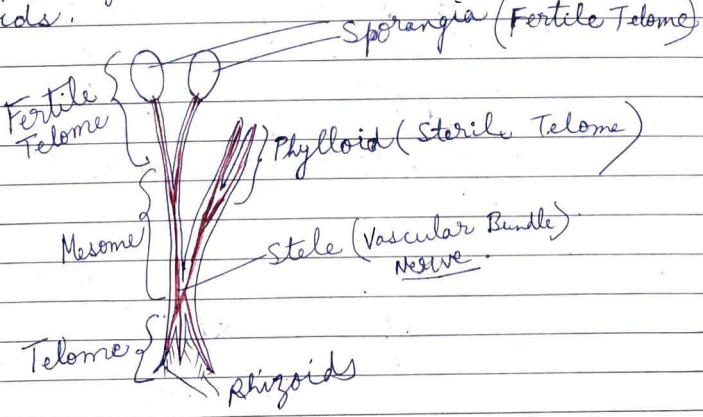
# TELOME THEORY.

Zimmerman explained origin of the vascular plants based on his Telome Theory. (1930, 1938, 1949).

Telome theory explains → the vascular plants with well differentiated roots, stem & leaves have evolved from simple primitive leafless & dichotomously branched plant like Rhynia made up of Telomes which in turn arose from green algae with dichotomously forked and radially symmetrical thallus.

Telome is a single nerved extreme or terminal portion of a dichotomously branched plant axis. Internodes below the telomes are termed Mesomes.

Upper telomes when fertile, bear the Sporangia. The sterile telomes do not bear Sporangia. Lower telomes bear rhizoids.



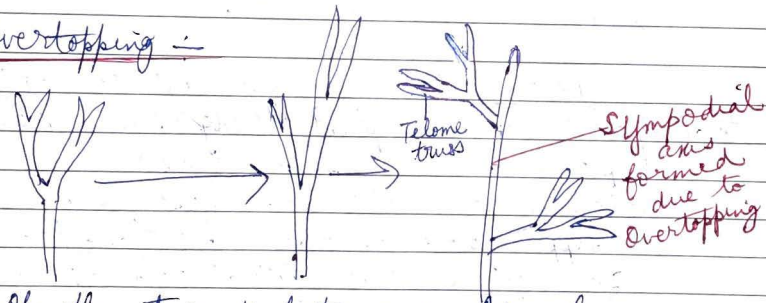

Syntelome structure of Rhynia

Telome theory holds that during evolutionary development shoot axis, leaves & change from dichotomous branching to Sympodial branching of higher vascular plants occured due to

ORGANO GENETIC PROCESSES like :-

1.) Overtopping (2.) Planation
3.) Syngenesis (webbing)
4.) Reduction (5.) Curvation.

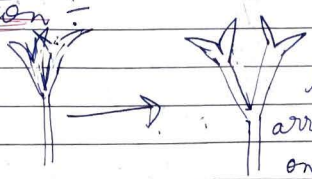
1.) Overtopping :-




Of the two dichotomous branches, one becomes stronger & erect while the weaker branch was pushed aside.

This process was repeated at every dichotomy & it resulted in an axis with lateral branches & leaves.

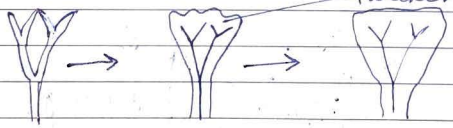
2.) Planation :-



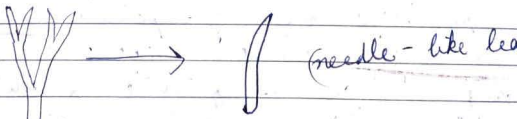
Due to Planation, the telomes & mesomes arrange themselves on the same plane.

