

IAWA Hardwood Feature List

Definitions and Illustrations
For **Features 13-39.**

Numbered photographs are from
IAWA Committee. 1989. IAWA Bulletin
n.s. 10(3): 219-332.

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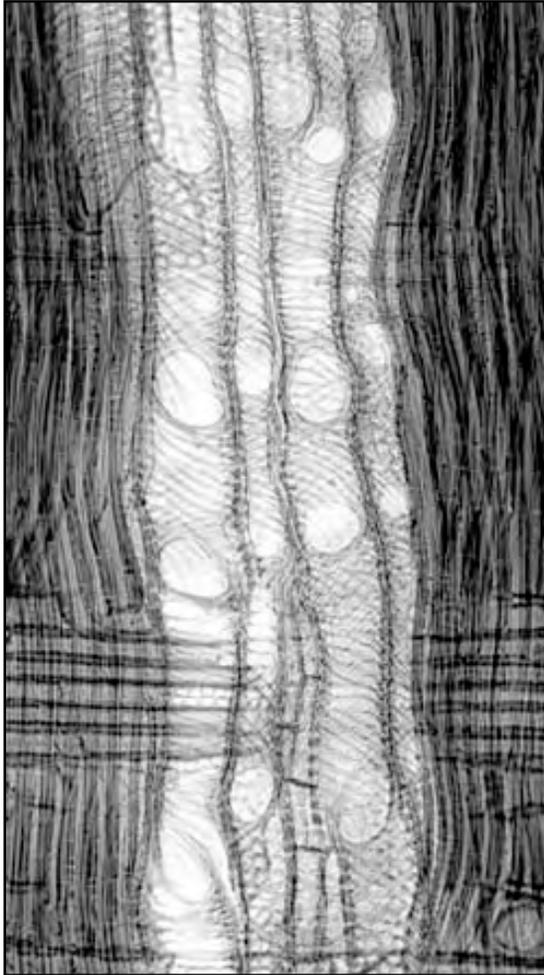
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<http://bio.kuleuven.be/sys/iawa>

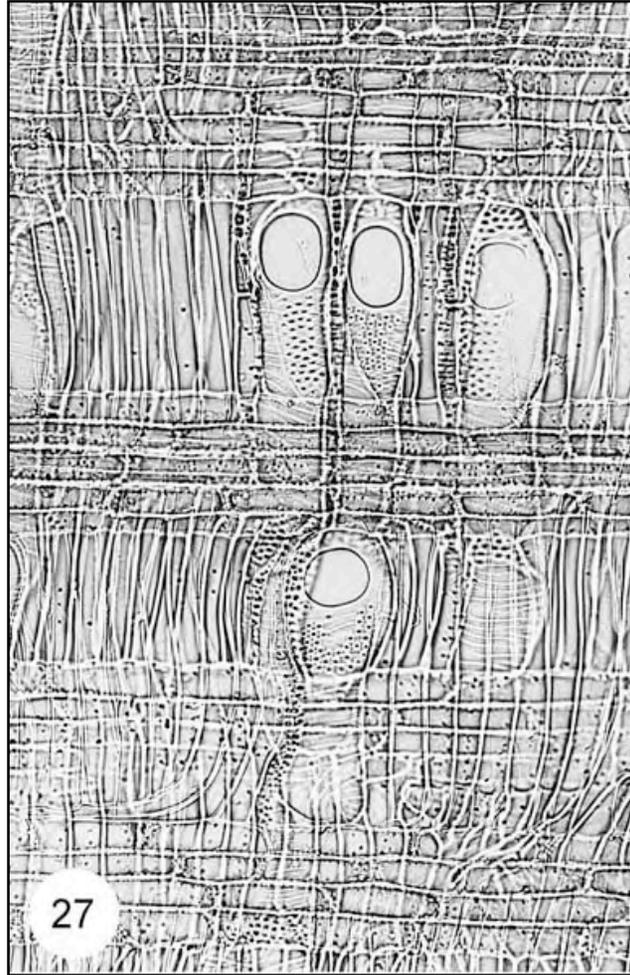
Slide Set Assembled by E.A.Wheeler

PERFORATION PLATES

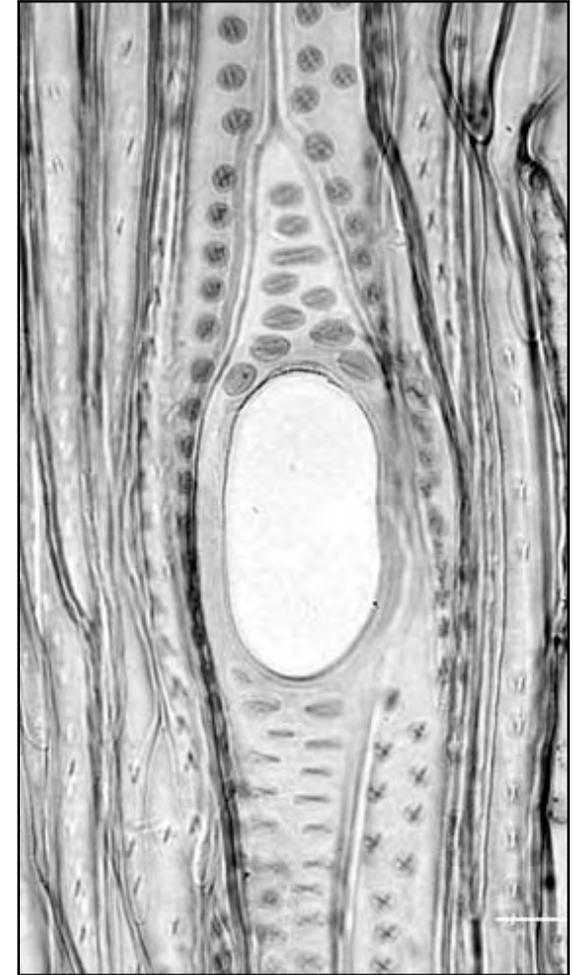
Feature 13. Simple perforation plate = a perforation plate with a single circular or elliptical opening.



Pistacia atlantica:
P. Baas (Anacardiaceae)

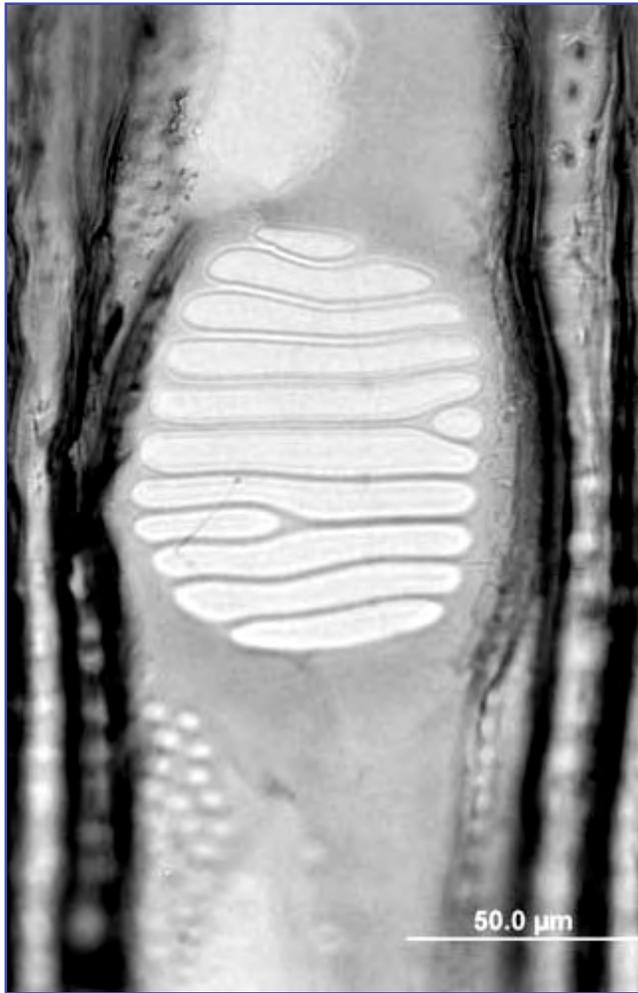


Aesculus hippocastanum:
D. Grosser (Sapindaceae)

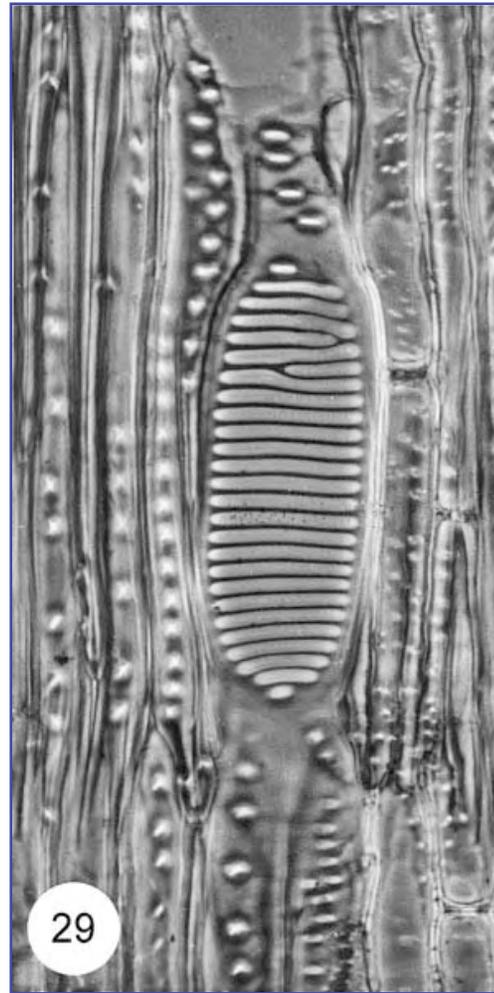


Chrysolepis chrysophylla:
E.A. Wheeler (Fagaceae)

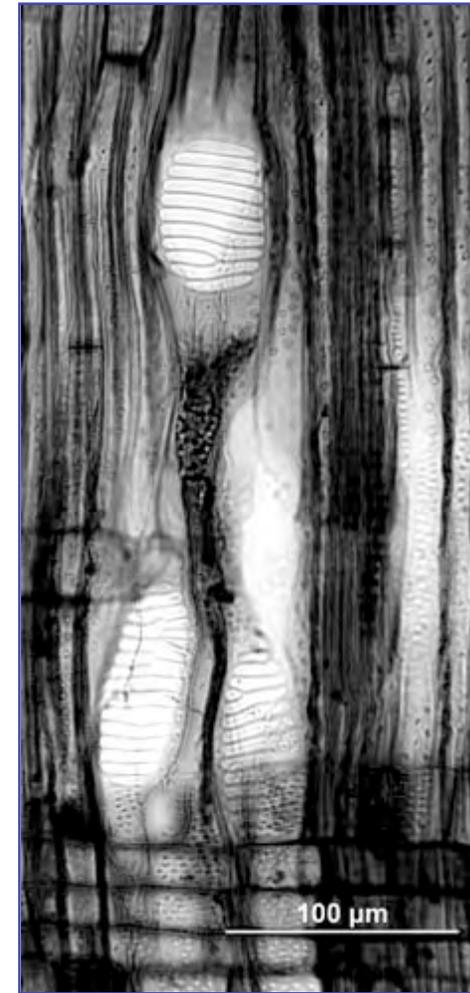
Feature 14. Scalariform perforation plate = a perforation plate with elongated and parallel openings separated by one to many mainly unbranched bars.



Melliodendron xylocarpum
E.A. Wheeler (Styracaceae)



Staphylea pinnata
D. Grosser (Staphyleaceae)



Halesia macgregorii
E.A. Wheeler (Styracaceae)

- 15. Scalariform perforation plates with ≤ 10 bars
- 16. Scalariform perforation plates with 10 – 20 bars
- 17. Scalariform perforation plates with 20 – 40 bars
- 18. Scalariform perforation plates with ≥ 40 bars



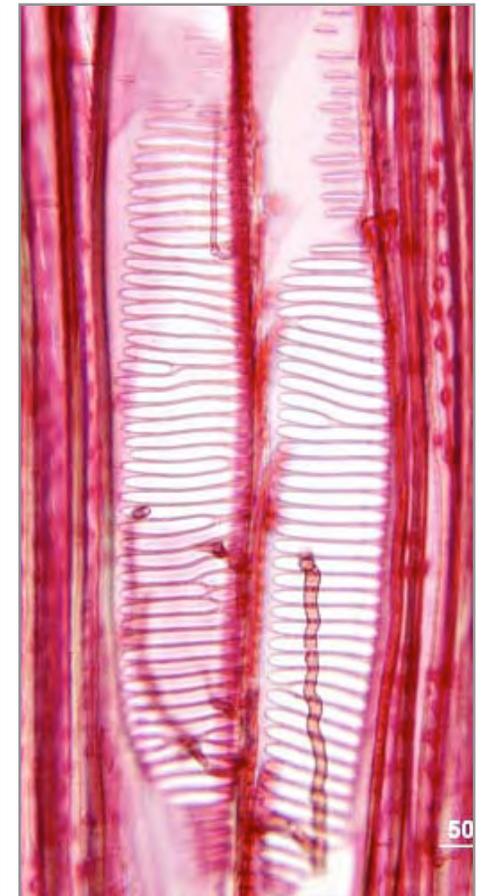
Corylus californica
(Corylaceae)



Halesia macgregorii
(Styracaceae)



Camellia sp.
(Theaceae)



Hedycarya cupulata
(Monimiaceae)
E.A. Wheeler

During sectioning,
bars in scalariform
perforation plates
often tear out,
especially when the
bars are fine, so
sometimes it may be
difficult to count
the number of bars.

