INDEX

A

Acrothele ? richmondensis, 383, 384, 392
Alexandrian series, 411; relation to Maquoketa, 318, 349, 354
Allamakee county, exposures in, 334, 336; fossils from, 403, 420; Galena-Maquoketa contact in, 382; structure of Maquoketa in, 360
Amphilichas bicornis, 395
Anaphragma mirabile, 369, 392
Anolotichia crassa, 391
Anticosti, connection with Mississippi valley, 325; Maquoketa fossils from, 409
Aparchites fimbriatus, 395
Appalachian region, Clinton ore of, 356
Archimacella rotunda, 394
Arctic regions, Maquoketa fossils from, 327, 409; seas from, 326
Arkansas, Cason shale in, 311, 407; Depauperate fauna in, 311; Maquoketa beds in, 407
Armenoceras, 409; **clermontense**, 394
Arnheim beds of Ohio valley, 310; relations, 368-370
Arthropora shafferi, 384, 392
Astylospongia, 391
Atactoporella, 391
Auburn, limestone at, 350, 352

B

Bain, H. F., cited, 341, 342, 346, 374, 383, 412
Bassler, R. S., acknowledgments, 313; cited, 368, 412, 416
Barren middle beds of Maquoketa, 343
Barrier, near Mississippi valley, 311, 410
Basal conglomerate of Alexandrian, 411; of Devonian, 358, 411; of Niagaran, 354
Batostoma, 392; **rugosum**, 392
Bellerophon, 383; **lirata**, 383, 384, 394; **patersoni**, 366, 383, 384
Bellevue, exposures near, 339, 341, 350, 379; graptolites at, 386
Beloitoceras discrepans, 394; **whitneyi**, 384, 394
Beyer, S. W., cited, 412
Beyrichia parallela, 370, 395
Big Bay de Noquette, strata on, 322, 362
Big Horn dolomite, position, 326
Bill's creek, Michigan, strata on, 324, 362, 367
Bill's Creek beds, Michigan, age, 364, 367
Black River strata in Michigan, 364, 365; of Minnesota, 374
Blanchester formation of Ohio, 327
Blue Limestone and Marls of Ohio, age, 320
"Blue Shale", position, 321
Boscobel, Wis., Dubuque beds near, 345
Bradley, Frank H., cited, 412; study of Maquoketa shale, 323
Bradley, John H., Jr., cited, 381, 412
Brainard, exposures near, 329, 337
Brainard shales, 309; character, 329, 332; exposures, 337, 359; fossils from, 391; relations, 368, 369; selenite crystals from, 337; illustr., 436
Branson, E. B., cited, 412
Brassfield formation of Ohio, 350
Bumastus, 386
Burchard, E. F., cited, 342, 383, 413
Burroughs dolomite, age, 351
Byssonchia, 394; **tenuistriata**, 394
Bythocypris, 384, 395
Bythopora delicatula, 392; **meeki**, 392; **striata**, 392

C

Calloporella ? lens, 392
Calvin, Samuel, cited, 312, 341, 342, 346, 351, 374, 383, 387, 412; study of Maquoketa shale, 321, 329, 332
Calymene, 385; **fayettensis**, 395; **gracilis**, 395; **mammillata**, 384, 395
Canada, studies of Maquoketa in, 312
Cape Frazier, fossils from, 310, 397
Carabocrinus, 327; **slocomi**, 391; **slocomi costatus**, 391
Carman, J. E., cited, 412
Cascade Gulch, exposure in, 335-337
Cason shale of Arkansas, 311, 407
Cephalopods in Vogdesia beds, 387
Ceramoporella irregularis, 391
Ceraurus elginensis, 395
Chamberlin, T. C., cited, 356, 412
Charactoceras, 409; **baeri**, 394; **clermontense**, 394; **laddi**, 340, 394
Chasmatopora, 392
Chicago Great Western R. R., cuts by, at Graf, 341

