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External Structure of Rhynia:

The plants of Rhynia were herbaceous. R. major was 50 cm. in height and 1.5 to 6 mm in diameter whereas R. gwynne-vaughani was only about 20 cm. in height and 1 to 3 mm in diameter.

The plant body was differentiated into a subterranean rhizome with an abruptly turned upright photosynthetic aerial shoots. Roots were absent but at places rhizome was provided with tufts of unicellular rhizoids (Fig. 1 A, B). The aerial shoots were cylindrical and leafless with a tapering dichotomously branched system.

In R. major the aerial shoots were smooth (Fig 1 A) but in case of R. gwynne-vaughani many adventitious branches were present on the aerial shoots as well as rhizome (Fig. 1 B). These branches perhaps help in vegetative propagation.

The tip of the aerial branch usually bears a solitary terminal sporangium which was about 12 mm in length and about 4 mm in diameter.

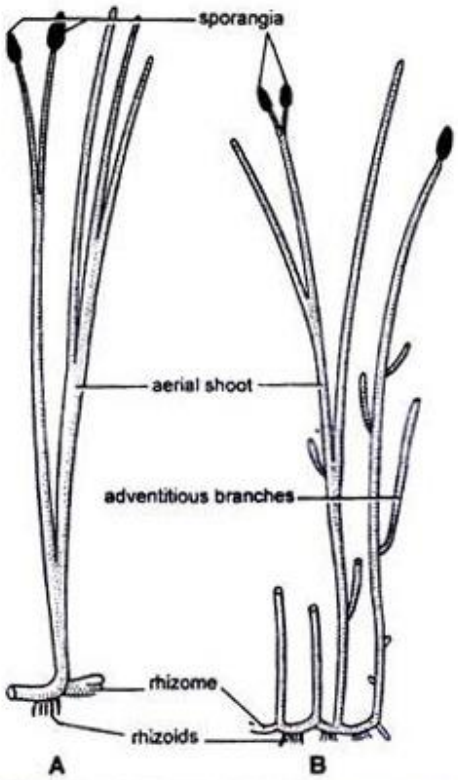

Fig. 1 (A–B). *Rhynia.* External features. A. *R. major*, B. *R. gwynne-vaughani*

Internal Structure of Rhynia:

Transverse section (T.S.) of Aerial shoot and Rhizome:

Anatomically, the aerial shoots and rhizome are almost similar. T. S. of aerial shoot can be differentiated into three parts: epidermis, cortex and stele (Fig. 2 A).

(a) Epidermis:

It was the outer-most surrounding layer. It was one cell thick and covered by thin cuticle. In aerial shoots it was interrupted at certain places by stomata but stomata (Fig. 2 B) were absent in rhizome.

(b) Cortex:

Epidermis was followed by cortex. It is differentiated into outer cortex and inner cortex. The outer cortex was only 1-4 cells thick, thin walled and without

intercellular spaces. The inner cortex had large intercellular spaces and its cells had chloroplast. It is thought that this was the chief photosynthetic region of the plant. The endodermis and pericycle layers were absent.

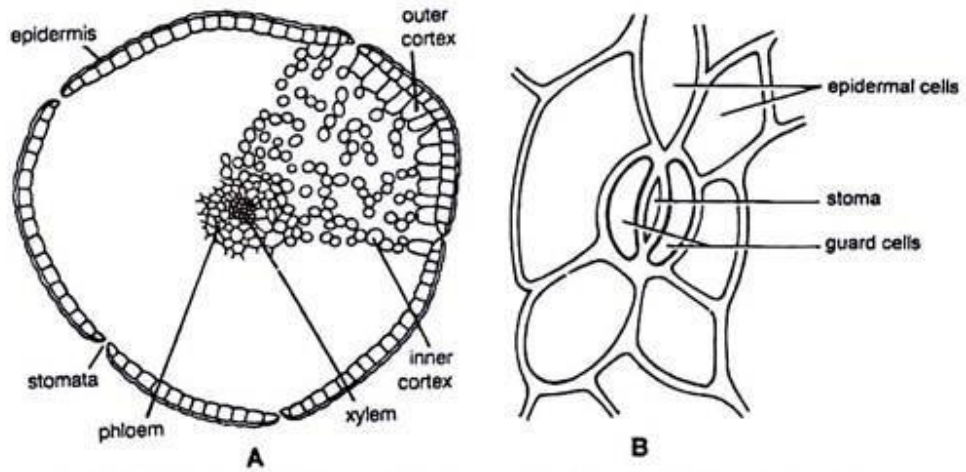

Fig. 2 (A–B). Rhynia. Internal Structure : A. T. S. of aerial shoot, B. a stoma

Stele:

The centre of the aerial shoot/rhizome was occupied by stele. The stele was a protostele (haplostele). The xylem was made up of annular tracheids and there were no sieve plates in phloem.

