

TABLE 20.—Mineral Production in Citrus and Levy counties, Florida (1944–1949)

PRODUCT	1944		1945		1946		1947		1948		1949	
	Amount (short tons)	Value	Amount (short tons)	Value	Amount (short tons)	Value	Amount (short tons)	Value	Amount (short tons)	Value	Amount (short tons)	Value
Colloidal Phosphatic Clay ¹ , ³	48,942	\$206,493	63,400	\$234,460	86,222	\$316,795	76,145	\$278,596	60,343	\$267,512	70,747	\$268,639
Clay, Dolomite ² , Chert, and Hard-Rock Phosphate ³	99,673	305,906	188,176	711,994	199,339	978,304	170,245	792,000	131,583	512,760	157,093	401,336
Limestone (Road Base Course Material)	163,094	118,314	168,033	144,623	265,401	238,450	297,407	286,960	122,737	108,096	116,975	113,047
Totals	311,709	\$630,713	419,609	\$1,091,077	550,962	\$1,533,549	543,797	\$1,357,556	314,663	\$888,368	344,815	\$783,022

¹ Includes some production in adjacent counties, represents total production in Florida by companies operating in Citrus County.

² Does not include production of Golden Dolomite Company for which figures were unavailable.

³ Amount converted to short tons.

BIBLIOGRAPHY

Applin, Esther R. (also see Applin, Paul L., 1944, 1947)

- 1945 (and Jordan, Louise) *Diagnostic Foraminifera from subsurface formations in Florida*: Jour. Paleontology, Vol. 19, No. 2, pp. 129-148.

Applin, Paul L.

- 1944 (and Applin, Esther R.) *Regional subsurface stratigraphy and structure of Florida and southern Georgia*: Bull. Am. Assoc. Petroleum Geologists, Vol. 28, No. 12, pp. 1673-1753.
- 1947 (and Applin, Esther R.) *Regional subsurface stratigraphy, structure, and correlation of Middle Cretaceous rocks in Alabama, Georgia and north Florida*: U. S. Geol. Survey, Oil and Gas Investigations Preliminary Chart 26 (in 3 sheets).
- 1951 *Possible future petroleum provinces of North America—Florida*: Bull. Am. Assoc. Petroleum Geologists, Vol. 35, No. 2, pp. 405-407.
- 1951a *Preliminary report on buried pre-Mesozoic rocks in Florida and adjacent states*: U. S. Geol. Survey Circular 91, 28 pp.

Bassler, R. S. (see Canu)

Campbell, Robert

- 1939 *Deep test in Florida everglades*: Bull. Am. Assoc. Petroleum Geologists, Vol. 23, pp. 1713-14.

Canu, Ferdinand

- 1920 (and Bassler, R. S.) *North American early Tertiary bryozoa*: U. S. Nat. Mus. Bull. 106, 879 pp.

Cathcart, J. B.

- 1950 *Notes on the land-pebble phosphate deposits of Florida*: Symposium on mineral resources of the S. E. United States, Proc. of 1949, Univ. of Tenn. Press, Knoxville, Tenn., pp. 132-151.

Colbert, Edwin H.

- 1932 *Aphelops from the Hawthorn formation of Florida*: Fla. Geol. Survey Bull. 10, pp. 55-58.

Cole, W. Storrs

- 1938 *Stratigraphy and micropaleontology of two deep wells in Florida*: Fla. Geol. Survey Bull. 16, 77 pp.
- 1941 *Stratigraphic and paleontologic studies of wells in Florida*: Fla. Geol. Survey Bull. 19, 91 pp.
- 1942 *Stratigraphic and paleontologic studies of wells in Florida*: Fla. Geol. Survey Bull. 20, 89 pp.
- 1944 *Stratigraphic and paleontologic studies of wells in Florida*: Fla. Geol. Survey Bull. 26, 168 pp.

