Name: Joe

Discovering the Conditions That Promote the Growth of Bacteria

I) Problem:

Which microhabitat will most effect the promote of bacteria and what are the characteristics of the bacteria?

II) Background Information:

Van Leeuwenhoek sought out bacteria and other microbes in many environments. He collected standing water from ponds and roadside ditches. He made infusions of peppercorns, hay, and beans. He also scraped the plaque from between his teeth. Each time he looked at something new he described his observations in his diary. To convince other people that he wasn't imagining his "wee beasties," he hired an artist to look through his microscopes and draw what he saw there.

Bacteria can be cultured, or grown, on nutrient agar. Nutrient agar is a jellylike substance extracted from seaweed to which nutrients have been added so that bacteria or other microorganisms' cab be grown on it. If conditions are favorable, bacteria will rapidly reproduce by dividing in two. Eventually, bacterial reproduction produces spots on the nutrient agar, each of which consists of the many descendants of a single bacterium. These spots, which are visible to the unaided eye, are called colonies.

Bacteria are all around us. Given good growing conditions, a bacterium grows slightly in size or length, a new cell wall grows through the center forming two daughter cells, each with the same genetic material as the parent cell. If the environment is optimum, the two daughter cells may divide into four in 20 minutes.

Hypothesis:

If Joe's shoe has more bacteria then anywhere else, then more bacteria will grow on it.

III) Experiment Plan:

Materials

Nutrient agar plates
China marker
Applicator swabs

Procedure

1) Be sure to follow sterile techniques during this lab so that contamination doesn't occur and ruin the results of this lab.
2) Using the china marker, draw a line on the bottom of your nutrient agar Petri dish dividing it in half. Number each half with a different number.
3) Select a variety of microhabitats to test for the presence of bacteria. Record the microhabitats in your data table. Identify characteristics of this microhabitat and record in your data table. (wet or dry, light or dark, clean or dirty, isolated or high-traffic)
4) With a sterile applicator stick, swab the given microhabitat.
5) Streak the swab across the center of the nutrient agar plate section in a straight line, beginning and ending about 2cm from each edge of the dish. Do not break through the nutrient agar. Try to keep each streak mark the same size. Remember, you will be applying two different streak marks from two different microhabitats to each nutrient agar plate. Keep the cover off the dish for as little time as possible.
6) Discard the applicator stick in the manner instructed by Mr. Ogden.
7) Repeat steps 4-6 for the other microhabitats.
8) Mr. Ogden will leave one dish untouched as a control.
9) Incubate the dishes for at least five days.

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10) Record the growth of the microorganism on each plate in both qualitative and quantitative terms in the data collection section of this lab.

Experimental Components

Manipulated (Independent) Variable: Different microhabitats
Responding (Dependent) Variable: The amount of bacteria we can see
Controlled (Constants) Variables: Same amount of time of growing bacteria, same amount of agar/food for bacteria, same growing environment, and same cotton swab.
Control: Plain plate.

IV) Data Collection:

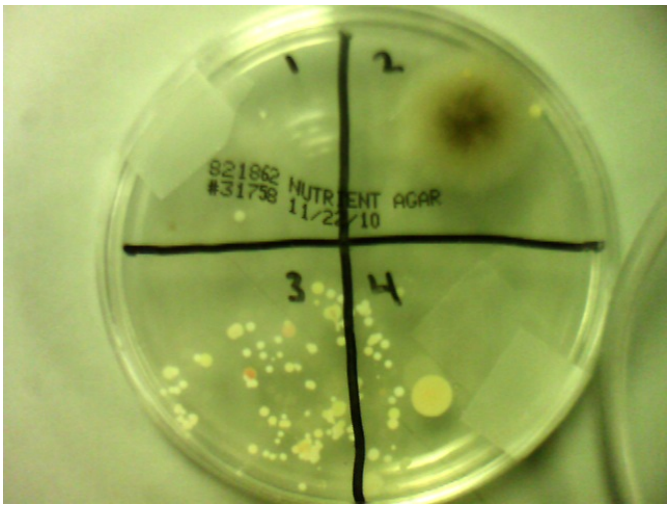
Observations:

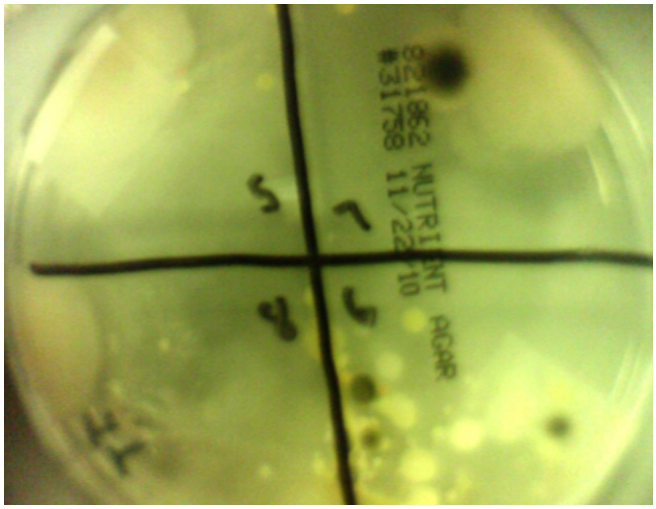
Section 1: About 4 little dots in the section. They are yellow.
Section 2: 1 huge black spot near the edge. Middle of it is black and the outside of it is a very light brown
Section 3: Lots of little dots. They are white, yellow, red, and bright orange.
Section 4: 1 average sized bacteria colony. A few bacteria from section 3 is on section 4. The color is bright orange.
Section 5: 3 small colonies and 4 very small colonies. They are red and bright orange.
Section 6: Lots of bacteria. Most bacteria are near section 8. It is all mashed together in lots of colors. They are white, yellow, black, brown, red, and yellow. This one has most bacteria on it.
Section 7: 2 big colonies and 2 little colonies. They are black, white, red, and yellow.
Section 8: Not much on it. There are only a few bacteria but it look like its from section 6. 1 part of it is white and black.
Section 9: (control) Nothing on it.

Data Table:

Section Number	**Microhabitat**	**Microhabitat characteristics:** dry/wet, Clean/dirty, light/dark, isolated/high-traffic	**Amount of bacteria** 10-numerous/1-very few
1	**Alan's hair**	**Clean dark isolated dry**	**2**
2	**Bathroom door handle**	**Dirty dark isolated dry**	**5**
3	**Drinking fountain push**	**Dirty light isolated dry**	**8**
4	**Toilet seat***	**Dirty dark isolated dry**	**4**
5	**James's tongue**	**Dirty light high-traffic wet**	**6**
6	**Soap pump**	**Dirty light isolated dry**	**10**
7	**Classroom door handle**	**Dirty light high-traffic dry**	**5**
8	**Bottom of Joe's shoe***	**Dirty dark high-traffic dry**	**3**
9	**Control**	**----------**	**0**

Photographs:





V) Conclusion

1) Why was it important to keep the agar plates uncovered for as little time as possible?
So the bacteria don't escape and so that more bacteria doesn't be added to the plate from the air.
2) Why was it important to observe sterile methods and use a new, sterile swab for each different microhabitat?
So the bacteria from other sources don't mix with the source you are gathering bacteria from.
3) Why was the nutrient agar sterilized before the investigation?
To attract bacteria.
4) Early biologists grew bacteria on freshly cut slices of vegetables. Why would it be important to have "freshly cut" vegetable slices?
So bacteria isn't on the vegetables.
5) What was the purpose of the control?
To have something to compare to.
6) Which microhabitat seemed to result in the most bacterial growth?
The soap pump.
7) Aside from the control, which microhabitat seemed to result in the least bacterial growth?
Alan's hair.
8) What kinds of microhabitat characteristics seem to have the greatest impact on the growth of bacteria?
The most used ones.
9) There are thousands of different kinds of bacteria. Do you think that shape alone is enough to identify a particular species of bacteria? Why?
No because bacteria colonies can be similar shapes and sizes.
10) Do all the bacteria colonies have the same appearance (i.e. color, shape, and size)? If not, what does that indicate?
No because some bacteria are more dangerous and they multiply quicker.