

APPENDIX L. REFERENCE BOOKS.

THE reference books listed at the end of each chapter deal in part, if not entirely, with the topic treated in that chapter. There are a number of general books, some of which are included in those lists, which should be in every physical geography laboratory. Among these are most of the following:—

MILL, *International Geography*, Appleton & Co., N.Y., 1902, \$3.50; HUXLEY, *Physiography*, Macmillan Co., N.Y., 1891, \$1.80; GEIKIE, *Scenery of Scotland*, Macmillan Co., N.Y., 1901, \$3.25; TARR, *Physical Geography of New York State*, Macmillan Co., N.Y., 1902, \$3.50; LUBBOCK (Lord Avebury), *Scenery of England*, Macmillan Co., N.Y., 1902, \$2.50; *National Geographic Monographs*, *Physiography of the United States*, American Book Co., N.Y., 1895, \$2.50; SHAHER, *Outline of the Earth's History*, Appleton & Co., N.Y., 1898, \$1.75; SHAHER, *Aspects of the Earth*, Scribner's Sons, N.Y., 1890, \$2.50; GEIKIE, *Fragments of Earth Lore*, John Bartholomew, Edinburgh, 1893, 12s. 6d.; BONNEY, *Story of Our Planet*, Cassell, London, 1898, 7s. 6d.; GEIKIE, *Earth Sculpture*, Putnam's Sons, N.Y., 1898, \$2.00; MARR, *The Scientific Study of Scenery*, Methuen & Co., London, 1900, 6s.; SALISBURY, *Physical Geography of New Jersey*, Vol. IV, Final Report, New Jersey Geological Survey, Trenton, 1902; DRYER, *Studies in Indiana Geography*, Inland Printing Co., Terre Haute, Ind., 1897, \$1.25; POWELL, *Geology of the Uintah Mountains*, Department of the Interior, Washington, 1876 (out of print); GILBERT, *Geology of the Henry Mountains*, Department of the Interior, Washington, 1877 (out of print).

The following are leading magazines of geography, at least one of which it is desirable to have in the school: *Journal of Geography*, Chicago, Ill., \$1.50; *National Geographic Magazine*, Washington, D.C., \$2.50; *Bulletin of the American Geographical Society*, New York, \$4.00; *Geographical Journal*, London, \$6.00; *Scottish Geographical Magazine*, Edinburgh, \$5.00.

The United States Geological Survey publishes Bulletins, Annual Reports, Professional Papers, Monographs, Folios, and Irrigation Papers, many of which contain valuable physiographic material, possibly relating to your own region.

INDEX.

A.

- Absolute humidity, 244.
Absorption, 235.
Abyssal life, 197.
Abyssinia, peninsula of, 25.
Adirondacks, 107, 127, 301, 302.
Adobe, 373.
Africa, 24.
Agassiz, Lake, 73.
Age of earth, 45.
Ages, geological, 415.
Aggrading, 53.
Agriculture, Central Plains, 311; development of, 370; New England, 299; New York, 302; Piedmont Belt, 307; western United States, 315.
Air, 13, 18, 19, 229-250; effect of gravity on, 231; importance of, 14; importance of, to animals, 353; importance of, to plants, 336; influence of, in weathering, 40; in ocean water, 180; pressure of, 255; warming of, 238.
Air pressure, measurement of, 421.
Alabama River, 329.
Alaska, glaciers of, 139.
Alaska, peninsula of, 23, 207, 222.
Albany, 303.
Aldrich deep, 175.
Aleutian Islands, volcanoes of, 124.
Alkali flats, 87, 169, 324.
Alleghany plateau, 308, 310, 327.
Allegheny, 309.
Allegheny River, effect of ice sheet on, 155, 156.
Alluvial fan, 66, 97, 321.
Alpine flora, 344.
Alps, 94, 101, 102, 107, 108, 388; glaciers of, 137, 141; settlement of, 105.
Altitude, effect of, on temperature, 240; influence of, on climate, 276.
Amazon, plains of, 77.

- American ice sheet, 146.
American race, 382, 383.
Amphibia, home of, 359.
Andes, 20, 24, 99, 107.
Andesite, 412.
Anemometer, 422.
Aneroid barometer, 422.

- Animals, aid of, in spread of plants, 345, 346; aid of, in weathering, 41; barriers to spread of, 361; dependence of, on plants, 333; distribution of, 353-366; domestic, 365, 371; fresh water, 358; homes of, 359; in Arctic, 354; in Australia, 362; influence in plant variation, 347; influence of man on, 364; influence of surroundings on, 353; in South America, 363; in temperate zone, 356; in tropical zone, 357; mode of life of, 354; of desert, 357; on islands, 361; spread of, 360; zones of, 364.

- Annual plants, 341.
Antarctic ice sheet, 145.
Antarctic Ocean, 26.
Anthracite coal, 109, 413.
Anticline, 37.

- Anticyclones, 263, 291, 292; influence of, on weather, 265; succession of, 263; winds of, 289.

- Antitrades, 260.
Appalachian belt, 308.
Appalachian Mountains, 23, 94, 99, 100, 101, 102, 107.

