Aquatic Ecosystem in a Jar

Have you ever wanted to see life evolve before your eyes? Do you miss summer and swimming in lakes during the long winter? An aquatic ecosystem in a jar is an excellent way to not only learn more about the amazing life forms in the water, but also a maintenance-free way to keep some amazing aquatic critters!

Materials Needed.

1. One mason jar with a sealable lid (the bigger the better!)  
   a. Any glass container with a sealable lid works great, pickle jars, jam containers, etc. Just make sure to wash thoroughly before use.
2. A river/stream/lake/pond
3. An adult to accompany to the river/stream/lake/pond  
   - Optional, a net
**What to Do:**

- With your jar in hand, take a stroll to the nearest water source near you.
- With an adult watching carefully, navigate to a shallow section of your water source.
  - Try to go to a water source that remains partially unfrozen in the winter, as the
    unfrozen water will enable many more organisms to survive.
- With your hand or a net, scoop about 1 (one) inch of substrate from the
  river/lake/stream/pond into your jar.
- Next, fill your jar up with water, trying to move the jar across the bottom of the water and
  around rocks to catch small critters.
- If you have a net, run the net through the water a few times and transfer the contents of
  the net into your jar (this will help you get more critters!)
- Put one or two pieces of leaf litter and any branches and aquatic plants/moss/algae you
  can find into your jar. Not only will this give your critters food to munch on, this will
  provide oxygen to your jar once sealed.
- Seal your jar by tightly closing the lid, don’t worry if the water is cloudy, it will clear up
  with time.
- Place the jar by a window that receives sun for at least 8 hours a day.
- You’re done! Observe your jar for any changes and try to see how critters emerge over
  time!

**Some Critters You Might Find:**
Daphnia, these mini water filters are food to many of the larger water critters (such as fish, dragonfly nymphs, etc). They can be characterized by their jerky swimming movements.

Known as a seed shrimp, you will probably see these small round critters swimming in smooth circles around your jar.

Known as nematodes, you might see these tiny thin worms sifting around your substrate.
Beware of aliens! You will most likely see these tangly predators after setting up your jar for awhile. These critters, known as hydra, use their long arms to catch and eat smaller, and, sometimes bigger, prey.
Eggshell Chalk!

Create sidewalk chalk out of eggshells! This experiment is a great way to recycle food scraps, save money by creating your own chalk, and learn about forming compounds in a fun and unique way. This activity is perfect for elementary and middle school children, especially those who love to draw outdoors with chalk in the summer!

**Necessary materials:**
- 10 egg shells
- 1 bowl
- 2 teaspoons (tsp) of plain flour
- 4 teaspoons (tsp) of hot water
- Food dye for chalk color
- 1 long paper towel
- Mortar and pestle (if you don’t have one, a coffee grinder or Ziplock bag and rolling pin will also work!)

Instructions (step-by-step):

1. Clean and dry each eggshell, making sure the membrane is entirely removed

2. Grind your eggshells into a very fine powder using the objects you have at your disposal (either a mortar and pestle, coffee grinder, or rolling pin. If using a rolling pin, place the eggshells into a Ziplock bag so you don’t get powder everywhere!)
   Note: This step will take a long time! Be prepared to put in some elbow grease—it’s worth it!

3. Place the powdered eggshells into a bowl

4. Add 2 tsps of flour and about 4 tsps hot water to the eggshell powder (enough to make a stiff paste)

5. Add your choice of food coloring to the eggshell paste!

6. Place your colored eggshell paste on a long paper towel.

7. Roll the paper towel into a tube to help shape your eggshell paste into a chalk stick.
8. Here’s the hard part—wait a few **days** (not minutes or hours!) for the chalk-shaped eggshell paste to fully dry.

9. Once your chalk stick has completely dried, you can start drawing on the sidewalk!

10. If you’d like to make chalk in other colors, repeat steps 1-9 for each new color!

**Some “egg”cellent facts:**

- It’s also possible to “walk on eggshells!” By distributing your weight evenly on 2 egg cartons, you can stand on eggshells without breaking them. Try it!

- To demonstrate the effect of sugary drinks on your teeth, you can submerge an egg in soda, an egg in juice, and an egg in water. Calcium, the material that eggshells are made of, protect eggs just like enamel protects the fragile pulp of your teeth! Watch how the eggshells change depending on the liquid they’re exposed to—your tooth enamel experiences something similar, depending on what you drink!

- Eggs are one of the most nutritious foods on the planet! They contain vitamin A, vitamin B, vitamin D, calcium, healthy fats, and an essential mineral named selenium.
If you liked this project, you should also check out:

- The article “Why Are Eggs Good for You? An Egg-ceptional Superfood” by Healthline
  (https://www.healthline.com/nutrition/why-are-eggs-good-for-you)

- The YouTube video “Awesome Science Experiments YOU Can Try at Home!” by DaveHax
  (https://www.youtube.com/watch?v=UMcWCOOyTAg)

- Resources for learning about science at the National Science Foundation website
Solar Oven Smores

Harness the sun’s energy to make one of your favorite summertime snacks. See the chocolate melt before your eyes as the solar oven traps the sun’s heat and cooks the smores. This project is perfect for preschool to middle school. From designing and personalizing the ovens to experimenting with different cooking methods, this project is a great way to kids to spend a sunny summer day.
Necessary materials:
- Cardboard pizza box
- Aluminum foil
- Plastic wrap or bag
- Black construction paper
- Tape
- Glue stick
- Pencil or wooden skewer
- Scissors or utility knife
- S’mores supplies: chocolate, graham crackers, marshmallows

Instructions (step-by-step):

1. Cut the “oven door” flap on the box. The size depends on what you are cooking and how much access you need.
2. Decorate your solar oven with sharpies.
3. Glue black construction paper to the bottom of the box. The black color absorbs the heat.
4. Glue aluminum foil to the inside of the door. The foil reflects the sun into the oven.
5. Tape the plastic over the opening of the door. This will allow the air inside the box to heat up but keep the heat trapped inside the box.
6. Add a graham cracker, marshmallow, and chocolate inside the oven.
7. Place your oven outside in the sun. I taped a wooden skewer to prop the lid open at an ideal angle.

Fun facts (related to this project):
- The outer layer of the Sun can reach 1.8 million degrees fahrenheit.
- Aluminum can reflect about 92% of light and 98% of heat.