

I N D E X

A

- Abutilon avicennae*, 338
Acalypha virginica, 343
Accr dasycarpum, 249, 338; *rubrum*, 334; *saccharinum*, 102
Acerates longifolia, 341
Acervularia, 397, 500; *davidsoni*, 368, 383, 409, 542; beds, 365, 410, 411; *profunda*, 408, 411, 454, 458, 541, 545; beds, 369, 371, 410
Actinoptera decussata, 541
Adair, brickyards at, 322; elevation at, 284; loess at, 316
Adair county, alluvium in, 318; area of timber land, 331; botany of, 327; boulders in, 353; brick industry, 322; changes incident to human occupation, 324; correlation and structure, 297; Cretaceous sandstone, 294; Dakota stage, 294; dip of strata 304; drainage, 281; economic geology, 322; elevations, 283; erosion in, 324; exposures east of the divide, 288; exposures west of divide, 294; exposures of strata in, 284; fault plane in, 301; flowering plants of, 336; forest trees of, 329; geology of, 7, 277; glacial and interglacial deposits, 307; gravels, 319; groves, 332; gumbotil, 308; Iatan limestone, 288; location, 281; loess in, 320; Missouri stage, 288; natural history, 327; paleontology, 321; peat, 319; Pleistocene, 307; Post-Pleistocene deposits, 318; previous geological work, 282; section across, 307; shales, 322; soil, 315; streams, 329; table of formations, 287; thinning of strata, 304; topography, 281; types of flora, 328; well sections, 312
Adder's Tongue, 250
- Aesculus flava*, 335; *glabra*, 338; *hippocastanum*, 249
Afton Junction, gravels near, 4
Aftonian drainage, Clarke county, 115; gravels, 5; stage, Adair county, 307, 309; Cass county, 224; Clarke county, 117; Ringgold county, 52; Taylor county, 85; topography, Clarke county, 114
Age of fault in Cass county, 215
Agelaius phoeniceus phoeniceus, 253
Agrimonia eupatoria, 339; *parviflora*, 339
Agrostis vulgaris, 249
Alaska, glacial breccia in Chaix hills, 434
Albertan drift, 50
Alden, W. C. 117, 223, 347
Aletis farinosa, 249
Alismaceae, 344
Allium canadense, 344; *cernuum*, 249; *tricoccum*, 249
Alopecurus pratensis, 249
Allotropa terminale, 321
Alluvial soil, 242
Alluvium as soil, 58; Cass county, 237; character, 94; origin, 57; Ringgold county, 57; Taylor county, 93
Altitudes, see Elevations
Alveolites goldfussi, 542
Amarantaceae, 342
Amaranthus, 249; *albus*, 249; *retroflexus*, 342
Amaryllidaceae, 344
Ambocelia planoconvexa, 79
Ambrosia artemisiaefolia, 250, 340; *philostachya*, 341; *trifida*, 340
American plum, 335
Ammonia in water, 154
Amorpha canescens, 339; *fruticosa*, 250
Ampelopsis quinquefolia, 250, 338
Amphicarpa monoica, 339
Anacardiaceae, 339

- Analyses of coal in Cass county, 271; from Plowman shaft, 271; limestone from Bertram, 373; Bettendorf, 406; Big Creek, 373; Cedar Rapids, 379; Cedar Valley, 374; Davenport, 406; Earlham, 163; Indian Creek, 373; Lime City, 374; Osceola, 163; Otis, 379; Peru, 163; Rochester, 406; Springville, 373; Vinton, 378; Winterset, 163; shale from Osceola, 164; Winterset, 164
- Analysis of water, Atlantic, 254, 261; average, 157; Cumberland, 264; Marne, 267; Osceola, 158; Stuart, 160, 161
- Anamosa phase in Cedar county, 534; in Linn county, 495
- Anderson, A. O., 163, 164
- Anderson, J. P., 249
- Anemone, 250; *cylindrica* 337; *virginiana*, 250, 337
- Anemonella thalictroides*, 250
- Anita, brick and tile plants, 271; elevation, 183; water supply, 262
- Antrostomus vociferus vociferus*, 253
- Anychia dichotoma*, 342
- Appanoose formation, 120
- Aquilegia canadensis*, 337
- Arabis canadensis*, 337
- Araceae, 344
- Arbor Hill, Adair county, outcrop at, 290
- Archaeocidaris*, 129
- Archilochus colubris*, 253
- Arctium lappa*, 341
- Arey, Melvin F., 371; geology of Ringgold county, 33; of Taylor county, 65
- Arisema triphyllum*, 250, 344
- Arrowhead, 252
- Asarum canadense*, 250
- Asclepias cornuta*, 341; *incarnata*, 341; *purpurascens*, 250; *syriaca*, 250; *tuberosa*, 341; *verticillata*, 341
- Ash, 102
- Ashley, M. F., 153
- Asparagus officinalis*, 344
- Aster, 250; *laevis*, 340; *multiflorus*, 340; *sagittifolius*, 250
- Astragalinus tristis tristis*, 253
- Astragalus caryocarpus*, 250, 339; *cooperi*, 339
- Astreospongia hamiltonensis*, 542
- Aquilegia canadensis*, 250
- Athelstan, altitude of, 73
- Athyris fultonensis*, 409, 461, 542; beds, 410, 411; *subtilis*, 95, 288, 290, 321
- Atlantic, analysis of water, 254, 261; brick and tile plants, 270; coal, 269; elevation, 183; loess, 235; Nebraskan drift, 223; precipitation, 245; prospect hole, 256; sand, 232; water supply, 260
- Atlantic Building Supply Company, 273
- Atlantic Coal and Mining Company, 256
- Atrypa*, 397, 435; *aspera* var. *occidentalis*, 394, 408, 410, 458, 460, 461, 470, 486, 524, 526, 531, 540; *hystrix*, 542; *reticularis*, 393, 394, 408, 409, 410, 458, 460, 461, 470, 475, 476, 486, 501, 519, 524, 526, 531, 540, 541
- Aungst quarry, breccia at, 490
- Aviculopecten neglectus*, 322; *occidentalis*, 290

B

- Bailey, Bert H., 9, 249
- Bain, H. Foster, 38, 47, 90, 91, 110, 119, 120, 127, 129, 131, 132, 133, 136, 147, 153, 178, 199, 215, 229, 300, 303
- Bajada breccia, 361, 436
- Baker, Ed, well of, 313
- Baltimore Oriole, 253
- Bank Swallow, 254
- Baptisia leucantha*, 339; *leucophea*, 339; *tinctoria*, 250
- Barn Swallow, 254
- Barren beds in Benton county, 486; in Buchanan county, 367
- Barris, Rev. W. H., 363, 366, 541
- Basswood, 102, 252, 335
- Beach subaqueous breccia, 362, 436
- Beaconsfield, altitude of, 43
- Bealer quarry, analysis of rock, 374; strata, 535
- Bean, John, coal mine, 97
- Bedford, altitude, 73; brick yards, 96; quarries, 95; outcrops, 78; well, 80, 98

