How do living things interact?

Snail – Algae Interactions Observations				
	Vial 1 *Water*	**Vial 2** *Water & Algae*	**Vial 3** *Water & Snails*	**Vial 4** *Water, Snails, & Algae*
Color at start				
Color after 1 hour (or overnight)				

What It Means

1. What was the order of the vials from the most yellow to the darkest blue? Based on this, order the vials from the greatest amount of carbon dioxide to the least amount of carbon dioxide.

   Vial # _____ (most CO_2)

   Vial # _____

   Vial # _____

   Vial # _____ (least CO_2)

2. Read the introduction to this lab again. For vials 2, 3, and 4, explain how carbon dioxide was being used and how it was being produced. What interactions among organisms took place?

3. Snails eat algae and also need the oxygen that algae produce. Based on this, predict what would happen if you added a lot more snails to vial 4.

Advising the Team

Based on your observations of snails and algae, and the information you've learned during Investigation 1, what does it mean for an ecosystem to be "balanced"? What can happen if an ecosystem is not in balance?

Science Seekers

Endangered Species

How do living things interact?

Investigation 1
Science Lab

What You Need

4 vials with caps

masking tape

pipette

algae

paper cup of water that sat overnight

4 snails

plastic spoon

bromothymol blue

Caution

Do not touch or taste the bromothymol blue. Wash your hands after handling the living organisms.

Interactions in a Pond Ecosystem

Kelp is a type of giant seaweed and belongs to a family of plants called algae, which usually grow in water. Some algae plants are too small to see, while others, like kelp, can grow to be over 100 feet tall. Just as giant kelp is a producer in the kelp forest food web, smaller algae plants are producers in other ecosystems like lakes and ponds.

Algae not only provide food for other living things in the ecosystem, they also provide oxygen. During photosynthesis, algae plants absorb carbon dioxide from the water, and release oxygen gas. The oxygen that algae produce gets used by other living things. Animals like fish and snails absorb oxygen from the water and release carbon dioxide, the same way humans breathe air to get oxygen and then exhale carbon dioxide. The algae plants themselves also absorb some oxygen, and produce a small amount of carbon dioxide. In this Science Lab, you'll observe snails and algae and investigate changes in the amount of carbon dioxide in the water to see how these living things interact.

What To Do

1. First, set up four different environments in the vials. Use masking tape to label the vials.
   Vial 1 – Water
   Vial 2 – Water & Algae
   Vial 3 – Water & Snails
   Vial 4 – Water, Snails, & Algae

2. Using a pipette, add 5 mL of water that has been standing overnight to vials 1 and 3. Vial 1 will serve as a control.
3. From the aquarium your teacher has set up, add 5 mL of water that contains algae to vials 2 and 4.
4. Using a plastic spoon, remove two snails from the classroom holding tank. Drain off any extra water. Add the snails to vial 3. Add another two snails to vial 4. Make sure the snails go all the way down into the water.
5. Bromothymol blue is an indicator that is blue when the amount of carbon dioxide (CO_2) in water is low and becomes more and more yellow as the amount of carbon dioxide increases. To find out the relative amounts of carbon dioxide in each environment, add 10 drops of bromothymol blue to each vial. Put the caps on the vials. Gently swirl each vial to mix the indicator with the water.
6. Observe the color of the water in each vial. Record your observations in the "Snail – Algae Interactions Observations" chart.
7. Allow all 4 vials to sit in direct sunlight for about an hour, or overnight. Then observe the color of the water in each vial again. Record your observations in the chart.

How does a species survive?

Yeast Population Observations					
	Stage 1 *Yeast and warm water*	**Stage 2** *Yeast, water, and sugar*	**Stage 3** *After 20 min. in freezer*	**Stage 3** *After adding boiling water*	**Stage 4** *After 20 min. at room temperature*
Vial 1 Color changes					
Vial 2 Color changes					

What It Means

1. How did each of the following factors affect the yeast population:

   Sugar: _____

   _____

   Cold temperature, followed by return to room temperature: _____

   _____

   _____

   Boiling water: _____

   _____

2. How was the growth of the yeast affected by sugar, and by temperature changes?

_____

_____

_____

Advising the Team

Like yeast, all living things must live in an ecosystem where they can find food, ideal temperatures, and much more. What are some of the things sea otters need to survive that are provided by the kelp forest? What is one environmental change that you think could cause the sea otter population to increase? Why? What is one change that could cause the population to decrease? Why?

_____

_____

_____

_____

_____

Science Seekers

Endangered Species

How does a species survive?

