Microorganisms Are Everywhere

Background:

Nutrient Agar Plates are generally made with some kind of nutrient mixture that includes vitamins, minerals, and sugar. These plates allow bacteria and fungi to grow when stored at appropriate temperatures. A new plate will have no microorganisms on it of any kind, and will be referred to as **sterile**. The jelly-like substance found in the plate is made from agar, which is a seaweed derived material that is a time-tested staple in microbiology. Agar melts into liquid at boiling, and once it solidifies at room temperature, it can be incubated (meaning stored for growth) at very high temperatures before re-liquefying. There are other kinds of agar plates which can be made from many kinds of recipes. Originally, bacteriologists cooked all manner of kitchen materials in a stew, which was boiled, strained, and then used as a growth medium. It is still possible to make some of these exotic agars today, including oatmeal molasses media and beef peptone broth!

Insert mpf1234 w/caption: Agar plates with lids.

Objective:

Use agar plates to investigate bacterial and fungal presence on common objects.

Materials:

Nutrient Agar Plate
Sterile Cotton Swabs
Permanent Marker

Experiment:

1. Obtain a plate from the instructor. On the bottom of the plate (meaning the part with the solid agar), label with your name, section, and create 4 quadrants. Number each quadrant.
2. Select four items/organisms/body parts to swab. Open a single sterile swab and firmly rub your chosen test object. If you are swabbing yourself, please remember to be specifically label the location: arm, elbow, ear, mouth, etc. and use good judgement about selecting such an area!
3. Gently swipe the swab back and forth in one of the quadrants on the agar surface. Do NOT tear the agar- it is firm to the touch but too much friction will cause it to rip. *You only need to transfer the microorganisms to the surface- not embed them in the media.*
4. Repeat the swabbing and swiping for each of the next three quadrants.
5. Invert the plate* (meaning turn it so the lid is on the bottom) and store in an incubator at 37C for at least 24 hours.
6. Review the diversity of growth in your next lab.

Insert MLTA 4e Fig 3.1 with original caption

***Tip:** The plates are grown upside down to prevent the condensation that forms on the lid from falling on the plates and ruining the experiment. Drops of water falling on the agar surface will cause bacteria, yeasts and fungi to slide or spread and will prohibit meaningful conclusions of experiments.

Insert Figure 1.4 and Figure 1.5 w/Caption: Bottom view and top view of plate growth.

Questions:

1. Why are there different colors, sizes, and shapes visible on the plate after growth?
   (3 answer lines)
2. What object (or body area) had the most microorganisms? Which had the greatest diversity?
   (3 answer lines)
3. If a plate is left open on the bench (meaning the lid is off) for an hour, and nothing is swabbed on the surface, but this plate is incubated alongside all the others in the lab, will anything grow? If so, where did these organisms come from?
   (5 answer lines)
4. Is it possible to grow an infectious organism from the environment by performing this experiment? Why or why not?
   (6 answer lines)
5. Sketch what you see under the microscope:
   (leave ¼ page space for students to draw)