Kucera, L. J.; Meylan, B. A.; Butterfield, B. G. 1977: Vestured simple perforation plates. IAWA Bulletin (No. 1): p.3-6

29 wood species indigenous to New Zealand known to have simple perforation plates and vestured vessel pits (outgrowths or deposits in the apertures and chambers of the pits) were examined under SEM and 100 perforation plates checked in each species for the presence of vestures. Vestured perforation plates were frequently observed in all wood samples of Leptospermum ericoides, *Metrosideros* *excelsa* , M. fulgens, M. robusta and M. umbellata. They were rarely found in Fuchsia excorticata, Coprosma australis, C. repens and C. rotundifolia and not observed in other Metrosideros and Coprosma species. The absence of vestures in the depression between the borders in each perforation plate (which marks the position where the perforation partition formerly separated the adjoining vessel members) suggests that the vestures are deposited prior to the removal of the perforation partition, before the death of the protoplast.

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VESTURED SIMPLE PERFORATION PLATES

by

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Twenty-nine woods indigenous to New Zealand known to have simple perforation plates (Meylan and Butterfield, 1975 and unpublished data), and vestured vessel pits (Meylan and Butterfield, 1974 and unpublished data) were selected for examination. Small cubes of wood were prepared for examination by our usual technique (Exley, Butterfield and Meylan, 1974) and examined using a Cambridge stereoscan 600 scanning electron microscope. At least 100 perforation plates were checked for the presence of vestures in each species.

The results of our observations are listed in Table 1. Out of the 29 species belonging to 10 genera of 7 families examined, vestures were found along the perforation plate borders in 9 species belonging to 4 genera of 3 of the families. In five woods: *Leptospermum ericoides, Metrosideros excelsa, M. fulgens, M. robusta* and *M. umbellata* (all members of the Myrtaceae) vestured perforation plates were frequently observed in all of the wood samples examined of each species. In *Fuchsia excorticata* (Onagraceae), *Coprosma australis, C. repens* and *C. rotundifolia* (Rubiaceae) vestures were found in only about 3% of the perforation plates and even then they were not present in all the wood samples of each species. Their occurrence is therefore described as rare. Non observation of vestures in the perforation plates of the other *Metrosideros* and *Coprosma* species does not preclude the possibility of their existence. When present, the perforation plate vestures show a marked similarity in architecture to those found in the vessel pits in the same wood. In some cases the vestures line the borders on each side of the perforation plate (Fig. 1), while in others they may line only one of the two borders (Fig. 2). The depression between the borders in each perforation plate, however, is always free of vestures (Fig. 3). This depression marks the position where the perforation partition, made up of the primary walls and intervening middle lamella, formerly separated the adjoining vessel members. This partition is removed enzymatically during vessel member differentiation (Meylan and Butterfield, 1972). The absence of warts and vestures from this depression suggests that these features are deposited prior to the removal of the perforation partition.

Vestures are outgrowths or deposits in the apertures and chambers of vessel and fibre pits. They occur in some of the members of a limited number of dicotyledonous families: Metcalfe and Chalk (1950), citing Bailey (1933), record some 24 families where vestured pits were known to occur in some or all of the members. Vestured vessel and fibre pits have also been observed in a member of the Proteaceae (Butterfield and Meylan, 1974a), a family not normally listed as possessing this character.

In the wood of certain species, the vestures occur only in the pit chambers and apertures (e.g. in some species of the Loganiaceae, Onagraceae, Papilionaceae and Rubiaceae) whereas in others they may spread out onto large areas of the inner wall surface of the cell (e.g. in some species of the Myrtaceae and Proteaceae) (Meylan and Butterfield, 1974). They have also been found between the bars of scalariform vessel perforation plates in *Neomyrtus pedunculata*, a New Zealand member of the Myrtaceae (Butterfield and Meylan, 1974b). This note records the observation of vestures in the openings of simple perforation plates.

Vestures were also observed lining the border on the simple half-plate side in simple to scalariform combination perforation plates in *Coprosma rotundifolia* (Rubiaceae) (Fig. 4). Combination perforation plates comprise less than 1% of the perforation plates in the species, the majority being simple.

The observation of vestures lining the borders of simple and simple to scalariform combination perforation plates reinforces our earlier belief (Butterfield and Meylan, 1974b) that these structures need not be confined to pit apertures and chambers. Vestures are already known to spread out from the pit aperture onto the lumen surface of the cell wall in a number of species (Meylan and Butterfield, 1974). The similarity in appearance of vestures and the particles of the warty layer has been noted by Côté and Day (1962) and

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Table 1

Twenty-nine New Zealand woods known to have both simple perforation plates and vestured pits in their vessels. Woods where vestures were also observed on the borders of the simple perforation plates are indicated by + when of common occurrence and by (+) when observed rarely.