3.) Syngenesis or Webbing — resulted in the fusion of telomes & mesomes due to the development of parenchymatous & photosynthetic tissues between them. Syngenesis lead to the formation of (a.) leaf with open dichotomous venation

b.) leaf with pinnate venation
c.) leaf with reticulate venation
d.) Complex stele in stem
e.) origin of Megaphyllous leaves



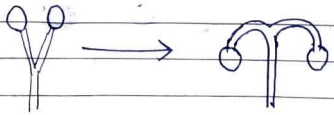

4) Reduction —




Microphyllous leaves of Lycopods & Sphenopsida evolved by simplification or reduction of telome trusses.

5.) Curvation : is of two types :

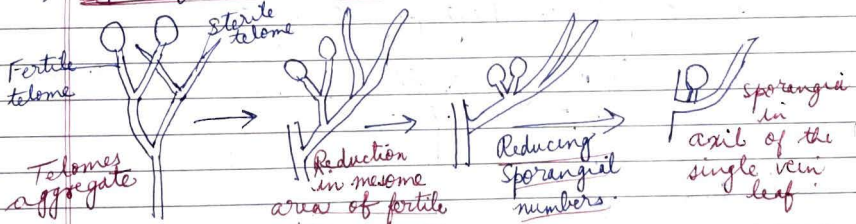
a) Recurvation — Sporangia bend downwards as in Sphenopsida.



b.) Incurvation – Sporangia of the leaf shift downwards from terminal position to the ventral surface of the leaf. eg in ferns.

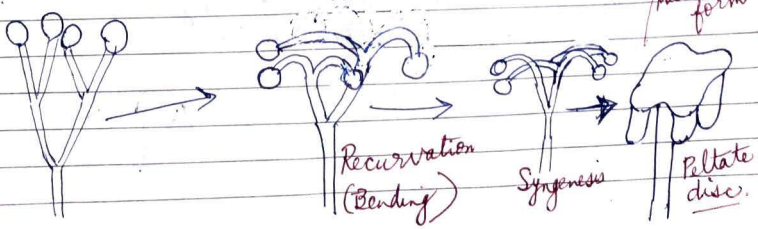
Telome theory explains the Origin of Sporophyll & Sporangia in
a.) Lycopsida (b.) Sphenopsida (c.) Pteropsida (Filicopsida)

a.) Sporangia in Lycopsida (eg Lycopodium, Selaginella)




Members of Lycopsida have axillary Sporangia which evolved due these steps :-
1.) Aggregation of fertile & sterile telome.
2.) Reduction of intermediary mesomes & reducing the sporangial numbers.
3.) This process evolved one single veined leaf with an axillary sporangium.

b.) Origin of Sporangia in Sphenopsida

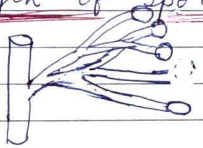


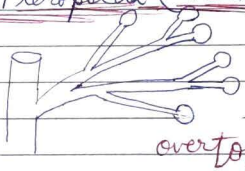
In Sphenopsida, elementary processes like recurvation & Syngenesis led to form peltate Sporangiophores.

Downward bending of sporangia was due to recurvation. This was followed by fusion & flattening (expansion) of several fertile telome & mesomes to form peltate disc.

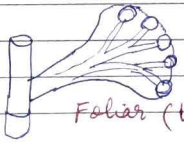
eg. Equisetum.

C) Origin of sporangia in Pteropsida (Ferns).





overtopping



Foliar (webbing)

incurvation — Sporangia on ventral surface of sporophylls.

Megaphyllous sporophylls of ferns were evolved as a result of elementary processes like Overtopping, Reduction, Foliar webbing & Incurvation.

① Overtopping produced Pinnate sporophylls (compound leaf).

② Mesomes when fused laterally with each other formed pinnately veined sporophylls with grouped marginal sporangia.

This group of sporangia converted into Sori.

③ Later due to incurvation the marginal

Sporangia shifted towards the lower surface of the Sporophylls as seen in Ferns.

⊙ A further incurvation led to form various types of Ovaries in Angiosperms.