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IAWA Hardwood Feature List

Definitions and Illustrations

Features 60-70. Tracheids and Fibers

Numbered photographs from:
IAWA Committee. 1989. IAWA List of
Microscopic Features for Hardwood
Identification. IAWA Bulletin n.s. 10(3):
219-332.

Photographs without numbers are associated
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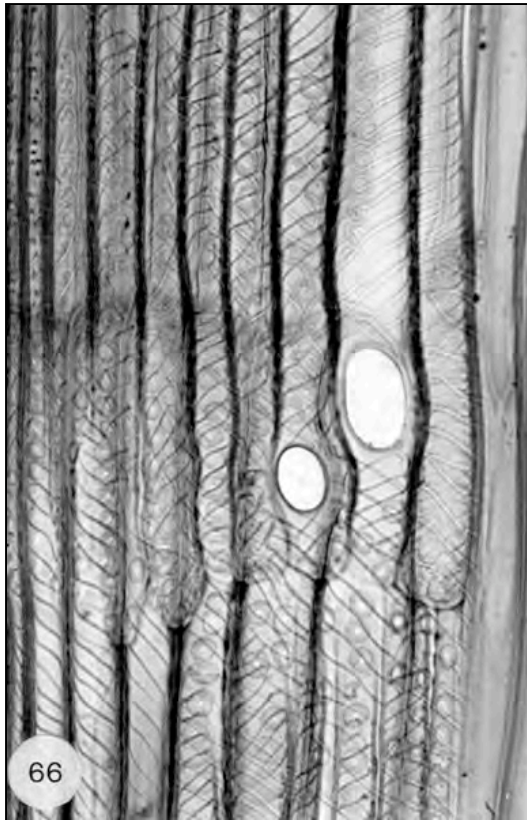
<http://insidewood.lib.ncsu.edu/search>

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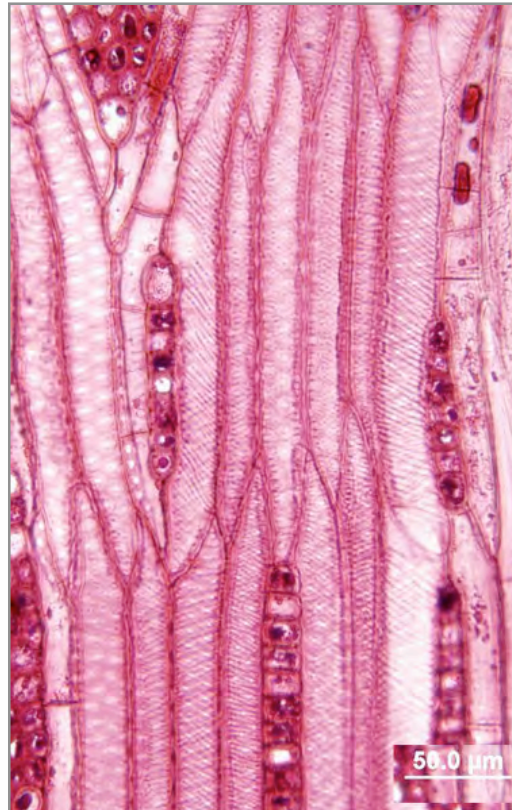
Slide Set Assembled by E.A.Wheeler

Feature 60. Vascular/vasicentric tracheids present

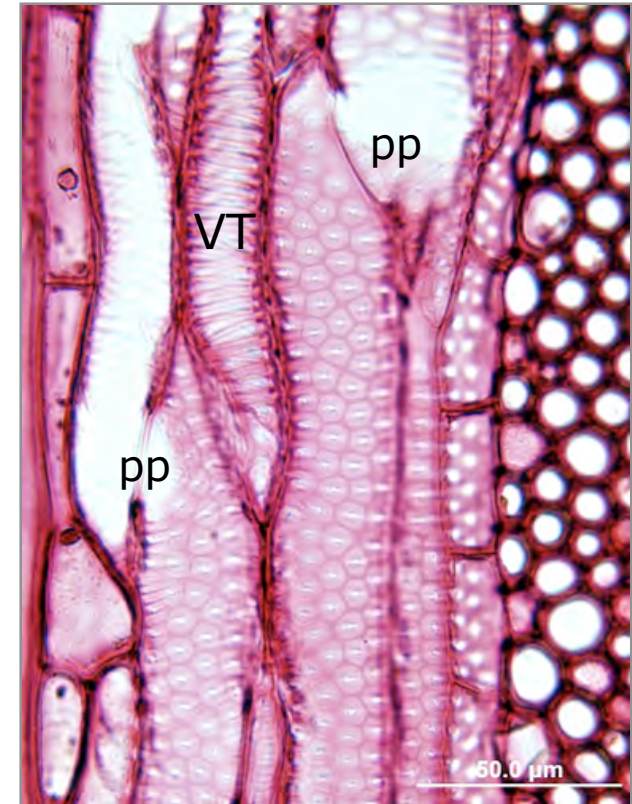
Vascular tracheids = imperforate cells resembling in size, shape, pitting, and wall ornamentation narrow vessel elements and intergrading with the latter.



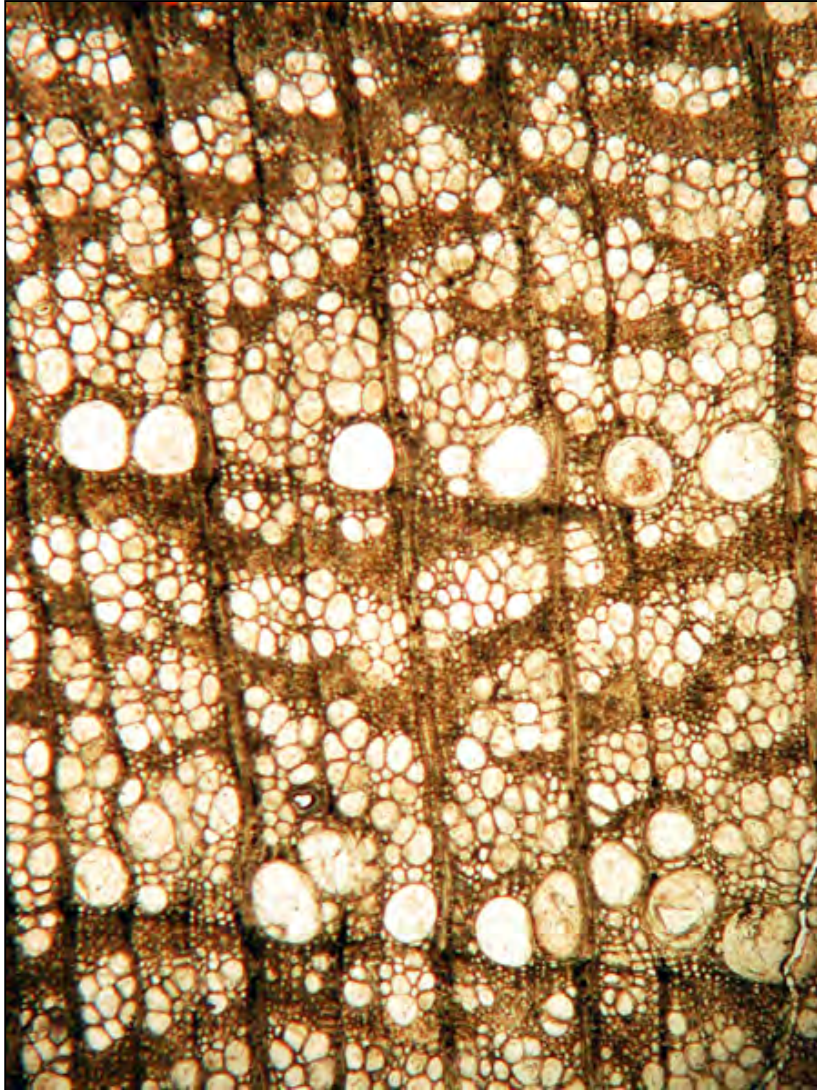
Phellodendron amurense (Rutaceae)
Vessel elements surrounded by
vascular tracheids. P.E. Gasson



Ulmus thomasi (Ulmaceae)
Mixture of narrow vessel elements and
vascular tracheids
E.A. Wheeler



Celtis reticulata (Cannabaceae)
PP = perforation plate in narrow vessel element.
VT = vascular tracheid
E.A. Wheeler



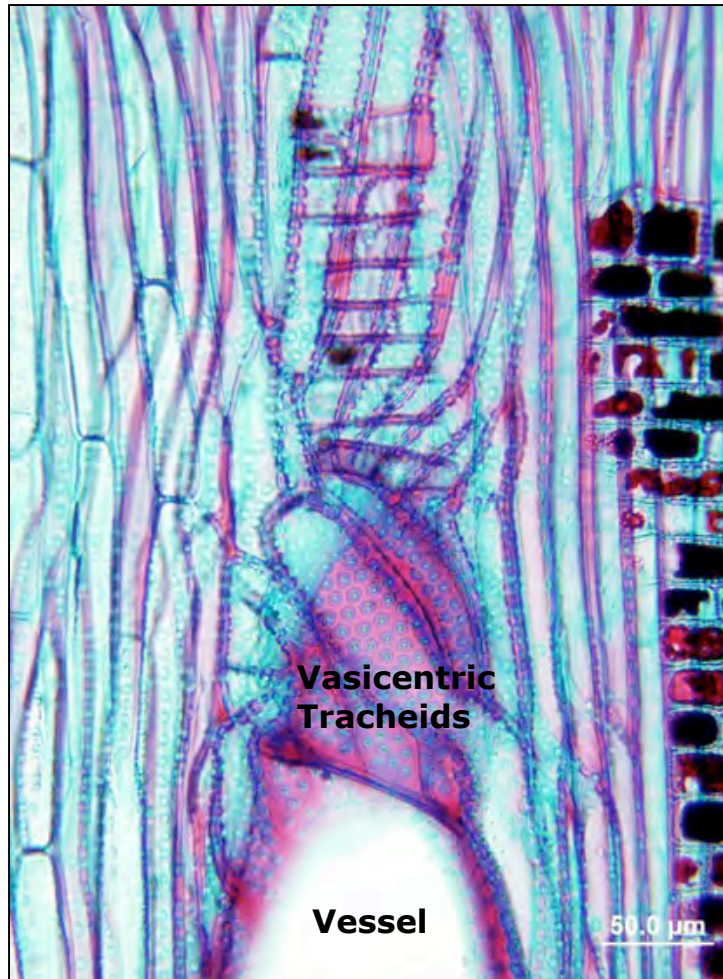
Cross section: *Ulmus miocenica*
(Ulmaceae)
E.A. Wheeler

Comments: Vascular tracheids often occur in association with extensive vessel multiples or vessel clusters, especially in the latewood, e.g., some species of *Celtis* (Cannabaceae) and *Ulmus* (Ulmaceae).

