BIO 201 Lab 7
Experiments 9, 10, 11 & 12
Results

Professor Diane Hilker
Overview

I. Exp. 9: The Effect of pH on Growth of Microbes

II. Exp. 10: The Effect of Osmotic Pressure on Microbes

III. Exp. 11: The Effect of Ultraviolet Light on Bacteria

IV. Exp. 12: Oxygen Requirements for Growth of Microbes
I. Exp. 9: pH & Growth

- Purpose: To determine the effects of pH on certain microorganisms.
  - **Acidophile**: microbes that grow at a low pH (less that pH 7)
  - **Alkalophile**: microbes that grow at a high pH (greater that pH 7)
  - **Most bacteria prefer a neutral pH (pH 7)**
  - **Most fungi prefer an acidic pH**
I. Exp. 9: pH & Growth

- Food is preserved with low pH solutions
  - Vinegar
  - Lemon Juice
  - Tomato Sauce
I. Exp. 9: pH & Growth

- Certain diseases are treated or prevented by lowering pH
  - Urinary Tract Infections: Cranberry Juice
  - Vaginitis: vinegar douches
  - Swimmer’s ear (Otitis externa):
    - vinegar/rubbing alcohol ear drops
    - *Pseudomonas sp.*
I. Exp. 9: pH & Growth

- Fill in Table 3 with +’s and −’s
- Which microbe is an acidophile?
- Which microbe is an alkalophile?
Overview

I. Exp. 9: The Effect of pH on Growth of Microbes

II. Exp. 10: The Effect of Osmotic Pressure on Microbes

III. Exp. 11: The Effect of Ultraviolet Light on Bacteria

IV. Exp. 12: Oxygen Requirements for Growth of Microbes
II. Exp. 10: Osmotic Pressure & Growth

- Purpose: To determine the salt tolerance of different microorganisms.

- Refer to Unit 4 Lecture Notes
  - What is Osmotic Pressure?
  - What moves across the semi-permeable membrane, the solvent or solute?
II. Exp. 10: Osmotic Pressure & Growth

- **Isotonic:** no movement of $\text{H}_2\text{O}$ in or out of the cell

- **Hypotonic:** $\text{H}_2\text{O}$ enters the cell
  - Cell will swell and then burst

- **Hypertonic:** $\text{H}_2\text{O}$ leaves the cell
  - Cell shrinks–cell membrane pulls away from the cell wall
  - Bacteriostatic state created
II. Exp. 10: Osmotic Pressure & Growth

(a) Normal cell in isotonic solution. Under these conditions, the solute concentration in the cell is equivalent to a solute concentration of 0.85% sodium chloride (NaCl). See Figure 4.18.

(b) Plasmolyzed cell in hypertonic solution. If the concentration of solutes such as NaCl is higher in the surrounding medium than in the cell (the environment is hypertonic), water tends to leave the cell. Growth of the cell is inhibited.
II. Exp. 10: Osmotic Pressure & Growth

- **Osmophiles**: love hypertonic solutions
  - **Halophile**: loves salt
    - Found in the oceans and on skin

- **Saccharophile**: loves sugars or carbohydrates
II. Exp. 10: Osmotic Pressure & Growth

- Fill in Table 4 with +’s and −’s
- Which microbe is a halophile?
I. Exp. 9: The Effect of pH on Growth of Microbes

II. Exp. 10: The Effect of Osmotic Pressure on Microbes

III. Exp. 11: The Effect of Ultraviolet Light on Bacteria

IV. Exp. 12: Oxygen Requirements for Growth of Microbes
III. Exp. 11: UV Light

- **Purpose:** To determine the effects of UV light on certain microorganisms.
  - Prevents replication and function of DNA
  - **Limited uses:** can’t penetrate surfaces
  - **Used to sterilize:**
    - Surfaces such as tabletops, instruments, and goggles
    - Atmosphere of enclosed areas like operating rooms
  - Protect eyes
Fill in Table 5 with +’s and –’s
Which microbe requires longer periods of time to eliminate it? Why?
Overview

