

## LEPIDODENDRALES A FASCINATING EARLY FOSSIL PTERIDOPHYTIC WORLD

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### ABSTRACT

Pteridophytes are the very valuable creation of the nature. They have the first evolved true vascular system in the evolution of the plant life. Seed and fruit formation are absent in whole of the group, the whole of the lines has been divided in the four groups among them Psilophyta, lycophyta and sphenophyta and pterophyta are the main cladistesc of the evolution, these plants with sporophytes which have the roots, stem and spirally arranged leaves. stele system is the protostelic or in some of the cases it is polystelic. Homospory is common in most of genera however in some of the genera Heterospory is the significant feature.

Lepidodendrales was the fossil empire in the lower and the upper carboniferous time period, they were the large and the giant trees with the crown of the leaves on the tops, Heterospory and the approximation to the seed has been reached in the majority of the cases, they represent the very important early lines of the evolution of the many plant parts.

**KEYWORDS:** Heterospory, Fossil plants, Protostele, polystele, sporophytes.

### INTRODUCTION

Pteridophytes are the plants which are commonly known as the ferns. The main plant body is the sporophytes, while it is gametophytic in the bryophytes. The saprophytes body is differentiated in to the roots, stem and leaves, however such kind of the division is absent in the bryophytes. The sex reproduction occurs by the archegonia and the antheridia which are much reduced in sizes, but they reached in their approximations in the bryophytes. There occur heterospory, the sizes of the heterospores reaches in different genera, but such kind of the division is absent in the previous group.<sup>[1,2,5]</sup> Whole of the pteridophytes have been divided in to the four of the classes, these are enlisted as psilophytosida, lycopsida, spehnopsida, pteropsida.<sup>[1,2,5]</sup> In the lycophyta group the sporophytes is divided in to the root, stem and the

leaves, leaves are generally microphylls types and they are spirally arranged. The steeltear system in the lycophyta is the protostealic kinds, in some of the cases the protosteale is medullated and in some of the genera the steel is divided in to the polysteleic kind of the division of the vascular system. Sporangium are the homosporous or the heterosporous, they are borne on the sporophylls or some time loose attachment of the cones have been seen in some living members of the lycophyta.<sup>[1,2,5]</sup>

The lycophytes have been divided in to the five orders, these are enlisted as.

#### 1) **Protolpidodendrales**

It consists of the two families, one of them is the Drephanophyaceae, Protolpidodendraceae

Lycopodiales: Lycopodiaceae

#### 2) **Lepidodendrales**

Lepidodendraceae, Bothodendraceae, sigillariaceae, pleromiaceae.

#### 3) **Isoetales**

Isoetaceae

#### 4) **Selagenales**

Selagiaceae

This review article is consist with the some of the aspects of the fossil order entitled as the lepidodendrales, lepidodendrales was the very great empire in the Palaeozoic era, they were starting appears in the lower carboniferous time and they were in there approximation in the upper carboniferous time periods.<sup>[1,2,5]</sup> Overall 200 species of the orders have been reported in the differ fossils deposits form the different part of the world. In the fossil reconstruction it had been reported that fossil swamp forest have been found which were co dominant with the lepidodendrales, pleurmiaceae and the sigillariaceae, giant arborescent trees of the lepidodendrales have been reported in the upper carboniferous time period.<sup>[1,5]</sup>

In the carboniferous time period they have the stout trunks and the crown of the leaves on the top and hardly branching on the top, majority of the trunk was unbranched, in all of the members one of the underground kinds of the structure was reported, it was the stigmarian axes.<sup>[1,2,3,5]</sup>

In some of the members of the lepidodendrales regular dichotomous kind of the branching pattern have been reported but in some of the members there was regular monopodial kinds

of the branch have been seen, which was the resultant of the regular kind of the unbranching pattern.<sup>[1,2,3,5]</sup>

In majority of the genera's the stele was the Protostelic but in the other kinds of the species variation have been observed in the stem or the other organs which was the regular features in the early lycopods. In the fossils stem medullated stele and the growth of the cambium has been reported.<sup>[1,2,3,5]</sup>

Some of feature of the fossil stem of the lepidodendrales has been observed and these are presenting over here. *Lepidopholios wuenschianuas* fossil genus of the lepidodendrales have been studied in detail, in the petrified stem various kind of the stele has been observed, at the time of the petrification these steles have fallen in to the base of the trunk, the metaxylem was composed of the large trachedis with the scalariform thickening, however in the anatomy the majority of the stem were at the approximation of the modern lycopods.



