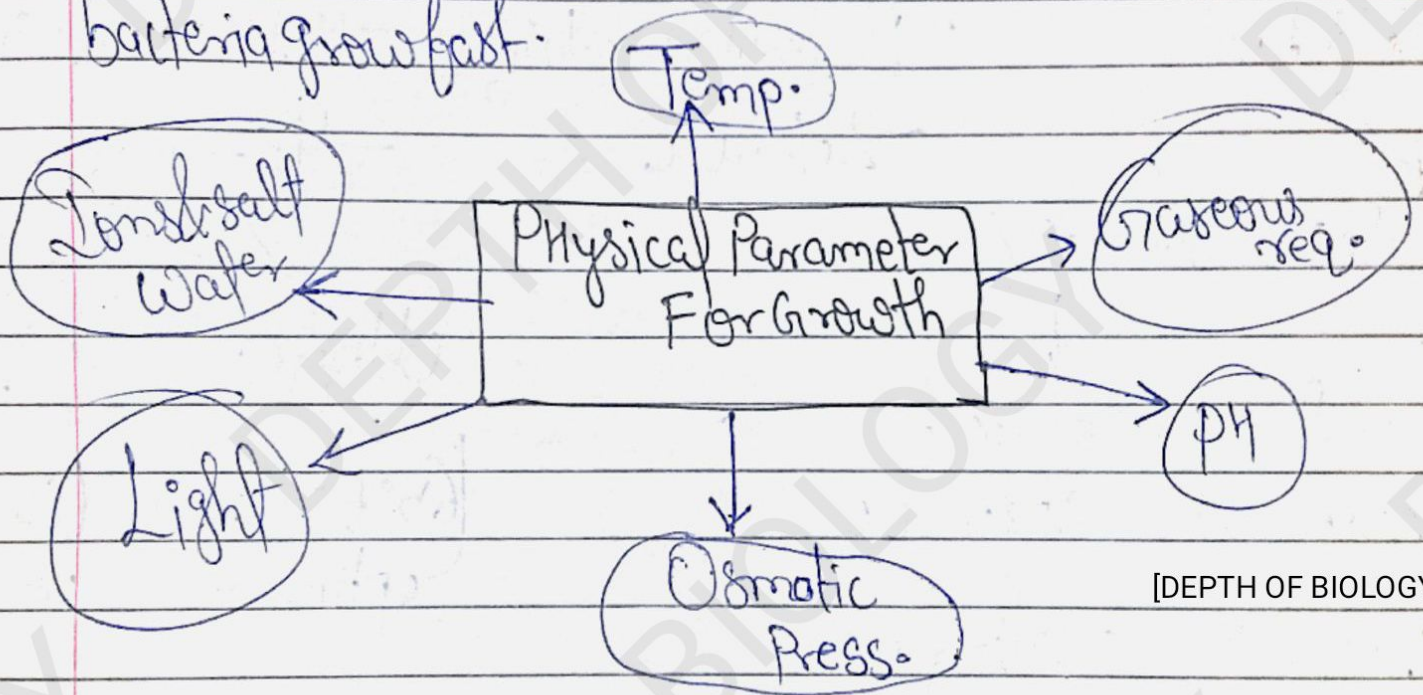


Physical Parameters for Growth of Bacteria

In addition to proper nutrients for the cultivation of bacteria

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it is also necessary to maintain physical environment in which bacteria grow fast.



[DEPTH OF BIOLOGY]

① Temp. \Rightarrow Most Imp. Physical parameter for Bacterial Growth.

① Optimal Growth Temp. \Rightarrow Temp. at which rate of multiplication or growth is most rapid.

② Minimum Growth Temp. \Rightarrow Refers to the min. Temp. / lowest Temp. at which bacteria grow.

