

(574)

INDEX.

ABIES.

A.

- Abies communis*, effect of killing or injuring the leading shoot, 187
 — *pectinata*, effect of killing or injuring the leading shoot, 187
 —, affected by *Æcidium elatinum*, 188
Abronia umbellata, its single, developed cotyledon, 78
 —, rudimentary cotyledon, 95
 —, rupture of the seed coats, 105
Abutilon Darwinii, sleep of leaves and not of cotyledons, 314
 —, nocturnal movement of leaves, 323
Acacia Farnesiana, state of plant when awake and asleep, 381, 382
 —, appearance at night, 395
 —, nyctitropic movements of pinnæ, 402
 —, the axes of the ellipses, 404
 — *lophantha*, character of first leaf, 415
 — *retinoides*, circumnutation of young phyllode, 236
Acanthosicyos horrida, nocturnal movement of cotyledon, 304
Acanthus candelabrum, inequality in the two first leaves, 79
 —, petioles not arched, 553
 — *latifolius*, variability in first leaves, 79
 — *mollis*, seedling, manner of breaking through the ground, 78, 79
 —, circumnutation of young leaf, 249, 269
 — *spinousus*, 79
 —, movement of leaves, 249

AMPHICARPEA.

- Adenantha pannonia*, nyctitropic movements of leaflets, 374
Æcidium elatinum, effect on the lateral branches of the silver fir, 188
Æsculus hippocastanum, movements of radicle, 28, 29
 —, sensitiveness of apex of radicle, 172-174
Albizia lophantha, nyctitropic movements of leaflets, 383
 —, of pinnæ, 402
Allium cepa, conical protuberance on arched cotyledon, 59
 —, circumnutation of basal half of arched cotyledon, 60
 —, mode of breaking through ground, 87
 —, straightening process, 101
 — *porrum*, movements of flower-stems, 226
Alopecurus pratensis, joints affected by apogeotropism, 503
Aloysia citriodora, circumnutation of stem, 210
Amaranthus, sleep of leaves, 387
 — *caudatus*, nocturnal movement of cotyledons, 307
Amorpha fruticosa, sleep of leaflets, 354
Ampelopsis tricuspidata, hyponastic movement of hooked tips, 272-275
Amphicarpæa monoica, circumnutation and nyctitropic movements of leaves, 365
 —, effect of sunshine on leaflets, 445
 —, geotropic movements of, 520

ANODA.

- Anoda Wrightii*, sleep of cotyledons, 302, 312
 —, of leaves, 324
 —, downward movement of cotyledons, 444
 Apheliotropism, or negative heliotropism, 5, 419, 432
Apios graveolens, heliotropic movements of hypocotyl, 422-424
 — *tuberosa*, vertical sinking of leaflets at night, 368
Apium graveolens, sleep of cotyledons, 305
 —, *petroselinum*, sleep of cotyledons, 304
 Apogeotropic movements effected by joints or pulvini, 502
 Apogeotropism, 5, 494; retarded by heliotropism, 501; concluding remarks on, 507
Arachis hypogæa, circumnutation of gynophore, 225
 —, effects of radiation on leaves, 289, 296
 —, movements of leaves, 357
 —, rate of movement, 404
 —, circumnutation of vertically dependent young gynophores, 519
 —, downward movement of the same, 519
 Arching of various organs, importance of, to seedling plants, 87, 88; emergence of hypocotyls or epicotyls in the form of an, 553
Asparagus officinalis, circumnutation of plumules, 60-62.
 —, effect of lateral light, 484
Asplenium trichomanes, movement in the fruiting fronds, 257, *n.*
Astragalus uliginosus, movement of leaflets, 355
Avena sativa, movement of cotyledons, 65, 66.
 —, sensitiveness of tip of radicle to moist air, 183
 —, heliotropic movement and circumnutation of cotyledon, 421, 422
 —, sensitiveness of cotyledon to a lateral light, 477
 —, young sheath-like cotyledons strongly apogeotropic, 499

BRASSICA.

- Avena sativa*, movements of oldish cotyledons, 499, 500
Averrhoa bilimbi, leaf asleep, 330
 —, angular movements when going to sleep, 331-335
 —, leaflets exposed to bright sunshine, 447
Azalea Indica, circumnutation of stem, 208
- B.**
- Bary, de, on the effect of the *Æcidium* on the silver fir, 188
 Bataïin, Prof., on the nyctitropic movements of leaves, 283; on the sleep of leaves of *Sida napæa*, 322; on *Polygonum aviculare*, 387; on the effect of sunshine on leaflets of *Oxalis acetosella*, 447
Bauhinia, nyctitropic movements, 373
 —, movements of petioles of young seedlings, 401
 —, appearance of young plants at night, 402
Beta vulgaris, circumnutation of hypocotyl of seedlings, 52
 —, movements of cotyledons, 52, 53
 —, effect of light, 124
 —, nocturnal movement of cotyledons, 307
 —, heliotropic movements of, 420
 —, transmitted effect of light on hypocotyl, 482
 —, apogeotropic movement of hypocotyl, 496
Bignonia capreolata, apheliotropic movement of tendrils, 432, 450
 Bouché on *Melaleuca ericæfolia*, 383
Brassica napus, circumnutation of flower-stems, 226
Brassica oleracea, circumnutation of seedling, 10
 —, of radicle, 11
 —, geotropic movement of radicle, 11

BRASSICA.

- Brassica oleracea*, movement of buried and arched hypocotyl, 13, 14, 15
 —, conjoint circumnutation of hypocotyl and cotyledons, 16, 17, 18
 —, of hypocotyl in darkness, 19
 —, of a cotyledon with hypocotyl secured to a stick, 19, 20
 —, rate of movement, 20
 —, ellipses described by hypocotyls when erect, 105
 —, movements of cotyledons, 115
 —, — of stem, 202
 —, — of leaves at night, 229, 230
 —, sleep of cotyledons, 301
 —, circumnutation of hypocotyl of seedling plant, 425
 —, heliotropic movement and circumnutation of hypocotyls, 426
 —, effect of lateral light on hypocotyls, 479-482
 —, apogeotropic movement of hypocotyls, 500, 501
Brassica rapa, movements of leaves, 230
 Brongniart, A., on the sleep of *Strephium floribundum*, 391
 Bruce, Dr., on the sleep of leaves in *Averrhoa*, 330
Bryophyllum (vel *Calanchoe*) *calycinum*, movement of leaves, 237

C.

