



Lignification and mycorrhization in Devonian-Carboniferous times. Studies on French material.

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One of the most important events in the history of Life is the colonisation of the land by plants; the earliest steps occurred about 460 million years ago. A few million years later, during the Devonian period, plants became more and more abundant. Tracheophytes evolved from small dichotomous axes with terminal sporangia to plants reaching 40 m in height. The evolution of large erect plants with tree-habit was achieved by the Pseudosporochnales (Monilophytes) during the Middle Devonian and the Archaeopteridales (Lignophytes) at the end of the Devonian. We describe here a possible early representative of the Lignophytes from the Lower Devonian from the Chateaupanne quarry (Anjou, Armorican massif, France). Pyritized axes show well-preserved anatomy. The primary xylem is centrarch or mesarch and is circular in transverse section. It is surrounded by a zone of radially aligned cells that is interpreted as a simple secondary xylem. Both primary and secondary (?) xylems comprise P-type tracheids.

The link with symbiotic fungi goes back to the dawn of the land plants. The evidence of paramycorrhizae occurring in the prostrate axes of *Aglaophyton* major from the Rhynie Chert dated to the early Devonian. *Aglaophyton* however did not possess tracheids that characterize the tracheophytes. By Late Devonian and Carboniferous times, various rooting structures had evolved in tracheophytes. Our reinvestigation of historical thin sections from silicified material from the Late Pennsylvanian of Grand' Croix (Central massif, France) provides evidence for the mycorrhizal status of *Radiculites*-type Cordaitalean rootlets. These rootlets are characterized by a cortical reticulum of cell wall thickenings named phi-thickenings. This lignified reticulum is an important feature used to distinguish Cordaitalean rootlets from underground parts of other plants. As a result, our study demonstrates the oldest evidence for mycorrhizal association in the conifer clade.