Cooke, C. Wythe

- 1915 *The age of the Ocala limestone*: U. S. Geol. Survey Prof. Paper 95, pp. 107-117.
- 1929 (and Mossom, Stuart) *Geology of Florida*: Fla. Geol. Survey 20th Ann. Rept., pp. 29-227.
- 1936 (and Mansfield, W. C.) *Suwannee limestone of Florida*: (abstract) Geol. Soc. America Proc. for 1935, pp. 71-72.

- 1939 *Scenery of Florida, as interpreted by a geologist*: Fla. Geol. Survey Bull. 17, 118 pp.
- 1939a *Equivalence of the Gosport sand to the Moody's marl*: Jour. Paleontology, Vol. 13, No. 3, pp. 337-340.
- 1941 *Cenozoic regular echinoids of eastern United States*: Jour. Paleontology, Vol. 15, No. 1, pp. 1-20.
- 1942 *Cenozoic irregular echinoids of eastern United States*: Jour. Paleontology, Vol. 16, No. 1, pp. 1-61.
- 1943 (and Gardner, Julia, and Woodring, Wendell P.) *Correlation of the Cenozoic formations of the Atlantic and Gulf Coastal Plain and the Caribbean region*: Bull. Geol. Soc. America, Vol. 54, pp. 1713-23.
- 1945 *Geology of Florida*: Fla. Geol. Survey Bull. 29, 339 pp.

Cushman, J. A.

- 1917 *Orbitoid Foraminifera of the genus Orthophragmina from Georgia and Florida*: U. S. Geol. Survey Prof. Paper 108-G, pp. 115-124.
- 1919 *The age of the underlying rocks of Florida as shown by the Foraminifera of well borings*: Fla. Geol. Survey 12th Ann. Rept., pp. 77-103.
- 1920 *The American species of Orthophragmina and Lepidocyclina*: U. S. Geol. Survey Prof. Paper 125-D, pp. 39-105.
- 1921 *American species of Operculina and Heterostegina*: U. S. Geol. Survey Prof. Paper 128-E, pp. 125-142.
- 1934 *Upper Eocene Foraminifera of the southeastern United States*: U. S. Geol. Survey Prof. Paper 181, 181 pp.
- 1945 *A foraminiferal fauna from the Twiggs clay of Georgia*: Contr. Cushman Lab. Foram. Res., Vol. 20, pp. 29-50.
- 1946 *A rich foraminiferal fauna from the Cocoa sand of Alabama*: Spec. Pub. 16, Cushman Lab. Foram. Res., 40 pp.

Dall, William Harris

- 1890-1903 *Contributions to the Tertiary fauna of Florida*: Wagner Free Inst. Sci. Trans., Vol. 3, parts 1-6, pp. 1-1654.
- 1892 (and Harris, Gilbert D.) *The Neocene of North America*: U. S. Geol. Survey Bull. 84, 349 pp.
- 1894 (and Stanley-Brown, J.) *Cenozoic geology along the Apalachicola River*: Bull. Geol. Soc. America, Vol. 5, pp. 147-170.
- 1897 *A table of the North American Tertiary horizons, correlated with one another and with those of western Europe, with annotations*: U. S. Geol. Survey 18th Ann. Rept. 1896-1897, pp. 323-348.
- 1915 *A monograph of the molluscan fauna of the Orthaulax pugnax zone of the Oligocene of Tampa, Florida*: U. S. Nat. Mus. Bull. 90, 173 pp.

Ericson, David B. (also see Rainwater)

- 1945 *Gulf Hammock formation in Florida*: Science, N. S., Vol. 102, No. 2644, p. 234.

Fenneman, N. H.

- 1928 *Physiographic divisions of the United States*: 3rd Ed. Annals, Assoc. Am. Geographers, Vol. 18.

Fisk, H. N.

- 1938 *Geology of Grant and La Salle parishes*: La. Dept. Cons. Geol. Bull. 10, 246 pp.
- 1939 *Depositional terrace slopes in Louisiana*: Jour. Geomorphology, Vol. 2, pp. 181-200.
- 1940 *Geology of Avoyelles and Rapides parishes*: La. Dept. Cons. Geol. Bull. 18, 240 pp.