**Figure: 1** Lepidodendrales stem reconstruction (sources macdenial. Edu).

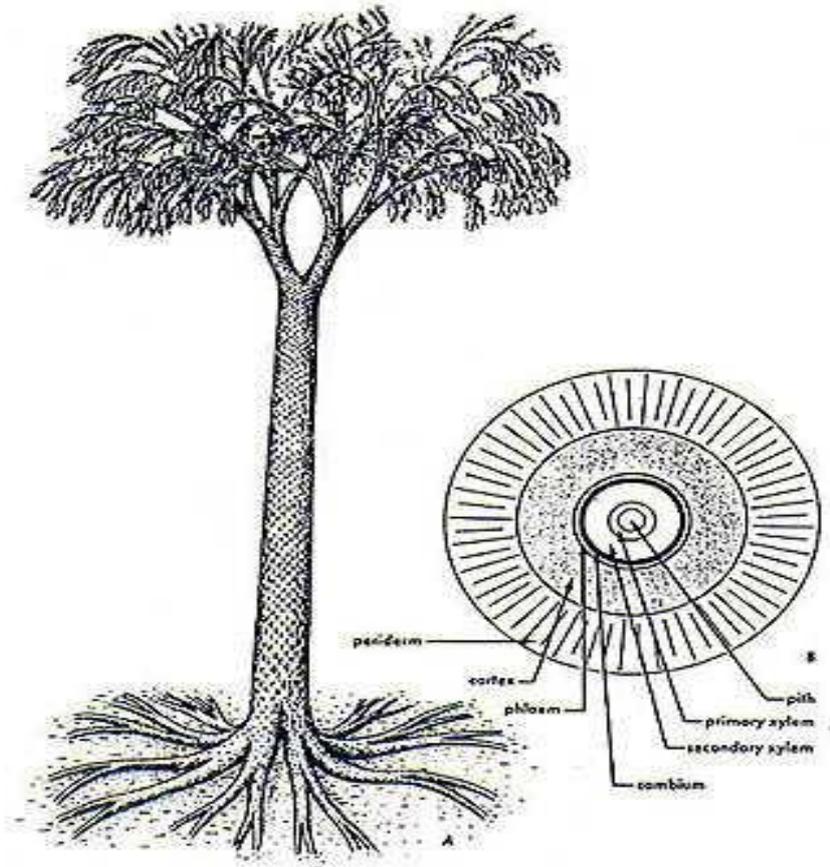


Figure: 2 Anatomy of the lepidodendrales stem (sources macdaniel. edu).

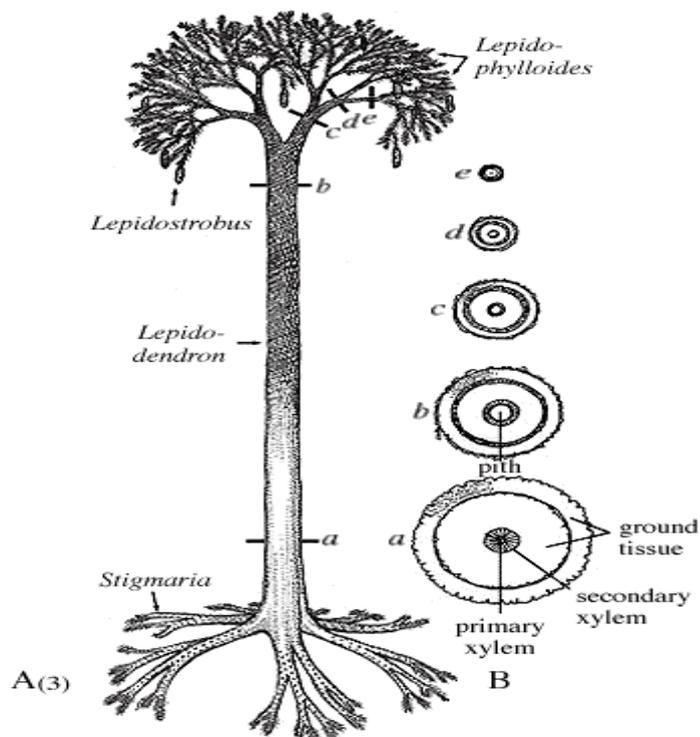
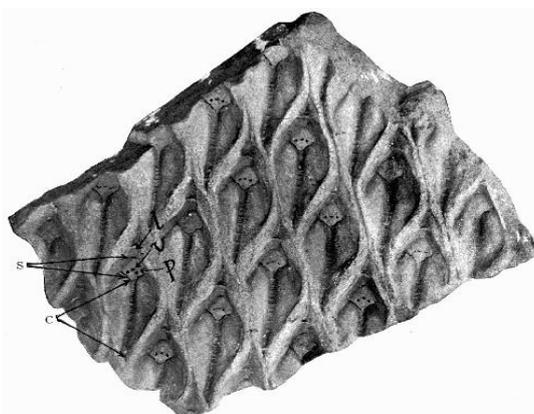