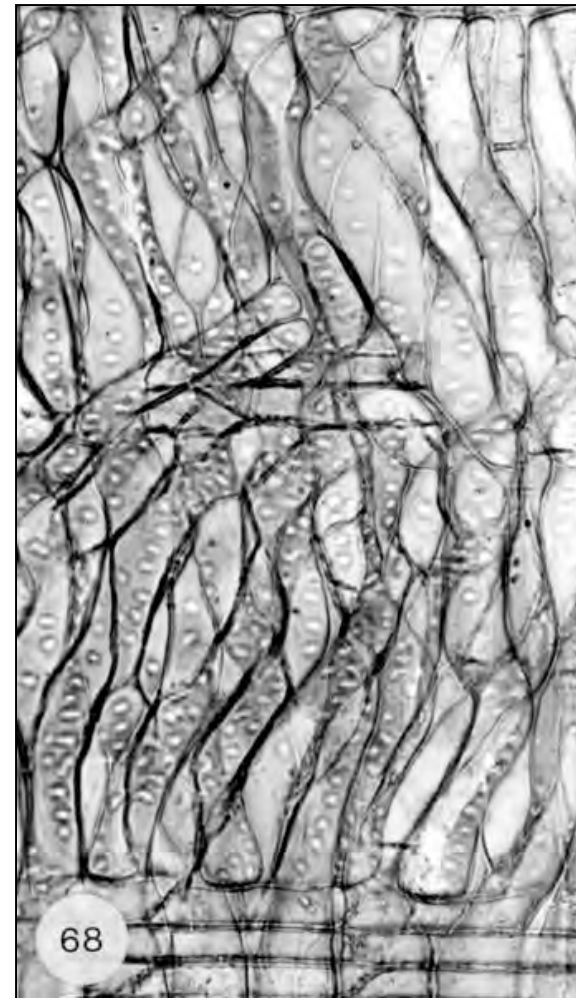
Thus, one would expect the possibility of 'vascular tracheids present' in a wood with this vessel grouping and arrangement, but **must use longitudinal sections or macerations** to confirm presence of vascular tracheids.

Feature 60. Vascular / vasicentric tracheids present

Vasicentric tracheids = imperforate cells with numerous distinctly bordered pits in their radial and tangential walls, present around the vessels, and different from ground tissue fibres, often, but not always of irregular shape.



Lithocarpus edulis (Fagaceae)
E.A. Wheeler



Castanea sativa (Fagaceae) D. Grosser



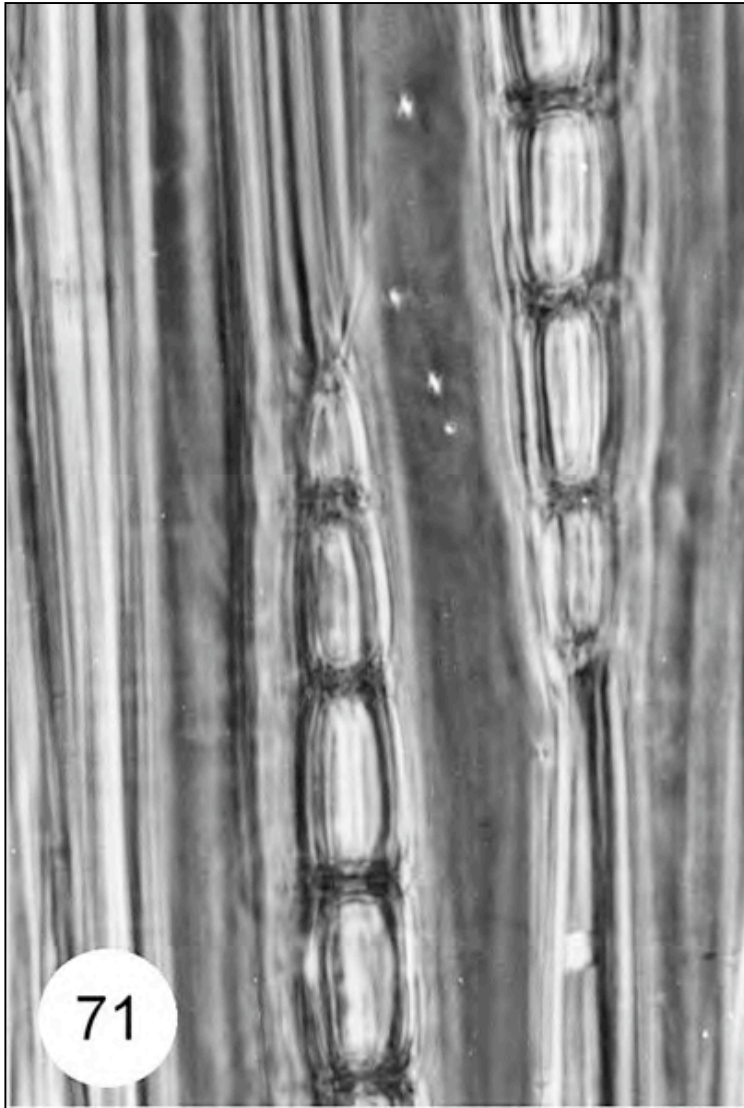
Lithocarpus edulis (Fagaceae) Cross section
E.A. Wheeler

Comments:

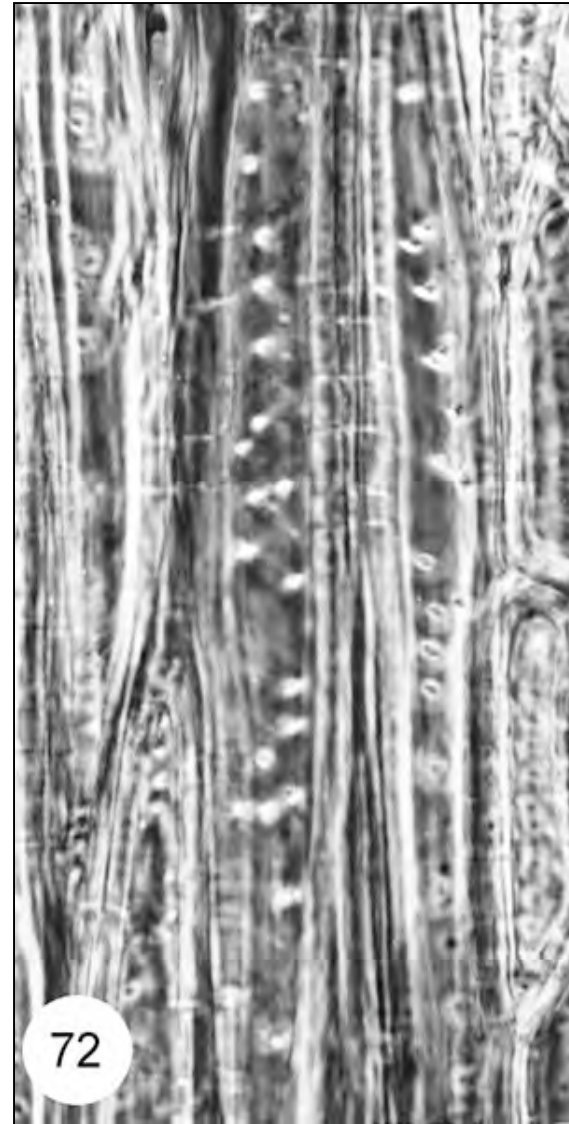
Vasicentric tracheids often occur in woods with predominantly solitary vessels with medium to large tangential diameters, e.g., *Casuarina* (Casuarinaceae), *Eucalyptus* (Myrtaceae), *Lithocarpus*, *Quercus* (Fagaceae).

In cross sections of such woods the vasicentric tracheids surrounding the vessels resemble vasicentric axial parenchyma. Confirming presence of vasicentric tracheids **requires examining longitudinal sections or macerations.**

Feature 61. Fibres with simple to minutely bordered pits = fibres (libriform fibres) with simple pits or bordered pits with the chambers less than 3 μm in diameter.

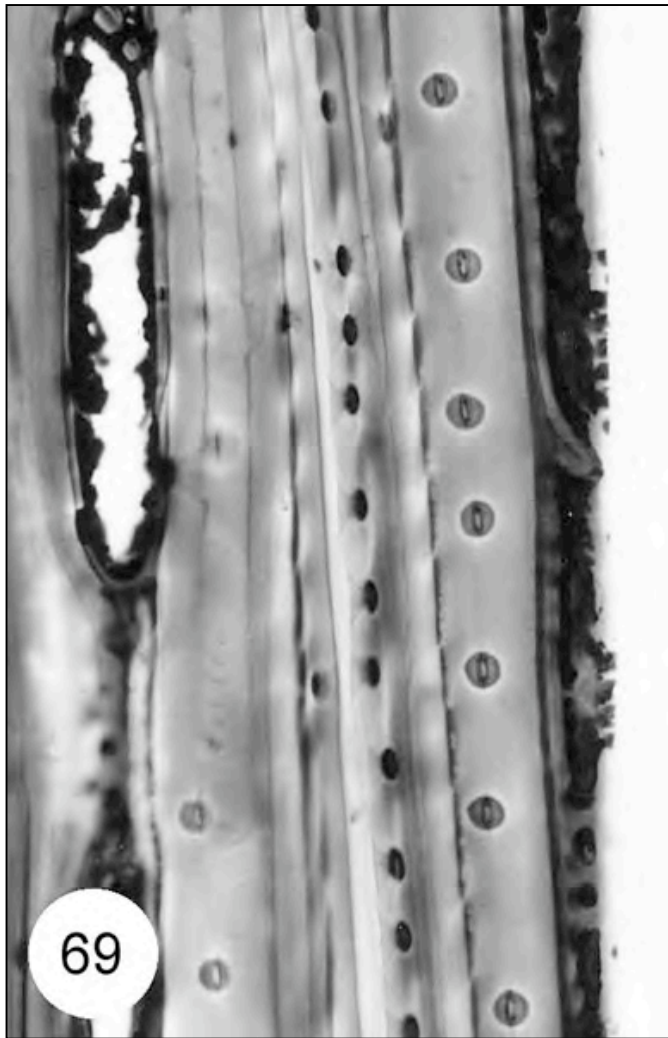


Populus sp. (Salicaceae) D. Grosser



Clematis vitalba (Ranunculaceae) D. Grosser

Feature 62. Fibres with distinctly bordered pits = fibres (or fibre-tracheids or ground tissue tracheids) with bordered pits with chambers over 3 μm in diameter.