Forest Survey Release Nos. 30, 31 and 35

- 1949-1950 *Florida resources of northeast Florida*: Division of Forest Economics of the Southeastern Forest Experiment Station, Ashville, N. C., in co-operation with the Florida Forest Service.
- Forest Survey Release No. 30, June 15, 1949, 35 pp.
- Forest Survey Release No. 31, Nov. 1, 1949, 36 pp.
- Forest Survey Release No. 35, Sept. 1950, 27 pp.

Fronzel, Clifford

- 1943 *Mineralogy of the calcium phosphates in insular phosphate rock*: Am. Mineralogist, Vol. 28, No. 4, pp. 215-232.

Gardner, Julia (see Cooke, 1943)

Gravell, D. W.

- 1935 (and Hanna, M. A.) *Larger Foraminifera from the Moodys Branch marl, Jackson Eocene, of Texas, Louisiana, and Mississippi*: Jour. Paleontology, Vol. 9, pp. 327-340.
- 1938 (and Hanna, M. A.) *Subsurface Tertiary zones of correlation through Mississippi, Alabama, and Florida*: Bull. Am. Assoc. Petroleum Geologists, Vol. 22, pp. 984-1013.

Gunter, Herman (also see Sellards, 1922)

- 1928 *Basement rocks encountered in a well in Florida*: Bull. Am. Assoc. Petroleum Geologists, Vol. 12, pp. 1107-08.

Hanna, Marcus A. (see Gravell)

Harris, Gilbert D. (see Dall, 1892)

Herring, D. G. (see Rainwater)

Hutchinson, George Evelyn

- 1950 *Survey of contemporary knowledge of biochemistry. Part 3 — The biogeochemistry of vertebrate excretion*, 554 pp.

Jordan, Louise (see Applin, Esther R.)

Keller, R. N.

- 1939 (and Quirke, T. T.) *Mineral resources of the chemical industries*: Econ. Geol., Vol. 34, pp. 287-96.

Kibler, D. B., Jr.

- 1941 *Mining and preparation of Florida hard-rock phosphate*: Am. Inst. of Mining and Metallurgical Engineers Tech. Pub. No. 1315, 9 pp.

Lowe, E. N.

- 1915 *Mississippi, its geology, geography, soils and mineral resources*: Miss. State Geol. Survey Bull. 12, 335 pp.

MacNeil, F. Stearns

- 1944 *Oligocene stratigraphy of southeastern United States*: Bull. Am. Assoc. Petroleum Geologists, Vol. 28, No. 9, pp. 1313-54.
- 1946 *The Tertiary formations of Alabama*: Fourth Field Trip Guide Book, Southeastern Geol. Soc., Tallahassee, Fla., 91 pp., 1 map, 1 correlation chart.
- 1947 *Correlation chart of the outcropping Tertiary formation of the eastern Gulf Region*: U. S. Geol. Survey, Oil and Gas Investigations Preliminary Chart 29.
- 1949 *Pleistocene shore lines in Florida and Georgia*: U. S. Geol. Survey Prof. Paper 221-F, pp. 95-107, map.

Mansfield, George R.

- 1942 *Phosphate resources of Florida*: U. S. Geol. Survey Bull. 934, 82 pp.

Mansfield, W. C. (also see Cooke, 1936)

- 1937 *Mollusks of the Tampa and Suwannee limestones of Florida*: Fla. Geol. Survey Bull. 15, 334 pp.
- 1939 *Note on unreported Oligocene in Citrus County, Florida*: Jour. Wash. Acad. Sci., Vol. 29, No. 2, pp. 45-46.

Matson, George C.

- 1913 (and Sanford, Samuel) *Geology and ground waters of Florida*: U. S. Geol. Survey Water-Supply Paper 319, 445 pp.

Mossom, Stuart (also see Cooke, 1929)

- 1926 *Review of the structure and stratigraphy of Florida*: Fla. Geol. Survey 17th Ann. Rept., pp. 174-268.

