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Microbiology (Quickstudy: Academic)

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ROBUST'S #1 ACADEMIC OUTLINE

MICROBIOLOGY

INTRODUCTION

What is Microbiology?

Microbiology is the study of microorganisms that are too small to be seen with the naked eye. The division of biology that deals with the study of bacteria, fungi, protists, algae, viruses and other unperceived minute creatures.

Why Study Microbiology?

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HISTORY OF MICROBIOLOGY

1620 Deodandus used to reduce production of Sodium hypochlorite used as Parisian sponge to reduce disease.

1684 Ignaz Semmelweis, a Vienna physician, was experimenting medical students in the hospital to wash their hands before operating. He found that the death rate from puerperal fever in pregnant women. He also noticed that using pH-controlled liquid hand-preserved soap in their patients, along with Chlorine. Many physicians in the US, followed him and most of the physicians used their hands before performing. Was complicated and many more women died as a result.

1856 Louis Pasteur, a very bright scientist trying to reduce the human life losses, found that bacteria can be killed by heating them to a higher temperature. When increased exposure was to the outside, antiseptic properties resulted. He proceeded to use chlorine as an antiseptic and proved it to be a powerful agent against the disease.

1865 Joseph Lister, an English surgeon, using this process to reduce the number of deaths from hospital beds to stacked up on the dispensary outside hospitals, proposed that infections were due to "infectants" from the surroundings. He began to use chlorine as an antiseptic. He also used chlorine to spray the air around the patient, which killed what he called "septic germs". His work was unprecedented for his time.

1890 Robert Koch, a German physician, came and on Lister's suggestion, after a long time of research, found that infected blood could transmit diseases, and the bacteria was isolated outside the body.

1895 Alexander Fleming discovered penicillium, which is a mold that produces penicillin, with Ernest Chain and Howard Flory. He developed a production process.

1950 Joshua Lederberg, Edward Tatum, and George Beadle discovered and worked on genetic recombination in bacteria.

1960 Francis Crick and James Watson discovered that DNA is a double helix model of genetic control of enzyme synthesis.

1980 Michael Bishop and Harald Varmus discovered that virus-induced carcinogenesis originates in endocrine cells.

1985 Kary Mullis invented PCR, polymerase chain reaction, a technique to amplify any DNA sequence.

1997 James Watson, a research Nobel Prize

for work on genes, "infectious proteins."

THE FIVE KINGDOMS

Monera

Includes bacteria and cyanobacteria.

Protista

Includes amoebae, flagellates, amoeba, ciliates, heterokonts, diatoms.

Fungi

Includes basidiomycetes, ascomycetes, yeast, chytrids, and other mushrooms.

Plantae

Includes green algae, monera, bryophytes, ferns, gymnosperms, angiosperms.

Animalia

Includes protists, arthropods, insects, vertebrates, mammals.

THE CELL THEORY

The cell theory, first put forth in the 1800's, has three main premises and states:

1. All living things are composed of cells.

2. All cells come from pre-existing cells.

3. Cells are the basic units of life.

Today, we know that viruses are not cells, and therefore, living organisms are just collections of RNA or DNA.

KOCH'S POSTULATES

To Prove A Microorganism Causes Disease

Microorganisms can be found in all multicellular cells with the same disease.

Microbes must be cultured outside the body.

Microbes must induce disease when given to healthy individuals.

Identical disease must be isolated from newly diseased organisms.

TYPES OF INFECTIVE AGENTS

Bacteria

Microorganisms

Rickettsiae

Viruses

Protozoa

Microorganisms

Chlamydia

Spirochetes

Chloroplasts

DNA/RNA

E. Faecalis

Viruses

Parasites

Proteins

DNA/RNA

HOW PROKARYOTES AND EUKARYOTES DIFFER

PROKARYOTES

No nucleus

One chromosome

Prokaryotic

Small diameter / 1-10µm

Prokaryotic

Simple

Prokaryotic

EUKARYOTES

True nucleus

Multiple chromosomes

Prokaryotic

Large diameter / 10-100µm

Eukaryotic

Complex

Prokaryotic

FOOD BORNE PATHOGENS

VIRUSES

Norovirus

Campylobacter

Escherichia

Salmonella

Shigella

Rotavirus

Calicivirus

Hepatitis A

Hepatitis E

Hepatitis B

Hepatitis C

Hepatitis D

Hepatitis G

Human papillomavirus

Human immunodeficiency virus

Human papillomavirus

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Synopsis

The basic principles of microbiology. Reference for any student studying biology or microbiology from high school to upper-level college courses.

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