

# ORIGIN AND DEVELOPMENT OF TISSUES IN ROOT OF LYGODIUM PALMATUM

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*Lygodium* has been a subject for morphological study for many years. Rogers (1923) worked out the development of the prothallium and archegonium as well as fertilization (1926) in *Lygodium palmatum*. Prantl, as early as 1881, had determined the structure of the leaf and the nature of the stem-tissue in the same species. Binford (1907) based his conclusions of sporangium development of *Lygodium* on two species, *Lygodium circinatum* and *Lygodium flexuosum*, while Twiss (1910) worked upon *Lygodium circinatum* for her prothallium studies. Bower examined several of the twenty-six species of *Lygodium* in his sporangium-development study of the Schizaeaceae. However, none of these earlier workers have recorded findings on the development of the tissues of the roots of the Schizaeaceae.

The aim of this investigation was to determine the development of the tissues of the root of *Lygodium palmatum*. Since all the cells of the root have a common origin in the apical cell at the root tip, the study resolves itself into tracing the sequence of cell division from this initial cell to the mature tissues of the root. It was found by the writer that this sequence of development is very similar to that of two other roots of this same family of Schizaeaceae. Therefore this paper resolved itself into comparisons between this species and those of *Schizaea rupestris* (Bartoo, 1929) and *Schizaea pusilla* (Bartoo, 1930).

The roots of all three species have tetrahedral apical cells from which all the tissues arise. The tissues of the roots are differentiated extremely early. The initial cell of the epidermis, cortex and endodermis is only one cell removed from the apical cell (Fig. 1). This is true also of the pericycle of *Schizaea rupestris* and *Schizaea pusilla* whereas in *Lygodium palmatum* the pericycle arises later. The initial of the xylem and phloem elements is two or three cells removed from the apical cell in each case. The number of cells per tissue varies considerably, *Schizaea rupestris* having the smallest number while *Lygodium palmatum* has the greatest number. *Schizaea rupestris*, the simplest of all known roots, has only two layers of cortical cells while *Lygodium palmatum* has five such layers.

Each segment cut from the apical cell divides by a periclinal wall into an outer and an inner cell (Fig. 1, *i. o.*). In every case of the three species studied, the outer cell thus derived forms the epidermis and the outer cortical layer. From the inner cell all other tissues of the root arise.

The arrangement of the bundle in each species is diarch with xylem, usually consisting of four elements, while the number of phloem elements varies from 8-12 in *Schizaea rupestris* to 25-35 in *Lygodium palmatum*.