- Appalachian plateau, 84, 327.
Arabia, peninsula of, 25.
Aral Sea, 162.
Arctic animals, color of, 355.
Arctic climates, 293, 294.
Arctic fauna, 354.
Arctic flora, 340.
Arctic, man in, 384.

Arctic Ocean, 27.
 Argentina, plains of, 77.
 Argon, 229.
 Arid lands, western United States, 287.
 Arid plains, west, 326.
 Arid plateaus, inhabitants of, 85.
 Arkansas River, 325, 326.
 Arroyo, 87.
 Artesian wells, 73.
 Ash, volcanic, 122, 412.
 Asia, 25.
 Asia Minor, peninsula of, 207.
 Asteroids, 4.
 Atlanta, 308.
 Atlantic Ocean, 27.
 Atmosphere, 13, 229-250.
 Atolls, 219, 222.
 Attraction of gravitation, 8.
 Augite, 407.
 Augusta, 75.
 Auk, 364.
 Aurora australis, 419.
 Aurora borealis, 419.
 Australia, 25.
 Australia, fauna of, 362.
 Autumnal equinox, 400.
 Avalanches, 44, 97.
 Avernus, Lake, 117.
 Axis of earth, inclination of, 8.
 Azores Islands, 124, 175, 222; animals in, 362.

B.

Bad Lands, 51.
 Bahama Islands, 219, 222.
 Baikal, Lake, 162.
 Balearic Isles, 207.
 Balkash, Lake, 162.
 Baltic Sea, 26.
 Baltimore, 75, 102, 224, 307, 376.
 Banks, fishing, 197; in sea, 208.
 Barograph, 422.
 Barometer, 421, 422.
 Barometric gradient, 255.
 Barrier beaches, 214, 222.
 Barrier reefs, 218.
 Barriers, to spread of animals, 361; to spread of plants, 345.
 Bars, across bays, 213; offshore, 214.
 Basalt, 412.
 Base level, 55.

Basin Ranges, 93, 100, 324.
 Basins, ocean, 175.
 Basques, 388.
 Bay of Fundy, 24; tides of, 187.
 Bay of St. Lawrence, 24.
 Bayous, 328.
 Bays, cause of, 207-210, 223.
 Beaches, 210, 212, 213; barrier, 214, 222; of glacial lakes, 150, 151.
 Beaver, 357; effect of, in forming lakes, 161.
 Belted plain, 80.
 Belt of calms, 259, 279.
 Berlin, 376.
 Bermuda Islands, 124, 175, 218, 222; life on, 361.
 Big trees, 341.
 Binghamton, 302.
 Biotite, 407.
 Birds, home of, 359.
 Birmingham, 310.
 Bison, 364, 366.
 Bituminous coal, 410.
 Black Hills, 310.
 Black race, 382, 383.
 Blake deep, 175.
 Blizzards, 289.
 Bluffs, river, 61, 327.
 Bogs, 168.
 Bog iron ore, 410.
 Bombs, volcanic, 122.
 Bonneville, Lake, 164; shore lines of, 220.
 Bore, 188.
 Bosses, 34, 127.
 Boston, 217, 224, 300; drumlins of, 153.
 Boston Harbor, 208.
 Boulder beaches, 212.
 Boulder clay, 142, 152.
 Boulders, erratic, 142.
 Boulder trains, 152.
 Brazos River, 329.
 Breakers, 185.
 Bridgeport, 300.
 British Isles, 25, 208, 210; reasons for importance of, 389.
 Brooklyn, 305.
 Brown race, 382, 383.
 Brussels, 376.
 Buffalo, 156, 166, 302, 303, 304, 313, 331, 376.

Building materials, 373.
 Buttes, 83.
 C.
 Cactus, 343.
 Cairo, 327.
 Calabria, earthquakes in, 131.
 Calcereous tufa, 409, 410.
 Calcite, 34, 407.
 Calderas, 120, 121, 123.
 California, filling of valley of, 67, 68.
 California, Gulf of, 207.
 Callao, 224.
 Calms, belt of, 259, 279.
 Camel, 89, 358.
 Campos, 283.
 Canary Islands, 124, 175, 222.
 Canyons, 81, 320, 321; Colorado, 322, 323.
 Cape Canaveral, 213.
 Cape Cod, 213, 215.
 Cape Fear, 213.
 Cape Hatteras, 213, 215.
 Cape Lookout, 213.
 Cape Verde Islands, 124, 175.
 Capes, cause of, 207-210, 222, 223.
 Carbonate of lime in ocean, 180.
 Carbon dioxide, 229; importance of, to plants, 336.
 Caribbean Sea, 23, 207.
 Cascade Ranges, 126.
 Caspian Sea, 162, 163.
 Castine, 224.
 Catskill Mountains, 98, 107, 301, 302.
 Caucasian race, 382, 383.
 Cave dwellers, 85.
 Caverns, 59.
 Cayuga Lake, 153, 303.
 Centigrade scale, 420.
 Central Plains, 76, 310.
 Chad Lake, 162.
 Challenger deep, 175.
 Champlain, Lake, 162, 165.
 Change of level of land, 24, 35, 204.
 Charleston, 306; earthquake, 131.
 Chasms, 211.
 Chemically formed rocks, 409, 410.
 Chesapeake Bay, 24, 74, 209, 306, 329.
 Chicago, 31, 150, 151, 166, 220, 313, 376.
 China Sea, 207.
 Chinook, 290.
 Cincinnati, 156, 312, 376.