Euptelea polyandra
E.A. Wheeler (Eupteleaceae)



Feature 19. Reticulate, foraminate, and/or other types of multiple perforation plates.

Reticulate perforation plate = a plate with closely spaced openings separated by wall portions that are much narrower than the spaces between them, or with a profuse and irregular branching of wall portions resulting in a netlike appearance (Fig. 30)

Foraminate perforation plate - a plate with circular or elliptical openings like a sieve; the remaining wall portions can be thicker than in the reticulate type

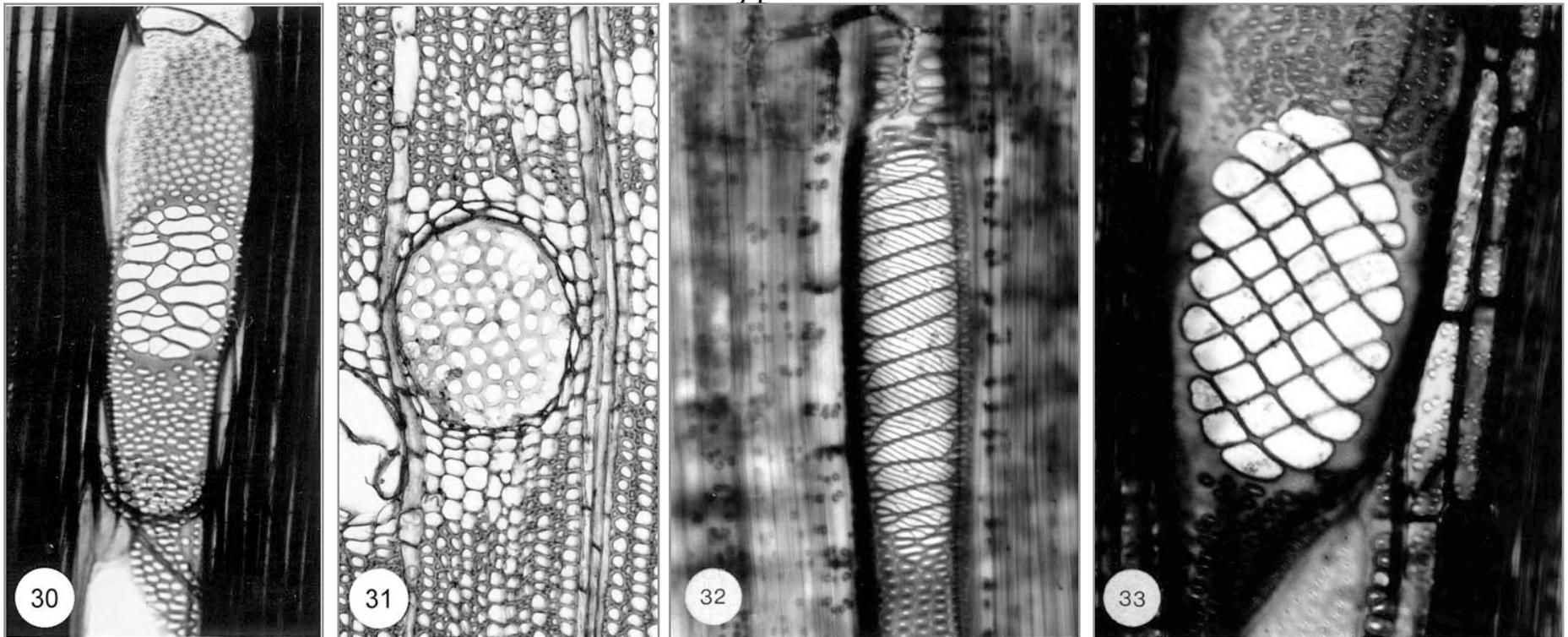
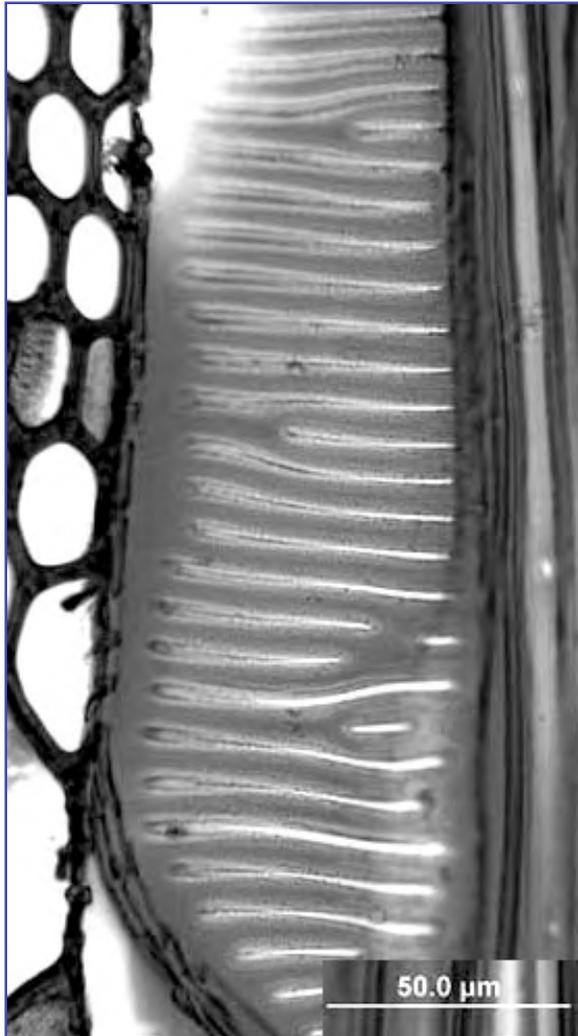


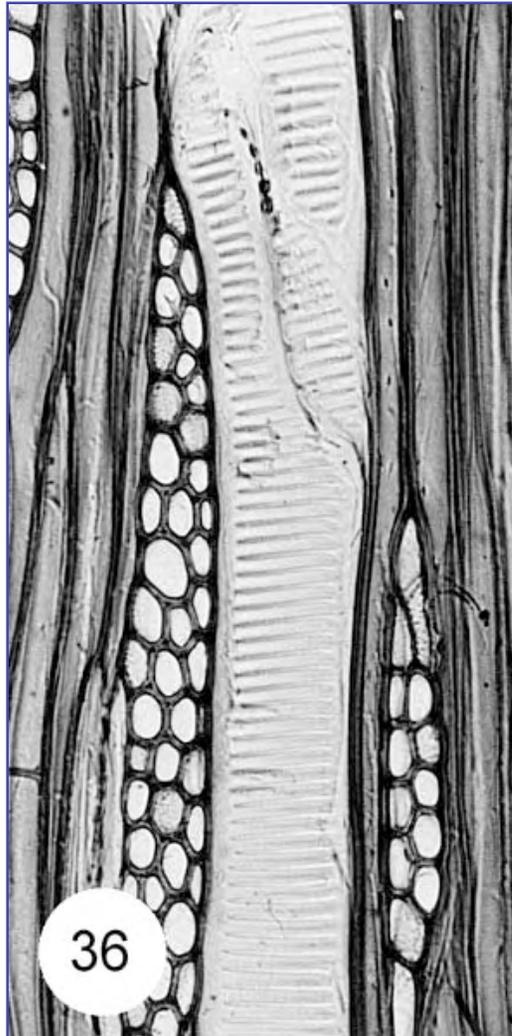
Fig. 30. Reticulate perforation plate. *Didymopanax morototoni*; P.E. Gasson. Fig. 31. Foraminate perforation plate, *Oroxylum indicum*; P.E. Gasson. Fig. 32. Obliquely compound scalariform with anastomosing bars (features 14 + 19), *Iryanthera paraensis*, P.E. Gasson. Fig. 33. Perforation plate regularly reticulate, *Iryanthera juruensis*, P.E. Gasson.

INTERVESSEL PITS: ARRANGEMENT AND SIZE

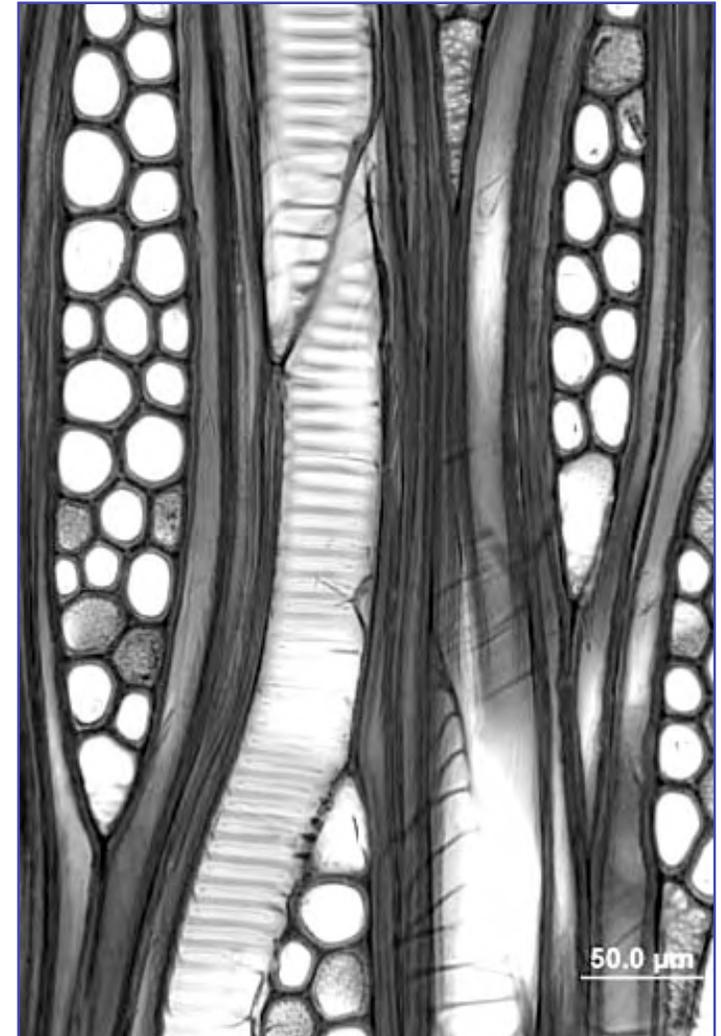
Feature 20. Intervessel pits scalariform = elongated or linear intervessel pits arranged in a ladder-like series.



Michelia alba: E.A. Wheeler
(Magnoliaceae)

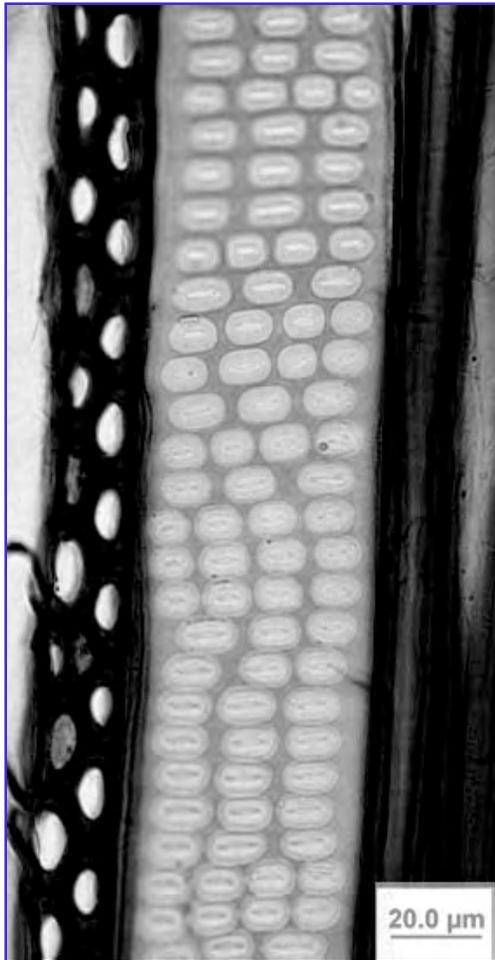


Michelia compressa:
P.E. Gasson (Magnoliaceae)