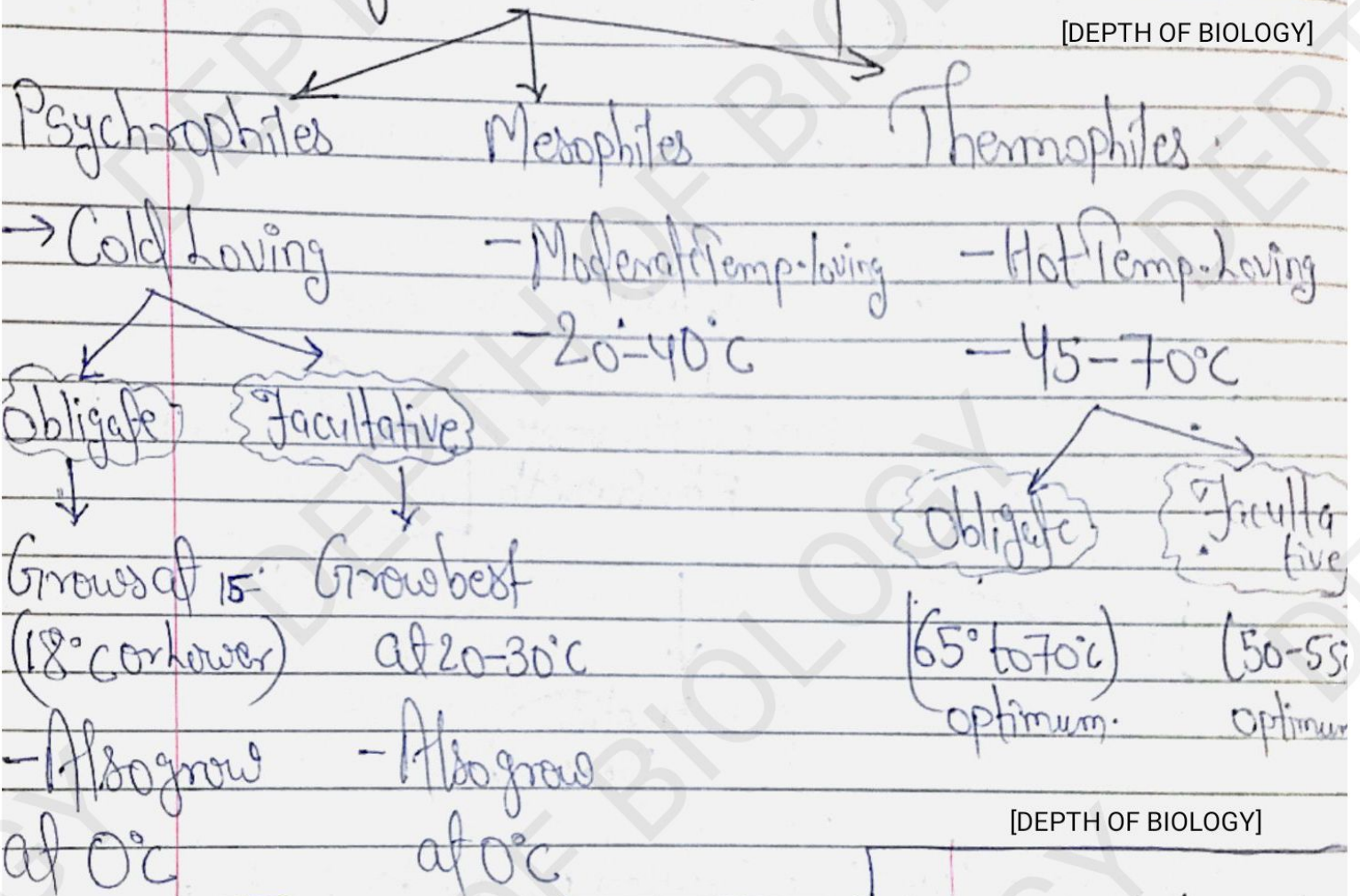
③ Maximum Growth Temp. \Rightarrow Refers to the highest Temp. at which bacteria grows.

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Bacteria May be Classified on the basis of Temp. Tolerance & its Influence on Bacterial Growth.