- Camellia Japonica*, circumnutation of leaf, 231, 232
 Candolle, A. de, on *Trapa natans*, 95; on sensitiveness of cotyledons, 127
Canna Warscewiczii, circumnutation of plumules, 58, 59
 —, of leaf, 252
Cannabis sativa, movements of leaves, 250
 —, nocturnal movements of cotyledons, 307

CASSIA.

- Cannabis sativa*, sinking of the young leaves at night, 444
 Cassia, nyctitropic movement of leaves, 369
Cassia Barclayana, nocturnal movement of leaves, 372
 —, slight movement of leaflets, 401
 — *calliantha*, uninjured by exposure at night, 289, n.
 —, nyctitropic movement of leaves, 371
 —, circumnulating movement of leaves, 372
 — *corymbosa*, cotyledons sensitive to contact, 126
 —, nyctitropic movement of leaves, 369
 — *floribunda*, use of sleep movements, 289
 —, effect of radiation on the leaves at night, 294
 —, circumnulating and nyctitropic movement of a terminal leaflet, 372, 373
 —, movements of young and older leaves, 400
 — *florida*, cotyledons sensitive to contact, 126
 —, sleep of cotyledons, 308
 — *glauca*, cotyledons sensitive to contact, 126
 —, sleep of cotyledons, 308
 — *lavigata*, effect of radiation on leaves, 289, n.
 — *mimosoides*, movement of cotyledons, 116
 —, sensitiveness of, 126
 —, sleep of, 308
 —, nyctitropic movement of leaves, 372
 —, effect of bright sunshine on cotyledons, 446
 — *neglecta*, movements of, 117
 —, effect of light, 124
 —, sensitiveness of cotyledons, 126
 — *nodosa*, non-sensitive cotyledons, 126
 —, do not rise at night, 308
 — *pubescens*, non-sensitive cotyledons, 126

Cambridge University Press

978-1-108-00360-5 - The Power of Movement in Plants

Charles Darwin

Index

[More information](#)

INDEX.

577

CASSIA.

Cassia pubescens, uninjured by exposure at night, 293
 —, sleep of cotyledons, 308
 —, nyctitropic movement of leaves, 371
 —, circumnutating movement of leaves, 372
 —, nyctitropic movement of petioles, 400
 —, diameter of plant at night, 402
 — *sp.* (?) movement of cotyledons, 116
 — *tora*, circumnutation of cotyledons and hypocotyls, 34, 35, 109, 308
 —, effect of light, 124, 125
 —, sensitiveness to contact, 125
 —, heliotropic movement and circumnutation of hypocotyl, 431
 —, hypocotyl of seedling slightly heliotropic, 454
 —, apogeotropic movement of old hypocotyl, 497
 —, movement of hypocotyl of young seedling, 510
 Caustic (nitrate of silver), effect of, on radicle of bean, 150, 156; on the common pea, 160.
 Cells, table of the measurement of, in the pulvini of *Oxalis corniculata*, 120; changes in, 547
 Centrosema, 365
Ceratophyllum demersum, movements of stem, 211
Cereus Landbeckii, its rudimentary cotyledons, 97
 — *speciosissimus*, circumnutation of stem, 206, 207
Cerinthe major, circumnutation of hypocotyl, 49
 —, of cotyledons, 49
 —, ellipses described by hypocotyls when erect, 107
 — effect of darkness, 124
 Chatin, M., on *Pinus Nordmanniana*, 389
Chenopodium album, sleep of

CRINUM.

leaves, but not of cotyledons, 314, 319
Chenopodium album, movement of leaves, 387
 Chlorophyll injured by bright light, 446
 Ciesielski, on the sensitiveness of the tip of the radicles, 4, 523
 Circumnutation, meaning explained, 1; modified, 263–279; and heliotropism, relation between, 435; of paramount importance to every plant, 547
Cissus discolor, circumnutation of leaf, 233
Citrus aurantium, circumnutation of epicotyl, 28
 —, unequal cotyledons, 95
Clianthus Dampieri, nocturnal movement of leaves, 297
Cobaea scandens, circumnutation of, 270
 Cohn, on the water secreted by *Lathraea squamaria*, 86, *n.*; on the movement of leaflets of *Oxalis*, 447
Colutea arborea, nocturnal movement of leaflets, 355
Coniferae, circumnutation of, 211
Coronilla rosea, leaflets asleep, 355
Corylus avellana, circumnutation of young shoot, emitted from the epicotyl, 55, 56
 —, arched epicotyl, 77
Cotyledon umbilicus, circumnutation of stolons, 219, 220
 Cotyledons, rudimentary, 94–98; circumnutation of, 109–112; nocturnal movements, 111, 112; pulvini or joints of, 112–122; disturbed periodic movements by light, 123; sensitiveness of, to contact, 125; nyctitropic movements of, 283, 297; list of cotyledons which rise or sink at night, 300; concluding remarks on their movements, 311
Crambe maritima, circumnutation of leaves, 228, 229
Crinum capense, shape of leaves, 253

2 P

ORINUM.

- Crinum capense*, circumnutation of, 254
Crotolaria (sp. ?), sleep of leaves, 340
Cryptogams, circumnutation of, 257-259
Cucumis dudaim, movement of cotyledons, 43, 44
 —, sleep of cotyledons, 304
Cucurbita aurantia, movement of hypocotyl, 42
 —, cotyledons vertical at night, 30±
 — *ovifera*, geotropic movement of radicle, 38, 39
 —, circumnutation of arched hypocotyl, 39
 —, of straight and vertical hypocotyl, 40
 —, movements of cotyledons, 41, 42, 115, 124
 —, position of radicle, 89
 —, rupture of the seed-coats, 102
 —, circumnutation of hypocotyl when erect, 107, 108
 —, sensitiveness of apex of radicle, 169-171
 —, cotyledons vertical at night, 304
 —, not affected by apogeotropism, 509
 —, tips cauterised transversely, 537
 Curvature of the radicle, 193
Cycas pectinata, circumnutation of young leaf, whilst emerging from the ground, 58
 —, first leaf arched, 78
 —, circumnutation of terminal leaflets, 252
Cyclamen Persicum, movement of cotyledon, 46
 —, undeveloped cotyledons, 78, 96
 —, circumnutation of peduncle, 225
 —, —, of leaf, 246, 247
 —, downward apheliotropic movement of a flower peduncle, 433-435

DESMODIUM.

- Cyclamen Persicum*, burying of the pods, 433
Cyperus alternifolius, circumnutation of stem, 212
 —, movement of stem, 509
Cytisus fragrans, circumnutation of hypocotyl, 37
 —, sleep of leaves, 344, 397
 —, apogeotropic movement of stem, 494-496
- D.
- Dahlia*, circumnutation of young leaves, 244-246
Dalea alopecuroides, leaflets depressed at night, 354
 Darkness, effect of, on the movement of leaves, 407
Darlingtonia Californica, its leaves or pitchers apheliotropic, 450, n.
 Darwin, Charles, on *Maurandia semperflorens*, 225; on the Swedish turnip, 230, n.; movements of climbing plants, 266, 271; the heliotropic movement of the tendrils of *Bignonia capreolata*, 433; revolution of climbing plants, 451; on the curling of a tendril, 570
 —, Erasmus, on the peduncles of *Cyclamens*, 433
 —, Francis, on the radicle of *Sinapis alba*, 486; on Hygrosopic seeds, 489, n.
Datura stramonium, nocturnal movement of cotyledons, 298
 Delpino, on cotyledons of *Chærophyllum* and *Corydalis*, 96, n.
Delphinium nudicaule, mode of breaking through the ground, 80
 —, confluent petioles of two cotyledons, 553
Desmodium gyrans, movement of leaflets, 257, n.
 —, position of leaves at night, 285
 —, sleep of leaves, not of cotyledons, 314
 —, circumnutation and nycti-

DESMODIUM.

- tropic movement of leaves, 358-360
Desmodium gyrans, movement of lateral leaflets, 361
 —, jerking of leaflets, 362
 —, nyctitropic movement of petioles, 400, 401
 —, diameter of plant at night, 402
 —, lateral movement of leaves, 404
 —, zigzag movement of apex of leaf, 405
 —, shape of lateral leaflet, 416
 — *vespertilionis*, 364, n.
Deutzia gracilis, circumnutation of stem, 205
 Diageotropism, 5; or transverse-geotropism, 520
 Dialheliotropism, 5; or Transversal-Heliotropism of Frank, 419; influenced by epinasty, 439; by weight and apogeotropism, 440
Dianthus caryophyllus, 230
 —, circumnutation of young leaf, 231, 269
 Dicotyledons, circumnutation widely spread among, 68
 Dioncea, oscillatory movements of leaves, 261, 271
Dioncea muscipula, circumnutation of young expanding leaf, 239, 240
 —, closure of the lobes and circumnutation of a full-grown leaf, 241
 —, oscillations of, 242-244
 Diurnal sleep, 419
Drosera Capensis, structure of first-formed leaves, 414
 — *rotundifolia*, movement of young leaf, 237, 238
 —, of the tentacles, 239
 —, sensitiveness of tentacles, 261
 —, shape of leaves, 414
 —, leaves not heliotropic, 450
 —, leaves circumnutate largely, 454
 —, sensitiveness of 570

EUCALYPTUS.

- Duchartre on *Tephrosia caribæa*, 354; on the nyctitropic movement of the Cassia, 369
 Duval-Jouve, on the movements of *Bryophyllum calycinum*, 237; of the narrow leaves of the Gramineæ, 413
 Dyer, Mr. Thiselton, on the leaves of *Crotolaria*, 340; on *Cassia floribunda*, 369, n., on the absorbent hairs on the buried flower-heads of *Trifolium subterraneum*, 517

E.

- Echeveria stolonifera*, circumnutation of leaf, 237
Echinocactus viridescens, its rudimentary cotyledons, 97
Echinocystis lobata, movements of tendrils, 266
 —, apogeotropism of tendrils, 510
 Elfving, F., on the rhizomes of *Sparganium ramosum*, 189; on the diageotropic movement in the rhizomes of some plants, 521
Elymus arenareus, leaves closed during the day, 413
 Embryology of leaves, 414
 Engelmann, Dr., on the *Quercus virens*, 85
 Epinasty, 5, 267
 Epicotyl, or plumule, 5; manner of breaking through the ground, 77; emerges from the ground under the form of an arch, 553
Erythrina caffra, sleep of leaves, 367
 — *coraliodendron*, movement of terminal leaflet, 367
 — *crista-galli*, effect of temperature on sleep of leaves, 318
 —, circumnutation and nyctitropic movement of terminal leaflets, 367
Eucalyptus resinifera, circumnutation of leaves, 244

Cambridge University Press

978-1-108-00360-5 - The Power of Movement in Plants

Charles Darwin

Index

[More information](#)

580

INDEX.

EUPHORBIA.

Euphorbia jacquineziflora, nyctitropic movement of leaves, 388

F.

Flahault, M., on the rupture of seed-coats, 102-104, 106

Flower-stems, circumnutation of, 223-226

Fragaria Rosacea, circumnutation of stolon, 214-218

Frank, Dr. A. B., the terms Heliotropism and Geotropism, first used by him, 5, n.; radicles acted on by geotropism, 70, n.; on the stolons of *Fragaria*, 215; periodic and nyctitropic movements of leaves, 284; on the root-leaves of plants kept in darkness, 443; on pulvini, 485; on natural selection in connection with geotropism, heliotropism, &c., 570

—, on Transversal-Heliotropismus, 419

Fuchsia, circumnutation of stem, 205, 206

G.

Gazania ringens, circumnutation of stem, 208

Genera containing sleeping plants, 320, 321

Geotropism, 5; effect of, on the primary radicle, 196; the reverse of apogeotropism, 512; effect on the tips of radicles, 543

Geranium cinereum, 304

— *Endressii*, 304

— *Ibericum*, nocturnal movement of cotyledons, 298

— *Richardsoni*, 304

— *rotundifolium*, nocturnal movement of cotyledon, 304, 312

— *subcaulescens*, 304

Germinating seed, history of a, 548

GYMNOSPERMS.

Githago segetum, circumnutation of hypocotyl, 21, 108

—, burying of hypocotyl, 109

—, seedlings feebly illuminated, 124, 128

—, sleep of cotyledon, 302

—, ——— leaves, 321

Glaucium luteum, circumnutation of young leaves, 228

Gleditschia, sleep of leaves, 368

Glycine hispida, vertical sinking of leaflets, 366

Glycyrrhiza, leaflets depressed at night, 355

Godlewski, Emil, on the turgescence of the cells, 485

Gooseberry, effect of radiation, 284

Gossypium (var. Nankin cotton), circumnutation of hypocotyl, 22

—, movement of cotyledon, 22, 23

—, sleep of leaves, 324

— *arborescens* (?), sleep of cotyledons, 303

— *Braziliense*, nocturnal movement of leaves, 324

—, sleep of cotyledons, 303

— *herbaceum*, sensitiveness of apex of radicle, 168

—, radicles cauterised transversely, 537

— *maritimum*, nocturnal movement of leaves, 324

Gravitation, movements excited by, 567

Gray, Asa, on *Delphinium nudicaule*, 80; on *Megarrhiza Californica*, 81; on the movements in the fruiting fronds of *Asplenium trichomanes*, 257; on the *Amphicarpaea monoica*, 520; on the *Ipomœa Jalappa*, 557

Grease, effect of, on radicles and their tips, 182, 185

Gressner, Dr. H., on the cotyledons of *Cyclamen Persicum*, 46, 77;

on hypocotyl of the same, 96

Gymnosperms, 389

HABERLANDT.