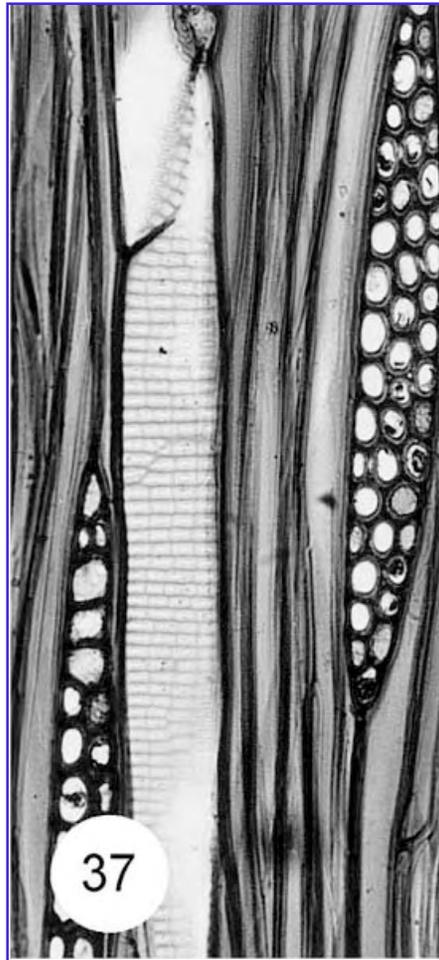


Magnolia grandiflora: E.A. Wheeler
(Magnoliaceae)

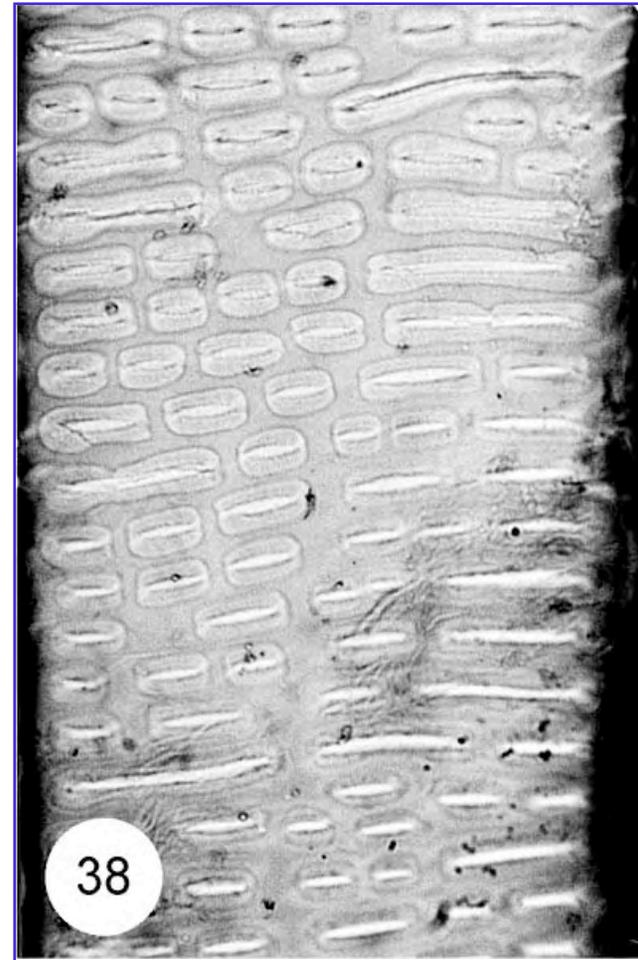
Feature 21. Intervessel pits opposite = intervessel pits arranged in short to long horizontal rows, i.e. rows orientated transversely across the length of the vessel.



Liriodendron tulipifera:
E.A. Wheeler (Magnoliaceae)

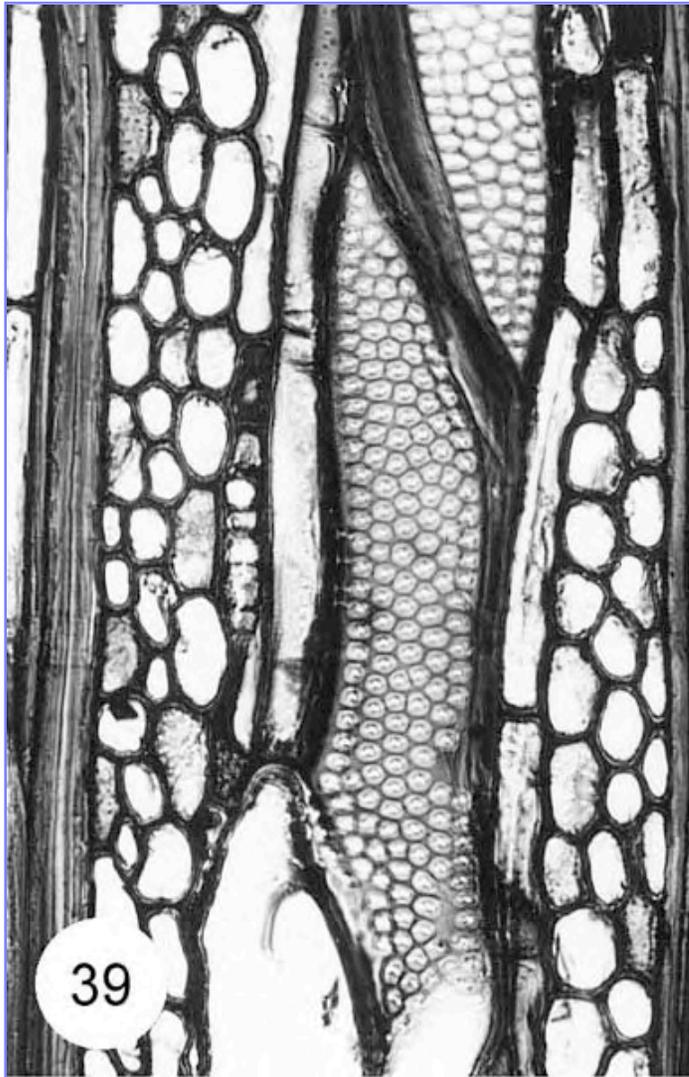


Liriodendron tulipifera:
P.E. Gasson

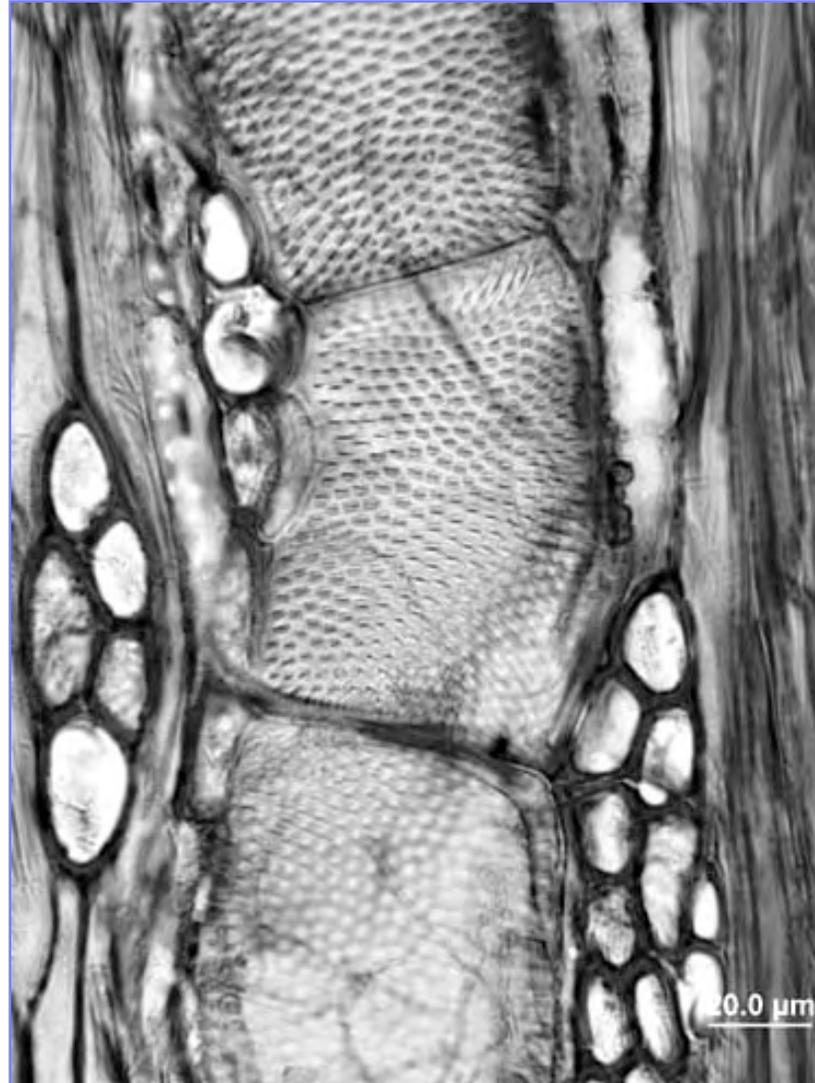


Ilex laurina: Intervessel pits scalariform to opposite. P. Baas. Blumea 1973. (Aquifoliaceae)

Feature 22. Intervessel pits alternate = intervessel pits arranged in diagonal rows.

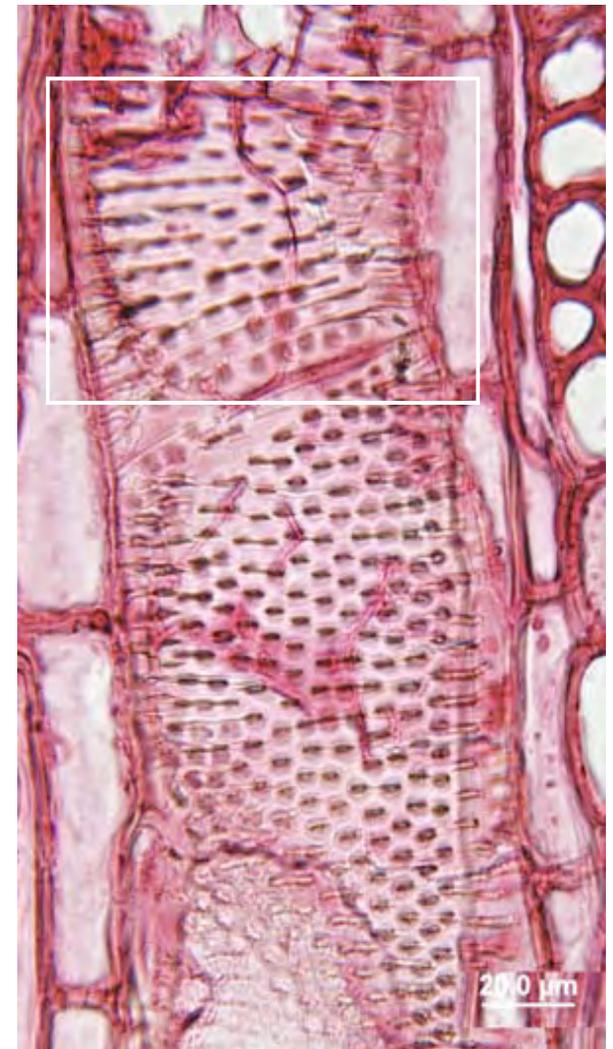
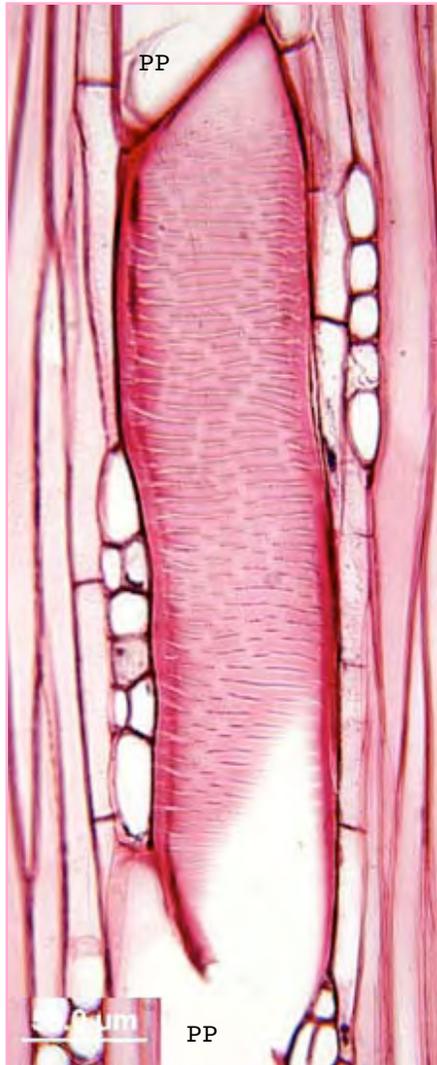


Mappia racemosa. I.W. Bailey
Bailey-Wetmore Laboratory Plant Anatomy and
Morphology, Harvard University
(Icacinaceae)



Schoepfia chrysophylloides : E.A. Wheeler
(Schoepfiaceae)