"Cincinnati Group", position, 322, 323; in Illinois, 323, 324
Cincinnatian faunas, 407
Clarke, John M., cited, 412
Clathrospira, 384
Clayton county, Depauperate zone in, 376, 377; exposures in, 333, 343; structure of beds in, 360
Clement, Mo., exposure at, 344
Clermont, exposures near, 329, 387, 388; shale pit at, 322, 336, 337
Clermont shales, 309; character, 329, 333, 371; deposition of, 410; exposures, 336; fauna, 388, 391
Clidophorus, 363; **faberi**, 369; **fabula**, 369; **neglectus**, 384, 393; **planulatus**, 373
"Cliff limestone" in Maquoketa area, 320
Climacograptus (Mesograptus) putillus, 391; **ulrichi**, 391
Clinton county, exposures in, 344; inlier in, 318, 328
Clinton ore of Appalachian region, 356
Coleolus, 366; **iowensis**, 343, 347, 369, 383, 384, 394
Colorado, Fremont limestone in, 326; Richmond fossils in, 409
"Cone-in-cone" structure, 381
Conocardium, 384, 394
Conotreta obliqua, 347, 384, 392
Constellaria polystomella, 392; **punctata**, 392; **robusta**, 392
Conularia, 394; **pumila**, 384, 394; **putilla**, 384, 394
"Coralline beds of Dr. Owen", position, 321
Cornulites, 369; **sterlingensis**, 338, 388, 391
Cornulites zone, age, 310, 368; exposures, 338, 340, 344, 359, 388; fossils from, 310, 369, 387, 389, 391, 402, 420; illustr., 432, 434; relations, 355, 370, 371
Correlation of Maquoketa shale, 319 ff, 362
Corryville beds, relations, 369
Corynotrypa curta, 391; **delicatula**, 391
Couler valley, 317
Cox, G. H., cited, 412
Crane, G. W., cited, 412
Crania, 392
Crepipora peculiaris, 391
Ctenodonta, 369, 374; **calvini**, 393; **fecunda**, 347, 366, 383, 384, 393; **fillmorensis**, 393; **obliqua**, 383, 384, 393; **recurva**, 393; **simulatrix**, 393
Cumings, E. R., cited, 412
Cybeloides iowensis, 395
Cyclendoceras, 409; **atkinsonense**, 385, 394; **clermontense**, 394
Cyclonema, 394; **jacksonense**, 394
Cyclora, 384, 394; **depressa**, 369; **hoffmanni**, 369; **minuta**, 369; **parvula**, 369
Cyclora limestones, relations, 369
Cyrtoceras, 346
Cyrtodonta grandis luculenta, 393
Cyrtolites, 385; **conradi**, 383, 384, 394; **disjunctus**, 394

D

Dalmanella, 345, 347, 352, 366, 369, 384, 393; **corpulenta**, 393; **macrior**, 393; **porrecta**, 393; **testudinaria**, 351, 383
Daniels, Edward, cited, 373, 412; study of Maquoketa shale, 321
Davis, Arthur Kyle, Jr., acknowledgments, 313
Decorah, exposure near, 375
Deformation of Maquoketa shale, 361
Delaware county, structure of beds in, 360
Dendrocrinus kayi, 391
Depauperate fauna, character, 349, 371; distribution, 310; map, 440; fossils, 383, 391; living conditions, 407; relations, 368; in Arkansas, 311; in Michigan, 310, 407
Depauperate zone, age, 310; character, 371, 373; exposures, 334, 340, 375; fauna of, 310, 407; illustr., 422; phosphate in, 348, 376 ff; position, 375; sections, 375; in Arkansas, 311; in Clayton county, 376; in Dubuque county, 378; in Fayette county, 376, 377; in Illinois, 380, 381; in Jackson county, 379; in Michigan, 366; in Missouri, 381; in Winneshiek county, 375
Des Moines sandstone, contact with Maquoketa, 319, 359, 361, 411
Devonian, basal conglomerate of, 358, 411; contact with Maquoketa, 318, 358
Diastrophism, basis of stratigraphy, 357
Dicranopora emacerata, 338, 392; **fragilis**, 369, 392
Dinorthis proavita, 393; **subquadrata**, 327, 402; **(Plaesiomys) subquadrata occidentalis**, 393; descr., 402; distr., 403; illustr., 420
Diploclema varians, 369, 391
"**Diplograptus** beds" of Sardeson, 374, 386
Diplograptus peosta, 340, 341, 343, 347, 378, 383, 384, 386, 391
Diplotrypa obscura, 384, 392
Dips in Maquoketa shale, 360
Dover Mills section of Maquoketa, 332, 334, 385
Drainage of Maquoketa area, 317
Drepanodus acinaciformis, 347, 366, 384, 394
Driftless area, topography, 313