Illicium cambodianum (Illiciceae)
H.P Wilkinson, Kew

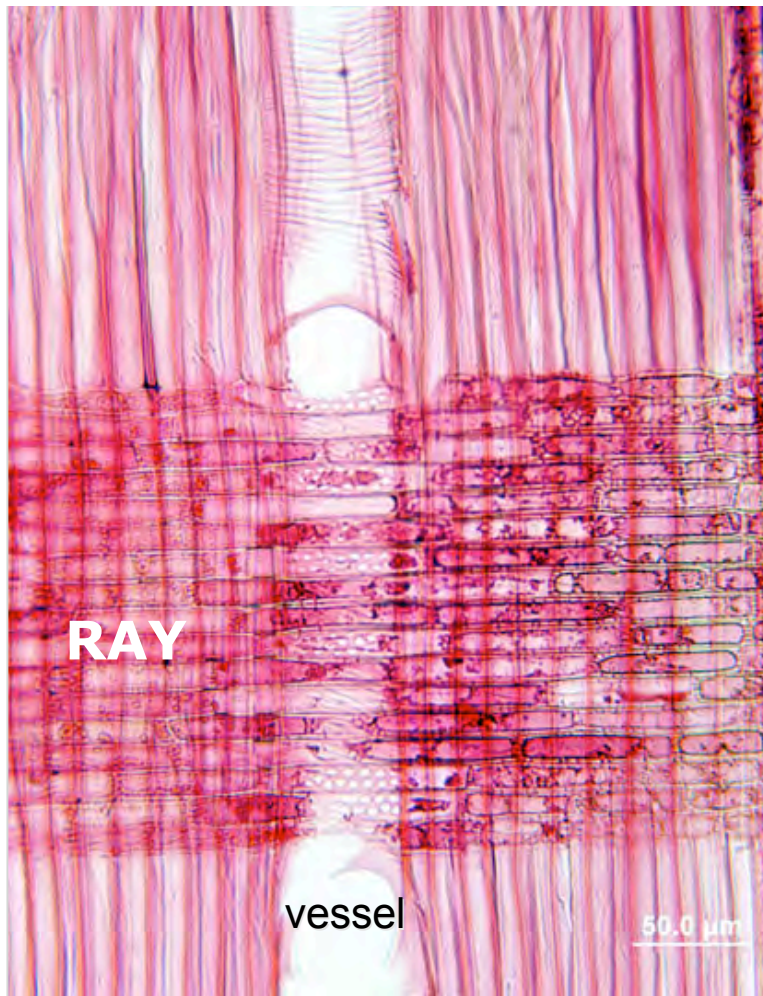


Xanthophyllum lanceatum (Polygalaceae)
Bridgwater & Baas. 1982. IAWA Bulletin

Comments: In some woods, two types of fibres with respect to wall pitting (both features 61 and 62 present) may occur.

Fiber pits usually are more common on radial walls than on tangential walls.

Shown here *Acer*, which has fibers with simple to minutely bordered pits (feature 61). Fiber pits are barely visible as slits in radial section, and not apparent in tangential section.



Radial section

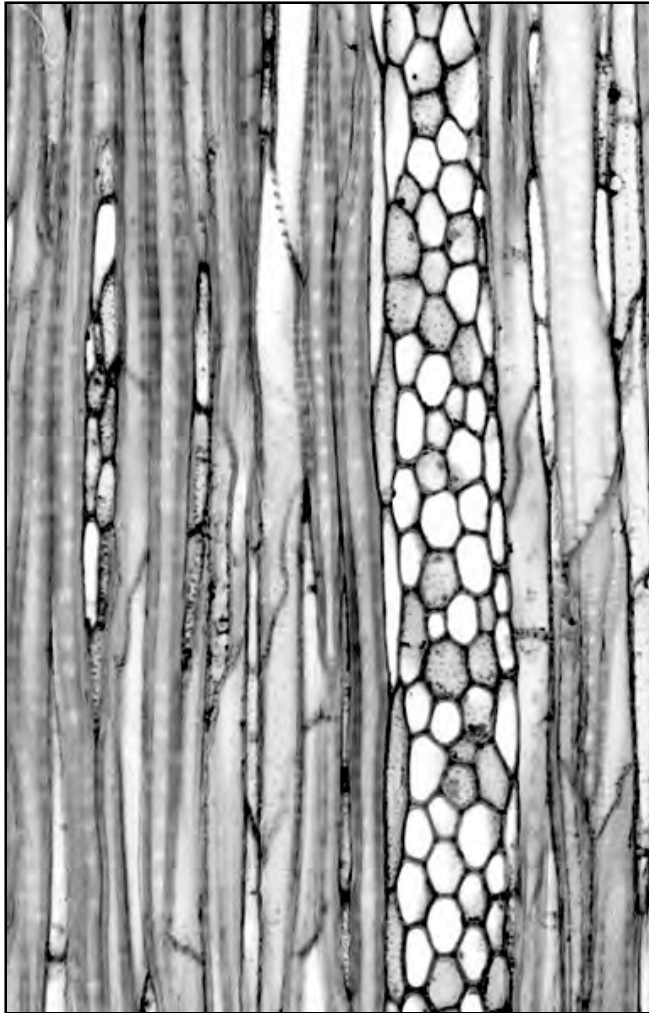
E.A. Wheeler



Tangential section

E.A. Wheeler

Feature 63. Fibre pits common in both radial and tangential walls = fibre pits, either bordered or simple, common in radial and tangential walls.

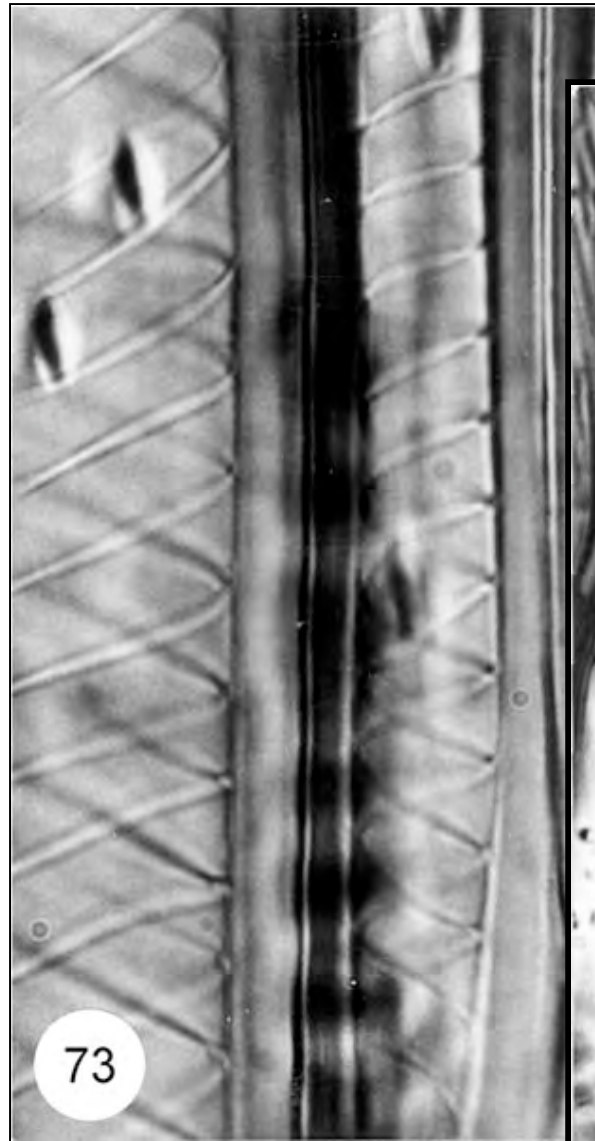


Tangential section.
Garrya fadyena (Garryaceae)
S. Noshiro

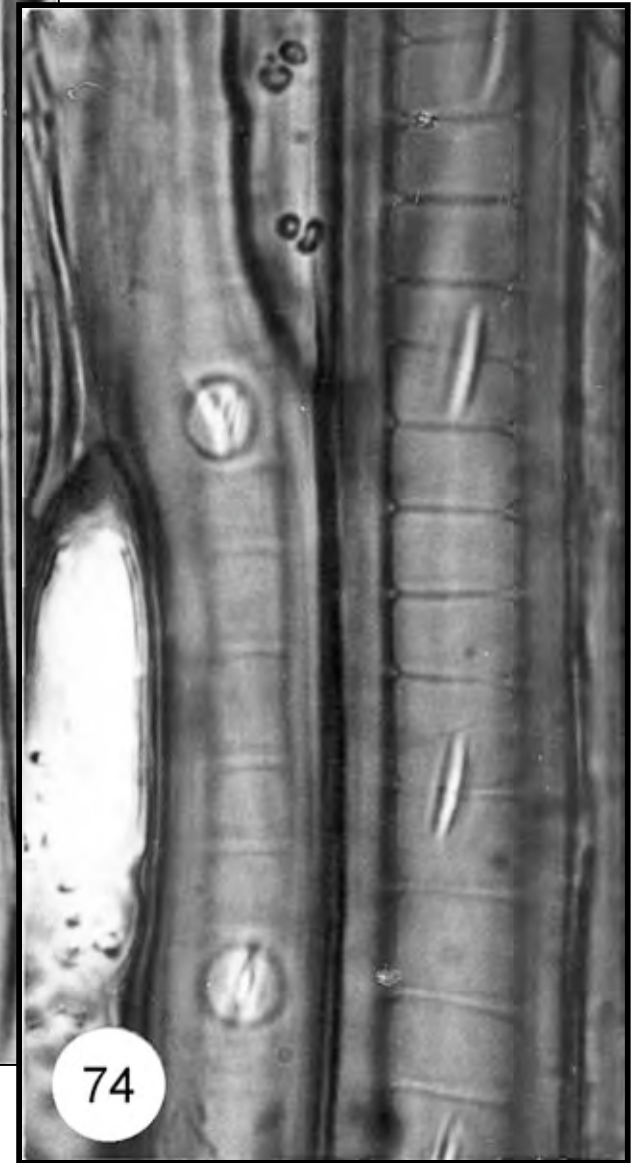


Radial section: Scalariform perforation plates and vessel elements with helical thickenings also present. S. Noshiro

Feature 64.
Helical
thickenings
(spiral
thickenings) in
ground tissue
fibres = ridges
on the inner
face of the fiber
wall in a roughly
helical pattern.

