**The Ubiquitous Nature of Microorganisms**

**Background:** It is somewhat unsettling to realize that within and on your body reside billions of tiny microbes, which think of you as their entire universe. Worse still, many of these, if given the chance, would send you to your final resting place.

*Streptococcus pneumoniae*, a normal inhabitant of the respiratory tract, is one of the nastiest bacterial residents in the human body and responsible for many cases of pneumonia in adults. Indeed this tenant bears close watching and should be evicted at the slightest provocation. Oswald Avery, in one of his lighter moments, nicknamed this heartless killer “The Sugarcoated Microbe” because of its prodigious capsule.

Today you will explore the microbial zoo known as Edinboro University. You will sample various locations in order to gain an appreciation for the widespread distribution and diversity in the microbial world.

# Materials:

8 TSA Plates Sterile swabs

**Environmental Sampling**

1. Divide 5 TSA plates in half with a marker. This will give you 10 different regions.
2. With sterile swabs, swab 10 different objects in your environment where you might expect to encounter (or not encounter) bacteria. For example, the bathroom sink.

Record the objects which you have chosen below:

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

1. Swab a region of the TSA plate with each and incubate plates at 37o C overnight.

**Hand-washing evaluation**

1. Remove the cover of a TSA plate and gently press your fingers onto the medium. Label this plate UNWASHED.
2. Remove the cover of a second plate; use a wooden applicator to remove material from under your nails. If you push too hard, it will hurt! Smear onto the plate. Label this plate NAILS
3. Wash your hands as instructed. Different groups will be using different agents for hand washing.
4. Gently, press washed fingers onto medium of a third TSA plate. Label this plate WASHED.
5. Invert all three plates and place them into the 37o C incubator. Observe within 24 to 48 hours.

**Protocol: Day 2**

1) Observe the “Environmental Sampling” plates and record the number of colonies present. Also note if all of the colonies are similar in size, color, structure, etc…. Variance in the appearance of colonies usually indicates the colonies represent different species of bacteria. Be careful when observing the plates if there is any “fuzzy” looking colonies. These may be fungus and if you notice any of these colonies DO NOT OPEN the plates until you have shown them to the instructor. Record your results in Table 1.

**Table 1: Number of Colonies on Environmental Plate.**

*Note that Gram stains will only allow you to get a general idea of the major types of bacteria present in your cultures, but will not yield enough specific information for making a proper identification of the organisms.*

|  |  |
| --- | --- |
| **Plate Description** | **Number of Colonies** |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
| 7 |  |
| 8 |  |
| 9 |  |
| 10 |  |

**Question:** How would you go about identifying the various types of bacteria you found in your cultures?

# NOTES:

While the number of colonies reflects the relative “cleanliness” of the surface tested, equally important are the types of microorganisms present. For example, is it better to have 20 harmless bacteria on surface or 3 pathogenic bacteria?

1) Pick 3 colonies that look interesting and Gram-stain them. Record the results below.

3) Observe the “hand-washing evaluation plates.” Count the number of colonies on each plate. Pool class results in the table below.

# Table 2: Gram-staining Characteristics of Cells from Environmental Plates.

# Table3: Number of Colonies Present Before/After Hand-washing

|  |  |  |  |
| --- | --- | --- | --- |
| **Washing Agent** | **Unwashed** | **Washed** | **% Change** |
| Water |  |  |  |
| Lab. soap |  |  |  |
| ? |  |  |  |
| ? |  |  |  |

**Question:** Where there more colonies on the plates before or after the hand-washing? Can you explain the differences you observed?