Dubuque, type exposure of Maquoketa near, 323
Dubuque county, Ctenodonta bed in, 374; Depauperate zone in, 378; exposures in, 330, 343, 344, 352; Graf section in, 341; iron ore in, 356; structure of beds in, 360
Dubuque dolomite, age, area, character, named, 318, 345; relation to Maquoketa, 318, 406; section of, 346; see also Galena
Dubuque-Maquoketa contact, character, 345
Dwarf faunas, character, 372

E

Eagle Point anticline, 360
Ectenocrinus raymondi, 391
Eden beds, 347
Edgewood limestone of Missouri, 350; distribution, 352; relations to Maquoketa, 318
Eldorado, exposures near, 337
Elgin, exposures near, 329, 330, 387
Elgin fauna, northern derivation of, 410
Elgin shaly limestones, 309; character, 329, 333; deposition, 409; fossils from, 385, 391, 397, 403, 405, 406, 418, 420; illustr., 430; same as Wykoff, 368
Elkader, section at, 346
Elkhorn beds of Ohio valley, 310; relations, 368-370
Ellesmereland, fossil from, 418
Encrinurus cristatus, 395
Endoceras, 373; **kayi**, 394
Ensign, Mich., exposure near, 367
Ephippiorthoceras, 409; **laddi**, 384, 394
Eridotrypa brainardensis, 392; **simulatrix**, 392
Erosion of Maquoketa shale, 314

F

Fauna, dwarf, of Tully pyrite, 407
Fauna of Elgin member, 409
Faunal lists of Maquoketa fossils, 390; zones of the Maquoketa, 370
Faunas, dwarf, character, 372; normal, character, 372
Fayette county, Cornulites fauna in, 390; Depauperate zone in, 376; exposures in, 329, 332, 334-339; Kankakee beds in, 353; structure of beds in, 360
Fenestella granulosa, 392
Fernvale limestone, age, 368; fossils in, 410; relations, 368, 369, 406
Fenton, C. L., cited, 412
Fenton, M. A., cited, 412
Fillmore county, Minn., exposure in, 334
Fish Haven dolomite, position, 326
Florenceville, exposure at, 358
Foerste, Aug. F., acknowledgments, 313; cited, 409, 410, 412, 415; study of cephalopods, 311, 390; study of Maquoketa, 325-327, 364
Fort Atkinson, exposures at, 336, 389; fossils from, 397
Fort Atkinson fauna, character, 410
Fort Atkinson limestone, 309; character, 329, 333; exposures, 329, 336; fauna, 371, 389, 391, 397, 399, 418; position, 325
Fossils of Maquoketa shales, 391
Foster, J. W., cited, 413; study of Maquoketa shale, 320
Frankfort shales of New York, position, 322
Fremont limestone, position, 326
Fusispira bed, 346

G

Galena Junction, Ill., exposure near, 349
Galena limestone, character, 345; exposures of, 339, 375, 376, 379; in Maquoketa area, 320; in northeastern Iowa, 314; relations, 406; topography on, 315; see also Dubuque dolomite
Galena-Maquoketa contact in Allamakee county, 382; in Dubuque county, 378
Geisonoceras ? clermontense, 394
Girardeau limestone of Missouri, 354
Glossograptus, 366; **mucronatus**, 391
Glyptorthis, see **Hebertella**
Goldman, M. I., cited, 348, 413
Goocher quarry, exposure in, 334
Goose Lake channel, 317, 328
Gordon, C. H., cited, 413
Graf, graptolites at, 386; section of Maquoketa shale, 341
Granger, Minn., exposure at, 334
Grant, U. S., cited, 342, 383, 413
Graptolite zone in the Maquoketa, 371; exposures of, 340; fossils from, 310
Graptolites in Isotelus zone, 385
"Gray Limestone", position, 321
"Green and Blue shales and limestone", position, 322
Green Bay, "Blue Shale" on, 321; Maquoketa beds on, 362
Greenland, Maquoketa fossils from, 409
Grout, Frank F., cited, 413