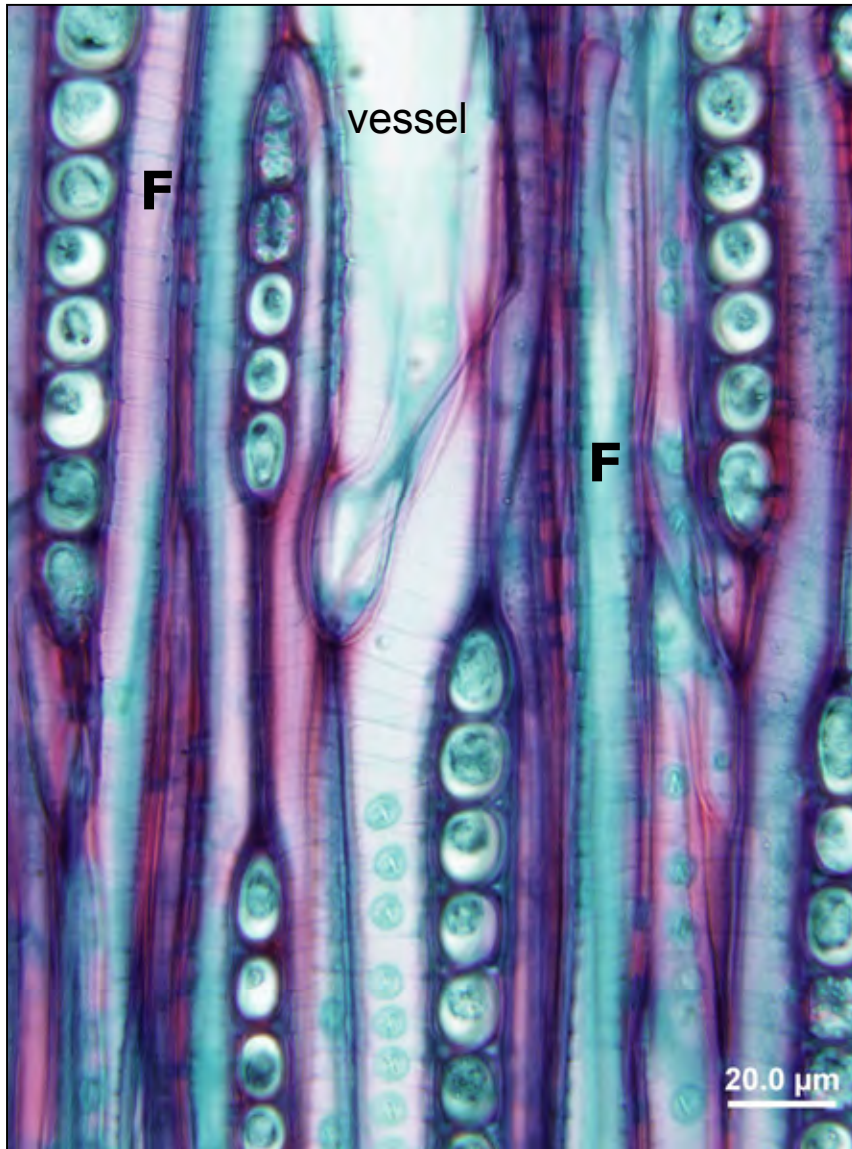


Ilex cinerea
(Aquifoliaceae)
Baas 1973. Blumea



Ilex chinensis (Aquifoliaceae)
Baas 1973. Blumea

Feature 64. Helical thickenings in ground tissue fibres

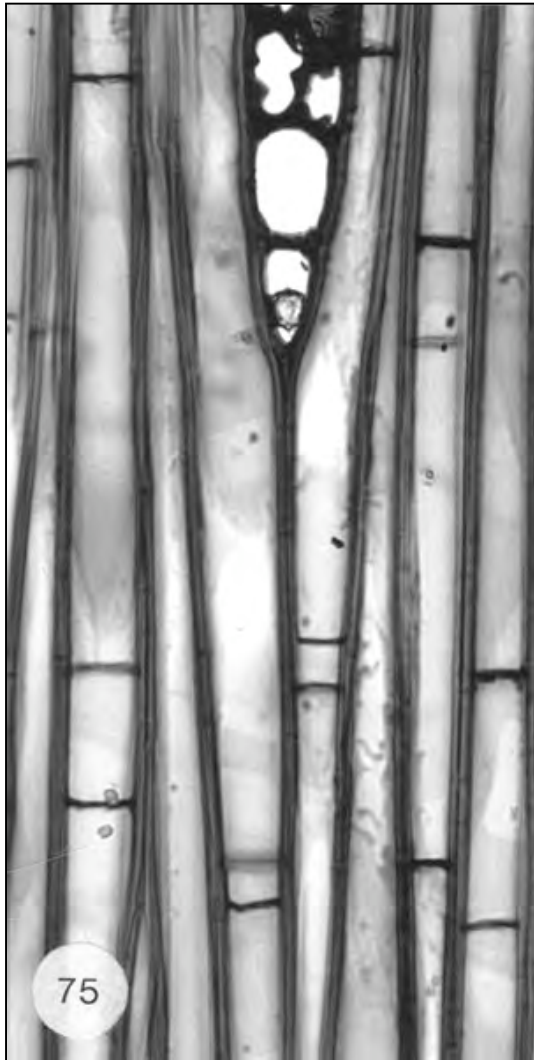


Comments: Fibers (F) with helical thickenings usually occur in woods that also have helical thickenings in the vessel elements . . [Feature 64] occur[s] much more frequently in temperate woods than in tropical woods.

Feature 64 is rare, in less than 3% of descriptions in the InsideWood database.

Euonymus sieboldianus (Celastraceae)
E.A. Wheeler

Feature 65. Septate fibres present = fibres with thin, unpitted, transverse wall(s). In some woods all fibres are septate (examples below and next slide)



Aucoumea klaineana
(Burseraceae) P.E. Gasson

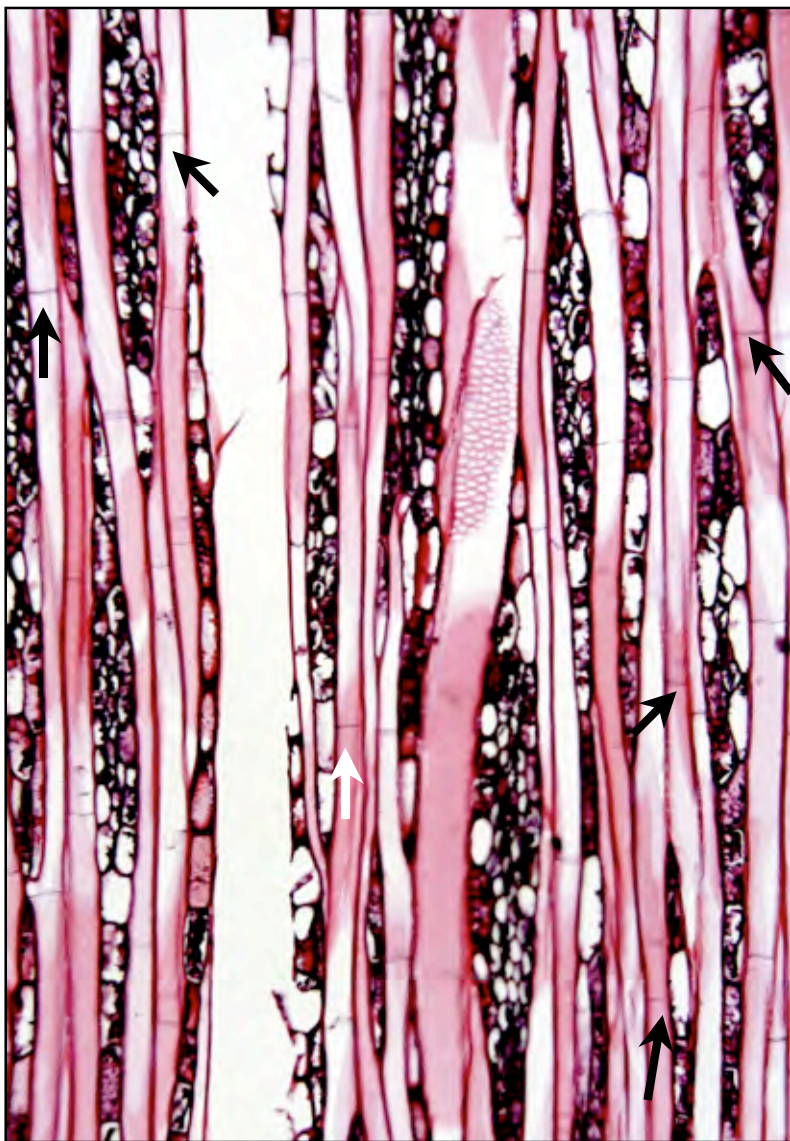


Aucoumea klaineana
(Burseraceae) K. Ogata



Aglaia littoralis (Meliaceae)
K. Ogata

Feature 65. Septate fibres present



Bischofia javanica FFPRI, Tsukuba, Japan
(Phyllanthaceae)

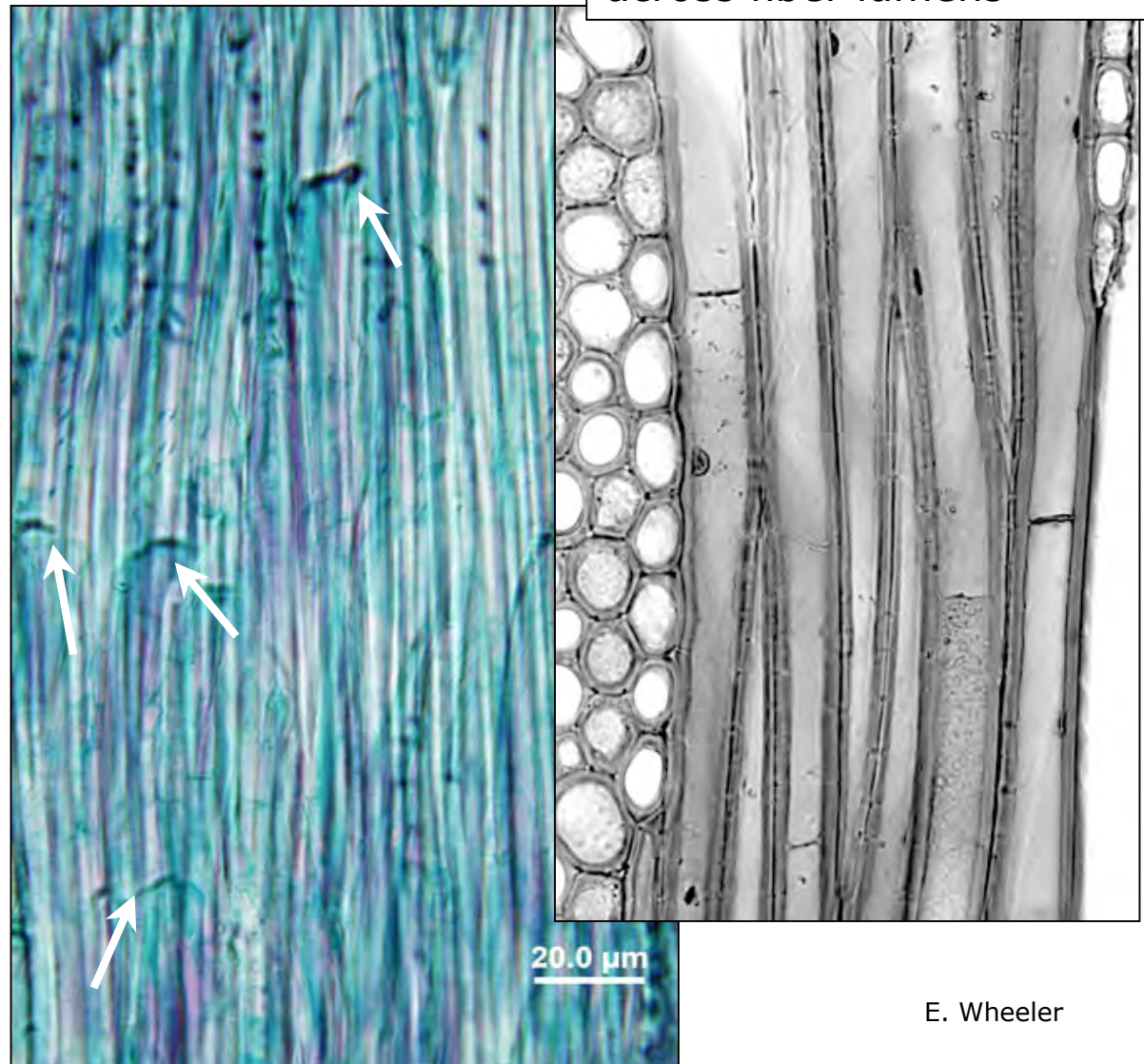


Canarium euphyllum RMCA, Tervuren, Belgium
(Burseraceae)

Caution. Do not confuse torn cell wall fragments, ..gum deposits, fungal hyphae, or tyloses in fibers (some Magnoliaceae, Lauraceae) with septa.

