

## CALAMITALES THE EXTINCT LINES OF THE SPHENOPSIDA EVOLUTION

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### ABSTRACT

Pteridophytes are plant with the sporophytic life of the pattern, prior to the pteridophytes the life cycle pattern was the gametophytic (in bryophytes), the sporophytic body is divided in to the roots, stem and the leaves, reproduction occurs by the sporangium. Homospory and the Heterospory is the prominent feature of the reproduction of the pteridophytes. Archegonia and the antheridia are in reduces in sizes as they are in the highest of the development of the bryophytes. All pteridophytes have the heteromorphoic alternation of the generation.

Pteridophytes have been divided in to the four of the classes. These are enlisted as the psilophytopsida, Lycopsida, sphenopsida, pteropsida lines of the evolution, here in this review articles we are presenting some of the features of the *class sphenopsida, the extinct orders calamitales*, they were very abundant in the upper Devonian period and they forms the large forest and ecosystem, in these plants Sporophytic body is divided in to the roots, stem and leaves. The leaves are whorled in organization. The stele was protosteletic and medullated. Sporangia was thick walled and the sporoangiphores are arranged in the thick walled peltate sporangiophores. Antherozoids were multiflagellate, this group reached its highest approximation in the upper carboniferous time period, they formed the giant forest in the carboniferous with the lepidodendrales. Rapid declines occurs in the vegetation during the Permian period.

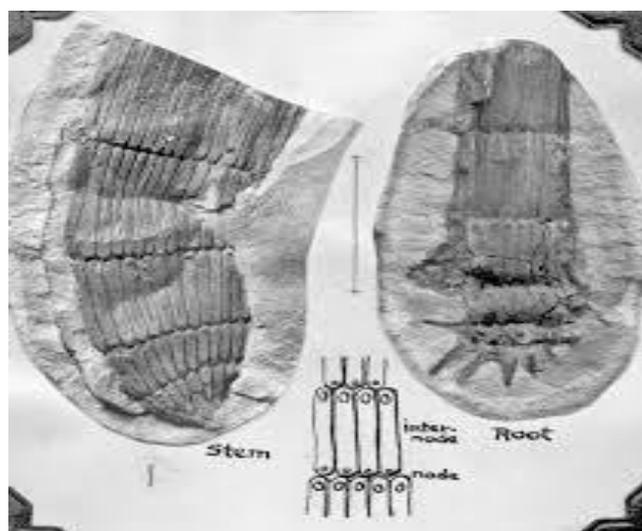
**KEYWORDS:** Sphenopsida, Multiflagealltes, Peltate sporangiophores, carboniferous s period, Heteromorphoic alternation of the generation.

### INTRODUCTION

Pteridophyte are the remarkable in the plant world, they flourish well in the upper Devonian and they were abundant in the upper carboniferous time period. Together with the giant horse

tails and the lepidodendrales they favours the large forest, these forest have been found in the form of the petrification and the petrified forest. In today world they are restricted to the very limited places in the world as well as in the India, like in India they are restricted to the Himalayas and the uttrakhand region, majority of the species are extinct in the lien of the evolution, they are endemic in the particular places.<sup>[1][2][3]</sup> The main sporophytic body is the sporophytes, they are divided in to the root, shoots and the leaves, they main plant body is the sporophytic and they have the sporangium, male and the female sporangium are different and the heterospory is the main features of the evolution of the reproduction of the pteridophytes. sex reproduction occurs by the archegonia and the anthredium, the sizes of the sex organs are very low and they are at the retrogressive evolution. The approximation of the sizes of the sex organs have not been seen in these groups as these features are very abundant the bryophytes. Gametophytes of the Pteridophytes are autotrophic, it may be heterotrophic and they may be in sizes from the small to the large but the large gametohpytes of the bryophytes have not been seen in the pteridophytic groups as in the bryophytes they are large and autotrophic. The gametophytic generation in the bryophytes are thalloid and leafy but in the pteridophytes they are thalloids.

There is some very significant difference from the gymnosperms, as they lack the typical cones organization from the gymnosperms woody cones.



