

Index

A

Abscisic acid (ABA), 11, 15, 196
Absorbance maxima, 57
Absorbance spectrum, 47
AC element, 144
1-Aminocyclopropane-1-carboxylic acid (ACC), 217
Arabidopsis, 4, 15, 29
Arabinogalactan proteins, 210–212
Araucariaceae, 226
Aromatic compounds, 56
Autofluorescence, 229, 230, 236, 241
Auxin, 13–15, 196, 214, 242

B

Bamboo lignin, 64
Biological archive, 160
Biomass, 141
Biosynthesis, 42
Boreal forest, 161, 172
Branch wood, 16
Bud break, 163, 168–170
Buxus, 226

C

Calcium (Ca²⁺), 14, 21, 29
Cambium, 188–189
 anticlinal cell division, 8, 9
 cambial zone, 188–189
 dormancy, 9, 10, 14
 fusiform cell, 6, 7, 10, 17
 mitosis, 7
 non-storeyed cambium, 6, 8
 periclinal cell division, 7, 9
 phloem mother cell, 5, 6

 ray cell, 6, 7
 reactivation, 9, 10, 12
 storeyed cambium, 6, 8
 width, 10
 xylem mother cell, 5, 11
Catechins, 47
Cell death, 27, 75–79
 autophagy, 28
 hydrolysis, 27
 nucleases, 29
 programmed, 78, 79, 81, 82
 vacuolar rupture, 28, 29
Cell enlargement, 59
Cell expansion, 17
 acid growth hypothesis, 19
 expansin, 20
 K⁺ channels, 19
 potassium, 18
 tip growth, 17
 turgor regulation, 18
Cellular anatomy, 166–167
Cellulose, 15, 21, 23, 25, 142, 208, 212, 226, 228, 230, 233–234, 239, 246
Cellulose synthase, 25
 CesA genes, 25, 26
Cell wall(s), 44
 differentiation, 45
 infiltration, 83
 layer, 206
 thickening, 59
Cis-elements, 143
Climate change, 187, 193
Climatic control, 173
Cold hardiness, 14
Compression wood, 225–248
Concentration gradient, 215

Condensed lignin, 50
 Crystallinity, 234
 Cytokinin, 14

D

Dibenzodioxocin, 232
 Drought stress, 187–198

E

Earlywood, 11
 EgMYB2, 145
 Electron dispersive X-ray analysis (EDXA), 48
 Electron microscopy, 48
 Embedding, 52
 Embolism, 191, 194
 Epithelial cells, 191
 Ethylene, 14, 28, 217–218, 242, 243
 Ethylene response factors (ERFs), 218
 Eucalyptus, 4
 Extractives, 46

F

Fasciclin-like AGPs (FLAs), 211
 Fibres, 61, 206

G

Galactan, 226, 230–232, 234, 237, 238, 241, 242, 247, 248
 Gelatinous fibers (G-fibers), 206, 212–213
 Gelatinous layer (G-layer), 206, 208–212
 Gene expression, 79–82
 expressed sequence tags, 81, 82
 microarray, 81, 82
 Gibberellins, 13, 216–217
Ginkgo, 226, 227, 232, 247
 Glycoproteins, 21
 Gravitropic responses, 205
 Gravity, 246
 Growth dynamics, 163, 172
 Growth in girth, 160, 162, 167, 168, 170
 Guaiacyl (G), 43

H

Heartwood, 56
 biosorbent, 74–75
 candidate enzymes, 80
 candidate genes, 82
 color, 74
 definition, 72
 extractives, 74, 77–80, 82–83

 anti cancer drug, 85, 86
 antioxidants, 83
 biocides, 84–85
 pharmaceuticals, 85–86
 gas volume, 75
 identification, 73
 initiation, 75, 77, 80
Juglans type, 78, 80
 lectins, 73
 mineral content, 76
 moisture content, 75–78
 proportion, 73
Robinia type, 78, 80
 Height growth, 162–164, 167–171
 Helical checks, 233, 235
 Hemicelluloses, 15, 21, 23, 26, 209–210
 Heritability, 245
 Homeodomain-leucine zipper (HD-ZIP), 152
 Hormonal wood evolution
 from diffuse-porous to ring-porous wood,
 127–129
 from tracheids to vessels and fibers,
 124–127
 Hormones, 214
 Hydraulic system, 194–195

I

Image profiles, 51
 Immunofluorescence microscopy, 19
 Immunogold labelling, 49
 Immunolocalisation, 231, 234, 235, 240
 Induction, 204
 Intact-tissue sampling, 165
 Intercellular spaces, 227, 228, 230, 231, 234–236
 Irrigation, 189

J

Jaccard's loop, 204
 Jasmonate, 14
 Juvenile wood, 15, 232, 233, 236–238, 247

K

KNOX, 152

L

Lambert–Beer's law, 52
 Laricinan, 234, 235, 246
 Latewood, 11
 Lignifications, 226, 229, 231–236, 239–244, 246, 247

- pseudo, 82–83
 - secondary, 82–83
- Lignin, 15, 21, 23, 24, 42, 82–83, 143, 195, 208–209, 212
 - abnormal, 83
 - composition, 60
 - coniferyl alcohol, 24, 25
 - content, 42
 - distribution, 42, 54, 60
 - incorporation, 59
 - p*-coumaryl alcohol, 24, 25
 - sinapyl alcohol, 24, 25
- Longitudinal shrinkage, 210