Quirke, T. T. (see Keller)

Rainwater, E. H.

- 1945 (and Herring D. G., Jr., and Ericson, David B.) *Southeastern Geological Society Third Field Trip — western Florida*, Southeastern Geol. Soc., Tallahassee, Fla.

Richards, Horace G.

- 1946 *A gastropod of the genus Velates from the Florida Eocene*: Notulae Naturae, No. 177, 6 pp.

Sanford, Samuel (see Matson)

Sellards, E. H.

- 1910 *A preliminary paper on the Florida phosphate deposits*: Fla. Geol. Survey 3rd Ann. Rept., pp. 21-41.
- 1913 *Origin of the hard rock phosphates of Florida*: Fla. Geol. Survey 5th Ann. Rept., pp. 23-80.
- 1916 *Fossil vertebrates from Florida; a new Miocene fauna; new Pliocene species; the Pleistocene fauna*: Fla. Geol. Survey 8th Ann. Rept., pp. 77-119.
- 1919 *Review of the geology of Florida with special reference to structural conditions*: Fla. Geol. Survey 12th Ann. Rept., pp. 105-41.
- 1922 (and Gunter, Herman) *On the petroleum possibilities of Florida*: Fla. Geol. Survey 14th Ann. Rept., pp. 33-135.

Shaler, N. S.

- 1890 *The topography of Florida*: Bull. Mus. Comp. Zool., Vol. 16 (geol. ser., vol. 2), pp. 139-158.

Simpson, George Gaylord

- 1929 *The extinct land mammals of Florida*: Fla. Geol. Survey 20th Ann. Rept., pp. 231-279.
1930 *Tertiary land mammals of Florida*: Am. Mus. Nat. History Bull., Vol. 59, Art. 11, pp. 149-211.
1932 *Miocene land mammals from Florida*: Fla. Geol. Survey Bull. 10, pp. 7-41.

Southeastern Geological Society — Mesozoic Committee

- 1949 4 charts, Alabama, Georgia and Florida.

Stanley-Brown, Joseph (see Dall, 1894)

Stenzel, H. B.

- 1939 *The Yegua problem*: Contr. to Geol., Univ. of Texas, Pub. No. 3945, pp. 847-911.

Toulmin, Lyman D., Jr.

- 1940 *The Salt Mountain limestone of Alabama*: Geol. Survey of Ala., Bull. 46, 126 pp.

U. S. Department of Agriculture

- 1941 *Climate and man*: Yearbook of Agriculture, 1248 pp.

U. S. Department of Commerce

- 1841-1950 *Climatological data — Florida*: Weather Bur., U. S. Dept. Comm., monthly and annual summaries.

Utley, George W.

- 1908 *Florida Historical Quarterly*, Vol. 1, No. 3, pp. 29-35.

Vaughan, Thomas Wayland

- 1910 *A contribution to the geologic history of the Floridian Plateau*: Carnegie Inst. Wash. Pub. 133, Papers from the Tortugas Lab., Vol. 4, pp. 99-185.
1928 *New species of Operculina and Discocyclina from the Ocala limestone*: Fla. Geol. Survey 19th Ann. Rept., pp. 155-165.
1933 *Studies of American species of Foraminifera of the genus Lepidocyclina*: Smithsonian Misc. Collections, Vol. 89, No. 10, 53 pp., 32 plates.

Vernon, Robert O.

- 1942 *Geology of Holmes and Washington counties, Florida*: Fla. Geol. Survey Bull. 21, 161 pp.
1943 *Florida mineral industry, with summaries of production for 1940 and 1941*: Fla. Geol. Survey Bull. 24, 207 pp.
1947 (and others) *Springs of Florida*: Fla. Geol. Survey Bull. 31, 196 pp.
1947a *Tertiary formations cropping out in Citrus and Levy counties*: Fifth Field Trip Guide Book, Southeastern Geol. Soc., Tallahassee, Fla., pp. 1-54.