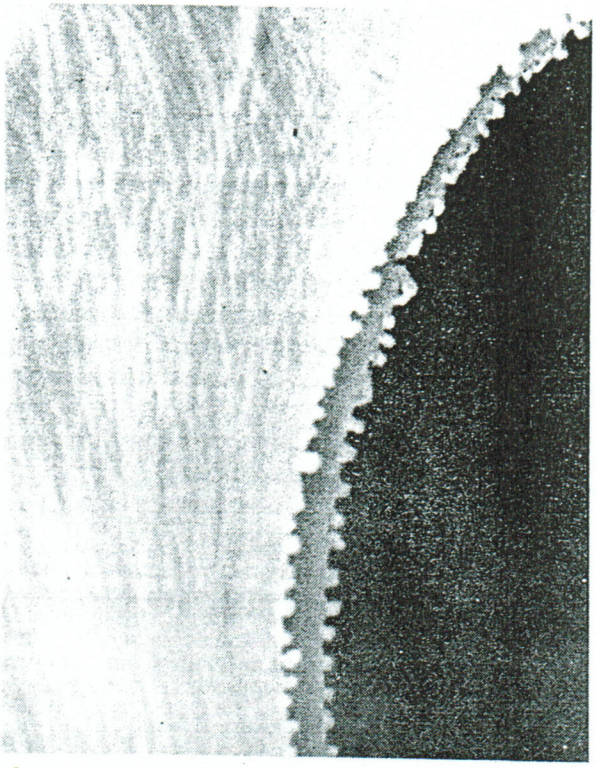
Loganiaceae	
Geniostoma ligustrifolium A. Cunn.	–
Myrtaceae	
Leptospermum ericoides A. Rich.	+
Leptospermum scoparium J.R. & G.Forst.	–
Lophomyrtus bullata (Sol.ex A.Cunn.) Burr.	–
Metrosideros excelsa Sol. ex Gaertn.	+
Metrosideros fulgens Sol. ex Gaertn.	+
Metrosideros parkinsonii Buchan.	–
Metrosideros perforata (J.R.& G.Forst.) A. Rich.	–
Metrosideros robusta A. Cunn.	+
Metrosideros umbellata Cav.	+
Onagraceae	
Fuchsia excorticata (J.R.& G.Forst.) L.f.	(+)
Papilionaceae	
Carmichaelia angustata Kirk.	–
Carmichaelia grandiflora (Benth.) Hook.f.	–
Sophora microphylla Ait.	–
Polygonaceae	
Muehlenbeckia complexa (A.Cunn.) Meissn.	–
Proteaceae	
Persoonia toru A. Cunn.	–
Rubiaceae	
Coprosma acerosa A. Cunn.	–
Coprosma australis (A. Rich.) Robinson	–
Coprosma ciliata Hook. f.	(+)
Coprosma foetidissima J.R. & G. Forst.	–
Coprosma lucida J.R. & G. Forst.	–
Coprosma parviflora Hook. f.	–
Coprosma propinqua A. Cunn.	–
Coprosma repens A. Rich.	(+)
Coprosma rhamnoides A.Cunn.	–
Coprosma robusta Raoul.	–
Coprosma rotundifolia A. Cunn.	(+)
Coprosma serrulata Hook. f. ex Buchan.	–
Coprosma tenuicaulis Hook. f.	–

Figure 1. Vestures lining both borders of a simple perforation plate in *Coprosma repens* A. Rich. x 4,700.

Figure 2. Branched vestures lining one border in a simple perforation plate in *Coprosma repens.* x 5,000.

Figure 3. Vestures lining both borders of a simple perforation plate in *Leptospermum ericoides* A. Rich. Note that the depression between the perforation plate borders is free from both warts and vestures. x 4,000.

Figure 4. Vestures lining the simple opening in a simple to scalariform combination perforation plate in *Coprosma rotundifolia* A. Cunn. x 5,100.



