, supporting students’ investigations by providing secondhand, visual data in the form of photographs. It also gives students experience with many features of informational texts.

Background

Literacy Note: About Reference Books

Reference books provide in-depth information about specific topics and are typically read for particular purposes. For this reason, students do not read every section in reference books, nor do they read reference books from beginning to end. Sometimes, they search for the information they need and then read the relevant sections carefully. At other times, they browse the book as a way of seeing multiple examples of something. In this lesson, students will be introduced to the table of contents and introduction and are given the opportunity to explore the book. This exploration will prepare students to use the reference book in later lessons in this unit, as a scientist might, and it encourages students to read complex text in varied but strategic ways.
Background

Science Note: What Are Crosscutting Concepts?
Crosscutting concepts are what science educators call the big, overarching ideas that cut across different topics and domains of science. Helping students recognize crosscutting concepts is important because it helps them connect ideas they are learning to ideas in different areas of science. Furthermore, crosscutting concepts can serve as a scaffold for students’ understanding—by connecting an unfamiliar idea to a familiar crosscutting concept, students can better construct an understanding of that new idea. Throughout this unit, there are many opportunities for students to engage with crosscutting concepts—we call out a few on which to focus. The focal crosscutting concept in the Animal and Plant Defenses unit is Structure and Function. Students have multiple experiences with this crosscutting concept and multiple opportunities to reflect on it as a useful idea in science. In addition, this unit has a secondary focus on Cause and Effect. The Standards section for each lesson (part of the Lesson Brief) offers a list of crosscutting concepts that are relevant in each lesson. In addition, there are notes in the Teacher Support tab that identify some (although not all) particularly good opportunities for you to call out the focal crosscutting concepts. Some of these notes explain more generally how the crosscutting concepts manifest in the unit, chapter, or lesson.

Crosscutting Concept: What Is Meant by Structure and Function?
Structure and Function is a crosscutting concept called out by the Next Generation Science Standards. It is one of seven powerful ideas that are widely useful across scientific topics and sub-disciplines. Making use of the crosscutting concept of Structure and Function involves assessing an object’s structural properties (its shape, color, patterning, hardness, smaller parts, etc.) and how that structure supports its function. Thinking about objects, organisms, materials, and habitats in terms of their structure and substructures enables students to make the connection with the purpose and function of those structures. Using a Structure and Function lens provides a way to generate hypotheses and explanations about how an object with particular properties might function, or what aspects of the object’s structure might be essential for it to function as it does.

Crosscutting Concept: Structure and Function Across This Unit
In this unit, students use a Structure and Function lens to investigate how living things use their structures to meet survival needs. (Note: The word structure can be used to refer to both the object itself as well as the properties of the object. In this unit, the word structure is defined for students as a part of an object or a living thing that does something. In the phrase structure and function, structure refers to the properties of an object that support its functions.)

Students have many opportunities to consider how the properties of an animal or plant part allow it to perform a particular function. In Chapter 1, students are introduced to the idea that an organism’s parts can perform various functions required for its survival, and begin to hypothesize about parts’ functions based on their properties. In Chapter 2, students build on this understanding as they focus specifically on the parts used for predation and defense. They figure out that animals use their sharp claws and teeth to catch or grab animals and plants and bite them into smaller pieces. And they investigate shells, spikes, and camouflage, to figure out and model the properties that make those parts good for hiding or fending off animals. In Chapter 3, students examine organisms’ offspring, adding to their understanding as they figure out that grown offspring have parts with properties that are similar to those of their parents, and therefore function in similar ways. By the end of Chapter 3, students will have constructed an explanation of how the properties of Spruce the Sea Turtle’s body parts, and the properties of the body parts of her offspring, will allow them to meet their needs for survival. In particular, they will explain how the hardness of a turtle’s shell protects
the turtle from sharks’ sharp teeth and how the colors of a turtle allow it to blend in with its surroundings and avoid being seen. In Chapter 4, students apply their understanding of structure and function to create models of other animals’ defenses.

Using a structure and function lens will lay the groundwork for students’ later learning about organisms’ adaptations, and eventually natural selection and evolution. You can support students’ thinking about structure and function by asking them to consider how a new structure might function (e.g., What do you think that part might help the animal do?), and asking them what allows a known structure to function as it does (e.g., What makes a shell good for protecting an animal from teeth and claws?).