H

Hall, C. W., cited, 413
Hall, James, cited, 320-322, 362, 383; study of Maquoketa shale, 320-322, 362
Hallopora, 392; **fayettensis**, 392; **persimilis**, 392; **subnodosa**, 392
Hanover, Ill., Depauperate zone at, 380
Hebertella bellarugosa, 401; **insculpta**, 327, 400; **(Glyptorthis) insculpta maquoketensis**, 393; descr., 399; distr.,

401; illustr., 418, 420; **occidentalis**, 402; **sinuata prestonensis**, 337, 393; descr., 401; distr., 402; illustr., 420; **subjugata**, 402
Helopora elegans, 369, 392; **thomasi**, 392
Hemiphragma nodosa, 392
Heterotrypa, 392
Hindia parva, 347, 383, 384, 391
History, geological, of Maquoketa shale, 406
Holtedahlina atkinsonensis, 393
Homotrypa nodulosa, 391; **wortheni**, 391
Homotrypella rustica, 391
Hopkinton dolomite, deposition, 411; exposures, 338, 339, 359; relations, 318, 354, 355; topography on, 315; in northeastern Iowa, 314
Hormotoma, 342, 366, 384, 394; **gracilis multivolvis**, 394
Houser, G. L., cited, 408
Howard county, exposures in, 334, 359
Howell, Jesse V., cited, 356, 413
Hudson Bay, Paleozoic rocks near, 326
"Hudson-river Group" in New York, 320; position, 324
Hussey, R. C., cited, 364, 413; study of Maquoketa shale, 320, 327
Hyolithes dubius, 369; **parviusculus**, 343, 369, 383, 384, 394; **versaillesensis**, 369

I

Illinois, basal conglomerate in, 354; Cincinnati group in, 323, 324; Depauperate zone in, 380, 381; Edgewood limestone in, 353; Kankakee limestone in, 351; Maquoketa exposures in, 344, 349, 350; studies of Maquoketa in, 312; unconformity under Maquoketa, 349
Indiana, strata in, 370; studies of Maquoketa in, 312
Inlier of Maquoketa, 318, 328, 361, 411
Iowa Geological Survey, reports on Maquoketa, 312
Iowacystis sagittaria, 391
Iowan drift area, topography on, 316
Iowan glacier, work of, 316
Iron ore in Dubuque county, 356
Ischadites, 346
Isotelus, 363; **iowensis**, 333, 334, 366, 385, 387, 394; **maximus**, 385; **rejuvenis**, 385, 395
Isotelus maximus zone, character, 333
Isotelus zone, 371; exposures, 333; fossils in, 385; illustr., 424, 426

J

Jackson county, Cornulites zone in, 390; Depauperate zone in, 379; exposures in, 339, 343, 344, 353, 359; fossils from, 402, 420; Maquoketa inlier in, 318, 328; structure of beds in, 360; Winston limestone in, 350
James, J. F., cited, 341, 346, 383, 413; study of Maquoketa shales, 319, 324
James Bay, Paleozoic rocks near, 326
Jones, O. T., cited, 357, 413

K

Kankakee limestone in Fayette county, 353; in Illinois, 350; relations to Maquoketa, 318
Kansan drift in northeastern Iowa, 316
Kansan glacier, work of, 316
Kentucky, strata in, 369
Keyes, C. R., cited, 413
Kimmswick limestone, unconformity above, 349
Kionoceras postvillense, 394; **tenuitectum**, 384, 394; **thomasi**, 384, 394
Kirk, Edwin, cited, 397, 398, 413

