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Chapter 6

BACTERIA

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BACTERIA

Single cellular prokaryotic organism, which is slightly advanced than virus. A bacterium can act as autotrophic and heterotrophic.

BACTERIUM

Refers to single bacteria

ANTON VAN LEEUWEN HOEK

A scientist who first discovered bacteria in 1676

COCCI

Rounded shape bacteria having no flagellum. ***They are sessile***

MICROCOCCI

Refers to one coccus bacterium

DIPLOCOCCUS

Refers to two cocci bacteria

STREPTOCOCCUS

Refers to many cocci bacteria

BACILLUS

Rod shaped bacteria having flagellum ***They are motile***

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MICROBACILLUS

Refers to one bacillus bacteria

STREPTOBACILLI

Refers to many bacillus bacteria

SPIRELLI

A coil shaped bacteria that are never found in colonies. They are also sessile

VIBRIO

Comma shaped bacteria

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MOTILE BACTERIA
Bacteria that can locomote with the help of flagellum

SESSILE BACTERIA
Bacteria that cannot locomote due to absence of flagellum

AUTOTROPHIC BACTERIA
Bacteria, which can make its own food

HETEROTROPHIC BACTERIA
Bacteria, which depend on others

PHOTOSYNTHETIC BACTERIA
Bacteria, which make their food with chlorophyll present in them. In bacteria, chlorophyll is not present in plastids, but it is free

CHEMOSYNTHETIC BACTERIA
In the absence of chlorophyll, bacteria can make food from sulphur, nitrate, ammonia and iron; such bacteria are called chemosynthetic bacteria

PARASAITIC BACTERIA
Bacteria, which get their food from living things

SAPROPHYTIC BACTERIA
Bacteria that get their food from dead organisms

SYMBIOTIC BACTERIA
Bacteria, which live in living organisms and give them benefit. E.g. *E coli* live in human intestine and donate cellulose enzyme with which the cellulose is digested into glucose

BINARY FISSION

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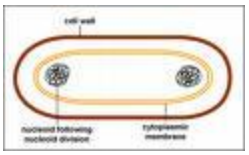
A simple type of asexual reproduction in which one bacterial cell divides to make two bacteria

ENDOSPORE FORMATION



A type of asexual reproduction which bacterium would use during un-favorable conditions. In this type a resistant cyst is formed outside the body, which disappears when favorable condition returns

CONJUGATION

Type of sexual reproduction in which two bacteria combine their genetic material through conjugating tube

LEDERBERG AND TATUM

Scientists who described conjugation experimentally

TRANSDUCTION

A type of sexual reproduction in which genetic material from one bacterium goes into other bacterium through virus (third party).

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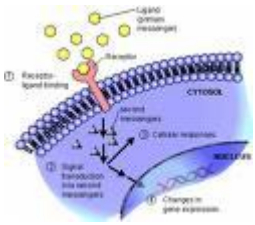

LEDERBERG AND ZINDER

They described transduction experimentally

TRANSFORMATION

A type of sexual reproduction in which DNA from one bacterium transforms the character of DNA in other bacteria

FRED GRIFFITH

He explained transformation experimentally

STREPTOMYCIN
TERRAMYCIN
NEOMYCIN

All are antibiotics extracted from bacteria

NOSTOC

NOSTOC

A common single cellular prokaryotic blue green algae. It is also called cynobacteria

HETEROCYST

A cellular structure in nostoc filament, which takes part in reproduction and nitrogen fixation

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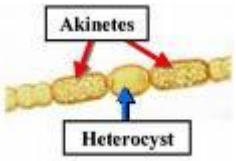

HORMOGONIA
Single cell of Nostoc

HORMOGONIUM
Chain of nostoc cells in filament form.

MONILIFORM
The nostoc cells which have same shape and are arranged in single line just like beats

GELATINOUS SHEATH
A layer around nostoc filament. This sheath is formed in order to avoid the shattering of nostoc cells

INCIPIENT NUCLEUS
A nucleus without nuclear membrane and nucleolus (prokaryotic cell)

HORMOGONIA
Asexual reproductions in nostoc in which few cell are detached from filament and grow as new nostoc. It happens in favorable condition

AKINETES
Asexual reproduction in nostoc, which is used in un-favorable condition. During this, a cell forms exospores, which protects it from climatic effects

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Aerobes -
Organisms that require oxygen to carry out respiration, as opposed to anaerobes.