Background

Crosscutting Concept: Structure and Function Across Chapter 1
In Chapter 1, students investigate: How do animals and plants do what they need to do to survive? To help answer this question, students engage in a variety of activities that introduce them to the crosscutting concept of Structure and Function. A Shared Reading of Tortoise Parts introduces students to how living things use their structures to do what they need to do to survive. Students practice visualizing the different ways tortoises use their structures and then work with the Structure-Function Language Frame to talk like scientists about how a tortoise uses its structures to survive. Following this introduction to structure and function, the class makes a series of live, video, and text-based observations to think about the structures that other living things use to do what they need to do to survive. Then, students participate in a movement routine to demonstrate their developing understanding of how living things use their structures for survival. At the end of the chapter, students apply their understanding of how living things use their structures to explain orally and in writing how Spruce the Sea Turtle does what she needs to do to survive. Students’ work with the crosscutting concept of Structure and Function in Chapter 1 forms the basis of their unit-long investigation of what living things need to live and grow.

Rationale

Literacy Note: Partner Reading
Partner Reading provides time for students to apply and practice the reading strategies they’re learning and provides opportunities for them to assist each other with reading. In this lesson, Partner Reading is not focused on reading the words of the text; rather, it is focused on working together with a partner to use the images in the book to make sense of the content. Later in the unit, Partner Reading will also involve working with a peer to read the words of the text. For first-grade readers, it may take more time to establish procedures for Partner Reading. This will vary depending on the needs of your class. You may wish to provide additional modeling on how to read images and search for animal and plant structures with a partner. Set clear expectations for partner work, such as sharing the reading equally, helping each other understand the pictures in the text, and speaking in quiet voices. Establishing procedures takes time at first, but it will pay off in terms of student learning and management of these lessons. Over time, students gain practice working together and will need fewer reminders about reading together effectively.

Rationale

Literacy Note: Reading the Pictures
This initial read of Spikes, Spines, and Shells, as well as the second read which takes place in Lesson 2.3, does not ask students to engage with the text. The images in the book provide useful evidence for students to draw conclusions about animal and plant structures, and reading the pictures with a purpose is an important aspect of the emerging literacy of first-grade students. Furthermore, this use of the reference book mirrors academic use of a reference book—searching intentionally with purpose, as opposed to attending to the text on each page.
Instructional Suggestion

What One Teacher Did: Using Sticky Notes
One teacher extended this activity by providing students with sticky notes. Rather than having students simply talk about the survival structures they observed on the pages of the reference book, this teacher modeled sticking a sticky note to the image of the survival structures he found. After providing time for students to work with a partner, he gathered his class together and had them switch partners to page through their book, using the sticky notes to explain what they found to their new partner.
Describing Tortoise Structures

The teacher introduces the Structure-Function Language Frame, and students use it to describe tortoise structures depicted in *Tortoise Parts*.

Instructional Guide

1. **Revisit the Investigation Question.** Point to the Investigation Question on the board.

   - Hemos estado trabajando como científicos y científicas para responder la pregunta ¿Cómo hacen los animales y las plantas lo que necesitan hacer para sobrevivir?

2. **Connect to prior learning.**

   - Para ayudar a responder esta pregunta, observamos a otro estudiante comer una zanahoria. ¿Cómo obtuvo la comida que necesitaba?
     - [Usó sus manos, su boca y sus dientes].

   Display the front cover of the *Tortoise Parts* big book.

   - Para ayudar a responder nuestra pregunta acerca de cómo hacen los animales y las plantas lo que necesitan hacer para sobrevivir, también leímos *Las partes de una tortuga*.

3. **Introduce the Structure-Function Language Frame.** Let students know that they are going to talk about what they observed in the book, just like scientists do. Point to the language frame you placed in a pocket chart or on the board and read it aloud.

   - Una ______ usa su/sus ______ para ________.

   - Podemos usar estas palabras para hablar como científicos acerca de cómo hace una tortuga terrestre lo que necesita hacer para sobrevivir.

4. **Introduce the Structure-Function Language Frame Cards set.** Turn over the cards you have placed beneath the language frame and read each one aloud.
Place the **tortoise** card in the first blank of the language frame.

5. Open to page 6 of *Tortoise Parts* and **read it aloud**. Place the **mouth** structure card in the second blank of the language frame.

¿Una tortuga terrestre usa su boca para hacer qué cosa? [Morder].

Place the **bite** function card in the third blank of the language frame. Read the completed sentence aloud.

Una tortuga terrestre usa su boca para morder.