L

Ladd, Harry Stephen, Maquoketa shale of Iowa, 305; cited, 414
Lake Winnepeg, strata near, 326
"Lamellibranch zone", 374
Lane, A. C., cited, 414
Larrabee, William, exposure on land of, 355
Lasiograptus, 391
Leonard, A. G., cited, 312, 414
Lepidocoleus, 384, 391
Leptaena, in "Blue Shale", 321; **raymondi**, 393; **unicostata**, 393
Leptobolus occidentalis, 343, 347, 374, 382-384, 392
Liberty beds, relations of, 368
Lichenocrinus minutus, 391
Limonite in Maquoketa shale, 349, 376 ff
Lindströmia solearis, 310, 337, 371, 389, 391; descr., 397; distr., 399; illustr., 418
Lingula, 343, 347, 352, 373, 380, 383; **beltrami**, 371, 392; **changi**, 364, 366, 384, 392; **iowensis**, 345; **quadrata**, 354
Lingulasma schucherti, 392
Lingulops whitfieldi, 392
Lioclemella annulifera, 392; **fusiformis**, 392; **solidissima**, 392
Liospira micula, 347, 366, 383, 384, 394
Little Bay de Noquette, strata on, 320, 362
Little Maquoketa river, drainage by, 317; exposures on, 330
Locke, John, cited, 414; study of Maquoketa shale, 319
Loess-Kansan area, topography on, 316
Loomis, F. B., cited, 372, 407
Lophospira, 366, 383, 384, 394; **quadrisulcata**, 394
Lore Hill, iron ore at, 356

Lorraine shales of New York, position, 322
Lower Brainard shales, character, 338
Lyckholm beds of Russia, 345

M

McCune limestone in Missouri, 381
McGee, W J, cited, 414; study of Maquoketa shale, 325
Maquoketa area, drainage, 317; physiography, 313; relief, 313
Maquoketa fauna, origin in north, 326; resemblance to Utica fauna, 325
Maquoketa fossils, lists of, 390; from Arctic regions, 397, 409
Maquoketa river, drainage by, 317
Maquoketa shale of Iowa, 305; age, 309, 323, 357; area, 309, 311, 323; character, 323, 329; columnar section, 331; conglomerate in, 355; correlation, 324, 362; dips in, 360; distribution in Iowa, map, 439; distribution, general, map, 438; divisions, 329; erosion, 411; extent, 326; faunal zones in, 370, 391; fossils in, 311, 383, 384, 390; general section, 332; geological history, 406; Graf section, 341; graptolite zone in, 386; inlier of, 318, 328, 361, 411; interpretations, 311; members, 309; named by White, 322, 329; of Richmond age, 357; outcrops, distribution, 328; overlying rocks, 309; pebbles from, illustr., 437; phosphate in, 348, 376 ff; previous study, 312; relation to Silurian formations, 318; relation to underlying rocks, 346; resistance to erosion, 314; soil under, 349; stratigraphy, 318; structure, 360; studies in Canada, Illinois, Indiana, Michigan, Missouri, Ohio, Ontario, 312; topography on, 315; typical localities, 323, 331; underlying rocks, 309
Maquoketa shale, northwest area, 309, 332; faunal zones in, 370 ff, 386; members in, 329, 332; southeast area, 309, 339; exposures in, 330, 339; faunal zones in, 370 ff
Maquoketa-Alexandrian contact, 349
Maquoketa-Des Moines contact, 359
Maquoketa-Devonian contact, 358
Maquoketa-Niagaran contact, 354
Mastigograptus gracillimus, 391
Maysville beds, 347
Mead, D. W., cited, 414
Meek, F. B., cited, 396, 414; study of Maquoketa shale, 322
Meekospira subconica, 394
Mesotrypa, 392; **maquoketensis**, 391; **patella delicatula**, 392
Michigan, Black River beds in, 365; Depauperate fauna in, 310, 366; "Hudson-river Group" in, 320; Maquoketa beds in, 407; relation of Richmond in, to Maquoketa, 362; Richmond in, 310, 327; studies of Maquoketa in, 312, 364-367; Upper Peninsula, map, 363
Microceras inornatum, 369; **patersoni**, 394
Miller, Hugh, cited, 374
Minnesota, fossils from, 406, 420
Mississippi river, drainage by, 317; exposures along, 339
Mississippi valley, barrier near, 311, 410
Missouri, Depauperate zone in, 381; Edgewood limestone in, 351; Maquoketa exposures in, 344; Orchard Creek and Girardeau beds in, 354; studies of Maquoketa in, 312; unconformity under Maquoketa, 349
Modilopsis, 373; **excellens**, 394
Mohawkian beds, relations, 369
Mount Auburn beds, relations, 369
Mount Hope beds, relations, 369

N

"Neda Iron Ore" in Iowa, 356
Niagaran series, basal conglomerate in, 354; contact with Maquoketa, 354; relation to Maquoketa, 318; topography on, 315
Nileus vigilans zone, character, 333
Northwest area of Maquoketa shale, 309, 332; deposition in, 409; faunas in, 310; graptolite zone in, 386; members, 329, 332
Norton, W. H., cited, 414
Nucula, 363; **poststriata**, 373
"Nucula shale", fossils in, 373; position, 321
Nuculaformis, 373

O

Ohio, Blanchester formation in, 327; studies of Maquoketa in, 312
Ohio valley, Richmond beds in, 310, 357, 368
Oklahoma, Sylvan shale in, 407; Depauperate zone in, 311
Oneota river in northeastern Iowa, 317
Ontario, studies of Maquoketa in, 312
Orbiculoidea, 384, 392
Orchard Creek shale of Missouri, 354
Ordovician-Silurian boundary, study of, 327, 356
Orthis testudinaria, 363
Orthoceras, 383; **sociale**, 342, 347, 366, 375, 378, 383, 384, 387, 394, 409
"**Orthoceras** beds", 342, 343, 409; of Graf, 375
Ossian, exposure near, 336; fossils from, 399

Ostracodes, 347
Owen, D. D., cited, 414; study of Maquoketa shale, 319, 321

P

Pachydictya, 392
Paleontology of the Maquoketa, 370
Paleozoic rocks near Hudson and James bays, 326
Parastrophia, 393
Patterson's spring, exposure at, 338, 388, 390
Pebbles from Maquoketa shales, 348; illustr., 437
Pennsylvanian system, relation to Maquoketa, 319, 359, 361, 411
Percival, J. G., cited, 414; study of Maquoketa shale, 321
Perdue, N. J., cited, 413
Peritocrinus, 327
Peronopora decipiens, 391
Phosphate in Maquoketa beds, 347, 348, 376-381
Phosphate zones, origin, 348
Physiography of Maquoketa area, 313
Plaesiomys, see **Dinorthis**
Platyceras, 396
Platystrophia, 393; **elginensis**, 393
Plectambonites, 338, 340, 344; **precosis**, 393; **recedens**, 393; **saxeus**, 393
Plectorthis (Austinella) whitfieldi, 392
Plethospira semele, 394
Pleurocystites, 326; **beckeri**, 391; **clermontensis**, 391
Pleurotomaria, 373; **(Lophospira) depauperata**, 347, 366, 382-384, 394
Porocrinus, 326; **fayettensis**, 391
Postville, exposures near, 332, 382; fossils from, 403, 420
Prasopora elginensis, 391
Pratt, W. H., cited, 414
Preston, exposures near, 353; fossil from, 420; structure of beds near, 360
Preston inlier, 318, 328, 361, 411
Primitia cincinnatiensis, 384, 395; **gibbera**, 395; **tumidula**, 395
Priscochiton, 384, 393; **elongatus**, 347, 383, 384, 393
Proboscina auloporoides, 391; **frondosa**, 391
Pterinea iowensis, 393
Pterygometopus fredricki, 395
Ptilodictya, 392
Pulaski shales of New York, position, 322

Q

Queenston beds, age, 357

R

Rafinesquina altidorsata, 393; **kingi**, 393; **subquadrata**, 393
Rapid river, Mich., Maquoketa shale on, 362
Raymond, P. E., cited, 335, 414
Receptaculites zone, 346
Relief of Maquoketa area, 313
Rhinidictya, 384, 392
Rhombotrypa quadrata, 392; **subquadrata**, 392
Rhynchotrema anticostiense, 393; **capax**, 404; **capax altirostratum**, 393; descr., 403; distr., 405; illustr., 420; **neenah**, 393; **perlamellosum**, 404
Richmond age of Dubuque beds, 345
Richmond basin, connected with Mississippi valley, 325
Richmond beds, age, 309, 357, 358; fauna, 357, 390; of Michigan, 327; age, 310; relation to Maquoketa, 362; of Mississippi valley, 406; of Ohio valley, relations, 368; of Wyoming, fossils in, 409; unconformity, 407
Richmond fauna, origin, 327
Richmond submergence, extent, 357; importance, 325
River valleys, abandoned, 317
Rockville, exposure at, 351
Rominger, Carl, cited, 414; study of Maquoketa shale, 324, 363
Ross, C. S., cited, 348, 356, 415
Rowley, R. R., cited, 414
Ruedemann, Rudolph, cited, 414

S

St. Donatus, exposure at, 379
Sactoceras maquoketense, 394
Saffordia sulcodorsata, 393; **ventralis**, 393
Salpingostoma imbricatum, 394
Sardeson, F. W., cited, 318, 324, 358, 374, 386, 413, 414; study of Maquoketa shale, 325, 345
Savage, T. E., cited, 312, 318, 348, 349, 350, 353, 356, 360, 368, 383, 398, 415; study of Maquoketa shale, 327, 332, 334; study of rocks near Hudson Bay, 326
Savanna, Ill., exposure at, 345, 350; structure of rocks at, 360
Sceptropora facula, 369, 392
Schizotreta minutula, 392
Schuchert, Charles, cited, 357, 415-417; study of Maquoketa shale, 325
Scofield, W. H., cited, 416
Seaman, A. E., cited, 414
Sea water, composition, effect on life, 408
Selenite crystals from Brainard shale, 337; illustr., 436
Serpulites, 384, 391
Shammattawa limestone, position, 326
Shaw, E. W., cited, 346, 355, 374, 380, 383, 415

Shaw, James, cited, 415; study of Maquoketa shale, 324
Shideler, W. H., acknowledgments, 313; cited, 368, 370, 390; study of bryozoa, 311, 390
Shipton, T. D., fossils from, 380
Silurian system, relation to Maquoketa, 318
Sinuites, 346; **concinna**, 394
Slocom, A. W., cited, 415; study of Maquoketa shale, 326, 333
Sny Magill anticline, 360
Soil, residual, under Maquoketa shale, 349
Soper, E. K., cited, 413
Southeast area of Maquoketa shale, 309, 339; deposition in, 409; exposures in, 330, 339; faunal zones in, 370 ff
Sphaerocoryphe maquoketensis, 395
Spatiopora iowensis, 342, 384, 391
Spirifer lynx, 363
Springer, Frank, cited, 416
Spring Valley, Minn., fossils from, 406, 420
Spyroceras calvini, 394; **clermontense**, 394; cf. **perroti**, 394
State University of Iowa, fossils at, 397 ff
Stigmatella incerta, 392
Stockton, Ill., exposures at, 344
Stomatopora arachnoidea, 391
Stony Mountain limestone, position, 326
Strata, uplift of, 411
Stratigraphy of Maquoketa shale, 318
Streptelasma, 391; **angulatum**, 397; **haysii**, 310, 391, 409; descr., 396; distr., 397; illustr., 418; **latusculum** var. **trilobatum**, 397; **trilobatum**, 397
Strong, Moses, cited, 415
Strophomena, 393; **abscissa**, 393; **acuta**, 393; **fluctuosa occidentalis**, 393; **planodorsata**, 393
Structure of Maquoketa shale, 360
Sygcaulocrinus typus, 391
Sylvan fauna, resemblance to Utica fauna, 325
Sylvan shale of Oklahoma, 311, 325, 407