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Group	Min. Temp.	Optimum Temp.	Max. Temp.	Examples
1. Obligat Psychrophiles	0-5°C	10-15°C	20°C	Vibrio, Psychocorynebacterium
2. Facultative psychrophiles	0-5°C	25-30°C	35°C	Pseudomonas, Flavobacterium
3. Mesophiles	15-20°C	35-40°C	45°C	Corynebacterium, Diptheria
4. Facultative Thermophile	35-40°C	50-55°C	65°C	Streptococcus Thermophilus
5. Obligat Thermophile	50-55°C	65-70°C	80°C	Thermus Aquaticus

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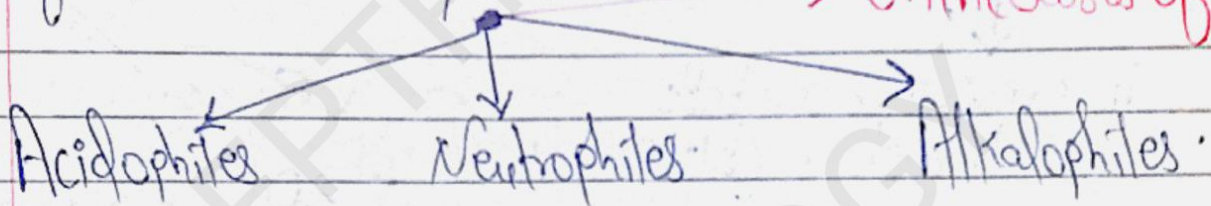
Date / /

② pH (Acidity or Alkalinity) \Rightarrow

Each Microbial species has definite pH range for growth & Multiplication.

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Optimum pH for Bacterial Growth is 6.5 to 7.5 & for Most of Bacteria it lies b/w 5-9. \rightarrow On the basis of ^{optimum} pH.



- Optimum pH range is to 6.5

- Grow in range of 6.5-7.5

- Grow optimum pH range b/w

eg \rightarrow E-coli

\rightarrow Salmonella typhi

7.5 to 14.

eg \rightarrow Agrobacterium

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③ Gaseous Requirement \Rightarrow

Optimum Gaseous environment is also essential for bacterial growth.

The Most Imp & Influencing Gases are CO₂ & Oxygen.

④ Oxygen \rightarrow

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The Need of Oxygen is for the req. of energy p.d.m.

Depending On Oxygen req. Bacteria is Classified into further Classes \Rightarrow

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(a) Aerobic Bacteria

(b) Anaerobic bacteria.

- req. O_2 for Growth.

Can grow when Incubate in air atmosphere (21% O_2)

eg \Rightarrow E-Coli

\rightarrow जरूरत ही होती है

Energy Pdm.

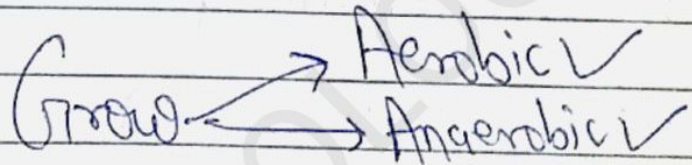
$\rightarrow O_2 \rightarrow$ Toxic है।

Air में ~~Grow~~.

(c) Facultative Anaerobe \Rightarrow

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जरूरत तो नहीं है O_2 की पर धा मिली तो मना नहीं करेगा।
for Energy Pdm.



(b) $CO_2 \Rightarrow$

All bacteria req. CO_2 for their Growth.

\rightarrow Some ^{Bacteria} req. More CO_2 for Growth Called Capnophilic Bacteria.

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④ Osmotic Press. \Rightarrow Bacteria are more tolerant to osmotic variation because of mechanical strength of the cell wall. They can grow in media with widely content of salts, sugars & other solutes. (सब चलेगा).

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— For survival & growth of Bacteria (environment) \rightarrow Isoosmotic environment
Same O. Press. Inside the Bacteria \leftarrow Mean cell.
[Isotonic].

⑤ Low/Salt/H₂O \Rightarrow [DEPTH OF BIOLOGY]

Bacteria requires Ionic environment for the growth which also balance the Osmotic Press.

— The Metal Ion such as K^+ , Ca^{++} , Mg^{++} , Fe^{++} , Zn^{++} , Cu^{++} etc. dissolved in H_2O ^{as a vehicle} with sugar & other subst. which are essential for Bacterial Growth.

[DEPTH OF BIOLOGY]

\Rightarrow Some bacteria like Archebacteria need high salt conc.



Date ___ / ___ / ___

⑥ Light ⇒

[DEPTH OF BIOLOGY]

★ Phototrophic bact^o must be exposed to source of Illumination

— Some bacteria need darkness for growth.

— Bacteria are sensitive to UV Light, Radiation, Direct light etc. (sterilization)

[DEPTH OF BIOLOGY]