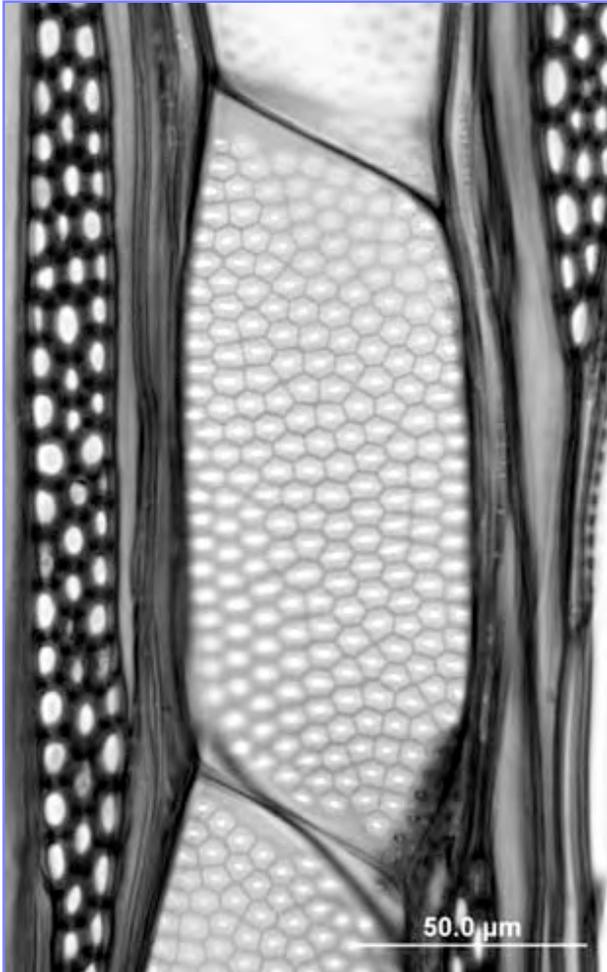
Feature 22. Intervessel pits alternate



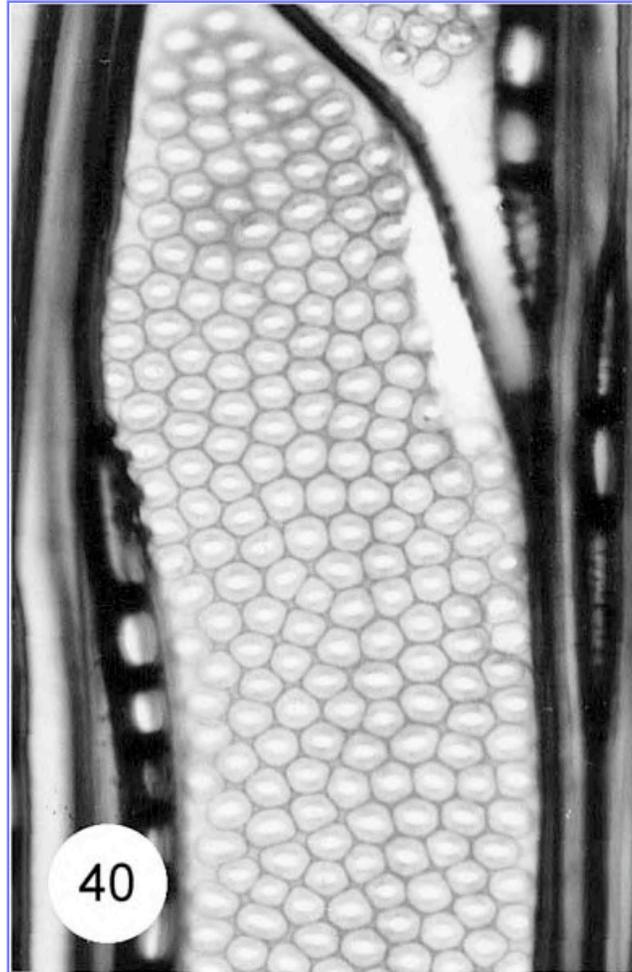
Zanthoxylum clava-herculis. Take care not to confuse alternate pits with coalescent apertures with scalariform intervessel pits. Note simple perforation plates (pp).
E.A. Wheeler (Rutaceae)

Citharexylum fruticosum. Alternate intervessel pits with coalescent apertures, coalescent apertures common within boxed area. E.A. Wheeler. (Verbenaceae)

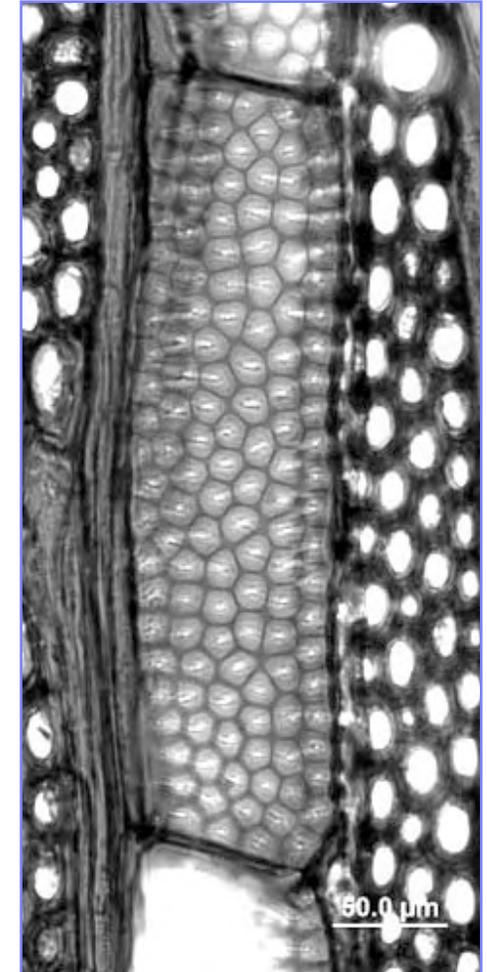
Feature 23. Shape of alternate intervessel pits
polygonal = outline of intervessel pits, as seen in surface view (longitudinal sections), angular and with more than 4 sides.



Acer negundo: E.A. Wheeler
(Sapindaceae)

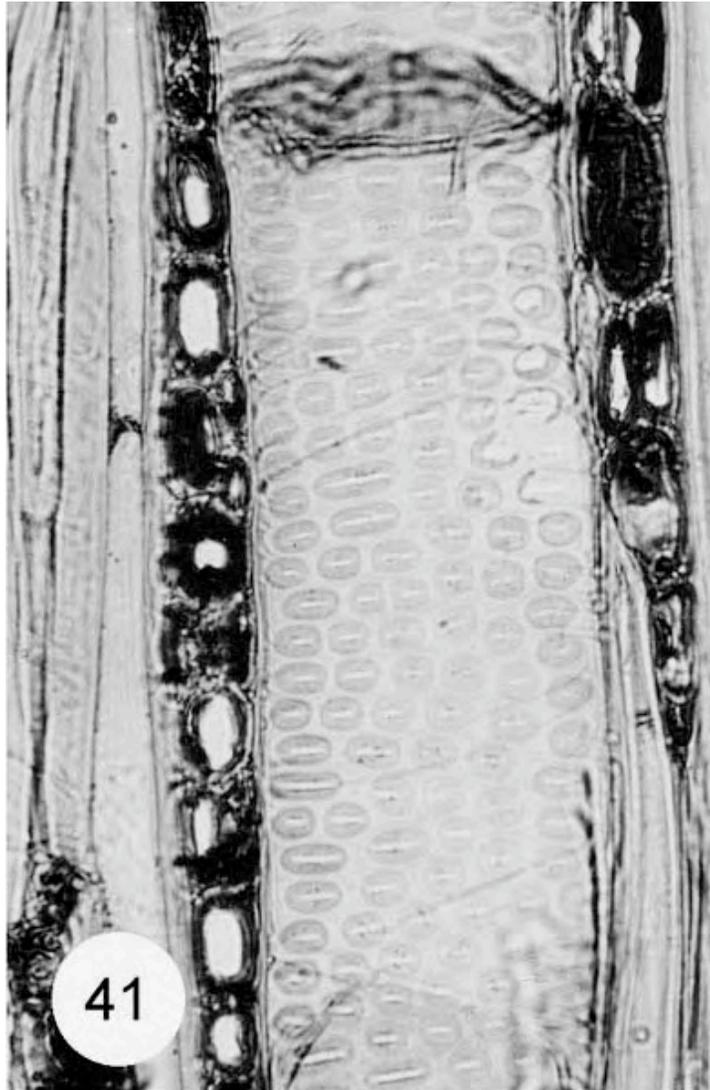


Salix sp. P.E. Gasson
(Salicaceae)

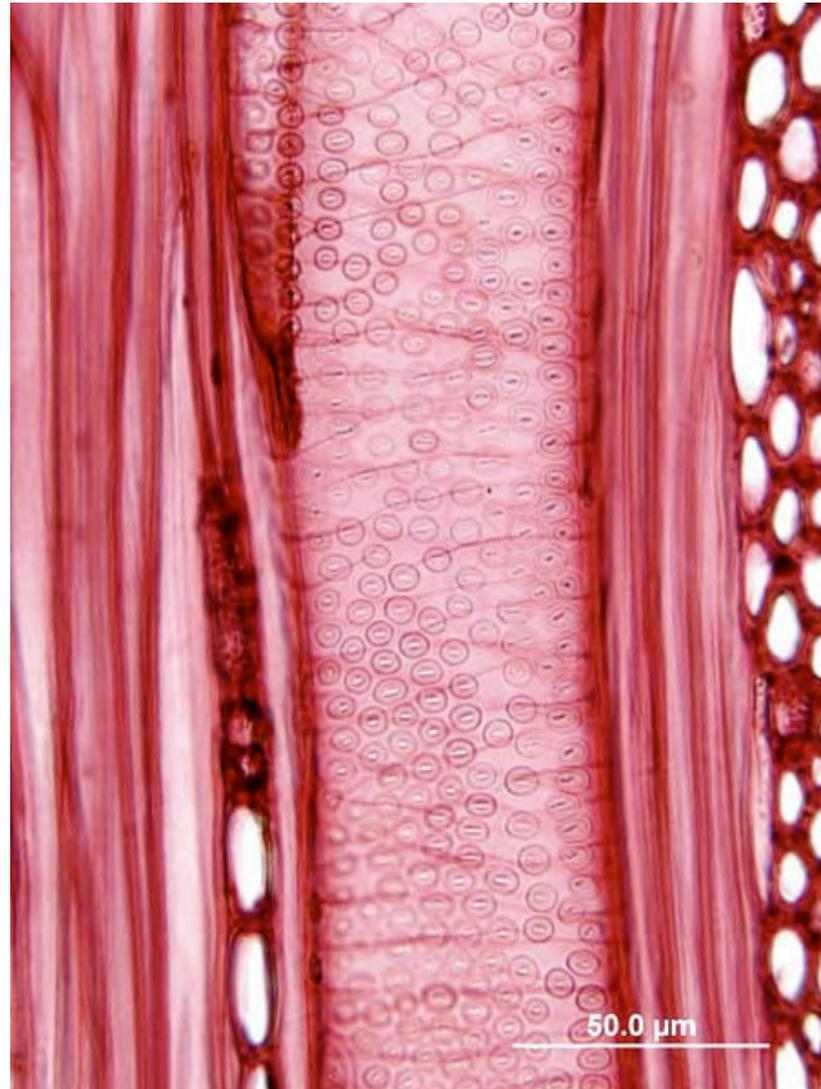


Phyllostylon rhamnoides:
E.A. Wheeler (Ulmaceae)

**Absence of Feature 23.
Shape of intervessel pits oval to circular.**



Nothofagus moorei: K. Ogata
(Nothofagaceae)



Prunus emarginata: E.A. Wheeler
(Rosaceae)

Intervessel pit size (alternate and opposite) = horizontal diameter of a pit chamber at the broadest part.

