

Zeitschrift: Archives des sciences et compte rendu des séances de la Société
Herausgeber: Société de Physique et d'Histoire Naturelle de Genève
Band: 42 (1989)
Heft: 1: Archives des Sciences

Artikel: Polarity : from dipoles to biopolarizations. II. Addenda and indexes
Autor: Turian, Gilbert
Anhang: Subject Index
Autor: Turian, Gilbert
DOI: <https://doi.org/10.5169/seals-740081>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 03.05.2026

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

SUBJECT INDEX

- Abiotic, 46
 Acetone, 39
 Achiral, 45
 Acidic, 40, 62, 82, 101-103, 112, 167, 168, 218, 339
 compartment, 167, 175, 185, 220
 hyaloplasm, 154
 pH, 235
 polysaccharide, 207
 protein, 154
 Acidification, 101, 108, 151, 175, 186, 236
 Acridine(s), 198, 199
 Actin, 15, 38, 80, 81, 96, 112-118, 120, 125, 129, 130, 132-136, 139, 144, 145, 152-154, 163, 167, 168, 177, 179, 180, 187, 200, 211, 218, 325, 344-347, 349, 350, 358
 binding site, 115, 118, 344, 348
 cable(s), 118, 130, 346
 cortex, 180
 dots, 151-154
 F-, 111, 113, 114, 117, 145, 174, 346, 347
 G-, 111, 114
 G-F, 133
 microfilaments, 152, 167, 173, 174, 179, 207, 344, 348
 molecule(s), 112, 114, 350
 polymerization, 179
 translocation, 180
 Actin-binding protein(s), 115, 344, 348
 Actin-like filaments, 154
 Actin-mediated transport, 183
 Action potential(s), 87, 88, 90-94, 341, 342
 Activation, 52, 60, 64, 67, 80, 92, 102, 117, 127, 145, 148, 158, 162, 189, 198, 217, 222, 232, 243, 247, 248, 250, 341
 Actomyosin, 89, 133, 134, 154, 346
 Adhesion, 81, 115, 134, 136, 181
 Affinity, 39, 40, 42, 60, 76, 106, 114, 194, 347
 Agglutinin, 79, 80
 Aggregates-aggregation, 68-71, 87, 96, 118, 137, 169, 209, 226, 228, 243, 265, 337
 Agravitropism, 355
 Algal
 axiation-differentiation, 195, 352
 eggs-embryos, 157-159, 229, 352
 elongation, 184
 exosporulation, 195
 rhizoids, 168
 zygote, 171, 207
 Algorithm, 61
 Amines, 40, 41, 95
 Amino acids, 40, 41, 44-46, 57, 58, 60, 66, 67, 73, 81, 86, 95, 96, 167, 168, 249, 328, 334, 337
 polar, 62
 Ammonia (-ium), 68, 243, 353
 Amoeboid (Amoeba), 15, 137-139, 141
 cells, 147, 347
 motion, 133-137, 346, 347
 movement, 134, 135, 346
 Amphipathic, 37, 40, 63, 65, 76-78, 80
 Amphitropic, 77
 Ampholytes, 41
 Amphoteric, 38, 41
 Amyloplasts, 168, 236, 344, 354
 Anaphase, 120, 125, 126
 Anchorage, 63, 76, 81, 115, 153, 222, 339
 Animal(s), 211, 212, 214-217, 223, 246, 250, 253, 255, 272, 325, 342, 353, 355
 cell(s), 189, 211, 223, 262, 353
 eggs-embryo 13, 211, 212, 225, 238, 325
 gradient, 217, 255
 pole, 190, 212, 217, 254, 255, 263
 regeneration, 13
 Animal-vegetal (A/V)
 axis, 212, 216, 253, 254, 262
 gradient(s), 264, 265
 halves, 255

- polarity, 211, 214, 216, 217, 253, 254, 262, 263, 269
- Anion(s), 30, 91, 220, 339
- Anisometry, 39, 70, 150, 181
- Anisotropy, 24, 185, 111, 112, 333, 338
- Ankyrin, 112, 221
- Annihilation, 17, 21, 22
- Anode, 180
- Antenna, 108-111, 343
- Anterio-posterior (A/P)
 - axis, 245, 249, 250, 252, 256, 259, 260, 265, 267-270, 356
 - differentiation, 228
 - gradients, 264
 - pattern(s), 240, 257
 - polarities, 213, 241-249, 250-266, 267-270
 - regeneration, 262
- Anterior
 - pole, 213, 228, 229, 257-260, 263
 - segment, 256
 - structures, 259
 - tip, 243, 257
- Anterograde (inward) transport, 122, 177-179
- Antheridia, 174, 197
- Antibiotic, 86, 151, 183, 343
- Antibodies, 66, 115, 204, 220, 249, 353
- Antigenes, 66, 67, 150, 243
- Antimatter, 18, 19, 21, 47, 327, 328
- Antiparallel, 25, 29, 49, 50, 64, 68, 86, 87, 117, 120, 345
- Antiport, 82
- Antisense, 58, 336, 350
- Antisera, 267
- Apex, 64, 129, 164, 165, 166, 169, 170, 172, 175, 180, 193-195, 197, 224, 225, 227, 232, 238, 239, 241
- Apical, 13, 100, 104, 137, 169-173, 208, 218, 221, 225, 226, 231, 242, 271, 348, 352, 353
 - axis, 184
 - bud, 232
 - cell(s), 160, 169, 172-174, 197, 205, 209, 211, 268
 - differentiation(s), 192-221, 352, 353
 - division, 173
 - dome, 194
 - dominance, 164, 165, 231, 242
 - growth, 157, 162, 344, 345
 - meristem(s) 224, 229, 231, 238, 239
 - pattern(s), 189, 236
 - pole(s), 162, 170, 218-220, 223, 225, 248, 256, 266, 267, 272
 - targeting signal, 348
 - zone, 100, 163, 164, 168, 169, 174, 175, 231
- Apical and basolateral
 - compartments (domains), 219, 220, 226, 353
 - gradients, 104, 171, 172
 - poles, 218, 219, 248, 352
 - surfaces, 220, 221
- Apolar (nonpolar), 37-40, 43, 50, 55, 61, 67, 75, 97, 147, 201, 264, 266, 271, 325
 - cells, 14, 79, 87, 158, 160, 209, 264, 266, 271
 - egg, 158
 - growth, 149, 160
- Archegonia, 174, 197
- Ascospores, 155
- Assembly, 57, 69, 70, 99, 111, 114, 117, 119-123, 125, 126, 132, 179, 202, 203, 219
- Asymmetric
 - budding, 219
 - carbon, 32
 - distribution-transport, 80, 218, 339, 341, 345, 349, 350
 - division(s), 149, 150, 161, 189, 192, 200-202, 206, 210, 211, 222, 225, 229, 230, 252
 - growth, 236
 - septation, 190, 191, 202, 205
 - structure(s), 74, 82, 202
 - synthesis, 46, 335
- Asymmetry, 13, 18, 35, 44, 46-48, 50-52, 64, 66, 74, 77, 79, 82, 100, 102, 108, 109, 112, 114, 119, 123, 132, 145, 154, 159, 173, 181, 186, 194, 200, 205, 206, 208, 210, 213, 216, 225, 230, 236, 237, 247, 266-269, 326, 327, 328, 334-336, 339, 341, 345, 356, 358
- Atomic, 17-32, 325-331

- ATP, 81, 83-85, 100, 104, 106-110, 114, 116, 117, 120, 122, 123, 128, 132, 135, 140, 142, 143, 160, 167, 179, 186, 192, 218, 327, 333, 338, 340, 345, 346
 pump, 106
 synthesis, 83-85, 339
- ATPase, 82-85, 90, 91, 102, 106, 110, 115, 118, 121-123, 126, 128, 129, 167, 168, 220, 345
- Auxin(s), 159, 160, 186, 222, 229-231, 233-238, 340, 354, 355
 transport, 229, 230, 233, 235, 341, 354
- Auxospores, 147, 184
- Axis-axes (axiation), 13, 21, 22, 29, 31, 32, 47, 50, 60, 64, 71, 79, 86, 104, 105, 107, 123, 130, 132, 137, 144-148, 154, 157, 165, 170, 182, 188-190, 192, 198, 200, 201, 206, 207, 213, 216, 221-224, 227, 228, 231, 233, 238, 241, 244, 246-250, 262-265, 271, 352-354, 356
 division, 209
 growth, 147, 158, 161, 165
 polarity, 148, 154, 161, 185, 192, 200, 205, 212, 213, 222, 227, 228, 233, 239, 242, 248, 262, 266, 272, 348, 354, 355
 proximal-distal, 261
- Axial, 66, 133, 174, 224, 247, 249, 356
 asymmetry, 13
 development, 224
 head activator gradient, 248
 regeneration, 13
 symmetry, 64, 221, 249, 265
- Axon(s), 90-92, 94, 105, 122, 123, 177-181, 349-351
 cytoskeleton, 350
 transport, 122, 177, 178, 350
- Axoneme, 122
- Axoplasm, 123, 179
- Bacterial, 129-132, 140, 167, 181, 356
 budding, 149, 150
 cell(s), 53, 182, 190
 chromosome, 183
 division, 190
 elongation, 167, 182
 helical, 267, 356
 shape, 150, 181
 sporulation (endospores), 190, 191
- Bacteriochlorophyll, 43
- Bacteriorhodopsin, 109, 142
- Band(s), 104, 110, 117, 130, 136, 148, 169, 172, 185, 195, 215
- Barbed end(s), 114, 130, 145
- Basal, 68, 122, 131, 137-139, 145, 147, 155, 160, 169-171, 193, 207, 208, 218, 225, 233, 235, 242, 244, 247, 249, 255, 256
 bodies, 104, 244-246, 256
 cell, 204, 211, 225
 compartment, 205
 permeability, 235
 pole(s), 158, 170, 181, 221, 225
 rhizoidal, 208
 zone, 163, 164, 170
- Basidia, 227, 228, 352
- Basidiocarp, 227
- Basidiospores, 155, 194, 195, 226, 352
- Basolateral, 218, 220
 cell surface, 219-221
 domain, 220
 membrane, 98, 218, 220, 221, 267
 pumps, 220
- Bending, 50, 131, 168, 169, 174
- Benzene, 39, 43, 67
- Biaxial patterns, 250-267, 356
- Bidirectional, 102, 123, 179
- Bifurcation, 143
- Big Bang, 17, 19, 327
- Bilayer(s), 63, 75-78, 107, 333, 338, 340
- Binary, 23, 26, 272, 330
 fission, 149, 150, 182, 201
- Binding, 17, 24, 33, 34, 39, 50, 52, 57, 60, 64, 66-70, 77, 80, 86, 90, 93, 96, 112, 114, 123, 140, 337, 344
 protein(s), 60, 114, 337
 site, 66, 111
- Bioelectric field(s), 237, 354, 355
 potentials, 166
- Bioelectrochemistry, 110
- Biosynthesis, 62, 73, 129, 155, 166
- Biopolarity, 14, 273, 326, 358
- Bipolar, 13, 22, 64, 72, 107, 113, 115-118, 124, 130, 167, 170, 173, 181-186, 195, 196, 202, 208, 209, 229, 247,