H.

- Haberlandt, Dr., on the protuberance on the hypocotyl of *Allium*, 59; the importance of the arch to seedling plants, 87; sub-aërial and subterranean cotyledons, 110, *n.*; the arched hypocotyl, 55†
- Hæmatoxylon Campechianum*, nocturnal movement of leaves, 368, 369
- Hedera helix*, circumnutation of stem, 207
- Hedysarum coronarium*, nocturnal movements of leaves, 356
- Helianthemum prostratum*, geotropic movement of flower-heads, 518
- Helianthus annuus*, circumnutation of hypocotyl, 45
- , arching of hypocotyl, 90
- , nocturnal movement of cotyledons, 305
- Heliotropism, 5; uses of, 449; a modified form of circumnutation, 490
- Helleborus niger*, mode of breaking through the ground, 86
- Hensen, Prof., on roots in worm-burrows, 72
- Henslow, Rev. G., on the cotyledons of *Phalaris Canariensis*, 62
- Hofmeister, on the curious movement of *Spirogyra*, 3, 259, *n.*; of the leaves of *Pistia stratiotes*, 255; of cotyledons at night, 297; of petals, 41†
- and Batalin on the movements of the cabbage, 229
- Hooker, Sir J., on the effect of light on the pitchers of *Sarracenia*, 450
- Hypocotyl, 5; manner of breaking through the ground, 77; emerges under the form of an arch, 553
- Hypocotyls and Epicotyls, circum-

IPOMCEA.

- nutation and other movements when arched, 98; power of straightening themselves, 100; rupture of the seed-coats, 102-106; illustration of, 106; circumnutation when erect, 107; when in dark, 108
- Hyponasty, 6, 267
- I.
- Iberis umbellata*, movement of stem, 202.
- Illumination, effect of, on the sleep of leaves, 398
- Imatophyllum* vel *Clivia* (sp.?), movement of leaves, 255
- Indigofera tinctoria*, leaflets depressed at night, 35†
- Inheritance in plants, 407, 491
- Insectivorous and climbing plants not heliotropic, 450; influence of light on, 488
- Ipomœa bona nox*, arching of hypocotyl, 90
- , nocturnal position of cotyledons, 306, 312
- *cœrulea* vel *Pharbitis nil*, circumnutation of seedlings, 47
- , movement of cotyledons, 47-49, 109
- , nocturnal movements of cotyledons, 305
- , sleep of leaves, 386
- , sensitiveness to light, 451
- , the hypocotyledonous stems heliotropic, 453
- , *coccinea*, position of cotyledons at night, 306, 312
- *leptophylla*, mode of breaking through the ground, 83, 84
- , arching of the petioles of the cotyledons, 90
- , difference in sensitiveness to gravitation in different parts, 509
- , extraordinary manner of germination, 557

IPOMŒA.

- Ipomœa pandurata*, manner of germination, 81, 557
 — *purpurea* (vel *Pharbitis hispida*), nocturnal movement of cotyledons, 305, 312
 —, sleep of leaves, 386
 —, sensitiveness to light, 451
 —, the hypocotyledonous stems heliotropic, 453
Iris pseudo-acorus, circumnutation of leaves, 253
 Irisch, on cotyledons of *Ranunculus Ficaria*, 96
 Ivy, its stems heliotropic, 451

K.

- Kerner on the bending down of peduncles, 414
 Klinostat, the, an instrument devised by Sachs to eliminate geotropism, 93
 Kraus, Dr. Carl, on the underground shoots of *Triticum repens*, 189; on *Cannabis sativa*, 250, 307, 312; on the movements of leaves, 318

L.

- Lactuca scariola*, sleep of cotyledons, 305
Lagenaria vulgaris, circumnutation of seedlings, 42
 —, of cotyledons, 43
 —, cotyledons vertical at night, 304
Lathræa squamaria, mode of breaking through the ground, 85
 —, quantity of water secreted, 85, 86, n.
Lathyrus nissolia, circumnutation of stem of young seedling, 33
 —, ellipses described by, 107, 108
 Leaves, circumnutation of, 226-

LOTUS.

- 262; dicotyledons, 226-252; monocotyledons, 252-257; nyctitropism of, 280; their temperature affected by their position at night, 294; nyctitropic or sleep movements, 315, 394; periodicity of their movements inherited, 407; embryology of, 414; so-called diurnal sleep, 445
Leguminosæ, sleep of cotyledons, 308; sleeping species, 340
 Le Maout and Decaisne, 67
Lepidium sativum, sleep of cotyledons, 302
 Light, movements excited by 418, 563; influence on most vegetable tissues, 486; acts on plants as on the nervous system of animals, 487
Lilium auratum, circumnutation of stem, 212
 —, apogeotropic movement of stem, 498, 499
 Linnæus, 'Somnus Plantarum,' 280; on plants sleeping, 320; on the leaves of *Sida abutilon*, 324; on *Oenothera mollissima*, 383
Linum Berendieri, nocturnal movement of cotyledons, 298
 — *usitatissimum*, circumnutation of stem, 203
Lolium perenne, joints affected by apogeotropism, 502
Lonicera brachypoda, hooking of the tip, 272
 —, sensitiveness to light, 453
 Loomis, Mr., on the movements in the fruiting fronds of *Asplenium trichomanes*, 257
Lotus aristata, effect of radiation on leaves, 292
 — *Creticus*, leaves awake and asleep, 354
 — *Gebelii*, nocturnal movement of cotyledons, 308
 —, leaflets provided with pulvini, 353
 — *Jacobæus*, movements of cotyledons, 35, 109
 —, pulvini of, 115

Cambridge University Press

978-1-108-00360-5 - The Power of Movement in Plants

Charles Darwin

Index

[More information](#)

LOTUS.

- Lotus Jacobæus*, movements at night, 116, 121, 124
 —, development of pulvini, 122
 —, sleep of cotyledons, 308, 313
 —, nyctitropic movement of leaves, 353
 — *major*, sleep of leaves, 353
 — *perigrinus*, movement of leaflets, 353
Lunularia vulgaris, circumnutration of fronds, 258
Lupinus, 340
 — *albifrons*, sleep of leaves, 344
 — *Hartwegii*, sleep of leaves, 341
 — *luteus*, circumnutration of cotyledons, 38, 110
 —, effect of darkness, 124
Lupinus, position of leaves when asleep, 341
 —, different positions of leaves at night, 343
 —, varied movements of leaves and leaflets, 395
 — *Menziesii*, sleep of leaves, 343
 — *mutabilis*, sleep of leaves, 343
 — *nanus*, sleep of leaves, 343
 — *pilosus*, sleep of leaves, 340, 341
 — *polyphyllus*, sleep of leaves, 343
 — *pubescens*, sleep of leaves by day and night, 342
 —, position of petioles at night, 343
 —, movements of petioles, 401
 — *speciosus*, circumnutration of leaves, 236
 Lynch, Mr. R., on *Pachira aquatica*, 95, n.; sleep movements of *Averrhoa*, 330

M.

- Maranta arundinacea*, nyctitropic movement of leaves, 389–391
 —, after much agitation do not sleep, 319

MELILOTUS.

- Marsilia quadrifoliata*, effect of radiation at night, 292
 —, circumnutration and nyctitropic movement of leaflets, 392–394
 —, rate of movement, 404
 Martins, on radiation at night, 284, n.
 Masters, Dr. Maxwell, on the leading shoots of the *Coniferae*, 211
Maurandia semperflorens, circumnutration of peduncle, 225
Medicago maculata, nocturnal position of leaves, 345
 — *marina*, leaves awake and asleep, 344
 Meehan, Mr., on the effect of an *Æcidium* on *Portulaca oleracea*, 189
Megarrhiza Californica, mode of breaking through the ground, 81
 —, germination described by Asa Gray, 82
 —, singular manner of germination, 83, 556
Melaleuca ericoefolia, sleep of leaves, 383
Melilotus, sleep of leaves, 345
 — *alba*, sleep of leaves, 347
 — *cœrulea*, sleep of leaves, 347
 — *dentata*, effect of radiation at night, 295
 — *elegans*, sleep of leaves, 347
 — *gracilis*, sleep of leaves, 347
 — *infesta*, sleep of leaves, 347
 — *Italica*, leaves exposed at night, 291
 —, sleep of leaves, 347
 — *macrorrhiza*, leaves exposed at night, 292
 —, sleep of leaves, 347
 — *messanensis*, sleep of leaves on full-grown and young plants, 348, 416
 — *officinalis*, effect of exposure of leaves at night, 290, 296
 —, nocturnal movement of leaves, 346, 347
 —, circumnutration of leaves, 348
 —, movement of petioles, 401

MELILOTUS.

- Melilotus parviflora*, sleep of leaves, 347
 — *Petityierreana*, leaves exposed at night, 291, 296
 —, sleep of leaves, 347
 — *secundiflora*, sleep of leaves, 347
 — *suaveolens*, leaves exposed at night, 291
 —, sleep of leaves, 347
 — *sulcata*, sleep of leaves, 347
 — *Taurica*, leaves exposed at night, 291
 —, sleep of leaves, 347, 415
 Methods of observation, 6
Mimosa albida, cotyledons vertical at night, 116
 —, not sensitive to contact, 127
 —, sleep of cotyledons, 308
 —, rudimentary leaflets, 364
 —, nyctitropic movements of leaves, 379, 380
 —, circumnutation of the main petiole of young leaf, 381
 —, torsion, or rotation of leaves and leaflets, 400
 —, first true leaf, 416
 —, effect of bright sunshine on basal leaflets, 445
 — *marginata*, nyctitropic movements of leaflets, 381
 — *pulica*, movement of cotyledons, 105
 —, rupture of the seed-coats, 105
 —, circumnutation of cotyledons, 109
 —, pulvini of, 113, 115
 —, cotyledons vertical at night, 116
 —, hardly sensitive to contact, 127
 —, effect of exposure at night, 293
 —, nocturnal movement of leaves, 297
 —, sleep of cotyledons, 308
 —, circumnutation and nyctitropic movement of main petiole, 374-378
 —, of leaflets, 378

NEPTUNIA.

- Mimosa albida*, circumnutation and nyctitropic movement of pinnæ, 402
 —, number of ellipses described in given time, 406
 —, effect of bright sunshine on leaflets, 446
Mirabilis jalapa and *longiflora*, nocturnal movements of cotyledons, 307
 —, nyctitropic movement of leaves, 387
 Mohl, on heliotropism in tendrils, stems, and twining plants, 451
 Momentum-like movement, the accumulated effects of apogeotropism, 508
 Monocotyledons, sleep of leaves, 389
Monotropa hypopitys, mode of breaking through the ground, 86
 Morren, on the movements of stamens of *Sparmannia* and *Cereus*, 226
 Müller, Fritz, on *Cassia tora*, 34; on the circumnutation of *Linum usitatissimum*, 203; movements of the flower-stems of an *Alisma*, 226
Mutisia clematis, movement of leaves, 246
 —, leaves not heliotropic, 451

N.

- Natural selection in connection with geotropism, heliotropism, &c., 570
Nephrodium molle, circumnutation of very young frond, 66
 —, of older frond, 257
 —, slight movement of fronds, 509
Neptunia oleracea, sensitiveness to contact, 128
 —, nyctitropic movement of leaflets, 374
 —, of pinnæ, 402

NICOTIANA.

- Nicotiana glauca*, sleep of leaves, 385, 386
 —, circumnutation of leaves, 386
 Nobbe, on the rupture of the seed-coats in a seedling of *Martynia*, 105
Nolana prostrata, movement of seedlings in the dark, 50
 —, circumnutation of seedling, 108
 Nyctitropic movement of leaves, 560
 Nyctitropism, or sleep of leaves, 281; in connection with radiation, 286; object gained by it, 413

O.

- Observation, methods of, 6
Oenothera mollissima, sleep of leaves, 383
Opuntia basilaris, conjoint circumnutation of hypocotyl and cotyledon, 44
 —, thickening of the hypocotyl, 96
 —, circumnutation of hypocotyl when erect, 107
 —, burying of, 109
 Orange, seedling, circumnutation of, 510
Orchis pyramidalis, complex movement of pollinia, 489
Oxalis acetosella, circumnutation of flower-stem, 224
 —, effects of exposure to radiation at night, 287, 288, 296
 —, circumnutation and nyctitropic movement in full-grown leaf, 326
 —, circumnutation of leaflet when asleep, 327
 —, rate of circumnutation of leaflets, 404
 —, effect of sunshine on leaflets, 447
 —, circumnutation of peduncle, 506

OXALIS.

