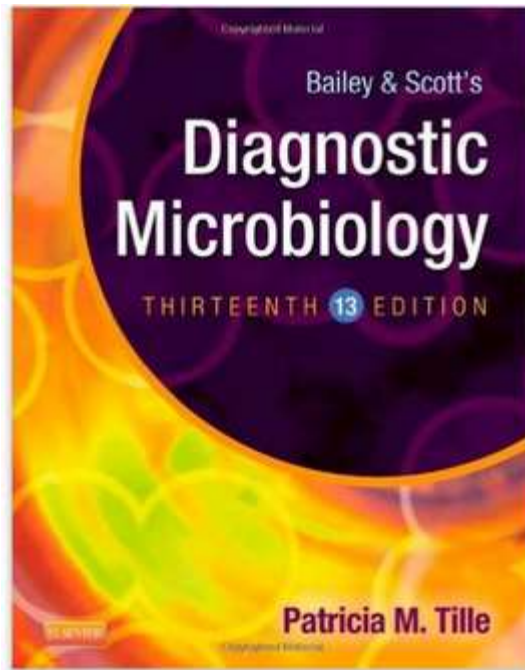




Microbial Diagnosis

320 MIC



Lecture 1 :

Basic Medical Microbiology

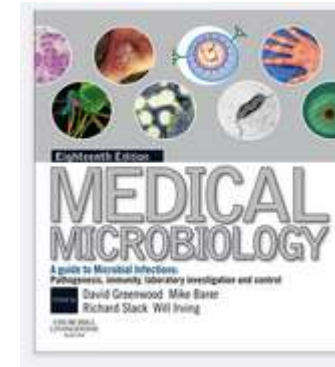
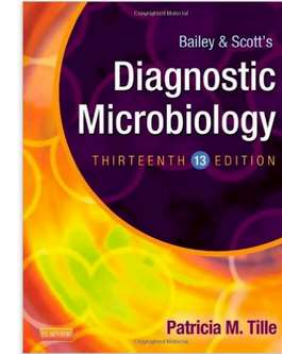
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References

1- Tille., P.M. **Bailey & Scott's Diagnostic Microbiology**, 13th edition, Mosby, Inc., 2014. ISBN: 978-0-323-08330-0

2- Murray., R.P. **Medical Microbiology**, 7th edition,

3- Greenwood D. et. al., **Medical Microbiology**, 18th edition



Basic Medical Microbiology

- Microbial Taxonomy.
- Bacterial Genetics, Metabolism, and Structure.
- Host-Microorganism Interactions.

I. Microbial Taxonomy.

- Define classification, identification, species, genus, and binomial nomenclature.
- Properly use the binomial nomenclature in the identification of microorganisms, including syntax, capitalization, and punctuation.
- Identify a microorganism's characteristics as either phenotypic or genotypic.
- Describe how the classification, naming, and identification of organisms play a role in diagnostic microbiology in the clinical setting.

Classification:

- It is the method for organizing microorganisms into groups or taxa based on similar morphologic, physiologic, and genetic traits.
- The hierarchical classification system consists of the following taxa designations:
 - **Species**
 - **Genus**
 - **Family**
 - **Order**
 - **Class**
 - **Phylum**
 - **Kingdom**

Classification:

Species: is the most basic taxonomic group and can be defined as a collection of bacterial strains that share many common physiologic and genetic features and as a group differ notably from other species.

Occasionally, taxonomic subgroups within a species, called Subspecies, are recognized. This might include biotype, serotype, or genotype maybe given to groups below the subspecies levels.

Genus:

Role of Taxonomy in Diagnostic Microbiology and Infectious Diseases

- Establishing an association of particular diseases or syndromes with specific microorganisms.
- Accumulating knowledge regarding the management and outcome of diseases associated with specific microorganisms.
- Establishing patterns of resistance to antimicrobial agents and recognition of changing microbial resistance patterns
- Understanding the mechanisms of antimicrobial resistance and detecting new resistance mechanisms exhibited by a particular microorganism.
- Recognizing new and emerging pathogenic microorganisms.
- Recognizing changes in the types of infection or disease caused by familiar microorganisms
- Designing alterations of available technologies for the development of new methods that optimize the detection and identification of infectious agents and optimize detection of microbial resistance to anti-infective agents.
- Developing new anti-infective therapies.

Identification:

- It is the process by which a microorganism's key features are delineated. Once those features are established, the profile is compared with those of other previously characterized.

Methods:

- Phenotypic Characteristics
- Genotypic Characteristics

To classify and name (identify) each organism properly.

Identification Methods:

The principles and practices of classification parallel the approaches used in the diagnostic microbiology encountered in the clinical setting.

Microbiologists can identify (recognize) organisms that have already been characterized and named by taxonomists.

Clinical microbiology laboratory is the place in which previously unknown or uncharacterized infectious agents are initially encountered and had increase responsibility of causing infectious diseases.

