A NOTE ON VESTURES ON HELICAL THICKENINGS

by

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The occurrence of vestures on helical thickenings in vessel elements has been already reported in several species by Ohtani and Ishida (1976), Meylan and Butterfield (1978) and Ohtani (1983). During a recent study on the occurrence of warts in vessel elements and wood fibres of New Zealand woods, vestures on helical thickenings were found in the vessels of all 11 species examined from 5 genera belonging to the Papilionaceae (Ohtani et al., 1983).

The present paper describes their morphology.

The following species which have vestures on helical thickenings were selected for this study:

Carmichaelia angustata Kirk
C. arborea (Forst. f.) Druce
C. flagelliformis Col. ex Hook.
C. grandiflora (Benth.) Hook. f.
C. rivulata Simpson
Chordospartium stevensonii Cheesem.
Corallospartium crassicaule (Hook. f.) J. B. Armst.
Notospartium carmichaeliae Hook. f.
Sophora microphylla Ait.
S. prostrata Buchan.
S. tetraptera J. Mill.

Wood samples were prepared by our usual technique (Exley et al., 1974, 1977), and examined in the scanning electron microscope. In each species examined more than 100 vessel elements were checked. Many SEM stereo pair photographs were taken for examination of the three dimensional structure of the vestures and their association with helical thickenings.

The proportion of vessel elements having vestures on their helical thickenings varied from species to species. In three species, *Sophora microphylla, S. prostrata* and *S. tetraptera*, the ratio was greater than 70% although the actual number of vestures per vessel element varied considerably. In four species, *Carmichaelia flagelliformis, C. grandiflora, Chordospartium stevensonii* and *Corallospartium crassicaule*, the ratio was about 65%. In the four species, *Carmichaelia angustata, C. arborea, C. rivulata* and *Notospartium carmichaeliae*, the ratio was only 10–30%. Except for *Sophora* the vestures in all these species tended to occur only in those smaller vessel elements whose helical thickenings are more prominent.

SEM stereo pairs proved very useful to determine the location of the vestures on the helical thickenings and their three dimensional structure (Fig. 1). In each species vestures on the helical thickenings were closely similar in shape and size to those associated with pits. Like pit vestures their morphology varied considerably. When present, the vestures were irregularly distributed within a vessel element (Figs. 2 & 3). Their location was not necessarily related to the position of pits (Fig. 2) but was closely associated with the shape of the helical thickenings. They were most commonly found on prominent helical thickenings whose shape in cross section can be seen on the left hand side of Fig. 4. It was observed that when the cross-sectional shape was symmetrical vestures generally occurred on both sides but when the shape was asymmetrical, they were found only on the more involuted side. The vestures were often paired with those arising from adjacent helical thickenings (Fig. 4). In rare instances these were observed to be joined together (arrow in Fig. 5).

The chemical composition of vestures in *Sophora microphylla* has been investigated by Ohtani et al. (this issue) using various chemical treatments. No significant differences were found between the vestures on helical thickenings and those around pit apertures. We conclude that the morphology and chemical composition of the two structures are the same.

During the course of our studies on New Zealand woods, in addition to the above eleven species the following species have also been found to possess both helical thickenings and vestured pits:

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Muehlenbeckia australia, M. axillaris, M. complexa (Polygonaceae), *Pimelea gnidia, P. oreophila, P. pseudo-lyallii, P. traversii* (Thymelaeaceae), *Persoonia toru* (Proteaceae), *Coprosma arborea, C. areolata, C. ciliata, C. foetidissima, C. linariifolia, C. lucida, C. parviflora. C. propinqua, C. pseudocuneata, C. repens, C. robusta, C. rotundifolia, C. serrulata, C. spathulata, "C. taylorea", C. tenuicaulis, C. tenuifolia, C. wallii* (Rubiaceae). Vestures associated with helical thickenings were not found in any vessels of these species.

The helical thickenings in these species however were found to be only of the prominent type in the four *Pimelea* species and these possess only sparse and small vestures around their pits. It is suggested therefore that the occurrence of vestures on helical thickenings is limited to some vessel elements of those species which have both prominent helical thickenings and well developed pit vestures.

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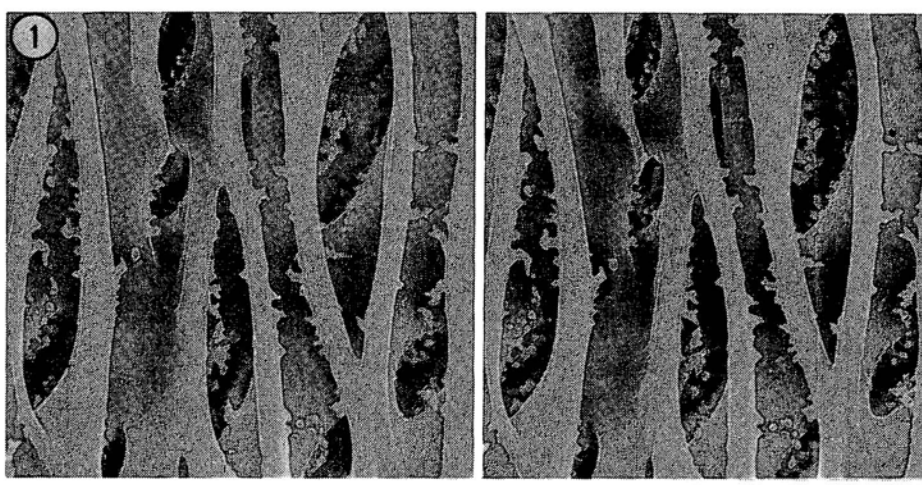

Fig. 1. *Sophora tetraptera* J. Mill. Stereo pair showing the location of vestures on helical thickenings, their three dimensional structure and their similarity to pit vestures. Vessel axis is horizontal; x 3600.

