SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF CIVIL ENGINEERING

19GET277- Biology for Engineers

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Microbial System: History, Types, Importance & Control

MICROBIAL SYSTEM: ECONOMIC IMPORTANCE

Role in Agriculture:

Decay and decomposition: Soil bacteria play an important role in brining about decomposition of organic matter. They serve a double purpose. In the first instance they act as scavengers removing harmful waste from the earth. ❖ Secondly, they return it to the soil as plant food.

Soil fertility: Some bacteria play an important role in maintaining and others in increasing soil fertility. The fertility of soil is proportional to its nitrogen content.

In dairy Industry: Lactic acid bacteria (LAB) play an important role in the fermentation process in the dairy industry. Some lactic acid bacteria (LAB) are used to produce butter, cheese, curd, etc. These bacteria make fermentation the lactose in the milk to produce lactic acid, which helps in curd coagulation and texture formation during the cheese production

MICROBIAL SYSTEM: ECONOMIC IMPORTANCE

In vinegar industry: Acetic acid bacteria (AAB) are used in the vinegar industry for the production of certain foods and vinegar. These are Gram-negative bacteria which belong to the family Acetobacteraceae. They can produce acetic acid during oxidative fermentation by performing oxidation reaction producing vinegar as a byproduct

In the Production of Vitamins: They are able to synthesize vitamin K and B vitamins, such as biotin, nicotinic acid, cobalamin, panthotenic acid, folates, pyridoxine, riboflavin and thiamine, etc. Among these bacteria, Pseudomonas denitrificans is used to produce Cobalamin (Vitamin B12) while Clostridium butylicum is used to synthesize Riboflavin.

MICROBIAL SYSTEM: ECONOMIC IMPORTANCE

In Fiber Retting: Microbiological processes are used for discharge of the fiber. In this case, there are many bacteria help in the retting of jute, hemp and flax fibers.

For Curing of Tea and Tobacco: Tea and tobacco are cured to give particular taste, flavor or smell by using bacteria, E.g., Bacillus megatherium and Micrococcus candisans which are used in the curing and fermentation of tea and tobacco leaves for commercial purposes.

In the Degradation of Petroleum: There are many indigenous microorganisms which live in water and soil, and they can eliminate hydrocarbon contaminants

MICROBIAL SYSTEM: ECONOMIC IMPORTANCE

Role in Medical field: Source of Antibiotics: Many bacteria are used in the pharmaceutical industry for the production of antibiotics, probiotics, drugs, vaccines, starter cultures, insecticides, medically-useful enzymes, etc.

Preparation of Serums and Vaccines: Serums are used in advance as a therapeutic measure of diseases such as diphtheria, lockjaw, pneumonia, etc. Vaccines are commonly used to make people immune to diseases like typhoid, small-pox, cholera, scarlet fever, etc.

Role in Wastewater Treatment ❖ There are many well-known bacteria which play an essential role in keeping sewage clean

MICROBIAL SYSTEM: ECONOMIC IMPORTANCE

- **In Biological Control of Insects :** It is the process for controlling different types of pests like insects, weeds, mites, and plant diseases by using other organisms.
- **Role in Food Spoilage** Some bacteria cause food Spoilage.
- **Role in Water Pollution** Water is polluted by different bacteria makes the water unsuitable for drinking.
- **Role in Reduction of Soil Fertility** Moist soil-inhabiting bacteria are capable of transforming soil nitrates into gaseous nitrogen. This process is called denitrification, and those bacteria are called denitrifying bacteria.
- **Role in Diseases** Many parasitic bacteria induce diseases in plants and animals, including human.

MICROBIAL SYSTEM: ECONOMIC IMPORTANCE

Microorganisms can be controlled using physical and chemical methods:

Physical methods

Heat: A common and old method that kills microbes by altering their membranes and denaturing proteins. It's used in cooking and canning.

Radiation: A commonly used physical method for controlling microbial growth.

Filtration: A method that removes microorganisms from fluids like water using a filter with pores that can trap organisms as small as viruses.

Desiccation: Also known as dehydration, this method dries up the water content of microorganisms like bacteria, yeasts, and molds, which inhibits their growth.

MICROBIAL SYSTEM: ECONOMIC IMPORTANCE

Refrigeration and freezing: Refrigeration slows down the growth of microorganisms, and freezing prevents the growth of most foodborne microorganisms.