Have students repeat the sentence with you: A tortoise uses its mouth to bite. Invite students to repeat the sentence to a partner. Remove the **mouth** and **bite** cards from the frame.

6. Use *Tortoise Parts*, as well as the Structure-Function Language Frame and cards, to describe additional tortoise **structures**. Use the following routine to discuss each structure:

- Turn to a new page of the book (pages 8, 10, 12, and 14).
- Read about the structure on that page aloud.
- Place the structure card in the second blank of the language frame.
- Ask students to share what a tortoise uses that structure to do.
- Place the corresponding function card in the third blank of the language frame.
- Read the sentence aloud, and then have students repeat the sentence with you.
- Invite students to repeat the sentence to a partner.
- Remove the structure and function cards from the language frame.

**Teacher Support**

**Instructional Suggestion**

**Going Further: Extending Sentences**

If time allows, you could invite students to add more details to the sentences created with the Structure-Function Language Frame. For example, they might say *A tortoise uses its toenails to dig a hole for its eggs*, rather than simply *A tortoise uses its toenails to dig.*
Rationale

Pedagogical Goals: Structure-Function and Explanation Language Frames
This unit includes two kinds of language frames to support students in using scientific language to express their thinking. The Structure-Function Language Frame supports students in relating specific parts of living organisms to their corresponding functions and generally takes the form of *The [living thing] uses its [part/structure] to [function]*. The Explanation Language Frames support students in constructing complete scientific explanations that connect an observable phenomenon to the processes, or conditions, that cause the phenomenon or process by using the word *because*. In this unit, the Explanation Language Frames generally take the form of *The [living thing and observable effect/outcome] because [cause]*. For example, *The sea turtle can survive because it uses its hard shell to keep sharks from biting it*. The Structure-Function Language Frames provide a scaffolded step toward using the Explanation Language Frames because students use what they know about structure-function relationships to explain a living thing’s survival.
Structures in Spikes, Spines, and Shells

Partners are introduced to the reference book and visualize how living things in the book use their structures to meet their survival needs.

Instructional Guide

1. Display the front cover of the *Spikes, Spines, and Shells* big book.

   - A veces los científicos leen libros para reunir nueva información. Hoy leeremos un libro para ayudarnos a aprender más acerca de cómo usan los animales y las plantas sus estructuras.

   - Este libro es un libro de referencia. El propósito de un libro de referencia es proporcionar mucha información sobre un tema. En vez de leer el libro desde el principio hasta el final, pueden leer partes del libro para averiguar sobre algo que quieren aprender.

   Read the title of the reference book aloud.

   - Púas, corazas y otras partes protectoras. Púas, corazas y otras partes protectoras son diferentes estructuras de plantas y animales.

2. Set the purpose for exploring the reference book.

   - Trabajarán juntos para observar las imágenes en este libro. Pensarán en cómo los animales y las plantas en este libro usan sus estructuras para hacer lo que necesitan hacer para sobrevivir.

3. Introduce Partner Reading. Let students know that they will work with partners. Point to the Partner Reading Guidelines on the wall. Explain that these guidelines will help students make sense of the book as they browse.

4. Model the Partner Reading Guidelines. Invite a volunteer to be your reading partner. Read each guideline aloud and model the corresponding behavior with a partner.
• Sit next to your partner.
• Put the book between you.
• Work together to read and understand. (This is modeled in Step 6.)

5. Revisit visualizing.

Recuerden que una manera importante en que los lectores aprenden de un libro es visualizar. Cuando visualizan, hacen una imagen o una película en su mente. Mientras repasan el libro, pueden visualizar cómo los animales y las plantas están usando sus estructuras para hacer lo que necesitan hacer para sobrevivir.

6. Model visualizing with your partner. Point to the picture of the crab on the front cover.

Sé que este cangrejo necesita comida para sobrevivir. Quiero averiguar cómo usa sus estructuras el cangrejo para obtener la comida que necesita. El cangrejo no está comiendo en esta imagen, pero puedo ver que tiene garras y partes de la boca grandes.

Close yours eyes.

Estoy visualizando al cangrejo sujetando comida con sus garras y llevando la comida a su boca.

Turn and share with your partner:

Pienso que el cangrejo usa sus garras para comer.

Invite your partner to find another animal or plant on the cover of the book and to visualize how that animal or plant uses its structures to do what it needs to do to survive.

7. Distribute copies of Spines, Spikes, and Shells. Distribute one copy of the book to each pair of students and have partners begin browsing. Remind students that they are looking for structures that animals and plants use to do what they need to do to survive.