- 259, 271, 272, 325, 330, 348
- axiation, 147, 181, 186, 192, 197, 204
- budding, 184, 187
- couple, 17, 21
- differentiation(s), 181, 202, 204, 205, 229
- field(s), 41, 222, 232, 240, 247
- filaments, 116, 117
- germination, 184
- gradient, 200
- growth, 167, 181-186, 271
- mating systems, 195
- mitochondrion, 107
- pattern(s), 41, 195-201, 332, 336
- regeneration, 251, 262
- segregation, 184, 199
- sexualization, 195, 196, 200
- Bipolarity, 22, 41, 70, 108, 113, 116, 117, 119, 183, 185, 200, 204
- Bipolarization, 70, 257, 258, 271, 272
- electric, 19-22, 330
- Bipolaron, 24
- Blastocyst, 266, 267
- Blastomere(s), 252-254, 262, 264, 266, 267
- Blue light, 31, 169, 174, 209, 340
- Bond(s), 24, 35, 39-41, 55, 59, 60, 62, 64-66, 68, 92, 332-335
- Boson(s), 19, 24, 27, 29, 44, 327
- Branching, 93, 164, 165, 169, 195, 228, 231
- Brevin, 113
- Bridges, 45, 70, 115, 122, 345, 353
- Bristle(s), 176, 261
- Bud(s), 95, 97, 101, 103, 149-154, 163, 172, 184, 187, 231-233, 239, 348
- growth, 150-154
- meristem, 238
- polarity, 152
- Budding, 102, 149-151, 153, 154, 162, 184, 187, 196, 246, 247, 342, 344, 348, 356
- bacterial, 149, 150
- forelimb, 265, 356
- polar, 151
- yeast, 150, 154, 184, 187, 326, 347, 348
- Ca²⁺, 73, 81, 88-90, 95, 106, 114, 118, 141-143, 166, 168, 169, 175, 180, 194, 209, 232, 237, 261, 340-342
- channel(s), 89, 90, 175, 207, 216, 341, 342
- currents, 216
- gradients, 175, 262, 349
- ionophore, 209, 254, 261
- pump, 106
- transport, 106, 342, 349
- uptake, 106
- Calcium, 23, 80, 88, 89, 93, 95, 102, 106, 116, 135, 139, 160, 237, 253, 254, 340-342, 349
- Calcofluor, 153
- Callus, 147, 239, 354
- Calmodulin, 95, 116, 139, 142, 237
- Cambium, 189
- Cancer, 148
- Capping, 80, 81, 113, 127
- protein(s), 114, 344
- Capsid(s), 69
- Carbohydrate(s), 13, 17, 72, 75, 78, 100, 109, 355
- Carbon, 38-40, 44, 60, 67, 75, 192, 248, 334
- Carotene, 42, 158, 198, 199, 228
- Carotenoids, 109, 161
- Catalysis (-yst), 45, 56, 339
- Cathode, 74, 180, 188, 348, 349
- Cation(s), 23, 24, 30, 37, 38, 78, 81, 86, 90, 92, 99, 135, 143, 338
- Caulonema, 172
- Causal, 214, 217, 231, 255
- CCl₄, 38, 39
- Cell(s), 13-15, 23, 30, 34, 38, 46, 52, 62, 64, 68, 72-74, 77-81, 83, 85, 87-105, 107-109, 111-115, 117-119, 121-127, 129-154, 157, 160-166, 170-193, 196, 197, 200-226, 228-230, 232, 233, 235-241, 243-247, 249-252, 254, 257, 259, 261-268, 271, 272, 325, 326, 333, 338, 342-348, 352-354, 358
- adhesion, 82
- asymmetry, 205
- axes, 175, 190, 271, 346
- compartment(s), 191
- cycle(s), 151, 153, 154, 165, 183, 197, 201, 202, 203, 229, 243, 264, 267, 270
- cytoplasm, 191
- differentiation, 81, 189-221, 228, 244, 245, 272, 352-354

- division(s), 12, 15, 147, 148, 152, 160, 165, 169, 173, 185, 187, 190, 191, 196, 200, 201, 203, 205, 206, 210, 222, 232, 244-246, 252, 253, 268, 272
- elongation, 148, 169, 182, 185, 186, 222, 238
- growth, 147-188, 348-351
- membrane(s), 333, 353
- movement(s), 123, 129-146, 346, 347
- polarity, 15, 112, 148, 154, 159, 160, 186, 190, 191, 205, 235, 248, 261, 272, 344, 346
- polarization, 205, 207
- pole(s), 203, 204
- surface(s), 63, 80, 89, 112, 149, 150, 157, 166, 181, 184, 204, 218, 219, 220, 246, 249, 255, 333, 348-350, 353
- target(s), 345
- Cellulose, 64, 129, 147, 176, 185-187, 206, 211, 241, 244
- Centriole(s), 124, 127, 138, 195
- Centrosome(s), 120, 124, 126-128, 141, 144, 145, 151, 345, 346
- Cephalon-abdomen, 215, 257, 258
- CH₃Cl, 39
- CH₄, 38, 39
- Channel(s), 22, 66, 83, 86, 87, 90, 91, 93, 94, 110, 141, 142, 154, 167, 194, 221, 340-342, 355
- gated (-ing), 83, 340, 341
- ionic (H⁺, K⁺, Na⁺, Ca²⁺, Cl⁻), 86-95, 154, 175, 180, 207, 216, 221, 341
- ligand-gated, 87
- polar, 90
- voltage gated, 87, 88
- Chaos, 17, 328
- Charge(s), 18-20, 22-24, 28, 33, 35, 42-44, 51, 52, 59-62, 64, 67, 68, 71, 74, 83, 84, 86, 87, 92, 108-110, 131, 135-137, 168, 271, 272, 327-334, 337, 343
- asymmetry, 271, 339
- separation, 43, 343
- transfer, 328, 334
- Chelation, 59
- Chemical communication, 149
- Chemical forces, 34
- Chemiosmotic theory, 82-85, 186, 102, 109, 235
- Chemo-structural gradient, 197
- Chemotaxis, 60, 134, 139-141, 145, 241
- Chirality, 15, 19, 43-48, 50, 53, 86, 124, 268, 325-328, 334, 335, 356
- Chitin, 150, 153, 154
- Chitosomes, 155, 157
- Chloral, 160
- Chloride, 85, 341
- Chloroform, 39
- Chloronema(ta), 172, 209
- Chlorophyll, 60, 109, 110, 211, 343
- Chloroplast(s), 50, 51, 83, 103, 108-111, 129, 130, 169-172, 195, 205, 209, 229, 343, 344
- Choline, 65, 92
- Chromaffin granules, 102
- Chromatophore, 110
- Chromosome(s), 52, 55, 120, 124-126, 128, 182, 192, 201, 203, 214, 252, 272, 337, 345
- Cilia, 104, 112, 114, 118, 121, 123, 130-132, 141, 145, 346
- Circular, 50, 51, 71, 86, 124, 327
- polarization, 45, 47, 48
- Cis*-, 53, 81, 89, 97-100, 102, 103, 257, 260
- Cl⁻ (see also Chloride), 158, 341
- Clathrin, 101, 102
- Clay(s), 73, 74
- Cleavage(s) 45, 57, 66, 101, 158, 194, 211-213, 215, 217, 218, 229, 249, 252, 253, 255, 258, 259, 262-264, 266, 268, 269, 336
- CO₂, 38, 65, 109, 162, 192
- Coalescence, 242
- Coat, 71, 117, 202
- Code, 53, 54, 57, 260, 336, 358
- Coenzymes (see also NAD-NADP), CoA, 65, 103
- Colchicine, 141, 160, 173, 179, 186, 206, 211, 251, 344
- Coleoptile, 186, 340
- Commitment, 201, 210, 249
- Communication, 72, 89, 249
- Compartment(s), 72, 84, 99, 102, 103, 106, 168, 205, 220, 346, 353, 355
- Competence, 198
- Complexity, 69, 145, 197, 226, 231
- Computer(s), 23, 26, 61, 66, 146, 330, 337
- Conductivity-conductance, 22-25, 86, 107,

- 329, 333, 338, 341
- Conformation, 45, 49, 50, 70, 85-87, 89, 117, 121, 344
- Conidia, 107, 155, 156, 184, 187, 188, 192, 193, 196, 349
- Copper (Cu⁺²), 23, 24, 61, 65, 66, 335
- Cortex, 100, 134, 136, 138, 144, 145, 202, 210, 212, 216, 244, 263, 344, 346
- Cosmic, 17, 25, 325, 327, 328, 330
- Coupling, 20, 24-26, 54, 82, 86, 89, 94, 97, 102, 111, 148, 185, 223, 250, 326, 341
- Crystal(s), 18, 21-24, 31, 32, 35, 37, 40, 55, 63, 64, 68, 76, 86, 110, 271, 328-333
- Current(s), 22, 23, 26, 34, 45, 62, 92, 95, 120, 129, 137, 139, 142, 143, 154, 159, 161, 166-169, 194, 207, 216, 230, 235, 236, 262, 339, 341, 349, 353
- loop(s), 157, 168, 231, 272
- Cyanide, 132
- Cycle(s), 90, 102, 113, 133, 135, 136, 147, 154, 165, 201, 203, 330
- Cyclic, 139, 179, 343
- adenosine monophosphate, 253
- cAMP, 134, 140, 141, 157, 162, 163, 240, 243, 340
- guanosine 5'-phosphate, 89
- photophosphorylation, 192
- Cyclosis, 129, 162, 164
- Cylindrical, 69, 71, 78, 130, 137, 147, 154-163, 165, 182, 183, 186, 221, 328
- germ tubes, 154-161
- Cysteine-Cystine, 40, 41, 337
- Cytochalasin(s) B, E, H, 80, 113, 145, 179, 200, 206, 207, 229, 344, 350, 352
- Cytochemical gradients, 166
- Cytochrome(s), 61, 66, 84, 198, 338, 339
- oxidase, 198, 339
- Cytogel, 72
- Cytokeratin, 111
- Cytokinesis, 136, 151, 153, 154, 161, 184, 200, 208
- Cytolytic, 99
- Cytoplasm, 15, 54, 62, 72, 85, 89, 103, 104, 112, 122, 124, 129, 130, 136, 142, 158, 161, 164, 168, 172, 173, 176, 186, 189, 190, 194, 198, 199, 208, 210, 212-214, 217, 218, 225, 235, 236, 255, 257, 259, 264, 269, 271, 272, 350
- Cytoplasmic, 15, 79-81, 88, 89, 94, 95, 100, 106, 111, 115, 123, 124, 126, 129-131, 133, 139, 141, 146, 149, 151, 152, 158, 161, 168, 169, 173, 179, 185, 189, 194, 197, 198, 200, 206, 209-214, 217, 221, 228, 229, 235, 252, 255, 261, 262, 264, 340, 349, 350
- basophilic gradient, 193
- DNA, 198
- granules, 151
- movements, 73, 129, 261
- streaming, 15, 129, 130, 137, 162, 164, 175
- zonation, 169
- Cytoskeleton, 81, 111, 112, 124, 132, 138, 139, 144, 145, 158, 162, 166, 173, 174, 176, 177, 179, 180, 200, 204, 206, 213, 214, 218, 219, 254, 264, 271, 325, 343-350, 353, 355, 358
- outgrowths, 261
- protein(s), 73, 77, 95, 99, 177, 350, 356
- Cytosol, 65, 72, 73, 77, 102, 111, 118, 130, 172, 177, 179, 343
- Dehydrogenases, 82, 84
- Deoxyribonucleic acid (DNA), 45, 49-57, 61, 64, 70, 71, 81, 155, 189-191, 197-200, 203, 259, 260, 272, 336, 337, 348, 358
- packaging, 71, 337
- polarity, 49, 336
- polymerase, 61
- positioning, 197-200
- replication, 52, 190, 203
- segregation, 191
- topology, 53
- transcription, 52-54
- Depolarization, 87-92, 94, 95, 108, 141, 142, 157, 216, 221, 251, 334, 340, 341, 346
- Design, 42, 69, 74
- Desmin, 111
- Detergent(s), 63, 76, 78, 110, 115
- Determinants, 122, 215, 253

- Development, 15, 27, 72, 74, 91, 147, 152, 155, 157, 160, 164, 165, 167, 169-172, 176, 189, 193, 194, 203, 204, 206, 208, 210, 212, 213, 217, 221, 222, 224-230, 232, 238, 240, 243, 244, 247, 251-255, 260, 261, 263, 264, 270, 272, 338, 356
- Dielectric, 19, 34, 61, 67, 332, 338, 339
 constant, 78, 338
 polarization, 332
- Dielectrophoresis, 78
- Differentiation, 13, 15, 139, 181, 189-221, 223, 225, 228, 230, 231, 233, 238, 240, 243, 244, 247, 255, 256, 260, 264, 269, 352-354
 apical, 192-200
 apico-basal, 200-221
 intercalary, 190-192
- Diffusion, 14, 25, 61, 76, 77, 101, 104, 154, 166, 235, 240, 272, 273, 333, 338, 354
 gradient(s), 14, 224, 228
- Dimorphism, 117, 157, 161-163, 201, 203, 238, 348
- Diode, 23, 330
- Diploid, 184, 196, 197
- Dipole(s), 13, 23, 26, 30, 33-39, 41-43, 58, 59, 61-63, 68, 75, 76, 79, 86, 87, 108, 111, 249, 250, 271, 273, 325-334, 336, 340, 343, 358
 electric, 21, 22, 33, 34, 328, 329
 field, 25, 332
 interactions, 76
 mineral, 34-38, 332, 333
 moment(s), 25, 33, 37, 39, 58, 60, 63, 76, 85-87, 89, 111, 329, 330, 332, 338
 organic, 38-43, 334
 protein, 61, 337
 water, 34-38, 332, 333
- Diprotic, 41
- Direction (-ality), 17, 19, 23, 25, 26, 28-33, 37, 43, 45, 49-53, 57, 58, 61, 62, 82, 86, 93, 99, 104, 106, 115-119, 121-123, 126, 129, 130, 133, 136, 140-147, 159, 160, 164, 165, 173, 174, 176, 179, 182, 185, 186, 189, 192, 197, 199, 205, 207-210, 220, 221, 224, 228, 231-234, 236, 241, 245, 249, 252, 254, 255, 261-263, 332, 344, 350, 352, 358
 division, 148, 185, 186, 200
 light, 209
 nucleation, 244
- Dismutation, 66
- Dissipation, 195, 197
- Dissymmetry, 33, 38
- Division(s) 79, 104, 120, 148, 149, 151, 160, 161, 172-174, 176, 181-183, 186, 189, 191, 192, 197, 200, 202, 203, 205, 206, 209-213, 217, 222, 224, 225, 229, 232, 245, 252, 253, 267, 268, 272, 345, 352
 nuclear, 125, 152, 205
 unequal, 182, 197, 200, 205, 209, 212, 272
- Domain(s), 47, 58, 66, 67, 76, 79, 81, 103, 213, 218, 221, 254, 260, 329, 349, 353-356
- Dominance, 13, 47, 144, 242
- Dorsal, 263
 meristem, 231
 tissue(s), 250, 257
 products, 260
- Dorso-ventral (D/V)
 axis, 256, 262
 genes, 259
 gradients, 264
 pattern(s), 256, 260
 polarities, 214, 250-266, 267-270
 structure, 173, 209
- Dots, 152-154, 205
- Double
 gradient(s), 190, 255
 helix, 50, 51, 56, 57, 112, 336
 strands, 62, 86
- Driving force(s), 42, 43, 111, 134, 135, 147, 166, 167, 186, 230, 345, 346
- Drug(s) 70, 80, 101, 121, 144, 145, 152, 188, 267, 335, 343, 349
- Duality, 13, 54, 67, 108, 140, 142, 161, 166
- Duplex, 52, 53
- Dyad, 51
- Dynamics, 46, 111, 121, 126, 127
- Dynammin, 345
- Dynein, 121, 123, 126, 129, 179, 344
- Ecto-meso-endoderms, 213, 248, 262, 264, 266, 269, 270

- Ectoplasm, 129, 133, 134, 173, 215, 261
- Egg(s), 13, 14, 157, 158, 190, 201, 204, 206, 208, 210-218, 225, 241, 252-265, 268-270, 325, 349, 352, 355
- axial polarity, 213, 217, 253, 254, 355
- crescents
- grey, 255, 262, 263
 - yellow-orange-red, 216, 254, 261, 262
- fertilized, 158, 159, 204, 210, 213, 215, 252, 253, 263
- Electric(al), 13, 14, 21-23, 26, 33-38, 60, 70, 74, 84, 86, 87, 89, 90-93, 107, 123, 131, 132, 143, 166, 168, 174, 209, 221, 248, 271, 272, 325, 338-342
- biopolarity, 26, 107, 158, 272
- bipolarity, 13, 15, 23, 108, 136, 230, 239, 271, 354
- bipolarization, 15, 19, 22, 328
- charge(s), 13, 14, 17-22, 27, 29, 30, 34, 35, 40, 41, 61, 62, 70, 85, 87, 93, 109, 221, 271, 325, 328, 329, 343
- current(s), 26, 34, 62, 73, 74, 78, 79, 158, 159, 168, 204, 207, 209, 262, 325, 327, 339, 349
- depolarization, 89
- dipole(s), 19, 21, 23, 27, 33-36, 63, 76, 87, 137, 272, 325, 328, 330, 339
- field(s), 19, 22-24, 31-34, 36, 37, 41, 61, 62, 78, 85, 87, 110, 137, 145, 160, 167, 168, 176, 180, 188, 201, 209, 210, 239, 247, 332, 338-340, 355
- gradient, 102, 204
- moment(s), 33, 38, 39, 272, 329, 331, 332
- poles, 27, 175, 325, 333
- potential(s), 83-86, 89, 90, 106-108, 133, 142, 143, 159, 166, 170, 200, 235, 338-340
- signal(s), 87, 93, 94, 221
- stimulation, 89, 154, 341
- Electride, 30
- Electrochemical, 68, 162, 176, 339
- force, 175
 - gradient(s), 82, 84, 91, 102, 107, 109, 140-142, 167, 168, 235, 339-341
 - potential, 82, 84, 102, 107, 110
- Electrode(s), 92, 137, 167, 339
- Electrofusion, 78
- Electrogenic, 110, 235
- pump(s), 154, 168, 339-341
- Electromechanical, 168
- Electromagnetic, 17-20, 26, 30, 31, 42, 45, 325, 327, 329
- field, 21, 31
- Electron(s), 13, 17-24-31, 33, 35, 38-44, 47, 50, 51, 60, 62, 65, 66, 68, 78, 82, 84, 90, 106, 108-111, 143, 144, 186, 271, 272, 325, 332, 334, 339-341, 343
- microscopy, 75, 98, 111, 114, 118, 119, 124, 151, 155, 156, 183, 184
 - polarization, 29, 47
 - transfer reactions, 338, 339, 343
 - transport, 82, 84, 110, 142, 186, 334
 - tunnelling, 42
- Electronic, 23, 30, 38, 43, 61, 68, 110, 330, 331
- Electrophoresis, 14, 50, 106, 118, 172, 200, 339
- Electrostatic, 14, 35, 58-61, 66, 67, 75, 336
- Elongation, 152, 165, 180-186
- Embryo(s), 72, 126, 180, 189, 204, 210-215, 217, 218, 223-225, 229, 230, 240, 249-259, 261, 263-268, 270, 352-355
- induction, 217
 - patterns, 256-260
 - polarity, 224, 257, 264
- Embryogenesis, 13, 210, 213, 216, 218, 224, 238, 241, 252, 255, 259, 262, 266, 325, 352
- Enantiomer(s), 44-47, 325, 326, 328, 334, 335
- Enantiomorphs, 32
- Endocrine, 93, 220
- Endocytosis, 99, 101, 102, 180, 219, 342
- Endonuclease, 51
- Endoplasm, 129, 133, 134, 215, 261
- Endoplasmic reticulum (ER), 59, 65, 74, 88, 95-100, 103, 148, 155, 164, 166, 180, 236, 342, 343, 354
- Energy, 17, 19, 21-24, 27, 30, 31, 35, 37, 43-45, 51, 52, 58, 64, 67, 68, 74-76, 80-82, 84, 85, 87, 91, 92, 95, 100, 102, 104-111, 116, 119, 132, 140, 142, 167, 178, 198, 209, 235, 271, 328, 333, 334, 338-341, 343
- transduction, 74, 82, 89, 102, 109, 338
- Entropy, 18, 19

- Environment, 14, 30, 40, 43, 46, 47, 50, 51, 61, 66, 95, 101, 134, 142, 159, 181, 224, 233, 239, 352
- Environmental, 138, 155, 163, 187, 197, 209, 226, 239, 252
factors, 129, 172, 272, 356
polarity, 79, 216
- Enzyme(s), 46, 50-54, 56, 60, 64-66, 69, 73, 79-82, 85, 89, 93, 98-100, 103, 118, 123, 164, 166, 177, 186, 187, 194, 208, 220, 259, 337, 339, 340
- Epidermis, 145, 175, 176, 185, 186, 210, 211, 228, 230, 261
- Epigenetic(s), 201, 223, 224, 251, 358
- Epithelium (epithelia), 104, 115, 146, 190, 218-221, 247, 260, 353
- Equilibrium, 37, 102, 114, 119, 120, 159, 162, 222
- Equipolar, 147, 181
- Erythrocyte(s), 52, 62, 79, 137
- Ethanol, 39, 43
- Evolution, 46, 94, 192, 269, 271
- Excitation, 42, 43, 51, 61, 74, 86, 88, 93, 108-111
- Excited electrons, 23
ionization, 271, 327, 329
- Excretion, 130, 230, 235
- Exocytosis, 90, 94, 98-102, 135, 219, 220
- Fascin, 114
- Fat, 104
- Fatty acids, 39, 40, 62, 73, 96
- Feedback, 92, 168, 173, 250
- Female, 174, 196-200, 327
basophilic gradient, 198, 199
gametangia, 192, 198, 199
- Fermentation, 215
- Fern(s)
gametophyte, 147
leaf, 238
mother cell, 210
prothallia, 173, 174
spores, 160, 173
- Ferritin, 79, 135
- Ferroelectricity, 26, 330, 331
- Ferromagnetism, 26
- Fertilization, 89, 157-159, 201, 204-207, 210, 212, 213, 215, 216, 224, 225, 252-254, 259, 261-263, 268, 269
- Fibroblast(s), 62, 135, 137, 146, 342, 346
- Fibronectin, 78, 134, 135
- Field(s), 19, 22-27, 30-33, 142, 165, 175, 180, 189, 210, 212, 222, 223, 240, 245-247, 252, 272, 330, 331, 355
polar, 205, 331
- Filamin, 114
- Filopodia, 122, 179, 180, 350
- Fimbrin, 114
- Flagella, 118, 121, 130-132, 138-140, 143, 195, 346
polar, 201
- Flip-flop(s), 56, 332
- Flippase, 77
- Flowering, 161, 197, 238, 239
- Fluid(s), 37, 72, 77, 93, 101, 136
mosaic model, 75, 77, 80
- Fluorescence, 42, 61, 155, 175, 183, 188, 347
polarity, 340
- Fluorophores, 61, 108, 350
- Flux(es), 25, 143, 207
- Fodrin, 95, 221
- Folic acid, 141
- Foot, 135, 225, 247, 250, 340, 358
- Formaldehyde, 46, 67
- Formic acid, 39
- Freeze, 102, 269
- Fungal, 63, 105, 155-157, 162, 164-168, 181, 184, 187, 192-195, 228, 341, 343, 345
conidia, 155, 181, 349
cell(s), 161, 164, 204
exosporulation, 192, 352
germ tubes, 155-157, 184, 187, 188
hypha(e), 107, 147, 165, 166, 169, 176, 186, 349
mycelia, 164
spore(s), 155, 160, 163, 325, 348, 352
- G-protein(s), 81, 89, 113, 149
- Galvanotropism, 180
- Gametangia, 197-199
- Gamete(s), 170, 195, 198, 215, 252
- Gametophyte(s), 160, 161, 173, 224
- Gamma (γ)-rays, 19, 21, 31, 47
- Gap junction(s), 219, 249
- Gas, 17, 18, 25, 28, 29, 327, 339
- Gel, 78, 114

- Gene(s), 15, 52-58, 70, 74, 148, 162, 163, 170, 189, 192, 196-198, 200, 204, 213, 223, 229, 243, 244, 246, 255-260, 268, 269, 272, 336, 356, 358
 conversion, 56
 expression, 15, 52, 53, 55, 56, 163, 181, 189, 238
 polarity, 52, 199, 259, 272, 356, 358
 targeting, 118
- Genetic(s)
 analysis, 55, 259
 control, 208, 358
 information, 57, 74, 132
- Genome, 50, 51, 57, 189, 191, 211, 223, 260, 336
- Germ tube(s), 108, 155-157, 160, 161, 163, 171, 181, 184, 187, 188, 204, 206, 325, 348
- Germination(s), 155-157, 160, 163, 187, 196, 204, 205, 209, 348, 349, 354
- Gliding, 132, 133, 139, 142, 143, 346
- Globin, 52
- Globular, 76, 115, 117
 molecules, 60, 76, 77, 106, 111, 113, 119
- Glucans, 166, 184
- Glucose, 64, 167, 168, 183
- Glutamic acid, 62
- Glycine, 39, 40, 41
- Glycocalyx, 78, 81, 129
- Glycolipids, 99, 353
- Glycolysis, 73, 92, 215
- Glycoproteins, 78, 80, 81, 98-100, 177, 347
- Glyoxysomes, 103
- Golgi (apparatus), 73, 74, 79, 95-104, 121, 148, 166, 175, 178, 206, 207, 216, 342, 343
 vesicles, 97, 99-101, 164, 168, 178
- Gradient(s), 14, 23, 54, 56, 72, 73, 82, 87, 93, 104, 133, 139-142, 146, 160, 162, 163, 165, 170-172, 176, 180, 190, 195, 197-201, 205-207, 211, 215, 217, 222, 223, 230-233, 237, 239, 240, 247-250, 253, 255, 256, 261, 262, 264, 272, 338-341, 349, 354, 358
 bioelectric, 354
 differentiation, 197-200, 217
 dissipation, 85
 flowering, 239
 inhibitor, 192
 ionic (H^+ , Ca^{2+} , Cl^-), 162, 163, 341, 349
 light, 209
 metabolic, 208, 217, 255
 morphogens, 15, 222, 223, 230, 240, 247, 354, 358
 polarity, 205, 340
 proton(s), 82, 83, 102, 108, 237, 338
 protoplasmic, 205
 redox, 264
 RNA, 198, 199
 spatial, 180
- Grafting, 14, 208, 212, 225, 233, 242, 245-247, 249, 265
- Gramicidin, 86, 133
- Gravitation, 26, 216
 field, 216, 234, 354
 forces, 19
- Gravitropism (Geotropism), 237, 341, 354, 355
 curvature, 168, 352
 response, 168, 186, 236
- Gravity, 19, 33, 39, 172, 173, 209, 216, 234, 237, 238, 264, 265, 327, 341, 354, 355
 perception-sensor, 354, 355
 signal-stimulus, 236, 354
- Growth, 13, 52, 68, 81, 113, 114, 117, 119, 122, 129, 131, 134, 146-150, 152, 154, 155, 158-160, 162-166, 169-174, 176, 177, 179-188, 191-194, 201, 206, 208-210, 212, 224-226, 228, 230-234, 236, 237, 241, 271, 344, 345, 348-351, 353, 357
 axis, 147, 160, 173, 183
 cone(s), 176, 177, 179, 180, 342, 349, 350
 differential, 186, 236, 237, 271
 direction, 147, 148, 186
 elongation, 182-186, 188, 349
 factor(s), 148, 149, 181, 226, 232, 354, 355
 inhibitors, 236, 351
 orientation, 148, 185
 pattern, 160, 175, 348, 349, 357
 polar, 133, 147, 181, 348-351
 zone, 165, 169, 181
- GTP, 119-121, 149, 253
- Gyrase, 51

- H, see Hydrogen
- H₂O (see also Water), 15, 17, 35-38, 78, 82, 271, 332-334
- Hadrons, 17, 19, 20
- Haem, 60, 62
- Hair(s), 175, 176, 208, 210, 211, 221, 246, 261
- Hair pin model, 82
- Handedness, 43-45, 48, 268, 269, 334, 356, 357
- Haploid, 137, 195
- Hapten(s), 67, 66
- Head (cephalon), 15, 26, 59, 63, 115-117, 130, 211, 213, 218, 247-251, 257, 258, 260, 273, 345, 358
 gradient(s), 50, 51, 87, 113, 247-249
 group(s), 76, 78, 340
 regeneration, 249, 250
- Heat, 29, 91, 190, 341
- Helical (helical), 50, 51, 55, 57, 59, 68, 70, 71, 86, 104, 115, 130, 131, 139, 267, 328, 334, 336, 345, 356, 357
 DNA, 50
 bacteria, 267, 356
 protein, 59
- Helix, 44, 45, 47, 49, 50, 53, 58-60, 70, 71, 86, 87, 139, 327, 336
 alpha, 76, 86, 106, 117
 dipole(s), 58, 59
 double, 49, 50, 113, 336
- Heme, 65, 66
- Heterobipolar, 39, 41, 147, 181, 200-221, 326
- Heterogeneity, 79, 171, 172, 195
- Heterocysts (Cyanobacteria), 191, 192
- Heterotrichous, 169
- Histidine, 40, 65, 140, 337
- Hole(s), 22-24, 51, 109, 330
- Homeobox, 260, 350
- Homeodomain, 260
- Homeotic mutants, 256, 260
- Homobipolar, 13, 39, 147, 148, 181, 185, 245, 326
- Hormone(s), 93, 95, 101, 102, 172, 186, 209, 220, 227, 230-234, 236, 239, 354, 355
- Hyaloplasm, 72, 104, 111
- Hydration, 34, 73, 76, 330, 333
- Hydrocarbon, 39, 40, 42, 43, 63, 76, 78, 109
- Hydrogen
 atomic (H), 13, 17, 18, 20-22, 27-29, 35, 37-40, 49, 50, 55, 58-61, 66-68, 75, 76, 82, 85-87, 101, 102, 107, 109, 116, 120, 142, 176, 186, 194, 199, 236, 265, 270, 271, 328, 337
 bond(s), 34-37, 49, 55, 58, 63, 66, 76, 86, 96, 332, 333, 337
 ionic (H⁺), 84, 109, 169, 175, 271
 channels, 87
 efflux, 235, 237
 gradient(s), 84, 102, 235
 pump (ATPase), 167, 220
 molecular (H₂), 17, 18, 82, 339
- Hydrolytic (-ases), 65, 103
- Hydronium (H₃O⁺), 37, 38, 168, 333
- Hydrophilic, 37, 39, 40, 63, 65, 75-77, 103, 106, 110, 249
- Hydrophobic, 34, 37, 39, 40, 63, 65, 66, 75, 76, 78, 80, 84, 86, 96, 97, 106, 107, 141, 244
 domain, 77
- Hydroxy(l) (OH⁻), 37, 40, 68, 78, 82, 334
- Hymenium, 226, 228
- Hyperpolarization, 89, 90, 108, 141, 142, 154, 187, 221, 236, 340
- Hypa(e), 63, 107, 129, 147, 157, 161-168, 174, 181, 192-194, 197, 199, 204, 205, 225, 226, 228, 271, 325, 349
 apex, 165, 190, 197, 200, 349
 pole, 204, 345
 tip(s), 105, 162-168, 174, 193, 194, 228, 349, 352
- Imaging, 124
- Immunochemistry, 66, 67, 103
- Immunofluorescence, 112, 117, 124, 152, 346
- Incompatibility, 195, 196
- Indole-3-acetic acid (IAA), 159, 186, 230-232, 234, 235, 340, 355
 asymmetry, 237
- Induction, 169, 200, 208, 215, 218, 222, 238, 239, 244, 246
 endospore, 190
 polarity, 266, 267
 prespore, 244
- Information, 18, 23, 43, 56, 70, 89, 103, 140, 144, 145, 149, 155, 162, 181,

- 197, 198, 200, 211, 214, 224, 227, 236, 243, 259, 262, 343, 353
- Inheritance, 218
- Inhibition, 64, 93, 139, 148, 155, 195, 231, 248, 249, 344
 contact, 80
- Inhibitor(s) 85, 99, 126, 187, 189, 192, 206, 211, 226, 228, 247, 351, 352
- Insulin, 100, 101, 220
- Integrin, 81
- Interface, 34, 61, 75, 334, 338
- Intermediate filaments, 111
- Interposon, 55
- Intestinal, 219
- Ion(s), 17, 25, 34, 37, 38, 41, 43, 65, 66, 68, 75, 82, 84-91, 93, 94, 102, 104, 110, 135, 141, 142, 207, 249, 327, 329, 333, 337, 340, 343, 355
- Ionic
 channel(s), 86-89, 91, 93-95, 154, 180, 340-342
 concentration, 201
 current flux(es), 110, 154, 181, 188, 230, 349
 gradient(s), 85, 175, 230, 236, 237
 permeability, 90
 transport, 104, 107, 341
- Ionization, 17, 31, 42, 237, 329
- Ionophore(s), 101, 133, 139, 160, 163, 170, 253, 261, 346
- Iron ($\text{Fe}^{2+}/^{3+}$), 14, 25-27, 60, 66, 74, 84
- Irradiation, 169, 209
- Isoelectric pH, 41, 164
- Isometric, 38, 70, 133, 149, 205, 271
 growth, 155
- Junctions, 112, 218, 267
- K^+ (see also Potassium), 24, 40, 85, 87, 88, 91-94, 101, 106, 107, 141, 142, 154, 158, 175, 237, 333, 341
 channels, 87, 88, 90-92, 94, 216, 221, 341
 efflux, 194, 341
 ionophore, 107
- Keratocytes, 145
- Kidney (renal), 104, 105, 137, 218, 220, 221, 353
- Kinase(s), 95, 148, 149, 162
- Kinesin, 101, 123, 163, 179, 345
- Kinetics, 43, 64
- Kinetochores(s), 120, 124-128, 345
- Kinetosomes, 244
- Label(l)ing, 118, 131, 150, 153, 166, 204, 350
- Lactic acid, 45
- Lamellar, 63, 76
- Lamellipodia, 179, 180, 346
- Lamina-Laminin, 219, 220, 255, 256
- Laser light, 23, 31
- Lateral-posterior direction, 265
- Lattice, 22, 24, 35, 38, 50, 64, 68, 72, 73, 79, 101, 111, 329
- Layer(s), 75, 78, 129, 134, 150, 184, 201, 221, 225, 227, 232, 239, 330
- Leading edge, 112, 135, 137, 144-146, 180, 346, 347
- Leaf (leaves), 197, 205, 211, 230-232, 235, 238, 239
- Lectins, 79, 80
- Left-right polarities, 267-270, 328, 356
- Leucine, 40, 47, 48, 60, 87
- Leukocytes, 133, 137, 139, 141, 142, 146, 346, 347
- Li^+ (Lithium), 158, 217, 255
- Life, 20, 34, 45, 46, 48, 74, 127, 138, 225, 229, 267, 271, 273, 327, 334, 358
- Life cycle(s), 170, 238
- Ligand(s), 66, 76, 79, 80, 81, 85, 101, 113, 141, 235, 337
- Light, 17, 23, 30-33, 43, 44, 46-48, 51, 66, 74, 80, 81, 87, 89, 94, 108-111, 129, 132, 142-144, 154, 159, 160, 169, 170, 172, 174, 189, 194, 201, 205-210, 214-215, 226, 227, 236, 242, 246, 258, 328-331, 340, 343, 352
 bioelectric response, 239
 energy, 84, 109
 excitation, 111
 perception, 89, 336
 polarization, 30, 32, 47, 124, 158, 174, 209, 210, 331
 transducers, 108
- Limb, 223, 231, 265, 356
- Lipid(s), 62, 63, 75-79, 97, 164, 177, 198, 331, 334, 338, 342, 344, 347

- bilayer(s) (see also membranes), 72, 75-78, 87, 123, 338
- flow model, 347
- mosaic model, 76-78
- transport, 97
- Lipophilic, 235, 348
- Lipoprotein(s), 63, 77, 82
- Liver, 105, 249, 270
- Locomotion, 126, 130, 132-136, 138, 144, 145, 179
- Lomasome, 155
- Lymphocyte(s), 99
- Lysosome(s), 62, 95, 98, 99, 103, 164, 178, 220
- Lysozyme, 59, 183

- Macroconidium (-ia), 155, 349
- Macroipoles, 60, 61
- Macromolecule(s), 14, 15, 34, 49-71, 73, 75, 79, 97, 155, 168, 170, 177, 206, 262, 271, 332, 336, 337, 358
 - conformation, 111
 - polarities, 49, 332, 358
 - signals, 89
- Magnetic, 13, 24-28, 325, 330
 - dipole(s), 30, 330
 - field(s), 14, 21, 24-26, 28, 30, 48, 175, 327, 330, 331
 - moment(s), 27, 29, 331
 - monopole(s), 26, 27
 - particles, 108
 - polarization, 25-30, 330, 331
 - resonance, 30
- Magnets, 13, 25, 27
- Male, 161, 174, 197-200, 261, 327
 - gametangia, 192, 198, 199
 - gradient, 199
 - mitochondria, 198
 - mutant, 198
- Maternal, 213, 218, 259, 267, 272
 - inheritance, 213, 214, 257, 259, 268, 269
 - mutations, 214, 256-259
- Mating, 152-154, 195, 197, 269
 - type(s), 56, 195-197
- Matrix, 42, 77, 78, 81, 84, 103, 105-107, 111, 130, 134, 181, 223, 255, 256, 347
- Matter, 17-22, 24, 26, 27, 29, 44, 47, 67, 82, 147, 161, 271, 327-329, 334, 358

- Mechanochemical
 - enzymes, 346
 - forces, 121, 123, 179, 180, 346
- Mechanoelectric transducers, 221
- Meiosis, 252
- Membrane(s), 14, 63, 72-93, 95-102, 104, 106-111, 114, 115, 123, 130-133, 135, 137, 139-144, 148-150, 153, 154, 163, 177, 178, 180, 182, 186, 191, 201, 204, 218-220, 267, 333, 338-343, 346-348
 - apical, 98, 175, 220, 353
 - asymmetric, 168
 - cellular, 15, 34, 58, 75, 76, 81, 86, 88, 91-93, 95, 101, 104, 109, 115, 135, 149
 - differentiation, 99
 - domains, 204, 221
 - plasmic (see Plasma membrane)
 - polarity, 85, 110, 191, 338, 339
 - potential, 85-93, 106, 107, 146, 155-157, 167, 188, 236, 239, 338-342
 - primitive, 73
 - protein(s), 62, 76, 77, 79-81, 85, 96, 100, 103, 110, 175, 219, 221, 333, 343, 347
 - pump(s), 158, 167
 - receptor(s), 80, 89, 181
 - surface, 73-95, 101, 177, 332, 338-342
 - traffic-flow, 95, 102, 338, 347
- Memory, 19, 23, 35, 95, 246, 329, 330
- Meristem, 210, 223, 224, 230, 238, 239
 - cells, 147, 225, 230
- Meromyosin, 112, 113, 121
- Messenger RNA (mRNA), 53-55, 57, 58, 96, 155, 177, 208, 213, 214, 216, 217, 257, 259, 261, 264, 272
 - polarity, 58
 - transport, 124
- Messenger(s),
 - chemical 89, 93, 94
- Metabolism, 14, 53, 72, 73, 82, 85, 89, 91, 96, 100, 103, 132, 169, 170, 190, 217, 228, 233, 247, 255
 - gradient(s), 208, 217, 247, 255
 - transport, 82, 83
- Metal(s), 22, 25, 68, 249, 339
 - ion(s), 40, 60, 65, 74, 337
- Metaphase, 120, 126, 128

- Methane, 38, 39
Methanol, 39
Methylation, 140, 348
Mg²⁺ (magnesium), 81, 135
Microbial spores, 14, 154
Microbodies, 103
Microconidium (-ia), 193
Microfibril(s), 162, 176, 211
Microfilament(s) (see also Actin-Myosin),
15, 81, 99, 111-113, 115, 117, 119,
121, 129, 130, 134, 138, 144, 157,
163, 164, 175, 177, 188, 199, 200,
211, 253, 267, 325, 344-346, 348, 350
associated protein, 116
Microgravity, 236, 354
Micropolarity, 338
Microinjection, 142, 259
Microspikes, 179
Microtrabecular lattice, 73, 111
Microtubule(s) (see also Tubulins), 15, 81,
95, 101, 105, 111-113, 118-129, 132,
138, 139, 141, 144-146, 148,
151-154, 157, 163, 164, 166, 167,
173, 176-180, 186-189, 193, 199,
200, 206, 211, 222, 229, 251, 253,
271, 325, 342-344, 350, 357
apical, 166
assembly-polymerization, 119, 121,
126, 187, 189, 222, 345
inhibitor, 152, 187
MAPs (-associated proteins), 118, 350
organizing centre (MTOC), 99, 121,
342, 343
polarity, 121, 122, 126, 127
Microvillus, 115
Microwave(s), 17, 37, 327
Mirror-image, 18, 44, 45, 69, 246, 268, 270,
334
Mitochondria, 74, 82-84, 96, 97, 103-108,
110, 122, 130, 146, 154-157, 164,
176, 168, 170, 173-175, 178, 179,
184, 188, 190, 198, 205, 206, 209,
215, 218, 221, 261, 264, 336
apical-subapical, 155, 167
ATP (ATPase H⁺ pump), 82-85
bipolarity, 108
Ca²⁺, 106
membrane(s), 83, 104, 107, 108
segregation, 198, 199, 261
Mitogenic, 199
Mitotic
figures, 104, 122-128, 139, 151, 172, 345
spindle, 112, 120, 124, 125, 151, 201,
345
Model(s), 19, 25, 49-51, 56, 61, 67, 70,
75-78, 83, 86-88, 95, 97, 99, 101,
103, 108, 117, 122, 124-126, 128,
130, 132, 135, 137-139, 141-143,
152, 157, 162, 167, 179, 183, 190,
191, 199, 206, 210, 219, 224, 228,
235, 237, 241, 243, 245, 247, 250,
254, 256, 260, 269, 332, 333, 340,
341, 347, 352, 356, 358
cell growth, 182, 183
membrane systems, 108, 109, 338
polarity, 22, 34, 88, 167, 183, 217, 220,
240, 246, 250, 356, 358
Modelling, 61, 67, 338
Molecular, 13, 14, 25, 29, 30, 34, 41, 42, 44,
46, 47, 50-52, 62, 63, 64, 66, 67, 69,
71, 72, 75, 77, 85, 89, 94, 100, 109,
110, 112, 117, 131, 140, 144, 145,
158, 170, 176, 177, 180, 189, 192,
215, 240, 243, 244, 256, 269, 271,
272, 332-335
chirality, 43-48, 334-335
dipoles, 15, 33-43, 332
movement, 14, 33, 37
orientation, 14
polarity, 119, 121, 358
self-assembly, 350
structure, 13, 62, 85, 337
Monensin, 99, 101
Monoaxial patterns, 241-250
Monopodial, 133, 138
Monopolar, 130, 132, 147-181, 197, 202,
272, 325, 348-351
apical growth, 163-181, 197, 348, 349
assembly, 70
axiation, 107, 348, 349
budding, 153
differentiation, 202
dominance, 163, 188, 271
germination, 155, 158, 171
growth, 162, 167, 227, 348, 350
molecules, 39
outgrowth, 149-163
pattern(s), 192-195, 352

- regeneration, 251
- Monopolarity, 133, 165, 187, 352
- Monopole(s), 13, 27, 39, 61, 325
- Morphogen(s), 14, 223, 228, 239, 240, 244, 249, 250, 253, 256, 259, 265, 272, 345, 356
 - gradient, 14, 256
 - transport, 248
- Morphogenetic, 149, 151, 154, 162, 193, 200, 208, 209, 212, 213, 222-270, 273, 325, 354-358
 - determinants, 213, 253
 - factor, 265
 - field(s), 14, 228, 245, 251
 - gradient(s), 217, 250, 255, 256, 264, 358
 - movement(s), 241, 264
 - mutants, 154, 245, 257
 - polarizations, 222-270, 354-358
 - signal, 127
 - substances, 14, 354, 355
- Morphopoiesis, 70, 337
- Morula, 266
- Mosaic model, 76, 77
- Moss(es),
 - leaves, 211
 - protonema, 172, 173, 208-210
 - spores, 160, 208
- Motion, 37, 43, 47, 51, 91, 110, 118, 125, 131, 132, 135, 137, 139, 143, 146, 179, 329, 332
- Motor, 93, 94, 114, 118, 123, 131, 132, 140, 142, 143, 167, 179, 341, 343
- Movement(s), 14, 38, 52, 62, 81, 87, 88, 90, 100-102, 112-116, 118, 120-123, 125-146, 151, 162, 175, 178, 180, 195, 214, 222, 231, 234, 262, 263, 332, 336, 346, 347
 - auxin(s), 230, 233, 237, 354
 - cytoplasm, 263
 - intracellular, 114, 130, 346
 - polarity, 126, 266, 346, 347
- Mucopolysaccharides, 64, 78
- Multipolar, 147, 187, 188, 226, 326, 332, 348
 - budding, 187, 247
 - germination (outgrowth), 147, 187, 188, 348
 - moment, 33, 332
- Muscle(s), 85, 88-90, 93, 104-106, 112, 114-117, 179, 190, 247, 340, 344
- Mutant(s), 53, 54, 56, 58, 59, 118, 132, 140, 142, 151, 152, 154, 183, 187, 188, 193, 204, 226, 245-247, 256-261, 268, 337, 344, 347, 355, 356
 - embryos, 257
 - morphological, 245, 256-261
- Mutation(s), 53-55, 58, 70, 88, 154, 213, 252, 256, 257, 259, 260, 268, 269, 336, 356
- Mycelium, 164-166, 193, 226, 340
- Myelin, 351
- Myofibril(s), 104
- Myoplasm, 215, 216, 261
- Myosin, 15, 80, 81, 111-118, 125, 129, 130, 134, 163, 167, 168, 179, 180, 211, 344-347, 358
 - gene, 118
 - kinase, 116, 118
 - fungal (myosin-like protein), 118
- Myxamoeba, 124
- N, see Nitrogen
- Na⁺, 37, 85, 89, 91-93, 106, 142, 158, 333
 - ATPase (pump), 91, 92, 221
 - channels, 87, 91-94, 216
- NAD, 82, 84
- NADH, 186, 338, 340
- NADP, 84
- NADPH, 109
- Negative, 18, 19, 22, 33, 35, 39, 41, 51, 53, 61, 68, 70, 85, 88, 90, 92, 94, 106, 108, 109, 131, 136, 140, 142, 143, 148, 167, 229, 325, 326, 330, 339, 345, 354
 - charge(s), 20, 33-35, 39, 40, 57, 64, 67, 82, 90, 108, 167, 175, 328, 345
 - electric potential, 235, 237, 327, 341
 - electrode, 209
- Nerve(s), 68, 85, 86, 93, 149, 180, 181, 249, 252, 262, 342, 349, 350
 - conduction, 91
 - growth factor (NGF), 181
 - induction, 238
- Neurite(s), 126, 176-181, 271, 325, 342, 349-351
- Neuron(s), 87, 88, 90-95, 146, 176-181, 346, 350

- cytoskeleton-neurofilaments, 177, 179, 180
- Neurotransmitter(s), 93-95, 102, 177, 178
- Neutron, 17, 22, 329, 333
- NH₃ (NH₄⁺), 38, 271, 353
- Nigericin, 107, 108
- Nitrogen (N₂), 40, 58, 60, 165, 192
 - fixing cell, 191
- Nuclear, 20, 30, 43, 45, 47, 57, 135, 164, 169, 171, 198, 205, 208, 209, 244, 271, 327-329, 331, 345
 - cap(s), 199
 - differentiation, 193, 254
 - dipoles, 30
 - division, 125, 152, 205
 - fusion, 345
 - magnetic resonance (NMR), 30, 73, 78, 331, 333, 340
 - matter, 17, 18
 - membrane, 74, 95, 96, 128, 148, 151, 152
 - pore(s), 123, 124
- Nucleation, 81, 114, 127, 128, 134, 344
- Nucleus (nuclei), 17, 19-21, 28-30, 33, 35, 38, 72-74, 89, 97, 101, 104, 112-114, 123-128, 130, 137, 145, 146, 148-150, 152, 158, 161, 170-173, 188, 189, 193, 195, 198-200, 205, 206, 208-211, 214, 216, 218, 225, 236, 244, 252, 255, 258, 259, 271, 327-329, 331, 345
- Nucleic acid(s) (see also DNA, RNA), 15, 49-58, 69, 70, 74, 75, 214, 332, 336, 337
- Nucleosomes, 53
- Nucleosynthesis, 17
- Nucleotide(s), 51, 57, 73, 119, 139, 157, 174, 256
- Nutrient(s), 60, 93, 101, 169, 175, 203, 348
- O, see Oxygen
- Oligosaccharides, 75, 79
- Ontogenesis (ontogeny), 160, 193, 224
- Ooplasm, 215, 216, 254, 261
- Operon, 53-55
- Optical, 23, 30, 44, 45, 48, 61, 119, 155, 328
- Oral (structures), 244-246
- Organelle(s), 72, 89, 94, 96, 97, 100-102, 103-112, 118, 122, 123, 127, 130, 131, 138, 145, 146, 342-344, 349, 354
- Organizer (organizing center), 124, 238, 241
- Orientation, 13, 14, 29, 33, 41, 43, 62, 63, 79, 104, 112, 114, 116, 121, 122, 126, 132, 142, 143, 148, 151, 158, 159, 183, 185, 186, 190, 191, 205, 206, 208, 211, 212, 229, 238, 244, 261, 262, 331, 332, 336, 341
- Oscillator, 89
- Osmotic pressure, 182, 193, 237
- Outgrowth(s), 108, 138, 149, 155, 157, 159, 160, 161, 169, 170, 180, 181, 184, 210, 232, 342, 348, 352
- Oxalic acid, 39
- Oxidation, 110, 340
 - phosphorylation, 85, 99, 106
 - reduction potential(s), 162, 166, 339
- Oxygen (O-O₂), 24, 25, 35, 37, 40, 58, 60, 65, 66, 82, 91, 92, 162, 186, 192, 198, 327, 332, 339, 340, 343
- Pancreas, 220
- Parallel
 - dipoles, 38
 - polarity, 50
- Paramagnetic, 26, 30
- Paramyosin, 117
- Parenchyma, 147, 233
- Parity, 18, 44, 45, 47, 327-330, 334
- Particle(s), 17-22, 26-31, 34, 43, 44, 48, 67, 69-71, 77, 111, 122, 131, 133, 201, 207, 271, 327-329
- Patches, 80, 81
- Pattern(s), 13, 14, 26, 61, 72, 115, 119, 131, 137, 138, 143, 145, 152, 154, 155, 159, 160, 165, 170, 172, 175, 182-185, 188, 189, 192-200, 207, 212, 215-217, 222, 223, 227, 228, 236, 238, 240, 241, 244, 246, 249, 250, 255, 256, 259, 260, 265, 268, 271, 272, 348, 349, 356, 357
 - formation, 154, 215, 222, 238, 247
 - polarizing current, 231
 - regulation, 217, 240, 241
- Pennate, 147, 184
- Peptide(s), 45, 53, 58-60, 62, 66, 80, 86, 87, 95, 107, 181, 249, 343

- dipole(s), 59, 60
 Peptidoglycan, 182
 Perception, 236, 340, 343, 354, 355
 Periodic, 88, 330, 336
 Periplasm, 60, 194
 Permeability, 82, 85, 87, 89, 91, 338
 Peroxide(s)-Peroxidase(s), 65, 66, 164
 Peroxisomes, 103
 pH, 37, 40, 41, 50, 80, 82, 84, 101, 106, 129, 159, 163, 166, 185-187, 201, 206, 220, 223, 230, 235, 237, 340, 353
 gradient, 84, 101, 102, 109, 159, 235
 intracellular, 168
 Phage(s), 53, 70, 71, 182, 337
 Phalloidin, 116, 152, 153, 174
 Phialide, 193
 Phloem, 233
 Phosphate(s), 40, 70, 55, 62, 63, 92, 100, 103, 149, 166
 Phospholipase, 88
 Phospholipid(s), 62, 63, 65, 75-78, 80, 96, 97, 107, 109, 338, 339
 Phosphoprotein, 177, 346
 Phosphorylation, 64, 84, 94, 103, 117, 118, 134, 140, 141, 181
 Photo-
 chemistry, 42, 47, 48, 108
 excitation, 42
 periodic induction, 239
 polarization, 206
 receptor(s), 89, 111, 142
 dipoles, 174
 synthesis, 43, 47, 48, 108-111, 142
 apparatus, 74
 magnetic particles, 108
 reaction center, 110
 system(s), 110, 343
 taxis, 142, 143
 transducers, 74
 voltaic, 108
 Photon(s), 17, 21-23, 27, 30-32, 47, 89, 108-111, 209, 329
 Phycobilisomes, 111
 Phyllotaxis, 197, 232
 Phytochrome, 89, 174, 239, 340
 Pigment(s), 81, 89, 100, 110, 142, 207, 213, 217, 242, 261, 269, 336, 340, 343
 blue-green, 132, 133, 143
 brown, 91, 159, 160, 169, 172, 195, 224, 244, 349
 green, 119, 130, 143, 147, 169, 170, 185, 188, 190, 208, 228, 340, 341, 349
 grey, 255, 262, 263
 orange, 198, 199, 216, 254, 261, 262
 red, 75, 111, 172, 185, 216, 220, 349, 353
 yellow, 147, 169, 195, 216, 261,
 Pinocytosis, 95
 Plant(s), 13, 15, 32, 73, 79, 80, 89, 91, 101, 102, 124, 129, 147, 161, 169, 170, 172, 175, 185, 186, 189, 197, 200, 204, 208-210, 212, 222-225, 229-233, 235, 236, 238, 239, 268, 325, 340, 343, 354, 355
 axis, 229, 233
 cell elongation, 185
 eggs-embryo, 154, 225, 325
 growth substance(s), 186, 235, 355
 Plasma membrane, 63, 74, 75, 77, 78, 80-82, 85, 89-91, 95, 97, 99-104, 106, 111, 112, 115, 132, 134-136, 141, 143, 149, 150, 154, 157, 162, 166, 173, 175, 185, 186, 195, 207, 216, 218, 219, 235, 269, 338, 352-355
 domain(s), 218-220
 polarization, 220
 Plasma, 24, 137, 214, 327
 Plasmalemma, 98, 142, 144, 164, 166, 167, 173-176, 180, 184, 194, 235-237, 254, 338
 Plasmid, 118
 Plasmodium, 129, 133, 143
 Plate(s), 32, 60, 70, 131, 174, 221, 228
 Polar, 13, 14, 33, 35, 37-41, 43, 53-55, 58, 60-62, 64, 66-68, 70, 73, 75, 76, 78, 80, 83, 86, 87, 97, 108, 111, 112, 115, 117, 119, 120, 125, 128-131, 135, 136, 137, 140, 143-145, 154, 160, 163, 166, 170, 172, 173, 181, 183, 189, 191, 198, 199, 201, 204, 211, 214, 215, 224-226, 228, 232-236, 241, 242, 244, 246, 247, 249, 267, 268, 271, 272, 331, 346-349, 352-354
 blastomeres, 264
 assembly, 179, 202
 auxin transport, 233-235, 354

- axiation, 13, 81, 147, 154, 160, 165, 173, 174, 200, 201, 206, 207, 212, 224, 228, 241, 242, 257, 258, 263, 265, 266, 271, 346, 353, 355
 - bodies, 212, 218, 266
 - bonds, 76
 - budding, 151
 - cell(s), 97, 176, 217-222, 266
 - development, 73
 - differentiation, 189, 193, 195, 201, 346
 - divisions, 157, 158, 205, 210, 211, 225
 - growth, 147, 151, 164, 173, 176, 186, 194, 348
 - movements, 15, 84, 112, 162, 232, 233, 266
 - conduction, 38
 - cytoplasm, 13, 200, 208, 214, 215
 - domain(s), 64, 107, 203
 - elongation, 161, 171, 173, 180, 181, 195, 201
 - genes, 259
 - gradient(s), 173, 176, 205, 234, 264, 345
 - granules, 256
 - group(s), 50, 55, 63, 75-78
 - liquid(s), 37, 68
 - lobe(s), 213, 252, 253, 255, 269
 - molecules, 14, 33, 35, 37-41, 43, 62, 63, 78, 80, 350
 - mutants, 54
 - pattern(s), 14, 26, 222, 239, 241
 - polymerization, 114
 - regeneration, 166, 234, 246, 251
 - segregation, 199, 343, 345
 - signal, 157, 261
 - site, 154
- Polarimetry, 32, 331
- Polarity, 13-15, 18, 23, 25, 34, 37, 40, 43, 50-57, 60-62, 66, 67, 72, 79, 81, 82, 86, 94, 98, 99, 101, 102, 107, 112-122, 124, 126-134, 137, 138, 143-145, 147, 148, 154, 157-160, 165, 166, 168-176, 179, 181, 183, 185-191, 200, 201, 204-210, 212, 214, 216-218, 220-222, 224, 225, 227-229, 231-234, 236, 238, 239, 241, 242, 244-252, 256-258, 260-263, 265-267, 271-273, 325-330, 332-334, 336-358
- cellular, 157, 158, 229, 240
 - control(s), 22, 56, 62, 143, 157, 171, 222, 236, 238, 244, 245, 248, 256, 257
 - cytoplasmic, 210, 211, 262
 - developmental, 227, 257, 352
 - egg(s), 157-159, 210-212, 253-259
 - embryonic, 224, 225, 249, 257
 - hyphal, 166, 348, 349
 - intrinsic, 14, 15, 51, 115, 119-121, 132, 182, 244, 245, 248, 250, 271, 272, 358
 - inverse, 49, 58, 242
 - macromolecular, 14, 332, 334, 358
 - organismic, 225-239, 358
 - pigments, 216, 261, 340, 343
 - replication, 52
 - reversal, 14, 50, 51, 92, 133, 141, 143, 174, 207, 220, 232-234, 247, 265, 268, 272, 343
 - systems, 244
 - tissular, 14, 262
- Polarizability, 332
- Polarizable particles, 19, 23, 34, 330, 332
- Polarization, 14, 17, 18, 24, 29-34, 37, 40, 41, 43, 45, 47, 48, 56, 89, 99, 101, 104, 105, 107, 109, 123, 127, 132, 137, 141, 145, 146, 149, 152, 155, 157-160, 177, 186, 205, 209, 210, 212, 216, 218, 220, 230, 254, 264, 266, 267, 327-333, 338-345, 348, 352-358
- analyzers, 32
 - field, 18
 - light, 30-32, 331
 - magnetic, 25-30, 330, 331
- Polarized, 13, 15, 23, 25, 28, 29, 31-34, 40, 47, 48, 50, 52, 60, 61, 64, 65, 79, 80, 97-99, 104, 106, 111, 113, 126, 131, 134, 138, 141, 142, 144, 145, 153, 155, 161, 162, 165, 166, 169, 173, 176, 198, 201, 211, 216, 218-221, 232, 240-243, 247, 256, 259, 265, 271, 273, 325-331, 336-341, 344, 345, 349, 350, 352, 353
- actin, 168, 344
 - beams of particles, 30