Reproductive Structures of Rhynia:

The sporangia were borne singly on the apices of some aerial branches, each sporangium being oval or slightly cylindrical structure with a little greater diameter than that of aerial branch on which it is developed. They were 12 mm long and 4 mm in breadth in R. major and 4 mm long and 1 mm broad in R. gwynne-vaughani.

A longitudinal section (L.S.) of sporangium shows that it had a five cells thick wall. The outermost layer was 1 cell thick cuticularized epidermis. It was followed by 3 cells thick middle layers of thin walled cells.

The inner-most layer was 1 cell thick tapetum. The wall was surrounding a spacious sporangial cavity which was without columella and contained large number of spores. The spores were of same size and measured upto 60 μ in diameter.

It means that Rhynia was homosporous. In many specimens the sporangium contained tetrahedral tetrads of spores (Fig. 3 B, C) which suggest that they were formed by reduction division and the plant bearing them represented the sporophytic generation.

There was no special mechanism of sporangium dehiscence. The liberation of spores seems to have taken place by disintegration of the sporangial wall. Nothing definite about the gametophyte of Rhynia is known.

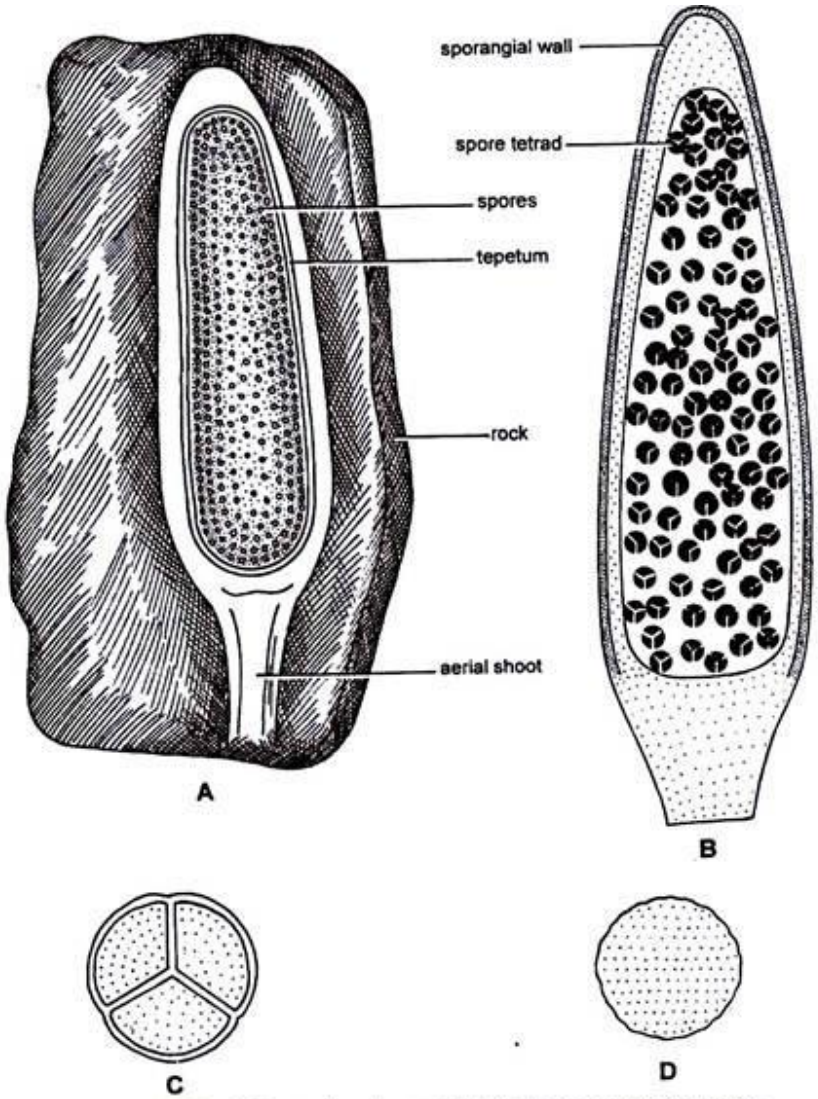

Fig. 3 (A–D) *Rhynia*. Sporangia and spores A. L. S. of sporangium of *R. major*, B. L.S. of sporangium of *R. gwynne-vaughani*, C. Sporetetrad, D. Spore