There are several words in students’ everyday lexicon that differ from the way words are used in the language of science. A specific type of probe in the Uncovering Student Ideas series called a word use probe is purposefully designed to reveal whether students recognize the difference between how a word is used in science versus how it is used in students’ everyday language. Some examples of colloquial words in the Uncovering Student Ideas formative assessment probes that have a different or more precise meaning in science include food, adaptation, substance, acceleration, theory, heat, experiment, model, and consumer.

The concept of food appears in several disciplinary core ideas in K–5 life science and is further developed in middle school. Table 1 shows the progression of food-related ideas in the elementary grades.

Children in grades K–2 learn that all animals need food. They begin to develop the idea that food has a biological origin by learning that food comes from plants or animals. In grades 3–5, students build upon these ideas by learning that food releases energy and that food can be traced back to plants, reinforcing the biological origin of food. Besides providing the energy organisms need to sustain life, children in grades 3–5 also learn that food provides the material organisms use for growth and repair. By the end of grade 5, students are expected to know and use the idea that food provides two things—energy and matter (material for growth and repair) and that all foods are traced back to plants. This important distinction of what food is, what it provides, and its biological origin is further built upon in middle school as students learn that food is made up of carbon-based molecules, the chemical process plants use to make food (sugars), when and how the sugars are used, and how they are broken down and reassembled to form other molecules.

Even though students are expected to know that food provides both energy and material for growth and repair and that food is traced back to plants and animals that eat plants, their understanding of the biological concept of food may be affected by their everyday use of the word. In our everyday language, food means anything we “eat” or ingest that is useful to our body. After learning the science ideas, research shows that students, even after completing high school biology, will often revert back to the everyday meaning of food if their initial conception of food has never been surfaced and challenged (Driver et al. 1994). The formative assessment probe “Is It Food?” (Figure 1) reveals whether students use the everyday meaning of food or the science ideas of providing energy and material for growth and repair and food being traced back to plants to decide if some-
thing is considered to be food or not food (Keeley and Tugel 2009).

This probe can be used as a card sort by putting the answer choices on cards and having students work in small groups to sort the cards into “things we consider to be food in science,” “things we do not consider to be food in science,” and “things we do not all agree on or we are unsure” (Keeley 2016). Remove items that students may not be familiar with the composition of, such as diet soda and vitamins. As students collaboratively sort the cards, they must provide a justification as to why they consider something to be food or not food in the scientific sense of the word. As you listen to students discuss their ideas and observe how they sort the items on the list, a clear picture emerges of how students interpret the concept of food. When this probe is used to uncover students’ initial ideas about food, some typical ideas include: food is something we eat, food provides energy (but not matter or vice versa), we need food to live, it has to be edible to be considered food, food keeps us from being hungry, and it’s food if it is good for us. All of these ideas mirror commonly held research-identified ways of thinking about food from elementary grades through high school, and even adulthood.

Everything on the list is considered food in a biological sense except for minerals, vitamins, diet soda, salt, and water. All of the other items can be traced back to plants or animals that eat plants and they provide both energy and matter. Even though some of the foods are not considered things we would consume directly (e.g., flour, ketchup, butter, pancake syrup) or are not healthy (candy bar, sugar), they still provide energy and matter for growth and repair and have a biological origin. Things like water, minerals, vitamins, and salt provide nutrients our bodies need but they do not provide both matter and energy and are not traced back to plants. They are inorganic substances derived from the Earth. Diet soda contains no sugar for energy or other energy-containing substances and therefore is not considered food.

Use students’ initial ideas as the starting point to develop the biological concept of food. Have them identify which items can be traced all the way back to plants, which captured energy from sunlight (Grades 3–5 PS3.D and LS2.A). Connect the need for food to how we use it to get the energy we need to maintain our body temperature and be active (Grades 3–5 LS1.C). Revisit the probe again after students have had the opportunity to develop the scientific concept of food and look for evidence of using the scientific ideas. By using this probe, you will provide elementary students with the opportunity to recognize and think through the difference between our everyday use of a word and how it has a more precise meaning in science. As a result, they are less apt to revert back to the everyday meaning of food, and further build upon and use this important biological concept in middle and high school.

REFERENCES

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### TABLE 1

<table>
<thead>
<tr>
<th>Grades K–2</th>
<th>Grades 3–5</th>
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<tbody>
<tr>
<td>LS1.C: All animals need food in order to live and grow. They obtain their food from plants or from other animals.</td>
<td>PS3.D: The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).</td>
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<tr>
<td>LS1.C: Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.</td>
<td>LS2.A: The food of almost any kind of animal can be traced back to plants.</td>
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