- M**
- Mannan, 230, 232, 234, 240–242
- Mechanical properties, 193–194
- Mechanical stress, 204
- MFA. *See* Microfibril angle (MFA)
- Micro-coring, 163–165
- Microfibril angle (MFA), 16, 23, 193, 208, 211–213, 227, 233, 234, 236–238, 245–247
- Microtubules, 10, 17, 26, 239
- Middle lamella (ML), 44
- Mild compression wood, 227, 231, 233–238, 244
- Modulus of elasticity (MOE), 193–194
- MYB, 145
- MYB46, 145
- MYB83, 145

- N**
- NAC, 147
- NAC domain transcription factors, 22, 28
- Nutrients, 76

- O**
- Osmotic
 - adjustment, 188, 189
 - stress, 188, 192, 197
- Oxidase, 217

- P**
- Parenchyma
 - axial, 77, 82
 - desintegration, 78
 - radial/ray, 76, 77, 81, 82
- Pectin(s), 10, 21, 210–212
- Pectin methyl esterase, 20, 21
- Peroxidases, 50
- Phenolic extractives, 56
- Photoperiod, 9
- p*-hydroxyphenyl (H), 43, 232, 237, 238, 240, 247
- Pine, 227, 229, 231–236, 238, 240–247
- Pinning, 163–165
- Pit apertures, 227, 228, 230
- Pit membrane, 58
- Plant Hormones
 - abscisic acid, 112
 - auxin, 103–104
 - auxin transport pathways, 100
 - brassinosteroids, 113
 - cytokinins, 107–109, 112, 114, 116, 128
 - ethylene, 108, 110–111
 - free and conjugated auxin, 104
 - gibberellins, 109–110
 - jasmonates, 112–113
 - sensitivity to auxin, 105
 - strigolactones, 113–114
- Plasmodesmata, 13
- PM H⁺-ATPase, 12, 19
- Point measurements, 51
- Polarised light microscopy, 21, 22
- Polylamellated fibre, 64
- Poplar, 143
- Populus*, 4, 6, 13, 27
- Potassium permanganate (KMnO₄), 49, 53
- Preparation, 51
- Primary cell wall, 21, 44
- Promoters, 143
- Proteome, 79
- Pseudotsuga*, 226, 244
- PtMYB4, 145
- PtMYB3, 145
- PtMYB20, 145
- PtWINDs, 147

- R**
- Ray parenchyma, 191
- Reaction wood, 204
- Regulation of vessel size and density along the tree axis, 122–124
- Research history, 165–166, 179
- Resin ducts, 191, 195
- Root wood, 16

S

- Salinity, 187–198
- Sapwood
 - biosorbent, 74–75
 - color, 74
 - definition, 72
 - gas volume, 75
 - identification, 73
 - moisture content, 75–78
 - proportion, 73
- Scanning area, 54
- Secondary cell wall, 21, 44, 142, 206
 - S1, S2, S3, 23
- Secondary xylem, 142
- Sectioning, 51
- S2L, 227, 229, 231–237, 239
- S2-layer, 24, 212
- SNBE sites, 147
- Stress, 226, 229, 246–247
- Sucrose, 12
- Sucrose-synthase, 79, 82
- SWNs, 147
- Syringyl (S), 43

T

- Tannins, 47
- Taxus*, 226, 227, 232, 239, 247
- Tension wood (TW), 204
- Topochemistry, 54
- Transcriptional factors, 143
- Transcriptional networks, 143
- Transition zone, 72, 77, 78, 81
 - definition, 72
 - moisture content, 75
- Transmission electron microscopy (TEM), 52
- Tree-growth model, 160, 161, 167, 168,
 - 171–175
- Turgor, 188

U

- Ultrastructure, 206, 208
- UV absorbance, 48, 52
- UV absorbance spectra, 57
- UV microspectrophotometry (UMSP), 47

V

- Vascular differentiation
 - circular vessels in branch junction, 122
 - fiber differentiation, 119–120
 - ray formation, 120
 - resin-duct formation, 121–122
 - tracheid differentiation, 118
 - vessel differentiation, 118–119
 - xylem and phloem relationships, 115–116
 - xylem formation, 113
- Vascular meristems
 - cambial activity and social status of
 - a forest tree, 124
 - cambium, 5, 114
 - procambium, 114
- Vascular pattern formation
 - vascular differentiation in roots, 116
 - vascular differentiation in tumors, 100, 117
 - venation pattern formation in leaves,
 - 114–115
- Vessel, 206

W

- Water
 - deficiency, 187, 190, 191, 193–196
 - transport, 194–195
- Wood, 141
 - chemistry, 195–196
 - density, 192, 194
 - formation, 45
 - gradients, 122–124
- Wound reactions, 61
- Wound response, 62

X

- Xylan, 27, 142, 209, 212, 230, 232, 234,
 - 240, 242
- Xylem resistance, 62
- Xylem to phloem ratio, 5
- Xyloglucan, 19, 21, 209

Z

- Zinnia elegans*, 4, 14, 28