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**B.Sc. PART- I
PAPER- II**

(i) TELOME THEORY

Paper - I

Telome Theory

Telome [Telos: End] → "Telome is the single nerved, simple ultimate terminal portions or extreme portions (at base or apex) of a dichotomously branched axis."

Discovery

Telome theory was first proposed by German paleobotanist Walter Zimmermann in his 1930 book entitled "Die Phylogenie der Pflanzen".

The telome theory was preceded by similar ideas expressed by Bowyer, Signier and Potonie who explained the uniformity of the plant body. Signier explained the plant body of primitive land plants as a dichotomously branching system of cylindrical cauloids which bore leaf like appendages (phylloids) and the absorbing rhizoids.

Types of Telomes

On the basis of function telomes are of two types -

- (A) Vegetative or Sterile Telome - These telomes are without sporangia and are also called phylloids.

⑤ Fertile Telomes → Those telomes which bear terminal sporangia are called fertile telomes. ②

Sporophytic plant is a single fertile telome terminating in a sporangium above and the foot below.

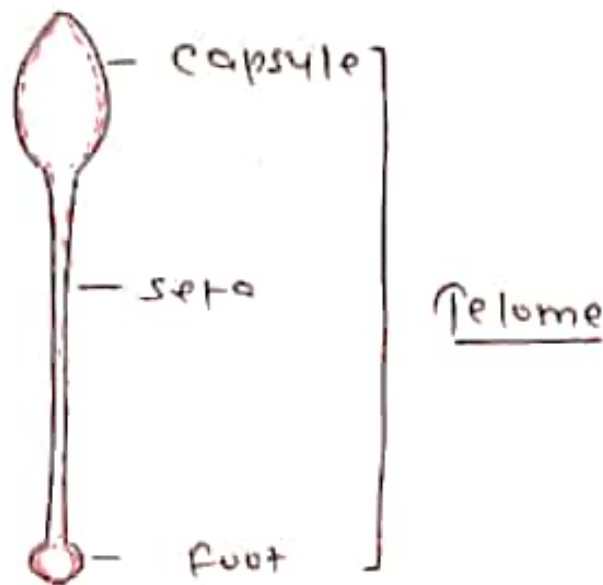


Figure - The single telome Bryophyte sporophyte

In pteridophytes (psilophytales) it is a syntelome developed by growth of the telome. The telome divides dichotomously and as it grows the new segments become new telomes and the older segments below are termed as mesomes. Thus the plant body is now termed of mesomes terminating in telomes above and below. The lower telomes bear rhizoids and upper telomes may be fertile bearing sporangia or be leaf like phylloids.

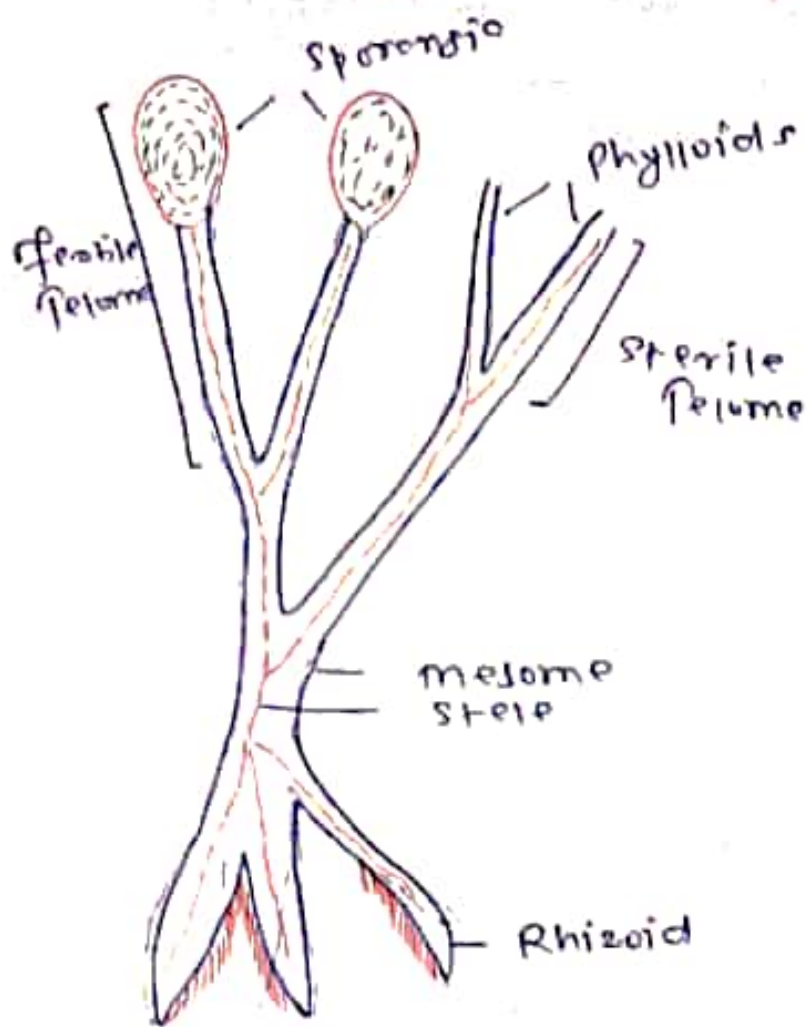


Figure - The syntelome structure of Rhynioid (Redrawn after Zimmermann)