- Beede, Lon, well, 60
Beggar's Lice, 250
Belamcantha chinensis, 250
Bellerophon pelops, 542
Bengtson, 185
Benton, altitude of, 43
Benton county, Davenport beds, 404; fossil fauna, 410, 486; Independence beds, 388, 401; sections of Wapsipinicon, 478; strata, 368; Upper Davenport beds, 407
Berberidaceae, 337
Berberis vulgaris, 337
Bergamot, 251
Bertram beds, 365, 371; age, 372; analysis, 373; character, 372
Bertram breccia, 413; in Linn county, 494
Bessey, Charles E., 249
Bethany Falls limestone, 120; eastern margin, 129; Clarke county, 125; Ringgold county, 48
Bettendorf, analysis of rock, 406; breccias, 444, 545; Lower Davenport beds, 404, 426
Beyer, S. W., 6, 110
Bidens frondosa, 341
Bindweed, 250
Birdfoot Violet, 253
Birds of Cass county, 253
Bittersweet, 250
Black Cherry, 102, 252; Haw, 253, 336; Oak, 334; Raspberry, 252; Snakeroot, 252; Walnut, 102, 251
Blackberry Lily, 250
Black-billed cuckoo, 253
Blackeyed Susan, 252
Bladder Nut, 252
Blockton, altitude of, 43, 73; brick yards at, 96
Bloodroot, 252
Blue Cohosh, 250; Grass, 251; pasture in, 325; Jay, 253; silt, Taylor county, 91, 102, 103; Violet, 253
Bluebird, 254
Bluff deposits of White, 177
Bob-white, 253
Bogs, preglacial, in Cass county, 219
Boneset, 251
Bonsteel, Jay A., 241
Boot, David H., 249
Borraginaceae, 342
Box Elder, 251, 334
Bowers, Al, well of, 296
Bowlders, Cass county, 228; Iowan drift; 347; Kansan drift, southern Iowa, 345; Ringgold county, 59; Taylor county, 95
Bradyville limestone, Cass county, 187; Taylor county, 98
Brandon, Independence beds near, 388
Brassica, 250; *nigra*, 337; *sinapistrum*, 337
Breccia, Wapsipinicon, area, 359; Aungst quarries, 490; Benton county, 368, 478; Bettendorf, 545; Bremer county, 369, 469; Buchanan county, 366, 473; causes, 359; Cedar county, 363, 532; Cedar river, 471, 499; character, 412; classification, 360; Crane creek, 454; Crooked creek, 538; Davenport, 544; Degn's quarry, 489; Devil's Den, 546; Duck creek, 546; Elmira, 531; Fayette, 364, 458; Fayette county, 368, 453; horizon, 362; Independence, 473; Indian creek, 526; Janesville, 472; Johnson county, 366, 530; Kearn's quarry, 489; Kenwood, 526; Linn, 499; Linn county, 494; location, 359; Meumann quarry, 544; Muscatine county, 367, 547; Quarter Section Run, 470; Quasqueton, 475; Rochester, 539; Rock creek, 534; Schmidt quarry, 544; Scott county, 367, 540; significance of fossils in, 434; Solon, 530; study, 359; Troy Mills, 496; Vinton, 486; West Union, 456; Westfield Bridge, 458; Wolf's Den, 498
Breccias of Iowa, Wapsipinicon, 355
Brecciated limestones, 7, 364; zones of Wapsipinicon beds, 412
Brecciation, date of, 442; major cause and conditions of, 436; minor, 442; minor, cause, 449
Bremer county, Independence beds, 401; sections of Wapsipinicon, 469; strata, 369, 371; Westfield beds, 377

INDEX

- Brick plants, Adair county, 322; Anita, 271; Atlantic, 270; Cass county, 273; Clarke county, 166; Lewis, 271; Ringgold county, 59
- Bridgewater, brickyard, 323; coal, 300; elevation, 384; wells, 294
- Briscoe, coal, 301; elevation, 182
- Briscoe mine, Adams county, 195, 211
- Broadhead, G. C., 120, 185, 301
- Bronzed Grackle, 253
- Brown, Louis A., well of, 154
- Brown Thrasher, 254
- Brunella vulgaris*, 342
- Bryozoa*, 48, 128
- Buchanan, Robert E., 249
- Buchanan county, fossil fauna, 408, 410; Independence beds, 388, 401; sections of Wapsipinicon, 473; *Spirifer pannatus* beds, 431; strata, 366
- Buckeye, 249, 355
- Bull Thistle, 250
- Bundy, Walter, well of, 154
- Bur Oak, 252, 334
- Burlington limestone, 178
- Buteo borealis*, 253; *lineatus lineatus*, 253
- Butorides virescens virescens*, 253
- Buttercup, 252
- Butternut, 102
- Buttonbush, 250
- C**
- Cacalia tuberosa*, 341
- Calceocrinus barrisi*, 541
- Calcilutite, 370
- Calhoun shale, Taylor county, 80
- Calvin, Samuel, 62, 69, 78, 79, 84, 90, 91, 102, 103, 178, 283, 363, 364, 366, 368, 387, 391, 397, 399, 408, 434, 473, 530, 531
- Campanula americana*, 341
- Campanulaceae, 341
- Campbell, John, coal mine, 98
- Cannabis sativa*, 343
- Capparidaceae, 338
- Caprifoliaceae, 340
- Capsella bursa-pastoris*, 250, 337
- Capulus echinatus*, 541; *erectum*, 541
- Carboniferous strata, Adair county, 288; Ringgold county, 47; see also Pennsylvanian
- Cardamine hirsuta*, 337
- Cardinal, 254
- Carman, J. Ernest, 218, 237
- Carpenter quarry, Clarke county, 162; analyses of stone from, 163
- Carter quarry, Clarke county, 162
- Carya alba*, 335, 343; *amara*, 343; *glabra*, 335; *ovata*, 102
- Caryophylaceae*, 338
- Casey, brickyards, 322; elevation, 284
- Casey, P. A., 254
- Cass, C. H., brickyard of, 323
- Cass county, Aftonian stage, 224; alluvium, 237; analyses of coal, 271; area, 175; birds, 253; boulders, 228; Carboniferous system, 191; Cenozoic group, 218, 221; clay, 273; coal, 268; Cretaceous system, 203; crops, 243; Dakota stage, 203; deep wells, 256; economic geology of, 240; elevations of, 182; fault in, 209, 215; fauna, 247; flora, 247; geology, 6, 171; gradients of streams, 183; historical references, 175; joints, 216; Kansan drift, thickness, 229; Kansan stage, 227; Kansan gumboot, 230; land form, 179; limestone, 272; location and area, 175; loess, 233; Mesozoic group, 203; meteorology, 244; Missouri stage, 191; Nebraskan drift, thickness, 224; Nebraskan gumboot, 225; Nebraskan stage, 223; nomenclature, 184; oil, 268; Ozarkian, 218; Paleozoic group, 191; physiography, 179; Pennsylvanian series, 189; plants of, 248; Pleistocene series, 221; Pliocene series, 218; post-Yarmouth stages, 231; precipitation, 245; previous geological work, 176; Quaternary system, 221; relief, preglacial, 221; sand, 275; sandstone, 272; Shawnee formation, 189; soils, 240; springs, 267; strata, correlation, 198; stratigraphy, 184; Tertiary system, 218; Upper Cretaceous series, 203; Yarmouth stage, 229
- Cassia chamaecrista*, 250, 339
- Castilleja coccinea*, 250
- Catalpa speciosa*, 342

- Catbird, 254
Catnip, 251
Cat-tail Flag, 253
Caulophyllum thalictroides, 250
Cavern breccia, 362
Cedar county, Coggon phase, 374; Davenport beds, 404; fossil fauna, 408, 409; Independence beds, 401; Lower Davenport breccia, 424; Otis breccia, 414; sections of Wapsipinicon, 532; strata, 363, 368; Upper Davenport beds, 407
Cedar Creek limestone, 298
Cedar Rapids, analyses of stone, 380; breccias, 444, 494, 509; Cedar Rapids phase, 378; Independence beds, 422, 450, 451; Lower Davenport breccia in, 426; Otis at, 371
Cedar Rapids phase of Otis beds, 378; fossils in, 379
Cedar river, breccia on, 471, 499
Cedar Valley, strata at, 535; analysis of rock from, 374
Cedar Valley limestone, 364, 366, 369; breccias in, 442; relation to Independence shales, 396
Celastraceae, 338
Celastrus scandens, 250, 338
Celtis occidentalis, 250, 335, 343
Cement, Portland, 10, 31, 164
Cenozoic group, Cass county, 221
Central City, beds at, 494
Central Iowa Poultry and Eggs Company, analysis of water of, 254
Cephalanthus occidentalis, 250
Ceryle alcyon, 253
Chaetura pelagica, 253
Chamberlin, T. C., 5
Chenopodiaceae, 342
Chenopodium album, 342
Cherokee formation, 120
Cherryvale shale, 299
Chicago & North Western Railway quarry, Cedar Rapids, 383, 385, 517; analysis of stone from, 380
Chicago, Burlington & Quincy Railway, elevations by, 283
Chicago, Milwaukee & St. Paul Railway, cut of, at Fayette, 460; at Linn, 388, 499
Chicago, Rock Island & Pacific Railway, cut of, at Cedar Rapids, 515; near Vinton, 486
Chickadee, 254
Chickweed, 252
Chinkstone, 415
Chimney Swift, 253
Chipping Sparrow, 254
Choke Cherry, 252, 336
Chondestes grammacus, 253
Chonotes, 49, 123; cf. *C. cancellatus*, 411, 482, 485, 486; *scitula*, 411; beds, 410; *verneuilianus*, 131, 194, 291, 293, 294, 321
Chrysanthemum leucanthemum, 341
Cicuta maculata, 340
Circae lutetina, 340
Circus hudsonius, 253
City Bluff beds, 187
Cladopora iowensis, 458; *palmata*, 542
Clark, H. B., 249
Clarke, John M., 377
Clarke county, Aftonian interglacial stage, 139; area, 109; Bethany Falls limestone, 125; boulders, 166, 353; Carboniferous system, 120; cement, 164; Chanute shale, 131; Cherryvale shale, 131; clay products, 166; coal, 167; creeks, 155; deep well problem, 158; De Kalb limestone, 131; Des Moines stage, 120; dip of strata, 135; drainage, 114; Drum limestone, 131; Earlham limestone, 125; economic geology, 148; elevations, 114; formations, 116; Galesburg shales, 130; geology, 6, 105; Hertha limestone, 122; Kansan gumbotil, 146; Kansan stage, 142; Ladore shale, 125; lime, 164; location and area, 109; loess, 148; Missouri stage, 122; thickness, 136; Nebraskan gumbotil, 138; Nebraskan stage, 137; peat, 168; Pennsylvanian series, 120; physiography of, 11; Pleistocene series, 137; previous geological work, 109; public roads, 165; Quaternary system, 137; recent series, 148; sand, 165; soils, 148; stone, 162; stratigraphy, 116; streets

INDEX

- Clarke county—Continued
 and country roads, 165; topography of, 111; water, 150; Westerville limestone, 132; Winterset limestone, 131; Yarmouth stage, 146
- Clay, Cass county, 273; Ringgold county, 59
- Clay and clay products, 10, 22
- Claytonia virginica*, 250, 338
- Clearfield, altitude of, 43, 73; wells near, 99
- Clematis viorna*, 250; *virginiana*, 250, 337
- Cnicus arvensis*, 341; *lanceolatus*, 250
- Coal, production of, 19; well records with reference to, 270; at Leon, 167; in Cass county, 268; in Iowa, 9; in Taylor county, 97
- Coccyzus americanus americanus*, 253; *erythrophthalmus*, 253
- Coffee, George Nelson, 241
- Coggon, beds at, 495
- Coggon beds, 365, 368; analyses of, 374; fossils in, 374; in Cedar county, 374, 532; in Linn county, 374, 494; in Scott county, 374, 544; of Otis beds, 374
- Colaptes auratus auratus*, 253
- Colinus virginianus virginianus*, 253
- College Springs, boulders at, 350
- Colluvial soil, 242
- Columbine, 250
- Compass Plant, 252
- Composita (Seminula) subtilis*, 129, 131, 290, 291, 321, 322
- Compositae*, 340
- Condra, Geo. E., 185
- Conocardium*, 377; *cuneus*, 541
- Convolvulaceae*, 342
- Convolvulus arvensis*, 250
- Conway, altitude, 73; well of, 312
- Conway Crossing, altitude of, 73
- Coral Berry, 252
- Corals from Silurian, 7
- Cornaceae*, 340
- Corniferous limestone, fossils from, 541
- Cornus paniculata*, 336, 340; *stolonifera*, 250
- Corvus brachyrhynchos brachyrhynchos*, 253
- Corydalis*, 250; *aurea*, 337
- Corydon, well at, 159
- Corylus americana*, 250, 336, 343
- Cottonwood, 252, 335
- Cowbird, 253
- Crab apple, 336
- Crackle breccia, 360
- Cranaena iowensis*, 411, 542; *romingeri*, 411, 542
- Crane creek, breccia on, 454
- Crania crenistriata*, 411; *hamiltoniae*, 411
- Craspedophyllum archiaci*, 542
- Crataegus coccinea*, 250, 336, 338; *tomentosa*, 336, 339
- Cretaceous sandstone, Adair county, 294; Cass county, 178
- Crinoids, 128
- Crinoid from Silurian, 7
- Crooked creek, breccia at, 538
- Crops, Cass county, 243
- Crow, 253
- Crow creek, strata on, 543
- Cruciferae, 337
- Crush breccia, 438
- Crystal Lake, joints, 216; sandstone, 216; section, 204; springs, 267
- Cucurbitaceae*, 340
- Cullum limestone, 298
- Cultivation, effect of, 325
- Culver, J. C., 344
- Cumberland, analysis of water, 264; elevation, 182; precipitation, 246; water supply, 263
- Cunningham, 141, 153
- Cup Plant, 252
- Cupuliferae*, 343
- Cuscuta glomerata*, 342
- Cyancocitta cristata cristata*, 253
- Cypripedium candidum*, 344
- Crytia umbonata*, 411
- Crytina hamiltonensis*, 411, 470, 477, 545; *umbonata*, 409, 545
- Cystiphylum americanum*, 452, 458

D

Dakota sandstone, Adair county, 294; Cass county, 178, 203; formation, 190; sand from, 275; steepness of slope, 208

Dallas county, boulders in, 353

Dallas deposit, 147, 230

Dalmanites erina, 377

Dandelion, 252

Darby, J. W., brickyard, 323

Datura stramonium, 250, 342; *tatula*, 342

Davenport, analysis of rock, 406; breccia, 430, 472, 544; Davenport beds, 404; Devonian, 371; geologists, 363; Lower Davenport breccia, 424, 540; Upper Davenport beds, 404, 540; Upper Helderberg, 353, 366

Davenport Academy of Natural Sciences, 541

Davenport brecciations, 443

Day Brickyard, Fontanelle, 322

Dearborn Chemical Company, analysis by, 160

Decatur county, boulders in, 352

Deep wells in Cass county, 256; Clarke county, 157; Taylor county, 80.

Deer Creek limestone, Adair county, 298, 305; Cass county, 189, 196; Taylor county, 78, 80

Deering, 391

Deign's quarry, analysis of rock, 378; breccia, 489

De Kalb (*Fusulina*) limestone, 299; analysis, 163; Cass county, 185; Clarke county, 119, 131; Ringgold county, 48

Delaware stage in Fayette county, 459

Delphos, altitude of, 43

Delphinium azureum, 337; *exaltatum*, 337; *tricornе*, 250, 337

Dentaria laciniata, 250

Derbyia crassa, 195, 290, 293, 321

Desiccation breccia, 361

Des Moines stage, Clarke county, 116, 121; Taylor county, 83

Desmodium acuminatum, 339; *rigidum*, 339

Devil's Den, breccia at, 546

Devonian breccia, see breccia; system, Taylor county, 83

Diagonal, altitude, 43; brickyards, 59; well at, 61

Dicentra cucullaria, 250, 337

Dickcissel, 254

Dogwood, 336

Douvillina arcuta, 388; *variabilis*, 388

Downy Phlox, 251; Woodpecker, 253

Drainage, Adair county, 281; Cass county, 179; Clarke county, 114; Ringgold county, 44; Taylor county, 73

Drake's creek, Adair county, outcrop on, 289

Drift, Adair county, 307; Cass county, 221; Clarke county, 137; Ringgold county, 49; Taylor county, 83

Drum limestone, 185

Dryobates pubescens medianus, 253

Duck creek, analysis of rock, 406; breccia, 546

Dutchman's Breeches, 250

Dwarf White Trillium, 252

Dysodia chrysanthemoides, 341

E

Eagle Point, Independence beds, 422; Otis breccia, 416, 464

Earlham, analyses of stone, 163

Earlham limestone, Clarke county, 120, 125; see also Bethany Falls limestone

East Fork Grand river, 39, 46

Echinacea angustifolia, 341

Echinocystis lobata, 340

Echinospermum virginicum, 250

Ekblaw, W. E., 369, 411, 542

Elderberry, 252, 336

Elevations, Adair county, 283; Cass county, 182; Clarke county, 114; Ringgold county, 43; Taylor county, 73

Ellis, C. E., 164

Ellis Park quarry, analysis of stone, 379; breccia at, 509

Ellisia nyctelea, 341

Elliston, altitude of, 43

Elmira, breccia at, 531

Encrinurus nereus, 471
 Endolithic breccia, 362, 438
 Endostratic breccia, 360
 English Sparrow, 253
Erigeron strigosus, 340
 Erosion, differential, 330; periods, 190
Eryngium yuccaefolium, 340
Erythronium americanum, 250, 334
Eupatorium ageratoides, 340; *perfoliatum*, 251
Euphorbia corollata, 343; *cyparissias*, 251; *maculata*, 343; *preslia*, 343
Euphorbiaceae, 343
 Eureka shaft, Adair county, 200, 269, 296, 299, 301
 Expansion breccia, 362, 438

F

Falco sparverius sparverius, 253
 False Indigo, 250
 False Solomon's Seal, 252
 Fault, argument for, 211; coal north of, 268; coal south of, 270; in Adair county, 214, 301; in Cass county, 209, 211
 Fault breccia, 362, 438
 Fauna of Cass county, 247
Favosites, 393, 397; *alpenensis*, 410, 542; *favosus*, 460; *hamiltonensis*, 452; *placenta*, 410, 461, 541
 Fayette, breccia, 364, 458; Otis breccia, 416; Upper Davenport breccia, 430; Westfield beds, 377
 Fayette breccia, 365, 366, 368
 Fayette county, breccia at Eagle Point, 464; fossil fauna, 408, 410; Independence beds, 401; Otis breccia, 416; section of Wapsipinicon, 453; strata, 369; Upper Davenport beds, 407
 Felton creek, breccia at, 519
Fenestella, 290, 321
Feniculum, 251
 Field Sparrow, 254
 Fifth Fauna of Wapsipinicon beds, 409
 Figwort, Simpson Honey Plant, 252
 First Fauna of Wapsipinicon beds, 408, 410

Fistulipora constricta, 486; *nodulifera*, 321
 Fitzpatrick, T. J. and M. F. L., 248
 Five-finger, 252
 Fletcher, Mr., 265
 Flicker, 253
 Flora of Cass county, 247
 Flow breccia, 361
 Flowering plants of Adair county, 336
 Floyd county, boulders in, 349
 Fogel, Estelle D., 249
 Fold breccia, 362, 438
 Fontanelle, brickyards, 322; elevation, 284; wells near, 296
 Forbes limestone, 78, 187, 189, 196, 298
 Fort Des Moines, 282
 Foster, J. R., coal mine, 97
 Fossils from Benton county, 486; in breccias, significance of, 434; in Cedar Rapids phase, 379; in Coggon phase, 374; in Scott county, 541; of Wapsipinicon beds, 407
 Founder breccia, 362, 438
 Four-o'clock, 251
 Fourth Fauna of Wapsipinicon beds, 409
 Fox, "Prof." 283
 Fox quarries, Cass county, 182, 194, 200, 272
 Fracker, S. B., 249
Fragaria vesca, 339; *virginiana*, 251, 339
 Fragmental limestone, 111, 119, 300
Fraxinus americana, 341; *rigidis*, 341
 Frost Grape, 253
 Frosts, Cass county, 247
Fumariaceae, 337
 Funk, well of, 313
Fusulina, 48, 128, 193, 195; *cylindrica*, 95, 293, 321; limestone, 119, 200, 272, 306

G

Galion, springs near, 267; strata near, 206
 Gannett's Dictionary of Altitudes, 73
 Gas, natural, 8, 31
Gentiana alba, 341; *saponaria*, 341
Gentianaceae, 341
 Gentry Platform, 111

- Geological formations, Adair county, 287; Cass county, 184; Clarke county, 116; Ringgold county, 46; Taylor county, 77
Geology of Adair county, 277; Cass county, 171; Clarke county, 105; Ringgold county, 33; Taylor county, 65
Geraniaceae, 338
Geranium, 251; *maculatum*, 251, 338
Germaner, 252
Geum virginianum, 339
Gilbert, G. K., 226
Ginger, 250
Glacial and interglacial deposits, Adair county, 307
Glacial breccia, 361
Gleditschia triacanthos, 335, 339
Glide breccia, 362
Golden-rod, 252
Goldfinch, 253
Gomphoceras, 394, 410, 542
Goniophora sp. 411
Gordon, C. H., 90, 218, 237
Goshen, altitude of, 43
Goura biennis, 340
Gow, James Ellis, 6, 179, 248, 299, 312, 336; geology of Adair county, 277
Gower stage in Cedar county, 534; Johnson county, 530
Grand River, Ringgold county, 38, 45
Gravel, Aftonian, 5; residual, Taylor county, 88; Ringgold county, 59
Graveyard Moss, 251
Gravity, altitude of, 73; brickyards at, 96; wells near, 100
Greenbriar, 252
Greene, F. C., 111, 119, 120, 179, 185, 187, 306
Greenfield, brickyard at, 323; elevation of, 284; wells near, 295, 313
Griswold, coal at, 269; elevation of, 183; sand near, 231; strata near, 205; water supply of, 264
Grosbeak, 254
Grove township, Adair county, elevation of, 284
Gumbo, Cass county, 229; Ringgold county, 53; Taylor county, 89
Gumbotil, definition, 55; Illinoian, 4; Kansan, 4; Adair county, 310; Cass county, 230; Clarke county, 142; Ringgold county, 55; Taylor county, 80, 84; Nebraskan, 3; Adair county, 308; Cass county, 225; Clarke county, 138; elevation of, 226; Ringgold county, 56; Taylor county, 84; origin, 54; soil, 241
Guss, wells near, 100
Gypidula comis, 364, 369, 371, 394, 408, 410, 458, 460, 461, 474, 475, 486, 500, 524, 526, 533, 540, 541, 544; *laeviuscula*, 411, 486
Gypsum in Iowa, 10, 29
Gyroceras, 408, 410, 475, 486, 526; beds, 365, 369, 398, 399, 431, 473; *pratti*, 541.
- H**
- Habenaria leucophea*, 344
Hackberry, 250, 335
Hairy Puccoon, 251
Hall, James, 109, 176, 363
Hall, Robert, well, 60
Halysites catenulatus, 460, 471, 472
Hamilton limestone, 363
Hard Maple, 102
Harrison township, Adair county, elevation of, 284; exposures in, 291
Hawks and Owls, 9, 253
Hawleyville, section near, 79
Haworth, Erasmus, 20
Hawthorn, 336
Hazelnut, 250, 336
Helderberg, see Upper Helderberg, 363
Helianthus annuus, 341; *grosse-seratus*, 341
Helophilum halli, 542
Heliopsis scabra, 341
Hemitrypa tenera, 542
Hendry, J. G., wells, 294
Henry county, boulders in, 352
Henshaw, mine near, 97
Heracleum lanatum, 340
Herpetocrinus, 7
Hertha (Fragmental) limestone, 48, 111, 119, 300, 303; eastern margin of, 124
Hicoria glabra, 251; *ovata*, 251

INDEX

- Hinds, Henry, 110, 111, 119, 167, 185, 187, 196, 202, 215, 306
 Hines, Jesse, 317
 Hixson, A. W., 6
 Hoary Vervain, 253
 Honey Locust, 102, 335
 Honeysuckle, 251
 Hop, 251
 Hopeville, precipitation at, 151; well at, 155
 Hopkinton stage, Bremer county, 469; Linn county, 495
 Horse Chestnut, 249; Gentian, 253
 House Wren, 254
 Howard county, strata in, 368
 Howard limestone, 80, 196
 Hulbert, J. A., 294
 Humeston, well at, 159
Humulus lupulus, 251, 343
Hustedia mormoni, 124
Hydrophyllaceae, 341
Hydrophyllum virginicum, 251, 341
Hypericaceae, 338
Hypericum ascyron, 338
Hypothyridina beds, 410; *cuboides*, 371, 408, 410, 458, 531, 540, 541
Hypothyris intermedia, 371
Hypoxis erecta, 251, 344
- I**
- Iatan limestone 202, 306
Icterus galbula 253; *spurius*, 253
Illecebraceae, 342
 Illinoian gumbotil, 4
 Illinois Central Railway, cut near Coggon, 495
Impatiens pallida, 251
 Inclusions in Independence beds, 401
 Independence, breccia at, 473; Upper Davenport beds, 407
 Independence beds, 370; character of, 388; discovery, 387; distribution, 401; inclusions, 401; breccia, 417, 440; origin, 482; at Linn, 503; in Benton county, 479, 481; Bremer county, 470; Buchanan county, 476; Cedar county, 532, 537; Fayette county, 456; Johnson county, 530; Linn county, 494; Scott county, 543; brecciations, 450; impure limestones, 400; shales, 364, 367; at Independence, 363; stratigraphy, 395; unfossiliferous shales, 400
- Indian creek, breccia at, 526
 Indian Currant, 252; Turnip, 250
 Indianola, gumbotil at, 226
 Indigo, 250; Bunting, 254
 Iowan drift, boulders on, 347
Ipomoea hederacea, 251
Iridaceae, 344
 Iron ore, 11, 32
 Ironweed, 253
 Ironwood, 335
 Island-rock breccia, 361
Isopyrum biternatum, 337
- J**
- Jack in the Pulpit, 250
 Jackson county, Independence beds, 401
 Jackson township, Adair county, elevation, 284
 Janesville, breccia, 472
 Jasper county, boulders, 352
 Jefferson county, boulders, 352
 Jenkins, J. C., 262
 Jerseyan drift, 50
 Jimson weed, 250
 Johnson county, fossil fauna, 410; section of Wapsipinicon in, 530; strata in, 366; Upper Davenport beds, 407
 Joints in Cass county, 216
Juglandaceae, 343
Juglans cinerea, 343; *nigra*, 102, 251, 335, 343
- K**
- Kansan drift, Adair county, 307, 310; Cass county, 227; character, 86; Clarke county, 117; pebbles in, 143, 311; Kansan drift, Ringgold county, 53; Taylor county, 86; soil, 58; Southern Iowa, boulders in, 345
 Kansan gumbotil, 4; Adair county, 310; Cass county, 230; Clarke county, 117; Ringgold county, 55; Taylor county, 89; see gumbotil; plain, Clarke county, 111; stage, age, 87; till, see Kansan drift; topography in Taylor county, 72

INDEX

559

- Kansas City Division, Cass county, 188; Ringgold county, 47
Kanwaka shale, 187
Kay, George F., 54, 62, 64, 80, 84, 85, 90, 91, 92, 93, 95, 103, 111, 117, 119, 147, 179, 308, 345
Keyes, C. R., 47, 90, 110, 119, 120, 185, 187, 196, 200, 210, 215, 218, 237, 269, 283, 296, 299, 301
Kearn's quarry, breccia at, 489
Kellerton, altitude, 43; brickyards, 59; well, 61
Kellogg, Harriett S., 249
Kenwood, breccia at, 526; Independence beds, 371; Lower Davenport breccia, 424
Kew, altitude, 43
Kilduff's quarry, 399
Kingbird, 253
Kingfisher, 253
Kinney, C. N., 261, 264
Knotweed, 251
Knowlton, altitude of, 43
- L**
- Labiateae*, 342
Lacelle, well at, 155
Lactuca canadensis, 251, 341; *scariola*, 341
Ladoga, altitude, 73; swamp near, 76; wells near, 99
Ladora shale, 301
Lake Calvin, 8
Landslide breccia, 361, 436
Lake Sparrow, 253
Larkspur, 250
Lastime, Andrew, 266
Lawrence shale, 297, 306
Lead and zinc, 30
Leather Flower, 250
Le Claire phase in Cedar county, 534; Johnson county, 530
Lecompton limestone, 187, 298
Leek, 249
Lees, James H., 6, 169, 218, 237, 276
Leguminosae, 339
Leighton, M. M., 117, 223, 347
Lenox, altitude of, 73
Lenox, Taylor county, brickyards at, 96
Lenticular structure in Otis beds, 380
Leon, well at, 159
Leonard, A. G., 110
Lepachys pinnata, 341
Lepidium, 251; *virginicum*, 337
Leptacna rhomboidalis, 471
Lespedeza capitata, 339
Leverett, Frank, 237
Lewis, brick and tile plants, 271; elevation, 182; Indian sites, 175; quarries, 272; springs, 267; strata near, 191, 206; water supply, 265
Liatris pychnostachya, 340; *scariosa*, 340
Life zones of Wapsipinicon beds, 407
Lignite, Cass county, 205
Liliaceae, 344
Lilium philadelphicum, 251, 344
Lime City, analysis of rock, 374; strata at, 536
Lime Creek shales, relation to Independence shales, 395
Limestone, Adair county, 322; Cass county, 272; Clarke county, 122; Ringgold county, 48; Taylor county, 78
Linaceac, 338
Linden, 252, 335
Linn, Independence breccia at, 421, 443, 499, 503; Lower Davenport breccia, 443, 506; *Spirifer pennatus* breccia, 509; Upper Davenport breccia, 429, 443, 506
Linn county, Bertram beds, 372, 494; Cedar Rapids phase, 378, 494; Coggon phase, 374, 494; fossil fauna, 408, 410; Independence beds in, 401, 494; Lower Davenport beds in, 494; Otis beds in, 414, 494; Upper Davenport beds in, 407, 494
Linum sulcatum, 338; *usitatissimum*, 338
Lithospermum canescens, 342; *hiratum*, 251
Little Green Heron, 253
Livingston, J. C., 266
Lobelia spicata, 341; *syphilitica*, 341
Lobeliaeae, 341
Locust, Black, 252

- Loess, Adair county, 315, 320; Cass county, 233; Clarke county, 117; Ringgold county, 56; soil, 58, 240; Taylor county, 92
- Loesslike clay, origin, 56; Ringgold county, 57; Taylor county, 91, 93, 103
- Loggerhead Shrike, 254
- Lonicera*, 251; *glaуca*, 340; *parviflora*, 336
- Lonsdale, E. H., 195
- Lophophyllum profundum*, 95
- Lorah, elevation, 183
- Love, J. W., 245
- Lower Coal Measures, 119
- Lower Davenport beds, 365, 366, 368, 369, 370, 424, 440, 443; analyses, 406; character, 404; distribution, 404; breccia at Linn, 506; at Cedar Rapids, 524; Benton county, 478, 485; Bremer county, 470; Buchanan county, 474; Cedar county, 533, 538; Johnson county, 531; Linn county, 494; Muscatine county, 547; Scott county, 542
- Lucas county, bowlders in, 349, 352
- Lupinus perennis*, 339
- Lysimachia ciliata*, 341
- Lythraceae*, 340
- Lythrum alatum*, 340
- M**
- Macbride, T. H., 249
- MacDonald, G. B., 249
- Mackinac Island, breccias on, 396
- Macksburg, Madison county, 283
- Madison county, bowlders in, 353
- Mains quarry, 495
- Major brecciation, cause and conditions, 436; characteristics due to, 412
- Mallow, 251
- Maloy, altitude of, 43
- Malva*, 251; *rotundifolia*, 338
- Malvaceae*, 338
- Mammals, Pleistocene, 8
- Maquoketa shales, 368
- Marbutt, C. F., 111
- Marne, analysis of water, 267; elevation, 183; loess, 234; water supply of, 266
- Marshall county, bowlders, 352
- Marshall silt loam, 149, 241
- Martin, C. L., 274
- Maryland Yellow-throat, 254
- Massena, elevation, 182
- May Apple, 251
- Mayaceae*, 344
- McDonough, C. B., 153
- McGee, W. J., 364, 417, 435, 459, 464
- McKinley mine, 98
- Meadow Foxtail, 249
- Meadow Rue, 252
- Meadowlark, 253
- Medicago sativa*, 339
- Meekella striatocostata*, 131
- Megistocrinus beds, 531; *farnsworthi*, 411; *nodosus*, 541
- Meinzer, O. E., 61, 70, 82
- Melanerpes erythrocephalus*, 253
- Melanthium virginicum*, 344
- Melilotus alba*, 251, 339
- Menispermum canadense*, 251
- Mentha canadensis*, 342
- Meteorology, Cass county, 244
- Meumann quarry, breccia at, 544
- Michael, L. G., 163
- Middle Coal Measures, 119
- Middle river, 285
- Milk Vetch, 250
- Millison mine, 97
- Mineral production in Iowa, 9
- Mineral waters, 30
- Minor brecciations, 442, 449
- Mirabilis*, 251
- Mississippian series, Taylor county, 83
- Missouri Iron Company, 11
- Missouri limestone at Spring creek, joints in, 217
- Missouri stage, 7; Adair county, 288; Cass county, 191; Clarke county, 116; comparative table, 186; Ringgold county, 47; Taylor county, 78
- Molothrus aster aster*, 253
- Monarda fistulosa*, 251, 342
- Monotis (gregaria?)*, 290
- Moonseed, 251

- Morning Glory, 251
Morus rubra, 251
 Mosaic breccia, 360
 Mottled limestones in Otis beds, 384
 Mount Ayr, altitude of, 43; well at, 60
 Mourning Dove, 253
 Mullein, 253
 Murray, Aftonian bogs, 226; elevation, 114; precipitation, 151; well, 154
 Muscatine county, fossil fauna, 408, 410; Lower Davenport breccia, 426; sections of Wapsipinicon, 547; strata, 367; Upper Davenport beds, 407
Myalina subquadrata, 290, 322
 Myers, Lewis, well, 49, 60
Myiochanes virens, 253
- N**
- Nasturtium armoracia*, 337; *officinale*, 337
Naticopsis, 124
 Natural gas, 8, 31
 Nebraskan drift, Adair county, 307; Cass county, 224; Clarke county, 117; Ringgold county, 50; Taylor county, 83; gumbootil, 3; Adair county, 308; Cass county, 225; Clarke county, 138; Ringgold county, 56; Taylor county, 84
Negundo aceroides, 251, 334, 338
Nepeta cataria, 342; *glechoma*, 342
 New Market, altitude, 73; loess, 92; mine, 97; wells near, 100
Newberria johannis, 409, 458, 541, 545; beds, 369, 410, 411
 Niagaran, Bremer county, 469; Cedar county, 532; Fayette county, 459; Johnson county, 530; Linn county, 495
 Nichols, T. E., 260
 Nicholson, Henry, well of, 154
 Nishnabotna sandstone, Cass county, 178
 Nodaway coal, 7; Adair county, 301, 303; Cass county, 187, 270; Taylor county, 80, 98; Adair county, 285; Taylor county, 75
 Noland, W. R., 263
- Norton, W. H., 6, 7, 70, 82, 179, 237, 256, 283, 355, 365, 366, 367, 369, 370, 372, 390, 499
Nucleospira ventricosa, 542
Nucula (*ventricosa?*), 290
Nuculana bellistriata, 290
Nyctaginaceae, 342
- O**
- Oak, 102
Oenothera biennis, 340
 Oil, Cass county, 268; Ringgold county, 61; and gas, 8
Oleaceae, 341
Onagraceae, 340
 One Hundred and Two River, Taylor county, 74
 Onion, 249
Orbignyella monticula, 542
 Orchard Oriole, 253
Orchidaceae, 344
 Oread limestone, Adair county, 297; Cass county, 202
 Orient, elevation, 284
Orthis, 436, 475, 482, 484, 519; *chemungensis*, 486; *impressa*, 393; *iowensis*, 394, 461; *vanuxemi* beds, 410
 Osage shales, 187
 Osborn, Herbert, 248
 Osceola, analyses of shale, 164; brick plant, 138; elevation, 114; quarries, 125, 162; water supply, 155; wells at, 121, 155, 157
Osmorrhiza brevistylis, 340; *longistylis*, 340
Ostrya virginica, 343, 355
 Otis, analysis of stone from, 380; beds, 365, 366, 370; Cedar Rapids phase, 378; character, 373; beds, Coggon phase, 374; composition of lenses, 381; conditions of deposit, 386; lenticular structures, 380; mottled limestones, 384; Vinton phase, 377; Westfield phase, 377; breccia, 414; beds, Benton county, 479, 481; Bremer county, 469; Cedar county, 532, 536; Fayette county, 456; Linn county, 494; Scott county, 543

INDEX

- O'Toole quarry, 399
 Otter creek, Clarke county, 114
Otus asio asio, 253
 Owen, David Dale, 176, 282, 362
Oxalis stricta, 251, 338; *violacea*, 251, 338
Oxybaphus angustifolius, 342; *hir-sutus*, 342
 Ozarkian, Cass county, 218
- P**
- Page county, boulders in, 350
 Painted Cup, 250
 Paleontology of Iowa, 7
 Palmer, E. L., 249
 Pammel, L. H., 248, 249.
Panicum capillare, 251
 Papaveraceae, 337
Paracyclas elliptica, 486, 541
 Paralta, beds at, 495
 Parsnip, 251
 Partridge Pea, 250
Passer domesticus domesticus, 253
Pastinaca sativa, 251
 Patrick, G. E., 271
 Pearce, J. N., 4, 55, 147, 179, 230
 Peat bog, Clarke county, 141
 Pebbles in drift, Cass county, 228
 Pellett, Frank C., 248, 249, 253
 Pennsylvanian series, Adair county, 288; Cass county, 191; Clarke county, 116; Ringgold county, 47; Taylor county, 78; strata, wells in, 60
Pentamerella arata, 411, 486, 541; *dubia*, 409, 411, 458, 477, 541; *micula*, 411, 541
 Peppergrass, 251
 Permian uplift, 189; jointing by, 217
 Perry's quarry, Adair county, 288
 Peru, analyses of stone from, 163
Petulostemon candidus, 339; *violaceus*, 339
Phacops rana, 411, 486, 541
Phillipsastrea billingsi, 367, 408, 500, 531, 541, 544, 545, 547; beds, 365, 368, 410, 411
Phillipsia, 126
Phlox glaberima, 251; *maculatum*, 251; *pilosa*, 251, 341
- Pholidostrophia iowensis*; *nacreia*, 408, 410, 461, 477, 486, 524, 526
 Phoebe, 253
 Phragmoceras beds, 366; *walshi*, 541
Physalis lanceolata, 342
 Pigeon creek, strata on, 543
 Pignut hickory, 102, 251, 335
 Pigweed, 249
Pilca pumila, 343
 Pisgah, Adair county, 282
Plantaginaceae, 342
Plantago major, 251, 342
 Plantain, 251
 Plants of Adair county, 329; Cass county, 248
 Platte river, in Ringgold county, 43; Taylor county, 73
 Platte shale, 187
 Plattsburg limestone, Cass county, 202
 Plattsmouth limestone, Adair county, 297; Cass county, 202
Platystoma lineatum, 541
 Pleasanton division, Clarke county, 116, 120
 Pleistocene mammals, 8
 Pleistocene series, Adair county, 307; average thickness, 222; Cass county, 221; Clarke county, 116; Ringgold county, 49; Taylor county, 83
Pleurotomaria lucina, 542
 Pliocene series, Cass county, 218
 Plowman shaft, analyses of coal, 271
 Plum, 252
Poa pratensis, 251
Podophyllum peltatum, 251
 Poison Ivy, 252
Polemoniaceae, 341
Polygonaceae, 343
Polygonatum biflorum, 251, 344
Polygonum, 251; *aviculare*, 343; *incarnatum*, 343; *orientale*, 343; *persicaria*, 343; *ramosissimum*, 343
Populus canadensis, 335; *deltoides*, 252; *monilifera*, 343
 Port Union, Adair county, fossils, 322; outcrops, 289
 Port Union shale, 322
 Porter, Charles, 195
 Portland cement, 31

Portulaca oleracea, 338
Portulacaceae, 338
 Post-Cretaceous uplift, jointing by, 217
 Post-Yarmouth events, sequence of, 237
Potentilla arguta, 339; *canadensis*, 252, 339; *norvegica*, 339; *paradoxa*, 339
 Pre-Kansan drift, 50
 Precipitation, Atlantic, 245; Cass county, 245; Cumberland, 246
 Preglacial drainage, Clarke county, 115
 Prickly Ash, 253
Primulaceae, 341
Productella spinulicosta, 541; *subalata*, 411, 461, 470, 486, 542
Productus, 48; *cora*, 321; *costatus*, 293, 321; *longispinus*, 293, 321; *nebrascensis*, 194, 288, 292, 321; *prattianus*, 131; *punctatus*, 293, 321
Proctus, 377; *clarus*, 541; *crassimarginatus*, 541; *haldemani*, 411; *prouti*, 541; *rowei*, 541
Prunus americana, 252, 335, 339; *serotina*, 252, 335, 339; *virginiana*, 252, 336, 339
Ptychophyllum, 397
Ptyctodus calceolatus, 461, 541
 Public roads, Clarke county, 165
 Pudding breccia, 360
 Pullen mine, Taylor county, 97
 Purple Martin, 254
Pycnanthemum lanceolatum, 342
Pyrus coronaria, 336, 339

Q

Quarries, Cass county, 272; Clarke county, 162
 Quarter Section Run, breccia on, 470
 Quasqueton, breccia at, 475; Lower Davenport breccia, 424; Upper Davenport beds, 407
 Quaternary system, Adair county, 307; Cass county, 221; Clarke county, 137; Ringgold county, 49; Taylor county, 83
Quercus alba, 102, 334, 343; *coccinea*, 343; var. *tinctoria*, 334; *macrocarpa*, 252, 334, 343; *rubra*, 252, 334, 343
Quisqualis quiscula aeneus, 253

R

Raft breccia, 361, 436
 Ragweed, 250
Ranunculaceae, 337
Ranunculus abortivus, 252, 337; *acris*, 337; *fascicularis*, 252
Raphanus sativus, 337
 Recent series, Clarke county, 116; Ringgold county, 57; Taylor county, 93
 Red clover, 252; Elm, 333; Haw, 336; Maple, 334; Mulberry, 251; Oak, 252, 334; Osier Dogwood, 250; -headed Woodpecker, 253; -shouldered Hawk, 253; -winged Blackbird, 253
 Redding, altitude, 43; brickyards, 59
 Redstart, 254
 Redtop, 249
 Reed, F. H., 350
 Reef subaqueous breccia, 361, 436
 Reno, strata near, 207
 Reservoirs, water supply from, 156
 Residual breccia, 361, 436
Reticularia fimbriata, 411, 541; *subundifera*, 411, 541
Rhipidomella pecosi, 49
Rhombopora, 48; *lepidodendroides*, 290, 293, 321
Rhus glabra, 252, 336, 339; *toxicodendron*, 252, 339
Rhynchosella ambigua, 388
Ribes, 252; *gracile*, 340
 Ringgold county, Aftonian interglacial stage, 52; alluvium, 57; altitudes, 43; area, 37; boulders, 59; clays, 59; drainage, 44; economic products and problems, 58; forestry, 62; geological formations, 47; geology, 33; gravel, 59; gumbotil, 53; Kansan stage, 53; Kansas City division, 47; location, 37; loess, 56; Missouri stage, 47; Nebraskan stage, 50; oil, 61; Pennsylvanian series, 47; physiography, 38; Pleistocene series, 49; Quaternary system, 49; recent series, 57; rock outcrops, 48; sand, 59; soils, 58; stratigraphy, 46; topography, 38; water supply, 60; wells, 60

- Robertson quarry, analyses of stone, 163
 Robin, 254
Robinia pseudacacia, 252
 Rochester, breccia at, 539; Lower Davenport beds, 404, 424; strata at, 537
 Rock creek, breccia, 534, 535
 Rock Elm, 333
 Rock glacier, 361
 Rock Island, breccia on, 542; Davenport beds, 404; Lower Davenport breccia, 424; strata, 366; county, strata, 369
 Rodents of Iowa, 9
Rosa arkansana, 339; *setigera*, 252
 Rosaceae, 339
 Rose, 252
 Rubble breccia, 360, 436
Rubus occidentalis, 252; *villosus*, 339
 Ruby-throated Hummingbird, 253
Rudbeckia hirta, 252; *subtomentosa*, 341
 Rue Anemone, 250
Rumex, 252; *crispus*, 343; *verticillatus*, 343
 Run-off and evaporation, relation to precipitation, 153
 Rust Artesian Well Co., prospect hole of, 256
 Rutaceae, 338
 Ruthven, A. G., 249
- S**
- Sagittaria variabilis*, 252, 344
 Saint Peter sandstone in southern Iowa, 161
 Salicaceae, 343
Salicifolius, 250
Salix, 252; *alba*, 343; *amygdalooides*, 343; *cordata*, 343; *nigra*, 336, 343
Sambucus canadensis, 252, 336, 340
Sanguinaria canadensis, 252, 337
 Sand, Cass county, 275; Ringgold county, 59; and gravel, 27; beneath loess, Cass county, 232; beneath river beds, Cass county, 231
 Sandstone, Cass county, 272
Sanicula marilandica, 252
 Sapindaceae, 338
 Savage, T. E., 248, 368, 369, 394, 459, 464, 478, 485
 Sawash, Clifton, 155
Saxifragaceae, 340
Sayornis phoebe, 253
 Scarlet Haw, 250; Tanager, 254
Schizoporia iowensis, 408-410, 470, 486, 524, 526, 531, 541; *macfarlanei*, 369, 408, 410, 470, 474, 524, 526, 531, 541
 Schmidt quarry, breccia at, 544
 Schoewe, W. H., 6, 7, 8
 Schull well, 141, 155
 Scott, D. H., 264
 Scott county, Coggon phase, 374; fossil fauna, 408, 410, 541; Independence beds, 401; Lower Davenport breccia, 426; Upper Davenport beds, 406; Wapsipinicon sections, 367, 540
 Scranton shale, 187
 Screech Owl, 253
Scrophularia marylandica, 252
Scrophulariaceae, 342
 Scrub Oak, 334
Scutellaria lateriflora, 342
 Seaver, Fred J., 249
 Second Fauna of Wapsipinicon beds, 408, 410
 Sections west of divide, Adair county, 294
 Seers, F. H., well of, 296, 313
Seminula subtilita, 123, 124
Scnecio aureus, 341
 Severy shale, Cass county, 187; Taylor county, 80, 98
 Shale, analyses, 164
 Shannon City, altitude, 43
 Sharpsburg, altitude, 73
 Shawnee division, Cass county, 187; Taylor county, 98
 Shell-bark Hickory, 102, 251, 335
 Shepherd's Purse, 250
 Shimek, B., 6, 50, 90, 153, 223, 234, 249
 Shoal breccia, 361, 436
 Short quarry, Clarke county, 162
 Siegel brick and tile works, 138, 166
Silene nocturna, 338; *stellata*, 252, 338
Silphium integrifolium, 340; *lacinatum*, 252, 340; *perfoliatum*, 252, 340
 Silts of Tertiary period, 218

- Silurian system, Cedar county, 532; Johnson county, 530; Taylor county, 83
- Simpson, H. E., 155, 179, 256, 283, 286
- Simpson Honey Plant, 252
- Sisymbrium officinale*, 337
- Sisyrinchium angustifolium*, 344
- Sium cicutaefolium*, 340
- Slate-colored Juncos, 254
- Slippery Elm, 253
- Slough grass, value of, 324
- Smilacina racemosa*, 252, 344
- Smilax, 252; *ecirrhata*, 252; *rotundifolia*, 252
- Smooth Sumac, 252
- Smith, George L., 120, 178, 185, 187, 195, 199, 200, 210, 211, 214, 269, 300, 301, 303
- Snouffer's quarry, beds in, 384, 513
- Soft Maple, 249, 334
- Soil, origin of, 149
- Solanaceae*, 342
- Solanum carolinense*, 342; *nigrum*, 342; *rostratum*, 342
- Solidago*, 252; *lanceolata*, 340; *missouriensis*, 340; *rigida*, 340; *speciosa* var. *angusta*, 340
- Solomon's Seal, 251
- Solon, breccia at, 530
- Somes, M. P., 249
- Sonchus asper*, 341
- Song Sparrow, 254
- Sorrel, 252
- Southern Iowa loess, 149
- Sparrow Hawk, 253
- Spiderwort, 252
- Spiranthes gracilis*, 344
- Spirifer asper*, 409, 411, 486, 541; *bimesialis*, 408, 524, 541; beds, 410; *cameratus*, 126, 129, 131, 288, 290, 293, 321; *euryteines*, 409, 542; *parryanus*, 395; beds, 409, 410, 411, see also *S. euryteines*; *pennatus*, 364, 368, 369, 394, 397, 408, 409, 411, 458, 460, 461, 470, 475, 476, 477, 486, 500, 509, 524, 531, 540, 545; beds, 365, 367, 370, 371, 394, 410, 413, 422, 430, 435, 436, 437, 442, 473, 509; brecciation, 431; *subumbonus*, 374, 379, 382, 496, 499, 519, 529, 530, 532, 535; *subvaricosus*, 409, 411, 542
- Spiriferina kentuckiensis*, 95; *lineata*, 95
- Spoon, W. L., 165
- Spring Beauty, 250
- Springs, Cass county, 267; Taylor county, 100
- Squaw creek, Clarke county, 114
- Stacey, E., well of, 295, 314
- Stachys palustris*, 342
- Stainbrook, Merrill A., 388
- Staphylea trifolia*, 252
- Star Grass, 249, 251
- Starry Campion, 252
- State Line, altitude, 73
- Steiger, George, 163
- Steironema ciliatum*, 341
- Stellaria media*, 252
- Stennett, Montgomery county, 196, 200; limestone, 189
- Stereocrinus triangulatus*, 541
- Stevenson, W. H., 241
- Stone and lime, 23
- Stoner, Dayton, 9, 249
- Straparollus*, 195; *lativolvus*, 541
- Stratigraphy of Independence shales, 395
- Strawberry, 251
- Streptelasma simplex*, 542
- Stromatopora expansa*, 541
- Stropheodonta demissa*, 394, 408, 410, 461, 477, 485, 486, 526; var. *plicata*, 410, 540; *perplana*, 411, 545; *quadra*, 388
- Stuart, analysis of water, 159, 160; elevation, 284; strata, 298; well, 159
- Sturnella magna magna*, 253
- Sub-Aftonian drift, 50
- Subaqueous breccias, 361, 436
- Sugar creek; strata at, 536
- Summerset township, Adair county, elevation, 284
- Swallow, G. C., 109
- Swamp Maple, 334
- Sweet Clover, 251; William, 251
- Switzer well, 124
- Symphoricarpuus vulgare*, 252
- T
- Tabular divides, Ringgold county, 41
- Talus breccia, 361, 436
- Talus reef breccia, 361

