



V Microbial Physiology 1–8

- 1 Oxygen Requirements, 2 Candle Jar, 3 Anaerobe Jar,
4 Temperature, 5 pH & Microbial Growth,
6 Growth & Osmotic Pressure, 7 Growth Curve, 8 Bacteriophage

Physiology 1 Oxygen Requirements

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- Objectives/Key Words
 - Oxygen Requirements of Microbes
 - Aerobes
 - Anaerobes
 - Facultative Anaerobes
 - Microaerophiles
 - Aerotolerant Anaerobes
 - Thioglycolate Agar Deep 1
 - **Thioglycolate Agar Deeps** (Biosafety Level 1)**✓
 - **Thioglycolate Agar Deeps** (Biosafety Level 2)**✓
 - **Thioglycolate Agar Deeps** (disposable needle)**✓
 - Thioglycolate Agar Deep 5*
 - Thioglycolate Cultures
- 23 interactive pdf pages
 - 33 illustrations, 13 images of microbes
 - * 3 techniques animations
 - * 4 techniques videos
 - ✓ 4 best practice animations
 - * 1 physiology animation
 - * 4 scenic microbiology, 10 images
 - ❖ La Parisienne Boulanger, Paris
 - ❖ Louis Pasteur, Pasteurization of Wine
 - ❖ Shipwreck Galleries, South Australia
 - ❖ Wine Making, Barossa Valley, Australia
- **Physiology Quick Quiz 1A: Oxygen**
- **Physiology Quick Quiz 1B: Best Practice**
- **Physiology Question Bank 1.1'–1.7**

Thioglycolate Agar Deep,
Clostridium sporogenes



Physiology 2 Candle Jar

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- Objectives/Key Words
 - The Candle Jar
 - **Assembling a Candle Jar****
 - Microaerophiles✓
 - **Aerobe/Microaerophile Culture** (BSL1)**✓
 - **Aerobe/Microaerophile Culture** (BSL2)***✓
 - **Aerobe/Microaerophile Culture** (DL)**✓
 - Aerobe & Microaerophile Cultures
- 12 interactive pdf pages
 - 12 illustrations, 7 images of microbes
 - * 4 techniques animations
 - * 5 techniques videos
 - ✓ 5 best practice animations
- **Physiology Quick Quiz 2A: Candle Jar**
- **Physiology Quick Quiz 2B: Best Practice**
- **Physiology Question Bank 2.1'**

candle jar



Physiology 3 Anaerobe Jar

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- Objectives/Key Words
 - Anaerobe Jar
 - **Assembling an Anaerobe Jar***
 - Anaerobes✓
 - **Culture of Aerobes & Anaerobes** (BSL1)**✓
 - **Culture of Aerobes & Anaerobes** (BSL2)**✓
 - **Culture of Aerobes & Anaerobes** (DL)***✓
 - Aerobe & Anaerobe Cultures
- 13 interactive pdf pages
 - 14 illustrations, 9 images of microbes
 - * 3 techniques animations
 - * 5 techniques videos
 - ✓ 5 best practice animations
- **Physiology Quick Quiz 3A: Anaerobe Jar**
- **Physiology Quick Quiz 3B: Best Practice**
- **Physiology Question Bank 3.1'–3.2**

anaerobe jar



Physiology 4 Temperature

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- Objectives/Key Words
 - Cardinal Temperatures
 - Temperature Requirements
 - Psychrophiles
 - Mesophiles
 - Thermophiles
 - Hyperthermophiles
 - **Test Microbes at 4°–55°C** (BSL1)**✓
 - **Test Microbes at 4°–55°C** (BSL2)**✓
 - **Test Microbes at 4°–55°C** (DL)**✓
 - Test Microbes at 4°–55°C✓
- 27 interactive pdf pages
 - 68 illustrations, 19 images of microbes
 - * 3 techniques animations
 - * 4 techniques videos
 - ✓ 5 best practice animations
- **Physiology Quick Quiz 4A: Temperature**
- **Physiology Quick Quiz 4B: Best Practice**
- **Physiology Question Bank 4.1'–4.13****
- ❖ 16 scenic microbiology, 55 images, 2 videos♦
 - ❖ 19th Century Appliance
 - ❖ 21st Century Refrigerator
 - ❖ Alaska Purchase/Ice to California*
 - ❖ *Aquae Sulis*, Bath, England*
 - ❖ Farm Composting, Mesophiles & Thermophiles
 - ❖ Fish Markets & Temperatures: Abu Dhabi, Goa, Muscat
 - ❖ Food Pasteurization & Sterilization
 - ❖ "Hot Water Plants", Yellowstone
 - ❖ Microbes & Temperature Requirements²
 - ❖ Perishable Food Storage, San Francisco Plantation, Louisiana
 - ❖ Psychrophile, Mesophile, Thermophile & Hyperthermophile Environments⁴
 - ❖ Sulfur Springs, Petit Piton, St Lucia

