

Session 1 – Microbiology in Perspective

Text: Chapters 1 and 2
Anticipated time: 2 class periods
Thinking Questions: Chap 1: 1, 2. Chap 2: 1, 2.
Basic Objectives: You should be able to discuss the contributions of the listed scientists, and the historical development of the discipline of microbiology. Do not hesitate to relate to other historical developments as well. You should be able to discuss the basic principles of microscopy, the diversity of types of microscopes used by microbiologists, and how specimens are prepared for viewing.

Chapter 1 – The History and Scope of Microbiology

Introduction *Review. Define: Microbiology. Review Fig 1.2 for an historical perspective.*

1.1 Members of the Microbial World

Review. Review Fig 1.1 and note the phylogenetic position of organisms typically studied by Microbiologists.

1.2 The Discovery of Microorganisms

Review. What was Leeuwenhoek's contribution to microbiology?

1.3 The Conflict Over Spontaneous Generation

Review. What was Pasteur's contribution to the debate?

1.3 The Golden Age of Microbiology

Review. What contributed to Lister's interests in antiseptics? What was the contribution of Koch to the development of medical microbiology? Read Tab 1.1 and understand the significance of Koch's postulates. Read Box 1.2 and correlate to the original postulates.

1.4 The Development of Industrial Microbiology and Microbial Ecology

Review. Note the contributions of Pasteur, Winogradsky and Beijerinck to the development of environmental microbiology.

1.6 The Scope and Relevance of Microbiology

Review. Note the interface between microbiology and modern molecular biology.

1.7 The Future of Microbiology

Read carefully. Is microbiology important?

Chapter 2 – The Study of Microbial Structure

Introduction

Review.

2.1 Lenses and the Bending of Light

Read, including Figs 2.1 and 2.2. *Define*: Refraction and focal point.

2.2 The Light Microscope

Introduction

Review.

Bright-Field

Read. What is the function of the condenser?

Resolution

Read. Define: Resolution and Magnification. What determines these characteristics? How does oil (Fig 2.6) increase resolution?

Dark-Field

Read. Differentiate: Bright-field from dark-field condenser. See Fig 2.7b.

Phase-Contrast

Read. Don't worry about the optical physics. What is the utility of this microscope? *Review* Fig 2.8.

Differential

Review.

Fluorescence

Read. Is this just dark-field microscopy? *Review* Figs 2.12 and 2.13.

2.3 Preparation and Staining of Specimens

Introduction

Review.

Fixation.

Read.

Dyes

Read. Define: Contrast.

Differential

Read carefully, including Fig 2.15. *Understand*: Utility of the Gram Stain.

Structures

Read. Define: Structural stain. *Review* Fig 2.14.

2.4 Electron Microscopy

Introduction

Review.

Transmission EM

Read. Does this microscope have magnifying and condenser lenses?
Review Figs 2.17 and 2.19 and Tab 2.4. How is resolution increased?
How is contrast achieved? *Review* Fig 2.20.

Scanning EM

Read. Review Figs 2.23 and 2.24.

2.5 Newer Techniques in Microscopy

Confocal

Read.

Scanning Probe

Read. Review Figs 2.27-1.29.

Don't forget our basic reading guidelines:

Read very carefully = Read and study hard, even the details. The material is very important and fundamental to basic microbiology.

Read carefully = Read and study well, even the details. The material is important and will be used at later times in the course.

Read = Read and understand the concepts well. The concepts are important but the details are not worth memorizing.

Review = Read for background and perspective. The material is valuable, it helps provide insight, but it is not essential to 'study' it.

Summarize = Read superficially if time permits. The material is interesting or informative, but may not be covered in class.

Skip = We will not cover this in class.