INDEX

- Tanacetum vulgare*, 341
Taraxacum officinale, 252, 341
 Taylor, C. E., 273
 Taylor, G. F., 160
 Taylor county, Aftonian stage, 85; alluvium, 93; altitudes, 73; area, 69; Bedford well, 98; boulders, 95; building stones, 95; Carboniferous system, 78; clay products, 96; coal and coal mines, 97; drainage, 73; economic products, 95; forests and forestry, 100; geological formations, 77; geology, 65; Kansan gumbootil, 89; Kansan stage, 86; loess, 92; Missouri stage, 78; Nebraskan gumbootil, 84; Nebraskan stage, 83; Pennsylvanian series, 78; physiography, 70; previous geological work, 69; recent series, 93; road and road materials, 96; situation, 69; soils, 94; springs, 100; stratigraphy, 76; topography, 70; water and water supplies, 98
 Tectonic breccia, 362, 438
 Temple, W. N., 155, 158
Tentaculites hoyti, 411
Tephrosia virginiana, 339
 Terraces, Cass county, 237
Teucrium canadense, 252
Thalictrum, 252; *purpurascens*, 337
Thaspium barbinode, 340
 Thayer, gravels near, 4
 Third Fauna of Wapsipinicon beds, 408, 411
 Thomas, A. O., 6, 7, 388, 395
 Thompson's Fork, Ringgold county, 38, 46; Nebraskan on, 52; rock on, 48
 Thurman, Fremont county, fault at, 209
 Thurman-Wilson fault, 7
 Tiffany, A. S., 364, 370, 541
Tilia americana; 102, 252, 335, 338
Tiliaceae, 338
 Tilton, Besse S., 248, 249, 253
 Tilton, John L., 6, 47, 80, 105, 120, 127, 131, 132, 136, 147, 158, 216, 218, 229, 238, 278, 288, 297, 299, 301, 307; Geology of Cass county, 171; Geology of Clarke county, 105
 Timber cutting, effect of, 325; Ringgold county, 63
 Tingley, altitude, 43
 Todd, J. E., 209, 210, 214, 301
 Tohee, 254
 Toothwort, 250
 Topeka limestone, Taylor county, 80
 Touch-me-not, 251
Tradescantia virginica, 252, 344
 Tree planting in Taylor county, 101
Trifolium agrarium, 252; *hybridum*, 338; *pratense*, 252, 339; *repens*, 252, 339
Trillium nivale, 252, 344
Triosteum perfoliatum, 253
 Troy Mills, breccia at, 364, 444, 496
 Tuff breccia, 361
 Tumble Grass, 251
 Tumbleweed, 249
Typha latifolia, 253, 344
Typhaceae, 344
Tyrannus tyrannus, 253

U

- Udden, J. A., 90, 237, 366, 367, 547
Ulmus americana, 102, 253, 333, 343; *fulva*, 253, 333; *pubescens*, 343; *racemosa*, 333, 343
Umbelliferae, 340
 Union county, boulders, 351, 353
 Union township, Adair county, elevation, 284
 Upper Coal Measures, 119
 Upper Davenport beds, 365, 370; character, 406; distribution, 406; Fayette county, 369; fossils, 410, 485, 541; Howard county, 368; breccia, 429, 442, 446; Benton county, 478, 484; Buchanan county, 474; Cedar Rapids, 524; Cedar county, 539; Linn, 506; Linn county, 494; Muscatine county, 547; Scott county, 541
 Upper Helderberg limestone, 363; Davenport, 366
Urtica gracilis, 343
Urticaceae, 343
Uvularia grandiflora, 344

V

Valleys of Tertiary period, 218
 Van Hyning, T., 249
 Van Tuyl, F. M., 6
Verbascum thapsus, 253, 342
Verbena bracteosa, 342; *stricta*, 253, 342; *urticaefolia*, 253, 342
Verbenaceae, 342
Vernonia, 253; *fasciculata*, 340
Veronica virginica, 342
Viburnum prunifolium, 253
 Vinton, analysis of rock, 378; breccia, 486; fossils, 485; Independence breccia, 421; Otis breccia at, 415; strata, 371; Upper Davenport breccia, 429; beds, 377
 Vinton phase of Otis beds, 377; analysis, 377
Viola blanda, 338; *canadensis*, 253; *cucullata*, 338; *pedata*, 253, 338; *pubescens*, 253, 338
Violaceae, 338
 Virginia Creeper, 250
 Virgin's Bower, 250
Vitaceae, 338
Vitis aestivalis, 336; *cordifolia*, 253; *riparia*, 338
 Volcanic subaqueous breccia, 361

W

Wake Robin, 252
 Walnut, 335
 Wapello county, bowlders in, 352
 Wapsipinicon breccia, character, 372, 412; in Iowa, 355; see breccia, 360; stage, 7, 365, 366, 369; brecciated zones, 412; divisions, 370; fauna, 369, 407; section of, Bremer county, 469, 478; Buchanan county, 473; Cedar county, 532; Fayette county, 453; Johnson county, 530; Linn county, 494; Muscatine county, 547; Scott county, 540; thickness, 370
 Warren county, bowlders, 352
 Warrensburg Platform, 111
 Washington township, Adair county, elevation, 284

Water, analyses, 157, 158, 160, 161, 261, 264, 267; significance, 261
 Water for farm use, 254; for municipal use, 259
 Waterleaf, 251
 Waterloo, strata at, 371
 Waverly, strata at, 371; Westfield beds at, 377
 Weather and Crop Service, 150
 Weems, J. B., 163
 Weldon, elevation of, 114
 Well records, Adair county, 312; Cass county, 219, 223; with reference to coal, 270
 Wells, Lloyd, 249
 Wells, Cass county, analysis of water, 254; Ringgold county, 60
 West Fork Grand river, Ringgold county, 46
 West Union, Otis breccia, 416, 456
 Westerville limestone, Clarke county, 119; Ringgold county, 48
 Westfield Bridge, breccia at, 458; phase of Otis beds, 377, 416
 Whip-poor-will, 253
 White, Charles A., 69, 109, 119, 120, 177, 193, 283, 289, 363
 White Breast creek, Clarke county, 113, 114; -breasted Nuthatch, 254; Clover, 252; Elm, 102, 253, 333; -eyed Vireo, 254; Maple, 102; Oak, 102, 334; Thorn, 336; Vervain, 253
 Whitney, James D., 176
 Whitney, T. H., 245, 248
 Wickham, H. F., 248
 Wilcox, Nathan, coal mine, 98
 Wild Cherry, 335; Gooseberry, 252; Grape, 336; Lettuce, 251
 Williams, A. J., 6
 Williams, I. A., 110
 Williamson, John, well of, 154
 Willow, 252, 336; Aster, 250
 Wilson, J. M., well of, 312
 Winterset, analyses of shale from, 164; of stone, 163; limestone, Clarke county, 119; Ringgold county, 48
 Wiota, elevation, 183
 Wisconsin ice, drainage from, 238

INDEX

Witham, W. W., well of, 295, 314
Wolf's Den, breccia at, 498
Wood, W. M., 121
Wood, Aftonian, 85; Lily, 251; Pewee,
253; Sage, 252; Thrush, 254
Woodbine, 250
Woodbine, Clarke county, well, 121
Woodburn, elevation, 114; precipita-
tion, 152; well, 155
Woodsorrel, 251

X
Xanthoxylum americanum, 253, 338
Xanthium canadense, 341
Y
Yellow-billed Cuckoo, 253
Yellow Clover, 252; Violet, 253;
Warbler, 254
Z
Zenaidura macroura carolinensis, 253
Zizia aurea, 340