- Oxalis acetosella*, seed-capsules, only occasionally buried, 518
 — *articulata*, nocturnal movements of cotyledons, 307
 — (*Biophytum*) *sensitiva*, rapidity of movement of cotyledons during the day, 26
 —, pulvinus of, 113
 —, cotyledons vertical at night, 116, 118
 — *bupleurifolia*, circumnutation of foliaceous petiole, 328
 —, nyctitropic movement of terminal leaflet, 329
 — *carnea*, circumnutation of flower-stem, 223
 —, epinastic movements of flower-stem, 504
 —, effect of exposure at night, 288, 296
 —, movements of the flower-peduncles due to apogeotropism and other forces, 503–506
 — *corniculata* (var. *cuprea*), movements of cotyledons, 26
 —, rising of cotyledons, 116
 —, rudimentary pulvini of cotyledons, 119
 —, development of pulvinus, 122
 —, effect of dull light, 124
 —, experiments on leaves at night, 288
 — *floribunda*, pulvinus of cotyledons, 114
 —, nocturnal movement, 118, 307, 313
 — *fragrans*, sleep of leaves, 324
 — *Ortegesii*, circumnutation of flower-stems, 224
 —, sleep of large leaves, 327
 —, diameter of plant at night, 402
 —, large leaflets affected by bright sunshine, 447
 — *Plumierii*, sleep of leaves, 327
 — *purpurea*, exposure of leaflets at night, 293
 — *rosea*, circumnutation of cotyledons, 23, 24

OXALIS.

- Oxalis rosea*, pulvinus of, 113
 —, movement of cotyledons at night, 117, 118, 307
 —, effect of dull light, 124
 —, non-sensitive cotyledons, 127
 — *sensitiva*, movement of cotyledons, 109, 127, 128
 —, circumnutation of flower-stem, 224
 —, nocturnal movement of cotyledons, 307, 312
 —, sleep of leaves, 327
 — *tropaeoloides*, movement of cotyledons at night, 118, 120
 — *Valdiviana*, conjoint circumnutation of cotyledons and hypocotyl, 25
 —, cotyledons rising vertically at night, 114, 115, 117, 118
 —, non-sensitive cotyledons, 127
 —, nocturnal movement of cotyledon, 307, 312
 —, sleep of leaves and not of cotyledons, 315
 —, movements of leaves, 327

P.

- Pachira aquatica*, unequal cotyledons, 95, n.
Pancreatum littorale, movement of leaves, 255
 Paraheliotropism, or diurnal sleep of leaves, 445
Passiflora gracilis, circumnutation and nyctitropic movement of leaves, 383, 384
 —, apogeotropic movement of tendrils, 510
 —, sensitiveness of tendrils, 550
Pelargonium zonale, circumnutation of stem, 203
 —, and downward movement of young leaf, 232, 233, 269
 Petioles, the, rising of, beneficial to plant at night, 402
Petunia violacea, downward move-

PHASEOLUS.

- ment and circumnutation of very young leaf, 248, 249, 269.
 Pfeffer, Prof., on the turgescence of the cells, 2; on pulvini of leaves, 113, 117; sleep movements of leaves, 280, 283, 284; nocturnal rising of leaves of Malva, 324; movements of leaflets in *Desmodium gyrans*, 358; on *Phyllanthus Niruri*, 388; influence of a pulvinus on leaves, 396; periodic movements of sleeping leaves, 407, 408; movements of petals, 414; effect of bright sunshine on leaflets of Robinia, 445; effect of light on parts provided with pulvini, 363
Phalaris Canariensis, movements of old seedlings, 62
 —, circumnutation of cotyledons, 63, 64, 108
 —, heliotropic movement and circumnutation of cotyledon towards a dim lateral light, 427
 —, sensitiveness of cotyledon to light, 455
 —, effect of exclusion of light from tips of cotyledons, 456
 —, manner of bending towards light, 457
 —, effects of painting with Indian ink, 467
 —, transmitted effects of light, 469
 —, lateral illumination of tip, 470
 —, apogeotropic movement of the sheath-like cotyledons, 497
 —, change from a straight upward apogeotropic course to circumnutation, 499
 —, apogeotropic movement of cotyledons, 500
Phaseolus Hernandezii, nocturnal movement of leaves and leaflets, 368
 — *caracalla*, 93
 —, nocturnal movement of leaves, 368
 —, effect of bright sunshine on leaflets, 446

PHASEOLUS.

- Phaseolus multiflorus*, movement of radicles, 29
 —, of young radicle, 72
 —, of hypocotyl, 91, 93
 —, sensitiveness of apex of radicle, 163-167
 —, to moist air, 181
 —, cauterisation and grease on the tips, 535
 —, nocturnal movement of leaves, 368
 —, nyctitropic movement of the first unifoliate leaves, 397
 — *Roxburghii*, effect of bright sunshine on first leaves, 445
 —, *vulgaris*, 93
 —, sleep of leaves, 318
 —, vertical sinking of leaflets at night, 368
Phyllanthus Niruri, sleep of leaflets, 388
 — *linoides*, sleep of leaves, 387
Pilocereus Houletii, rudimentary cotyledons, 97
Pimelia spectabilis, sleep of leaves, 387
 Pincers, wooden, through which the radicle of a bean was allowed to grow, 75
Pinus austriaca, circumnutation of leaves, 251, 252
 — *Nordmanniana*, nyctitropic movement of leaves, 389
 — *pinaster*, circumnutation of hypocotyl, 56
 —, movement of two opposite cotyledons, 57
 —, circumnutation of young leaf, 250, 251
 —, epinastic downward movement of young leaf, 270
Pistia stratiotes, movement of leaves, 255
Pisum sativum, sensitiveness of apex of radicle, 158
 —, tips of radicles cauterised transversely, 534
 Plants, sensitiveness to light, 449; hygroscopic movements of, 489

QUERCUS.