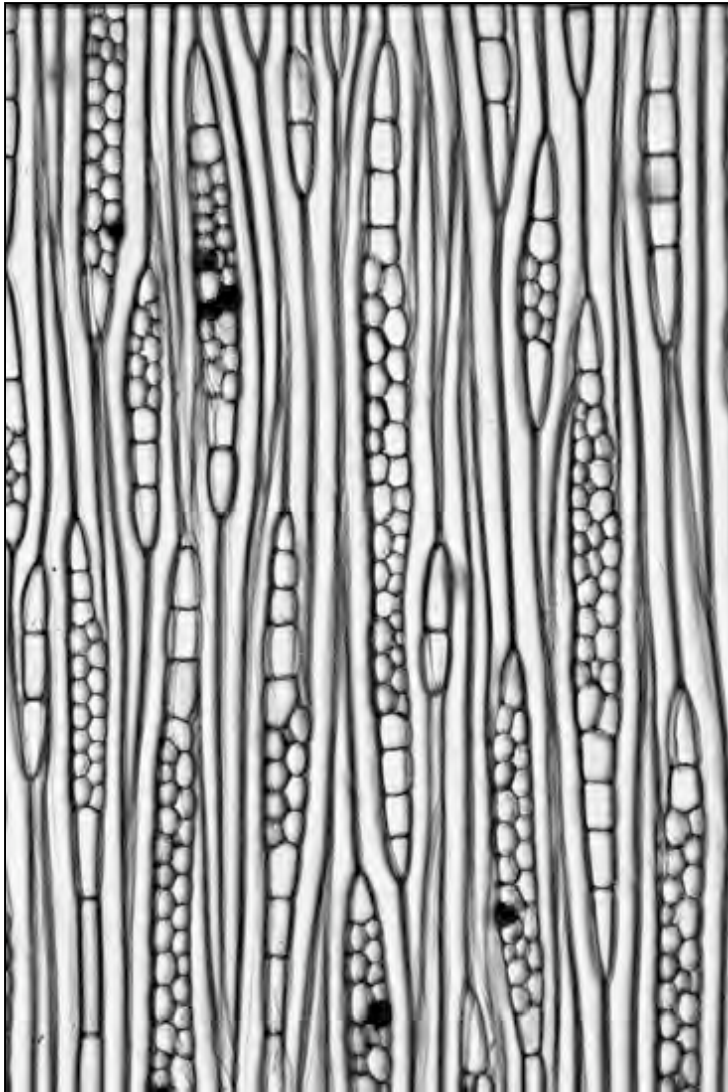
Torn cell wall fragments (arrows) and fungal hyphae often are **not** transverse across fiber lumens and traverse more than 1 fiber.

Septa are transverse across fiber lumens



E. Wheeler

Feature 66. Nonseptate fibres present = fibres without septa. In some woods all fibres are nonseptate (examples below). AP indicates axial parenchyma strands adjacent to the vessels (V).

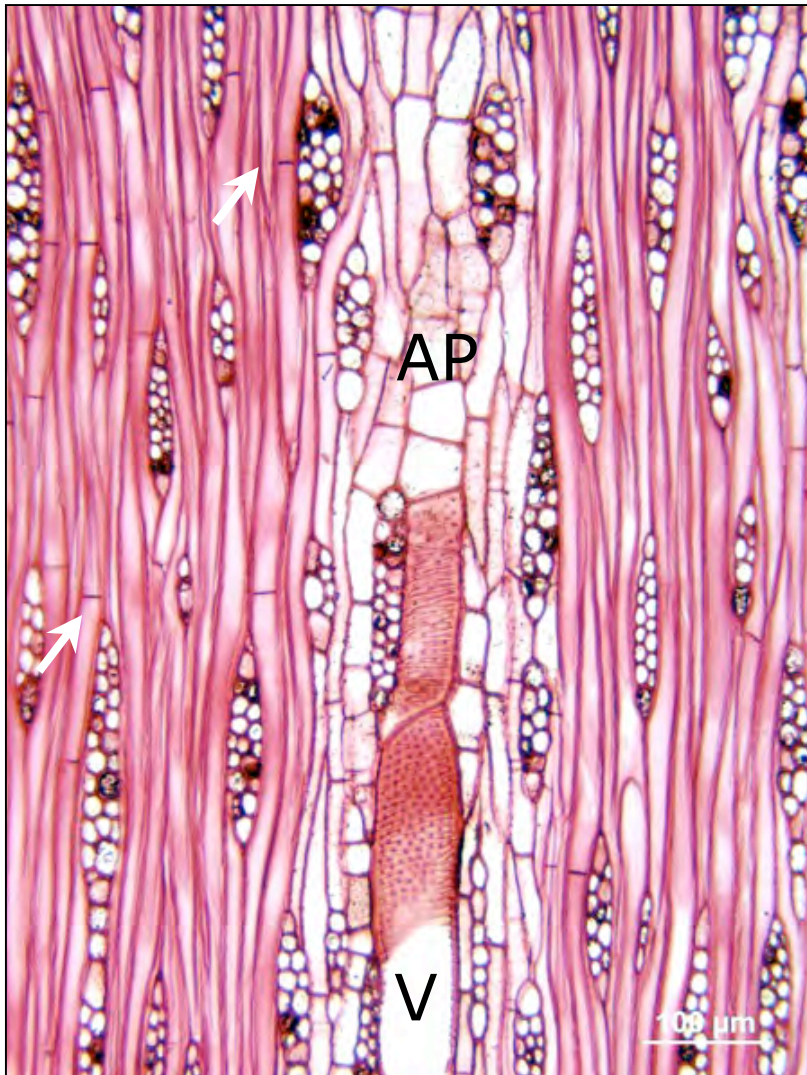


Coelocaryon preusii (Myristicaceae)
RMCA, Tervuren, Belgium

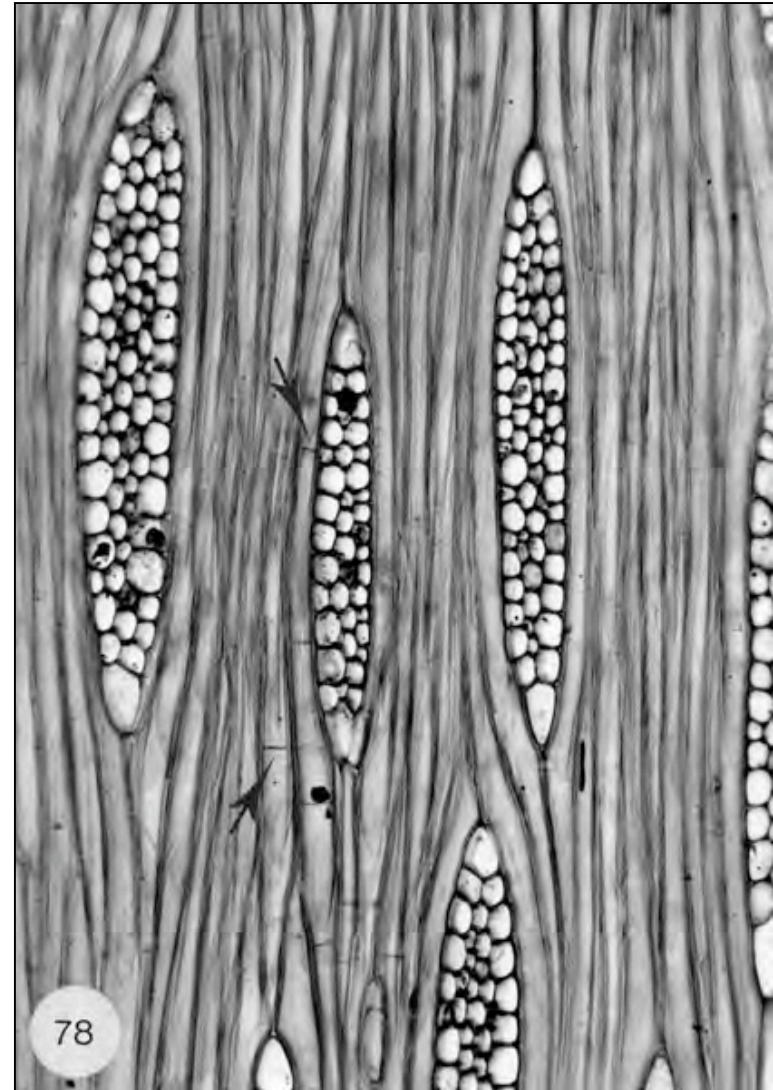


Brousonettia kasinoki (Moraceae)
FFPRI, Tsukuba, Japan

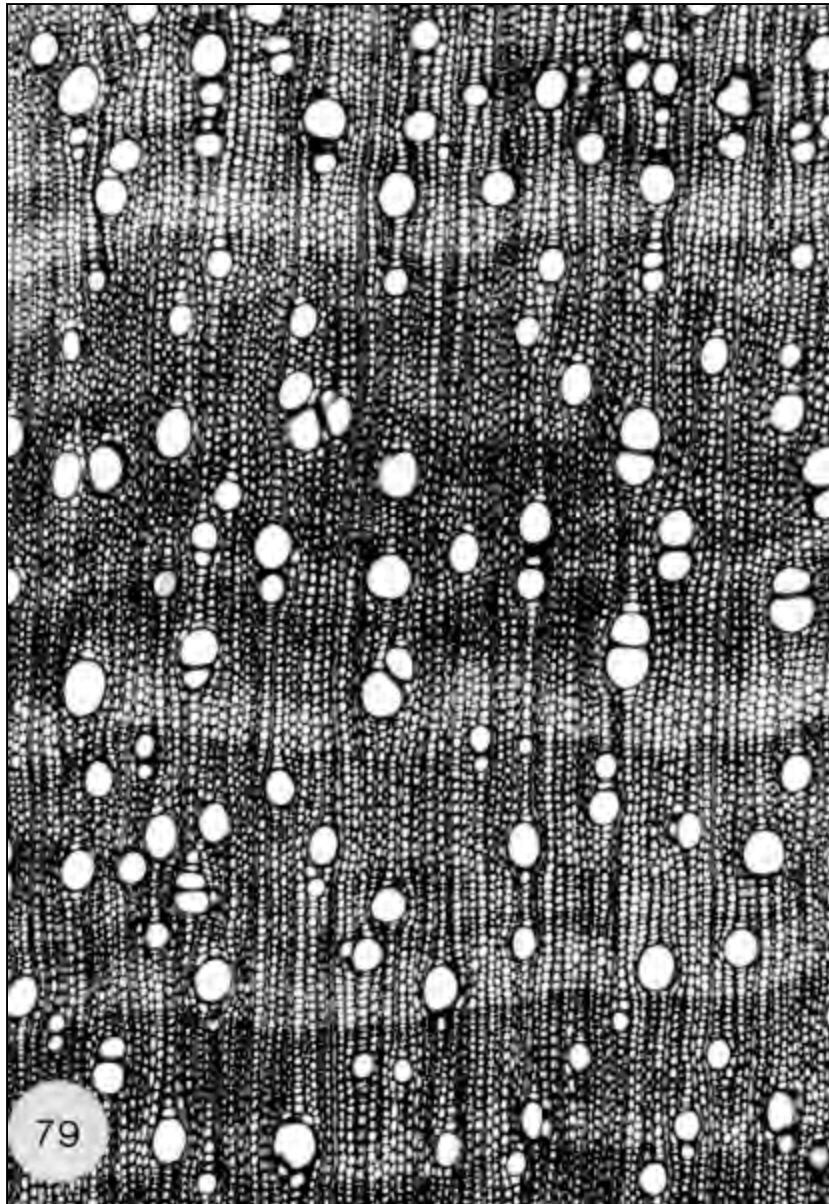
In some woods, both septate and nonseptate fibres occur together. Arrows point to septa. Photo on left shows axial parenchyma strands (AP) associated with vessel (V)



Umbellularia californica (Lauraceae)
E.A. Wheeler



Swietenia macrophylla (Meliaceae)
P.E. Gasson



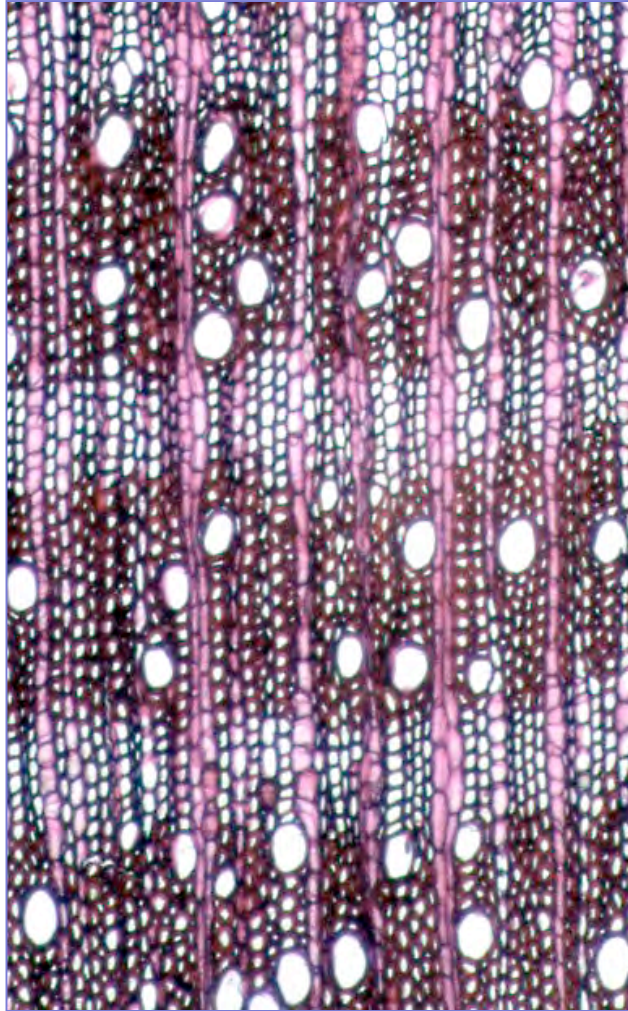
Feature 67. Parenchyma-like fibre bands alternating with ordinary fibres = tangential bands of relatively thin-walled fibres alternating with bands of thicker-walled fibres.

Feature of limited occurrence, mostly in

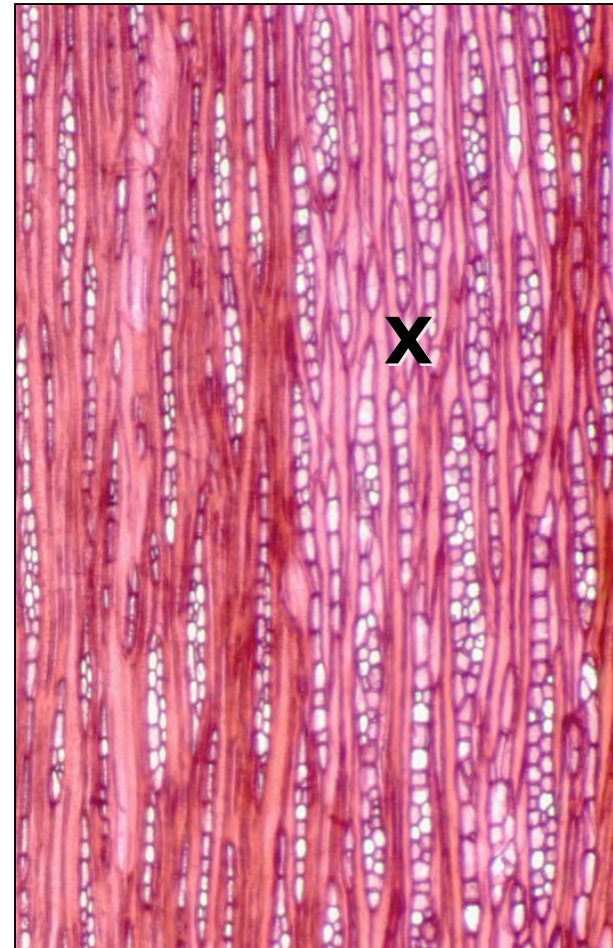
- Celastraceae,
- Lythraceae,
- Melastomataceae,
- Sapindaceae.

Physocalymma scaberrimum (Lythraceae)
P.E. Gasson

Feature 67. Parenchyma-like fibre bands alternating with ordinary fibres. Use longitudinal sections (preferably radial) to check whether bands are composed of fibres or of parenchyma.



Maytenus senegalensis (Celastraceae) M.E. Bakker

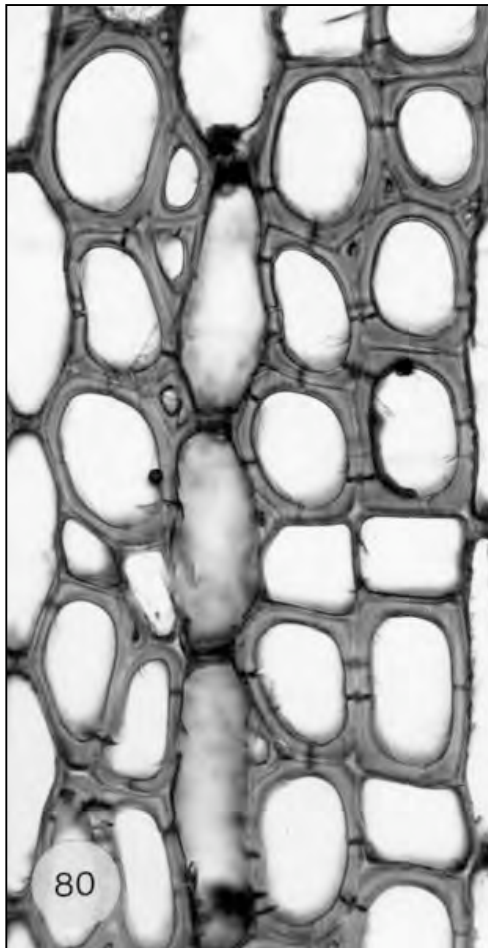


Tangential section showing region with thin-walled fibres (X) and region with thicker walled fibres (on left).

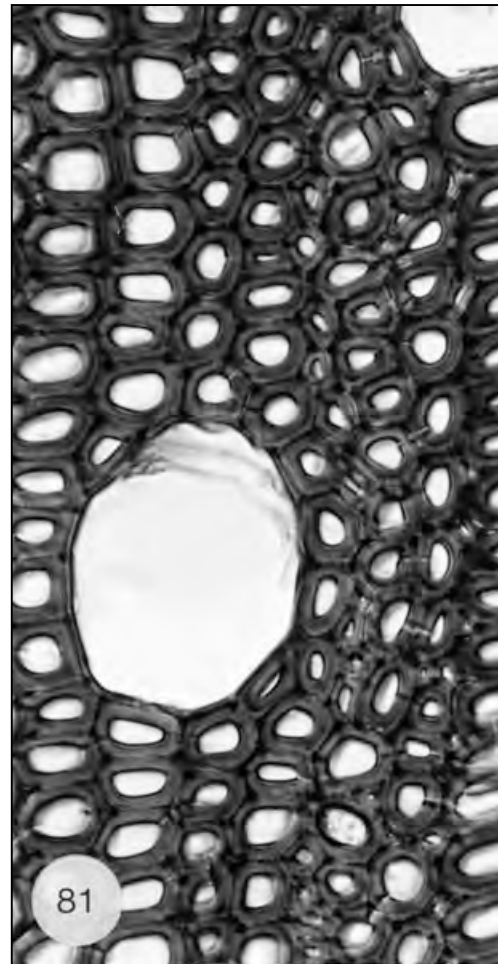
Feature 68. Fibres very thin-walled = fibre lumina 3 or more times wider than the double wall thickness.

Feature 69. Fibres thin- to thick-walled = fibre lumina less than 3 times the double wall thickness, and distinctly open.

