Vaucheria

Q. Describe the structure and mode of reproduction in Vaucheria 1993.
Give a brief account of the life history of Vaucheria - 1992
Short notes on Sex organs of Vaucheria - 90

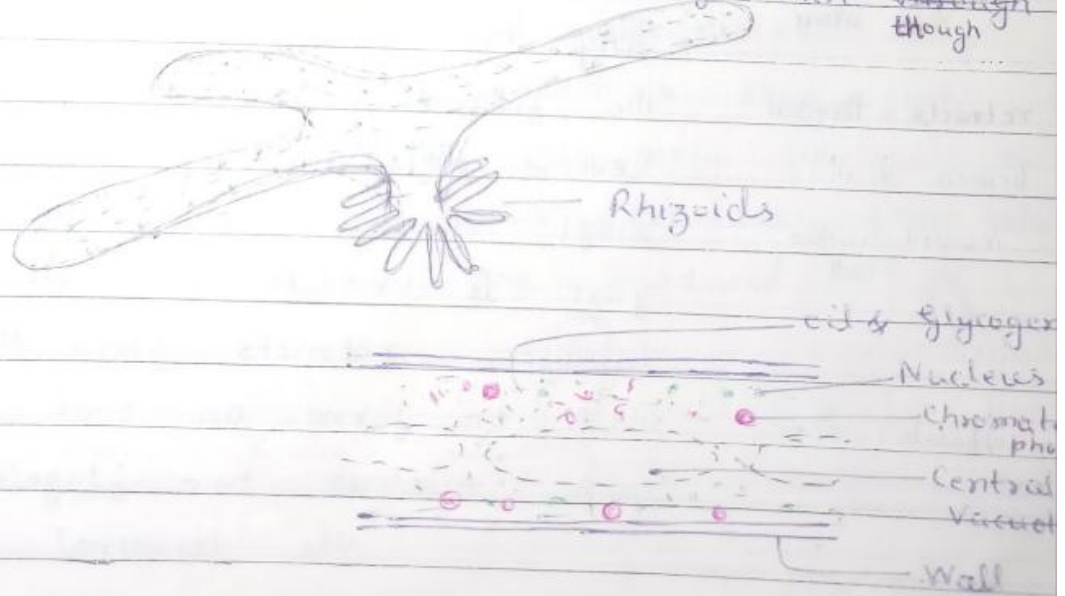
L.H. Vaucheria

→ Vaucheria - a yellow green alga, comprises 40 sps, either aquatic or terrestial.
belongs to

Class — Xanthophyceae
Order — Heterosiphonales
family — Vaucheriaceae.

Structure :- The thallus consists of branched, coenocytic unseptate and tubular filament. Attachment of the filament to the substratum is by a thapteron like structure provided with colourless branched outgrowths known as rhizoids. The septation takes place only at the time of the formation of sex organs or injury to plant.

The cell wall consists of two layers; inner cellulose and outer pectose. The cell wall is relatively thin though



often encrusted with lime. Numerous nuclei, discoid chloroplast without pyrenoids are scattered in the layer of cytoplasm between the wall and the central vacuole, that runs the whole length of the thallus without interruption. Oil forms the reserve food.

Reproduction :-

The reproduction takes place by vegetative, asexual and sexual methods.

Vegetative reproduction — By fragmentation only.

Asexual reproduction — It takes place by the following methods.

By compound multiflagellate zoospore —

The large multiflagellate zoospores, known as synzoospores or coenozoospores are singly formed in elongated, club-shaped zoosporangium cut off at the ends of the antilar thallus by cross wall. The branch tip bulges out forming a potential zoosporangium. A large number of nuclei and chloroplasts along with cytoplasm stream into swollen tip which is cut off by a cross wall differentiating the zoosporangium from the rest of the filament. The chloroplasts and nuclei reverse their position i.e. the chloroplasts shift inward and nuclei towards periphery just to beneath the cell wall. The protoplasts retracts from the zoosporangium wall to form an oval mass opposite to each nucleus two flagella are developed.

The terminal portion of the

Zoosporangium gelatinize to form a small pore for the liberation of the synzoospore which is multiflagellate, ovoid or elliptical. The zoospore moves but slowly through the water for 15-30 minutes before it comes to rest, withdraws its cilia and secretes a wall. Germination takes place immediately, during which the zoospore sends forth one to three tubular outgrowths which may elongate indefinitely, to produce an adult plant.