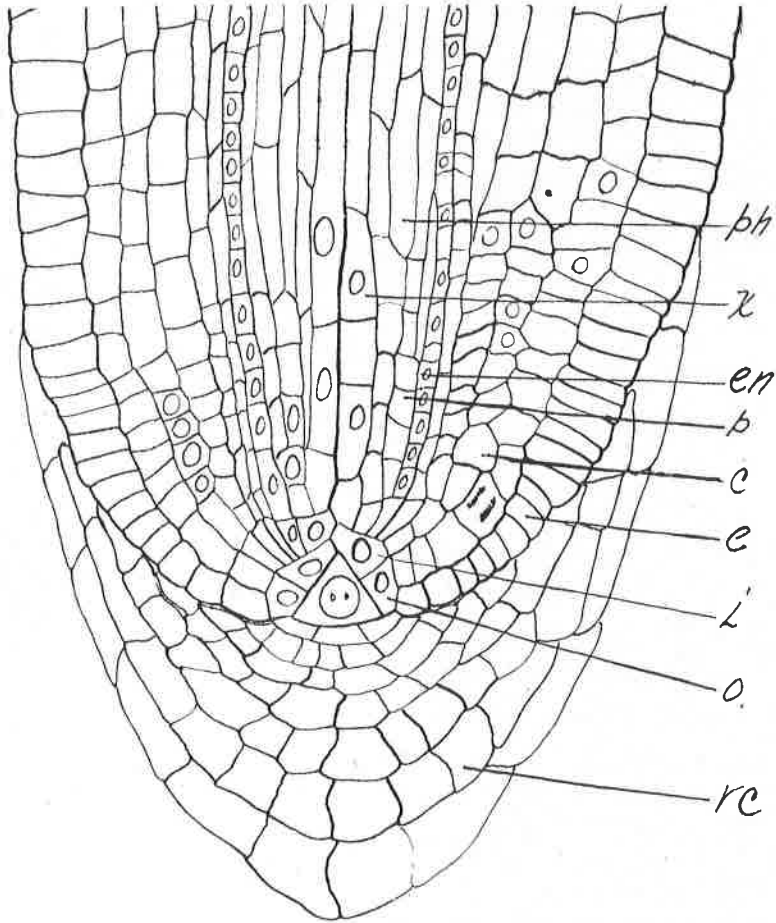


Fig. 1. Longitudinal Section of the Root of *Lygodium palmatum*. *c*, cortex; *e*, epidermis; *en*, endodermis; *i*, inner cell; *o*, outer cell; *p*, pericycle; *ph*, phloem; *rc*, root cap; *x*, xylem.

In the present study the pericycle and endodermis were found to be of the same immediate origin. This is not in accordance with Hanstein's histogenetic idea that the pericycle and endodermis are of different immediate origin. Therefore this study lends support to

the assumption that Hanstein's histological distinctions are not trustworthy.

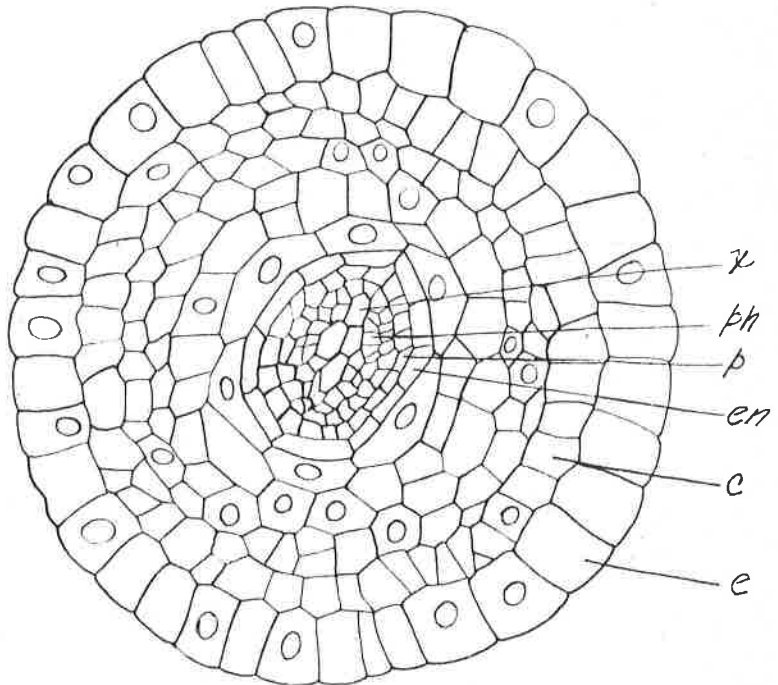


Fig. 2. Cross Section of the Root of *Lygodium palmatum*. *c*, cortex; *e*, epidermis; *en*, endodermis; *p*, pericycle; *ph*, phloem; *x*, xylem.

#### SUMMARY

1. All the tissues of the root have their origin in a tetrahedral apical cell. This is also true of *Schizaea rupestris* and *Schizaea pusilla*.
2. The root is one of the simplest. However *Schizaea pusilla* and *Schizaea rupestris* are simpler, the latter having the distinction of being the simplest root structure known.
3. The epidermis and cortical layer have a common origin. The stele, inner cortical layers and endodermis also have a common origin.
4. The arrangement of the bundle is diarch. This is true also of *Schizaea rupestris* and *Schizaea pusilla*.

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## DRIVER IN FATAL ACCIDENT RARELY PUNISHED IN COURT

In a report to Congress on a study of fatal highway accidents, the Bureau of Public Roads notes that of 905 drivers involved, only 28 served time in jail and only 95 paid fines. More than 88 per cent were not penalized by the courts in any way.

Records from four States accounted for 614 of these cases. Motor-vehicle departments in these States reported their action following the fatal accidents. Only 11.5 per cent of the drivers escaped the forfeiture—for at least a short period—of their rights to drive, and the driving privileges of one-third were either suspended for 6 months or more, or revoked entirely.