Monera

- Introduced by Copeland.
  - ↳ coined term mycota
- Term monera → Daughtery and Allen
- Kingdom of PK ory
- most abundant microbes
- nutritionally most diversed
- structurally simplest
- show very complex behavior
- most primitive and ancient organisms.
- present almost everywhere even in harsh conditions
  - hot spring, desert, snow, deep sea
    - ↓
    - Barophilic bacteria

Respiration in bacteria

(A) Obligate aerobe

- Has enzymes of aerobic respiration only.

$+O_2$ → Survive

$-O_2$ → death Azotobacter, Bacillus subtilis

(B) obligate anaerobe

- has enzymes of anaerobic respiration only.

$+O_2$ → death

$-O_2$ → survives

Clostridium botulinum
- ↳ causes food poisoning

(C) Facultative aerobe

$+O_2$ → survives, better growth

$-O_2$ → survives

- normally shows anaerobic respiration and in the presence of O_2 they become aerobes.

most of photosynthetic bacteria
- ↳ Rhodospirillum, Chlorobium etc.

(D) Facultative anaerobe

$+O_2$ → survive.

$-O_2$ → survive, less growth

normally show aerobic resp^n and in the absence of O_2 they become anaerobe.

Halophiles, Pseudomonas

Nutrient related terms

- PKs can be classified as follows.

(A) Based on C source

↳ → inorganic (CO_2) → autotroph.

→ organic → heterotroph

↳ protein, nucleic acid, carbohydrate, etc.

(B) Based on energy source

↳ → light → phototroph

→ oxidation of chemicals → chemotroph

(C) Based on e^- and H^+ source

↳ → inorganic compound → lithotroph

→ organic compound → organotroph.

Photosynthetic bacteria

Purple S bacteria → Chromatium, Thiospirillum

green S bacteria → Chlorobium

Purple non S bacteria → Rhodopseudomonas, Rhodospirillum

green non S bacteria → Chloronema, Chloroflexus.

Bacterial group	energy source	carbon source	e^-, H^+ source
Photolitho autotroph	light	inorganic	inorganic
Photoorgano heterotroph	light	organic	organic (FA, AA)
chemolitho autotroph (chemosynthetic)	oxidation of inorganic compounds	inorganic	inorganic
chemoorgano heterotroph → saprophytic → symbiotic → parasitic	oxidation of organic compounds	organic	organic (FA, AA)

Keys FA → fatty acids
AA → Amino acids

Photosynthetic bacteria
↓
water is used as e^- and H^+ source
↓
photolysis of water does not takes place
↓
O_2 is not evolved
↓
anoxygenic photosynthesis

Photosynthesis in BGA and EK
↳ protists, plants

↓

water is used as e^- and H^+ source

↓

photolysis of water takes place

↓

O_2 is evolved

↓

oxygenic photosynthesis

chemosynthetic bacteria (chemolithoautotroph)

- They use energy released due to oxidation of inorganic compounds to synthesize food.

(A) Nitrifying bacteria

↳ perform nitrification

↳ $NH_3 \rightarrow NO_2^- \rightarrow NO_3^-$

energy → food synthesis ← energy

(ammonium) NH_4^+ (NH_3) (ammonia) —oxidation→ NO_2^- (nitrite) —oxidation→ NO_3^- (nitrate)

Nitrosomonas, Nitrococcus

Nitrobacter, Nitrocystis

(B) Sulphur bacteria

energy → food synthesis

$H_2S \xrightarrow{oxd^n} H_2SO_4$

Thiobacillus thio-oxidans, Beggiatoa

(C) Iron bacteria

energy → food synthesis

$Fe^{2+} \xrightarrow{oxd^n} Fe^{3+}$

Leptothrix, Ferrobacillus

(D) Methane bacteria

energy → food synthesis

$CH_4 \xrightarrow{oxd^n} CO_2$

Methanomonas

Heterotrophic bacteria

majority of bacteria are heterotrophic

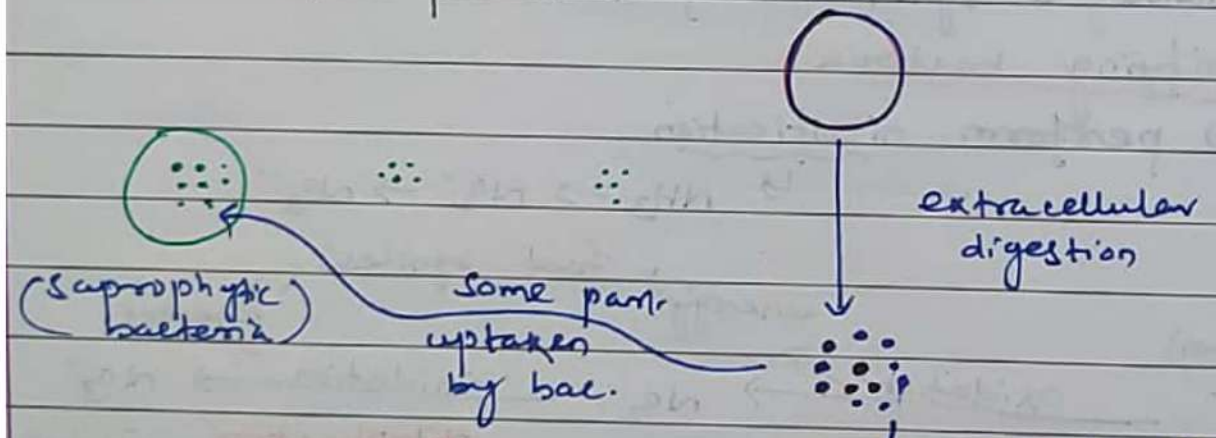
heterotrophic bacteria →
- saprophytic
- symbiotic
- parasitic