24. Minute: $\leq 4 \mu\text{m}$

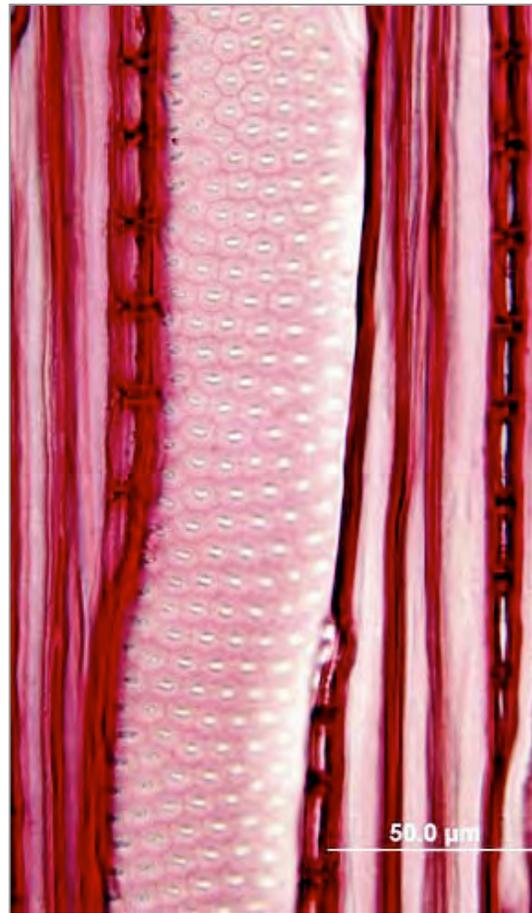
25. Small: $4 - 7 \mu\text{m}$

26. Medium: $7 - 10 \mu\text{m}$

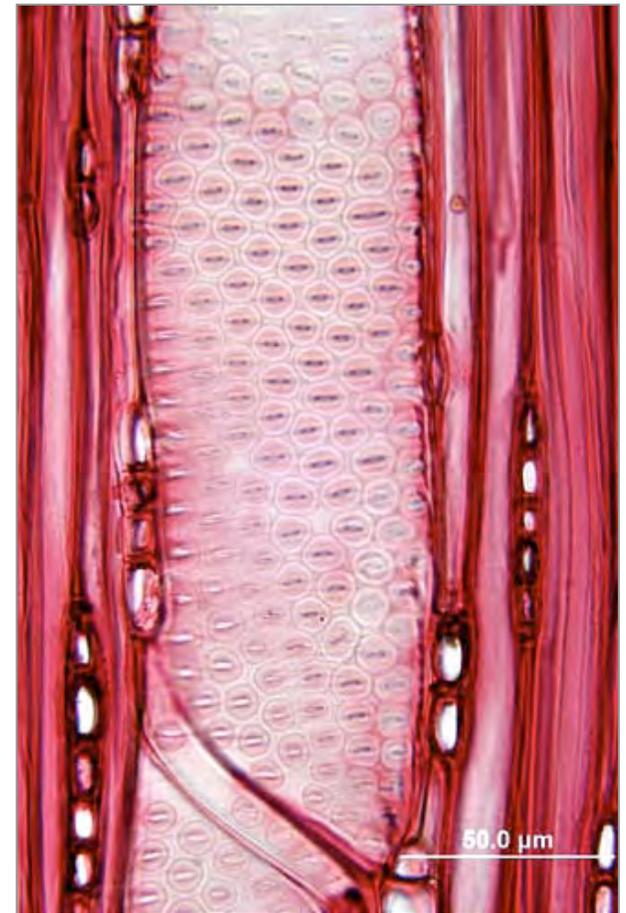
27. Large: $\geq 10 \mu\text{m}$



Annona glabra (Annonaceae)



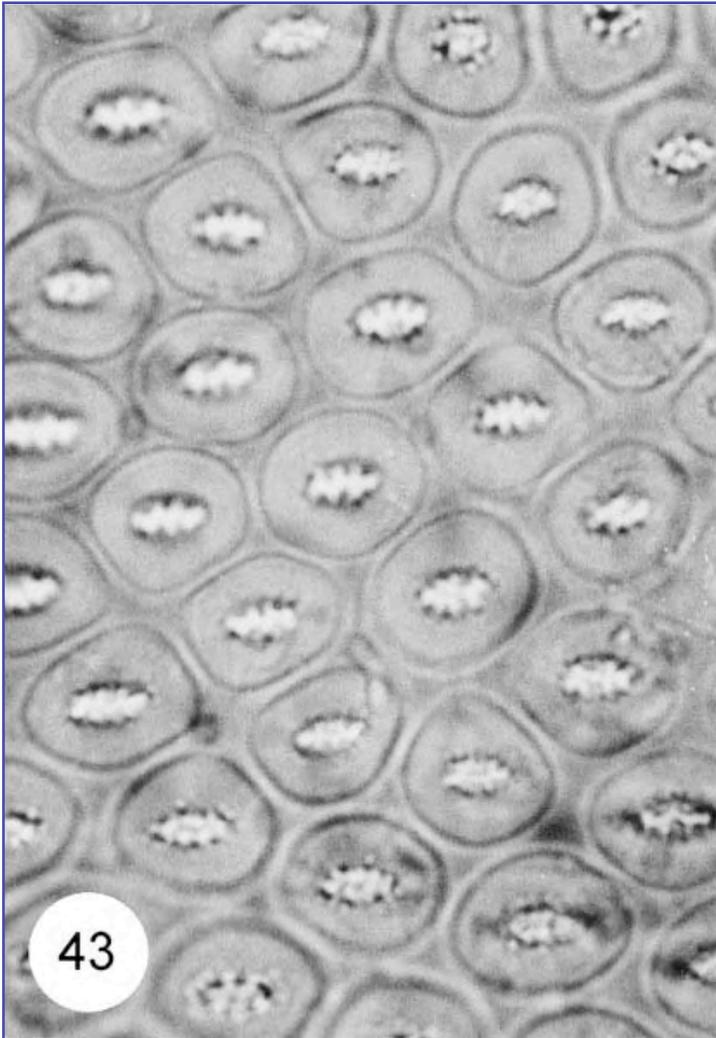
Aesculus octandra
(Sapindaceae)



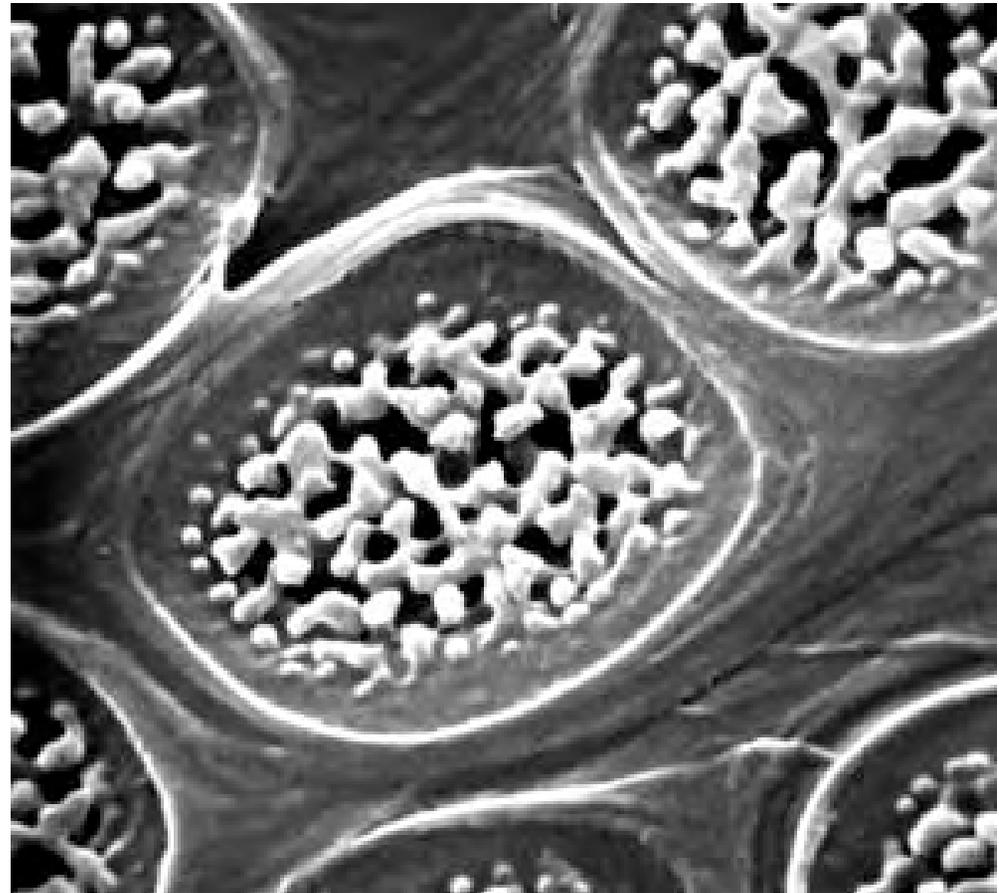
Acer floridanum
(Sapindaceae)

VESTURED PITS

Feature 29. Vestured pits = pits with the pit cavity and/or aperture wholly or partly lined with projections from the secondary cell wall.



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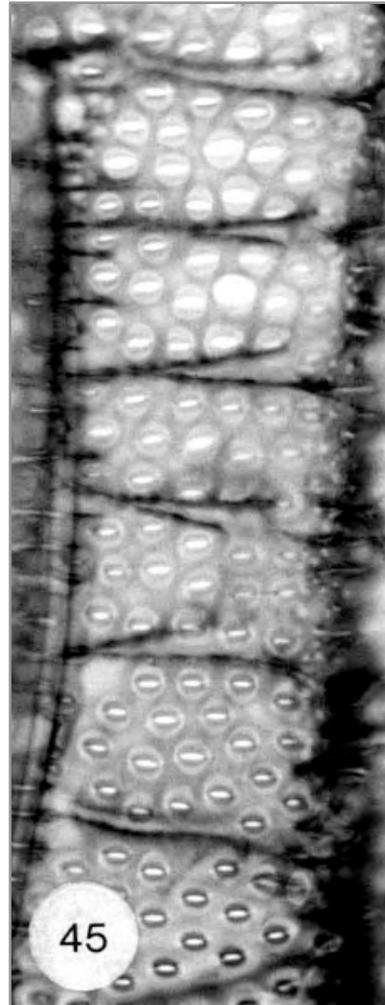
SEM view vestured pits

VESSEL-RAY PITTING

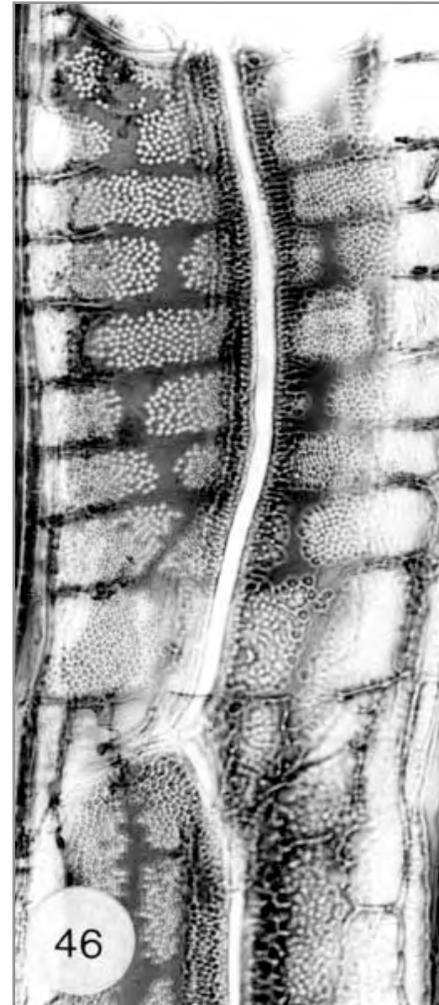
Feature 30. Vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell.



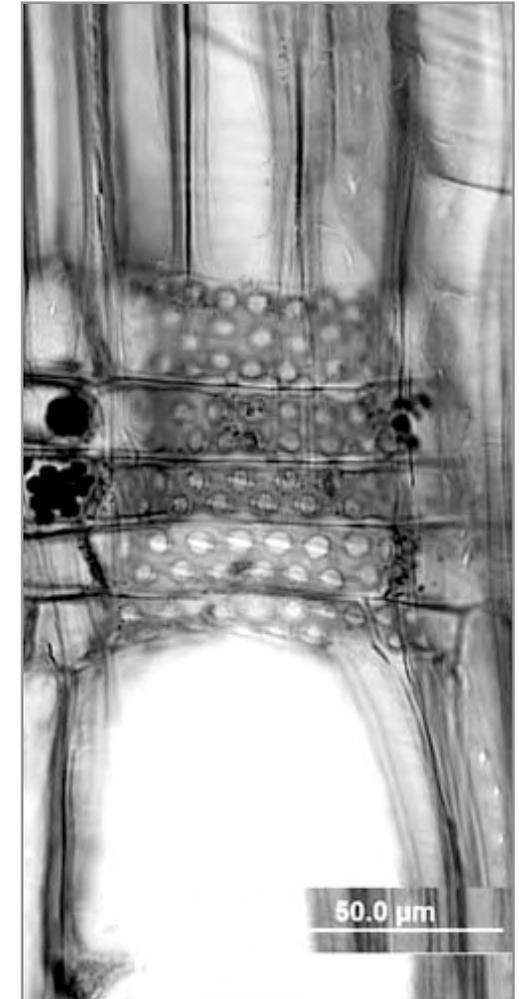
Ugnadia speciosa:
E.A. Wheeler (Sapindaceae)



Couratari cf. *oblongifolia*
P.E. Gasson
(Lecythidaceae)

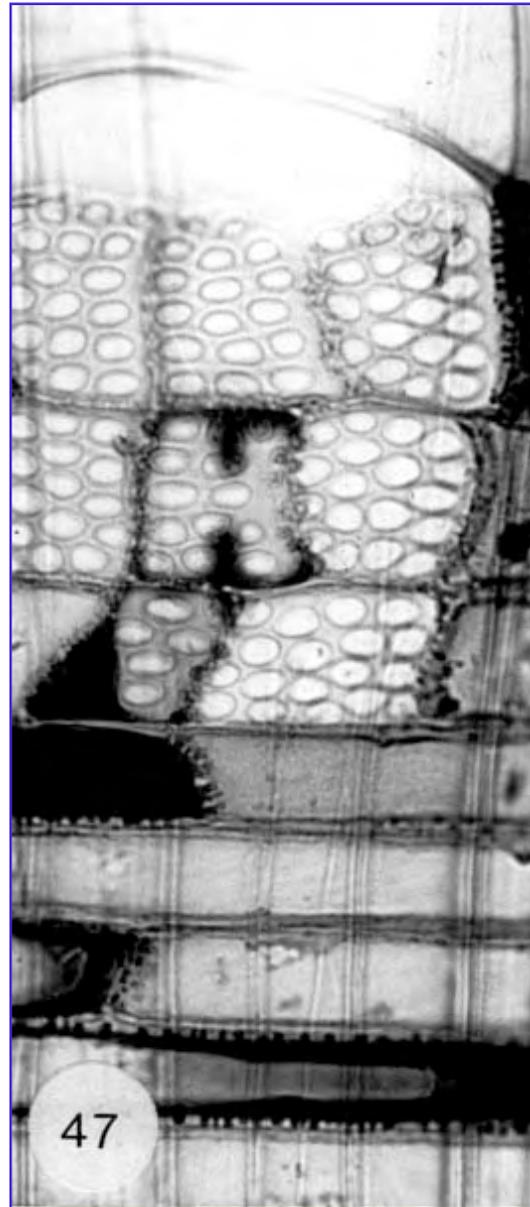


Camptostemon philippinense:
P.E. Gasson (Malvaceae /
Bombacaceae)



Acer barbatum: E.A. Wheeler
(Sapindaceae)

Feature 31.
Vessel-ray pits
with much
reduced borders
to apparently
simple: pits
rounded or
angular.