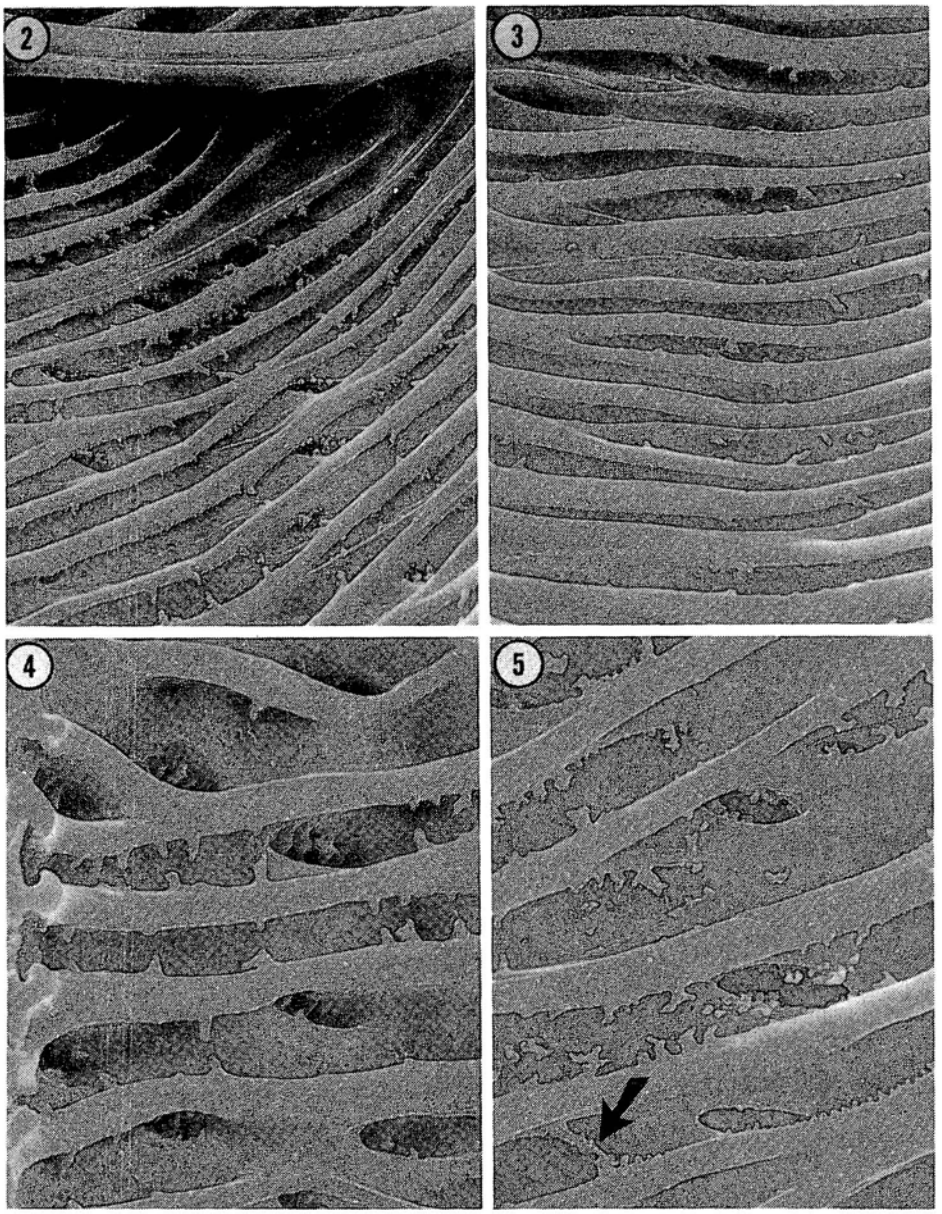

Fig. 2. *Sophora tetraptera* J. Mill. Irregularly distributed vestures on helical thickenings; x 2100. — Fig. 3. *Carmichaelia flagelliformis* Col. ex Hook. Irregularly distributed vestures on helical thickenings; x 3100. — Fig. 4. *Sophora prostrata* Buchan. Vestures on helical thickenings. Note the relation between their occurrence and the shape of the helical thickenings in cross section (shown on left hand side); x 4000. — Fig. 5. *Sophora tetraptera* J. Mill. Vestures on helical thickenings. Note vestures (arrowed) joined together; x 4100.