Figure: 3 Anatomy of the stem Lepidodendrales showing the variations (sources berkely. com).

The primary cortex was the thin walled and a number of the zones can be found in the stem cortex. Main region was the secretary zones and they are made up of the conducting tissues.<sup>[1,2,5]</sup>

Leaves were the Lepidophyllum. They were arranged at the particular angles from the main stem. They were linear and they were up to the 20 cm in length. Stomata were on the two rows. When the leaf was shed they present the permanent kinds of the scar on the stem and it was counted for the structure and analysis of the taxonomy of the different kind of the genera of the order.<sup>[1,2,3,4,5]</sup>

The shape and the sizes of the leaf bases was the rectangular and they were also considered as the taxonomic key for the identification of the genera.<sup>[2,5]</sup>



**Figure: 4 Lepidodendron stem leaf bases (sources Gypsy herbs).**

There are two fossil genera which are separated on the basis of the structures of the leaf bases **Lepidopholies**, **Lepidodendron**, both genera are separated on the basis of the position of the leaf bases and the presence of the cones on the trunk, in the **Lepidodendron** they are on the terminals whereas on the **Lepidopholies** they are arranged laterally. Since other features cannot be preserved in the petrified stem of the evolution.<sup>[2,5]</sup>

The cones of the Lepidodendrales are termed as the Lepidostrobus. They have the central axis around which the Microsporophylls are arranged spirally. The apices of the sporophylls are projected towards the axes to protect the sporangia on the axis.<sup>[2,5]</sup>

The height of the cones varies from the 6 cm to the 45cm. some of the cones are hermaphrodites and some of the cones are homosexuals.<sup>[2,5]</sup>

The number of the megaspores varies from the species to the species, in some of the sporangium it is the one megaspores. have been placed in the The underground organ of the all genera of the lepidodendrales are very similar in structures, they have been place in the same organ it has been termed as the Stigmaria, they have been placed in the one species termed as the foicoids.<sup>[5,2]</sup>

The morphological nature of the Stigmaria have been discussed in many ways like in some of the palaeobotanist they termed these structures as the pioneers of the roots of the higher plants.<sup>[4,3]</sup> However form the morphologically as well as the anatomically these stigmaria are very different form the roots of the higher plants. The reason for the imperfect knowledge was the less and the imperfect preservation of the fossils in the deep forest.<sup>[1,2,5]</sup>

**Sigilalria** was also very similar in many features from the others genera's of the lepidodendrales but they were vertical in the arrangement and the leaves were linear and they were genera's like, the cones structures and the anatomy was also very like the other genera's of the lepidodendrales. ve the stigmaria like roots.<sup>[1,2,5]</sup>

**Pleuromia** is the another genera of the fossil lepidodendrales, only one major dofercesi s that in the other fossil genera of the order they have the **stigmaria** like roots but in this genera they have the four lobes which are bifurcated and they have the rootlets form the other sides of the theses four lobes.<sup>[1,2,5]</sup>

## CONCLUSION

Among the extinct early vascular plants lepidodendrales are outstanding for the many reasons, they have the arborescent habit and the megasporangium and the large megaspores due to which they reaches the approximation of the seed habits of the higher plants.<sup>[1,2,5]</sup>

Lepidodendrales exhibit the excellent flora in the ecosystem in the past. They developed the huge forest with the arborescent habit of the trees which reached the highest height in the carboneferous time period. The marvellous petrification of the fossil in the late and the middles of the carboniferous time periods made theses plants excellent study material for the study of the fossil era and the fossil vegetation. They harbour the whole of the world in the early carboneferous time period and they just disappears in the Permian time. Well this review shows the small account of knowledge of the lepidodendrales.

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