Wetmore, Alexander

- 1942 *Fossil birds from the Tertiary deposits of Florida*: New England Zool. Club Proc., Vol. 22, pp. 59-68.

White, Theodore E.

- 1942 *The lower Miocene mammal fauna of Florida*: Harvard College Mus. Comp. Zool. Bull., Vol. 92, No. 1, 49 pp.

Wilmarth, M. Grace

- 1938 *Lexicon of geologic names of the United States (including Alaska)*: U. S. Geol. Survey Bull. 896, 2396 pp.

Wood, Albert Elmer

- 1932 *New Heteromyid rodents from the Miocene of Florida*: Fla. Geol. Survey Bull. 10, pp. 45-51.

Woodring, Wendell P. (see Cooke, 1943)

INDEX

Numbers in bold face type indicate figures and the double numbers separated by a diagonal are illustrations between pages.

- Abbott-Prudential well, **76/77**, 84, 86, 87, 88, 155
- Alachua formation, 18, 22, 26, 30, **54/55**, **56/57**, 67, **94/95**, 141, 152, 153-155, 179, 180, 181, 183-186, 189-208
- Altschuler, Z. S., cited on phosphate, 201
- Area of counties, 2
- Artesian ground water, 24, 241-244
- Atkinson formation, 67, 75, 78-80
- "A" zone, **76/77**, 77, 78, 79
- "B" zone, **76/77**, 77, 78, 79
- Austin equivalent, 67, 75, **76/77**, 77, 80-81
- Avon Park limestone, 23, **54/55**, **56/57**, 67, **94/95**, 95-111, 130, 153-155, 204
- Zone "B", 93, 98-99, 118
- Berdan, Jean, paper by, 68-71, 72
- Borelis* fauna, 84-85
- Bridge, Josiah, paper by, 68-71, 72
- Brukenfeld-Levy-Lennon well, **76/77**, 84, 86, 87, 88, 155
- Byram limestone, 172, 173, 174
- Calver, James L., cited on petrology, 73
- "Cannon" ball concretions, 114, 132
- Caverns, 28, 43-44
- Cedar Keys formation, 67, 77, 78, 84-86
- Cement, 233-234
- Cenozoic rocks, 84-217
- "Central Highlands", 14, 16, 18
- Chert, economic, 234
- Chiefland Limestone Plain, 25, **26**, 32
- Citronelle formation of Cooke, 15, 39
- Claiborne group, 88-111
- Regional correlation, 89-90
- Clay deposits, 230, 233
- Climate, 9-10
- "Coastal Lowlands", 14, 16
- Coastal Plain Province, 14, 17
- "Coastal Plains Province", 14, 16
- Coastal-Ragland well, 66, 69, 71, 72, 73, **76-77**, 76, 79, 81, 82, 84, 86, 87, 88, 155
- Coastal terraces, 21, 27, **22**