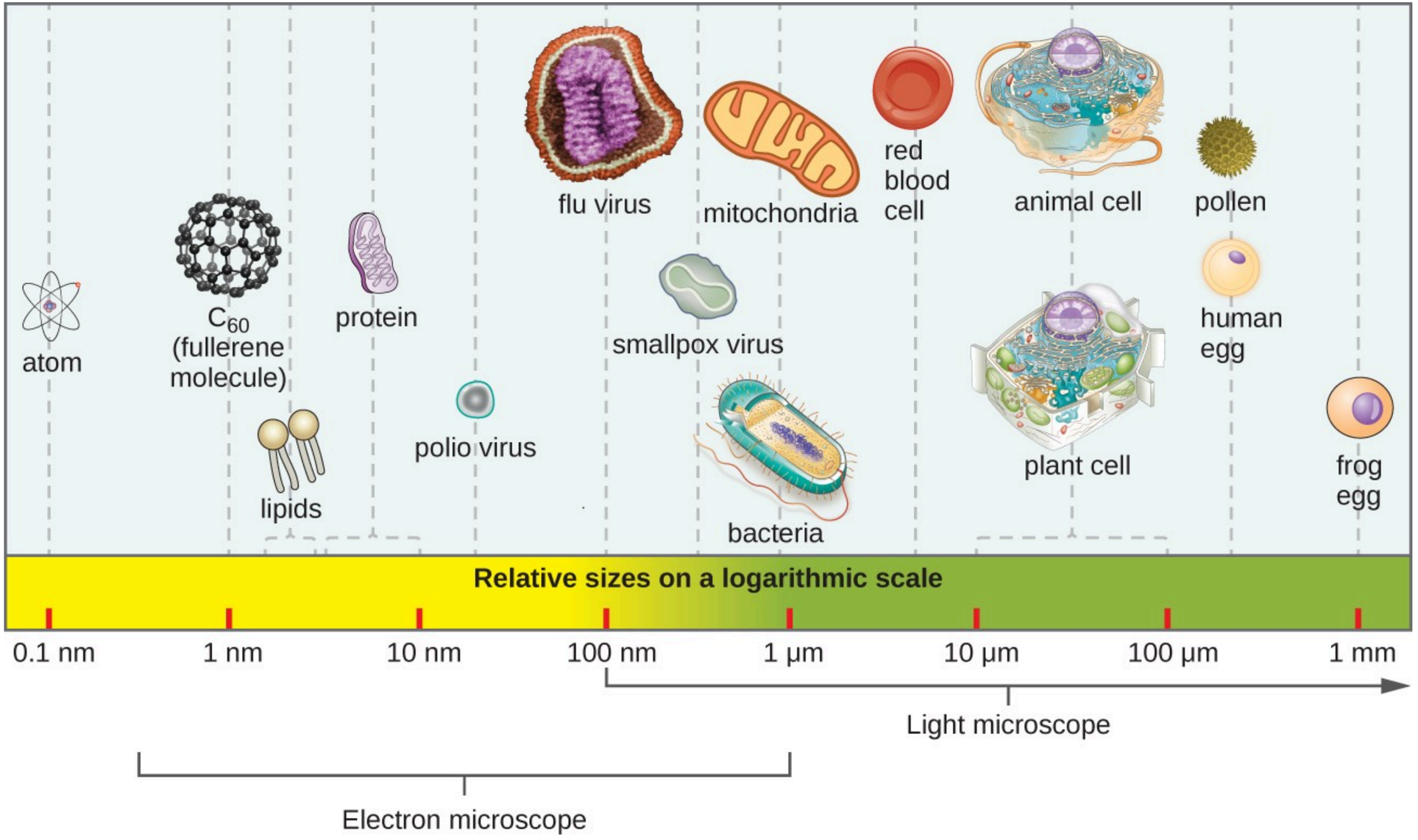
Chemical methods

Antibiotics and synthetic drugs: These antimicrobial chemotherapeutic agents use selective toxicity to inhibit or kill pathogens without harming the host.

Chemicals such as alcohol, aldehydes, and heavy metals: These chemicals are used to control microorganisms.

Microbial control chemicals: These chemicals are applied through spraying, fumigation, and immersion, and can be used as liquids, gases, or solids.

Controlling microorganisms is important to prevent the transmission of diseases and infection, stop decomposition and spoilage, and prevent unwanted microbial contamination.


flu virus
mitochondria
red blood cell
animal cell
pollen
atom
C60 (fullerene molecule)
protein
smallpox virus
human egg
lipids
polio virus
bacteria
plant cell
frog egg
Relative sizes on a logarithmic scale
0.1 nm
1 nm
10 nm
100 nm
1 µm
10 µm
100 µm
1 mm
Light microscope
Electron microscope

Thankyou