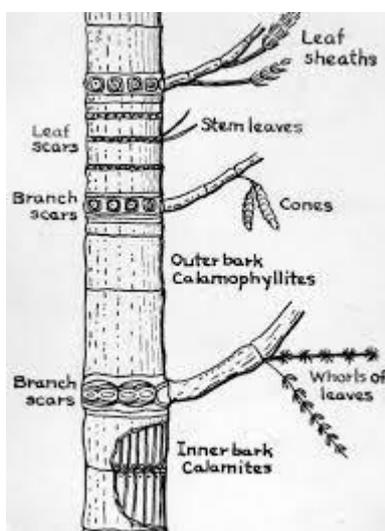
**Figure 1: Calamitales fossil stem (sources George basement).**

Sporophytic plant body is very large and arborescent in the gymnosperms but it is completely absent in the pteridophytes, pteridophytes are homosporous and heterosporous whereas they all gymnosperms are heterosporous. Gymnosperms are the seed plants whereas the pteridophytes

lack the development of the seeds. The vascular system in the pteridophytes consists of the steles of the various kinds whereas in the case of the gymnosperm typical vascular system has been observed, from the angiosperm of course one can find the basic and the major differences.

Pteridophytes have been divided into the four of the classes, these are enlisted as the Psilophytopsida, Lycopsidea, Sphenopsida and the Pteropsida.

Here in this review articles we are representing some of the aspects of the fossil Calamitales of the pteridophytes, which belongs to the categories of the Sphenopsida.



**Figure 2: Calamites stem reconstruction (sources: Fossil era. com).**

Members of the Sphenopsida are termed as the horsetails, because of the crowded secondary branching arises from the stem and it is of the very dense kinds. The Sphenopsida includes the living as well as the fossil pteridophytes, they flourished well in the Devonian period, the only *living* representatives of the sphenopsida is the Equisetum.

The sporophytic body consists of the joint axes; they are divided into the nodes and the internodes, the leaves are extremely reduced they are termed as the Microphylls, the phyllotaxy is whorled.

The whole of the Sphenopsida are divided into the four of the orders,

- 1) Hyeniales
- 2) Sphenophylloales
- 3) Calamitales

## 4) Equisetales.

Calamitales reached the highest developments in the Upper Carboniferous time period. In the fossil deposition of the coals forest large and the dominant vegetation has been seen, they were together with the large giant forest of the Lepidodendrales.

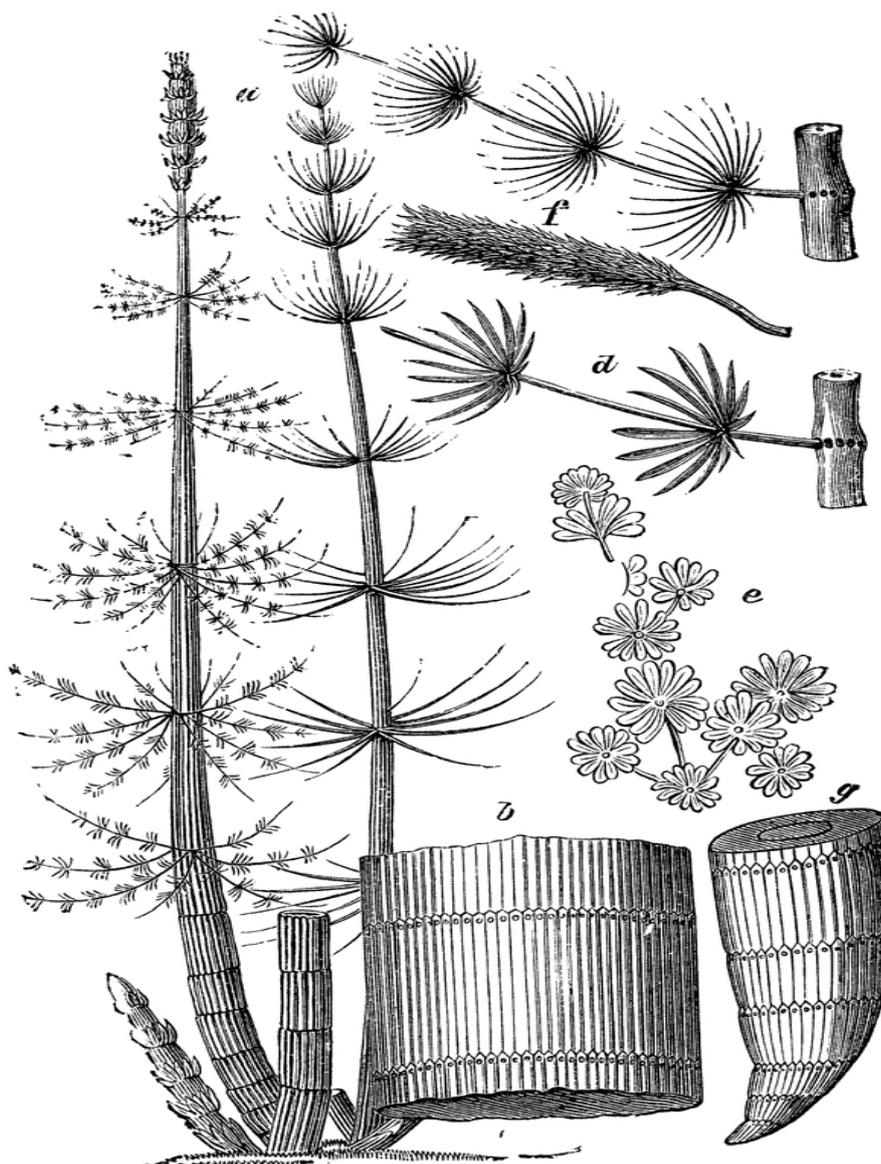
At the end of the Permian whole of the forest of the giant calamitales were at the junction of the extinction. at the beginning of the Devonian period the calamites lappers in the form of the *Asterocalamitaceae*. *Asterocalamites* was the main representatives of the *Asterocalamitaceae*.