Circumpolar whirl, 260.
 Cirques, 142.
 Cirrus clouds, 248.
 Cities, location of, 375.
 Civilization, ancient, 387; influence of commerce on, 378.
 Clastic rocks, 409, 410.
 Clay beds, 409, 410.
 Cleveland, 166, 220, 313.
 Cliff dwellers, 85.
 Cliffs, sea, 211.
 Climate, 275-295; Arctic, 293, 294; belt of calms, 279; continental, 288; east coasts, 288; equable, 238; Indian, 284; influence of altitude on, 276; influence of lakes on, 165, 166; influence of ocean currents on, 278; influence of, on plants, 339; influence of topography on, 279; influence of water on, 277; influence of winds on, 278; mountain, 95; plateau, 83; south temperate zone, 293; southwestern United States, 316; temperate zones, 285-293; west coasts, 286.
 Climbing bogs, 168.
 Clothing, 371.
 Cloudbursts, 86, 268.
 Clouds, 247.
 Coal, 108, 170, 410, 411; Appalachians, 309; Central Plains, 312, 313.
 Coastal plains, 72, 305; swamps on, 169.
 Coast lines, 203-225; changes in, 204; of drowned lands, 208; elevated sea bottom, 205; influence on man, 389; irregularities of, 23-26; irregular mountainous, 207; life history of, 221; New England, 299; sinking of, 74; straight mountainous, 206.
 Coast Ranges, 99.
 Cold-blooded animals, 353.
 Cold pole, 288.
 Cold waves, 290.
 Color, 232, 233; of Arctic animals, 355; of ocean water, 181.
 Colorado Canyon, 56, 82, 316, 322-323.
 Colorado plateau, 322, 324.
 Colorado River, 87, 322; of Texas, 329.
 Columbia lava plateau, 125, 320.
 Columbia River, 320.
 Columbia, S.C., 75.

Combustion, 229.
 Commerce, development of, 377.
 Compass, 418.
 Conduction, 236.
 Cone deltas, 66.
 Cones, forms of volcanic, 123.
 Conglomerates, 409, 410.
 Connecticut River, 329.
 Connecticut valley, 298.
 Consequent course, 55.
 Consequent mountain drainage, 103.
 Constantinople, 376.
 Continental climate, 288.
 Continental glaciers, 146.
 Continental shelf, 72.
 Continental slope, 22.
 Continents, 22-26; climate of interior of, 288; elevation of, 22; influence of form on man, 26.
 Contour interval, 429.
 Contour maps, 428.
 Contraction, 99.
 Convection, 236.
 Coral reefs, 217, 222.
 Cordillera, 95.
 Cordilleras, western, 23.
 Corrosive work, 52.
 Corsica, 25, 207.
 Crater Lake, 121, 123.
 Crest of waves, 185.
 Crete, 207.
 Crevasses, 138; in levees, 62, 328.
 Crinoids, 198.
 Crumpling of strata, 37.
 Crust, movement of, 35.
 Cultivated plants, 348.
 Cumulus clouds, 248, 268.
 Cusps, 213.
 Cyclonic storms, 262, 291, 292; cause of, 264; influence of, on weather, 265; paths followed by, 264; succession of, 263; winds of, 289.
 Cypress, 344.
 Cyprus, 207.

D.

Daily range, 241.
 Dead Sea, 22, 161, 163; lack of life in, 339.
 Death Valley, 324.
 Débris cones, 97.

Deccan, lava plateau of, 126.
 Deciduous trees, 340.
 Declination, 418, 419.
 Deep-sea exploring, 173, 174; life in, 197.
 Deeps, ocean, 175.
 Degrading, 53.
 Degrees, 402.
 Delaware Bay, 24, 209, 306, 329.
 Delaware River, 329.
 Delta, Mississippi, 328.
 Deltas, 64, 222; lake, 162, 164.
 Denmark, peninsula of, 208.
 Density of sea water, 181.
 Denudation, 45; of mountains, 96.
 Denver, 315, 376.
 Desert fauna, 357.
 Desert flora, 342.
 Deserts, 86-89; as barriers to spread of animals, 361; as barriers to spread of plants, 346; drainage of, 86; life on, 88; man in, 386; nature of, 86; rainfall of, 86; trade wind, 281; wind work in, 87.
 Detroit, 166, 313.
 Dew, 246.
 Dew point, 245.
 Diabase, 411, 412.
 Diathermanous, 234.
 Diatom ooze, 177.
 Diffraction, 233.
 Dike, 34, 126.
 Diorite, 411, 412.
 Dip, 37; compass, 418.
 Dismal swamp, 74, 169.
 Distributaries, 64, 65, 328.
 Distribution, of animals, 353-366; of mankind, 381, 383.
 Dodo, 364.
 Doldrums, 259.
 Dolomite, 407, 411.
 Dome-shaped mountains, 100.
 Domestic animals, 365, 371.
 Dormant volcanoes, 115.
 Downes, 283.
 Drainage, of deserts, 86; of mountains, 103.
 Dredging, 174.
 Drift, glacial, 147, 154; ocean, 191; stratified, 149.
 Droughts, 286, 291.