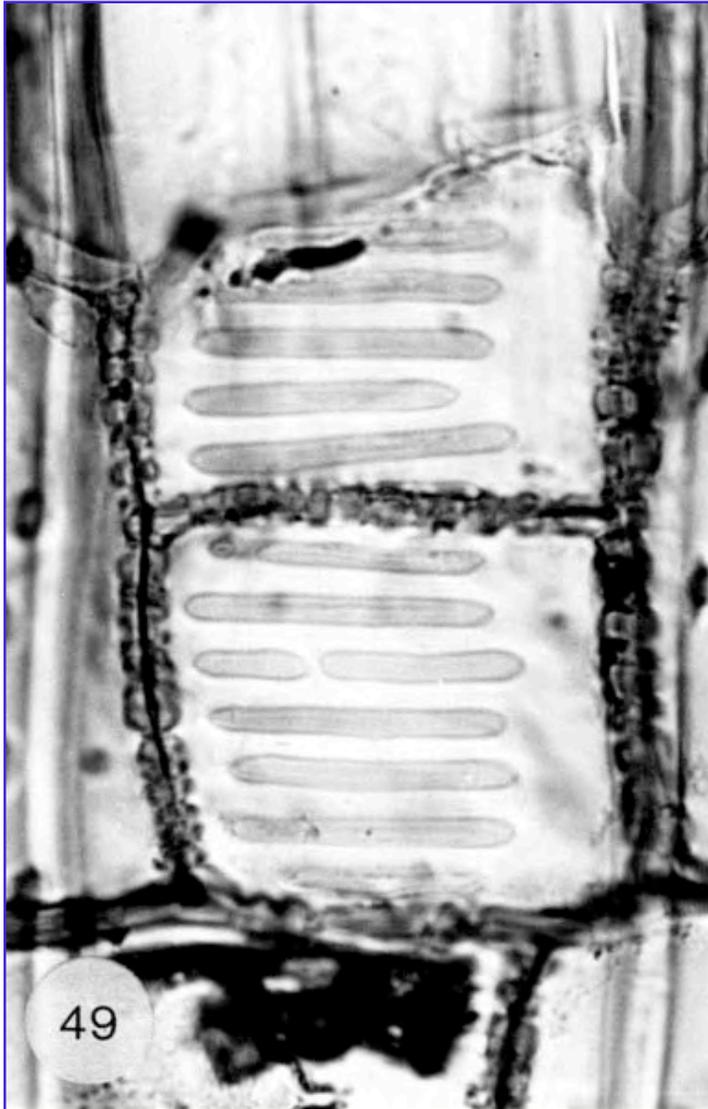


Salix sp: P.E. Gasson
(Salicaceae)

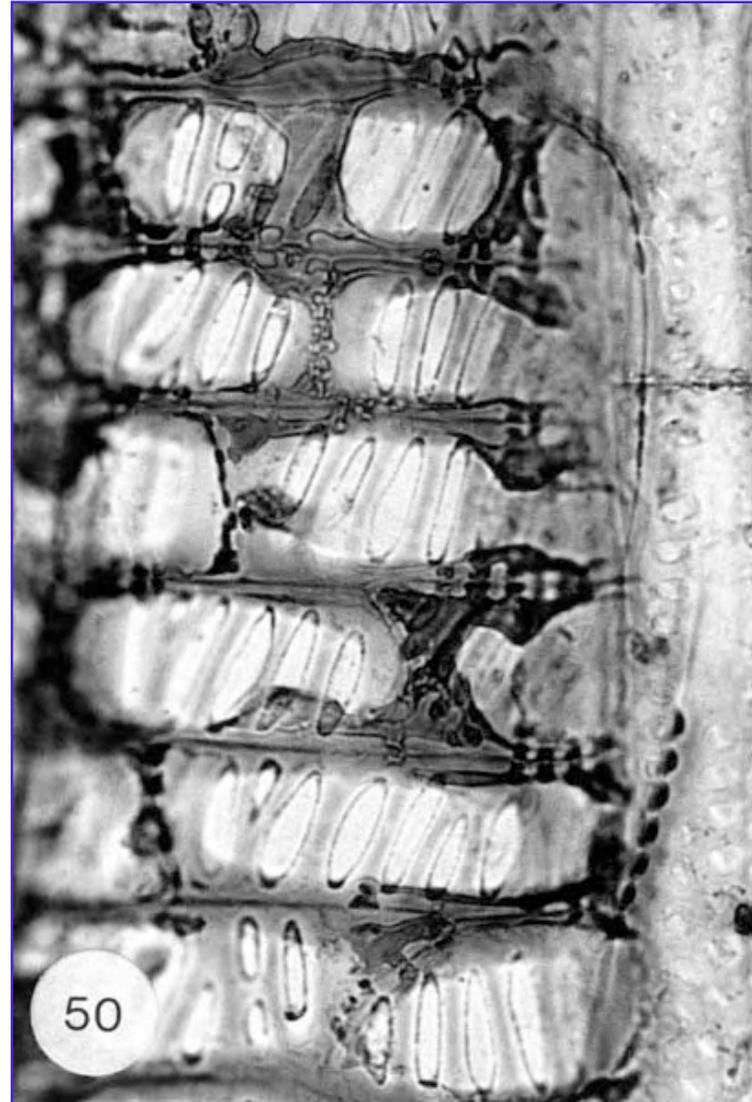


Elaeocarpus calomala: P.E.
Gasson (Elaeocarpaceae)

Feature 32. Vessel-ray pits with much reduced borders to apparently simple: pits horizontal (scalariform, gash-like) to vertical (palisade)

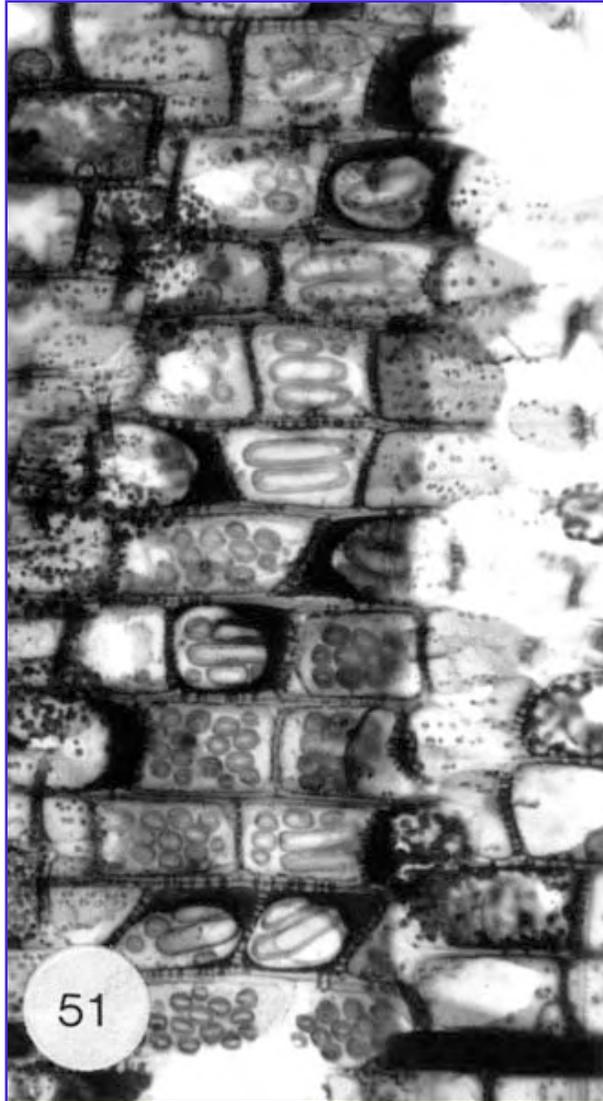


Atherosperma moschata. P.E. Gasson
(Atherospermataceae)

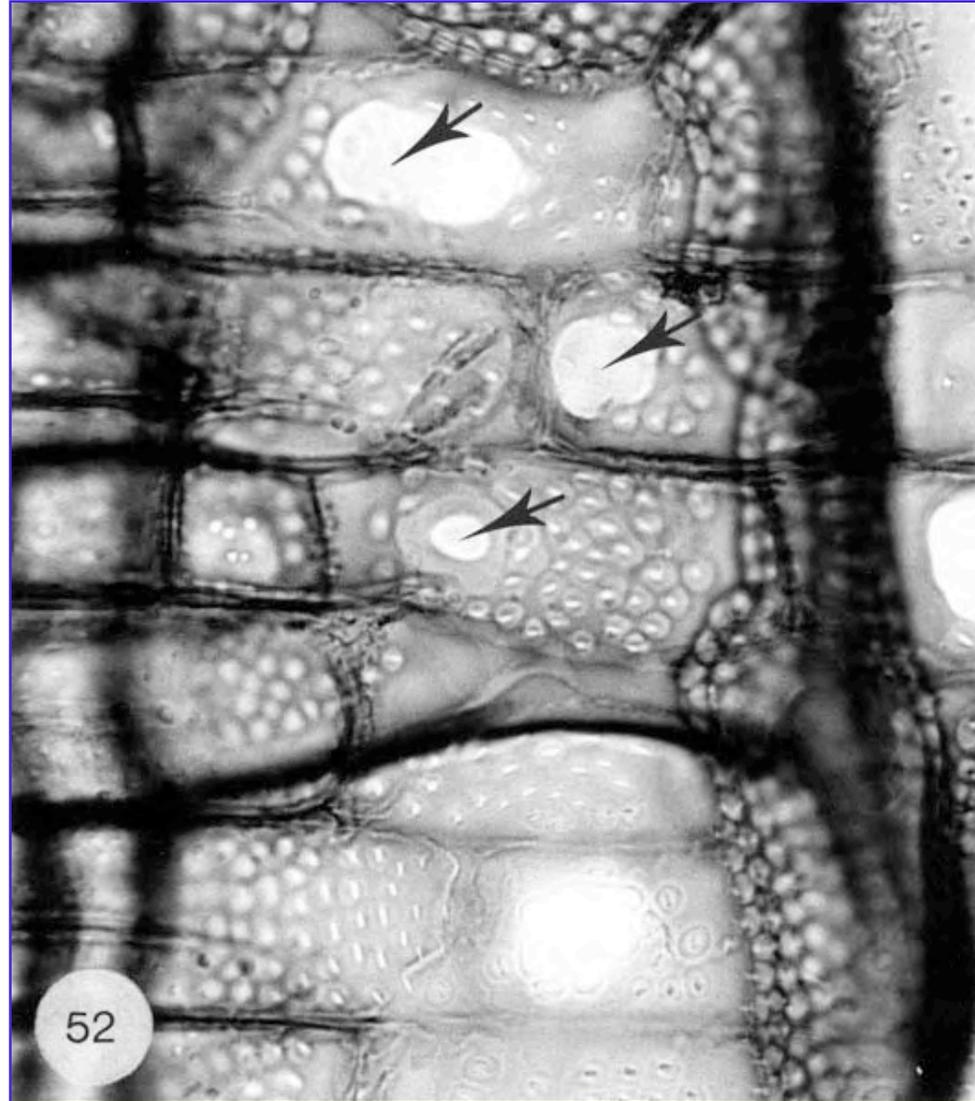


Trigonobalanus verticillata. P.E. Gasson
(Fagaceae)

Feature 33. Vessel-ray pits of two distinct sizes or types in the same ray cell.