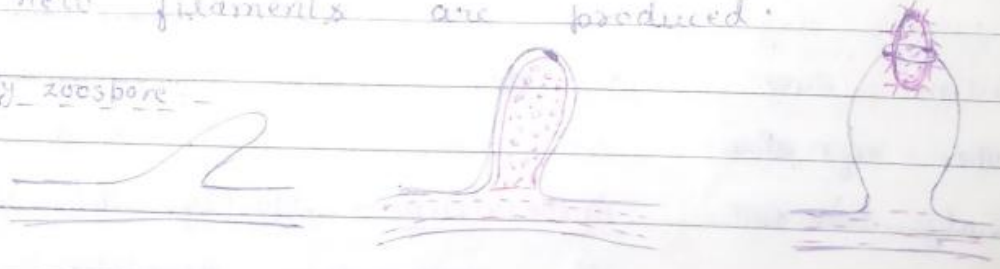
By aplanospore —

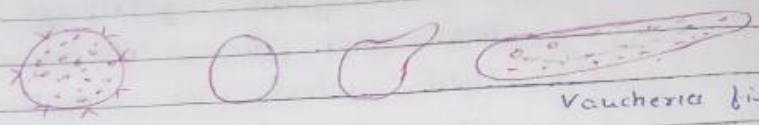
The aplanospores develop in dry conditions and especially in terrestrial form. Here the contents of an aplanosporangium develop into a non motile aplanospore which on the approach of favourable condition germinates after liberation or within the aplanosporangium producing tubular outgrowths.

By hypnospore and cyst —

In some terrestrial spp. if exposed to greater desiccation, the threads become septate and rows of cysts are formed giving rise to what is termed Gongrosira stage. Under favourable conditions these cysts germinate either into new filaments or into small amoeboid structures from which new filaments are produced.

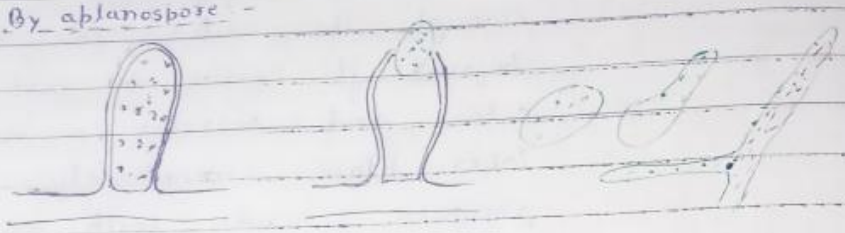
By zoospore —



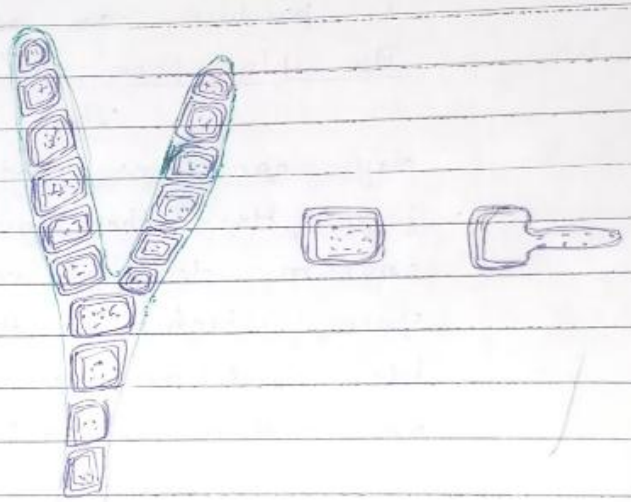


Vaucheria filament

By aplanospore -



By hypnospore -

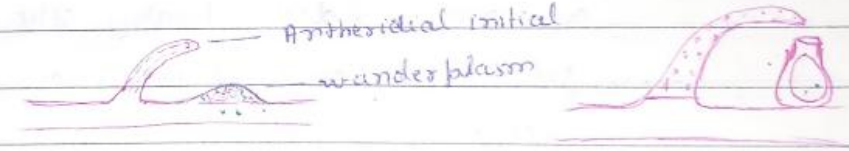


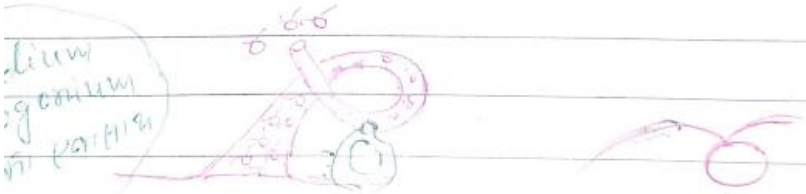
3> Sexual reproduction -

All sps of vaucheria rebroduce sexually. It is of rare occurrence in plants growing in flowing water. The fresh water or terrestial forms are monoecious where as the marine forms are dioecious. The male and the female gametes differ greatly in size, form and structure. They are produced in distinct cells called specialized sex organs - antheridium (male) and oogonium (female).

Antheridium - Mostly the sps are protandrous. The antheridia develops on the lateral branches

at their ends shortly before the formation of oogenia. The part of the thallus giving rise to antheridium possesses abundance of cytoplasm chloroplasts and nuclei. The antheridium is a slender, curved, hook like tubular structure which is walled off from the rest of the filament. During development of antherozoids, small portions of cytoplasm surround each nucleus, thus making small pear shaped bodies which aquire a pair of flagella. At maturity numerous small antherozoids are developed. Each antherozoid bears two laterally inserted unequal flagella- one being whiplash the other tinsel and consists of a nucleus and a small amount of cytoplasm surrounded by a membrane. The antherozoids are liberated through a terminal pore of the antheridium.