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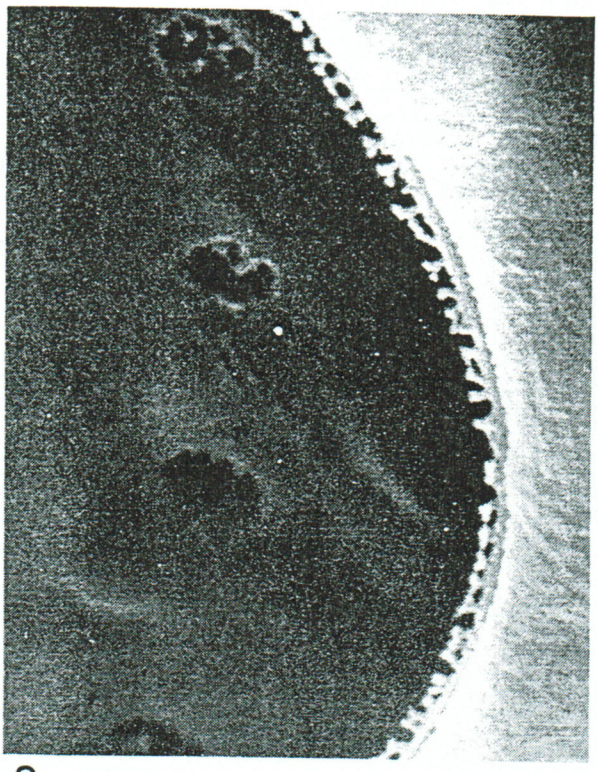

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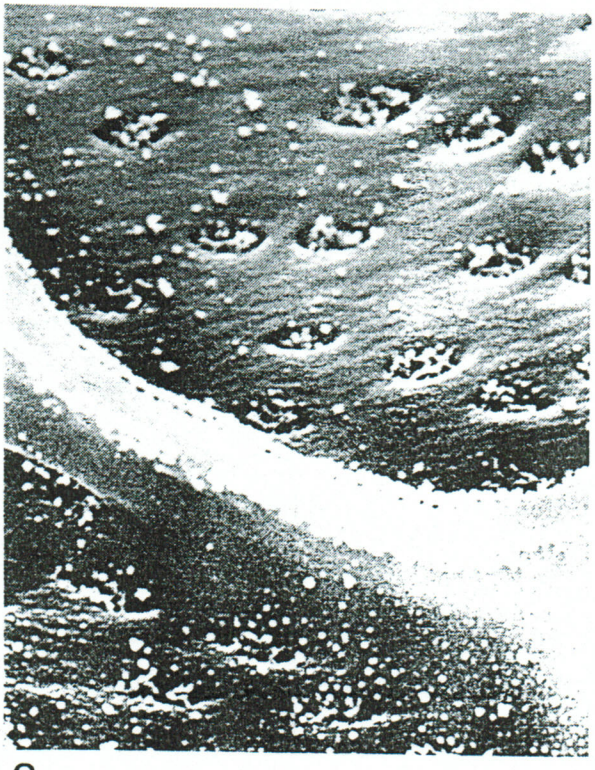

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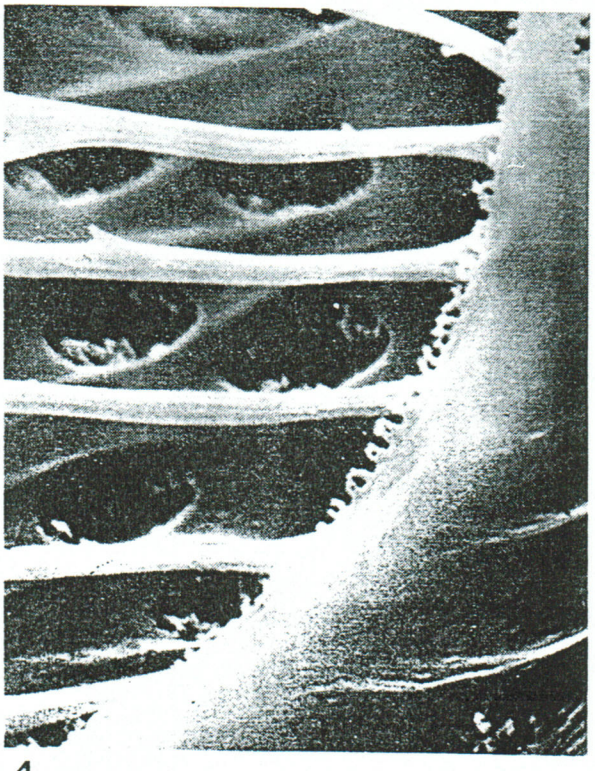

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Liese (1965). Similarly, Scurfield and Silva (1970) were unable to distinguish between these features on either morphological or chemical grounds. Schmid and Machado (1964), however, have proposed that vestures are deposited directly on the cell wall outside the plasmalemma by a living protoplast whereas warts are the deposited remnants of a dead protoplast. This present observation of vestured perforation plates suggests that vestures are indeed deposited prior to the death of the protoplast but does not reveal any further information on their relation to warts.

Acknowledgement

One of us (L.K.) gratefully acknowledges the awards of a postdoctoral fellowship by the University of Canterbury, Christchurch, New Zealand, and also a grant of the Huber-Kudlich Stiftung, Zürich, Switzerland.

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