8. On-the-Fly Assessment: Students browse the reference book and discuss structures. Provide students time to search for structures. Circulate and observe as they talk.

9. Gather students back together in the discussion area.

10. Invite students to share ideas. Invite students to share a living thing they observed in the book and how they visualized to think about how that living thing uses its structures to do what it needs to do to survive.

11. Connect student ideas to the crosscutting concept of Structure and Function.
Hemos estado aprendiendo acerca de qué estructuras usan los seres vivientes para obtener lo que necesitan para sobrevivir.

También hemos estado pensando acerca de cómo son estas estructuras. Por ejemplo, la trompa de un elefante es larga, así que es buena para alcanzar el agua, y una tortuga terrestre tiene uñas de los pies grandes para ayudar a la tortuga terrestre a excavar.

12. **Summarize the discussion and post the new key concept.** Post the key concept on the wall and read it aloud to students.

Los animales y las plantas tienen estructuras para ayudarles a hacer lo que necesitan hacer para sobrevivir.

13. **Add the read card to the What Scientists Do chart.** Point to the chart and read the title aloud. Remind students that this chart will help them remember and think about the important things that scientists, like them, do to answer their questions.

Los científicos hacen muchas cosas para responder sus preguntas. Hemos estado trabajando como científicos cuando observamos.

Post the prepared read card to the What Scientists Do chart.

Una de las cosas más importantes que hacen los científicos es leer para averiguar información que les ayuda a responder sus preguntas.

¿De qué manera leímos como científicos hoy? [Leímos partes de Las partes de una tortuga. Miramos las fotos en Púas, corazas y otras partes protectoras y visualizamos cómo usan los animales y las plantas sus estructuras].

Como científicos y científicas, leímos libros y miramos las imágenes para reunir información que nos ayudó a responder nuestra pregunta acerca de cómo hacen los animales y las plantas lo que necesitan hacer para sobrevivir.

14. **Conclude the lesson.** Let students know that, in the next few lessons, they will continue working as scientists to figure out what additional things animals need to do to survive.
Embedded Formative Assessment

On-the-Fly Assessment 2: Finding Examples of Structures

Look for: Students’ paired discussion of structures in the reference book presents an opportunity to informally assess their initial understanding of how structure supports function. In general, students should be starting to identify different body parts and hypothesizing about what the parts do. It is not important that they accurately infer the function, just that any function they describe is reasonable given the structure’s shape. For example, suggesting that a crab uses its claws to climb and escape predators is reasonable given the shape of the claws, but suggesting that a crab uses its claws to drink water is generally not reasonable.

Now what? If you notice many students suggesting functions that are not a good fit with the structures’ shapes, you could take time during the subsequent class discussion to briefly model thinking about function in relation to a structure’s shape through visualization. Model both figuring out a reasonable function and rejecting an unreasonable one. For example, The crab uses its claws to climb away from things that might eat it. I can visualize those claws opening and closing to help the crab hold on when it climbs away, and The crab uses its claws to get water to drink is hard to visualize. Water would drip right off its claws and none would get to its mouth! The claws would not be good for that. You could also suggest both a reasonable and somewhat ridiculous function for a structure, asking students to try to visualize and evaluate each one.

Teacher Support

Background

About the Book: *Spikes, Spines, and Shells: A Handbook of Defenses*

*Spikes, Spines, and Shells* is the reference book for this unit. It’s full of striking photos of various animals and plants whose defenses fall into four categories: camouflage, armor, spikes and spines, and poison and venom. It provides a place for students to find more information about defensive structures and food-web relationships for many different organisms. The entries provide information about the organisms’ habitats, defensive structures and their functions, defensive behaviors, and animals that eat them. *Spikes, Spines, and Shells* is used as a Shared Reading throughout the unit, supporting students’ investigations by providing secondhand, visual data in the form of photographs. It also gives students experience with many features of informational texts.

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Reference books provide in-depth information about specific topics and are typically read for particular purposes. For this reason, students do not read every section in reference books, nor do they read reference books from beginning to end. Sometimes, they search for the information they need and then read the relevant sections carefully. At other times, they browse the book as a way of seeing multiple examples of something. In this lesson, students will be introduced to the table of contents and introduction and are given the opportunity to explore the book. This exploration will prepare students to use the reference book in later lessons in this unit, as a scientist might, and it encourages students to read complex text in varied but strategic ways.