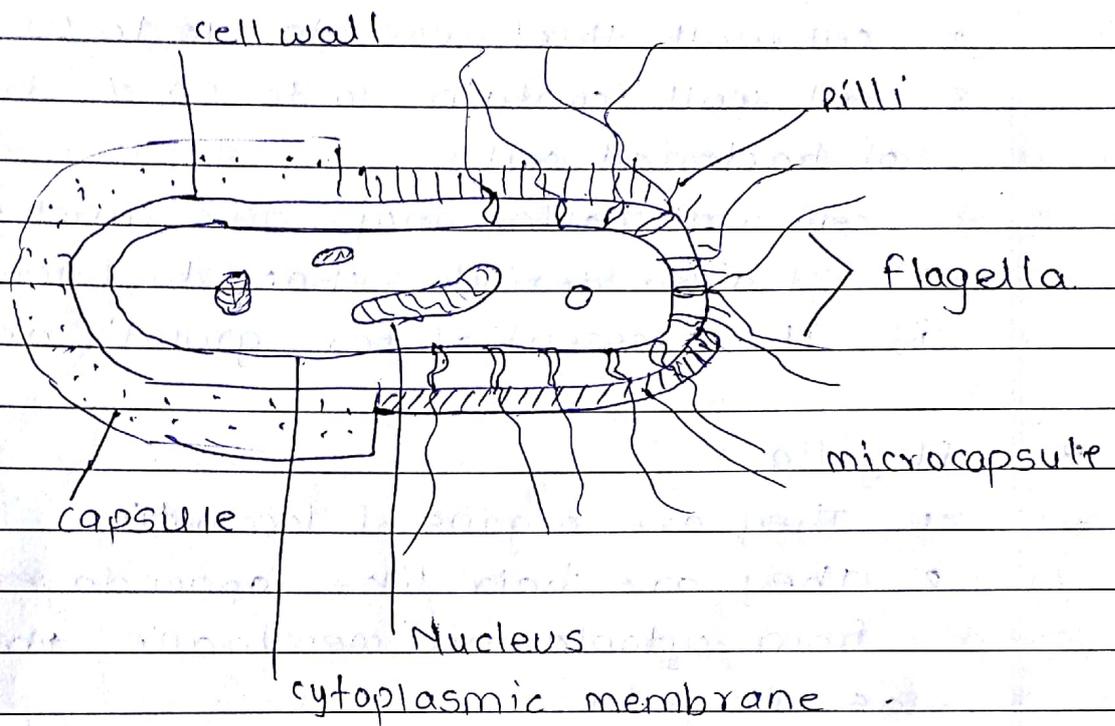


Q. 1 Diagram of Bacteria and describe flagella, pilli and cell wall.



General structure of bacterial cell -

main components of bacterial cell :-

1. capsule
2. cell wall
3. flagella
4. pilli
5. cytoplasmic membrane
6. cytoplasm

1. capsule :-

1. In many bacterial cells develop enclosing cover of gummy material forming layer of considerable thickness. This layer known as capsule layer.
2. It protects the bacterial cell during adverse condition.

## 2. cell wall :-

1. cell wall is rigid, thin and gives definite shape to bacterial cell.
2. cell wall thickness is 10 to 25  $\mu\text{m}$ .
3. cell wall contains 10 to 40 % dry weight of bacterial cell.
4. cell wall having major two functions:
  - i) It gives definite shape to bacterial cell
  - ii) It is essential for growth and division.

## 3. flagella :-

1. They are organs of locomotion.
2. They are hair like appendages originate from cytoplasmic membrane this is known as flagella.
3. They are mostly present in rod shaped and spiral shaped bacteria.

## 4. pilli

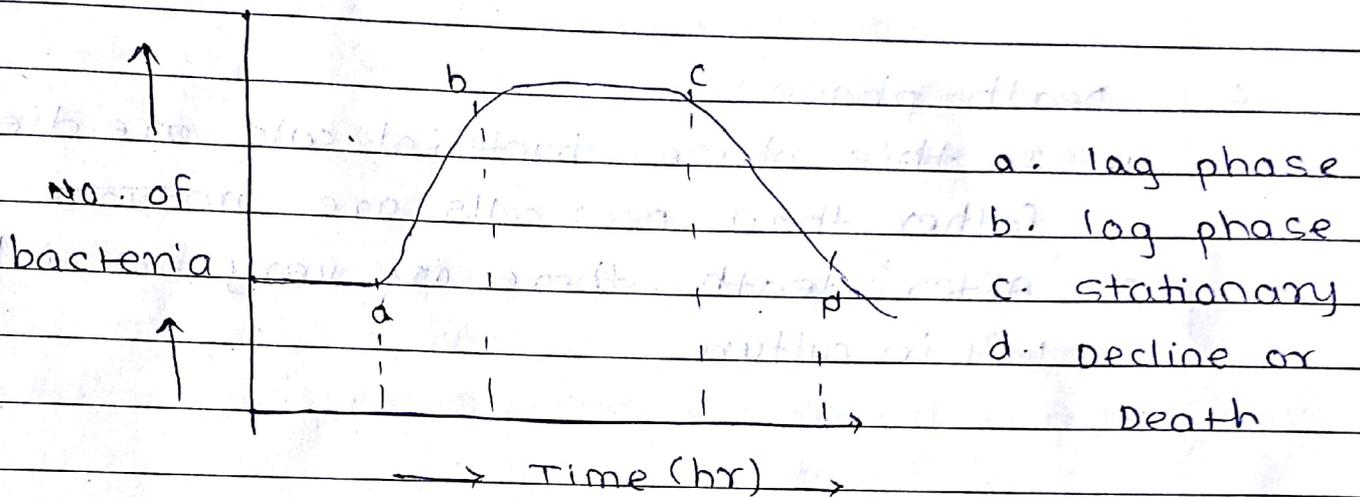
1. pilli is smaller, shorter, numerous, hair like structure compared to flagella.
2. They can not produce regular waves
3. They are only visible with electron microscope.
4. pilli is made up of protein subunits called pilin.