Anaerobes -
Organisms that do not require oxygen to carry out respiration, as opposed to aerobes. Anaerobes may be facultative anaerobes or obligate anaerobes.

Autotrophs -
Organisms thatdo not require a specified exogenous factor for normal metabolism

Binary fission -
Asexual reproduction found in prokaryotes in which a cell divides into two equal daughter cells by a non-mitotic process.

Chemoautotrophs -
Organisms who derive their energy through the synthesis of organic materials from inorganic molecules.

Eukaryotes -
Organisms whose cell interiors are characterized by separation into organelles and whose genetic material is enclosed by a nuclear membrane. Compare with prokaryotes.

Eukaryote flagella
The type of flagellum found in prokaryotes. These flagella are covered by the cell membrane
and move in a back and forth motion.

Facultative anaerobes -
Organisms that do not require oxygen to carry out respiration, but are not harmed by the presence of oxygen and may have the ability to respire aerobically in its presence. Compare with obligate anaerobes.

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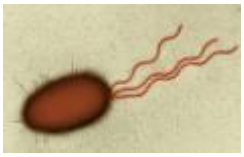
Flagella -
A term used to refer to two different structures in prokaryotes and eukaryotes, both used in cell movement. Flagella in both groups are long, hair-like structures, but their internal structure and evolutionary history are completely different.



Flagellin -
Protein subunits that make up prokaryotic flagella.

Gram Staining -
A process by which components of bacterial cell walls are bound to Gram's stain. Some bacteria lack the cell wall component that will bind Gram's stain and are classified as Gram-negative.

Heterotrophic -
Requiring organic materials from the environment due to an inability to produce them internally. As opposed to autotrophic.

Nucleoids -
The clear regions in which the genetic material of prokaryotes is located. Nucleoids are not membrane bound.

Obligate anaerobes -
Organisms that do not require oxygen for respiration and are poisoned in the presence of oxygen. Compare with facultative anaerobes.

Parasites -
A party in symbiosis that benefits at the expense of the other party.

Peptidoglycan -
The component of cell walls bound by gram's stain.

Photoautotroph -

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An organism that gains energy by synthesizing organic compound using light energy.

Plasmids -
Circular DNA molecules found in prokaryotes.

Prokaryotes -
Organisms whose cells lack internal organization into organelles and whose genetic material is not contained within a membrane-bound nucleus.

Prokaryote flagella -
The type of flagellum found in prokaryotes. These flagella are not covered by the cell membrane and move in a spiral motion.

Pseudopeptidoglycan -
A substance found in the cell walls of some archaebacteria that is similar to peptidoglycan.

Ribosomes -
Cellular machinery for protein synthesis.

Tubulin -
Protein that makes up the microtubules of eukaryotic flagella.

Saprophytes -
Heterotrophic organisms that live on dead organic material.

Alternation of generations -
A reproductive strategy that involves a succession of haploid and diploid phases.

Ameboid motion -
Type of motion in which cytoplas can flow beneath the cell membrane into new branches called pseudopods, helped by filaments of a structural protein called actin, causing the cell to move in a given direction.

Cilia -
Short hair-like projections found on eukaryotic cells that can help the cell move or can sweep food particles toward the mouth.

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Chlorophyll -
The pigment found in green plants and algae that allows them to undergo photosynthesis

Chloroplasts -
The organelles in which photosynthesis takes place in green plants and algae.

Endosymbiotic theory -
This theory states that eukaryote organelles may have evolved when large eukaryotic organisms engulfed but did not digest smaller organisms and a symbiotic relationship arose.

Isogamus -
An organism that has only one type of gamete rather than separate male and female gametes.

Macronucleus -
In ciliates, the large nucleus that holds many copies of the cells genetic material. It is responsible for the growth and metabolism of the cell.

Micronucleus:
In ciliates, the smaller nucleus responsible for the transmission of genetic material during sexual reproduction.

Oral groove
In ciliates, the membrane structure that functions in food uptake.

Pinocytosis -
Method of food uptake in which a liquid or small food particle is sucked into an invagination in the cell membrane, which then folds in on itself and pinches off from the cell membrane to become a small vacuole.

Phagocytosis -
Method of food uptake in which a flexible portion of the cell membrane surrounds a food particle and engulfs it, bringing it into the cell in a vacuole. Phagocytosis is used to ingest other unicellular organisms or large particles.