Investigation 2

Science Lab

What You Need

2 vials with caps

1 package of yeast

1 measuring scoop

masking tape

sugar

methylene blue

warm tap water

ice water or a freezer

boiling water

Caution

Do not touch or taste the methylene blue.

Effects of Environmental Changes on a Yeast Population

An **ecosystem** is a community of living things interacting with each other and with the physical environment. For a species to survive, each individual must be able to find enough food, water, shelter, and other things it needs within its ecosystem. This is true whether the organism is an animal like a sea otter, or a tiny microscopic yeast.

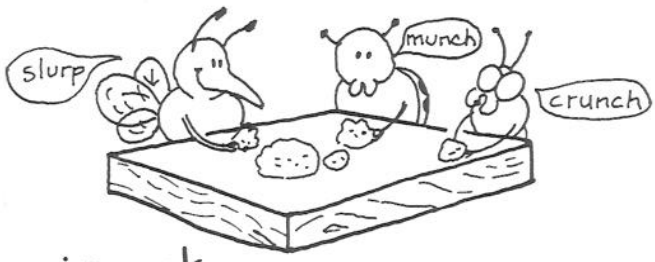
Yeast are fungi that have a dormant (or resting) stage. When you buy yeast at the store, the yeast are in this dormant stage. But when dormant yeast are placed in an environment with ideal conditions of food, temperature, and water, they begin to grow and reproduce. The yeast get the energy they need to grow by breaking down sugars and other carbohydrates. During this process, known as **respiration**, oxygen is removed from the environment and converted to carbon dioxide. By monitoring the level of oxygen in the environment, it is possible to determine whether or not a yeast population is growing. A low oxygen level means that respiration is taking place and the yeast are growing. A high oxygen level means that respiration is not taking place.

Like all living things, yeast grow best within a certain temperature range. In this Science Lab, you will observe how changes in the environment can make yeast grow, or stop growing.

What To Do

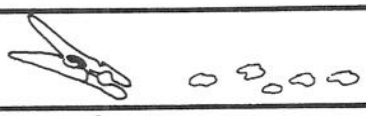
1. Use masking tape to label two vials.
   Vial # 1
   Vial # 2
2. Use a measuring scoop to add ¼ teaspoon yeast to each vial. Then add 1 tablespoon of warm water to each vial. The water should feel warm to the touch, but not so hot that you can't keep your finger in i for a few minutes.
3. Methylene blue is an indicator that is blue in the presence of oxygen. When there is no oxygen present, methylene blue becomes colorless Add 1 drop of methylene blue to each vial. Replace the caps and shake the vials to mix the yeast and water. Observe the color of the mixture in each one. Record your observations in the "Stage 1" column of the Yeast Population Observations chart.
4. Add ¼ teaspoon of sugar to each vial. Replace the caps and shake the vials. Let the vials sit for 5 minutes. Observe and record the colo of the mixtures and any other changes you see.
5. Place vial 1 in the freezer for about 20 minutes. While you wait, continue with step 6.
6. Add 1 tablespoon of boiling water to vial 2. Let it sit for 5 minutes. Then observe and record the color of the mixture and any other changes in the appropriate column of the chart.
7. After 20 minutes, remove vial 1 from the freezer. Observe the color of the mixture and any other changes that may have occurred, and record your observations in the chart.
8. Allow both vials to sit at room temperature for about 20 minutes. Observe the color of the yeast mixture and any other changes, and record your observations in the chart.

Table Manners



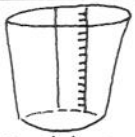
Question: Which mouthpart of an insect will gather the most food?

Prediction: _____

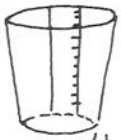
Mouthpart:	Total Food Eaten:
1. Chewing: 	_____ pieces
2. Sucking: 	_____ ml
3. Piercing/Sucking: 	_____ ml
4. Sponging/Lapping: 	_____ ml

