

Lecture (2) CHARACTERISTICS OF MICROORGANISMS

Objectives

List in brief major characteristics of: Bacteria, Fungi, Viruses, Prions

Bacteria

Bacteria are unicellular prokaryotic organisms

I. Bacteria are Prokaryotic Cells

Their cells lack nuclear membrane and organelles, which distinguish them from eukaryotes.



<u>Size of Bacteria:</u> <u>Bacteria are smaller than eukaryotic cells</u>.

Bacterial cells are extremely small so they are:

Measured in micrometers (µm). One micrometer equals 1/1000 millimeter.

Bacteria can be seen by light microscope.





Bacteria have a rigid cell wall

Bacterial cell wall contain peptidoglycan.
 The cell wall surround the cell membrane and determines the shape of the organism.



Bacteria have a rigid cell wall

 Bacteria are classified according to the structure of their cell wall into two groups, either
 Gram-positive or Gram-negative.



Additional structures

External to the cell wall may be:
Flagella,
Pili, and/or a
Capsule.



Shape of Bacteria

Most bacteria have one of four basic **shapes** that can be described as either:

- Rod shaped (Bacillus),
- Spherical (Coccus),
- Curved (vibrio) or
- Spiral (spirochete).





Spirochete







Independent existence

Most bacteria are capable of <u>independent</u> <u>existence</u> and growth, but species of Chlamydia and Rickettsia are obligately intracellular organisms.

Bacterial Reproduction

- Bacterial cells reproduce asexually by binary fission.
- However, many bacteria can exchange some genetic information carried on <u>plasmids</u> "small extrachromosomal genetic elements".





 Fungi are eukaryotes.
 Fungi has a complex <u>carbohydrate cell wall</u> (like plants) that contain chitin (plant's cell wall contain cellulose).



Fungi are saprophytic

 Fungi are <u>non-</u> <u>photosynthetic</u>, generally <u>saprophytic</u> organisms (unlike plants).



Two major groups are yeast and mold.

Some fungi are multicellular filamentous, and are commonly called <u>molds</u>,

Others "the <u>yeasts</u>" are unicellular.





yeasts







Fungal reproduction may be asexual, sexual, or both.

All fungi produce **spores**.

Viruses



Viruses are very small

Viruses are too small to be seen in the light microscope
 Measured in nanometer (one nanometer = 1/1000 micrometer)
 Can be seen only by electron microscope.

Virus Structure

- Viruses are not cells (acellular). They have a simple structure.
- A virus consists of
 Nucleic acid
 molecule(s) (DNA or
 RNA but not both),
 surrounded by a protein
 coat (Capsid).



Virus Structure

Some viruses may also have a lipid "envelope".





Obligate intracellular parasites

Viruses Are obligate intracellular parasites of other living cells. Viruses contain the genetic information necessary to direct their own replication, however, they require the host cell's structures and enzymatic machinery.

Prions



Prions are infectious protein particles that lack nucleic acid.

A prion is a misfolded form of a normal brain protein.



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Prion can convert a normally folded protein into the prion form, creating a chain reaction that increases prion numbers.



Prions can cause several degenerative brain diseases including scrapie in sheep, "mad cow disease", and Creutzfeldt-Jacob disease in humans











1. Mention three basic bacterial shapes:





2. Virus size is measured in ?

- A. Millimeter
- B. Micrometer
- C. Nanometer
- D. Picometer



3. Virus can be seen by ____?

- A. Light microscope
- B. Naked Eye
- C. Electron Microscope



4. Which of the following is measured in nanometer:

A. FungiB. VirusesC. Bacteria



5. The <u>eukaryotic</u> infectious agent that has a complex carbohydrate <u>cell wall</u>:

- A. Viruses
- B. Fungi
- C. Prions
- D. Bacteria





7. Unicellular fungi are called

A. YeastB. Mold

8. True or False

1. Viruses can be seen by light microscope (2. Viruses can be seen by Electron microscope (3. Eukaryotic cells are smaller than bacterial cells (4. bacterial cells are smaller than Eukaryotic cells (

9. True or False

1. Fungi are photosynthetic () 2. Fungi are saprophytic () 3. Fungi has cell wall that contain peptidoglycan () 4. Fungi has cell wall that contain chitin (

10. Bacterial cell wall contain ?

- A. Peptidoglycan
- B. Cellulose
- C. Chitin

11. Fungal cell wall contain ?

- A. Peptidoglycan
- B. Cellulose
- C. Chitin

12. Bacterial cell are measured by ?

- A. Nanometer
- B. Micrometer
- C. Millimeter

13. Infectious protein particles that lack nucleic acid are called

- A. Virus
- B. Bacteria
- C. Prion
- D. Yeast

14. Multicellular fungi are called ?

A. YeastB. Mold

15. This picture is of:

- A. Virus
- B. Bacteria
- C. Fungus
- D. Prion

A. ProkaryoticB. EukaryoticC. Subcellular

17. Fill in the spaces:

Number 1 is :
 Number 2 is :
 Number 3 is:

A. BactriaB. VirusC. Fungus

A. EukaryoteB. Prokaryote

A. YeastB. Mold

21. Prions can cause a disease that affect ____?

- A. Brain
- B. Lung
- C. Intestine
- D. Bones

22. Bacteria reproduce by ?

A. MitosisB. MeiosisC. Binary fission

23. Fill in the spaces:

Number 1 is :

Number 2 is :

Number 4 is:

Number 5 is:

