

# Index

- AAO3, 48  
ABA (Abscisic acid), 48, 49, 50, 53, 54, 61, 87, 89, 91, 92, 143, 146  
abaxial, 5, 9, 13, 19, 59, 60, 98, 120  
abnormal, 18, 24, 91, 94, 96  
abscisic acid, 53, 61, 74, 89, 93, 109, 126  
absorption, 8, 9, 13, 16, 20, 30, 33, 37, 52, 56, 58, 68, 70, 76  
accumulate(d), 2, 33, 35, 38, 56, 61, 64, 74  
accumulation, 13, 21, 30, 33, 38, 48, 52, 56, 85  
*Acer saccharum*, 35, 87  
acetonitrile, 26  
acetylcholine, 39, 40  
acid, 21, 32, 73, 81, 89  
acropetal, 64, 88, 120  
actin, 43, 50, 51  
active, 11, 96  
activity,  
    cellular, 43  
    cyclic, 21  
    pulsatory, 31  
    respiratory, 50  
    root, 109  
    vital, 31  
    water, 22, 34, 45, 51, 109  
activities, 8  
actomyosin, 50  
    -like, 50, 74  
adaptation, 59  
adaptive, 33, 45, 89  
adaxial, 5, 7, 10, 19, 120  
adenine, 39, 92  
adsorption, 24  
aeration, 21, 22, 65, 69  
aerobic, 52  
aero-guttation, 2  
agricultural,  
    implications, 19, 24  
agriculture, 82  
air, 54  
*Alchemilla vulgaris*, 139  
alcohol, 27, 81, 83  
    ethyl, 27  
    methyl, 27  
algae, 5, 7–8, 48, 55, 93, 96–97  
    eco-friendly, 27, 124  
    genetically modified, 8  
alkaloids, 72, 74, 81, 102, 127, 128  
alpine, 5  
    sub-alpine, 5  
amino acid, 43, 44, 72, 73, 74, 79, 81, 93, 140  
amplitude, 50, 64  
analogous, 45  
analysis, 16, 25, 48, 64, 78  
anatomical, 1, 9, 59  
anatomy, 6, 8, 14, 34, 56, 146

- anesthetic(s), 39
- angiosperm(s), 5, 9, 43, 55, 113, 119
- animal(s), i, 1, 8, 40, 49, 117
- anion, 64, 77, 83, 110
  - channel, 64
  - channel inhibitor(s), 64
- antagonist, 40, 52
- antecedent, 38, 54
- anterior, 9
- anthesis, 29, 59, 67
- anthracene, 64
- antibody(ies), 72, 78, 104, 115, 126, 133
- anticlinal, 13
- anticlinal division, 13
- antiphase, 50
- aperture, 15
- apical, 16, 64, 91, 100
- apices, 9, 113
- apoplast, 9, 13, 40, 51, 70, 76, 79, 99, 114, 115, 129
- apoplastic, 9, 13, 51, 70, 76, 99, 120
  - space(s), 9, 51
- apparatus, 9, 11, 116, 118, 123
- applied, 24, 32, 38, 45, 61, 85, 89, 96, 104, 106
- aqp (aquaporin), 32, 40, 46–52
- aquaporin(s), 32, 41, 64, 89,
- aquatic, 2, 5, 7, 14, 26, 60, 61, 64, 66,
  - plant(s), 2, 5, 7, 14, 21, 22, 26, 57, 60, 61, 120
    - submerged, 2, 5, 7, 14, 22, 26, 57, 64, 96, 120
- Arabidopsis thaliana* (L.) Heynh, 17, 113
- arid, 25, 118
  - semi-arid, 25
- aroma/aromatic, 18, 89, 116, 142
- array, 56, 116, 119
- arrowhead, 10, 15, 17
- Arum colocasia*, 7, 28, 55, 56, 84
- ascent, 30, 42, 45, 46, 145
- aspartate, 74, 140
- aspirator, 26
- Asplenium trichomanes*, 7, 47, 64
- assessment, 24–25, 56, 110, 112, 122
  - visual, 24
- asteraceae, 5, 14
- asterisk, 15
- asynchronism, 50
- atmosphere, 2, 4, 9, 20–23, 65
  - saturated, 22, 60, 65–66
- atmospheric, 4, 22, 32, 62, 65
  - gas(es), 4
- ATP (adenosine triphosphate), 40, 53
- ATPase, 41, 43–45, 52, 54, 65, 72, 77, 80
  - inhibitor(s), 44, 52
- AtPUP1 (*Arabidopsis thaliana* PUP1), 48, 49, 62, 75,
- AtPUP2 (*Arabidopsis thaliana* PUP2), 48, 49, 62, 75, 113
- Australia, 21, 56
- austrobaileyaceae, 7
- automatic, 31, 88, 138, 147
- auxin, 16–18, 21, 48, 88
  - balsam, 58
  - balsaminaceae, 5, 56
  - bamboo, 20, 35, 56, 108
    - moso, 20, 56
  - bar(s), 10, 15, 67
  - barley, 9, 14, 23, 28, 49, 55, 60
  - basal, 64, 88, 99
  - basic, 2, 17, 47, 79, 89, 106, 120, 157
  - basipetal, 16, 48, 88
  - bean, 29, 29, 33, 56, 75, 98, 131
  - begoniaceae, 5
  - bell jar, 23, 30
  - benzyladenine, 61, 87
  - biochemical, 24, 61, 73, 76, 85, 91, 122, 137, 145–147
  - biological phenomenon, 41, 66, 144
  - biological process, 73, 112
  - biology, 8, 19, 27, 54, 77, 120, 125, 142, 146, 148
    - structural, 8, 19, 54, 77
  - biosynthesis, 48, 138, 142, 143
  - biotechnology, 108, 119, 127132, 136, 142
  - blade, 11, 24, 25, 28, 81, 113
  - Blechnum lehmannii* Hieron, 7
  - bleeding, 4, 19, 21, 28, 35, 136
  - blockage, 560, 61
  - Borassus flabellifera*, 35
  - botanical, 3, 18
    - classification, 46, 62, 115
    - distribution, 1, 5, 17, 49, 60, 80, 117
    - research, 17–18, 116, 119, 145–146
  - botanist(s), 3, 108, 109
  - botany, 2, 3
  - branch(es), 24, 35, 69, 88
  - breeding, 27, 58, 59
  - bud(s), 90
  - bundle, 9, 17, 48, 52, 89, 109
  - CaCl<sub>2</sub> (calcium chloride), 39
  - calcofluor, 13, 120
    - white, 10, 13, 17, 2432, 34
  - calcium, 22, 39, 66, 81–86
    - channel, 7, 11, 28