Q. Growth in bacteria and describe phases

Ans.

Growth :- Increase in number of bacterial cells with the time or per time lapse.

Growth curve - no. of bacterial cell and time is drawn on graph, then graph is obtained called growth curve



1. lag phase :-

1. cells also require some time for adjustment to new physical environment.
2. cell division do not occur for some time such slack period called lag phase
3. At the end of lag phase some cell divide and increase in population

2. log phase

1. In this phase, bacterial cells are multiple by binary fussion at constant rate.
2. The portion of curve is linear and straight line.

3. All cells are uniform in their chemical composition and physiological characters

2. Stationary phase -

1. At the time no net increase or decrease of cells in medium or at this phase

2. This stage is called stationary phase

3. In this stage cell division rate and cell death rate is uniform

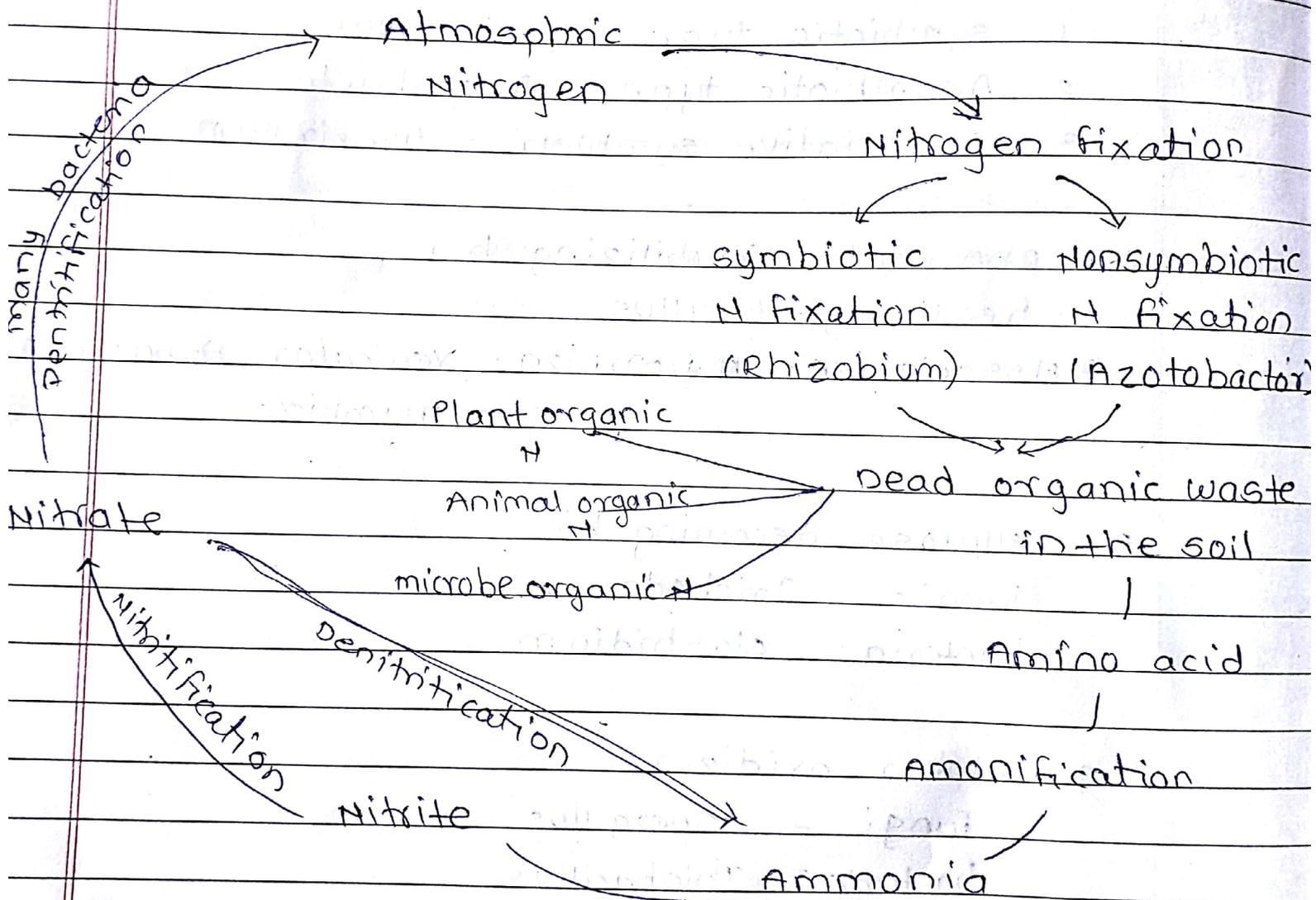
4. Death phase :-

1. In this phase, bacterial cells are die faster than new cells are produced.

2. After death, there are very few viable cells left in culture.

Q. Define Nitrogen cycle.

Ans define :- sequence are changes from free atmospheric nitrogen fixed inorganic nitrogen to simple organic compound to complex organic compound in plant & animal & microorganism. release of this nitrogen back to atmosphere.



- A) Proteolysis :- The breakdown of protein and get converted into amino acid.  
organism :- Pseudomonas
- B) Ammonification :- The production of ammonia from amino acid is called ammonification.  
organism :- Clostridium.
- C) Nitrification :- The oxidation of ammonia to nitrite and further oxidation of nitrite to nitrate is called as nitrification  
organism :- Nitrosomonas, Nitrobacter
- D) Nitrate reduction - The process of Nitrification is completely reversed which known as nitrate red<sup>n</sup>.
- E) Denitrification :- The transformation of nitrate to gaseous nitrogen by micro organism in series of biochemical changes  
organism - Pseudomonas, Bacillus.

	Gram +ve bacteria	Gram -ve bacteria
1.	cell wall is thicker. i.e. 20 to 25 $\mu\text{m}$	cell wall is thinner i.e. 10 to 15 $\mu\text{m}$
2.	The peptidoglycan is 50 - 80 %.	The peptidoglycan is 5 - 15 %.
3.	The Teichoic acid is present.	Teichoic acid absent