- Coharie-Okefenokee formations, 67, 137, 149, 203, 206, 207, 212
- Coharie-Okefenokee Sand Ridge, 18, 21, 25-27, 190, 192, 212
- Coharie terrace, 19-20, 39-41
- Cole, W. Storrs, cited on foraminifers, 98
- Comanche? series, 67, 75, 76, **76/77**
- Cosden-Lawson well, 82
- County names, 11
- Cretaceous overlap of older rocks, 65, 66-68, 75, **76/77**
- Cretaceous rocks, 67, **76/77**, 74-84
- Crystal River Rock Company Quarry, **II**, 165-169, **168**, **169**, 205
- de Cizancourt, Marie, cited on large foraminifers, 142
- Delta plain, 15, 18
- Delta Plain Highlands, 16, 18-19
- Depositional facies, 65-66, 74-75, 89
- Devonian, Lower, 67, 69
- Diabase, quartz, 70, 71-74, **76/77**
- Dictyoconus americanus* zone, 90-91
- Dolomite rock, economic, 221-224
- Domes, 58
- Homosassa Springs dome, **59**, 59-60
- West Levy dome, **59**, 60
- Drowning of coastal margins, 20, **21**
- Eagle Ford shale, 67, 75, 77, 78, 79
- Economic geology, 217-246
- Distribution map, **218**
- Ellaville, section at, 173-174
- Eocene series, 86-172
- Eutaw equivalent, 77, 80
- Fault breccia, **II**
- Faults, 47-52, **54/55**, **56/57**, 60-61, 67, 110, 111, 167, 169
- Bronson graben, **59**, 60, 161-162
- Caves, 49-52
- Inverness fault, **59**, 60-61, 116
- Long Pond fault, **59**, 61, 116, 161, 214
- Fischer, Alfred G., cited on echinoids, 118, 159
- Florida Oil-Sholtz well, **76/77**, 76, 78, 79, 81, 82, 83, 86, 88, 154
- Floridian Plateau, 14, 64
- Formational tops in well penetrations, **54/55**, **56/57**, 72, **76/77**, **94/95**, 153-155, 156
- Fracturing, 47-52, **51**
- Reflection of buried structures, 48
- Causes, 49-52
- Stream alignment on, 50
- Geologic column in Citrus and Levy counties, table, 67
- Geologic controls, 16-17
- Geologic cross-sections,
- General, 53-57, **54/55**, **56/57**
- Cretaceous, 75-76, **76/77**
- Lake City limestone, 94, **94/95**
- Geologic studies in Florida, summary of, 63-64
- Gravell, Donald W., cited on camerinids, 142
- Greaves-Walker, A. F., cited on clays, 230-232
- Ground water, 24, 31, 241-244.
- "Gulf Hammock formation", 64, 102-104