- channel inhibitor(s), 64
- camphor, 40
- canopy, 84, 117
- cantaloupe(s), 11, 69
- capillary, 26, 32, 37, 67
  - glass, 23, 24, 26
  - micro-glass, 24, 26
  - flow, 32
  - velocity, 57, 65
- capillaries, 23, 24, 26
- carbohydrate, 5, 35, 68, 76, 81, 97, 142
- Caryota urens*, 4, 29
- catalyze(d), 107
- cation(s), 41, 77, 83
- caustics, 25
- cavitation(s), 33, 35, 42, 45, 46, 68, 118
- cavity, 9
  - stomatal, 99, 100
- cavities, 4, 46
- Cedrus deodara*, 22
- cell(s)
  - cluster, 13
  - division, 13
  - elongation, 13, 56
  - differentiation, 13, 16–18, 54, 135
  - maturity, 13
  - living, 31–32, 35–36, 40, 46, 49–52, 62, 80, 142
  - cortical, 31
- cellulose, 74, 102, 135,
  - fiber(s), 74, 135,
- cereal, 5, 31, 56, 78, 98, 101–102, 113, 134–135
  - crop(s), 102, 111–112
  - plant(s), 31, 102, 113, 136,
- cell wall(s), 13, 16, 51, 80, 102, 115
- chalk, 7, 12
  - scale(s), 7, 12
- chamber, 9, 19, 98
  - moist, 98
  - pressure, 23–24, 33, 45–46
  - root, 23
  - root pressure, 45–46
- chemical, 47, 102, 122
- chemistry, 71, 125
- Chlamydomonas reinhardtii*, 48
- chloranthaceae, 7
- chloranthoid, 119
  - leaf teeth, 119
- Chloranthus japonicus*, 119
- chlorenchymatous, 9
- Chlorophyton comosus*, 50
- chloroplast, 5, 9
- circle, 25,
  - reflection, 25
- circuit, 41
  - transport, 41
- climate, 67, 107, 118, 119, 124
- cloud stripping, 20, 28
- cohesion-tension, 32, 35, 42, 46
- colchicine, 39, 40, 50
- cold, 20, 65, 76, 119,
- coleoptile, 9, 25, 31, 47, 63–64
  - apices, 9
- collection, xix, 3, 26, 95, 117
  - mass, 26, 79, 148
- co-localizing, 17
- Colocasia antiquorum*, 28, 56, 83, 84
- column(s), 33, 130
  - water, 33
- companion, 48
- compensating pressure (theory), 46
- component, 26–27, 35–40, 46, 54, 73, 110, 122, 144
  - metabolic, 39–40, 50, 54
- composition, 21, 60, 71, 81
- concave, 25
- concentration, 5, 16, 123, 157
- conception, 38–39
  - osmotic, 38–39
- concomitant, 38, 54, 77
- condensation, 2, 4, 123
- condense, 65
- conductance, 29, 50–52, 57, 69, 118, 120, 143, 150, 153, 155
  - hydraulic, 29, 50–52, 57, 69, 120, 146
- conductivity, 36, 39, 48, 59–60, 70, 84, 89, 118
  - root, 48, 70, 89
  - water, 36, 39, 60
- conifer(s), 7
- conjugates, 102
- contaminant(s), 24, 27, 85
- contamination, 26, 147
- contraction, 40, 49, 50–51
  - phase, 50
  - rhythmic, 49–50
- convective, 155
- converse, 7, 29, 61, 69, 97, 126
- convex, 25
- convolution(s), 2
- cool(ing), 4, 20

- corn, 38, 47, 56, 94  
 correlation, 7, 27, 38, 40, 68, 70, 88, 98, 109, 113–115,  
     119, 123  
     positive, 7, 27, 113, 115, 119, 123  
 cosmeceutical(s), 127, 136, 142, 143  
 cotton, 17, 37, 71, 135  
 cotyledon(s), 17  
 covering(s), 21  
 CPMCW (cytoskeleton–plasma membrane–cell wall),  
     47  
 CQU, 21  
 crassulaceae, 5  
 creek(s), 20, 28, 108  
 cresograph, 49  
 crop(s)  
     field, 49  
     horticultural, 35, 65, 75, 81, 99, 102  
 cross-section, 10, 15  
 crown, 95  
 crystal, 81, 86, 96, 105, 110, 115, 142  
*Cucurbita*, 7, 50, 55  
*Cucurbita pepo*, 50  
 culminating, 30  
 cultivator(s), 30  
 culture, 8, 28, 36, 60, 69, 84, 98  
 curvature, 25, 64  
 cuticle, 9, 90, 110  
 cuticular, 20, 27, 66  
 cutinized, 1  
 cyatheaceae, 7  
 cycle, 14, 16, 20–21, 41, 47, 49, 63, 87–90  
     irrigation, 49, 90  
 cycling, 41–42, 85, 96, 111  
 cylinder, 23  
 cytochalasin B, 39, 40, 50  
 cytochemical, 13, 111, 120  
 (CKs), 91  
 cytokinin(s), 48, 49, 61, 75, 90, 91  
 cytological, 13, 14  
 cytoplasm, 9, 13–15, 51, 96, 99,  
     cytoplasmic, 51, 113, 123  
 darkness, 11, 47, 56, 64  
 date palm, 4, 29, 35  
     Indian, 4, 29, 35  
 David Midmore, 21  
 decapitate(d), 40, 50, 51, 79  
 decapitation, 22, 48, 71, 89  
 deciduous, 28, 33, 35, 65, 119  
     tree(s), 28, 29, 33, 35  
 deficiency, 20, 22, 69, 96  
 definition, 2  
 dehydration, 49, 89, 118, 123  
 denaturation, 48, 89  
 Denmark, 26, 77  
 dentation, 11  
 depolarization, 64  
 desiccated, 13  
 detach(ed), 4, 24, 26, 98  
 detector(s), 24  
 detopped, 33, 37  
 development, 5, 8, 13, 16, 27, 35, 38, 51  
 dew, 2, 4, 25, 65, 67, 84, 97, 110–112, 116–118, 145  
     dewfall, 26, 28, 67, 93–95, 110  
 dewatering, 8, 28  
 diameter, 25, 32, 67  
 2,4-D (dichlorophenoxyacetic acid), 39  
 dicot(s), 5, 9, 76  
     family(ies), 5, 9  
 dictyosome(s), 5  
 dictyosomal, 4  
 diethylstilbestrol, 64  
 differentiation, 13, 16, 54, 104, 135  
 diltiazem, 64  
 discoverer, 2  
 discovery, 1, 32, 44, 145  
 dish(s), 24  
     petri, 24  
 disposal, 76–77, 108, 122  
 diurnal, 21, 33  
 divergence, 59, 146  
 DNP (2,4-dinitrophenol), 39, 40, 50, 52  
 dormancy, 143  
 dough, 29, 59  
 downhill, 43, 44  
 DPD (diffusion pressure deficit), 36, 108  
 dripping(s), 26, 54  
     leaf, 26  
 driving, 19, 35, 45, 59  
 drop(s), 25  
 droplet(s), 2, 8, 25  
 drug(s), 30, 78, 128, 129  
 d-tubocurarine, 40  
 duct(s), 4, 83, 142  
 ecological, 117  
 ecophysiological, 18  
 ecophysiology, 18  
 ecosystem(s), 2, 20, 117–119, 121, 125, 137, 142, 144,  
     147

- balance, xx, 20, 119
- edge(s), 2, 5, 9, 26, 30, 56
- EDTA (ethylene diamine tetraacetic acid), 39
- efflux, 36
- egress, 11
- elatostemeae, 5
- electric, 7, 41, 43, 51, 78–79, 145
  - probe, 147
- electrical, 7, 43, 51, 145
  - polarization, 7, 43
  - potential, 32, 150
  - pulse, 51
- electrode, 49
- electron, 101
- electronic, 24
- elements(s), 13, 14, 22, 30, 76, 122
- elongating, 16
- elute(ing), 82, 110
- embolism, 35, 42, 45, 68, 109, 110, 118
- emerge, i, 11, 20, 54, 56, 92, 108, 137
- enclosure(s), 19, 21–22
  - plastic, 22
- endocytosis, 13, 14, 16, 111, 120, 123
- endodermis, 31, 36, 46, 51
- endoplasmic reticulum, 14, 96, 128
- energy, 14, 25, 38–47, 50–54, 63, 75
  - coupling, 51
  - dependency, 39, 63, 75
  - metabolic, 38, 41–43, 54
- engine(s), 144
- England, 25
- enlarge, 14
- environment(s), xx, 2, 11, 21, 63–64, 92, 97, 105–124
  - friendly, 97
- environmental, 7, 20–21, 28, 30, 62, 65–67, 70, 81, 118, 145
- enzyme, 5, 13, 44, 61, 72–74, 77, 79–83, 100–107, 112–113, 130–131, 135, 138, 143, 146
  - digesting, 13
- epidermal, 7, 9, 11, 13, 18, 52, 85, 142
  - cell(s), 9, 11, 13, 18, 52
  - subepidermal, 13
- epidermis, 9–13, 51, 86
- epithem, 9–16, 47–49, 62, 75, 94–97, 103, 111–114, 120, 123
- epithelial, 11, 16
- eppendorf, 23
- equilibrium, 36, 37, 43, 108, 158
- equipment, 121
- Equisetum arvense* (fern), 6, 7
- Equisetum spp.*, 7
- ethyl alcohol, 27
- ethylene, 26, 89
- evaporate(s), 2, 7, 25
- evaporation, 2, 20, 25, 46, 52, 65, 69, 71, 96
- evaporation-tension-cohesion (mechanism), 52
- evolution, 4, 18, 106, 119, 126
- evolutionary, 17, 35, 119
- excitement, 40
  - nervous, 40
- excretion, 80, 84, 96, 110, 122
- exodermis, 46
- exogenous, 48, 61, 81, 89, 114
- expansion, 4, 49, 89, 91, 110–111, 135
  - rhythmic, 49–51
- expression, 33, 37, 41, 44, 48, 148
- extend, 14, 29, 45
- exterior, 9
- extrusion, 39, 50, 79
- exudates(s), 8, 24, 76, 81
- exudation(s), xvii, 2, 4–14, 19–24, 29, 31–48, 50, 60–64, 69, 71–73, 82–85, 88–92, 109–112, 118–120, 128–129, 146
  - force, 31
  - pressure, 11, 21, 33, 68, 112
- exude(s), 2, 20, 31, 48, 57
- factor(s), 21, 55, 62, 65–66, 102, 128–129, 143
  - edaphic, 33, 51, 65–66, 70
  - environmental, 62
  - external, 21, 55, 62
- family(ies), 7, 14, 44
- feedback, 31, 48, 88–89
  - mechanism, 48, 88
  - signal, 48, 88–89
- fellow, 21
- fern(s), 5, 7, 14, 47, 48
- fiber(s), 74, 135–136, 145, 147
  - cellulose, 74, 135
- ficus formosana*, 910, 12, 15
- filament(s), 16
- flow, 1, 9, 11, 24, 31–42, 45–46, 51–54, 57–61, 65, 90–91, 108, 120, 146
  - hydraulic, 57, 59–61, 120
  - velocity, 57, 65
- flower(s), 28, 56, 63, 67, 88, 107
- fluctuation(s), 21, 33, 51, 63, 66
  - rhythmic, 21, 49–51, 63

- fluid(s), 2, 7–12, 24–27, 31–38, 72–74, 83, 95, 123  
 fluid-phase, 123
- fog, 25, 118
- foliar, 13, 87, 97
- food(s), 31, 75, 92, 97, 108, 123–127, 136–137, 142–147  
 reserve, 31
- force, 5, 11, 19, 31–32, 35–37, 45, 50, 59, 62, 66–67, 97,  
 capillary, 32, 37, 67  
 physical, 31–32  
 vital, 31–32, 50
- forest(s), 7, 28, 35, 65–67, 95, 108, 119–122, 146  
 rain, 7, 28  
 tropical, 7, 28, 35, 65–67,  
 rain, 7, 28, 108
- freezing, 4, 45, 84, 109, 118
- frond(s), 7
- frozen, 4
- fruit(s), 14, 18, 28, 78
- Fuchsia globosa*, 3
- function, 4, 8, 40, 44, 62, 92, 106, 111, 142
- fundamental, 1, 90, 109, 106
- fungal, 105, 115,
- fungi, fungus, 7, 8, 28, 31, 44, 56, 70, 82, 105
- gallon(s), 29
- gametophyte(s), 7, 47, 64
- gas(es), 4, 23, 33, 35, 42  
 atmospheric, 4
- gating, 16, 46, 65, 73
- gene(s), 4, 19, 44, 51, 58, 76, 81, 85, 136
- genera, 5, 101
- genetic, 17, 28, 54, 55, 70, 88, 101, 104, 128, 143
- genetics, 77, 121
- genome, 44, 78, 135, 138
- genomic, 17, 47, 99, 135, 146
- genotypic, 58, 123
- gladiolus, 14
- gland(s), 1, 4–5, 9, 27, 84, 116, 138  
 salt glands, 4
- glandular, 1, 12, 26, 84, 116, 135
- glass vial(s), 27  
 air-tight, 27
- glistinin, 11
- golgi body(ies), 15
- Gossypium hirsutum*, 17
- gradient, 8, 17, 36, 120
- graft(ed), 48, 88
- grafting, 48, 91
- graft transmissible, 48, 88, 89, 91
- gramineous, 7  
 crops, 18
- grass(es), 2, 14, 34
- gravimetrically, 27
- gravity, 62
- greenhouse, 20, 69
- growth, 5, 8, 19, 21, 45, 56, 59, 72, 90–92, 97–98, 102,  
 109, 128–130
- cabinet, 21
- chamber, 19
- media, 8, 45, 56, 72, 97–98, 102, 130
- root, 90, 92, 109
- substance(s), 5
- guard, 9, 11, 15, 142  
 cell(s), 9, 11, 15, 142
- gum(s), 5, 60, 102, 136
- guttate(d), 22, 23, 71, 94, 101
- guttating, 37, 75, 128, 143
- guttation  
 aero-guttation, 2  
 artificially induced, 24  
 efficient, 113, 142, 145
- gymnosperm(s), 5, 55
- H<sup>+</sup> (hydrogen ion), 44
- H+-ATPase (proton-translocating adenosine  
 triphosphatase), 43, 44, 52
- H<sub>2</sub>O<sub>2</sub> (hydrogen peroxide), 114
- habitat(s), 19, 37, 42
- hair(s), 5, 11, 34, 46, 54, 70, 84, 97  
 modified hairs, 5,
- HCO<sub>3</sub><sup>-</sup> (bicarbonate ion), 83
- heading, 27, 29, 59  
 pre-heading, 27
- heart(s), 31, 40, 46, 49–50  
 beat, 31, 49
- Helianthus annus*, 39
- Helix-loop helix-basic (bHLH), 17, 135
- herbaceous, 4, 7, 23, 33, 55, 119  
 species, 33, 55, 119
- hexose, 35, 59
- histological, 14
- Holcus lanatus*, 25
- holistic, 18
- hormonal, 61, 88, 90, 135
- hormone(s), 16, 61, 87, 128, 129
- humid, 2, 20, 22, 26, 28, 30, 56, 64–67, 98, 108
- humidity, 2, 4, 20–22, 54–55, 62–66, 93, 116–119  
 atmospheric, 65–66, 118

- relative, 22, 52, 66, 93, 116,
- hyacinth, 3, 57, 100
- hydathodal, 17, 47, 60, 79, 119–121, 146
  - distribution, 17, 60,
- hydathode(s), 1–2, 8–9, 11–14, 16–18, 54, 60–62, 94–104, 106–119, 124–125, 138
  - active, 11, 13–14
  - epidermal, 9, 11, 18
  - epithelial, 11, 16
  - passive, 11
- hydration, 13, 49, 62, 120, 123
- hydraulic, 29, 50–52, 57–61, 69, 120, 131, 146
  - conductance, 29, 50–52, 57–60, 69, 120, 146
  - flow, 120, 131
- hydrolysis, 35, 43, 44, 77
- hyperosmotic, 16
- hypodermis, 5, 11
  - leaf hypodermis, 11
- hypothesis(es), 16, 38, 40, 55, 64, 70, 95
- IAA (indole acetic acid), 88, 91, 92
- idioblast(s), 4, 142
- Illicium*,
- illumination, 7, 47, 84
- image, 6, 24–25, 64, 85, 142
  - visual, 24
- impetus, 54
- indole acetic acid, 21
- β-Indoleacetic acid, 39
- in situ*, 22, 28, 90
- incubation, 100
- India, 4, 29, 31, 35, 148
- induce(d), 21, 94, 96, 102
- inducing, 39, 89
- induction, 16, 22, 23
- industrial, 2, 20, 126, 132, 136, 138, 144–145
  - product(s), 2, 145
- influx, 21, 36, 50, 54, 139
- inhibit(ed), 17, 103
- initiation, 13, 16, 23, 54, 91, 101, 135
- injection, 24, 137
- injury, 4, 22, 39, 66, 69, 85, 94, 95, 116
- inner, 31, 66
- inorganic, 4, 25, 27, 56, 71–74, 83–84, 87–88, 93–94, 98, 103, 106–107, 111–114, 121, 145
  - material(s), 72, 83–84
- instrumentation, 21, 27, 92, 119, 147
- intact, 22, 23
- intensity, 28
- intercellular, 9, 11, 13, 82, 99, 101, 114, 128
- interdependency, 18
- intermingle(d), 2, 4
- intrinsic, 54, 66, 94
- intrinsically, 18
- intruding, 12
- invagination, 16
- inward, 32
- ion, 7, 33, 36, 39, 41–42, 44–45, 47–48, 52, 64, 67, 69, 75, 77, 83, 89–90, 111, 120
  - channel, 7, 36, 41, 47, 64
  - mineral, 90, 111, 120
  - mobile, 65, 69
  - pump, 44, 64
  - transporter(s), 41, 48, 52
- ions, 21, 26, 28, 33, 36–37, 40–44, 47, 52, 65, 69, 72, 77, 83–84, 90, 93–94, 103, 109, 111, 120–121
  - mineral, 90, 111, 120
  - mobile, 65, 69
  - pump, 52
  - transporter(s), 41, 44, 52
- ionic, 151
- irrigate(d), 20, 30, 93, 116
- irrigation, 49, 67–68, 90, 101, 108, 110, 118
  - cycle, 49, 90
- isolate(d), 142
- isopentenyl, 75, 90, 92, 142
  - adenine, 75, 92
- jar, 23, 30
  - bell jar, 23, 30
- jump, 46, 50
  - endodermal, 50
- Kadsura japonica*, 7
- Kadsura longipedunculata*, 7
- KCN (potassium cyanide), 7, 37, 39, 50
- Kentucky, 26, 80, 107
- kinetin, 61, 87, 88, 130
- knowledge, 9, 33, 48, 80, 88, 92, 98, 105, 123, 142–145
- laboratory, 19, 21, 23–27, 85, 90, 96, 111, 127, 129
- lamina(e), 11, 14, 59, 94, 97
- laminal, 11
- laminar, 5, 9–10, 12–15, 96, 109, 120
  - hydathode(s), 5, 9–10, 12–15, 109, 120
- lanolin, 23
- lanthanum nitrate, 13, 120
- latex, 4, 114, 136

- leaf, 2, 4–18, 22–29, 35, 47, 51–52, 56–61, 63–65, 67–69, 48–49, 54–56, 73–76, 81–91, 94–101, 103–104, 109–111, 113–115, 118–121, 128–132, 142–143, 145–146  
 blade(s), 11, 24, 81, 113  
 rolling, 24  
 unrolling, 24  
 leaves, 2–9, 13, 16, 18–19, 21–25, 28–33, 35, 37–38, 45–46, 59–71, 75–76, 80–87, 89–98, 101, 103, 106–108, 110–111, 113–114, 116, 118–122, 124, 127–129, 134, 138, 142–143, 145–146  
 lenticel(s), 28, 58, 97  
 lettuce, 2, 58, 66, 78, 87, 94, 116, 127  
 light, 47, 63  
 lignified, 102  
 lipophilic, 4–5, 72  
 materials, 4, 72  
 substances, 5  
 liquid, 2, 8–9, 30, 37, 54, 58, 71, 82–83, 91, 93, 110, 116  
*Lobelia dortmanna*, 14, 22, 57, 120  
 local pressure(s), 31, 35  
 longitudinal, 75  
 lotus, 7  
 $l_p$  (water permeability), 48, 51, 61, 68  
 $l_{pr}$  (root hydraulic conductivity), 48, 89  
 lumen, 36, 80, 115  
*Lycopersicon esculentum*, 73, 101, 116  
  
*Myrothamnus flabellifolius*, 13, 120  
 macromolecule(s), 48, 73, 82, 89, 123, 134  
 magnesium, 85  
 magnification, 10, 12, 15  
 magnitude(s), 33  
 mahsuri, 29, 58  
 maize, 9, 20, 22, 55, 61, 73, 80, 89, 94, 142  
 malt, 8  
     agar, 8  
     extract, 8  
 mannitol, 37  
 margin(s), 7, 9–11, 16–19, 22, 25, 27–28, 35, 57, 60, 69, 85, 94–95, 97, 103, 114, 119, 129  
     leaf, 10–11, 16, 18, 57, 60, 69, 94–95, 103, 119  
 material, 11, 24, 26, 76, 112, 114, 136,  
 materials, 1–2, 4, 24, 26, 29, 36, 62, 69, 72–73, 81, 83–84, 95, 101, 103, 123, 127, 134, 142  
     osmotically active, 36  
 maturity, 29, 58, 59  
 maxima, 21, 66, 88  
 maximal, 129  
 means, 26, 48, 79, 82, 109, 151  
 measurement, 24–27  
 measuring, 26, 145  
 mechanical, 62  
 mechanism, 4, 13–14, 30–31, 35, 43–45, 47–48, 53–54, 88, 102, 118, 122, 129, 138, 144  
     feedback, 31, 48, 88  
 mechanosensor(s), 46  
 medicinal, 126, 136  
 medium, 28, 33, 36–38, 45, 60–61, 63, 67–69, 71, 83, 96–98, 102, 128–130  
     external, 36–38  
 membrane, 7–8, 14, 16, 32, 39–47, 51–54, 64–65, 77, 99, 113, 123  
     gradient, 41  
     permeable, 32  
     potential, 7–8, 41–44, 46–47, 54, 64, 77  
     semipermeable, 43  
 mesophyll, 9, 13, 80, 84, 86, 113  
 metabolic, 1, 21, 38–40, 50, 54,  
     component, 39–40, 50  
     process(es), 1, 38, 40  
 metabolism, 36, 43, 45, 48, 56–57, 66, 76, 82, 102, 112, 116, 123, 135, 138–139, 142  
 metabolite(s), 8, 44, 47–48, 54, 72–73, 82, 89, 98, 102, 109, 112–113, 130, 146  
 methyl alcohol, 27  
 methylene chloride, 26  
 microbial, 74, 78, 101, 126  
 microbiological, 24, 72  
 micrograph(s), 12, 15  
 microorganism(s), 73, 84, 93, 96, 98, 100, 107, 113, 116  
 micro-oscillation(s), 51  
 microscopic, 11, 24, 50, 61, 85, 101  
 microstructure, 42, 62  
 microtubule(s), 13, 15  
 mid-dormancy, 143  
 midrib, 10  
 milk, 29, 59  
 mineral, 28, 44, 60, 65, 69, 83–85, 90, 93, 108–111, 120, 146  
     deficiency, 69  
 minima, 21, 66, 88  
 mitochondria, 1, 5, 15, 96  
 mobility, 18, 40, 79, 87, 115, 144  
     chemical, 18, 144  
 mode, 30, 94  
 moisten, 56  
 moisture, 108

- molecular, 49, 136, 142
- moraceae, 5
- morning, 2, 25, 67, 68, 80, 107, 138
- morphogenesis, 13
- morphogenetic, 49
- morphological, 9, 98
- morphologically, 9
- morphology, 8, 11, 14, 16, 34, 56
- moss, 48
- mountain, 20
  - valley(s), 20
- mouth(s), 1, 8, 18–19, 106, 124, 144, 146
  - without lips, 8, 18, 106, 124, 146
- mRNA, 62, 72, 104, 111, 138, 142, 143, 146
- mucilage(s), 5
- multicellular, 13, 36
- muscle, 40
- mutant, 48, 76, 81, 88–91, 105, 135, 139–142
  - double, 48, 89, 91
  - grafted, 48, 88
  - rms1, 88–89, 91
  - rms2, 88–89, 91
  - rms3, 88–89
  - rms4, 88–89, 91
- mutants, 48, 76, 88–89, 91, 135
  - rms1, 88–89, 91
  - rms2, 88–89, 91
  - rms3, 88–89
  - rms4, 88–89, 91
- mycelia, 12, 82
  - fungal, 12
- mycorrhiza(s), 70,
- mycotoxin(s), 8, 74, 81, 82, 102, 113, 114
- nanotechnology, 119, 136, 146
- Nasturtium*, 7, 55
- natural, 19, 102, 104
- nectaries, 4, 106
- nectariferous, 4
- needles, 4, 24
  - pine needles, 4, 24
- nervous, 40
  - excitement, 40
- Nicotiana tabacum*, 128
- nifedipine, 64
- niflumic acid, 64
- nitrate, 13, 22, 36, 80, 83–84, 95, 100, 116, 120
- nitrogen, 16, 22, 69, 81, 84, 95, 100, 121
  - ammonium, 22, 84, 95
  - organic, 16,
- node(s), 24, 45, 88
- noninvasive, 110, 112, 122
- non-osmotic, 36, 38
- non-stressed, 48
- nucleus, 15, 123
- nutrient(s), 4, 7, 13, 20, 26, 28, 44, 47, 62, 68–69, 72, 77, 95, 106, 118–121, 124, 136, 146
  - nutrient acquisition, 106
  - transport, 62, 77, 122
- oat(s), 9, 47, 55, 56, 61, 63, 64, 73, 80, 83
- oblique, 10
- ochratoxin A and B, 82,
  - ochratoxigenic, 82
  - isolates, 82
- oil(s), 5, 72, 74, 81, 142
  - volatile, 5, 72, 74, 81
- onion, 33
- ontogenesis, 16
- ooze(s), 51
- oozing, 4, 30, 31, 51, 67, 137
- organelle(s), 1, 5, 14, 123
- organic, 4, 8, 16, 25, 27, 44, 71–72, 74, 79–84, 87, 93–96, 98, 103, 106–107, 110, 112–114, 118, 121–122, 145
  - materials, 72, 81, 103
- organism(s), 46, 138
- organs, 1, 2, 4, 11, 13, 47, 76, 81, 90, 106, 122, 127, 142
- oscillation(s), 42, 46, 49–51
  - self, 50, 51
  - micro, 51
- osmometer, 36
- osmosis, 32, 37, 52
  - electro, 32
- osmotic, 16, 21, 24, 32–33, 36–40, 45–48, 52, 54, 58, 67, 70–71, 89, 111
  - adjustment, 48, 89, 111
  - electro, 32, 36,
  - influx, 21, 36
  - law(s), 37
  - phenomenon, 32, 35
  - potential, 24, 33, 37–38, 52, 67, 71
  - solution, 37
  - value, 37–38
- outdoor(s), 20
- outgrowth, 48, 58, 88
- overlapping, 15
- oxidative, 47–48, 51, 64, 79, 107, 114
  - stress, 48, 51
- oxygen, 22, 52, 69, 114

- palmyra, 35
- panicle, 27, 26, 27, 35, 113, 123
- paper, 24, 26–27
  - blotting, 24, 26–27
- paradermal, 10, 15
- paragraph(s), 18
- parasitic, 8, 28, 94, 97
- parenchyma, 9–10, 36, 38–43, 48, 50, 51
  - parenchymatous, 9
- passage, 4, 9, 13, 43, 50
- patch(es), 18, 20, 56, 97, 108
- pathogenicity, 97
- pathway, 9, 11, 13, 40, 42, 51, 60, 70, 77–78, 81, 89, 91, 96–98, 99, 103, 113, 115, 120, 128, 135, 142, 146
  - apoplastic, 13, 70, 120
  - symplastic, 40, 51
- Pellionia, 5
- penetration, 56, 102, 104, 114
- Penicillium verrucosum*, 82
- Penicillium nordicum*, 8, 82
- pepper, 24, 101, 116
- peptide(s), 44, 47, 78, 79, 82, 93, 104, 130
- pericinal, 13
  - division, 13
- percytoplasm, 13
- periodicity, 21, 63
- periphery, 2
- periplasmic, 15
- permeability, 37, 46, 47
- peroxisome(s), 15
- pétiole(s), 24
- pharmaceutical, 2, 18–19, 24, 26, 30, 49, 71, 92, 125–138, 144–145
  - product, 26, 126–127, 129, 132, 138
- pharmaceuticals, 19, 30, 49, 92, 125–126, 128, 130, 132, 142–147
- phase, 42, 50, 63, 123, 132–134
  - contraction, 50
  - relaxation, 50
- phenomenon, 1–11, 19–21, 24, 29–38, 41, 47–48, 51–55, 66–70, 93–96, 104–109, 118–120, 144–146
  - rhythmic, 21
- phloem, 2, 4, 47–48, 54, 62, 69, 73, 75–76, 78–79, 81, 87, 90, 112–113,
  - sap, 2, 4, 47, 54, 73, 78–79, 81, 87, 113
- phloem-to-xylem, 2, 4, 47, 62, 69, 73, 78
- Phoenix dactylifera*, 35
- Phoenix sylvestris*, 4, 29, 35
- phosphorus, 22
- photosynthesis, 8, 113, 114
- photosynthetically, 155
- physical force, 32
- physiological, 2, 8, 19, 24–27, 45–51, 54–55, 58, 71, 75–76, 88, 96, 104, 107, 112, 115, 119–123, 129, 142
  - function, 8, 19, 25, 36, 75, 110, 142
  - phenomenon, 19, 48–49, 51, 55, 107,
- Physocarpus opulifolius*, 10
- phytohormone(s), 49, 111
- phytopathological, 19, 24, 25, 27, 115
- Pilea pumila*, 14
- Pilobolus*, 7, 28, 31, 56, 64
- pine, 4, 7, 24, 57, 95, 118,
  - white, 24
- pink, 3
- Pinus strobus*, 24
- pipette, 26
- pipolphenol, 39, 40, 50
- plant kingdom, 5
- plant physiology, 2, 31, 38, 89, 149
- plant, 4, 22–24, 35, 46–47, 66, 93, 94, 102, 106, 109, 112, 116, 119, 120, 136
  - aquatic, 66
  - excised, 24
  - intact, 22–23, 35
- plants, 2, 4–5, 14, 17, 19, 21–24, 26, 28, 31, 33, 46–47, 52, 57, 60–61, 64, 88–89, 93–94, 96, 102–106, 109–113, 116, 119–120, 122–123, 128–129, 131, 136
  - aquatic, 2, 5, 14, 21–22, 26, 57, 60–61, 64, 88, 120
  - excised, 24
  - intact, 19, 21, 24, 33
  - land, 2, 21
  - medicinal, 18, 89, 126
  - submerged, 2, 5, 7, 14, 22, 26, 28, 57, 60–61, 64, 66, 68–69, 120
  - transpiring, 52
- plasmalemma, 16
- plasma-membrane, 77, 99
- plasmodesmata, 4, 14, 15, 46, 49, 50, 51, 97, 101
- plasmolysis, 14, 16, 47
- plastid(s), 5
- polar, 32, 43
- polarity, 18
- polarization, 7, 43, 50–51, 64, 77
  - electrical, 7
- polypodiaceae, 7
- polypore(s), 8, 28, 56
- Polyporus squamosus*, 8, 28, 56