- bonds, 62, 85
- communication, 243
- conductivity, 22-25, 329, 330
- control, 56
- direction, 230
- enzymatic reactions, 64, 65
- flow, 180
- form, 177
- gas, 29
- genetic expression, 198, 199, 358
- growth, 15, 118, 129, 149, 155, 183, 226, 348-351
- ionic regulation, 232
- light, 32, 47, 124, 158, 174, 209, 210
- movements, 126, 266
- organelles arrangement, 180
- organization, 14, 148, 172, 195, 236, 241, 246
- orientation, 104
- photons, 45, 329
- secretion, 101, 220, 342, 343
- spores, 155-157, 187
- synapses, 93
- translocation-transport, 62, 84, 101, 106, 107, 166, 178, 229, 233-236, 272
- Polarizing field, 34
 - region(s), 265, 356
- Polarography, 339
- Polaron(s), 24, 51, 56, 68
- Polarotropism, 174
- Pole(s), 13, 14, 27, 33, 41, 49, 72, 82, 100, 107, 120, 124-126, 128, 130, 150, 158-161, 167, 171, 181-184, 190, 201, 204, 212-215, 217, 219, 220, 224, 229, 249, 254-256, 259, 263, 272, 325, 345, 352-355
- north/south, 13, 28, 175, 246, 249, 325
- rhizoidal, 158, 204-210, 352
- thallic, 181, 204-210, 352
- Poleward(s), 125-128, 345
- Pollen
 - grain(s), 161, 163, 175, 205
 - tube(s), 147, 161, 164, 169, 174, 175, 186
- Polyamine(s), 155, 348
- Polyglutamic acid, 135
- Polymer(s), 15, 64, 67, 68, 78, 112-114, 119, 121, 135, 183, 345
- Polymerization, 15, 47, 70, 112-114, 119-121, 128, 131, 134, 179, 344-345
- Polypeptides, 45, 55, 68, 196
- Polypodial, 133
- Polypolarity (also Multipolar), 133, 147, 326, 332
- Polyribosome(s), 96, 103, 264
- Polysaccharide(s), 64, 134, 153, 175, 187, 206, 237, 355
- Pore(s), 75, 79, 86, 87, 99, 123, 124, 155, 160, 211
- Porphyrin(s), 42, 60, 74
- Positional, 117, 172, 176, 180, 197, 199, 223, 227, 241, 243, 244, 247, 256, 265, 358
 - control(s), 195, 222, 231, 243
 - DNA, 198, 199, 336, 358
 - information, 14, 173, 197, 209, 211, 223, 228, 240, 252, 260
- Positive, 18-20, 22, 33, 35, 39, 40, 61, 65, 67, 68, 70, 83, 87, 90, 91, 93, 94, 102, 107-109, 140, 142-144, 148, 167, 168, 170, 325-327, 336-340
 - charge(s), 20, 33, 35, 59, 68, 71, 82, 91, 94, 168, 327-329, 338, 343
 - current, 161, 175, 194
 - electric potential, 235
 - electrode, 209
 - feedback, 230
 - gravitropism, 236, 237
 - hole(s), 22, 108, 109
 - ions, 236
- Positron(s), 17-19, 21, 22, 31, 44, 271, 327, 334
- Posterior, 256
 - pole, 213, 229, 245, 246, 256, 258, 263
 - region-segment, 244, 245, 250, 251, 257, 258, 261, 262-265, 346
 - structures, 252, 259, 346
- Postsynaptic, 93-95, 180
- Potassium (see also K⁺), 24, 85, 91-94
- Potential(s) (see also Electric-), 21, 30, 35, 42, 66, 74, 84-86, 88, 90, 91, 94, 109, 114, 131-133, 136, 142, 146, 148, 170, 176, 180, 225, 237, 243, 253, 272, 338-341, 346
- depolarization, 236, 334, 346
- difference(s), 89, 170, 230

- gradient(s), 93, 94, 109, 170
 polarization, 340
 Prebiotic, 46-48, 57, 73
 Precursor(s), 14, 57, 70, 74, 82, 103, 107,
 124, 144, 166, 183, 191, 233, 252
 Prepolar organization, 218
 Pressure (see also Osmotic), 23, 35, 133,
 182, 185, 193, 194, 237
 Presynaptic, 93-95, 108
 Primitive, 39, 73, 74, 108, 132, 137, 190,
 265, 266
 environment, 46
 Probe(s) (see also Fluorescence), 50, 61,
 152, 174, 204, 207, 340
 Profilin, 114
 Promotor, 52, 53, 55
 Protease, 194, 259, 337
 Protein(s), 13, 15, 34, 38, 45, 50-53, 55-63,
 66, 68-83, 86, 87, 89, 94-104, 106,
 107, 109-119, 122-124, 126, 129,
 131, 132, 134-136, 139, 140, 148,
 149, 151, 154, 155, 158, 161-163,
 168, 169, 172, 174, 175, 177,
 179-181, 198, 203, 204, 214,
 218-221, 225, 235, 237, 243, 244,
 256-261, 264, 269, 333, 336, 337,
 339, 342-346, 350, 353
 Proteoglycans, 78, 99, 219
 Prothallia, 173, 174, 209
 Proton(s), 13, 17-22, 27, 29, 30, 35, 37, 38,
 41, 44, 60, 65, 82, 83, 87, 102, 106,
 108-110, 132, 140, 142, 143, 167,
 168, 175, 176, 186, 220, 230, 235,
 271, 325, 333, 338, 339, 341, 343,
 349
 flow, 22, 176, 339
 gradient(s), 82, 83, 102, 108, 235, 237,
 335, 339
 motor, 167
 pump(s), 82, 102, 186, 220, 341
 sink(s), 167, 168, 185
 Protonema, 172, 173, 208-210
 Protonmotive force, 84, 106
 Protonophore(s), 108, 346
 Protonation, 50, 154
 Protoplasm, 13, 34, 72, 129, 133, 159, 165,
 194, 205, 211
 Protoplast(s), 78, 79, 162, 167, 202, 230,
 237
 Pseudoplasmodium, 241-243
 Pseudopodium-pseudopodia, 126, 133,
 134, 136, 138, 326, 342
 Pump(s), 82, 93, 102, 106, 154, 158, 186,
 220, 231, 341, 355
 Purines, 49
 Pyrimidines, 49
 Pyrite, 108
 Quadrupole(s), 38, 326, 331, 333, 340
 Quantization, 19, 20, 29
 Quantum, 17, 24, 26, 27, 29-31, 67, 42, 109,
 329, 333
 Quantum mechanics, 272, 328, 329, 333
 Quantum theory, 29, 333
 Quark(s), 19, 20, 329
 Quartz crystal(s), 46
 Quinone, 42
 Racemic, 45-48
 Radial, 112, 241, 148, 226, 262, 264, 271
 Radiation(s), 17, 21, 25, 30, 33, 45, 47, 48,
 67, 327, 331
 Reaction
 center(s), 110, 111, 343
 -diffusion, 247, 249, 250
 transfer, 339
 Reactivity, 50, 337
 Receptor(s), 60, 80-82, 93-96, 101-103, 107,
 134, 135, 139-141, 143, 217, 220,
 221, 235, 340, 341, 354, 355
 Recognition
 sequence, 336
 system(s), 51, 57, 58, 79, 81, 96, 162
 Red light, 89, 142, 174
 Redox, 17, 61, 68, 74, 82, 143, 166, 186,
 223, 264, 327, 339
 Reduction, 54, 82, 84, 90, 91, 109, 110, 264
 Regeneration, 13, 92, 132, 170-173, 177,
 207, 225, 230, 240, 242, 245-248,
 250, 251, 351, 352
 Regulation, 51, 54, 86, 91, 114, 148, 157,
 162, 184, 188, 189, 203, 350
 Relativity, 17
 Relaxation, 24, 42, 111, 133, 136, 340
 Replication, 52, 53, 74
 Reproduction, 172, 197-200, 238, 241
 Resistance, 50, 67, 216
 Respiration, 82, 103, 106, 166, 187, 188,

- 190, 198, 200, 215
Retina cells, 104, 181, 236
Retinal, 89, 341
Retinoic acid(s), 240, 244
Rhizoid(s), 147, 158-160, 164, 168-173,
181, 201, 204-210, 352, 353
 elongation, 172
 outgrowth, 205, 206, 352
Rhodamine, 152, 153, 155, 156, 174, 188
Rhodopsin, 81, 89, 141
Ribonucleic acid (RNA), 46, 52, 56-58, 70,
96, 124, 161, 166, 198, 199, 208, 214,
257, 336, 345
 polymerase, 52, 57
 viruses, 57
 gradient, 198, 199
Ribosome(s), 58, 72, 83, 96, 97, 124, 172,
198, 199, 205
 nuclear cap, 198
Root(s), 147, 163, 181, 185, 209, 210,
229-234, 236, 237, 268, 354, 355
 apex, 225, 229, 231
 cap, 176, 236, 355
 hair(s), 147, 164, 169, 175, 176, 186,
205, 210, 211
 meristem, 231
 -shoot axis, 224, 225, 230
Rotation, 37, 44, 45, 52, 51, 64, 69, 139,
140, 245, 265, 268, 331, 333
Ruthenium red, 106

Sarcomere(s), 116-118, 344
Sarcoplasmic reticulum, 89, 340
Scaffolding, 70, 112
Scale(s), 18, 46, 82, 99, 100, 244, 327
Scattering, 23, 29-31, 124, 227, 343
Sclerotium, 226
Secretion, 86, 94, 98, 99, 101, 103, 104, 132,
137, 149, 150, 152, 177, 205, 207,
219, 220, 342, 343, 353
Segmentation, 169, 224, 259, 260
 genes, 256, 259, 260
Segregation, 189, 200, 218
Self-assembly, 70, 189, 222, 357
Self-electrophoresis, 175
Semiconductor(s), 22, 68, 108, 329
Senescence, 238
Sensor(s), 141, 340, 341, 354, 355

Septation, 158, 181-183, 190, 191, 194, 195,
202, 205,
Sequence(s), 15, 50-58, 81, 86, 87, 94, 96,
97, 107, 121, 137, 157, 165, 184, 196,
204, 220, 226, 231, 256, 258, 336
Serine, 40, 87, 141, 259, 337
Severin, 114, 343
Sex (differentiation-disjunction), 153, 174,
197-200, 358
Shoot, 172, 185, 209, 229, 231-235, 237,
353
 apex, 225, 229, 231, 232, 238, 239
 axis, 224, 225, 230
 meristem, 231
Signal(s), 14, 53, 70, 81, 82, 87, 93, 95-97,
100, 101, 106, 107, 118, 138, 140,
142, 143, 145, 148, 179, 182, 203,
209, 230, 231, 236, 237, 239, 240,
243, 252, 253, 256, 265, 266, 342,
353-355
 inhibition, 185
 intracellular, 102
 morphogens, 240
 peptide(s), 82, 88, 97, 106
 receptor-recognition, 96, 97
 transduction, 79, 350
 target protein, 103, 353
Silicon (silica), 22, 108, 184, 330
Simulation, 222
Sink(s), 92, 157, 167, 168, 185, 222, 233,
240
Size(s), 20, 27, 34, 35, 40, 81, 93, 117, 137,
148, 149, 157, 161, 170, 173, 177,
182, 185, 189, 198, 200, 225, 228,
229, 240, 247, 250, 262, 331
Sliding, 76, 117, 120, 122, 125, 175, 345
Sodium (see also Na⁺), 23, 49, 63, 68, 76,
90-93, 333, 341
Solar, 45, 48, 108, 109, 327, 330
Solitons, 51, 52, 68
Solvation, 333
Sorocarp(s), 241, 242
Sorting, 96-98, 100, 102, 103, 161, 177, 219,
220, 342, 343, 353
 -out, 154, 198
Source(s), 22, 30, 45, 47, 48, 61, 92, 107,
132, 140-142, 173, 222, 233, 240,
206, 209, 328, 350

