

# Topic: Calamites

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## Systematic position

Division – Calamophyta

Class – Calamopsida

Order – Calamitales

Family – Calamitaceae

Genus – *Calamites*

The *Calamites* are a fossils genus of palaenozoic era which included an assembly of giant horse tail like terrestrial plants. The name *Calamites* is due to Sukow (1784) who used it for pith cast. The genus recognized several genera on the basis of stem, leaf, root and strobilus.

The sporophyte plant known mainly from cast were mostly trees attaining a height of 20-30 metres, although a few of them might have been smaller shrubs.

The plants had horizontal rhizomes differentiated into nodes and internodes with whorl of adventitious roots at each node. They had also secondary growth.

## External Features of Calamites

The *Calamitean* fossils range from pith casts, stems, twigs and leaves to strobili. The stem is known as Calamities, leafy twigs are called Annularia, and fructification is known as Calamostachys.

The plant body of Calamites was a tall tree growing to a height of 20-30 metres.

The plant had an underground prostrate rhizome. The rhizome was differentiated into nodes and internodes and had a whorl of adventitious roots at each node. From the upper surface of the rhizome arose a number of aerial shoots.

Some of these aerial shoots produced roots at some of the lower nodes, indicating that rhizome grew at some distance below the surface of the soil. Erect shoots were constricted at the point of their junction to the rhizome.

The branching was conspicuous in the aerial shoots which had whorls of branches at the nodal region.

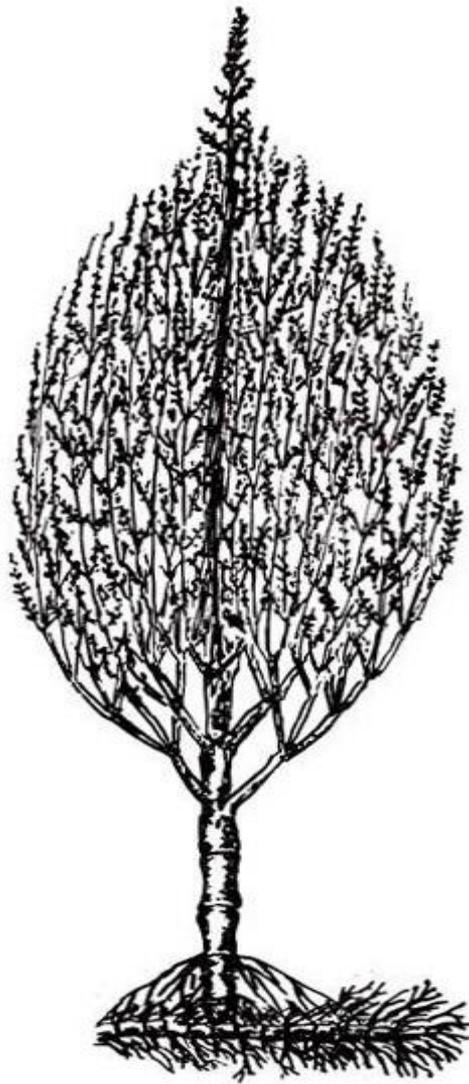


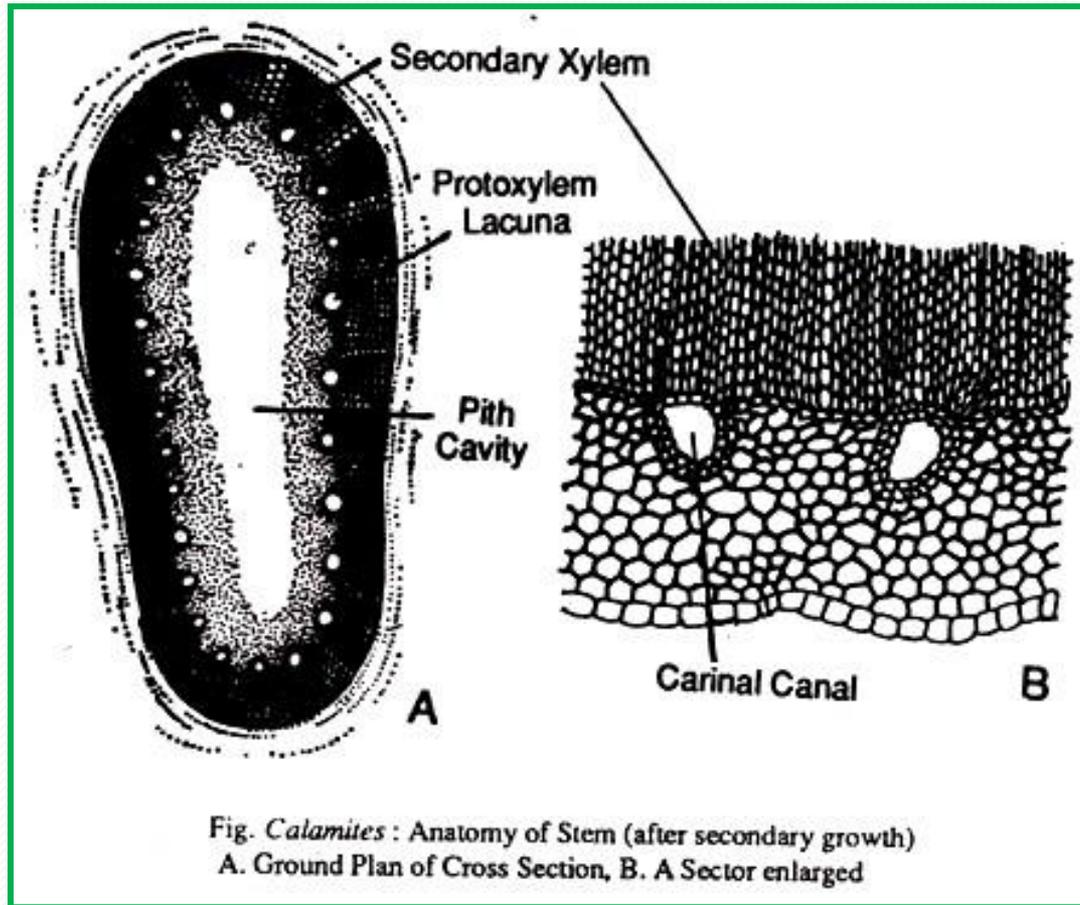
Fig. *Calamites* : Reconstruction of Plant Body

