**IAWA Journal - Volume 15(4)**

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| **Author(s):** | Editors IAWA Journal |
| **Title:** | **Preliminary Material** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | i-iii |
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| **Abstract:** |  |
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| **Author(s):** | Melvin T. Tyree; Stephen D. Davis; Hervè Cochard |
| **Title:** | **Biophysical Perspectives of Xylem Evolution: is there a Tradeoff of Hydraulic Efficiency for Vulnerability to Dysfunction?** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 335-360 |
| **Keywords:** | cavitation; frost; drought; xylem dysfunction; Xylem evolution |
| **Abstract:** | In this review, we discuss the evolution of xylem structure in the context of our current understanding of the biophysics of water transport in plants. Water transport in land plants occurs while water is under negative pressure and is thus in a metastable state. Vessels filled with metastable water are prone to dysfunction by cavitation whenever gas-filled voids appear in the vessel lumen. Cavitated vessels fill with air and are incapable of water transport until air bubbles dissolve. We know much more about how cavitations occur and the conditions under which air bubbles (embolisms) dissolve. This gives us an improved understanding of the relations hip between xylem structure and function. |
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| **Author(s):** | Helga Lindorf |
| **Title:** | **Eco-Anatomical Wood Features of Species from a Very Dry Tropical Forest** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 361-376 |
| **Keywords:** | hydraulic safety; conductivity; Ecological wood anatomy; vessels |
| **Abstract:** | In 19 species of a very dry forest in Venezuela vessel diameter, vessel frequency, vessel grouping, vessel element length, and intervessel pit size, were studied and compared with data from other habitats. A predominance of characters that presumably contribute to hydraulic safety was observed: numerous grouped vessels of small diameter, short vessel elements, and minute intervessel pits. In some species, a xeromorphic wood anatomy coexists together with adaptations such as deciduousness, xeromorphic foliage, deep or superficially-extended roots, and succulence. In other species studied, the presence of xerophytic adaptations such as assimilating stems, succulence, and deep roots, seem to mitigate the xeromorphic wood appearance and, to some extent, lend it a mesomorphic character. |
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| **Author(s):** | D.W. Woodcock |
| **Title:** | **Occurrence of Woods with a Gradation in Vessel Diameter Across a Ring** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 377-385 |
| **Keywords:** | diameter-distribution of vessels; Ring-porosity; fossil wood |
| **Abstract:** | The occurrence of a range of vessel diameters across a ring greater than × 5 (referred to here as graduated-porous) is not completely equivalent to ring-porosity as defined in the IAWA features list. Trees with graduated porous wood occur mainly in the mid-latitudes. A limiting factor relating to temperature (winter temperature extremes below -40° C) defines the northern occurrence of these trees, preventing them from being an important element in the boreal forest. Towards the equator, numbers fall off steeply where winter temperatures stay above freezing. In the mid-latitudes, where these trees are most prevalent (40-100% of the tree flora), percentages vary inversely with precipitation amount, a relations hip that has potential applicability in interpreting fossil assemblages. Occurrence of this character is consistent with its interpretation as an adaptation allowing high conduction rates early in the growing season that is particularly favoured in drier climates of the mid-latitudes. Trees with graduated-porous wood occur in the tropics, where they appear to be most common in dry-climate areas. Some tropical woods that display a range of vessel diameters but have narrow and wide vessels arranged in a random pattern (rather than showing a radial sequence from wide to narrow) may serve as indicators of climates that are seasonal with respect to precipitation but not temperature. Well-founded climate estimates based on fossil wood depend upon understanding more about the way wood is preserved in the fossil record; graduated-porosity (or ring-porosity) is itself a character that may influence likelihood of preservation. |
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| **Author(s):** | Editors IAWA Journal |
| **Title:** | **Wood Anatomy News** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 386-386 |
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| **Abstract:** |  |
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| **Author(s):** | Michael Trockenbrodt |
| **Title:** | **Quantitative Changes of Some Anatomical Characters during Bark Development in Quercus Robur, Ulmus Glabra, Populus Tremula and Betula Pendula** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 387-398 |
| **Keywords:** | Populus tremula L. and Betula pendula Roth; bark development; bark anatomy; Quercus robur L; Ulmus glabra Huds |
| **Abstract:** | Quantitative changes of certain anatomical characters during bark development of Quercus robur L., Ulmus glabra Huds., Populus tremula L. and Betula pendula Roth were analysed. |
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| **Author(s):** | Shuichi Noshiro; Tomoyuki Fujii |
| **Title:** | **Fusiform Parenchyma Cells in the Young Wood of Pinaceae, and their Distinction from Marginal Parenchyma** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 399-406 |
| **Keywords:** | Pinaceae; young wood; Larix; marginal parenchyma; fusiform parenchyma cells; Tsuga; Abies; Picea |