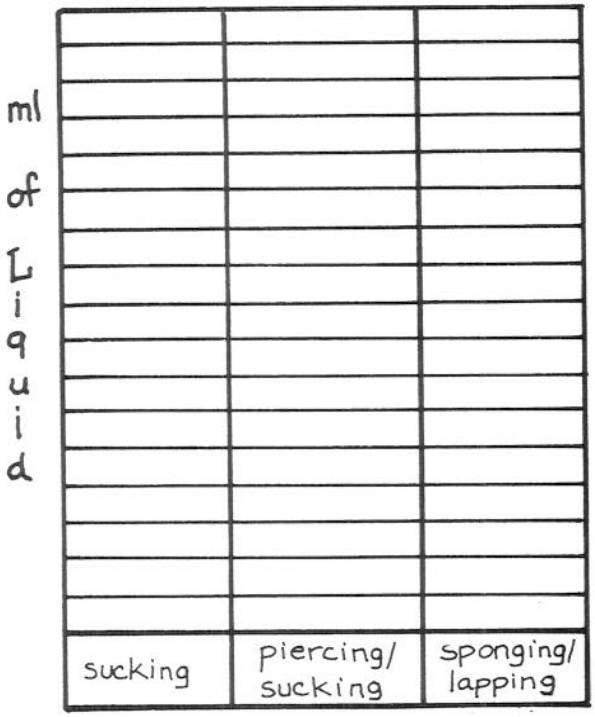
Collection Cups:

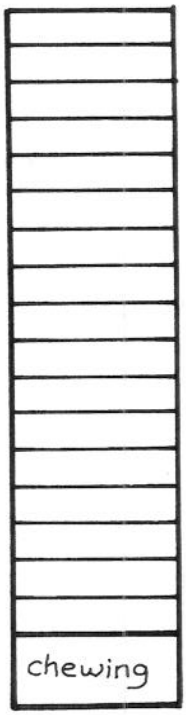

chewing pieces


sucking


piercing/sucking


sponging/lapping





What do you think?

1. Which mouthpart did you find the easiest to use? Why?

_____

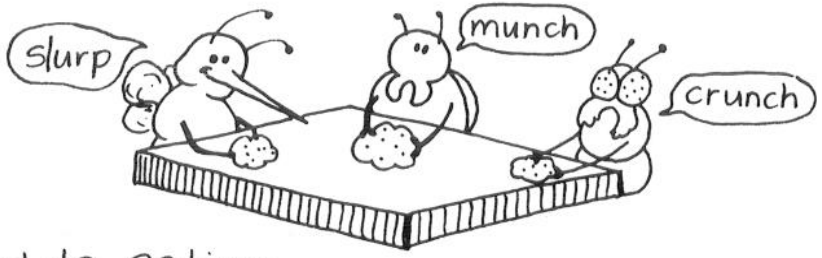
_____

2. Which mouthpart was the most difficult to use? Why?

_____

_____

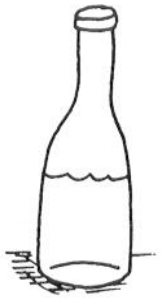
Table Manners



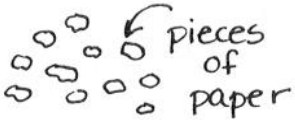
Question: How are insects adapted to eating certain types of food?

Mouthpart:	Prediction: Best Food Source	Actual: Best Food Source
1. Chewing:		
2. Sucking:		
3. Piercing/Sucking:		
4. Sponging/Lapping:		

Food Sources


A.


B.



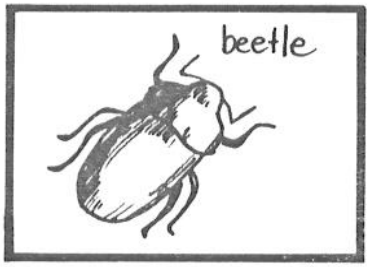
D.


C.

Conclusion: _____

_____

Label each type of mouthpart for the following insects.

1. 

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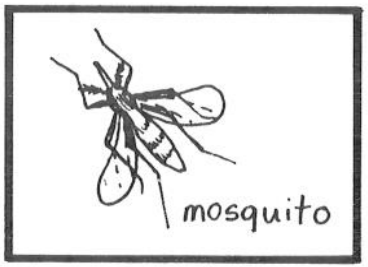
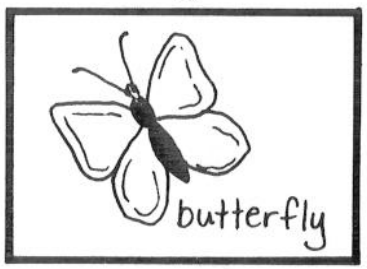
2. 

_____

3. 

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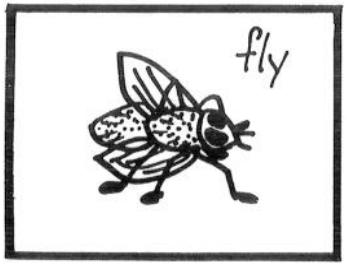
4. 

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