- Plants, climbing, circumnutation of, 264; movements of, 559
 —, mature, circumnutation of, 201-214
 Pliny on the sleep-movements of plants, 280
Plumbago Capensis, circumnutation of stem, 208, 209
Poinciana Gilliesii, sleep of leaves, 368
Polygonum aviculare, leaves vertical at night, 387
 — *convolvulus*, sinking of the leaves at night, 318
Pontederia (sp.?), circumnutation of leaves, 256
Portieria hygrometrica, circumnutation and nyctitropic movements of petiole of leaf, 335, 336
 —, effect of watering, 336-338
 —, leaflets closed during the day, 413
Portulaca oleracea, effect of *Æcidium* on, 189
Primula Sinensis, conjoint circumnutation of hypocotyl and cotyledon, 45, 46
 Pringsheim on the injury to chlorophyll, 446
Prosopis, nyctitropic movements of leaflets, 374
Psoralea acaulis, nocturnal movements of leaflets, 354
Pteris aquilina, rachis of, 86
 Pulvini, or joints; of cotyledons, 112-122; influence of, on the movements of cotyledons, 313; effect on nyctitropic movements, 396
- Q.
- Quercus* (American sp.), circumnutation of young stem, 53, 54
 — *robur*, movement of radicles, 54, 55
 —, sensitiveness of apex of radicle, 174-176

QUERCUS.

Quercus virens, manner of germination, 85, 557

R.

Radiation at night, effect of, on leaves, 284-286

Radicles, manner in which they penetrate the ground, 69-77; circumnutation of, 69; experiments with split sticks, 74; with wooden pincers, 75; sensitiveness of apex to contact and other irritants, 129; of *Vicia faba*, 132-158; various experiments, 135-140; summary of results, 143-151; power of an irritant on, compared with geotropism, 151-154; sensitiveness of tip to moist air, 180; with greased tips, 185; effect of killing or injuring the primary radicle, 187-191; curvature of, 193; affected by moisture, 198; tip alone sensitive to geotropism, 540; protrusion and circumnutation in a germinating seed, 548; tip highly sensitive, 550; the tip acts like the brain of one of the lower animals, 573

—, secondary, sensitiveness of the tips in the bean, 154; become vertically geotropic, 186-191

Ramey on the movements of the cotyledons of *Mimosa pudica*, and *Clianthus Dampieri* at night, 297

Ranunculus Ficaria, mode of breaking through the ground, 86, 90

—, single cotyledon, 96

—, effect of lateral light, 484

Raphanus sativa, sensitiveness of apex of radicle, 171

—, sleep of cotyledons, 301

Rattan, Mr., on the germination of the seeds of *Megarrhiza Californica*, 82

Relation between circumnutation and heliotropism, 435

SACHS.

Reseda odorata, hypocotyl of seedling slightly heliotropic, 454

Reversion, due to mutilation, 190

Rhipsalis cassytha, rudimentary cotyledons, 97

Ricinus Borboniensis, circumnutation of arched hypocotyl, 53

Robinia, effect of bright sunshine on its leaves, 445

— *pseudo-acacia*, leaflets vertical at night, 355

Rodier, M., on the movements of *Ceratophyllum demersum*, 211

Royer, Ch., on the sleep-movements of plants, 281, n.; on the sleep of leaves, 318; the leaves of *Medicago maculata*, 345; on *Wistaria Sinensis*, 354

Rubus idæus (hybrid) circumnutation of stem, 205

—, apogeotropic movement of stem, 498

Ruiz and Pavon, on *Porlieria hygrometrica*, 336

S.

SACHS on "revolving nutation," 1; intimate connection between turgescence and growth, 2, n.; cotyledon of the onion, 59; adaptation of root-hairs, 69; the movement of the radicle, 70, 72, 73; movement in the hypocotyls of the bean, &c., 91; sensitiveness of radicles, 131, 145, 198; sensitiveness of the primary radicle in the bean, 155; in the common pea, 156; effect of moist air, 180; of killing or injuring the primary radicle, 186, 187; circumnutation of flower-stems, 225; epinasty, 268; movements of leaflets of *Trifolium incarnatum*, 350; action of light in modifying the periodic movements of leaves, 418; on geotropism and heliotropism, 436, n.; on *Tropæolum majus*, 453;

SARRACENIA.

- on the hypocotyls slightly heliotropic, and stems strongly apheliotropic of the ivy, 453; heliotropism of radicles, 482; experiments on tips of radicles of bean, 523, 524; curvature of the hypocotyl, 555; resemblance between plants and animals, 571
- Sarracenia purpurea*, circumnutation of young pitcher, 227
- Saxifraga sarmentosa*, circumnutation of an inclined stolon, 218
- Schrankia aculeata*, nyctitropic movement of the pinnæ, 381, 403
- *uncinata*, nyctitropic movements of leaflets, 381
- Securigera coronilla*, nocturnal movements of leaflets, 352
- Seed-capsules, burying of, 513
- Seed-coats, rupture of, 102–106
- Seedling plants, circumnutating movements of, 10
- Selaginella*, circumnutation of, 258
- *Kraussii* (?), circumnutation of young plant, 66
- Sida napæa*, depression of leaves at night, 322
- , no pulvinus, 322
- *retusa*, vertical rising of leaves, 322
- *rhubifolia*, sleep of cotyledons, 308
- , sleep of leaves, 314
- , vertical rising of leaves, 322
- , no pulvinus, 322
- , circumnutation and nyctitropic movements of leaf of young plant, 322
- , nyctitropic movement of leaves, 397
- Siegesbeckia orientalis*, sleep of leaves, 319, 384
- Sinapis alba*, hypocotyl bending towards the light, 461
- , transmitted effect of light on radicles, 482, 483, 567
- , growth of radicles in darkness, 486

STAPELIA.

- Sinapis nigra*, sleep of cotyledons, 301
- Smilax aspera*, tendrils apheliotropic, 451
- Smithia Pfundii*, non-sensitive cotyledons, 127
- , hyponastic movement of the curved summit of the stem, 274–276
- , cotyledons not sleeping at night, 308
- , vertical movement of leaves, 356
- *sensitiva*, sensitiveness of cotyledons to contact, 126
- , sleep of cotyledons, 308
- Sophora chrysophylla*, leaflets rise at night, 368
- Solanum dulcamara*, circumnutating stems, 266
- *lycopersicum*, movement of hypocotyl, 50
- , of cotyledons, 50
- , effect of darkness, 124
- , rising of cotyledons at night, 306
- , heliotropic movements of hypocotyl, 421
- , effect of an intermittent light, 457
- , rapid heliotropism, 461
- *palinacanthum*, circumnutation of arched hypocotyl, 51, 100
- , of cotyledon, 51
- , ellipses described by hypocotyl when erect, 107
- , nocturnal movement of cotyledons, 306
- Sparganium ramosum*, rhizomes of, 189
- Sphaerophysa salsola*, rising of leaflets, 355
- Spirogyra princeps*, movements of, 259, *n.*
- Stahl, Dr., on the effect of *Æcidium* on shoot, 189; on the influence of light on swarm-spores, 488, *n.*
- Stapelia sarpedon*, circumnutation of hypocotyl, 46, 47

STAPELIA.

