NUTRIENT JELLY

OBJECTIVES

1. Create nutrient jelly ideal for growing microbes for observation.
2. Understand the environment for culturing microbial growth.
3. Develop an awareness of the safety issues of microbial growth.

BACKGROUND INFORMATION

Bacteria are very small, one celled, microscopic organisms that are found in air, water, soil, and the bodies of other living organisms. If provided with the right conditions they will multiply into a visible colony of bacteria cells.

Occurring worldwide, most fungi are largely invisible to the naked eye, living for the most part in soil, dead matter, and as symbionts of plants, animals, or other fungi. They perform an essential role in ecosystems in decomposing organic matter and are indispensable in nutrient cycling and exchange. Fungi may become noticeable when fruiting, either as mushrooms or molds.

The nutrient jelly provides a nutritious environment where the bacteria and fungi can grow into a visible group of cells (colony).

Baking the jars kills any pre-existing bacteria.

The placement of samples of material onto the culture medium (jelly) is called inoculation. The lid is held above the jar during inoculation to prevent particles from the air from falling into the container.

PRECAUTIONS

Most bacteria and fungi collected in the environment will not be harmful. However, once they multiply into millions of colonies in a petri dish they become more of a hazard. Be sure to protect open cuts with rubber gloves and never ingest or breathe in growing bacteria. Keep growing petri dishes taped closed. When the experiment is finished, a teacher or demonstrator should safely destroy the fuzzy bacteria colonies.using the method described at the end of this experiment.

Also, many types of bacteria will eat the gelatin; this will prevent you from growing large colonies of bacteria. Once the bacteria begin to liquefy your jelly, you should destroy the cultures as mentioned above.

WHAT YOU NEED

- Small jars – baby food jars, jam jars, petri dishes
- Small potato (approx 170g)
- Knife
- Microwave dish
- 2 cups of water
- Gelatin unflavoured (42g)
- 1 cup distilled water
- I beef bouillon cube
- bowl
- Masking tape/pen
- Fine weave cloth/tea towel and strainer OR filter paper and funnel

NUTRIENT JELLY

WHAT TO DO

1. Peel and cut potato into small pieces.
2. Place the potato pieces into a microwave proof container and add 2 cups of water.
3. Microwave potatoes in water until they are well done. Drain them and save 1 cup of the liquid potato broth.
4. Sprinkle the gelatin over the surface of 1cup of boiled water. Allow to stand for 2 minutes then stir.
5. Add the gelatin and bouillon cube to the potato broth in the dish.
6. Alternatively microwave on medium heat and stir, until the cube and gelatin dissolve.
7. Line the strainer with the cloth (or the funnel with the filter paper) and pour the mixture through the cloth into another bowl, straining out any herbs from the stock cube.

If you are using glass jars:

8. Wash the jars and lids with dishwashing liquid and rinse with water. Dry.
9. Pour strained hot gelatin broth into jars in equal amounts.
10. Quickly place lids loosely on each jar.
11. Place the jars on the tray and bake them in the oven at 121 degrees Celsius for one hour.
12. Allow the jars to cool before removing them form the oven. Place excess jars in refrigerator for use in later experiments.

If you are using plastic petri dishes:

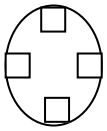
9. Bring the mixture to the boil again.
10. Clean the bench with bleach or disinfectant and lay out the dishes with their lids on.
11. While the mixture is still boiling, lift the lids, one dish at a time as you pour the mixture into each one. Quickly replace each lid. Allow to cool.
12. Allow gelatin to congeal before using.

INOCULATING NUTRIENT JELLY

NB: Recommended samples for inoculating are: coin, rubbers, pencil shavings, paper, and chalk. It is not recommended that you use soil or parts of the body. Also, you must not cough on the plate or take samples from areas such as the toilet.

13. Using a marking pen and masking tape label a jar ‘coin’. *Note: It is important to always label the jar or dish before you use it.*

14. Wash all hands in dettol wash
15. Lift lid on one jar but keep it hovering over the opening as you place the coin against the gelatin. Do not cut the gel.



16. Secure lid on jar. Seal with tape. Do not wrap the tape the whole way around the dish as this will encourage anaerobic growth of more harmful organisms.
17. Repeat with other safe samples mentioned above, labeling each sample.
18. You can transfer micro-organisms from surfaces onto the jelly using sterile cotton wool and forceps. Hold the cotton wool with the forceps and swipe the cotton across the surface. Open container of jelly, leaving lid to hover and swipe bud along surface of jelly. Place in dark, warm area such as near the hot water system or a cupboard beside a dishwasher.
19. It may take up to a week before visible signs of the bacterial culture are growing.
20. Place any items used to inoculate the jelly into a container of dettol (at the recommended dilution).

21. Wash all hands in dettol wash.

CLEAN UP

Use concentrated bleach:

1. Wear rubber gloves
2. Pour bleach into a container big enough to immerse your hands and jar in (do not dilute)
3. Immerse dish/jar wholly in the concentrated bleach, break the seal whilst submerged.
4. Leave to soak at least overnight.
5. Place in a plastic bag and dispose.

RESULTS

Spots of growth can be seen on all of the test surfaces except that of the control jar. If growths are seen in the control jar, prepare new jars, bake the jars for a longer time period and then repeat the experiment.

QUESTIONS

1. What is the growth made of? *Colonies of bacteria or fungi*
2. Is there any growth in the control dish? Explain why? *There should be no growth on the control dish, however because the procedure for making the nutrient jelly may not be a completely sterile procedure there may be some growth on the control.*
3. What are the different colours in the dish represent? *Different colonies of bacteria or fungi*

EXTENSION ACTIVITIES

Aerial Contamination

Perform this as a group exercise

1. Label the base of 4 Nutrient Agar (NA) plates with your initials, location and time of exposure.
2. Expose the plates as a set in a selected position in the classroom by removing the lids.
3. After 20, 40, 60 and 80 minutes, replace the lids and seal with sticky tape..
4. Leave in a warm place for 2 days.
5. Observe the variety of microbial colonies occurring on the plates and their total number.
6. Record the results and compare with other groups.

QUESTIONS

1. Was there variation in the number of colonies of microbial growth? Explain your results.

CURRICULUM CONCEPTS ADDRESSED

Essential Learnings: Life and living

By the end of year 5:

- Living things can be grouped according to their observable characteristics

By the end of year 7:

- Cells are the basic unit of all living things and perform functions that are needed to sustain and reproduce life
- Systems of scientific classification can be applied to living things

RESOURCES USED TO DEVELOP THIS ACTIVITY

1. VanCleave, J. (1993). *Janice VanCleave's A+ Projects in Biology Winning Experiments for Science Fairs and Extra Credit New York: Wiley*
2. Australian Academy of Science. 2005*. Marvellous micro-organisms Stage 3*
3. The Columbia Electronic Encyclopedia, 6th ed. Copyright © 2007, Columbia University Press. Date of Access: 23.06.09 Title: Types of Fungi
4. Hoffman, S. K. 1999. MICROBIOLOGY – Safety Considerations. Accessed 21 June 2009. http://www.southernbiological.com/Assets/pdf/Products/Specimens/MicrobiologicalSpecimens/MicrobiologySafetyConsiderations.pdf