- polysaccharide(s), 1, 4, 100, 114
- polyvinyl chloride, 23
  - sheet, 23
- population, 101, 103, 117, 121, 124, 143
- pore, 9–15, 17–18, 30, 43–44, 54, 101
  - water pore, 9–13, 15
- pores, 2–3, 5, 8–14, 20, 43, 54, 56, 61, 64, 66, 97–99, 114, 119
- positive charge, 77
- postdoctoral, 21
- post-mechanosensory, 46, 47, 62
- potassium, 7, 22, 37, 41, 63–65, 83–84, 110, 112
  - channel, 7, 64
  - blocker, 64
- potato, 78, 126, 132
- potential, 7–8, 13, 24, 27, 30, 32–33, 37–38, 40–47, 49–50, 52, 54, 58, 64, 66–68, 77, 98, 110
  - gradient, 8, 40, 43–45, 50, 52, 77
  - membrane, 7–8, 41–44, 46–47, 54, 64, 77
  - osmotic, 24, 33, 37–38, 52, 67, 71
  - sink, 27,
  - turgor pressure, 13
  - water, 30, 33, 38, 40, 43, 45–46, 49–50, 66–68, 98, 110
  - yield, 27, 58
- pragmatic, 18
- precipitated, 12, 83, 95
- precipitation, 25, 93, 97, 106, 116
- precursor(s), 48, 61
- pre-emergence, 108
- prenectar, 4
- pressure, 11, 13, 22–24, 30–31, 33, 35–36, 38, 43, 45–46, 51–52, 54, 57–60, 62, 64, 66–70, 77–78, 93–94, 99, 103, 106, 109, 111, 118–120, 124, 145
  - compensating, 46
  - diffusion, 36
  - hydrostatic, 11, 30–31, 33, 36, 43, 45, 52, 54, 68, 106, 109, 124
  - osmotic, 16, 33, 36–40, 45, 47, 58, 67, 70
  - pneumatic, 22,
  - root, 4, 7, 9, 11, 14, 19–21, 23, 30–43, 45, 47–52, 54, 57–60, 64, 66–70, 77–78, 93, 99, 103, 109, 111, 118–120, 145
  - sap, 11
  - turgor, 13, 36, 62, 94
- pressurized, 24
- principle(s), 19, 138
- probe, 33, 147
  - electric, 33, 147
- productivity, 107
- promoter, 62, 75, 129, 132, 143
- promoters, 52, 139–141
  - respiratory, 52
- propel, 145
- protein, 17–18, 29, 36, 39, 49, 58, 73, 77, 78, 126, 128–137
  - contractile, 39
  - MUTE, 17
  - recombinant, 58, 126, 128–130, 134, 137
- proteins, 1, 4, 26, 30, 32, 39–40, 46, 49–51, 54, 72–73, 77–78, 125–130, 132, 134, 138, 143, 146–147
  - contractile, 32, 39–40, 46, 49–51, 54
  - recombinant, 26, 30, 72, 78, 125–130, 132, 138, 143, 146–147
- proteome, 47, 78, 114, 115
- proton, 7, 13, 41–45, 47, 52, 64, 77, 111, 141
  - pump, 7, 13, 41–42, 47, 64, 111
  - transport, 43
- protoplasm, 11
- protuberance, 26
- pteridophyte(s), 7, 55
- pulled up, 31, 79
- pulsation, 31–32, 46, 49–51
  - propulsive, 31, 46, 49–50
  - theory, 31–32, 49–50
- pulsations, 49, 51
- pulse(s), 51
  - electrical, 51
- pump(s), 7, 13, 23, 31, 35, 41–47, 64, 77, 106, 111
  - battery-driven, 23
  - proton, 7, 13, 41, 42, 47, 64, 77, 111
  - submersible, 23
  - water, 35
- PUP (purine permease), 48, 49, 75, 113
- pushed up, 31
- putative, 73, 79, 81, 113
- $Q_{10}$  (temperature coefficient), 40, 50, 66
- qualitative, 25
- quantification, 19, 29, 33, 125
- quantify, 24, 33, 117, 120, 122
- quantifying, 24, 117, 120, 122
- quantitative, 24, 25, 27, 41, 58, 123
- Queensland, 20, 21, 56
- radiation, 20, 25, 66, 157
- rainforest(s), 7
- rainbow, 25
- rainfall, 7, 46, 62, 65, 95, 96, 108

