A NOTE ON L- AND T-SHAPED PARENCHYMA CELLS IN THE PHLOEM OF DACRYDIUM CUPRESSINUM LAMB. (PODOCARPACEAE)

by

Lek-Lim Chan*, Everett L. Ellis and Brian G. Butterfield
School of Forestry and Botany Department, University of Canterbury, Christchurch, New Zealand

Summary
Two unusual types of parenchyma are described in the phloem of Dacrydium cupressinum. They are L- and T-shaped parenchyma cells.

Introduction and Observations
Dacrydium cupressinum (Podocarpaceae) is a tall tree endemic to New Zealand, found in lowland and montane forests. It is distributed throughout New Zealand and produces timber of good quality. The bark is dark brown and scales off in thick flakes (Allan, 1961).

In the course of a study on the general anatomy of the bark of gymnosperms indigenous to New Zealand (Chan, 1982; Chan & Ellis, to be published), we found two unusual types of parenchyma cells in the phloem of D. cupressinum. In addition to the normal axial and ray parenchyma cells in this species, we found parenchyma cells with L and T shapes.

Fig. 1 shows an L-shaped parenchyma cell while Fig. 2 shows a T-shaped cell. Part of the L or T cell follows the axial system and the other part follows the ray system. Such L- and T-shaped cells are always filled with dark tannin. The L-parenchyma cells seem to be more abundant than T-parenchyma cells.

Discussion
It is well known that the parenchyma cells in the secondary phloem of most plants lie in two systems, namely axial and ray (cf. Esau, 1969; Chang, 1954 a, b). As far as we are aware, L- and T-shaped parenchyma cells have not been previously recorded. Craddock (1932), who examined the bark anatomy of some New Zealand gymnosperms including Dacrydium cupressinum did not record this feature.

It is not clear how L- and T-shaped parenchyma cells develop. One possibility is that they are formed by the intrusive growth of ray cells into the axial system or axial cells into the ray system after they have been cut off from the cambium. The other possibility is that they originate as axial parenchyma cells from fusiform cambial initials but that some portion of the derivative (either the tail or a portion of the central region) becomes pulled back into the radial plane. Since most axial parenchyma cells are tannin-filled and ray parenchyma cells are not, the L- and T-shaped cells are clearly more closely related to the former.

The function of L- and T-shaped parenchyma cells is also open to speculation. Since interparenchyma pitting is fairly common, there would appear to be no good reason why any additional contact between the axial and ray systems should be necessary. It could be that these cells are simply an anomaly of cambial division and/or cell differentiation, in which case one might expect such cells to occur in the bark of other plants.

References

* Present address: Chan Chng Villa, 95 Tabuan Road, Kuching, Sarawak, Malaysia.
Fig. 1 & 2. Phloem of *Dacrydium cupressinum*. – 1: Radial longitudinal section (light microscope), showing an L-shaped parenchyma cell. The part labelled A lies in the axial system while B lies in the ray system. Normal ray parenchyma cells (R), normal axial parenchyma cells (P), fibres (F) and sieve cells (S) can also be seen in the micrograph (x 320). – 2: Radial longitudinal section (light microscope), showing a T-shaped parenchyma cell. The part labelled A lies in the axial system while B lies in the ray system. The arrow indicates the junction where the ray part joins the axial part. A normal axial parenchyma (P) appears to the top left (x 650).