Photosynthesis -

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The process in which some organisms can use the energy of light to transform inorganic materials into usable organic materials.

Plankton -
Small free-floating organisms in fresh- and saltwater that are a major marine food source.

Plasmodium -
The diploid vegatative phase of acellular slime molds

Pseudoplasmodium -
The haploid slug-like phase of cellular slime molds that gives rise to the fruiting body.

Pseudopods -
Temporary cytoplasmic protrusions of ameboid cells that function in movement and food uptake by phagocytosis.

Stigma -
The light sensative region in euglenoids that allows them to move toward light sources.

Thallus -
The leaf-like bodies of algae.

Vacuole -
A membrane bound portion of the cell usually used for holding materials such as food and waste

PRACTICE SHEET

TEST-01

1. **The prokaryotes were earliest organisms and they lived and evolved all alone on earth for -----billion years**
   (a) 2
   (b) 3
   (c) 4
   (d) 5
2. Antony Van Leeuwenhoek was the first to observe the micro-organisms.
   (a) True

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(b) False

3. **Helpful bacteria are used in the production of which food?**
   (a) Fruit
   (b) **Yogurt**
   (c) Milk
   (d) Meat
4. **One of the important scientists who contributed to the discovery of bacteria is**
   (a) Albert Einstein
   (b) **Anthony van Leeuwenhoek**
   (c) Richard Leakey
   (d) Charles Darwin
5. **Some bacteria can live without oxygen. They are called _____.**
   (a) Hominids
   (b) Hermaphrodites
   (c) Omnivores
   (d) **Anaerobes**
6. **Which process do some bacteria use to reproduce?**
   (a) Budding
   (b) Regeneration
   (c) **Fission**
   (d) Cloning
7. **Rod-shaped bacteria are called _____.**
   (a) Cocci
   (b) colonie
   (c) Bacilli
   (d) Spirilla

8. **An organism that uses dead material as a source of food is called a(n)___.**
   (a) Parasite
   (b) **Saprophyte**
   (c) Protozoa
   (d) Omnivorous
9. **What pigment do cynobacteria need to make food?**
   (a) Ribosome
   (b) Aerobes

(c) Lysosomes
(d) **Chlorophyll**

10. **In which human organ can large numbers of bacteria be found?**
(a**) Large intestine**
(b) Liver
(c) Kidneys
(d) All

11. **Which statement is true about bacteria?**
(a) Bacteria are living organisms that consist of one cell.
(b) Bacteria are the smallest of all living things
(c) Bacteria are the oldest and most diverse life forms.
(d) **All three statements are true.**

12. **There are three common shapes of bacteria. They are**
(**a) Rods, spheres, and spirals**
(b) Rods, spirals, and tubes.
(c) Spheres, hexagons, and spirals.
(d) None of the above

13. Bacteria have adapted to live in
(a) The ocean.
(b) The desert and hot springs
(c) Snow or Polar Regions
(d) **Any climate**

14. Bacterial cell measures from 0.2 micron to 2 micron in breadth and

Question no.	Answer key
1.	
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9.	

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10.	
11.	
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TEST-2

1. **One of the following refers to the processes of induction of specific antigens, antibodies or immune cells.**
   (a) Injection
   (b) Immunization
   (c) Intra peritoneal
   (d) None
2. **The immunity may be protective or curative in nature**
   (a) True
   (b) False
3. **One of the following is way of immunization**
   (a) Vaccination
   (b) Chemotherapy
   (c) Physiotherapy
   (d) None
4. **Vaccination is a prophylactic in nature in which host is inoculated with**
   (a) Inactive pathogen
   (b) Weaker pathogen
   (c) Virulent pathogen
   (d) Both a&b
5. **Polio vaccine is given orally, but one of the following vaccine is administered by injection**
   (a) Tetanus
   (b) TB
   (c) Cholera
   (d) All
6. **One of the following is commercial substance produced by certain micro-organisms that inhibit or kill other micro-organisms.**
   (a) Antigen
   (b) Antibodies
   (c) Antibiotics
   (d) None
7. **The first antibiotic was discovered from penicillin fungi in -------**
   (a) 1940

(b) 1941
(c) 1942
(d) 1943

8. Antibiotics which are effective against range of infections are known as
(a) Narrow spectrum
(b) Broad spectrum
(c) Both
(d) None

9. Besides medical usage, antibiotics are used in agriculture both as a growth promoting substance in animal feed and as prophylactics
(a) True
(b) False

