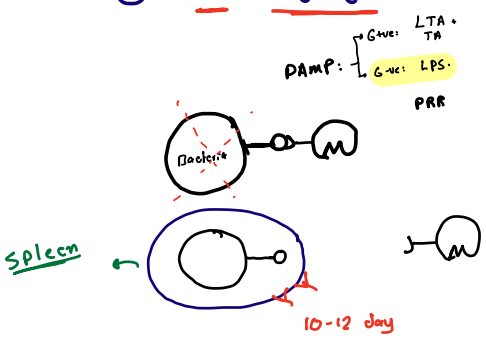
Bacterial structure, Nutrition, and Growth

* Capsule:

- Di / Poly saccharides OR polypeptides.
  - Homo
  - Hetero
- Functions:
  1. water Binding ⇝ prevent dryness
  2. Anti-phagocytic.

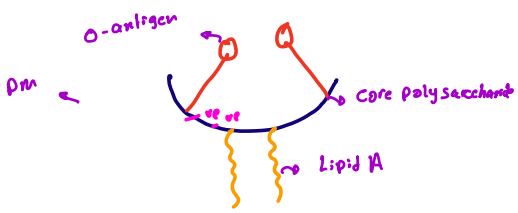


* Lipo poly saccharides: LPS

Where? outer layer membran of g-ve.

3:

1. Lipid A:
   - Firmly embeded to the membrane
   - Stabilize the OM + Act as endotoxin
2. Core polysaccharide:
   - -ve charges
3. O-antigen:
   - protection



Endotoxin:

Lipid A released when cell lysis.

↓

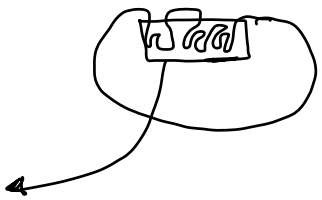
↑↑↑ Cytokines → ↑ / ↓ → ↓B.P → Septic shock

(highly Immunogenic)

* Structures Internal to cell wall:

① Cytoplasmic membrane:

- Similar in Both G+ve & G-ve.



[2] Mesosomes:

- FXN? ↑ surface area for cellular respiration
- Site of oxidative phosphorylation
- Like cristae in mitochondria

[3] Inclusion bodies:

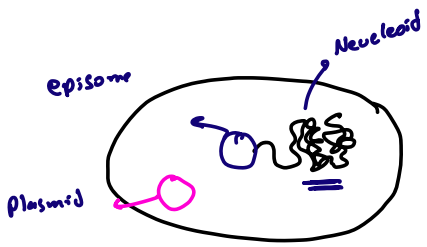
Granules / vacules store material for future use.

Ex:

- Glucose → Glycogen
- Lipid → PHB
- protein → parasporal crystal
- Gases → Gas vesicles (buoyancy in Aquatic environment)

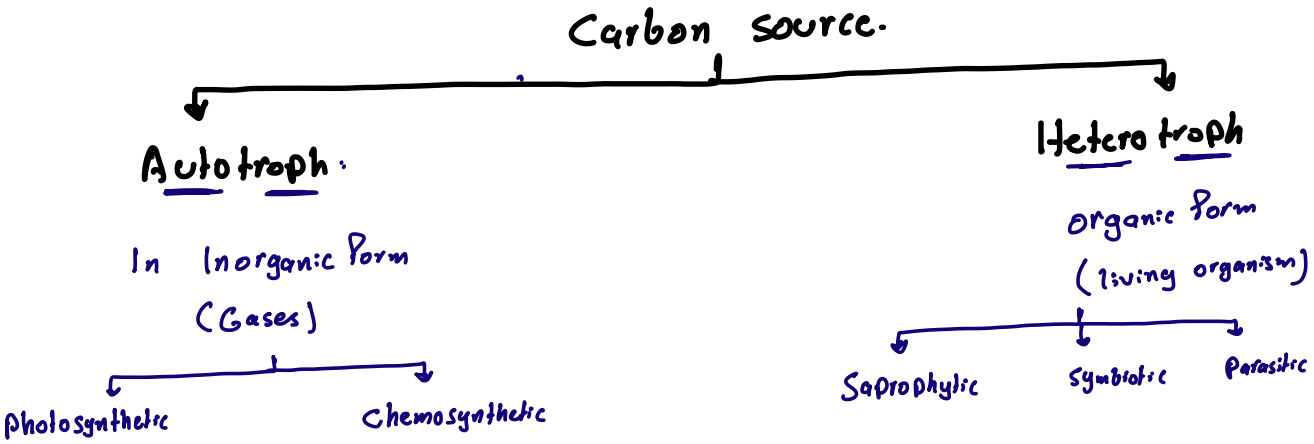
[4] Plasmid vs Episomes.

- Plasmid: Can't integrate.
- Episomes: Can integrate into the genome



- extrachromosomal DNA element
- proliferate independently.