| **Abstract:** | Fusiform parenchyma cells found in several genera of Pinaceae are described and compared with marginal parenchyma. Fusiform parenchyma cells are mostly fusiform in shape, with occasional smooth horizontal walls. They form discontinuous tangential bands in complete or incomplete circ1es in the innermost growth rings of Larix, Abies, and Tsuga. Fusiform parenchyma always contains resinous material, and is more conspicuous in branchwoods than in stem woods. Marginal parenchyma cells were observed in Cedrus, Keteleeria, Pseudolarix, and Pseudotsuga as well as in Larix, Abies, and Tsuga, and very rarely in Picea. Marginal parenchyma cells are scattered along growth ring boundaries. They are always in strands with nodular horizontal walls with conspicuous simple pits. Cell wall structure of these two types of parenchyma differs in the intensity of the birefringence of the secondary walls. Fusiform parenchyma cells are distinct from marginal parenchyma with which they were previously confused, and should be regarded as a new component of coniferous wood. |
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| **Author(s):** | Primož Oven; Niko Torelli |
| **Title:** | **Wound Response of the Bark in Healthy and Declining Silver Firs (Abies Alba)** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 407-415 |
| **Keywords:** | tree health; wounding; necrophylactic periderm; Bark; suberisation; Abies alba |
| **Abstract:** | The bark of five healthy and six declining silver firs (Abies alba Mill.) was artficially wounded in July 1991. Structural changes were observed 6, 9, 16,23, and 40 days later. After 6-9 days, there was necrosis and deposition of polyphenols in the exposed tissues. Hypertrophy of the axial and ray parenchyma, and hyperplasia of the rays resulted in the formation of a parenchymatic zone below the necrotic tissues. The outermost cells of this zone just below the necrotic tissues exhibited thickening of walls and lignification in the corners of individual cells. Except in two apparently healthy trees and one strongly declining test tree, intracellular suberin was detectable in some lignified cells by day 16. By then polyphenols were visible in the axial parenchyma cells underneath the parenchymatic zone. Between 23 and 40 days after wounding, progressive suberisation resulted in the formation of a 'ligno-suberised zone', which fused with the phellem of the pre-existing periderm. By day 23, initiation of a new phellogen internal to the 'Iigno-suberised zone' was observed. By the end of the experiment, the necrophylactic periderm did not fuse with the pre-existing periderm. The cells with brown deposits underlying the parenchymatic zone were not noticed on day 40. Suberisation coincided with the imperviousness detected in all trees by day 23. The bark response to mechanical wounding was essentially the same in healthy and declining trees. |
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| **Author(s):** | Editors IAWA Journal |
| **Title:** | **Association Affairs** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
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| **Author(s):** | B.G. Ridoutt; R. Sands |
| **Title:** | **Quantification of the Processes of Secondary Xylem Fibre Development in Eucalyptus Globulus at Two Height Levels** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 417-424 |
| **Keywords:** | Eucalyptus globulus Labill; wounding; secondary xylem differentiation; vascular cambium |
| **Abstract:** | The rate and duration of the phases of secondary xylem fibre development were quantified at 10 and 60% of tree height from the base in three trees of Eucalyptus globulus. At 60% of tree height the number of cells undergoing division, en1argement and secondary wall development was fewer than at 10% of tree height (P < 0.0001). A very strong positive correlation (r = 0.968, df = 4, P< 0.01) also existed between the rate of radial cell production and the number of cells in the cambial zone. At 60% of tree height cambial derivatives differentiating into fibre tracheids required an average of 5.3 days to complete enlargement and 25.2 days to complete secondary wall development. At 10% of tree height the average duration of these phases was 6.0 and 32.8 days respectively. Although not statistically significant these differences suggest that the duration of fibre differentiation increases basipetally. The average rate of fibre elongation was 66 µm d-1 at 60% of tree height and 99 µm d-1 at 10% of tree height. The duration of the differentiation of vessel elements and cells associated with vessels was shorter than for fibres, indicating that the different cell types in the developing secondary xylem have their own characteristic rate and duration for the processes of differentiation. Considering theories that suggest vessel development is promoted by auxin, this observation is regarded as indirect evidence that auxin reduces the duration of the differentiation process. |
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| **Author(s):** | W.E. Hillis; P. Soenardi |
| **Title:** | **Formation of Ebony and Streaked Woods** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 425-437 |
| **Keywords:** | fungi; streaked woods; Diospyros spp; Ebony; cellular deposits |
| **Abstract:** | Samples of 175 Diospyros species were examined with 27 containing some ebonised wood which was rarely uniformly jet black. Ebony is commonly composed of a series of axial and alternating black and paler streaks, often in characteristic patterns as in D. celebica. Large amounts of black non-structural deposits first appear in vessels, then fibres, and the origin of these materials could not be found. Deposits were absent from the axial and ray parenchyma of the paler streaks. Crystals were present in some species. Fungi have been detected in tissues adjacent to ebonised wood which appears to be formed differently from normal heartwood. |
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| **Author(s):** | B. J. H. ter Welle |
| **Title:** | **Review** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
| **Publication Year:** | 1994 |
| **Pages:** | 438-438 |
| **Keywords:** |  |
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| **Author(s):** | Editors IAWA Journal |
| **Title:** | **Wood Anatomy News** |
| **Source:** | IAWA Journal, Volume 15, Issue 4 |
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