

How Clean Is It?

Summary

Students grow microorganisms in cultures to see the large number of microorganisms around us.

Time Frame

2 class periods of 45 minutes each

Group Size

Large Groups

Materials

For Individual or Small Groups (2-3) of Students:

Nutrient medium for growing organisms. (Nutrient agar, slices of bread, or potatoes work well.)

Sterile, sealed container for each medium. (Petri dishes for nutrient agar or Ziploc plastic bags for bread and potatoes work well.)

Permanent black markers for labeling each container.

Cotton swabs if using nutrient agar.

Background for Teachers

Student will grow microorganisms in this lesson. A medium is needed to foster the growth of the organisms. Although petri dishes and nutrient agar can be used, they are not necessary. Wonderful cultures can be grown on bread and potatoes. If you would like to use nutrient agar, it can be obtained from Powell Laboratories 1-800-547-1733. The agar will come with preparation instructions. Sterile petri dishes can often be obtained from a local hospital or university.

Intended Learning Outcomes

Make predictions and observations.

Collect, record, and analyze data.

Recognize relevance of science.

Instructional Procedures

Special Instructional Note:

Two different sets of instructions are given below for the different mediums that may be used.

Regardless of the medium used, students should record their observations.

Consider having them include the following elements:

Question

Hypothesis

Procedure

Observations and Data

Results and Conclusion

Ideas for Future Research

Directions for Using Bread or Potato Mediums:

Give each student a slice of bread or cut piece of raw potato.

Have them rub the bread or potato on a surface in the school. Examples: desks, floor, door knob, hand sanitizer, washed hands, unwashed hands etc. Encourage students to select different areas from their peers. NOTE: If you are using potatoes, you will need to clean up the liquid residue it will leave.

Have the students place their slice of bread or potato in a Ziploc bag and seal it.

Have students label their bag with their name and the area they are testing.

Place the bags in a warm, dark area.

Observe them every few days.

The potatoes will show growth very quickly. The bread will take longer depending on how many preservatives are included in the ingredients.

Continue the investigation for as long as desired.

Conclude by having students write a summary of their investigation and what they learned.

Directions for Using Nutrient Agar Mediums

Prepare the petri dishes and nutrient agar according to manufacturer's instructions.

Divide students into groups of six.

Using permanent black marker, assign a number to each group to write on the outside bottom of each petri dish.

Draw lines on the outside bottom of the dish (like cutting a pie) so that each student has his/her own section for his/her swab.

Explain the importance of keeping the swab sterile. Have students use the cotton swab to collect one sample from a site where bacteria can be found.

Each student in the group should collect a sample from a different place such as: top of the desk, inside the mouth, under the fingernail, sink, bathroom, feet, etc.

Students should record their petri dish number, which area of the dish they swabbed, and the area where they obtained their sample.

Explain to students the importance of keeping the petri dish with agar as sterile as possible. The lid should be lifted only slightly along one edge just long enough to place samples in it. Replace the lid quickly. Explain that breathing on the agar or allowing particles in the air to settle will cause results other than the ones the students are planning.

Have each member of the group lightly rub the gathered sample across the agar above the number he/she has been assigned. The swabs should run back and forth along the entire section allotted to that student to deposit the sample in the petri dish. Remind students to be careful not to scratch or dig into the agar.

Gather the petri dishes, wrap them together, and place them in a dark, warm place. Make sure the dishes are stored with the bottom plate--agar side (the smaller one)--pointed up. This will prevent condensation from mixing with your inoculations.

Discuss and then have students record why the plates are incubated in the dark and in warm temperatures.

After the petri dishes have incubated for three to four days, return them to each group.

Explain that students are to keep the petri dish sealed and observe only, through the lids.

Students should also wash their hands after handling the sealed petri dishes.

Have the students record their findings.

All petri dishes may be set on the counter for other groups to observe. From what areas were the most bacteria obtained?

Dishes should be disposed of in a sealed baggie after observations have been obtained.

Using their observations, students should arrive at inferences about bacteria and mold growth and record it. Further information can be found with research.

Assessment Plan

Assess student's written experiment records using the Experiment Rubric below.

Rubrics

[Experiment Rubric](#)

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