10. Beside antibiotic resistance, the inappropriate use of antibiotic may lead to
(a) Allergic reaction
(b) Metabolic disorders
(c) Both a&b
(d) None

NUMBER	CORRECT OPTION
1	A
2	A
3	A
4	D
5	A
6	C
7	C
8	B
9	A
10	D

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VIRUS AND BACTERIA QUIZ

1. The word virus refers to
A**) Poison** B) Protein C) Sugar d) None

2. The first virus was discovered by
A) Stanely B) Romanowisky C) **Ivanowisky** D) None

3. The TMV was isolated in 1935 by
A) Ivanowisky B) **Stanley** B) Both C None

4. In size virus ranges from
A) 17-350um B) 10-350um B) Both D) **None**

5. Because virus does not possess cell membrane, cytoplasm and nucleus, so it is called
A) Single cellular B) **Non cellular** C) Monocellular d) All

6. Total number of DNA molecules in virus is
A**) 1** B) 2 C) 3 D)4

7. **Type of life cycle in which virus exploits the Bacteria and behaves like master is called**
A) Lysogenic B) Lytic C Lysis D) All

7. The head of virus contains a protein called
A) Rapid B) **Capsid** C) Caprin D) Collagen

8. The bacteria that move with flagellum are called
A) Sessile B) Sedentary C) **Motile** D)All

9. Since mitochondria are missing in bacteria so it makes ATP by
A) Plasma membrane B) Cell membrane **C) Both** D) None

10. First Bacterial cell was discovered by
A) **Leweenhoeck** B) Robert Hoek C) Robert Brown D) None

11. Since bacteria are present so they are called
A) **Omnipresent** B) Omniparus C) Both D) None

12. Bacteria that make their food by chlorophyll are called
A) Heterotrophic B) Autotrophic **C) photosynthetic** D) None

13. One of the following is not bacterial product
A) Insulin B) Penicillin **C) Both** D) None

14. Type of reproduction in which bacteria protects itself is called
A) Fission B) **Endospore formation** C) Exospore D) All

15. The simplest method of reproduction in bacteria is called
A) Fission B) Budding C) Transduction D) All

16. A type of sexual reproduction in which virus transfers bacterial DNA to another Bacteria is called

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A) **Transduction** B) Transformation C) Conjugation D) All

17. **The Streptococci pneumonia bacteria is the cause of**

A) **Pneumonia** B) Cholera C) Diptheria D) Small pox

18. **The simplest and smallest organism is**

A) Virus B) **Bacteria** C) Prion D) All

19. **Bacteria that help its host is called**

A) **Symbiotic** B) Parasitic C) Both D) None

20. **Bacteria that draw their food from dead organic matter is called**

A) **Saprophytic** B) Symbiotic C) Parasitic D) None

QUESTION NO.	ANSWER KEY
1)	
2)	
3)	
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TEST -03

(CYNOBACTERIA)

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1. **Cynophyceae, myxophyceae and cynobacteria refer to**
   a) Virus
   b) Fungi
   c) Blue green algae
   d) none
2. **The wall of cynobacteria is**
   a) Single gelatinous
   b) Double gelatinous
   c) Gelatinous
   d) none
3. **The majority of cynobacteria live in**
   a) Marine water
   b) Fresh water
   c) Brackish water
   d) Land
4. **The sexual reproduction in blue green alga**
   a) Does not occur
   b) Some times
   c) Regular
   d) none
5. **Water blooms are found in**
   a) Winter
   b) Spring
   c) Summer
   d) Autumn
6. **One of the following is not reproductive method in cynobacteria**
   a) Hormogonia
   b) Akinetes
   c) Budding
   d) All
7. **The Nostoc cytoplasm at border looks colorful due to**
   a) Centroplasm
   b) Cromoplasm
   c) Both a & b

d) None

8. The structure that helps in nitrogen fixation and protein formation is

a) Hormogonium
b) Moniliform
c) Heterocyst
d) All

9. The asexual reproduction by Nostoc in favorable condition is

a) Akinetes
b) Hormogonia
c) Both a&b
d) None

10. The endospore formation in Nostoc occur during

a) Favorable season
b) Unfavorable season
c) Both a&b
d) None

ANSWER KEY

QUESTION NO.	ANSWER KEY
1.	C
2.	B
3.	B
4.	A
5.	C
6.	C
7.	B

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8.	C
9.	B
10.	B