DEPARTMENT OF VETERINARY MICROBIOLOGY AND PARASITOLOGY COLLEGE OF VETERINARY MEDICNE UNIVERSITY OF AGRICULTURE, ABEOKUTA

VPM 302: INTRODUCTION TO VETERINARY MICROBIOLOGY

LECTURE NOTES

DR. M. A. OYEKUNLE
DR. O. E. OJO
DR. M. AGBAJE

INTRODUCTORY MICROBIOLOYAND MYCOLOGY

DR. M. A. OYEKUNLE

INTRODUCTION

- Microbiology is the study of microorganisms, which are tiny organisms that live around us and inside our body.
- An organism is a living thing that ingests and breaks down food for energy and nutrients, excretes undigested food as waste, and is capable of reproduction.
- A microorganism is simply very, very small organism that you cannot see with your naked eye, but with a microscope

TYPES OF MICROORGANISMS

Pathogenic microorganism

- Disease causing microorganism known as pathogenic microorganism.
- Some pathogenic microorganisms infect humans, other animals and plant.

Example

- *Yersinia pestis* is the microorganism that caused the Black Plague.
- It killed more than 25 million Europeans.

Non-Pathogenic microorganism

- Not all microorganisms are pathogens.
- Microorganisms help to maintain homeostasis in our bodies and are used in the production of food and other commercial products. For example, *flora* are

microorganisms found in our intestine that assist in the digestion of food and play critical role in the formation of vitamins such as vitamin B and vitamin K. They help by breaking down large molecules into smaller ones.

What is a microorganism?

- Microorganisms are the subject of microbiology, which is the branch of science that studies microorganisms.
- A microorganism can be one cell or a cluster of cells that can be seen only by using a microscope.
- Microorganisms are organized into five fields of study: bacteriology, virology, mycology, phycology, protozoology and parasitiology.

Bacteriology

- Study of bacteria.
- Bacteria are prokaryotic organisms. Prokaryotic organisms are one-celled organisms that do not have a true nucleus.
- Many bacteria absorb nutrients from their environment and some make their own nutrients by photosynthesis or other synthetic processes.
- Some bacteria can move freely in their environment while others are stationary.

Virology

- Study of viruses.
- A virus is a submicroscopic, parasitic entity composed of nucleic acid core surrounded by a protein coat.
- Parasitic means that a virus receives food and shelter from another organism and is not divided into cells. An example of a Virus is the *varicella-zoster* virus, which is the virus that causes chickenpox in humans.

Mycology

- Study of fungi.
- A fungus is eukaryotic organism, often microscopic, that absorbs nutrients from its external environment.
- Fungi are not photosynthetic.
- A *eukaryotic microorganism* is a microorganism whose cells have a nucleus, cytoplasm and organelles. These include yeast and some molds. Tinea pedis, better know as athlete's foot, is caused by a fungus.

Phycology

- The study of algae.

- Algae are *eukaryotic photosynthetic* organisms that transform sunlight into nutrients using photosynthesis.
- A *eukaryotic photosynthetic* microorganism has cells containing a nucleus, nuclear envelope, cytoplasm and organelles and is able to carry out photosynthesis.

Protozoology

- Study of *protozoa*, animal-like single-cell microorganisms that can be found in aquatic and terrestrial environment.
- Many obtain their food by engulfing or ingesting smaller organism. An example is *Amoeba proteus*

NAMING AND CLASSIFYING MICROORGANISMS

- Carl Linnaeus developed the system for naming organisms in 1735.
- This system is referred to as *binominal nomenclature*.
- Each organism is assigned two Latinized named because Latin or Greek was the traditional language used by scholars.
- The first name is called the *genus*. The second name is called *specific epithet*, which is the name of the species, and it is not capitalized. The genus and the epithet appear italicized.
- Sometimes are organisms are named after a researcher e.g *Escherichia coli*. The genus is *Escherichia*, which is named after Theodor Escherich, a leading microbiologist. The epithet or species is *coli*, which implies that the bacterium lives in the colon.
- Organisms were classified into either the animal kingdom or the plant kingdom before the scientific community discovered microorganisms in the seventeenth century.
- Carl Woese developed a new classification system that arranged organisms according to their molecular characteristics and then cellular characteristics.
- Only until 1978 that scientists agreed on the new system for classifying organism, and it took 12years after this arrangement before the new system became published.

Woese devised three classification; which are:

Domains

- Eubacteria: Bacteria that have peptidoglycan cell walls. (Peptidoglycan is the molecular structure of the cell walls of eubacteria which consists of N-acetyglucosamine, N-acetylmuramic acid, tetrapeptide, side chain and murein.)

- Archaea: Prokaryotes that do not have peptidoglycan cell walls

- Eucarya: Organisms from the following kingdoms:

Kingdoms

- Protista: Examples- Algae, protozoa, slime, molds.
- Fungi: Examples- one-celled yeasts, multicellular molds and mushrooms.
- Plantae: Examples- moss, conifers, ferns, flowering plant, algae.
- Animalia: Examples- insects, worms, sponges and vertebrates.

Size of microorganism

- Microorganisms are measured using the metric system.
- To explain this, let's compare a microorganism to things that are familiar to you.

A human red blood cell	100 micrometers (μm)
A typical bacterium cell	10 micrometers (μm)
A virus	10 nanometers (nm)
An atom	0.1 nanometers (nm)