Horsfieldia subglobosa. P.E. Gasson
(Myristicaceae)



Chaunochiton breviflorum. P.E. Gasson
(Olacaceae)

Feature 34. Vessel-ray pits unilaterally compound and coarse (over 10 μm)



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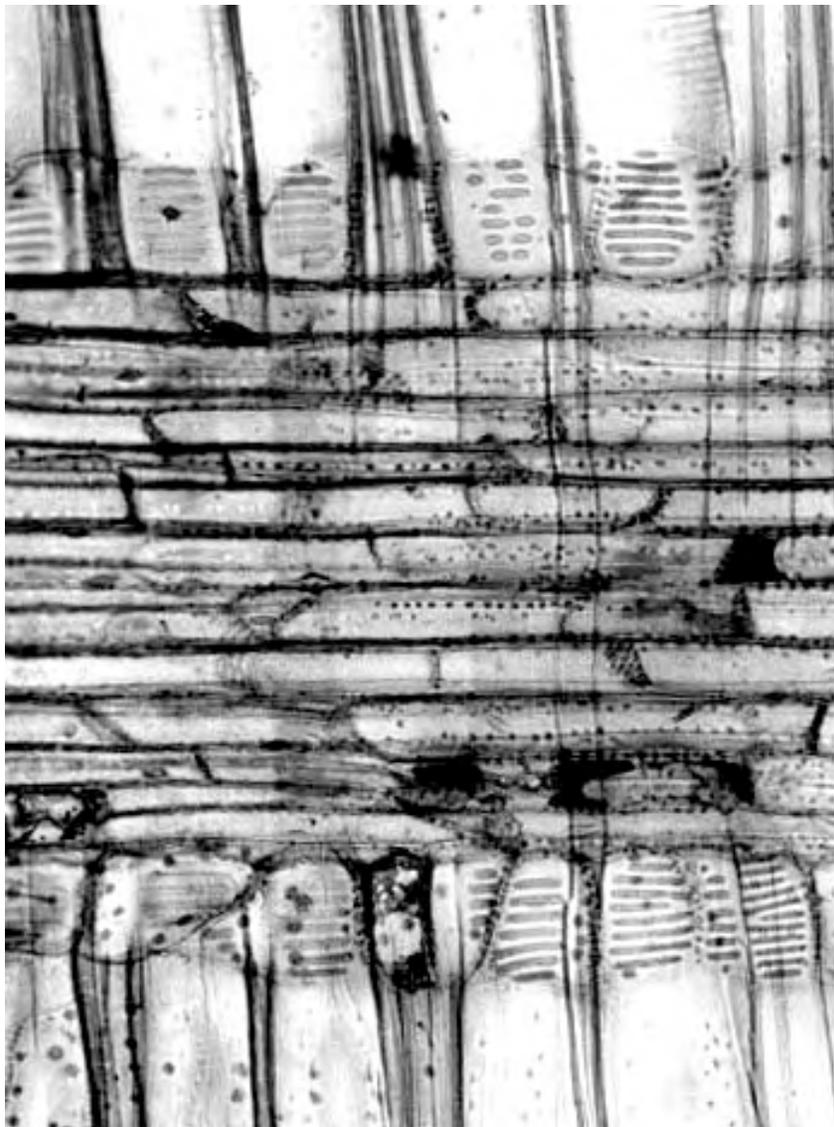
Ceriops tagal: P.E. Gasson. Photo taken using differential interference contrast (Rhizophoraceae)



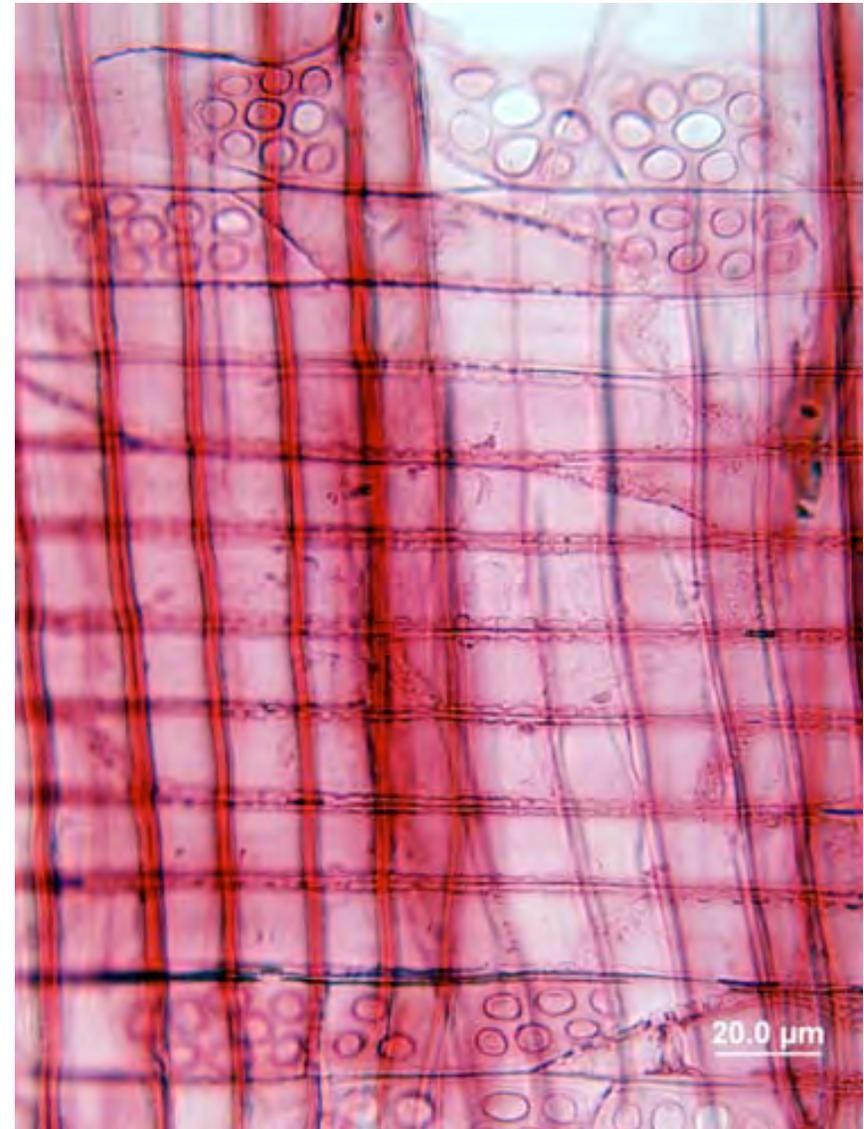
50.0 μm

Magnolia virginiana: E.A. Wheeler (Magnoliaceae)

Feature 35. Vessel-ray pits restricted to marginal rows.

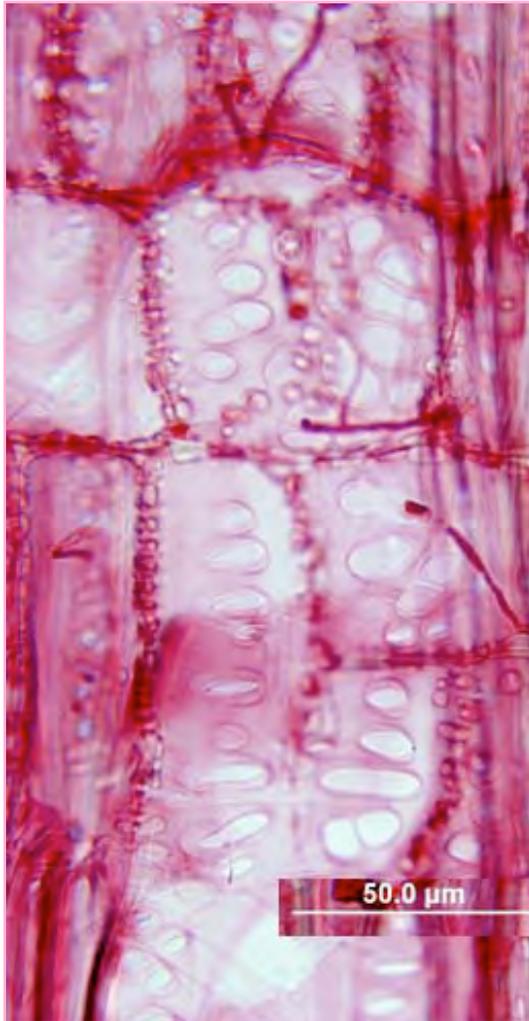


Atherosperma moschatum: E.A. Wheeler
(Atherospermataceae)



Populus tremuloides: E.A. Wheeler
(Salicaceae)

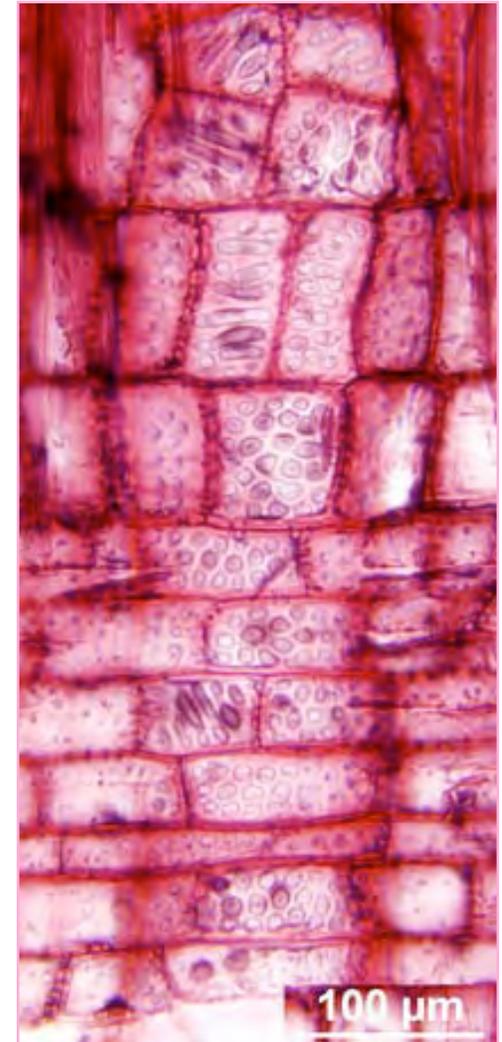
Various combinations of the vessel-ray parenchyma pit types may occur, and there may be intermediates. Vessel-ray pits in the body of the ray may differ from those in the ray margins.



Macaranga alchorneoides: vrp with reduced borders, rounded (f31) and horizontal (f32) (Euphorbiaceae)



Engelhardia pterocarpa:
E.A. Wheeler (Juglandaceae)

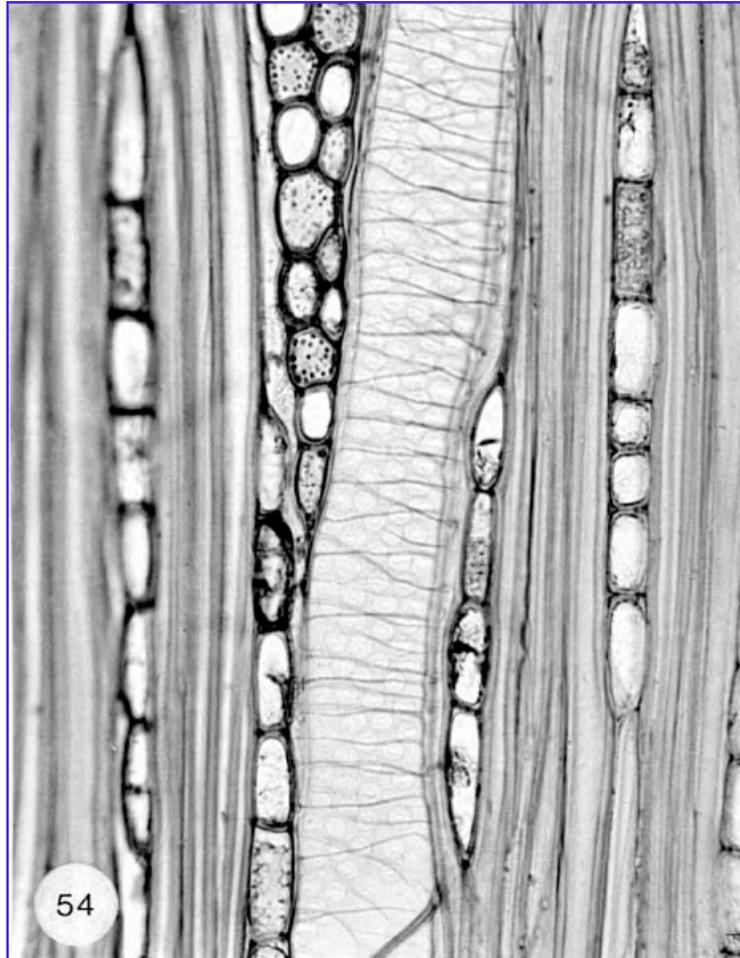


Chaetachme aristata:
E.A. Wheeler (Cannabaceae)

HELICAL THICKENINGS

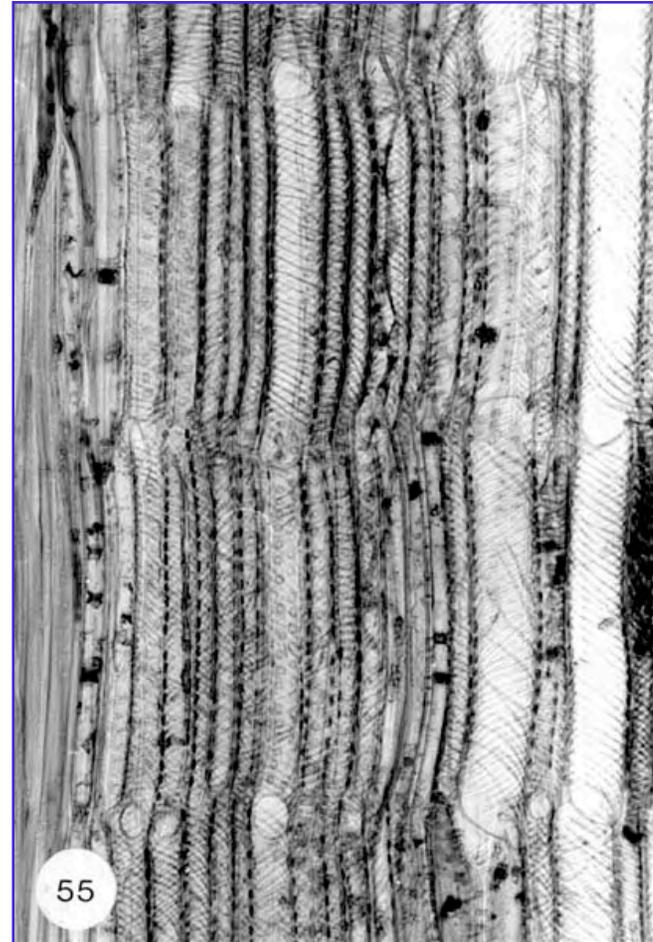
Feature 36. Helical thickenings in vessel elements present =ridges on the inner face of the vessel element in a roughly helical pattern.
Synonym: spiral thickenings.