Drowned coasts, 208.
 Drowned river, 330.
 Drumlins, 152.
 Duluth, 166, 220, 311, 313.
 Dust particles, 230; effect of, on fog, 247.

E.

Early man, 369.
 Earth, age of, 45; as a planet, 1-10; contraction of, 18, 35, 99; differences in temperature on, 239; general features of, 13-28; interior of, 17; proof of roundness, 2; radiation from, 235; rotation of, 6; shape of, 1; size of, 3; solid, 16; wind systems of, 258.

F.

Fahrenheit scale, 420.
 Fall Line, 75, 306, 307.
 Fall River, 300.
 Far West, 314.
 Fault, 37.
 Fault-block mountains, 93, 100.
 Fauna, 354: Australian, 362; of Arctic, 354; of desert, 357; fresh-water, 358; island, 361; of northern continents, 363; South American, 363; temperate, 356; tropical, 357.

Feldspar, 34, 406.
 Field work, 439.
 Fingal's Cave, 127.
 Finger Lakes, 153.
 Fiords, 26, 153, 209.
 Fishing banks, 197.
 Floodplains, 58, 61, 327, 328.
 Floods, Mississippi, 328.
 Flora, 339: Alpine, 344; Arctic, 340; of deserts, 342; of mountains, 343; of savannas, 342; of steppes, 342; subtropical, 342; temperate, 340; tropical, 342.
 Florida, frosts in, 286; plain, 74; plain, drainage of, 55.
 Flow of tide, 187.
 Focus of earthquake, 131.
 Foehn, 290.
 Fog, 247.
 Food of man, 370.
 Forest, care of, 349.
 Forestry, 350.
 Fracture, zone of, 18.
 Fragmental rocks, 409, 410.
 Fresh-water fauna, 358.
 Fringing reefs, 218.
 Frost, 235, 246; aid of, in weathering, 40.
 Fur-bearing animals, 353, 355, 356, 357.

G.
 Galapagos Islands, animals in, 362.
 Galveston, 73, 214, 215, 224, 306; effect of hurricane on, 271.
 Gas, 19.
 Geneva Lake, 103.
 Genoa, 376.
 Geological Ages, 415.
 George, Lake, 165.
 Georges Banks, 197.
 Geysers, 132, 133.
 Giant's Causeway, 127.
 Gibraltar, 223.
 Glacial drift, 147.
 Glacial erosion, 138, 153.
 Glacial lakes, shore lines of, 220.
 Glacial period, 147; cause of, 147.
 Glaciers, 137-156; Alaskan, 139; distribution of valley, 141; effects of continental on Mississippi system, 327; effect of continental in New England, 299; effect of continental in Central Plains, 310; former extension of valley, 141; Greenland, 143; influence of continental on New York, 301; valley, 137-142.
 Glasgow, 224.
 Globigerina ooze, 177.
 Gneiss, 34, 35, 413.
 Government, origin of, 375.
 Grade, 56.
 Graham Island, 112.
 Grand Banks, 197.
 Grand Canyon of Colorado, 81, 322.
 Grand River, 322.
 Granite, 34, 35, 411, 412.
 Graphite, 413.
 Gravel beds, 409, 410.
 Gravitation, attraction of, 8.
 Gravity, 8; effect of, on air, 231; effect of, on plants, 338; influence of, on animals, 354.
 Grazing, western United States, 314.
 Great Barrier Reef, 218.
 Great Basin, 324.
 Great Bear Lake, 162.
 Great Falls, 326.
 Great Lakes, 161, 162, 165, 166, 329, 330; origin of, 156; post-glacial history of, 150, 151; water route, 311.

Great Plains, 77, 326; ranching, 311.
 Great Salt Lake, 78, 163, 164, 324.
 Greece, peninsula of, 25, 98, 207.
 Greeks, ancient, 377.
 Green River, 322.
 Greenland, absence of plants in, 336; ice desert, 86; ice sheet, 143; interior of, 144.
 Greenwich Observatory, 404.
 Ground moraine, 138.
 Ground swell, 185.
 Guam, 175.
 Gulf of California, 23.
 Gulf of Mexico, 23.
 Gulf Stream, 192, 289.
 Gulfs, cause of, 207-210, 223.
 Gypsum, 167, 408, 410.

H.
 Hachure maps, 428.
 Hail, 250.
 Hair hygrometer, 423.
 Halos, 233.
 Hanging valleys, 142, 153.
 Harbors, 223-225; cause of, 207-210.
 Hardheads, 152.
 Hartford, 300.
 Hawaiian Islands, 20, 98, 175, 222; animals in, 362; volcanoes of, 119-121, 123.
 Haze, 230.
 Headland cliffs, 212.
 Headwater erosion, 104.
 Heat, 234-237; in earth's interior, 17; from sun, 10; latent, 238; of vaporization, 238; zones of, 275.
 Hell Gate, tides of, 188.
 Hematite, 408.
 Henry Mountains, 100.
 Herculaneum, destruction of, 115-117.
 High barometer, 421.
 High pressure, 255.
 High-pressure areas, 263.
 Himalayas, 102, 106, 388; rainfall at base of, 284.
 Hoangho River, 67.
 Hoboken, 305.
 Homes, selection of, 374.
 Homes of animals, 359.
 Hooks, 213.

Hornblende, 407.
 Horse latitudes, 261; rainfall of, 285.
 Hot springs, 132.
 Houses, 372, 373, 374.
 Hudson Bay, 24.
 Hudson River, 329; drowning of, 304.
 Humboldt glacier, 144.
 Humidity, 244.
 Huron, Lake, 161, 162.
 Hurricanes, 269; effects of, 271.
 Hygrometer, 423.

I.
 Ice, aid in river erosion, 53.
 Icebergs, 194, 195; formation of, 145.
 Iceberg waves, 186.
 Ice cave, 139.
 Ice-dammed lakes, 149.
 Ice fall, 138.
 Ice floes, 194.
 Ice in ocean, 194.
 Ice packs, 194.
 Iceland, lava plateau of, 126; volcanoes of, 124.
 Ice sheet, 143; Antarctic, 145; Arctic, 145; effects of, 154; former, 146; Greenland, 143.
 Igneous rocks, 33, 408, 411, 412.
 India, climate of, 284; peninsula of, 25.
 Indian Ocean, 27.
 Indian race, 382, 383.
 Indians, 385, 387.
 Indo-China, peninsula of, 25.
 Inhabitants of plateaus, 84, 85.
 Insects, home of, 359.
 Instrument shelter, 424, 425.
 Instruments, meteorological, 420-425.
 Interior basins, 22, 95.
 Interior of earth, 17.
 Intermittent desert streams, 87.
 Intruded igneous rocks, 34, 126, 411.
 Invertebrates, home of, 359.
 Irish Sea, 26.
 Iron, Appalachians, 309; Central Plains, 312, 313; deposits of, 410; ores of, 408.
 Iron pyrite, 408.
 Irrigation, 315.
 Ischia, island of, 117.
 Islands, cause of, 207-210, 222, 223; faunas of, 361.

Isobars, 262.
 Isogonic map, 419.
 Isothermal chart, 276.
 Isotherms, 276.
 Isthmus of Panama, 24.
 Italy, peninsula of, 25, 98, 207.

J.

James River, 329.
 Japan, earthquakes in, 130.
 Japanese Islands, 20, 25, 98, 207, 222.
 Japan Sea, 207.
 Jersey City, 305.
 Jetties, 328.
 Joint planes, 38; influence on rivers, 53.
 Jura, 94, 100.

K.

Kamchatka, peninsula of, 25, 98.
 Kames, 149.
 Kangaroo, 362.
 Kaolin, 407.
 Kettles, moraine, 148.
 Key West, 222.
 Kilaeua, 119, 120.
 Korea, peninsula of, 25, 222.
 Krakatoa, 119, 123.
 Kurile Islands, 22, 98.

L.

Laboratory equipment, 431-438.
 Labrador Current, 193, 279, 289.
 Labrador peninsula, 23.
 Laccolith, 127.
 Lachine rapids, 330.
 Ladrone Islands, 175.
 Lake basins, origin of, 160.
 Lake plains, 78.
 Lakes, 160-167; as resorts, 165; freezing of, 165, 166; glacial, 156; ice-dammed, 149; importance of, 165; influence on climate, 165, 166; influence on navigation, 166; life history of, 164; oxbow, 63, 328; salt, 163; shores of, 220; size and form of, 161; storage of water in, 167.
 Lake Superior highlands, 310.
 Land breezes, 256.
 Land, changes in level of, 35, 204; sinking of, 24; warming of, 237.
 Land hemisphere, 27.

Landslides, 44, 97.
 La Soufrière, eruption of, 113-115.
 Lassen Peak, 121.
 Latent heat, 238; liberation of, 266.
 Lateral moraine, 138.
 Latitude, 402.
 Lava, 33; Hawaiian volcanoes, 120, 121.
 Lava floods, 125.
 Lava flows, 122.
 Lava intrusions, 126.
 Lava plateau, 81; Columbia, 320.
 Lava soils, 130.
 Lawrence, 155, 300, 371.
 Leads in ocean ice, 194.
 Left-hand deflection, 258.
 Levees, 62, 328.
 Life, on deserts, 88; in ocean, 195-198; on ocean bottom, 197.
 Life history, of coast line, 221; of lakes, 164; of mountains, 101; of river valleys, 54; of volcanoes, 128.
 Light, 232; relation of plants to, 337.
 Lightning, 268.
 Lignite, 410, 411.
 Limestone, 33, 35, 410.
 Limonite, 408.
 Lipari Islands, 113.
 Liquid, 19.
 Littoral life, 196.
 Liverpool, 376.
 Llanos, 283.
 Lobate moraines, 148.
 Loess, 151.
 London, 210, 376; fog of, 247.
 Long Island, 24.
 Long Island Sound, 24.
 Longitude, 403.
 Los Angeles, 316.
 Louisville, 312.
 Low barometer, 421.
 Lower California, 23, 222; peninsula of, 98.
 Low pressure, 255; areas, 262.
 Luray Cave, 60.

