BIO 201 Lab 10
Experiments 19 & 20
Results

Professor Diane Hilker
Overview

I. Exp. 19: Water Analysis for Fecal Contamination

II. Exp. 20: Quantitative Analysis of H₂O
I. Exp. 19: Water Analysis for Feces

- **Purpose:** To learn & perform the 3 stage standard H₂O analysis test for fecal contamination
- **Waterborne Diseases:** *E. coli*, HAV, Polio, *Shigella, Giardia, Salmonella*
- **Fecal Indicator:** *E. coli*
- **Chlorine kills:** Gram negative bacteria, viruses and some Gram pos. & protozoa
- **Normal Flora Chlorinated H₂O:** non-pathogenic Gram pos. saprophytes
I. Exp. 19: Water Analysis for Feces

3 Tests Performed

I. Presumptive Test
   ◦ PRLB Tube—Phenol Red Lactose Broth with a Durham Tube

   ◦ 3 Reactions:
      *1. Red/orange with or without gas
      *2. Yellow without gas
      **3. Yellow with gas: lactose fermenter

      • *Potable or drinkable
      • **More testing necessary
I. Exp. 19: Water Analysis for Feces

3 Tests Performed

I. Presumptive Test

- 3 Reactions
I. Exp. 19: Water Analysis for Feces

3 Tests Performed

I. Presumptive Test
   ◦ Yellow with Gas–3 possible microbes
     1. *E. coli*: Gram neg. rod

2. *Enterobacter*: Gram neg. rod

3. *Clostridium*: Gram pos. rod
I. Exp. 19: Water Analysis for Feces

3 Tests Performed

II. Confirmed Test

- Test a tube that is yellow with gas to see which microbe is present
- **EMB Plate**: Eosin Methylene Blue
  - Inhibit Gram pos.
  - Allow certain Gram neg. lactose fermenters to grow
- Do a T–Streak, 24 hrs. at 37°C
I. Exp. 19: Water Analysis for Feces

3 Tests Performed

II. Confirmed Test

- 3 Possible Observations on EMB
  1. No Growth: *Clostridium*
  2. Growth: Beige colony – *Enterobacter*
  3. Growth: Green Metallic Sheen – *E. coli*
I. Exp. 19: Water Analysis for Feces

3 Tests Performed

III. Completed Test

- Take the green metallic sheen colony and do the following:
  1. **Repeat PRLB**: yellow with gas
  2. **Grow on Nutrient Agar**
      - Do a **Gram Stain**: Gram neg. rod

Confirms that E. coli is present!
I. Exp. 19: Water Analysis for Feces

- Follow Instructor’s Directions
Overview

I. Exp. 19: Water Analysis for Fecal Contamination

II. Exp. 20: Quantitative Analysis of H₂O
II. Exp. 20: Quantitative Analysis of Water

- **Purpose:** To test the hypothesis that potable H₂O may still contain bacteria & is safe to drink. To compare the number of bacteria in tap vs. well H₂O.
- Is Chlorinated water sterile?
- What microbes would be present?
- Which sample should have more microbes, well or tap water?
- Follow Instructor’s Directions
Overview

1. Exp. 22: Oral Flora
I. Exp. 22: Oral Flora

- **Purpose:** To examine different types of microbes in the mouth and to determine how effective mouthwash is in reducing these microbes

- Many different types of normal flora
- Commensal relationship with us
- Potentially can cause problems
I. Exp. 22: Oral Flora

- 4 Types of Commensals
  1. *Candida albicans*: Thrush
  2. *Lactobacillus*: Cavities
  3. *S. mutans*: Cavities
I. Exp. 22: Oral Flora

- Cavities

Sugar $\rightarrow$ Lactobacillus $\rightarrow$ S. mutans $\rightarrow$ Lactic Acid $\rightarrow$ Dissolves Calcium $\rightarrow$ Cavity
I. Exp. 22: Oral Flora

- How to prevent cavities?
  - Reduce sugary foods
  - Brush teeth to reduce *Lactobacillus & S. mutans*
  - Floss
  - Visit your dentist
I. Exp. 22: Oral Flora

- How to prevent cavities?
  - Use of fluoride in drinking water, toothpaste, mouthwash vitamins & fluoride treatments for children
  - Fluoride attaches to Calcium to form CaF$_2$
  - More difficult for lactic acid to dissolve Ca$^{++}$ when bound to fluoride
I. Exp. 22: Oral Flora

- 4 Types of Commensals
  - 4. Streptococcus Viridans Group: includes *S. mitis* & *S. salivarus*
    - If these microbes get into the blood and there is a weakness of the heart (pacemaker, mitral valve prolapse, by-pass surgery), they can cause SBE or Subacute Bacterial Endocarditis
I. Exp. 22: Oral Flora

- To prevent SBE if you are at a high risk, take an antibiotic prior to visiting the dentist (prophylactic measure)
I. Exp. 22: Oral Flora

- Follow Instructor’s Directions