

My Pet Extremophile Deconstruction

Day 1:

Morning session:

Intro to microbiology, sterile techniques (making a burner), cooking potatoes for simple medium

Materials

- 1 box plastic Petri dishes
- agar (13 g/L)
- 0,5 kg potatoes/L
- 10 g sugar/L
- gauze
- scale (min 1 g resolution)
- knife
- pressure cooker
- glass container to fit inside pressure cooker
- burner (for sterility)
- hotplate (to cook the medium)
- kitchen cloth or gloves for protection

Slice potatoes and boil them in 1 L of water for 1 h; drain the liquid through a sieve and gauze to get rid of the potatoes; add 10 g of sugar and 13 g of agar; stir; pour liquid in glass container, add enough water to the pressure cooker to cover the bottom (0,5 cm); heat under pressure for 20 min; let steam out; pour medium into plates (0,25 cm) by a burner; let set for at least 4 hours.

Afternoon session:

Intro to microbiology continued, sampling around TNUA, intro to incubator

Materials

- sterile cotton swabs (for sampling)
- outer and inner container
- air pump with tubes and the spongy thingy that makes bubbles
- heating element
- temperature sensor + relay
- weights and scaffold elements or spacers to hold the inner container in place
- hot glue gun
- lights (UV LED and EL wire, resistors, batteries)
- PS camera (installed), with time-lapse program
- thermometer

We begin the afternoon session with the first part of the incubator construction. Explanation of principles, building the container and connecting the heating. In the evening we sample different areas and inoculate the petri dishes.

Day 2:

Morning session:

Intro to extremophiles, making microorganism traps

Materials

- fishing line and lead weights
- scissors
- styrofoam peanuts or polyurethane foam

The tiny spaces in styrofoam peanuts and blocks of polyurethane foam can also be colonized by microorganisms and can be used to fish bacteria and protists out of marine and freshwater environments.

Gather several pieces of string or monofilament fishing line (approximately 8 inches long) together in a bundle and tie in a single knot at one end. To the end of each piece of string except one, tie a styrofoam peanut or small piece of soft foam. Add a fishing weight to the last piece of string and add a long string or fishing line leader to the top of the tied bundle. This array of traps can be tied to a pole and suspended in the water, or tied to a stone or brick and allowed to sink to the bottom of the water being sampled. Be sure that the foam is not exposed at low tide. The length of string leading to each foam piece should be short so that the foam does not float above the water surface.

As with coverslip traps, the longer they are allowed to sit, the more different organisms will be observed. Allow traps to sit at least 24 hours before removing. Collect traps in the water that are suspended in and place into a Ziploc bag or covered jar. To observe organisms, simply squeeze the Styrofoam or polyurethane foam pieces into a dish. Observe dishes with a dissecting scope or pipette a drop of water onto a microscope slide and cover with a coverslip to observe under the light microscope.

Afternoon session

Field trip, setting up microorganism traps, collecting samples from extreme urban environments, measuring T, pH at the sources, collecting substrate to make selective media

Materials

- pH indicator
- thermometer
- sterile swabs
- bottles with caps
- bags
- microscope slides
- plastic pipettes

Day 3:

Making selective media, finishing the incubators, inoculating (after the media cool down)

Day 4:

Morning session:

Gathering the microorganism traps, building microscopes from the webcams

Materials

- PS cameras

- thick cardboard
- elastic
- screws

Afternoon session:

Watching microorganisms under microscope, making alginate spheres to preserve microorganisms (freezing)

Materials

- sodium alginate
- calcium chloride
- straws