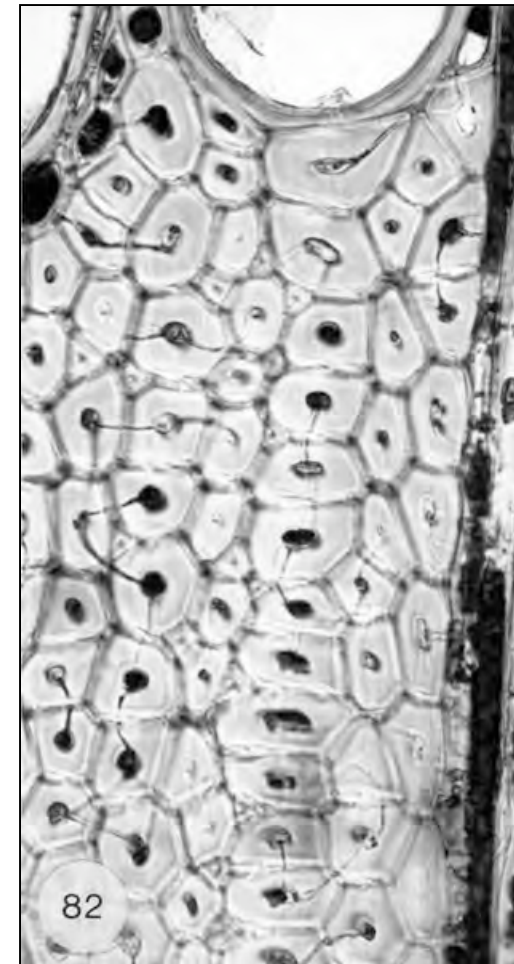
Feature 70. Fibres very thick-walled = fibre lumina almost completely closed.



Neubergia corynocarpa
(Loganiaceae) P.E. Gasson

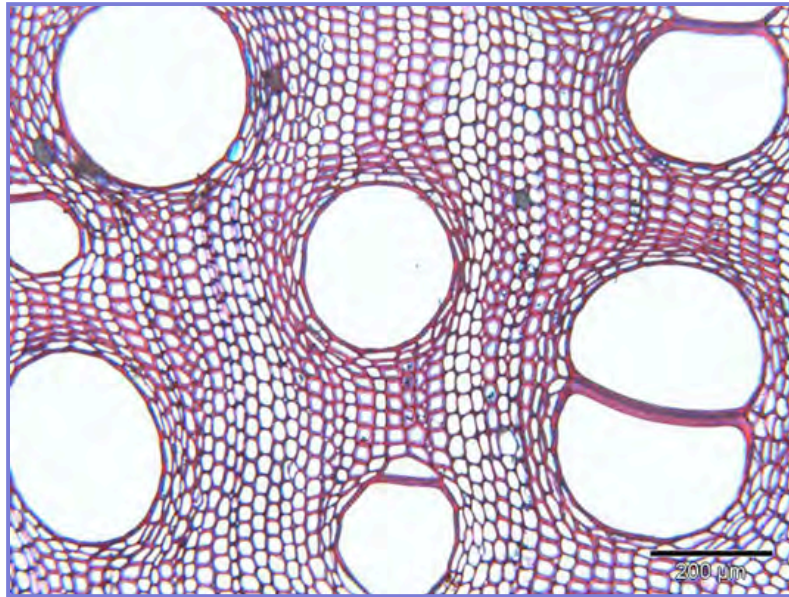


Michelia compressa
(Magnoliaceae) P.E. Gasson

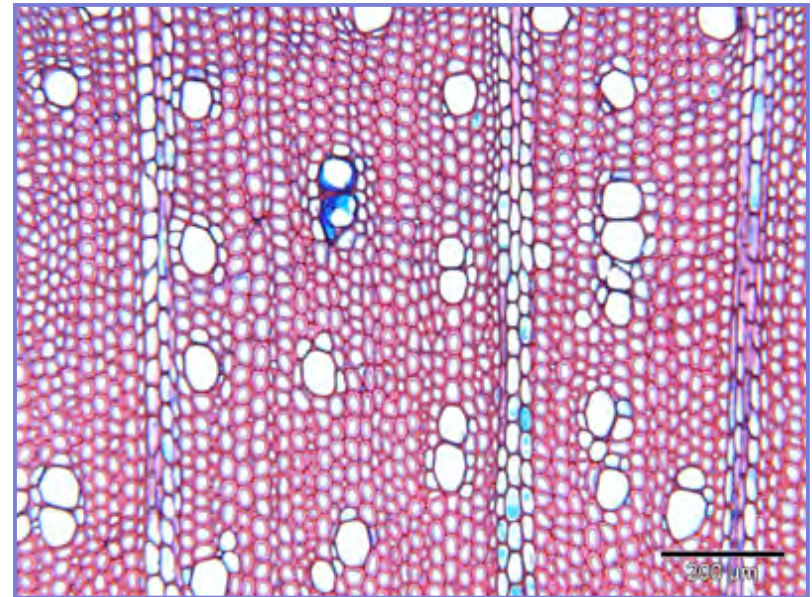


Rhizophora mangle
(Rhizophoraceae) P.E. Gasson

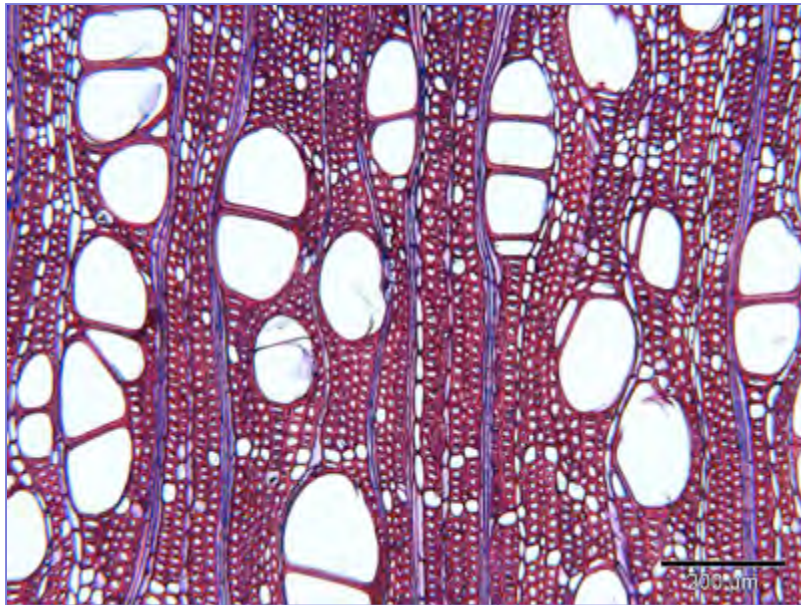
FIBRE WALL THICKNESS Very thin, thin to thick, very thick



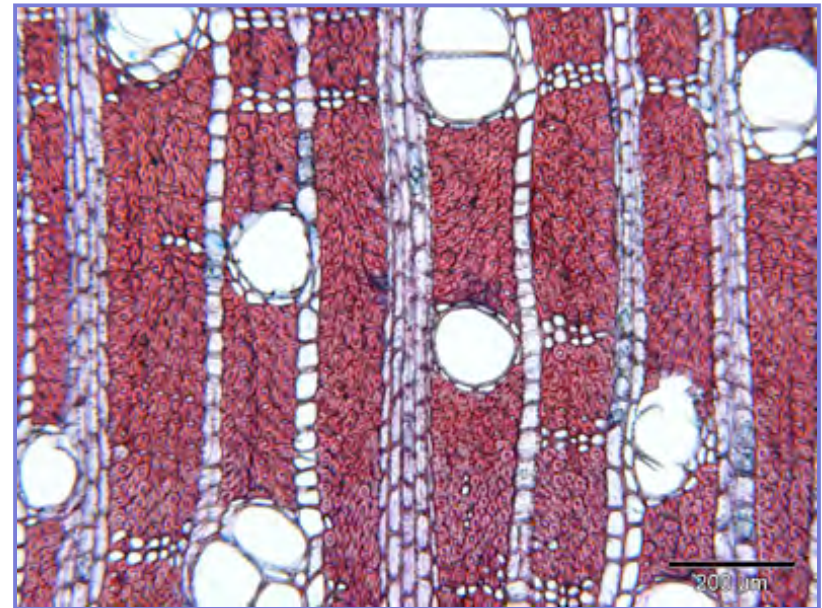
Souroubea sympetala (Marcgraviaceae) F. Lens