Saprophytic bacteria

→ derive nourishment from detritus
- ↳ dead organic matter
- ↳ dead body, animal excreta, fallen leaves, etc

→ always free living

→ called nature's scavengers, decomposers



① obligate saprophyte

\+ detritus → survive

\- detritus → death

Bacillus vulgaris

⑪ facultative parasite

\+ detritus → survive, saprophyte

\- detritus → survive, parasite

Pseudomonas

Parasitic bacteria

→ derives nourishment from host.

→ can be pathogenic
↳ disease causing

① Obligate parasite

(+) host → survive

(−) host → death

Mycobacterium leprae

② facultative saprophyte

(+) host → survive, parasitic

(−) host → survive, saprophyte

Mycobacterium tuberculosis.

Reproduction in bacteria

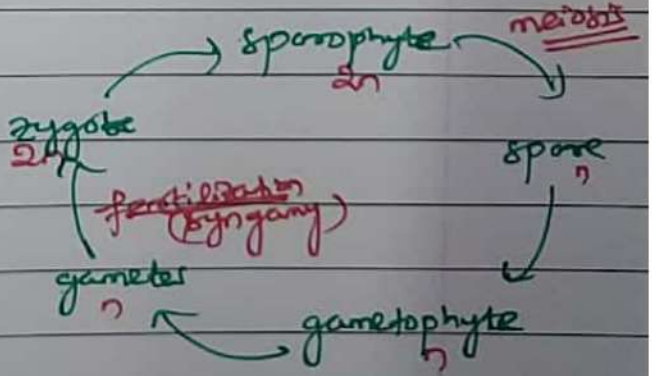
- Asexual
  - → binary fission
  - → cyst formation
  - → endospore formation
- Parasexual (genetic recombination)
  - → transformation
  - → conjugation
  - → transduction

Note:

Bacteria (monera) don't show alteration of generation

↓ Reasons

lack of fertilisation (syngamy) and lack of meiosis.

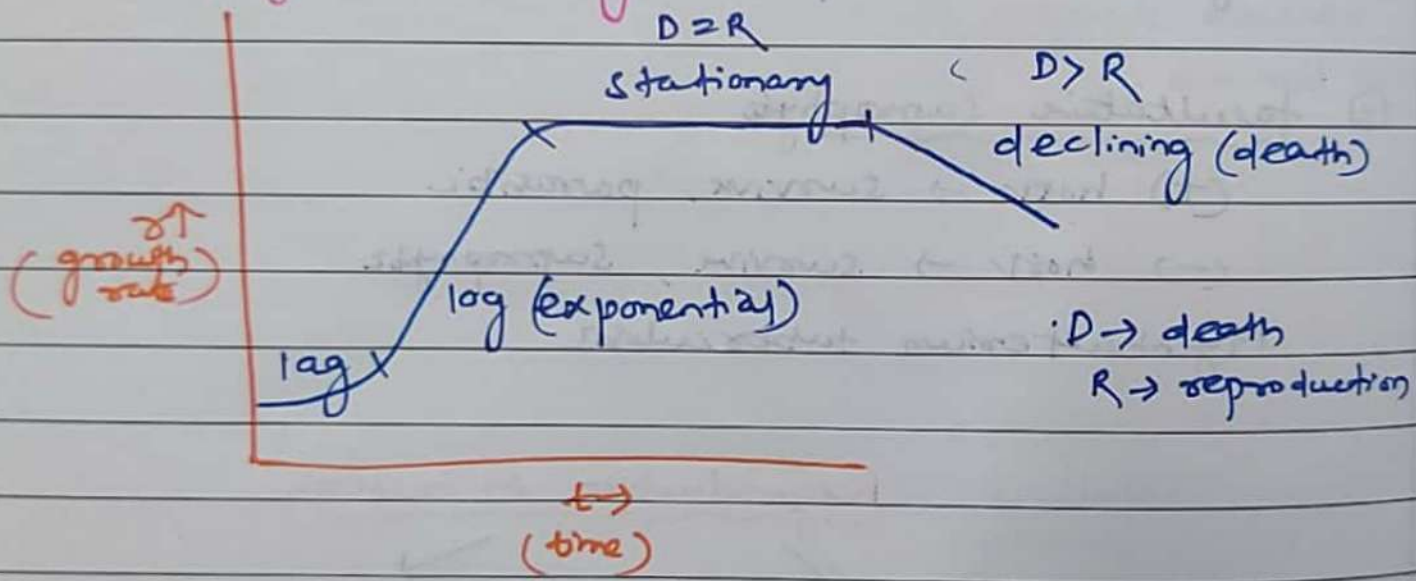


(Alteration of generation in plants)

Binary fission

- most common mode of reproduction in bacteria
- takes place under favorable condition
- cell division → amitosis
- no. of bacteria produced from x no. of bacteria after 'n' no. of generation is x^2

Phases of growth during batch culture of bacteria



Stationary phase is achieved due to

- lack of nutrients
- lack of space
- accumulation of waste (toxin) materials
- accidental introduction of lytic virus
  ↓
  cause lysis of bacteria