M.

Madagascar, 25, 222.
 Madeira Islands, 222.
 Madrid, 376.
 Magnetic north, 418.

Magnetic poles, 418.
 Magnetism, 418.
 Magnetite, 408.
 Malaria, 170.
 Malaspina glacier, 140.
 Malay Peninsula, 98, 207, 222.
 Malay race, 382, 383.
 Mammals, home of, 359.
 Mammoth, 360, 363, 364.
 Mammoth Cave, 59.
 Man, aid of, in spreading plants, 345; in Arctic, 384; barriers overcome by, 381; dependence of, on nature, 369; in desert, 386; domestication of animals by, 365; early, 369; effect in forming lakes, 161; effect of ice sheet on, 154-156; effects of ocean currents on, 193, 194; effects of tides on, 189; effect of valley form on, 58; food of, 370; importance of shore lines to, 203; influence of coast line on, 389; influence of continent form on, 26; influence of deltas on, 65; influence of deserts on, 88; influence of lakes on, 165, 167; influence of mountains on, 105-109, 388; influence of ocean on, 15, 28; influence of swamps on, 170; influence on animals, 364; influence on nature, 379; influence on plant variation, 348; in temperate zone, 385; in tropical zone, 385; plants of value to, 348; relation of plateaus to, 84, 85; relation of, to land, 31; relation of volcanoes to, 129; spread of, 381.
 Man and nature, 369-392.
 Manchester, 155.
 Mangrove, 344; swamps, 217.
 Mankind, development of, 369-380; distribution of, 381-383; races of, 382, 383.
 Manufacturing, Appalachians, 309; New England, 299.
 Maps, 428; for laboratory use, 431-438; mounting of, 437; use of, 432.
 Marble, 34, 35, 413.
 Marshes, salt, 216.
 Marsupials, 362.
 Massachusetts Bay, 208.
 Mastodon, 360, 363, 364.
 Mature coast line, 221.
 Mature mountains, 102.

INDEX.

Mature plains, 79.
 Mature valleys, 57.
 Mauna Kea, 119, 120.
 Mauna Loa, 119, 120.
 Meanders, 62, 328.
 Medial moraine, 138.
 Mediterranean, 207, 208; climate of, 279; early commerce in, 377; tides of, 187.
 Memphis, 327.
 Meridian, 403.
 Mesas, 82, 83.
 Mesquite, 343.
 Metamorphic rocks, 34, 408, 413.
 Meteorological instruments, 420-425.
 Mexico, Gulf of, 207.
 Mica, 407.
 Michigan, Lake, 161, 162.
 Mid-Atlantic Ridge, 175.
 Milan, 376.
 Milwaukee, 166, 313.
 Minerals, 406-408.
 Mineral wealth, Central Plains, 312; of mountains, 108.
 Mining, Appalachians, 309; western United States, 315.
 Minneapolis, 155, 311, 312.
 Mirage, 232.
 Mississippi, delta of, 65, 328; drainage area of, 320; river, 310, 312; rock load of, 52; system, 325-328; valley of, 76, 77, 310, 325, 328.
 Missouri river, 325, 326, 327.
 Mobile, 306; bay of, 209.
 Models, 428.
 Mohave desert, 282.
 Moist plateaus, inhabitants of, 84.
 Monadnock, 298.
 Money, origin of, 378.
 Mongolian race, 382, 383.
 Monoclinal shifting, law of, 104.
 Monocline, 37.
 Monotremes, 362.
 Monsoon winds, 256, 259, 284.
 Monte Somma, 115.
 Mont Pelé, eruption of, 113-115.
 Montreal, 313, 330.
 Moon, 3, 6, 18.
 Moraines, 138; terminal, 148; of recession, 148.
 Mountain flora, 343.

N.

Natural bridge, 60.
 Natural levee, 62.
 Navigation, development of, 377, 378.
 Neap tides, 189, 417.
 Nebula, 18.
 Neck, volcanic, 126.
 Negro race, 382, 383.
 Netherlands, 170.
 Névé, 137.
 New Bedford, 300.
 New England, 298.
 Newfoundland, 24, 208, 210, 247.
 New Haven, 300.
 New Orleans, 224, 286, 306, 312, 376.
 New York City, 102, 210, 224, 304-305, 376.

