

## Winogradsky Column

- ⇒ A model ecosystem that is used in the study of aquatic and sediment microorganisms, named after the Russian microbiologist "Sergei Winogradsky".
- ⇒ It promotes the development of photosynthetic bacterial populations that use  $\text{H}_2\text{S}$  as the electron donor in their photoautotrophic metabolism.
- ⇒ Winogradsky column — A microcosm in which microorganisms and nutrients interact over a vertical gradients, usually constructed using a glass graduated cylinder - illustrates many interactions and gradients that occur in aquatic environment.
- ⇒ Winogradsky column consists of mud or sediment placed within a glass or clear plastic cylinder.
- ⇒ The height of the column allows the development of an aerobic zones at the surface and microaerophilic and anoxic zones below the surface.
- ⇒ The column is exposed to light so that various photosynthetic populations develop at differing depths in the column.

### Methodology

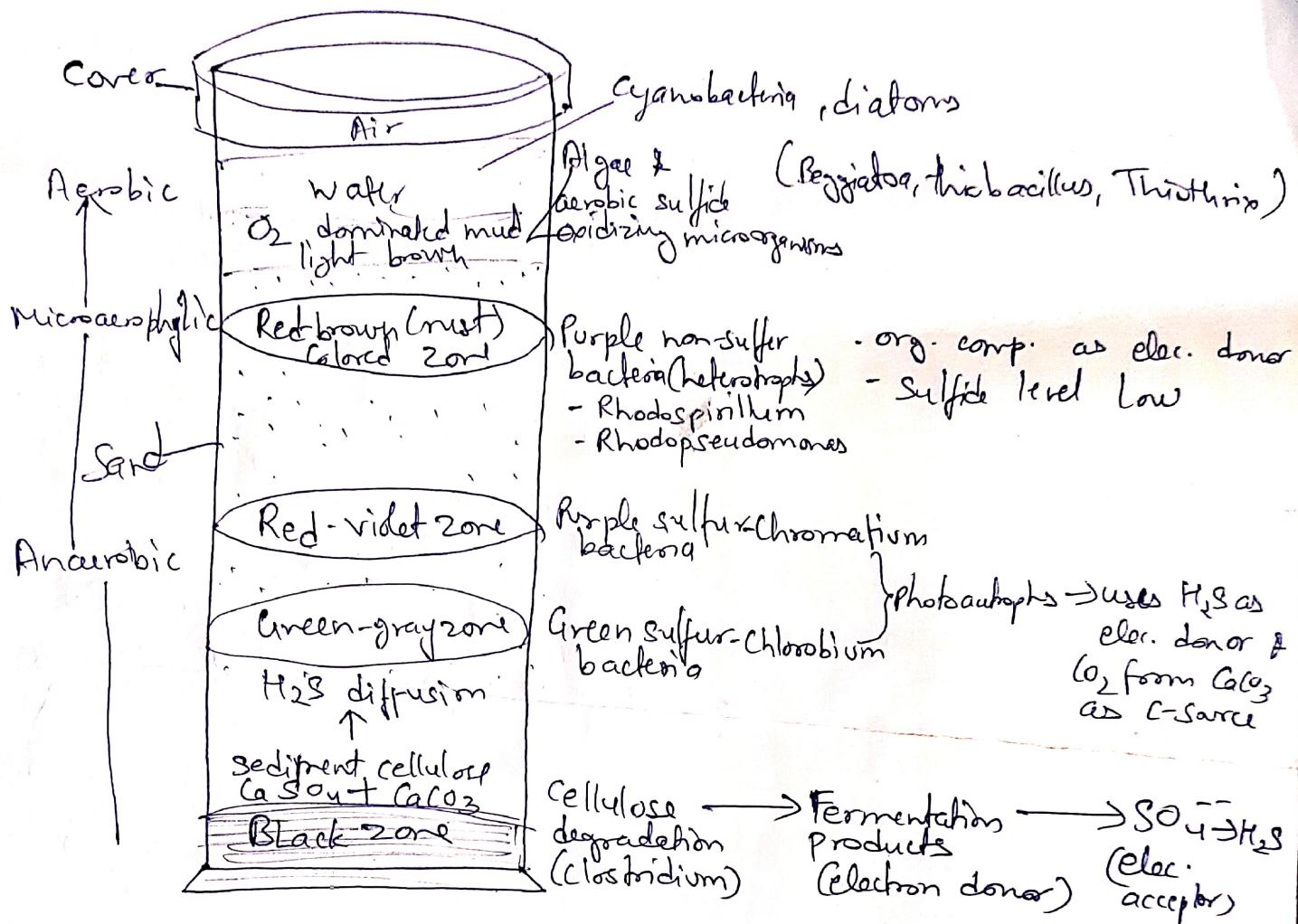
Take column of 1 lit capacity + Fill 1/3 with layer of sediment mud + 0.5%  $\text{Na}_2\text{SO}_4$  + 0.25%  $\text{Na}_2\text{CO}_3$  + shredded news paper (or  $\text{CaSO}_4$  +  $\text{CaCO}_3$ )



Additional mud(sand) and water to fill remaining height of column (2/3)

↓  
Cover with transparent film

↓  
Incubate in light



### Principle 1-

The column provides numerous gradients depending on additive nutrients from which a variety of org. can grow. Incubating the column in sunlight for months results in an aerobic/anaerobic gradient as well as a sulfide gradient. These two gradients promote the growth of different microorganisms such as Clostridium, Desulfovibrio, Chlorobium, chromatium, Rhodomicobium & Beggiaea as well as many other spp of bacteria, cyanobacteria and algal.

Observation! - Column was time to time observed for visible appearance of <sup>black</sup> green-gray, red-violet, rust, light brown zonation in column.

(One way to examine the biota of a developed Winogradsky column is to draw off layer by layer, the liquid above the sediment and examine by microscope the, algae, protozoa, cyanobacteria, Beggiatoa and so on associated with these layers.)

Merits - It is still an excellent tool to determine the major bacterial communities in a sample.

Demerits 1) not allow to see the densities or individual bacterial colonies.

2) take a long time to complete the cycle.

Object ~~To culture and observe~~ <sup>diversity</sup> large density of microorganism in a submerged ecosystem  
in W. column

Note! - In place of  $\text{Na}_2\text{CO}_3$  - Chalk can be used  
" " " "  $\text{Na}_2\text{SO}_4$  - Raw or hard boiled egg can be used.