I. Exp. 9: The Effect of pH on Growth of Microbes

II. Exp. 10: The Effect of Osmotic Pressure on Microbes

III. Exp. 11: The Effect of Ultraviolet Light on Bacteria

IV. Exp. 12: Oxygen Requirements for Growth of Microbes
IV. Exp. 12: O₂ Requirements for Growth

- **Purpose:** To determine the effects of oxygen on the growth of certain microorganisms.
- **Refer to Unit 4 Lecture Notes**

- **Aerobes:** require O₂ for growth
- **Anaerobes:** killed in the presence of O₂
- **Facultative:** can grow in the presence or absence of O₂
IV. Exp. 12: $O_2$ Requirements for Growth

- 2 Culture Media Tubes Used:
  - Fluid Thioglycollate Broth
  - Brewers Anaerobic Agar Deep

- 2 Chemicals Found in the Tubes:
  - Thioglycollate: removes $O_2$
  - Resazurin: $O_2$ Indicator
    - $O_2$ Present: pink/purple color
    - No $O_2$: colorless
IV. Exp. 12: $O_2$ Requirements for Growth

- Fill in Table 6 with +’s and –’s
- Which microbes are aerobes, anaerobes or facultative?
- What does a hyperbaric chamber do and what type of microbes would be eliminated by this device?
BIO 201 Lab 7–New Exp.
Experiments 23, 24 & 25

Professor Diane Hilker
Overview

I. Exp. 23: Transformation of *E. coli* – discussed last

II. Exp. 24: Passive Agglutination with Latex Beads

III. Exp. 25: Parasitology
I. Exp. 23: Transformation of *E. coli* – discussed last

II. Exp. 24: Passive Agglutination with Latex Beads

III. Exp. 25: Parasitology
II. Exp. 24: Agglutination with Latex Beads

- Purpose: To perform an agglutination procedure and to determine what species of *Staphylococcus* is present on a petri plate
- Immunology Experiment: Antigens and Antibodies
- Staphaurex R Test Kit:
  - *S. aureus* vs. *S. epidermidis*
Antibodies on beads will recognize *S. aureus* only

**Positive Reaction:**
- Agglutination or clumping
- *S. aureus* present on plate

**Negative Reaction:**
- No agglutination or smooth appearance
- Not *S. aureus*
- *S. epidermidis* present on plate

Demonstration by instructor
Overview

I. Exp. 23: Transformation of *E. coli* - discussed last

II. Exp. 24: Passive Agglutination with Latex Beads

III. Exp. 25: Parasitology
III. Exp. 25: Parasitology

- Purpose: To be able to observe different types of helminths
- Observe Preserved Specimens
- Observe Prepared Slides: Scan Power/Clean Slide
- Observe a Live Worm: Vinegar Eels

- 2 Types of Worms:
  - Platyhelminths: Flatworms
    - Tremodes or flukes
    - Cestodes
  - Nematodes: Roundworms
III. Exp. 25: Parasitology

- Platyhelminthia
  1. *Clonorchis*: fluke
  2. *Taenia sp.*: tapeworm
    - a. *Scolex*: head
    - b. *Proglottids*: segments (male & female organs)
III. Exp. 25: Parasitology

- Nematodes
  3. *Enterobius*: pinworm
  4. *Necator*: hookworm
III. Exp. 25: Parasitology

- Nematodes
  - 5. *Ascaris*:

- 6. *Trichinella sp.*: muscle biopsy
III. Exp. 25: Parasitology

- Nematodes: Live Worm
  7. Vinegar eels: *Turbatrix aceti*

  - Non-pathogenic
  - Need a low pH
  - Found on fermented apples and non-pasteurized vinegar
Overview

I. Exp. 23: Transformation of *E. coli*

II. Exp. 24: Passive Agglutination with Latex Beads

III. Exp. 25: Parasitology
I. Exp. 23: Transformation of *E. coli*

- **Purpose:** To genetically transform *E. coli* so that it is resistant to the antibiotic ampicillin
- **Groups of 2–3 students**
- **Materials Needed/group**
  - Follow procedure in Lab Manual
- **Theory to be discussed in the next lab**