- ratio, 16, 41, 61, 111
- refilling, 42
- reflect(ed), 21, 25, 109
- reflection, 25
- rehydration, 13, 120
- relaxation, 40, 50
  - phase, 50
- remnant, 12
- reorganization, 16
- repetition, 107
- reserve, 31, 40, 68
  - food(s), 31
- resin, 5, 102, 136, 142
  - resin-embedded, 10
- resistance, 9, 24, 31, 35, 48, 57, 59–61, 80, 98, 100–105, 113–116, 124, 137–142, 146
  - water flow, 11, 24, 60–61, 146
- respiratory, 50, 52
  - activity, 52
  - promoter(s), 52
- respirable, 21
- respiration, 21, 51, 58, 69
- respire(d), 52
- retrieval, 4, 13, 48, 62, 106, 109, 120
  - solute, 4, 120
- retrieve, 41, 49, 113
- reverse, 77, 118
- Rhamnus mican*, 3
- rhizome, 21, 56, 108
- rhythm(s), 21, 47, 49
- rhythmic, 21, 49, 50, 63
  - contraction, 49
  - expansion, 49
- rhythmicity, 50
  - impulsive, 50
- rice varieties, 28, 58
  - late maturing, 28, 58
  - early maturing, 28, 58
  - medium maturing, 28, 58
- ridge, 57
- Rockhampton, 21
- root, 4, 7, 9, 11, 14, 19–23, 31–54, 57–60, 66–70, 77–78, 85, 87, 89, 90, 92, 97, 99, 109, 111–112, 118–120, 125
  - hair(s), 34, 46, 54, 70, 97
  - hydraulic, 48, 89
  - conductivity, 48, 70, 89
  - root activity, 45, 58, 109
  - root exudation, 7, 19, 33, 38–39, 88, 90, 112
  - root growth, 90, 92, 109
  - root pressure, 4, 7, 9, 11, 14, 19–23, 31–43, 45, 47–52, 54, 57–60, 66–70, 77–78, 99, 109, 111, 118–120
  - root system, 4, 33–34, 39–40, 50, 67, 70, 85, 87
  - roots, 4, 22, 30, 33, 35, 70, 120
  - ROS (reactive oxygen species), 114, 115
  - rosaceae, 5
  - rubber plant (*Ficus elastica*), 4
  - rudimentary, 48
  - salicaceae, 5
  - Salix*, 5
  - Salt secretion, 52
  - sap, 2, 4–5, 11, 16, 19, 29, 31–32, 35–37, 41–46, 79, 81, 87, 91, 103, 111, 113, 143, 145
    - ascent of, 31–32, 45–46, 145
    - flow, 31, 35, 91
    - phloem, 2, 79, 81, 87, 113
    - xylem, 16, 21, 33, 36–37, 42, 46, 91, 111, 113
  - saps, 4, 47, 54, 61, 73, 76, 85, 112
  - saprobic, 8, 28
  - scale, 132
  - scanning, 12
  - scanning electron microscopy (SEM), 12, 14
  - scar(s), 56
  - Schisandra chinensis*, 7
  - Schisandra glabra*, 7
  - Schisandra henryi*, 7
  - scholar(s), 148
  - screening, 111, 123
  - secrete, 1, 5, 7, 129, 142
  - secretion(s), 1, 4
  - secretory, 1, 4–5, 9, 81, 106, 131, 136, 138, 142
    - organs, 4, 106, 142
    - tissues, 1, 4, 9
  - sediments, 22
    - natural, 22
  - seedling(s), 28, 39, 50, 56, 58, 84, 109
  - self-oscillations, 50–51
  - senescence, 76, 90, 113, 142
  - sensing, 24, 42, 46, 54, 81
    - network, 46
  - sensor(s), 147
  - Sequoia gigantea*, 7
  - Sequoia sempervirens*, 118
  - shape, 25
  - sheath, 9
  - shoot, 35

- shotgun, 78
- sieve tube(s), 4, 62
- signal, 38, 44, 46–49, 72–73, 77–79, 88–89, 113, 128–129, 144
  - feedback, 48, 88–89
  - transduction, 72–73, 77–79, 113, 144
- signals, 38, 44, 46, 89, 145
- signaling, 47–49, 77, 88–89, 114
  - chemical, 49, 89
- sink, 27, 35, 58, 76, 113, 123
- sinuous, 16
- size, 25
- sleeve, 39
- soil, 4, 20, 22, 65, 66–70, 80–81, 84–90, 96, 100–101, 106–109, 118–125, 144–145
  - aerated, 20
  - dry, 20
  - moisture, 22, 54, 65, 67–68, 108, 118
  - solution, 70
- solute, 8, 16, 25–26, 34, 36, 38, 41–44, 51–55, 71, 94, 114, 120
  - dissolved, 26
  - inorganic, 25, 71
  - organic, 25, 71
  - osmotically active, 36
    - transport of, 44
- solutes, 4, 9, 13, 16, 21, 25–27, 33, 71, 83
- solution, 21–22, 28, 36–40, 44–45, 60, 65, 67–71, 82–85, 95–96, 121, 145
  - culture, 28, 36, 60, 84–85
  - deficient, 22
  - dilute, 21, 71, 83
  - mannitol, 37
  - nutrient(s), 22, 28, 68–69, 71
  - osmotic, 37
  - plasmolyzed, 37
    - salt, 38, 65, 67–70
- solvent(s), 26–27
- sound, 46
- Sparganium emersum*, 14, 22, 57, 120
- species, 55
- split-root, 49, 90
- spongy, 10
- spontaneous, 19, 43
- starch, 15, 35, 36, 59
- stellar, 41
- stele, 39
- stem, 4, 21, 24, 31–36, 45, 49, 51, 59, 63, 79, 86–87, 111–112, 129, 143
- pressure, 31, 34–35
- sterilize, 103
- sterilizing, 27
- stimulator(s), 38–40, 113
- stimuli, 5, 38, 42, 46, 62, 78,
  - external, 5, 54, 78
  - mechanical, 42, 46, 62
  - physical, 46
- stimulus, 11, 47
- stomata, 2, 8, 9, 11, 20, 47, 66, 110
- strategy, 18, 33, 45, 82, 101, 110
- strawberry, 7, 60, 73, 79, 110
- stress, 16, 42, 47–48, 51, 65–68, 73, 79, 87, 98–99, 109, 111, 118, 123, 145
  - oxidative, 48, 51
  - water, 67–68, 98–99, 118, 145
- stresses, 47, 51
- stress-induced, 48
- structure, 7, 9, 11, 16, 18, 39, 50, 94, 97–98, 101, 116
- structures, 2, 5, 8–11, 13–14, 43, 50, 73, 98, 100, 125, 142, 144
- stump, 19, 38, 51, 85m 87m 112
- subcellular, 46
- submerged, 2, 14, 22, 28, 57, 96, 120
- subtend, 13
- sucrose, 35, 44, 59, 62, 76, 81, 113
- suction, 26, 96
  - vacuum, 26
- sugar(s), 4, 35, 36, 40, 72, 81, 100, 113, 121, 135
- sulforhodamine G (SR), 13, 120
- sunlight, 20, 25, 136
- sunrise, 31
- sunset, 20, 30, 65
- surface, 2, 5, 9–16, 25–28, 32, 56–60, 73, 78, 84, 94, 98–104, 107–108, 113, 117, 138, 142
- tension, 2, 25, 154
- survival, 25, 45, 62, 81, 103, 108, 110, 114, 118, 145
  - plant, 25, 45, 81
- survive, 50, 76, 98
- symplasma, 51
- symplastic, 40
- symptom(s), 22, 66, 91, 101, 123
  - deficiency, 22
- synchronism, 50
- system, 9, 11, 13–14, 16, 33–34, 38–40, 43, 47–50, 59, 62, 67–70, 75, 87–88, 96–100, 122–124, 129–134, 145–147
- water-conducting, 13–14