4.	Lipids are in traces,	more lipids are present
5.	ex. <i>Bacillus lact</i> <i>subtilis</i> .	e.g. <i>Rhizobium</i>

Q. Ans. biofertilizers and types

Types .

1. Nitrogen fixing bacteria biofertilizer
2. phosphate solubilizing bacteria bio.
3. cellulose decomposing bio.
4. sulphur oxidizers

1. Nitrogen fixing biofertilizer

1. symbiotic type - Rhizobium.
2. Asymbiotic type - Azotobacter
3. Associative symbiotic - Azospirillum.

2. phosphate solubilizing bio

1. free living - bacillus
2. Associative - Mycorrhiza - vesicular Arbuscular mycorrhiza.

3. cellulose decoming bio.

- Fungi - Trichoderma  
Bacteria - clostridium

4. sulphur oxidizers

- fungi - Aspergillus  
bacteria - Thiobacillus

#

## Importance of biofertilizer :-

1. Renewable energy source
2. low cost , no side effect
3. ecofriendly
4. Increase soil fertility and yield
5. safe to handle
6. compatable fungicide & insecticide
7. use in sustainable (with) agri.
8. Available in wide range of crop.

potants  
of

## Merit and demerit biofertilizers.

### Merit :-

1. low cost
2. used in low conc.
3. more effective
4. ↑ seed germination
5. more effective in land <sup>my</sup> cond<sup>n</sup>.

### demerit -

1. slow increase in soil fertility.
2. can't replace the inorganic fertilizer.
3. require and specific skill for preparation and application.
4. effect depends on other factors.
5. specific to crop.
6. limitation under<sup>in</sup> high temp. condition
7. cannot used in all types of soil.
8. require cold storage.
9. cannot mixed with inorganic fertilizer.

## Prokaryotic cells

## Eukaryotic cells

1. Size of prokaryotic is 1-10  $\mu\text{m}$ . size of eukaryotic range from 10 to 100  $\mu\text{m}$ .
2. Nuclear membrane is absent. Nuclear membrane is present.
3. Nucleus is primitive type. Nucleus prominent type.
4. Mitochondria is absent. Mitochondria is present.
5. Mesosomes are present. Mesosome are absent.
6. Asexual method of reproduction. sexual method of reproduction.
7. Methane gas production is present. Methane gas production is absent.
8. one circular chromosome. Without histones. one or more linear chromosomes with histone.
9. eg. bacteria, Blue green algae (BGA). Algae, fungi, protozoa.
10. cell division - Meiotic type. cell division mitotic type.

# Carbon cycle :-