Oogonium

The oogonium appears as a globular outgrowth usually near an antheridium consisting of small mass of colourless multinucleate cytoplasm. This mass is called wanderplasm. It is separated from the rest of filament

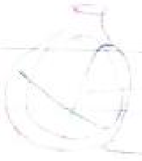
by septum. It is densely filled with oil and chromatophores but has a single nucleus at maturity. There are three views regarding uninucleate condition of the mature oogonium.

(I) The numerous nuclei in the oogonium fuse to form a single nucleus (Brebens, 1890).

(II) All but one of the nuclei migrate back to the vegetative filament before the formation of the transverse septum (Oltamanns 1895)

(III) Degeneration of all the nuclei (Supernumerary nuclei) but one in the oogonium (Davis 1904).

The entire protoplast of the oogonium forms a single large spherical ovum with a single centrally located nucleus and a colourless receptive spot, a one sided beak. The tip of the beak gelatinises and forms a pore opposite the receptive spot



egg

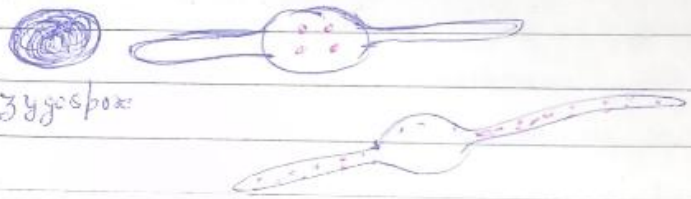
Fertilization

At maturity the beak opens slightly. through [illegible] several antherozoids [illegible] enter oogonium, swimming [illegible] of [illegible] eventually one [illegible] fuses with the nucleus of the egg resulting in the formation of oospore. The Karyogamy

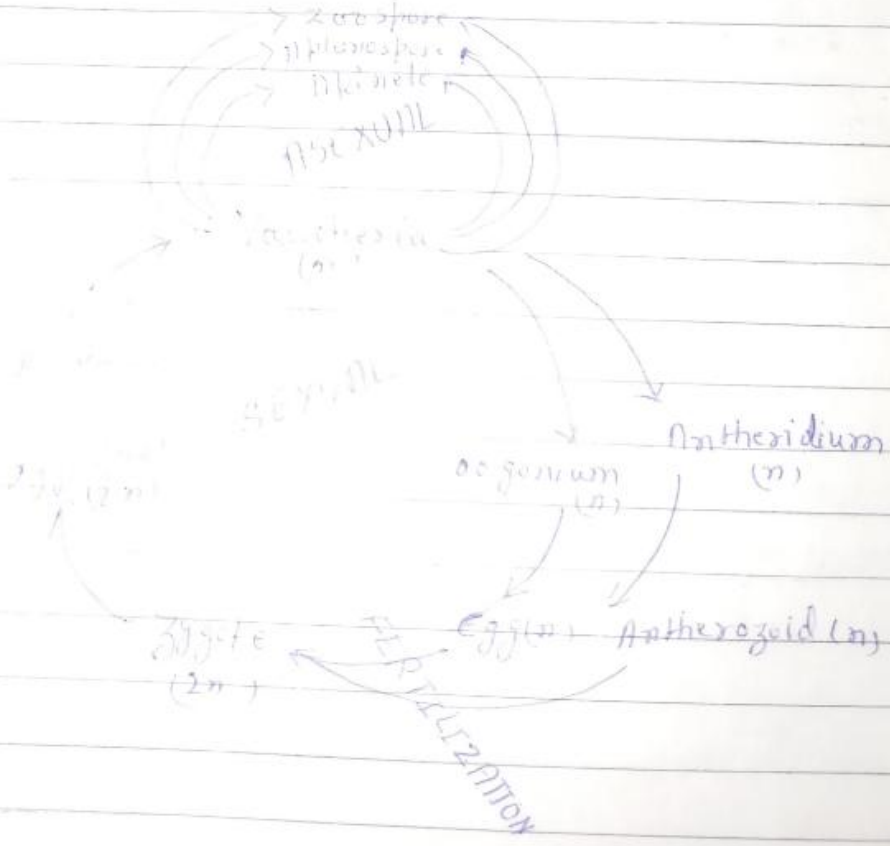
may be delayed. The oospore secretes a thick wall and passes into rest.

germination —

After the dormant period the oospore ~~goes~~ undergoes zygotic meiosis and germinates to give rise directly to the new haploid vaucheria filament. Mundie (1929) held that Vaucheria thallus is diploid and meiosis occurs at the time of gamete formation.



Graphic ~~&~~ life cycle —



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