From the Pettcyur of the Scotland the earliest representatives of the calamitales, *Protocalamites* has been reported. Theses fossil vegetation has been reported from the lower carboniferous time period. In the anatomy of the stem, the ridges were alternating with the furrows of the stem.

Transverse section of the wood of the protoacalamites of shows the centripetal and the centrifugal wood.

*Protocalamites* is the name given to the petrified stem of the of the precalamitales of the calamites, they were described by the Walton, they were discovered by the island of warren from the upper carboniferous period. In the report it has been reported that the cones were dropped from the main branches of the calamites stem and they were twice branches. In this respect theses plants were totally different from the rest of the plants of the calamitales.

Due to the lack of the imperfect petrification and the other fossil means the has exact height of the stem of the calamite has not been reported, it is assumed that the height of the stem is about the 30 meter and the diameters of the stem was also of the 30-40 cm in height.



**Figure 3: Calamites world (sources etc. usf.edu).**

The names of the calamites should be to the pith cast or strictly to the stem of the calamites not for the other parts of the plants, the transverse section of the stem consists of the alternating ridges and the grooves, the protoxylem stands are in front of the successive nodes, The leaves are unbranched with the single mid vein; the leaves of the calamites are consisting of the whorl of the 4 to the 20.

In most of the species they are free from the base but in some of the species is they are fused.

There cones are formed in the variety of the forms, in some species they are single at the nodes but in the other species they are borned in the group. In majesty of the genera the sporangial are peltate and they have the two or three sporangium at the bases. The

sporangiophores are in alternating whorls, they alternate with the bracts in the successive rings.

*Calamostachyites banayana* is a cone with the 3.5 cm long, 7.5 cm long wide, and they had six sporangiophores in the whorls, They are totally different from the rest of the genera, in one of them they are at the 90 degree angle and in other genera they are at the 45 degree angle.'

## CONCLUSION

Well this is the short review articles of calamitales we are depicting presenting some of the aspects of the calamites, here we present some of the cones as well as the sporangiophores, Some of the anatomy of the fossil stem of the calamites also has been proposed. Calamites are the fossil lines of the changing land habitat. They represent the tremendous evolution of the lost sphenopsida world. They formed the giant world and the ecosystem in the upper Devonian and the carboniferous time period. They were codominant with the large fossil lepidodendrales. The anatomy was the great adaptation towards the harsh change habitat from the aquatic to the land habitat. Later on the peltate sporangia shows the adaptation towards the protection of the Megaspore from the random conditions of the nature, environment. These valuable cladistic lines of the evolution lost in the upper Permian, these forest has been found in the fossil remains of the coal swamps of the various countries. They represent the early lines of the valuable of the fascinating ecosystem of that era. By study of this world one can trace out the evolution of the lost world.

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