- Stapelia sarpedon*, minute cotyledons, 97
Stellaria media, nocturnal movement of leaves, 297
 Stems, circumnutation of, 201-214
 Stolons, or Runners, circumnutation of, 214-222, 558
 Strasburger, on the effect of light on spores of *Hæmatococcus*, 455, *n.*; the influence of light on the swarm-spores, 488
 Strawberry, stolons of the, circumnutate, but not affected by moderate light, 454
Strephium floribundum, circumnutation and nyctitropic movement of leaves, 391, 392

T.

- Tamarindus Indica*, nyctitropic movement of leaflets, 374
 Transversal heliotropismus (of Frank) or dialheliotropism, 438
Trapa natans, unequal cotyledons, 95, *n.*
Tecoma radicans, stems apheliotropic, 451
Tephrosia caribæa, 354
 Terminology, 5
Thalia dealbata, sleep of leaves, 389
 —, lateral movement of leaves, 404
Trichosanthes anguina, action of the peg on the radicle, 104
 —, nocturnal movement of cotyledons, 304
Trifolium, position of terminal leaflets at night, 282
 — *globosum*, with hairs protecting the seed-bearing flowers, 517
 — *glomeratum*, movement of cotyledons, 309
 — *incarnatum*, movement of cotyledons, 309
 — *Pannonicum*, shape of first true leaf, 350, 415

TRITICUM.

- Trifolium pratense*, leaves exposed at night, 293
 — *repens*, circumnutation of flower-stem, 225
 —, circumnutating and epinastic movements of flower-stem, 276-279
 —, nyctitropic movement of leaves, 349
 —, circumnutation and nyctitropic movements of terminal leaflets, 352, 353
 —, sleep movements, 349
 — *resupinatum*, no pulvini to cotyledons, 118
 —, circumnutation of stem, 204
 —, effect of exposure at night, 295
 —, cotyledons not rising at night, 118, 309
 —, circumnutation and nyctitropic movements of terminal leaflets, 351, 352
 — *strictum*, movements of cotyledons at night, 116, 118
 —, nocturnal and diurnal movements of cotyledons, 309-311, 313
 —, movement of the left-hand cotyledon, 316
 — *subterraneum*, movement of flower-heads, 71
 —, of cotyledons at night, 116, 118, 309
 —, circumnutation of flower-stem, 224, 225
 —, circumnutation and nyctitropic movements of leaves, 350
 —, number of ellipses in 24 hours, 405
 —, burying its flower-heads, 513, 514
 —, downward movement of peduncle, 515
 —, circumnutating movement of peduncle, 516
Trigonella Cretica, sleep of leaves, 345
Triticum repens, underground shoots of, become apogeotropic, 189

Cambridge University Press

978-1-108-00360-5 - The Power of Movement in Plants

Charles Darwin

Index

[More information](#)

INDEX.

591

TRITICUM.

- Triticum vulgare*, sensitiveness of tips of radicle to moist air, 184
Tropaeolum majus (?), sensitiveness of apex of radicle to contact, 167
 —, circumnutation of stem, 204
 —, influence of illumination on nyctitropic movements, 333-340, 344
 —, heliotropic movement and circumnutation of epicotyl of a young seedling, 428, 429
 —, of an old internode towards a lateral light, 430
 —, stems of very young plants highly heliotropic, of old plants slightly apheliotropic, 453
 —, effect of lateral light, 484
 — *minus* (?), circumnutation of buried and arched epicotyl, 27

U.

- Ulex*, or gorse, first-formed leaf of, 415
Urtica lagopus, vertical sinking of leaflets at night, 365
 Vaucher, on the burying of the flower-heads of *Trifolium subterraneum*, 513; on the protection of seeds, 517
Verbena melindres (?), circumnutation of stem, 210
 —, apogeotropic movement of stem, 495

V.

- Vicia faba*, circumnutation of radicle, 29, 30
 —, of epicotyl, 31-33
 —, curvature of hypocotyl, 92
 —, sensitiveness of apex of radicle, 132-134
 —, of the tips of secondary radicles, 154
 —, of the primary radicle above the apex, 155-158
 —, various experiments, 135-143
 —, summary of results, 143-151
 —, power of an irritant on, com-

WILSON.

- pared with that of geotropism, 151-154
Vicia faba, circumnutation of leaves, 233-235
 —, circumnutation of terminal leaflet, 235
 —, effect of apogeotropism, 444
 —, effect of amputating the tips of radicles, 523
 —, regeneration of tips, 526
 —, short exposure to geotropic action, 527
 —, effects of amputating the tips obliquely, 528
 —, of cauterising the tips, 529
 —, of grease on the tips, 534
 Vines, Mr., on cell growth, 3
 Vries, De, on turgescence, 2; on epinasty and hyponasty, 6, 267, 268; the protection of hypocotyls during winter, 557; stolons apheliotropic, 108; the nyctitropic movement of leaves, 283; the position of leaves influenced by epinasty, their own weight and apogeotropism, 440; apogeotropism in petioles and midribs, 443; the stolons of strawberries, 454; the joints or pulvini of the Gramineæ, 502

W.

- Watering, effect of, on *Porlieria hygrometrica*, 336-338
 Wells, 'Essay on Dew,' 284, n.
 Wiesner, Prof., on the circumnutation of the hypocotyl, 99, 100; on the hooked tip of climbing stems, 272; observations on the effect of bright sunshine on chlorophyll in leaves, 446; the effects of an intermittent light, 457; on aerial roots, 486; on special adaptations, 490
Wigandia, movement of leaves, 248
 Williamson, Prof., on leaves of *Drosera Capensis*, 414
 Wilson, Mr. A. S., on the movements of Swedish turnip leaves, 230, 298

WINKLER.	ZUKAL.
<p>Winkler on the protection of seedlings, 108 <i>Wistaria Sinensis</i>, leaflets depressed at night, 354 —, circumnutation with lateral light, 452</p>	<p><i>Zea Mays</i>, geotropic movement of radicles, 65 —, sensitiveness of apex of radicle to contact, 177-179 —, secondary radicles, 179 —, heliotropic movements of seedling, 64, 421 —, tips of radicles cauterised, 539 Zukal, on the movements of <i>Spirulina</i>, 259, <i>n.</i></p>
Z.	
<p><i>Zea Mays</i>, circumnutation of cotyledon, 64</p>	

THE END.