thermophiles,
Yellowstone, National Park



Physiology 5 pH & Microbial Growth

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- Objectives/Key Words
 - pH = - log [H⁺]
 - Pure Water is pH 7.0
 - pH of the Environment
 - pH of the Body
 - pH Range of Microbes
 - Acidophiles
 - Neutrophiles
 - Alkalophiles
 - pH Indicators 1–2
 - **Phenol Red Broth Subculture (Overview)****
 - **Phenol Red Broth Subculture** 1**✓–2**✓ (BSL1)
 - **Phenol Red Broth Subculture** 1**✓–2**✓ (BSL2)
 - **Phenol Red Broth Subculture*****✓ (DL, BSL1, BSL2)
 - pH & Microbial Growth
- 24 interactive pdf pages
 - 30 illustrations, 12 images of microbes
 - * 3 techniques animations
 - * 4 techniques videos
 - ✓ 4 best practice animations
 - ❖ 3 scenic microbiology, 6 images
 - ❖ Pickled Vegetables, Arikio, Chile
 - ❖ Saltern, South San Francisco
 - ❖ Solfatara, Yellowstone National Park

microbial growth & pH



Physiology 6 Growth & Osmotic Pressure

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- Objectives/Key Words
 - Solvent & Solute
 - Osmotic Pressure & Osmosis
 - Water Activity (a_w)
 - Compatible Solutes
 - Halophiles
 - **Growing an Extreme Halophile 1–2**
 - **Growth on 0–20% NaCl** (BSL1)**✓
 - **Growth on 0–20% NaCl** (BSL2)**✓
 - **Growth on 0–20% NaCl** (DL, BSL1, BSL2)***✓
 - Growth on 0–20% NaCl 3
 - **Growth on 0–70% Sucrose** (BSL1)*✓
 - **Growth on 0–70% Sucrose** (BSL2)*✓
 - **Growth on 0–70% Sucrose** (DL)*✓
 - Growth on 0–70% Sucrose 3
- 30 interactive pdf pages
 - 62 illustrations, 19 images of microbes
 - * 6 techniques animations
 - * 4 techniques videos
 - ✓ 7 best practice animations
 - ❖ 11 scenic microbiology, 42 images, 2 videos♦
 - ❖ Dried Fruits & Vegetables, Spain
 - ❖ Honey, San Gimignano, Italy♦
 - ❖ **Isolating an Extreme Halophile,** San Francisco
 - ❖ Italian & French Preserves
 - ❖ Jamón Ibérico & Prosciutto♦
 - ❖ Pink Lake, Esperance, South Australia
 - ❖ Salted & Dried Fish, Goa, India
 - ❖ Salterns & Salt, Bonaire, Caribbean
 - ❖ Salted Fish, La Boqueria Market, Spain
 - ❖ Salted Fish & Canned Salted Fish, Crete
 - ❖ Spotted Lake, Osoyoos, Canada
- **Physiology Quick Quiz 6A: pH & Growth**
- **Physiology Quick Quiz 6B: Best Practice**
- **Physiology Question Bank 6.1'–6.11****

Halobacterium/salt lagoon

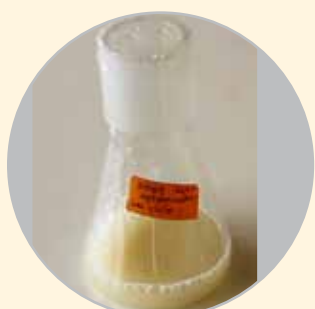


Physiology 7 Growth Curve

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- Objectives/Key Words
 - Growth of Single Cells**
 - Growth of Cell Populations
 - Shaking Incubators*
 - Phases of Growth
 - Lag Phase
 - Logarithmic Phase**
 - Growth Rate & Generation Time
 - Mid-Log & Late-Log
 - Maximum Stationary Phase
 - Death Phase
 - **Measuring Growth** 1'✓, 2**✓, 3**✓, 4**✓, 5'✓
- 21 interactive pdf pages
 - 31 illustrations, 10 images of microbes
 - * 3 techniques animations
 - * 3 techniques videos
 - ✓ 5 best practice animations
 - * 5 growth & cell division videos
 - ❖ 1 scenic microbiology, 4 images
 - ❖ Colony Forming Units (CFU), Nestlé Ski D'Lite Yoghurt
- **Physiology Quick Quiz 7A: Growth Curve**
- **Physiology Quick Quiz 7B: Best Practice**
- **Physiology Question Bank 7.1'–7.2**

10⁹ cells/ml



Physiology 8 Bacteriophage

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- Objectives/Key Words
 - Bacteriophage T4
 - T4 Lytic Cycle♦✓
 - **Bacteriophage Titer****✓
 - **No Mouth Pipetting**✓
 - **E. coli/T4 Phage Overlay Plates** 1**✓, 2**✓, 3**✓
 - **E. coli/T4 Phage Overlay Plates** 1**✓, 2**✓, 3**✓
 - Phage Titer✓
 - One-Step Growth Curve
 - Lysogenic & Lytic Cycles♦✓
 - Lambda Phage Plaques✓
- 21 interactive pdf pages
 - 18 illustrations, 5 images of microbes
 - ♦ 2 phage cycle animations
 - * 8 techniques animations
 - ✓ 12 best practice animations
- **Physiology Quick Quiz 8A: Phage Cycles**
- **Physiology Quick Quiz 8B: Best Practice**
- **Physiology Question Bank 8.1'–8.2**

lysogenic lambda plaques