[2] Nutrition:



Types of Hetero trophic Bac.:

① Sapro phytic Bacteria:

- Dead organic compounds
- Complex organic compound → Enzymes → Soluble compound → Absorption.

[2] Symbiotic Bacteria:

- Symbiosis (Benficial partnership)
- Ex: Bacteria in the root.
  (microbiola)

[3] Parasitic Bacteria:

Feed on living tissues.

3 * Bacterial Reproduction:

- Asexuall (vegetative)

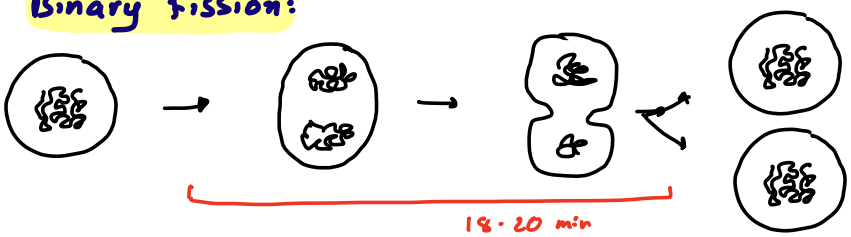
Sexuall ??

* Bacterial Growth = ↑ in # Not Size

need:
Space, Food, water, O2
↓ waste product
Light, Temp (Appropiate)

* 1% Survival rate of Bacteria

Binary fission:



18-20 min

only ↑ in # Not size.

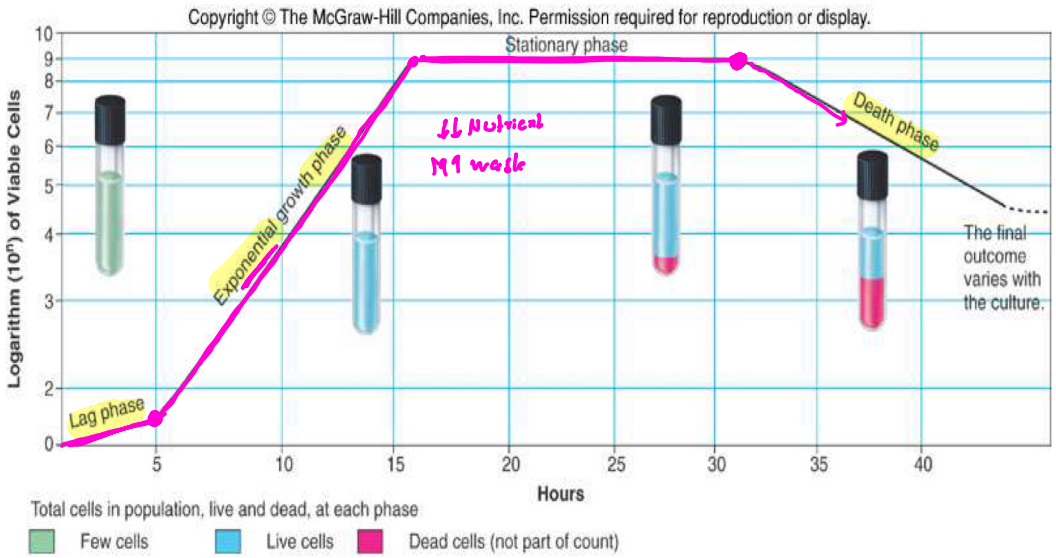
Growth Stages

Lag phase:
- Adjustment
- Little growth

Exponential / log phase.
Maximum growth,
as long as
Nutrients are Adequate
& favorable enviromeal.

Stationary Phase
Growth = Death
↓↓ Nutrient
↑ wastes

Death Phase
Death > Growth



Colony:
one Bacterial cel

Character	Endotoxins	Exotoxins
Definition	are the lipopolysaccharide-protein complexes, produced at the time of cell death.	are polypeptide proteins excreted by few species of bacteria
Location	It is a part of the cells and located on chromosomal genes	It is released from the cells and located on extrachromosomal genes (e.g. plasmids).
Toxicity	Endotoxin is moderately toxic	Exotoxin is highly toxic
Source	It is produced after the disintegration of the gram-negative bacteria	It is produced in the living gram-positive bacteria and gram-negative bacteria
Boiling	It does not get denatured on boiling	It gets denatured on boiling
Diseases	Meningococcemia, sepsis by gram-negative rods, etc.	Botulism, Diphtheria, Tetanus
Effects	general symptoms are fever, diarrhea, vomiting etc	cytotoxin, enterotoxin or neurotoxin with defined action on cells or tissues.
Neutralization	cannot be neutralized by antibodies	can be neutralized by antibodies
Vaccines	No effective vaccines are available	effective vaccines are available
Examples	Toxins produced by E.coli, Shigella, Vibrio cholera, Salmonella Typhi	Toxins produced by Staphylococcus aureus, Streptococcus pyogenes, Bacillus anthracis, Bacillus cereus.