T

Tennessee, strata in, 369
Tetradella quadrilirata, 370, 395; **simplex**, 370, 395
Tetradium ontario, 384, 391
Thomas, A. O., acknowledgments, 313; cited, 341, 389, 415; fossils from, 398; photo by, 314, 385, 388
Thwaites, F. T., cited, 415
Topography of Driftless area, 313; of Galena area, 315; of Iowan drift area, 316; of Loess-Kansan area, 316; of Maquoketa area, 315; of Niagaran area, 315
''Transition beds'' above Maquoketa shales, 351
Trematis, 392
Trematopora granulata, 392
Trenton faunas, 407
''Trenton Group'' in New York, 320
Triplecia bed, 345
Triplecia (California) ulrichi, 393
Trochonema (Eunema) minnesotensis, 394
Trowbridge, A. C., cited, 346, 355, 374, 380, 383, 415
Tully pyrite, dwarf fauna of, 407
Turgite in Maquoketa beds, 377, 378
Turkey river, drainage by, 317
Tysor, Homer J., acknowledgments, 313; fossils from, 398

U

Udden, J. A., cited, 312, 415
Ulrich, E. O., acknowledgments, 313; cited, 345, 346, 351, 357, 358, 368, 370, 374, 375, 383, 405-407, 415, 417; study of Maquoketa shale, 319, 321, 324, 325, 327
Ulrichia bivertex, 384, 395
Unconformities, evidence of, 345
Unconformity below Maquoketa, 346, 349
U. S. National Museum, specimens in, 396 ff
Uplift of strata, 411
Upper Elgin beds in the Maquoketa, 371; exposures, 335; fossils from, 387, 401, 420
Upper Iowa river in northeastern Iowa, 317
Utah, Fish Haven dolomite in, 326
Utica fauna, in Mississippi valley, 407; resemblance to Maquoketa, 325
Utica shales of New York, position, 322

V

Valleys, abandoned, 317
Van Tuyl, F. M., cited, 415; study of rocks near Hudson Bay, 326
Vanuxemia bristolensis, 393
Vogdesia beds in the Maquoketa, 371; exposures, 335; fossils from, 387; illustr., 428; origin, 387
Vogdesia vigilans, 335, 387, 394

W

Wachsmuth, Charles, cited, 416
Walcott, C. D., cited, 416
Walter, Otto, cited, 416; study of Maquoketa shale, 327
Wapsipinicon formation, relation to Maquoketa, 318
Wapsipinicon river, drainage by, 317
Waucoma, limestone at, 350, 352

Waucoma limestone, character, 350
Waynesville beds, age, 368; relations, 370
Weiser, Miss Frances, acknowledgments, 313
Weller, Stuart, cited, 349, 383, 416
White, C. A., cited, 416; named Maquoketa shale, 322, 329
Whitefish river, Mich., Maquoketa on, 362
Whitella minnesotensis, 393; descr., 405; distr., 406; illustr., 420; **obliquata**, 405; **sterlingensis**, 393
Whitewater beds, relations, 368-370
Whitfield, R. P., cited, 416; study of Maquoketa shale, 324
Whitney, J. D., cited, 383, 413, 416; study of Maquoketa shale, 320, 321, 322
Whittlesey, Charles, cited, 417
Williams, I. A., cited, 412
Wilson, A. G., cited, 417
Winchell, N. H., cited, 358, 383, 417; study of Maquoketa shale, 319, 321, 324
Winneshiek county, Depauperate zone in, 375; exposures in, 334-338, 359; fossils from, 397, 399, 401, 405, 418
Winston, Ill., exposure at, 349
Winston limestone, character, 349, 350
Wisconsin, beds in, 319, 322; Dubuque beds in, 345
Worthen, A. H., cited, 414, 417; study of Maquoketa shale, 322
"Wykoff Beds" of Sardeson, position, 358; relations, 368
Wyoming, Big Horn dolomite in, 326; Richmond fossils in, 409

Z

Zaphrentis haysii, 396
Zygospira, 384, 393; **modesta**, 369, 383