New York Harbor, 224.
New York State, 301-305.
New Zealand, 98, 222.
Niagara Falls, 54, 155, 329, 331-334; recession of, 332, 333.
Niagara River, 56, 164, 167, 330, 333.
Nicaragua Lake, 130.
Nile delta, 64.
Nile River, 87.
Nile valley, early civilization in, 387.
Nimbus clouds, 248.
Nitrogen, 229.
Nomads, 89, 386, 387.
Norfolk, 306.
North America, 23.
North Atlantic eddy, 192.
Northeast storms, 266.
Northeast trades, 259.
Northers, 289.
North magnetic pole, 418.
North pole, climate near, 294.
North Sea, 26.
Norway, fiords of, 209.
Nova Scotia, peninsula of, 208.
Nunatak, 144.
Nyassa, Lake, 162.

O.

Oases, 89, 387.
Obsidian, 412.
Ocean basins, 175.
Ocean bottom, 173-179; deposits on, 176; life on, 197; light on, 182; temperature of, 183, 184; topography of, 178.
Ocean currents, 190-194; aid of, in spreading plants, 345; effects of, 193; influence of, on climate, 278.
Oceanography, 173.
Oceans, 14, 173-198; as barriers to spread of animals, 361; as barriers to spread of plants, 346; depth of, 14, 20, 174, 175, 176; ice in, 194; importance of, 15; life in, 195-198; temperature of, 182-184; form of, 26.
Ocean water, color of, 181; composition of, 179; density of, 181; movements of, 184-195; pressure of, 181.
Offshore bars, 214, 222.
Offshore platforms, 212.

Ohio River, 325, 327; effect of ice sheet on, 155, 156.
Old mountains, 102.
Old plain, 79.
Old valleys, 58.
Ontario, Lake, 154, 161, 162.
Öölite, 409, 410.
Oozes, ocean bottom, 176.
Orbit, earth's, 397.
Organic rocks, 410.
Orinoco delta, 65.
Ottawa River, 330.
Overturned folds, 37.
Ox-bow cut-off, 63, 328.
Oxygen, 13, 229.

P.

Pacific Ocean, 27.
Pack ice, 194.
Palisades, 127, 411.
Parallels of latitude, 402.
Paris, 376.
Park lands, 283.
Parks, mountain, 95.
Passes, at Mississippi mouth, 328.
Pass, mountain, 95.
Peaks, mountain, 95.
Peat bogs, 168, 170, 410, 411.
Pelagic life, 195.
Peneplain, 58, 102, 307.
Peninsulas, cause of, 207-210, 222, 223.
Perennial plants, 341.
Philadelphia, 31, 75, 102, 224, 307, 376.
Philippine Islands, 20, 22, 25, 98, 207, 222.
Phosphate, 306.
Phosphorescence, 182.
Physiography, 32; of United States, 298-317.
Picture writing, 379.
Piedmont Belt, 102, 307, 308.
Piedmont glacier, 140.
Pikes Peak, 34.
Pittsburg, 31, 156, 309, 312, 327, 376.
Plains, 72-80; central United States, 76-314; classes of, 79; coastal, 72, 305-307; continental shelf, 72; industries of, 77; lake, 78; life history of, 79; New York, 303; relation to moun-

INDEX.

tains, 22; Russian, 75; Siberian, 75; submarine, 175.
Plane of ecliptic, 397.
Planets, 3-6.
Plant food, 40.
Plants, aid in weathering, 40; Arctic, 340; barriers to spread of, 345; conditions influencing, 336-339; dependence on, of animals, 353; of deserts, 342; distribution of, 336-350; effect of gravity on, 338; importance of air to, 336; importance of soil to, 338; importance of sunlight to, 337; importance of water to, 337; influence of climate on, 339; means of distribution of, 345; of mountains, 343; relation of, to temperature, 336; of savannas, 342; of steppes, 342; temperate, 340; tropical, 342; of value to man, 348; variation in, 346; water, 344.
Plateaus, 80-85; Alleghany, 308-310, 327; Appalachian, 308-310; climate of, 83; Colorado, 322, 324; inhabitants of, 84, 85; lava, 81; nature of, 80; New York, 302; relation to continents, 22; resemblance to mountains, 98; sculpturing of, 81.
Platte River, 325, 327.
Platypus, duck-billed, 362.
Playas, 169, 324.
Pocket beaches, 212.
Po, filling of valley of, 68.
Poles, magnetic, 418.
Pompeii, destruction of, 115-117.
Porphyritic crystals, 412.
Portland, Maine, 300; Oregon, 210, 316, 321.
Pot holes, 54; glacial, 138.
Potomac River, 329.
Prairies, 77.
Precipitation, 245.
Pressure, air, 255; of sea water, 181.
Prevailing westerlies, 260; variable winds of, 289.
Prime meridian, 404.
Promontories, cause of, 207-210, 222.
Providence, 300.
Psychrometer, 423.
Pteropod ooze, 177.
Pueblos, 85.