Identification Methods:

Genotypic Characteristics

- They are related to an organism's genetic makeup, including the nature of the organism's genes and the constituent nucleic acids.
- **Examples:**
 - DNA base composition ratio (i.e. G+C content)
 - DNA & RNA base sequence analysis (i.e. base sequence)

Identification Methods:

Phenotypic Characteristics

They are based on features including the readily observable characteristics and that may require extensive analysis procedures to be detected.

Examples:

- Macroscopic morphology, environmental requirements, Nutritional requirements, resistance profile, Antigenic properties, Subcellular properties.
- Microscopic morphology, staining characteristics.

Host- Microorganism Interaction

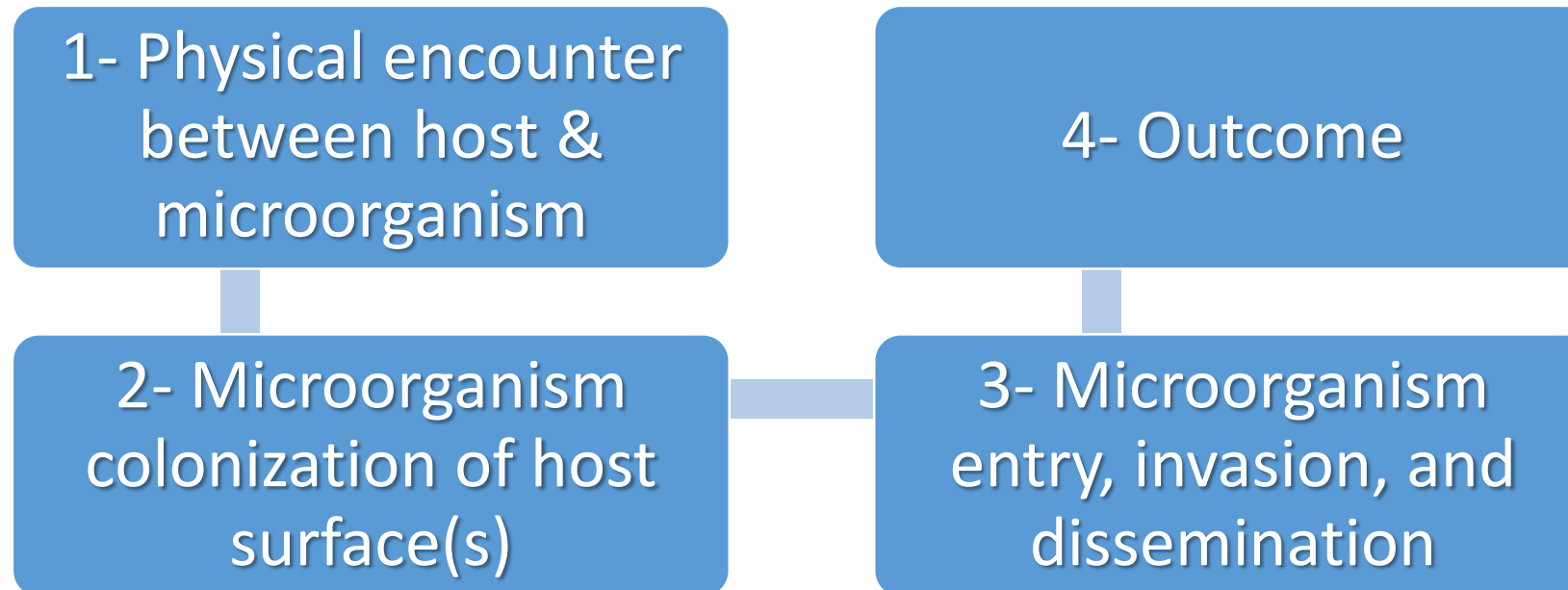
- **Hosts:** Human, Animals, plants,...
- **Carrier:** a person who harbours the etiologic agent but shows no apparent symptoms of infection or disease.
- **Mode of transmission:** the means by which etiologic agents are brought in contact with human host (e.g. infected blood, contaminated water, insect bite).
- **Microbial reservoir:** The origin of the etiologic agent or location from which it disseminate (e.g. environment, animals, insects or other humans).
- **Vector:** a living entity that transmits the etiologic agent (e.g. animal, plant or Insects) **Vs.** Vehicle

Host- Microorganism Interaction

- **Disease Incidence:** The number of new diseases or infected persons in population.
- **Nosocomial Infection:** Infection for which the etiologic agent was acquired in a hospital or long-term health care centre or facility.
- **Outbreak:** A larger than normal number of diseased individuals that occurs over a relatively short period.
- **Strain typing:** Laboratory-based characterization of an etiologic agents designed to establish their relatedness to one another during a particular outbreak or epidemic.

Host- Microorganism Interaction

- The subsequent development of infection and disease during the microbial – host association include:



Summary of Microbial Reservoirs and Modes of Transmission