- Gulf series, 67, 75, 76/77, 77-84
Hagerman, R. S., cited on clays, 230-233
Hammocks, 24-25, 104
Hawthorn formation, 17, 18, 54/55, 56/57, 67, 94/95, 178-189
Helicostegina gyralis zone, 86, 93
Historical geology of Florida, summary, 65-66
Howe, H. V., cited on ostracods, 97, 214
Humble-Cone well, 69
Humble-Hodges well, 82-83
Humble-Robinson well, 66, 70, 71, 72, 73, 76, 76/77, 79, 80, 81, 82, 84, 86, 87, 88, 155
Inglis member, see Moodys Branch formation
Jackson-Claiborne contact, 100, 113-115
Jackson group, 111-172
 Correlation, 112
 History of, use of term, 111-113
 Spongiform concretions, 117
Jordan, Louise, cited on Foraminifera, 118, 140/141
Jurassic rocks, 65
Karrenfeld surface, 152, 194, 196, 197, 199-200
Keys, 42
Kissimmee faulted flexure, 56-57
Lake City limestone, 90-94, 94/95, 95
 Table of wells, penetrating, 94
Lake Flirt marl, 67, 130, 215
Lakes, 30, 44-46
Land forms
 Citrus and Levy counties, 17-52
 Florida, 14
Land utilization, 11-14
Lawson limestone, 76/77, 77, 81, 82-84
Limestone, economic, 217-221
Limonite, economic and origin, 235-236
Location of area, 1, 3
Long Pond, 46
Louisiana terraces, correlation with Florida terraces, 40
Lower Cretaceous, 67, 75, 76
MacNeil, F. Stearns, cited on mollusks, 166
Maps, 2
"Marion Lowlands", 14
Mesozoic rocks, 71-84
Midway age, 67, 84-86
Mineral production, 244-245, 246
Mineral producers in Citrus and Levy counties, 244
Miocene series, 178-208
 Correlation, 178-181, 183
 Distribution, 180/181, 183
 Geologic history, 183-186
 Marine deposits, 183-189
 Miocene problem, 181-183
 Pre-Miocene surface, 183
 Terrestrial deposits, 183-186
 Vertebrates, 184-185
Mixon bone bed, 193
Modern submarine plain, 20-21
Moodys Branch formation, 23, 54/55, 56/57, 94/95, 95, 99, 115-155, 156, 159, 214
Checklist of Foraminifera, 140/141
 Inglis member, 24, 30, 115-140, 207
 Basal unconformity, 99, 100, 101, 102-104, 109, 113-115, 130
 Rubble bed, 99, 103, 109, 114-115, 130
 Localities in checklist, 138-140
 Williston member, 111, 128, 129, 133, 134, 137, 141-156, 166, 204-205, 206
Moore, Wayne E., 15, 16
Naegeli, Hans G., cited on foraminifers, 167
Navarro equivalent, 76/77, 77, 78, 82-84
Non-fossiliferous limestone of the Ap-
 plins, 88-89
Oakley, K. P., cited on spongiform con-
 cretions, 117
Ocala limestone (restricted) 17, 18, 23, 54/55, 56/57, 67, 94/95, 143, 144, 147, 148, 153-155, 156-172, 180, 181, 192
Ocala uplift, 53-62
 Date of movements, 30-31, 38, 56-57, 61-62, 195-200
 Fracturing, 47-52
 Relation of Miocene deposition to, 182-186, 191
Oceanic deep development, lack of evi-
 dence for, 39
Oil and gas possibilities, 237-240
Oil-bearing horizons, possible, 237-238
Oil tests in Citrus and Levy counties, 239
Okefenokee formation, see Coharie
Okefenokee terrace, 18, 39-41
Oldsmar limestone, 67, 86-88, 93, 94/95
Oligocene series, 166, 170, 171, 172, 172-178
 Correlation, 172-173
Ordovician, Lower, 67, 70-71
Osceola low, 57-58
Paleocene series, 84-86
Paleozoic rocks, 64-65, 66, 67, 68-71, 72, 76/77
Pamlico formation, 67, 105, 107, 108, 123, 125, 132, 135, 160, 212-215
Pamlico terrace, 20, 21, 22-25, 24, 39-41
Penholoway terrace, 39, 40
Peninsular arch, 53, 65, 75
Periarchus lyelli floridanus zone, 113, 115, 118-119, 121
Peronella dalli zone, 97, 99-100, 101, 122
Phosphate, 190-192
 Economic, 224-230
 Mineralogy, 200-203
 Origin, 189, 190, 195-200
Phosphate fixation, 26, 27, 195-202
Physiography of Citrus and Levy coun-
 ties, 17-52, 22