Conomorpha peruviana (Myrsinaceae) F. Lens

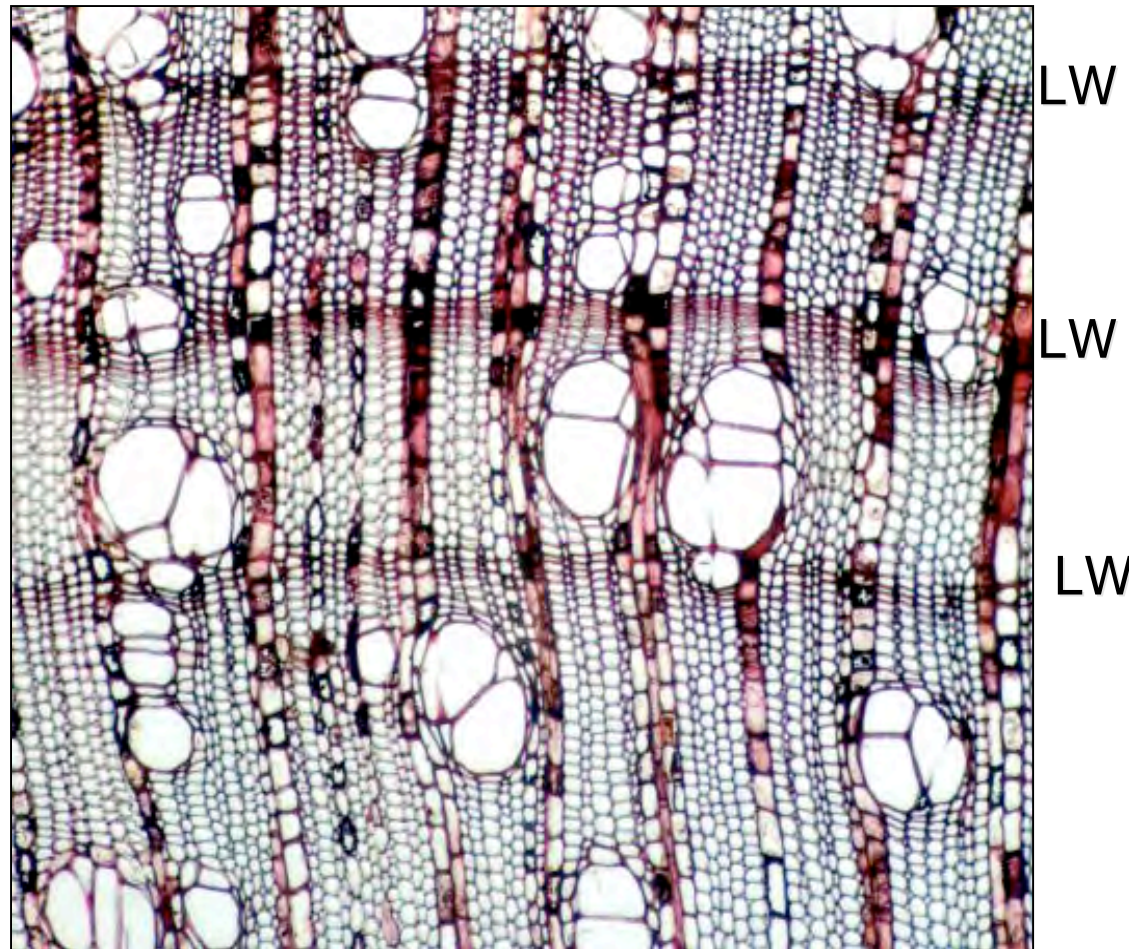


Chrysophyllum lacourtianum (Sapotaceae) F. Lens



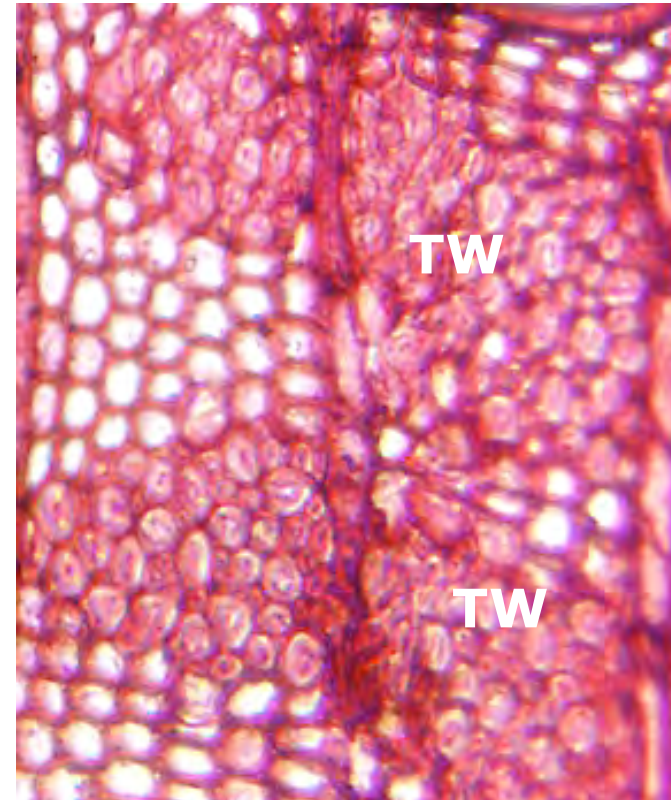
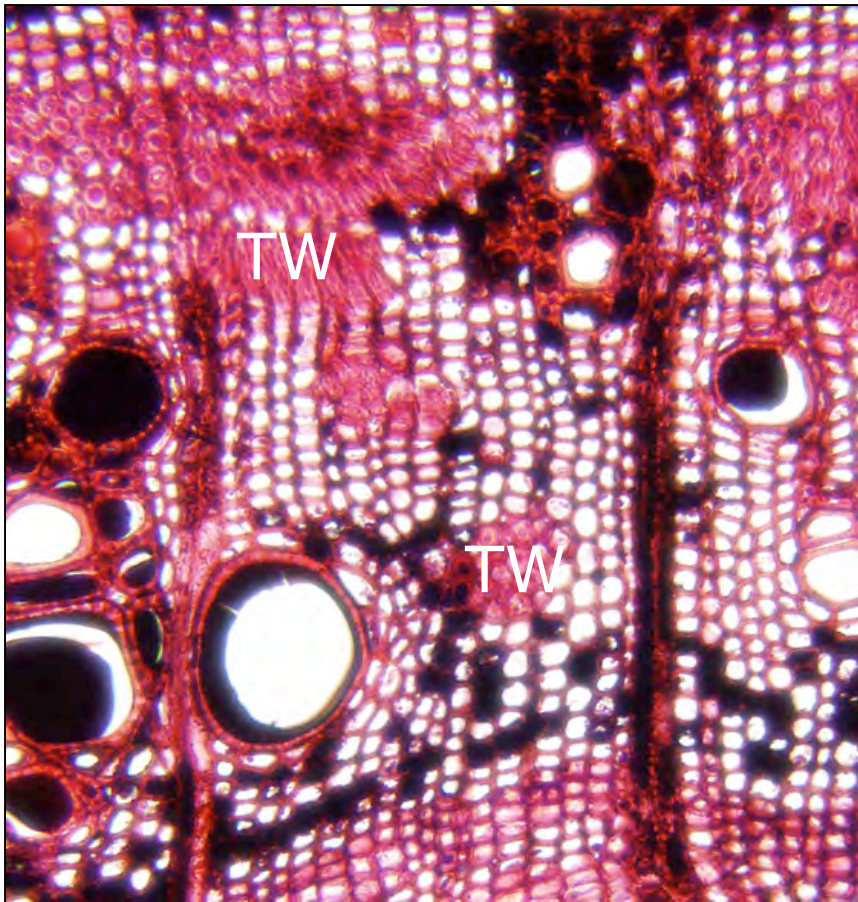
Barringtonia longisepala (Lecythidaceae) F. Lens

Caution. In woods with distinct growth rings, fibre wall thickness changes throughout the growth ring, and may be particularly thick at the end of the growth ring. When describing fibre wall thickness, do **not** consider these last latewood fibres (LW).



Meliosma pinnata (Sabiaceae) M.E. Bakker

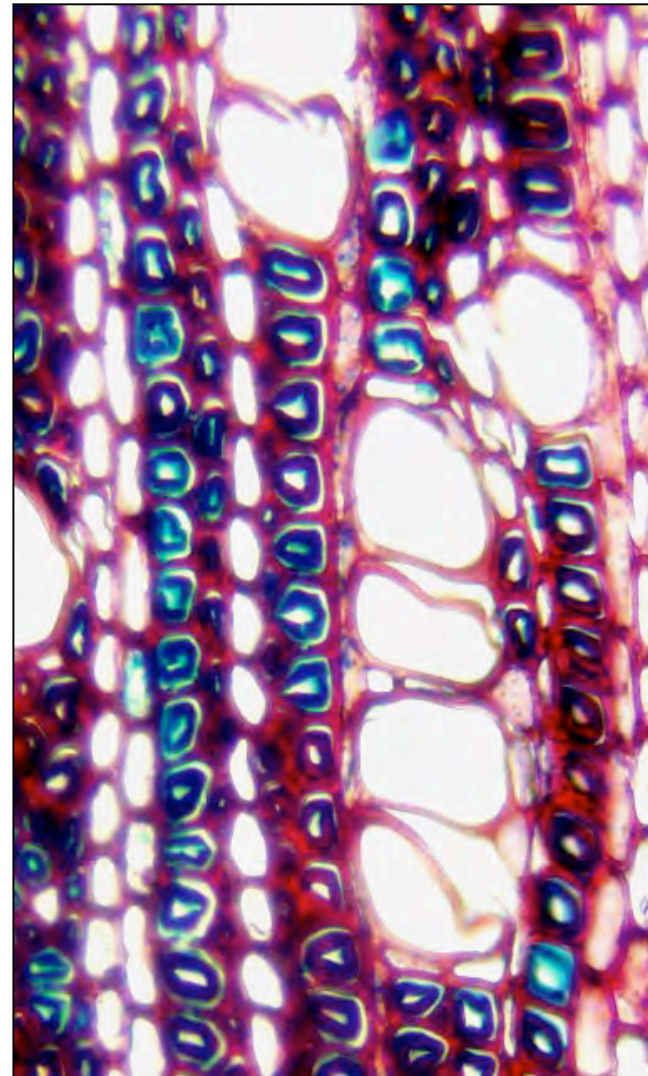
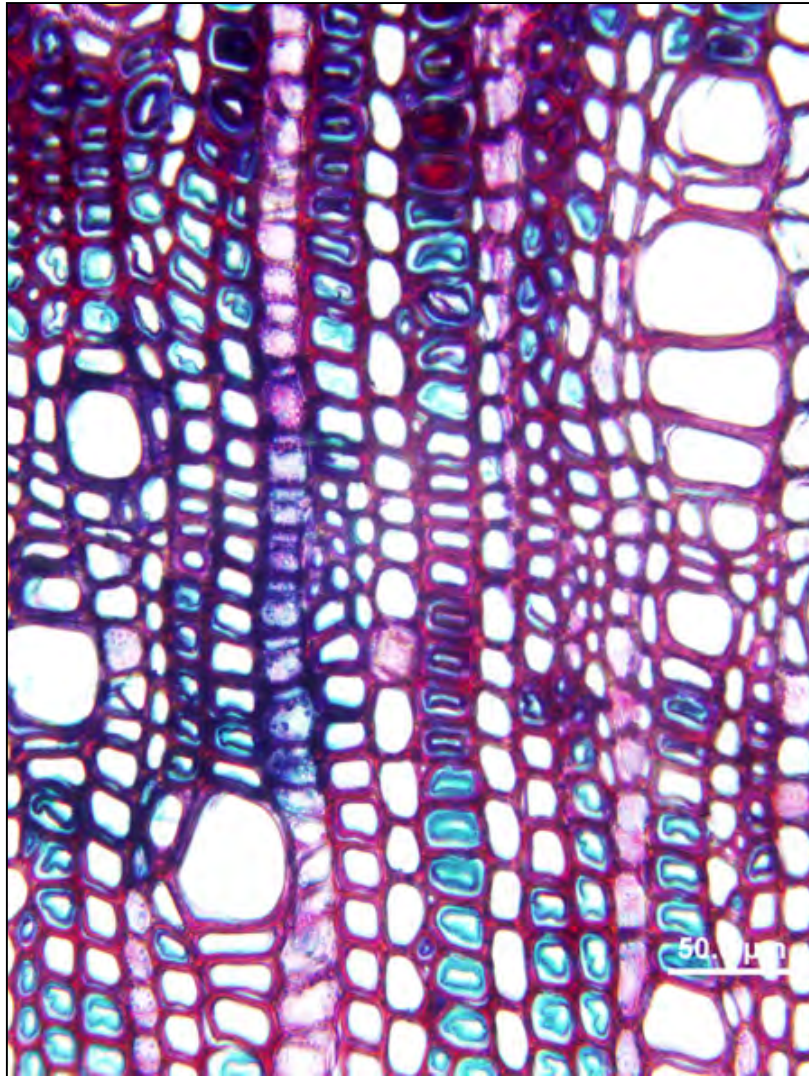
Caution. Do **not** describe wall thickness for gelatinous fibres (=tension wood fibres = TW), which usually have thick walls with an unligified gelatinous layer [gelatinous layers usually separate from the other cell wall layers during sectioning].



Acacia greggii (Leguminosae-Mimosodieae)
With patches of gelatinous fibres (TW)

E.A. Wheeler

Unlignified gelatinous layers stained blue-green.
Note gelatinous layers separated from rest of cell wall.



Cleistanthus cunninghamii (Phyllanthaceae) E.A. Wheeler