The mode of branching is varied and it is used as a criterion in classifying the genus. Based on the branching pattern three sub-genera have been founded. In *Stylocalamites* the branches are few and scattered (e.g., *C. suckowi*). In *Calamitina*, whorls of branches are present only at certain nodes, (e.g., *C. undulatus*). In *Eucalamities*, branches are borne at every node (e.g., *C. cerinatus* and *C. cruciatus*).

The lateral branches of the aerial shoots in some cases persisted for a long time and were as thick as the main axis giving the familiar appearance of the present day Equisetum, but much larger in size. The surface of the stem had longitudinal ribs alternating with the grooves. But in some instances the ribs of the successive internodes were directly above instead of alternating with one another.

### **Internal Structure of Calamites**

Anatomically the stem of Calamites showed an epidermis, cortex and stele. In the young stems the cortex had an outer sclerotic zone and an inner thin walled parenchymatous zone. There were no Vallecular canals as in Equisetum. The stele was siphonostelic.





In the central region there was a parenchymatous pith at the nodes, but represented by a central cavity at the internodes.

The vascular bundles had collaterally arranged xylem and phloem. The xylem was endarch. The tracheids had scalariform thickenings in metaxylem but annular and spiral thickenings in the protoxylem. In each vascular bundle there was a carinal canal formed by the dissolution of the protoxylem elements.

Secondary growth in the stem took place by the activity of a cambium. The cylinder attained a thickness of 6 cm. or more due to the secondary growth. The secondary wood did not show the differentiation of annual rings.

These point out that the plant had an evergreen foliage and there was probably no seasonal variation in a year which is responsible for the annual ring formation. Secondary xylem had scalariform and pitted tracheids. Secondary growth also took place in the cortex producing periderm of several centimeters in thickness.

**1. Leaves:** The leaves of *Calamites* are given the name *Annularia*. The foliage was found mostly on the smallest twigs. They were whorled in arrangement. Each leaf was linear or lanceolate, had a single vein and ranged in length from 4 m to 5 mm.

**2. Roots:** Roots of *Calamites* are called *Astromylon*. Internally they had a direct triarch xylem with centripetal protoxylem. A cambium was present in the root, but produced only a limited quantity of secondary wood.

**3. Strobili:** The strobili associated with the *Calamitean* stem are given the name *Calamostachys*. In this, the strobilus had a central axis bearing whorls of sporangiophores. Alternating with the whorls of sporangiophores were whorls of sterile appendages called bracts. The sporangiophores had cruciately branched apices.

The tip of each branch recurved towards the strobilar axis and had a sporangium at the tip. The genus *Calamostachys* had both homosporous and heterosporous species. The strobilus had both the types of sporangia in heterosporous forms.

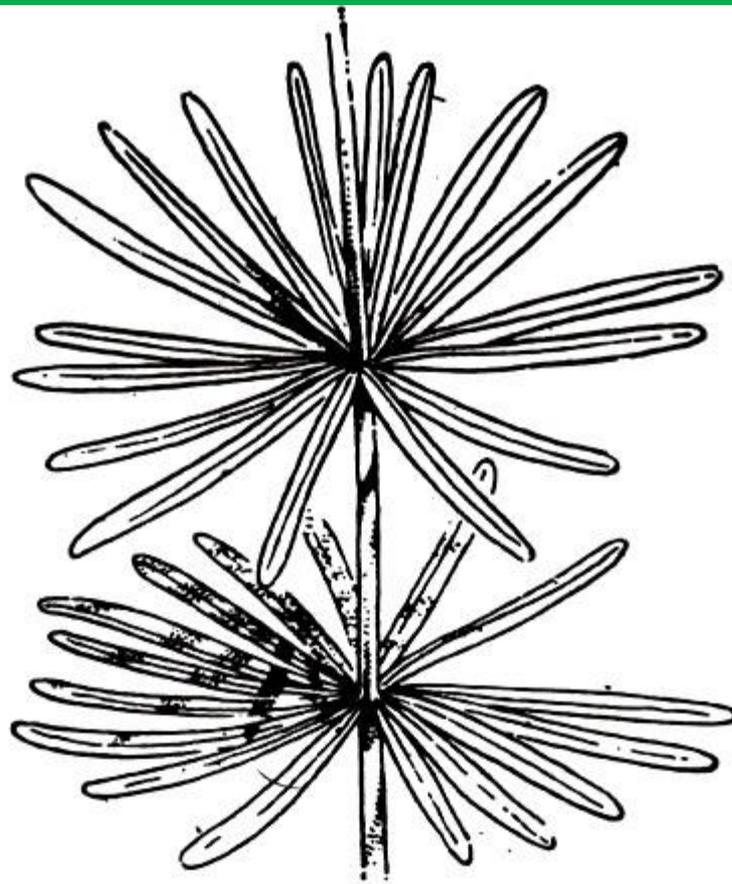


Fig. *Calamites* : Leaves of *Annularia*