Concept of Telome Theory

Based on telome theory

Zimmermann pictures the origin and evolution of land plants in this way

- ① The ancestors of land plants were green algae which live in the tidal waters of Cambrian and Silurian sea coasts. They had isomorphic alternation of generations.
- ② The psilophyton plant body was evolved out of the algae by the evolution of heteromorphic alternation of generations in which the two generations were independent of one another.

The Apophytic plant body (4) consisted of telomes (fertile and sterile) and mesomes (motor telomes). This symtelome later differentiated into stem, leaf and root.

(a) Bryophytes arose independently out of alga at a later time, probably Devonian. The sporophyte became parasitically dependent on the gametophyte and was reduced to a single telome.

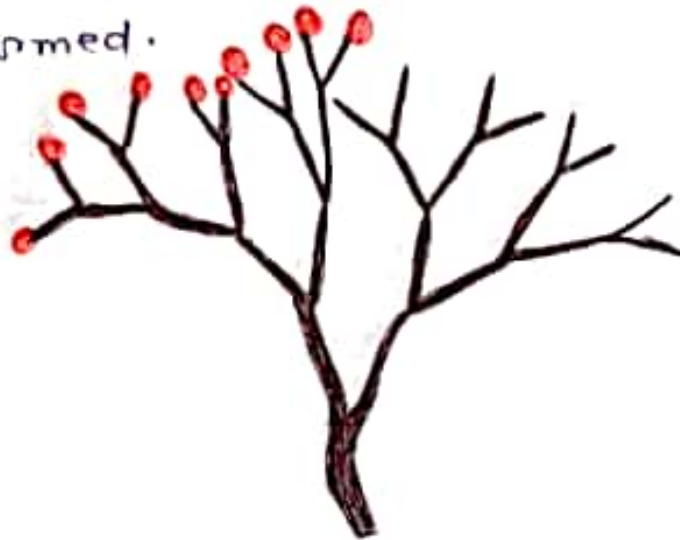
Process of Telome Theory

According to Zimmermann, these telomes or telome trusses of primitive Rhynia type of vascular plants have been subjected to certain evolutionary processes in varying degrees among the various taxonomic groups. These evolutionary processes are -

(1) **Overtopping** → In this process one of the two usually equal dichotomies from the telome one become stronger and erect becoming the axis which grew further while the other remained over topped as a short lateral branch. This axis there fore is sympodial.



- ② **Plantation** → The sympodial axis is liable to give rise to groups of telomes or telome truss of short lateral branches. These branching is radial. Now all such branches grow on the same plane by plantation so that a flat structure with fan like telome is formed.



- ③ **Syngenesi or webbing** → Fusion of telomes of such a telome truss by the development of connecting tissue as in the foot of a ^{swan} is called syngenesi or webbing. webbing results

In large megaphyllous leaves as found in ferns and higher plants.



④ **Reduction** - In this process the activity of terminal meristem of each telome of the frond becomes suppressed resulting into much shorter branches by decreasing the length of telomes and mesomes. This process is responsible for the formation of microphyllous leaves of the *Lycopodi* and *Sphenopsida* as well as the needle-like leaves of conifers.



⑤ **Curvation** - This evolutionary process is caused due to the unequal growth of the tissues on two opposite flanks of the telome.

Curvation has two sub processes ⑦

i) Recurvation - In this process the telome bends inward toward an axis. The inward projecting sporangia on a sporangiophore of *Equisetum* (Sphenopsida) is the result of this sub-process.



ii) Incurvation - In this sub-process, the fertile telome bends downward resulting in a downward shifting of the sporangia from terminal to the ventral surface of the leaf. This sub-process is responsible for the formation of ventral position of the sporangia in fern (pteropsida) leaf.

Significance of telome theory

i) The telome theory portrays the origin and evolution of the sporophytes in the

earliest known plants.

⑧

↳ The theory is based mostly on account of the comparative study of the fossil as well as living genera of the vascular plants. It actually explains the phylogenetic relationship between the fossil and the living plants.

⇒ The elementary processes give a unified concept of the manner in which evolution might have proceeded in the land plants.

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