Feature 37. Helical thickenings throughout body of vessel element.



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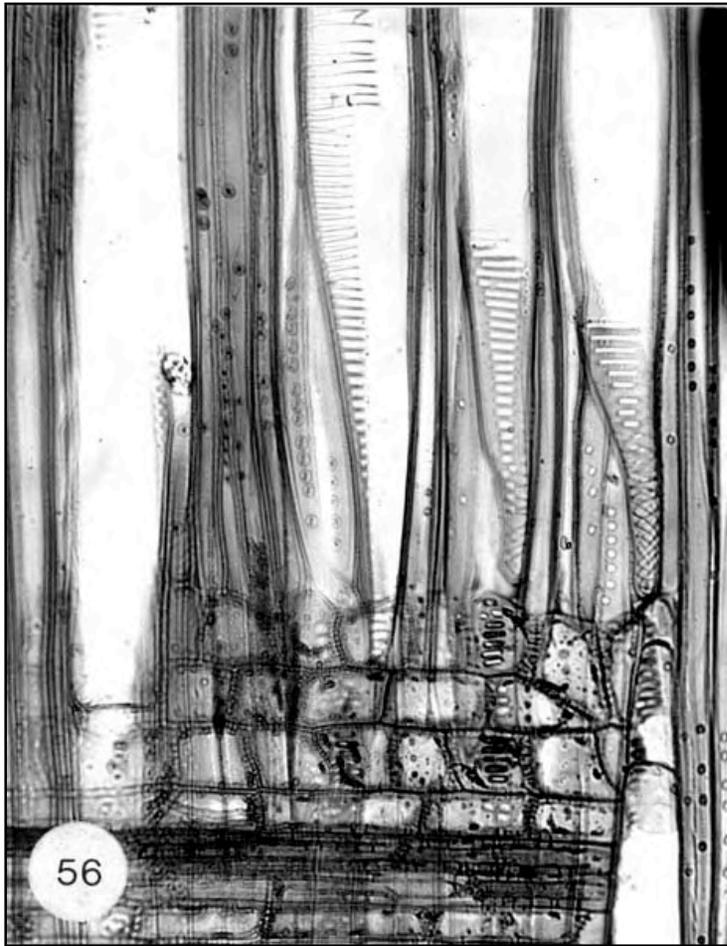
Prunus spinosa : P.E. Gasson
Features 36 and 37 present
(Rosaceae)



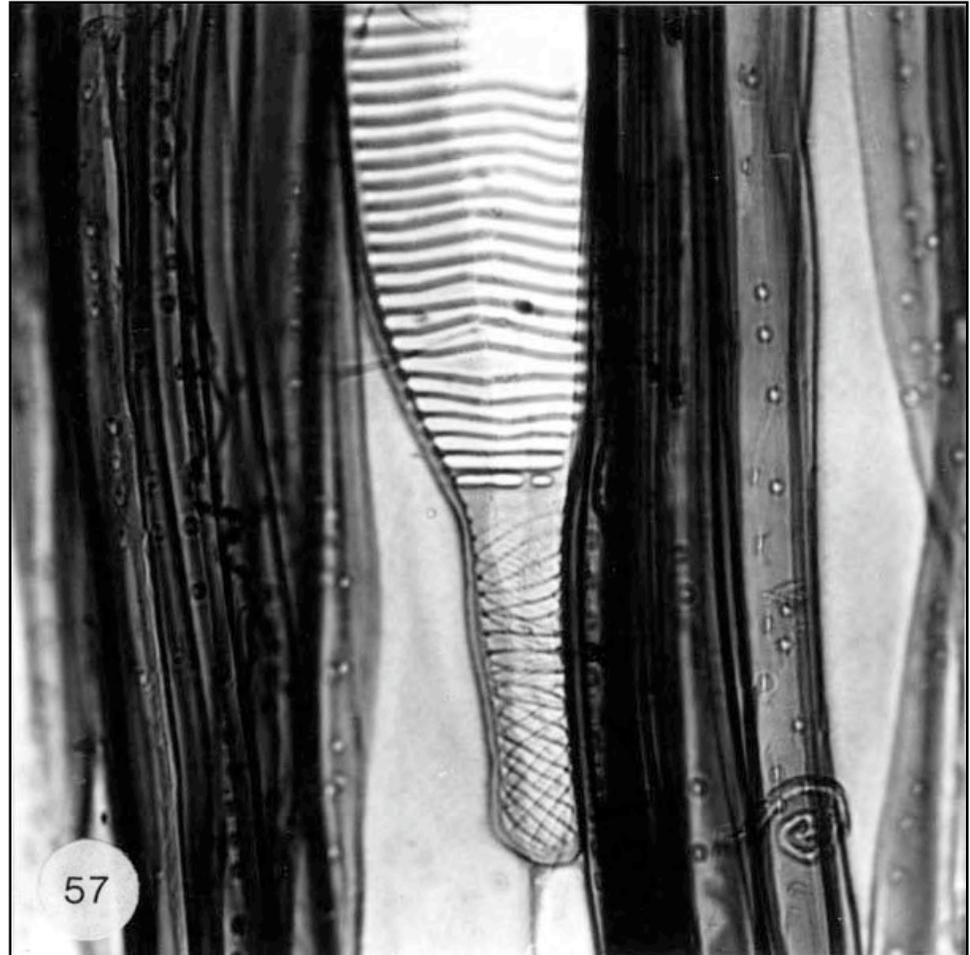
55

Cytisus scoparius: D. Grosser
Features 36 and 37 present
(Leguminosae - Papilionoideae)

Feature 38. Helical thickenings only in vessel element tails.

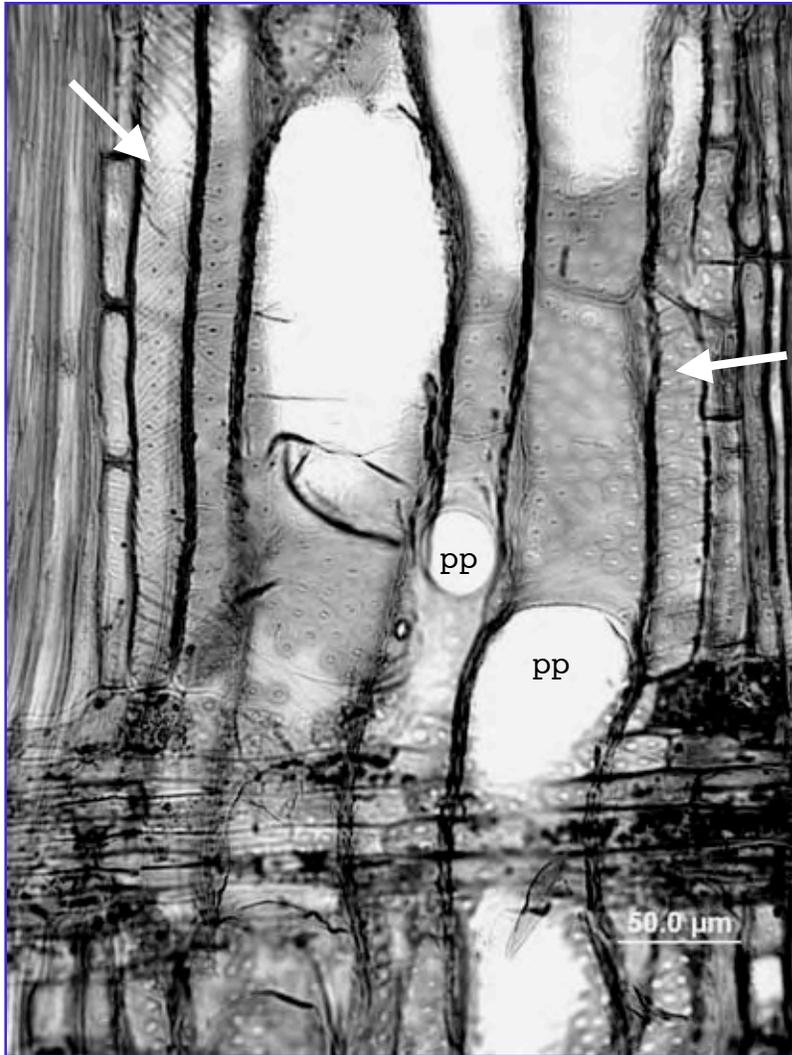


Cercidiphyllum japonicum: J.Ilic
(Cercidiphyllaceae)

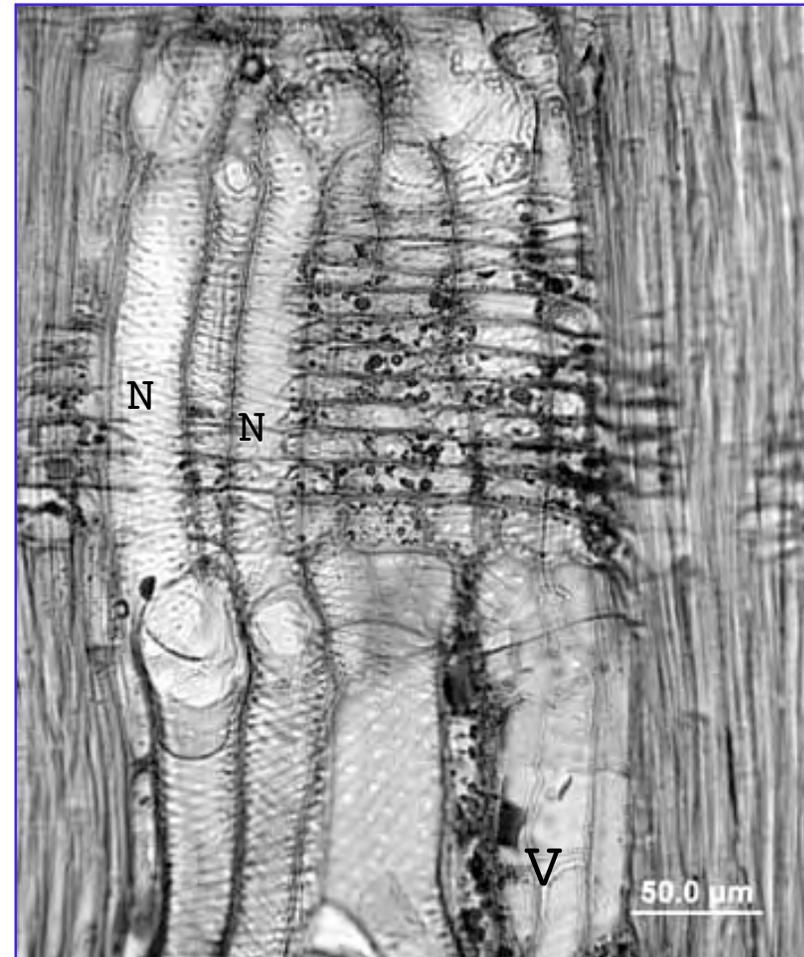


Cercidiphyllum japonicum. I.W. Bailey
Bailey-Wetmore Laboratory Plant Anatomy and
Morphology, Harvard University.
Note: Feature 14. Scalariform Perforation Plates

Feature 39. Helical thickenings only in narrower vessel elements



Ulmus americana: Features 36 and 39 present. Arrows point to narrow elements with helical thickenings. (Ulmaceae)
Note also: Feature 13. Simple perforation plates present (pp = perforation plate)



Ulmus serotina: Helical thickenings obvious in narrowest vessel elements (N) and are less obvious in the adjacent wider vessel element to apparently absent in the widest vessel element (V). Note also: Feature 13. Simple perforation plates present.
E.A. Wheeler