Do The Mystery Samples Contain Life?

Overview
Children explore the properties of three mystery samples and try to find out which one contains life. Then they review what they have learned so far about the characteristics of living things.

TIME:
• 20-30 minutes for exploration
• 15-20 minutes to review learning

Big Ideas
• Scientists define life in different ways, but agree that certain characteristics are common to living things. These are the ability to use energy, to grow, and to reproduce.
• Life as we know it on Earth requires water, a source of energy and a stable environment to exist.
• Sometimes we cannot see living things, but we can observe evidence of their presence.

Preparation
1. Label three jars for each group and fill them with the dry ingredients as listed on the chart below.

<table>
<thead>
<tr>
<th>Jar</th>
<th>Sand</th>
<th>Other Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>3 tablespoons</td>
<td>None</td>
</tr>
<tr>
<td>#2</td>
<td>3 tablespoons</td>
<td>1/2 pkg. Active dry yeast</td>
</tr>
<tr>
<td>#3</td>
<td>3 tablespoons</td>
<td>1 fizzing antacid tablet, crushed</td>
</tr>
</tbody>
</table>

2. Have a small cup with several teaspoons of sugar or several packets of sugar ready for each group.
3. Fill one container of warm tap water for each group, but do not distribute it yet.
4. Set out hand lenses, sheets of paper, and spoons at each station.
Focus the activity with a brief discussion.

Explain that sometimes it is difficult to tell whether or not something is alive. If appropriate, quickly review what children have discovered about the characteristics of living things.

Introduce the three mystery samples. Invite children to observe the mystery samples in the three jars to find out if they contain anything living. Use these prompts to encourage close observations:
• You may use all of your senses except taste. Be sure to look closely with the hand lenses, touch, listen, and smell.
• Take a small sample out of each jar, one jar at a time, and put it on the small piece of paper. After you observe, put the sample back in the right jar.

Discuss conclusions.
After children have made their observations, ask:
• Do any of the mystery samples contain living things? Why do you think so?

Add sugar to the mystery samples.
Give each group the small cup or several packets of sugar. Have them add one teaspoon or one packet of sugar to each sample. Ask:
• You’ve just added a food source to the sample. Do you see any changes to any sample yet?

Add warm water to the mystery samples. Look for changes.
Give one container of hot water to each group and tell them to pour enough water into each jar to just cover the mystery samples. Then ask them to observe changes.

For the Leader: What to Expect
Jar 1: no activity
Jar 2: will begin to show activity after about 5 minutes, and will continue to bubble
Jar 3: will fizz vigorously at first, slow down, and finally stop
Discuss New Conclusions.
Ask:
- Now do you think that any of the mystery samples contain living things? Give your reasons.
- What else might you want to know about the samples in order to figure out if they contain living things?

Add more sugar to each jar.
Have the children add more sugar to each jar.
- Does adding more food (sugar) re-start the fizzing in Jar 3? What is happening in Jar 2?
- Try adding more water to Jar 3. Does that re-start the reaction you saw before?
- Has your opinion about which jar contains the living thing changed at all? Why or why not?

For the leader: What to expect
Jar 1: Still no activity
Jar 2: Activity will continue
Jar 3: Once the fizzed has stopped, it can’t be restarted by the addition of either sugar or water.
The fizzing antacid tablet has completely dissolved in the water.

Reveal the contents of the jars.
Tell students what was in Jars 1 and 3. Then talk about Jar 2. Ask:
- Have any of you ever used yeast? What for?
Explain that yeast is a tiny living thing that stays dormant (kind of like staying asleep) until it is given water and food – in this case, sugar. Yeast is used to make bread rise, as it grows on the ingredients and makes bubbles and air pockets, just as it did in your jars.
- How was the yeast activity different from the fizzy antacid activity?
Explain that the antacid fizzed because it combined in a chemical reaction with the water. Once the chemicals got used up and all the bubbles escaped, the fizzing stopped, just like when you leave a can of soda out and it goes flat. There was nothing alive in the chemicals. But with yeast, the bubbling will continue as long as there is food for it to eat.