- Spatial, 14, 15, 85, 95, 110, 121, 140-142, 163, 180, 190, 203, 209, 214, 221, 223, 259, 265
 asymmetry-symmetry, 69, 271
 organization, 112, 239, 259, 348
 pattern, 207, 240, 252
 polarity, 214, 257, 259
 segregation, 183
- Spatio-temporal, 73, 325
- Spectra-spectrum, 30, 31, 61, 86, 89, 108, 331-333
- Spectrin, 112, 114, 221
- Sperm, 89, 254, 261-263
 cells, 161, 218
- Spherical, 34, 40, 63, 68, 69, 108, 131, 147, 149-154, 158, 159, 161-163, 187, 204, 229, 264, 325, 330, 348
 bud(s), 149, 157
 growth, 157
 stage, 154, 325
- Spin(s) 17, 22, 25, 27-30, 43, 44, 140, 331, 333
- Spindle, 120, 124-128, 345
 pole bodies, 151-153
- Spiral, 45, 245, 268
- Spitzenkörper, 105, 164, 166
- Sporangia, 191, 194, 195, 352
- Sporangiospore(s)-phores, 157, 163, 352, 354
- Spore(s) 13, 155, 160, 169, 172, 173, 181, 187, 190, 191, 194-196, 202-205, 208-210, 224, 228, 241, 325, 348, 349
 differentiation, 202
 germination, 155, 173, 208, 348
 induction, 195
 unpolarized, 205
- Sporulation
 endo-, 190-192, 202
 exo-, 192-195, 352
- Spreading, 145, 199, 350
- Stability, 13, 18, 22, 69, 127, 132, 183, 229
- Stars, 25
- Statocyte(s), 236, 354, 355
- Statolith(s), 168, 236, 355
- Stereospecificity, 15, 44-46, 86
- Steroids, 63, 78
- Stimulation, 90, 92, 141, 148, 227, 235
- Stimulus (Stimuli), 22, 86, 95, 139-141, 143, 145, 206, 210, 220, 221, 223, 239, 243, 253, 329, 341, 355
 transducers, 236
- Stomata, 205, 211
- Stress, 115, 126, 147, 149, 182, 186
- Structural proteins, 58, 73
- Subapical, 155, 165, 168, 169, 173, 175, 235, 349
 zone(s), 163, 164
- Substitution, 54
- Sucrose, 206, 207, 222
- Sugar(s), 44-46, 60, 64, 73, 79, 165, 233, 334
- Sulfur (SH₂, SO₂), 38, 84
- Superconductivity, 23-25
- Superoxide dismutase (SOD), 61, 66
- Surface
 charges, 237
 membrane(s), 73, 81, 90, 91, 101, 177, 333, 337-339
 potential(s), 230, 340
 proteins, 77, 332, 337, 347
 structures, 203
- Symmetry, 13, 18, 19, 44, 45, 47, 51, 64, 68-70, 72, 79, 123, 147, 154, 158, 159, 182, 221, 226, 246, 262, 265, 327-330, 334, 336
 bilateral, 328
 mutant, 268
 pattern, 255, 269, 330
 radial, 226, 262
 spatial, 69
- Symport, 82, 167, 168
- Synapse(s), 87, 93-95, 105, 122, 178, 180, 181
 polarity, 177, 178
 transmission, 94, 95, 180
 vesicle(s), 90, 94, 177, 178
- Synapsin, 94
- Synthetic, 23, 52, 74, 77, 93, 109, 110, 166, 185, 198, 235
 enzymes, 183
 polymers, 67
- Target(s), 30, 53, 81, 89, 96, 97, 99, 106, 122, 157, 162, 177, 178, 180, 181, 219, 230, 349, 350

- Targeting, 81, 97, 101-103, 107, 219
 signal(s), 97, 103, 106, 353
- Tartrate, 44
- Taxis (Chemo-, Photo-), 139-144
- Taxol, 121
- Temperature, 17, 24, 25, 63, 68, 76, 80,
 129, 154, 159, 161, 165, 175, 182,
 187, 193, 226, 267, 268, 356
- Template(s), 35, 52, 53, 55, 57, 58, 69, 122,
 132, 243
- Temporal, 15, 95, 133, 140, 141, 143, 163,
 180, 190, 203, 251
- Tetrahedral, 39, 64, 65, 332
- Tetrapolarity, 196, 340
- Thalli, 181, 204-210, 352
- Theory, 14, 17, 20, 24-27, 31, 92, 131, 134,
 223, 255, 327, 355
 metabolic gradients, 247, 255
- Thermodynamic(s), 14, 75, 128, 272, 337,
 341
- Thiol, 40, 162
- Thylakoid(s), 74, 79, 108-110, 143, 343
- Time, 17, 18, 30, 37, 51, 70, 72, 87, 92, 94,
 96, 98, 102, 112, 124, 125, 139-141,
 157, 159, 164, 175, 179, 181, 182,
 190, 195, 200, 206, 207, 209, 210,
 214, 215, 218, 226, 231, 234, 240,
 244, 253, 257, 269, 270, 273, 330,
 341
- Tip(s), 114, 115, 131, 144, 164, 167-169,
 173, 175, 176, 193, 195, 233, 349
 acidic, 167, 168
 growth, 150, 162, 163, 165, 167, 168,
 169, 352
 organelles, 167, 173, 178
- Tissue(s), 62, 130, 137, 147, 169, 177, 186,
 189, 201, 208, 224-228, 230-233,
 237-240, 247-250
 polarity, 230-234, 261, 262
 regeneration, 241, 242, 248
- Titanate, 23, 330
- Topology, 26, 50, 83, 102, 162, 174, 191,
 358
- Torque(s), 36, 37, 140
- Trace, 108
- Traffic (intracellular), 97-100, 122, 148,
 177, 256, 343
- Transducers, 109
- Trans*, 52, 97-101, 103, 260
- Transcellular, 104, 137, 154, 168
 calcium, 106
 electrical potential, 170
 ion current(s), 154, 161, 167, 349, 353
- Transduction, 140, 142, 143, 236, 338, 348,
 355, 358
- Transformation, 80, 133, 137, 138, 139,
 157, 162
- Translation(s), 44, 51, 53-55, 58, 60, 69, 70,
 96, 97, 132, 196, 214
- Translocation, 51, 52, 54, 82, 83, 85, 96, 97,
 106, 107, 123, 132, 169, 203, 204,
 236, 239, 333
- Transmembrane, 77, 81, 84, 86, 87, 90, 94,
 102, 110, 132, 136, 140, 340, 341,
 346, 353
 domains, 261
 potential(s), 89, 107, 339
 receptor protein(s), 42, 77, 86, 90, 112
- Transmission, 32, 86, 93-95, 105, 107, 343
- Transport(s), 24, 60, 62, 78, 79, 82, 83, 85,
 86, 89, 94, 97-106, 112, 122, 140,
 143, 152, 163, 177-179, 191, 207,
 219, 220, 231, 233, 235, 338, 341,
 342, 343, 355
- Transposons, 55, 336
- Treadmilling, 113, 114, 118, 120, 125
- Tree, 147
- Triaxial patterns, 267-270, 356
- Trichoblasts, 205, 211
- Trichome, 107, 133, 143, 211
- Trigger(s), 90, 93, 203, 215, 233, 239, 243
- Triplet(s), 54, 57
- Tripolar, 326, 329
- Trophoblast, 266
- Tropisms (tropic curvatures), 181, 235-238,
 354-355
- Tropomyosin, 114
- Tubular, 70, 99, 104, 163, 252, 340, 341
- Tubulin(s), 15, 81, 112, 114, 118-121, 125,
 128, 129, 139, 151, 153, 163, 174,
 177, 180, 187, 194, 200, 218, 325,
 344, 349, 358
 α - and β -, 111, 119, 121, 152
 gene(s), 151, 187
 membrane, 187
 mutations, 193
- Tumoral cells, 115, 149, 160
- Tunnelling, 35, 38, 42, 67, 272, 336

- Turgor pressure, 147, 162, 166, 186, 187, 230
- Uncoupling agents, 108
- Unidirectional, 15, 90, 97, 107, 111, 115, 119, 120, 132, 136, 182, 345
- Unification, 20, 26, 27, 45
- Unipolar, 147, 183, 240
- Unity, 20
- Universe, 17-19, 26, 27, 45, 271, 327, 328
- Unpolarized, 28, 62, 205, 212, 329
- Uptake, 94, 102, 106, 110, 340
- Urea, 115
- UV-irradiation, 214, 215, 257, 258
- Vacuole(s), 129, 130, 137, 155, 164, 173, 184, 185, 194, 195, 225, 244
- Valence, 22, 23, 24, 68, 328
- Valinomycin, 107, 108
- Vascular systems, 224, 225, 229, 231-233, 237
- Vector(s), 26-29, 33, 44, 249, 336, 350, 352
- Vectorial, 79, 82, 85, 89, 124, 142, 151, 166, 219, 220
 - movement, 102, 200, 353
 - mitochondrion, 106
- Vegetal, 212, 214-216, 253, 255
 - cortex, 214, 261
 - pole, 190, 212, 253-255, 261, 263, 264, 269
 - region, 217, 252, 255, 262
- Vegetative, 147, 164, 165, 169, 190, 194-197, 203, 208, 226, 229, 231, 238, 239, 241, 352
 - buds, 239
 - cell(s), 161, 191, 192, 202, 205, 228
 - differentiation, 193
 - growth, 238, 241
 - pole, 161
- Ventral, 231, 256, 263
- Vesicle(s), 74, 85, 94, 95, 97-102, 105, 110, 122-124, 137, 151, 153, 155, 157, 161-164, 166-168, 173, 175, 177-180, 183, 184, 194, 195, 204, 206, 207, 215, 235, 340, 342-345
 - membrane, 102, 109, 342
 - secretion (granules), 101, 207
 - transport, 151
- Vibrating probe (electrode), 154, 168, 194, 207, 230
- Villin, 114
- Vimentin, 111
- Vinculin, 144
- Virus(es), 57, 69-71, 117, 219
 - DNA, 58, 337
 - form (TMV), 69, 70
 - RNA, 57
- Vision, 89
- Vitamin B₁, 160
- Vitellogenesis, 100
- Voltage gradient, 167
- Wall(s), 15, 100, 129, 133, 134, 148, 150-153, 155, 157-159, 161, 162, 165-168, 175, 176, 182, 183, 185, 186, 193-195, 199, 206, 207, 209-212, 224, 225, 230, 236, 237, 256, 267, 341
 - apical, 164, 166
 - cell, 64, 79, 149-155, 157, 162, 166, 169, 175, 176, 183-187, 189, 201, 203, 206, 207, 211, 222, 223, 226, 230, 235, 352, 356
 - vesicles, 167
- Water (see also H₂O), 17, 34-41, 51, 55, 58-68, 73, 75-77, 104, 110, 155, 159, 169, 175, 228, 233, 246, 268, 325, 327, 332-334, 338, 343, 352
 - cell, 331
 - dipolar, 34-38, 332, 333, 338
 - splitting, 343
 - surface-interfaces, 63, 76, 333, 338
- Wing, 240, 260, 261, 265
- Wound, 176, 250, 251, 341
- X-ray(s), 35, 37, 78, 86, 110
- Xylem, 233
- Yeast(s)
 - budding(s), 150, 154, 184, 187, 344, 348
 - cell cycle, 151-154
 - cell polarity, 152, 161
 - cytoskeletal network, 342, 344, 348
 - elongation (fission-), 183, 184
 - forms, 161-163
 - mating, 152-154, 195-197
- Yellow egg crescent, 216, 261

- Yin-Yang, 13, 138, 148, 271
Yolk, 190, 212, 216-218, 269, 270
- Zinc (Zn^{2+}), 58, 59, 61, 337
- Zone(s) (cellular zonation), 104, 117, 129, 133, 134, 161, 165, 168, 171, 173-178, 185, 195, 199, 214, 230, 236, 237, 245, 248, 256, 262, 350, 352, 356
 elongation, 230
 exclusion (mitochondria), 103-105, 166-168, 193
- Zoospore(s), 134, 169, 195, 204
- Zwitterion, 41
- Zygospore, 169
- Zygote(s), 151, 158-160, 169-171, 184, 195, 196, 201, 204-207, 210, 213, 214, 224, 225, 252
 differentiation, 14
 germination, 205