- Caverns, 43-44
 Chiefland Limestone Plain, 25, 26
 Coastal terraces, 21-22
 Coharie-Okefenokee Sand Ridge, 25
 Fracturing, 47-52
 Introduction, 17-18
 Keys, 42
 Lakes, 44-46
 Modern submarine plain, 20-21
 Pamlico terrace, 22-25, 22, 24
 Pleistocene history in Florida, 36
 River Valley Lowlands, 27
 Sinks, 44
 Solution, 42-47
 Springs, 46-47
 Stream capture, 33-36, 32, 34
 Stream terrace sediments, 28
 Stream valleys, 27-28
 Stream valleys in Citrus and Levy counties, 41-42
 Stream valleys in western Florida, 41
 Suwannee River Valley Lowland, 29
 Terraced Coastal Lowlands, 19
 Tertiary Highlands, 18
 Tsala Apopka Lake, 30-31
 Waccasassa River Valley Lowland, 31-36, 32, 34
 Wicomico terrace, 22, 25
 Withlacoochee River Valley Lowland, 29-31
 Physiography of Florida
 Citrus and Levy counties, 17-52
 General divisions, 16
 Pleistocene geologic history, 36-42
 Pleistocene series, 153-155, 208-215
 Deposits, 23
 Formation names, 209
 Pre-Pleistocene surface, 209-210
 Sea-level oscillations, 15
 Stages, 208
 Stratigraphy, 210-215
 Terraces, 15, 17-52
 Plio-Pleistocene beds, 15
 Population, 11-12
 Pre-Cambrian, 64, 68
 Rabbitt, John C., analyses of phosphate, 200, 202-203
 Recent series, 15, 20-21, 215-216
 Red-bed facies, 76
 Richards, Horace G., cited on Mollusca, 119-121
 River Valley Lowlands, 16, 17, 18, 27-36
 "River Plains Province", 16
 Ross, C. S., cited on clay, 187
 Salt Mountain fauna, 85, 86, 87
 Sand, economic, 234-235
 Sanford high, 57
 Selma equivalent, 77, 80
 Silurian, Upper, 67, 69
 Simpson, J. C., 9, 35
 Sinks, 44
 Solution of limestone, 26, 27, 42-47
 Solution pipes, 44, 45
 Springs, 46, 47
 Stenzel, H. B., cited on Jackson group, 98, 113, 124, 130
 Stokes Ferry Bridge, outcrops near, 135-136, 151-152
 Stratigraphy
 Citrus and Levy, general, 66-68, 67
 Florida, general, 64-66
 Stream capture, 33-36
 Stream terrace sediments, 28-33
 Stream valleys, 27-28
 Citrus and Levy counties, 41-42
 Western Florida, 41
 Structural movements, date of, 30-31, 38, 56-57, 61-62, 195-200
 Structure
 Florida, general, 64-66
 Structure and sections, 53-62
 Structure favorable for oil accumulation, 238
 Structure maps, Plates 1 and 2, 75/76, 94/95
 Sunderland terrace, 39, 40
 Sun-Goethe well, 66, 69, 70, 72, 76/77, 76, 79, 81, 82, 84, 86, 87, 88, 154
 Sun-Perpetual Forest well, 71
 Surface water, economic, 240
 Suwannee limestone, 17, 18, 54/55, 67, 166, 170, 171, 172, 172-178, 181, 187
 Suwannee Petroleum-Sholtz well, 80, 81, 82, 83, 86, 88, 153
 Suwannee River, 18, 23, 27, 29
 Suwannee River deposits, 214, 215
 Suwannee River Valley Lowland, 29
 Talbot terrace, 39, 40
 "Tallahassee Hills", 14, 16
 Tampa formation, 181, 183, 184, 188
 Taylor equivalent, 67, 75, 76/77, 77, 78, 81-82
 Taylor, J. J., cited on chemical analyses, 235
 Terraced Coastal Lowlands, 16, 17, 19-27, 36-41
 Terraces, Pleistocene, 17-52
 Alluvial, 15, 13, 27-52
 Correlations, 40
 Definition, 39
 Marine, 15, 17-27
 Origin, 15, 36-42
 Sea-level oscillations, 15
 Tertiary Highlands, 16, 17, 18
 Tertiary rocks, 84-208
 Thomas farm vertebrate fauna, 185
 Towns, 4
 Transportation, 6-9
 Triassic rocks, 65, 67, 69, 70, 71-74, 76, 76/77
 Tsala Apopka Lake, 30-31, 141, 190
 Fresh water marls, 216
 "Tsala Apopka terrace", 31
 Union-Kirkland well, 70
 Upper Cretaceous, 67, 75, 76/77, 77-84

Vegetation, 9-10
 Vertebrate fossils, 184-185, 193-194, 212
 Waccasassa River, 17, 27, 31-36
 Delta plains, 23, 31-32
 Deposits, 215
 Waccasassa River Valley Lowland, 31-36
 Stream capture in, 32, 33-36, 34
 "Western Highlands", 14, 16
 Wicomico formation, 67, 141, 147, 148, 173, 212
 Wicomico terrace, 20, 25, 39-41
 Wilcox age, 67, 86-88
 Williston Limestone Plain, 21, 32-33, 141, 190
 Williston member, see Moodys Branch formation
 Withlacoochee River, 17, 18, 22, 27, 29-31
 Withlacoochee River Valley Lowland, 29-31
 Woodbine sand, 67, 75, 77, 78, 79
 Zone "B" of the Avon Park limestone, 93, 98-99, 118

JM19 1.60.7.0.
 #192 Jbs