- systems, xx, 1, 4, 8, 18, 25, 30–31, 34, 39–40, 43, 52, 69, 78, 85, 96, 102, 105–106, 116–117, 119, 123–128, 130, 132, 136–138, 144, 147  
 soil–plant–animal–environment, xx, 25, 30, 106, 116, 119, 123, 125, 144
- taxon(s), 5, 46  
 taxonomic, 5, 46  
     classification, 46  
 TEA (tetraethyl ammonium), 2, 7, 32, 33, 37, 108, 111, 118, 126, 130, 148, 149  
 tear drops,  
 technique, 16, 23, 25–27, 76, 100, 121, 128, 136–138, 142  
     Komarnytsky, 26  
     Pedersen, 26  
     Singh, 27  
     Wagner, 26  
 techniques, 25, 33, 41, 48, 72, 92, 146  
 teeth, 13, 113, 119  
     leaf, 13, 119–120  
         teeth chloranthus, 119,  
 temperate, 33, 118–119  
 temperature, 62, 66  
 tendril, 5, 11  
 tension 25, 32, 35, 42, 108,  
     surface, 25, 154  
 terrestrial, 7, 57, 61, 88, 97, 120  
 theoretical, 18, 50  
 theory(ies), 32, 46  
 threshold, 46, 87  
*Thuja orientalis*, 22  
 tillering, 29, 59, 65  
 tip(s), 2, 5, 9, 11, 22, 26, 30, 49, 56, 94, 108  
 tissue, 1, 4–5, 8–11, 26, 31, 46–51, 54, 61, 76, 79, 81, 85–90, 95, 98–104, 113, 121, 129, 137–138  
     living, 31, 51  
 tobacco, 26, 29, 54, 58, 78, 90, 126, 127, 129  
 tomato, 22, 28, 30, 55, 67, 73, 101, 129,  
 tonoplast, 44–45  
     H<sup>+</sup>-ATPase, 44–45  
 tooth, 13, 119  
 tortuous, 15  
 touch, 26, 27, 46, 62  
 toxin(s), 70, 72, 81, 82, 99, 102, 128, 129  
 tracer, 13, 41, 75  
 tracheae, 21  
 tracheid, 9–11, 13  
     terminal, 11  
 tracheids, 9, 13, 50  
 trafficking, 62, 73, 113  
     inter, 62, 73, 113  
 transfer, 7, 9, 26, 51, 75, 77, 138, 142  
     tissue, 9  
 transgenic, 128, 129  
 translocation, 8, 33, 56, 76, 82, 92, 112, 122  
 translucent, 2, 105, 115  
 Transmission Electron Microscopy (TEM), 14  
 transpiration, 2, 7–16, 20, 23, 30, 32–33, 42, 46–47, 52, 54, 62, 66–67, 76, 86, 90–91, 108–111, 119  
     cuticular, 20, 66, 90  
     stream, 46, 76, 86, 111  
 transpiring, 52  
 transport, 2, 24, 26, 33, 38, 40–45, 50–51, 59, 61, 64, 70, 75, 87, 111, 113, 120, 122, 128–129  
     hormones, 87, 128–129  
     long-distance, 42, 50, 75, 111, 113  
     nutrients, 62, 77  
     water, 2, 24, 26, 33, 38, 40–45, 50–51, 59, 61, 64, 70, 120  
 transvacuolar, 40  
 tree, 7, 28–29, 32–35, 42, 55, 65, 84, 87, 92, 95–96, 108, 119, 121, 135–136, 145–146  
     broad-leaved, 7  
 trees, 7, 33, 42, 55, 96, 136  
 tribe(s), 5  
 trichome, 1, 4, 11–13, 15, 26, 61, 73, 86, 97, 100, 106, 109, 132, 135–136, 138, 142  
     glandular, 1, 12, 15, 135  
     secreting, 26, 116, 135  
     secretory, 4  
 trichomes, 26, 61, 73, 86, 135, 138  
 trigger(s), 30, 38, 41, 144  
*Trimenia papuana*, 7  
*Trimenia weinmanniifolia*, 7  
 tropical, 7, 20, 28, 67, 108, 118  
     forest(s), 7, 28, 67, 108  
 turgid, 48  
 turgor, 13, 36, 46–47, 51, 54, 62, 89, 94, 109–110, 135  
     pressure, 13, 36, 62, 94
- UK  
 ultrastructural, 14  
 ultrastructure, 14, 18,  
 unicellular, 13, 78  
 unidirectional, 32, 51  
 University, 26, 58, 138, 147, 148  
 unstress(ed), 48

- upper, 4, 17, 20, 29, 38, 81, 86
- up-regulation, 48, 52, 76, 89, 135
- upward, 31, 32, 45
- Urtica dioica*, 14
- utricaceae, 5
- vaccine(s), 30, 78, 125, 126, 137, 145, 146
- vacuole, 15, 44, 45, 123, 128, 151
  - trans, 2, 75
- vacuoles, vacuum, 15, 26, 123,
- vanadate, 52, 64
- vapor, 2, 4, 8, 65, 110, 155
  - water, 4, 23, 110
- variation, 29, 56–62, 75, 114, 123
  - periodic, 21, 89
- variety, 3, 28, 28, 56, 58, 126, 128
- vascular, 1, 4, 16, 18, 31–32, 48, 52, 59, 75, 80, 96, 100, 109, 146
  - system(s), 1, 16, 18, 31, 48, 59, 75, 80, 96, 100, 146
  - bundle(s), 9–10, 12, 48, 52, 89, 109
  - plants, 1, 4, 31–32
- vegetative, 20, 66
- vein(s), 5, 7, 16, 86
- vein-end(s), 12, 13
  - ending, 13
- venation, 12, 16
- verapamil, 64
- vertical, 91
- vesicles, 4, 13–15, 96, 111, 120
  - coated, 13, 111, 120
- vessel(s), 14, 17, 31, 32, 36, 42, 50, 59, 120, 146
- Vicia faba*, 14
- vine(s), 29, 31, 35, 49, 69, 88, 90
- visible, 20, 33, 65
- vital force, 31, 32, 50
- vitamin(s), 72, 92, 93, 100, 105, 106, 114, 121, 134, 145
- Vitis vinifera*, 5
- volume, 16, 23, 24, 25, 41, 60, 96, 108, 129
- volumetrically, 27
- vulnerable, 103, 114
- warm, 4, 20, 33, 62, 65, 66, 70, 80, 107
- water, 2, 8–15, 20, 24, 26, 30–31, 33, 35–45, 50–52, 58–60, 66–68, 70, 97–98, 106, 108–110, 112, 119–120, 146, 148
  - absorption, 8, 20, 31, 33, 37, 58, 70
  - active, 14, 37–38, 44
  - column(s), 33
  - flow, 7, 11, 24, 36–42, 50, 52, 59–60, 108, 120, 146
  - pore(s), 2, 9–15, 66, 97, 119
  - potential, 30, 33, 38, 40, 43, 50, 66–68, 98, 110, 148
  - pump(s), 35, 106
  - secretion, 13, 37, 40–42, 52, 112
  - stomata, 2, 9, 11, 66
  - transport, 2, 24, 26, 33, 38, 40–45, 50–51, 59, 70, 120
- wet, 20, 45, 56, 65, 90, 107, 20
- wetting, 20, 25, 99
- wild-type, 76, 146
- wind, 65
- wood, 35, 118, 147
- woody, 4, 35, 55, 119
- xylem, 2, 4–5, 16, 20–24, 31–43, 46–54, 57–58, 61–64, 69, 71–92, 101–103, 109–115, 118–120
  - element(s) 36, 80, 115
  - pressure, 20, 22–23
  - sap, 16, 21, 36–37, 42, 48–49, 61–62, 64, 71, 76–92, 110–114,
  - vessel(s) 31, 36–37, 42, 50, 57, 79, 101–102
- xylem to phloem, 73
- YUCCA (YUC), 18
- yeast, 8, 75–76, 85
  - agar, 8
- Yorkshire, 25
- Zea mays*, 39, 61, 73
- zeatin, 61, 75, 87, 90, 92
  - glucoside, 90
  - riboside, 61, 90, 92
- zone, 16, 42, 46, 87, 128