Q.
Quaking bogs, 168.
Quartz, 34, 406.
Quartzite, 34, 35, 513.
Quicksands, 212.

R.
Races, of mankind, 382.
Races, tidal, 188.
Radiant energy, 234; passage of, 234.
Radiation, 234; from earth, 235.
Rain, 249; cause of, in cyclonic storms, 266.
Rainbows, 233.
Raindrops, 249.
Rainfall, at base of Himalayas, 284; belt of calms, 280; influence of cyclones and anticyclones on, 266; measurement of, 424; of deserts, 86, 282; of temperate zones, 285; of trade-wind belts, 280, 281; of west coasts, 286; on mountains, 96.
Rain gauge, 424.
Rain sculpturing, 51.
Raleigh, 75.
Ranching, Great Plains, 311.
Range, mountain, 94.
Rarefied air, 231.
Red clay, 177.
Red Race, 382, 383.
Red River, 325, 327.
Red River of the North, valley of, 78, 150, 320.
Red Sea, 207.
Reflection, 232, 235.
Refraction, 232.
Reindeer, 384.
Rejuvenated rivers, 83.
Relative humidity, 244.
Relief maps, 428.
Reptiles, home of, 359.
Residual soil, 43.
Revolution, 5, 397, 398; effects of, 7.
Rhine delta, 66, 170.
Rhyolite, 411, 412.
Richmond, 75.

Ridge road, 150.
Ridges, mountain, 95.
Right-hand deflection, 258.
Rio Grande, 324.
Rio Pecos, 325.
River capture, 104.
River pirate, 104.
Rivers, aid of, in spreading plants, 345; effect of ice on, 53; effect of glacial ice on, 156; erosive work of, 52; floodplains of, 61; grade of, 56; mature valleys of, 57; mountain, 103; old valleys of, 58; rejuvenated, 83; rock load of, 51; superimposed, 83; supply of water, 50; of United States, 320-334; variation in volume of, 50.
River swamps, 169.
River terraces, 63.
River valleys, 50-68; life history of, 54.
Roches moutonnées, 142, 153.
Rochester, 155, 229, 303, 376.
Rock, 19; beneath soil, 16.
Rock basins, 142.
Rock flour, 139.
Rocks, 408-413; chemically formed, 409, 410; classification of, 408; elastic, 409, 410; fragmental, 409, 410; igneous, 408, 411, 412; metamorphic, 408, 413; minerals in, 408; mountain, 93, 94; of crust, 32; organic, 410; resistance of, 34; sedimentary, 408-410; sedimentary, consolidation of, 33.
Rocky Mountains, 99, 101, 107.
Rollers, 185.
Rome, 376.
Rome, N.Y., 303.
Rotation, 5, 6, 398; effect of, on winds, 258; effects of, 7.
Royal Gorge of Arkansas, 326.
Russian plains, 75.

S.

Sacramento River, 321.
Sage brush, 343.
Sahara, 282.
St. Gothard tunnel, 107.
St. Helena, 124, 175.
St. Lawrence system, 155, 167, 329-334.
St. Louis, 312, 376.
St. Paul, 310, 312.

St. Petersburg, 376.
St. Pierre, destruction of, 113-114.
Salem, 224.
Salines, 87, 169, 170.
Salt, 170, 410; deposits of, 167; in ocean, 179, 180.
Salt Lake City, 164, 315, 324.
Salt lakes, 87, 163, 324.
Salt marshes, 216.
Samoa, typhoon at, 271.
Sand bars, 213.
Sand beds, 409, 410.
Sand dunes, desert, 88; seacoast, 215.
Sand plains, 149.
Sandstone, 33, 35, 409, 410.
Sandy Hook, 213, 215.
San Francisco, 278, 316, 376.
San Francisco Bay, 208, 321.
San Joaquin River, 321.
Sardinia, 25, 207.
Sargasso Sea, 192.
Satellite, 6.
Saturation of air, 244, 245.
Savanna belts, 283.
Savanna, flora of, 342.
Savannah, 306.
Scandinavia, peninsula of, 25, 208.
Scenery, western United States, 316.
Schist, 34, 35, 413.
Schools of forestry, 350.
Scoria, 122.
Scranton, 109, 309, 376.
Sculpturing by rain, 51.
Sea breezes, 256.
Sea caves, 211.
Sea cliffs, 211.
Sea coast, changes in, 204.
Sea Islands, 215.
Sea level, 8, 179.
Seasonal temperature range, 243.
Seasons, explanation of, 398.
Seattle, 316.
Sea water, composition of, 179; density of, 181; pressure of, 181.
Sedimentary rocks, 32, 408-410.
Sediment in rivers, 51, 52.
Seeds, distribution of, 345.
Selective scattering, 233.
Seneca Lake, 153, 303.
Shale, 33, 35, 409, 410.

Sheets, intruded, 34, 127.
Shelter, 372.
Shore lines, 203-225; abandoned, 220; importance of, 203; lake, 162, 220.
Shoshone Falls, 320.
Siberia, frozen soil in, 19.
Siberian plains, 75.
Sicily, 25, 207.
Siderite, 408.
Sierra Nevada, 99.
Silicious sinter, 410.
Sill, 34, 127.
Simplon tunnel, 107.
Sink holes, 60.
Sinking of land, 24.
Sirocco, 289.
Sky, color of, 233.
Slate, 413.
Sleet, 249.
Sling psychrometer, 423.
Snag Lake, 121.
Snake River, 320.
Snake River valley, lava plateau, 125.
Snow, 249; measurement of, 424.
Snow crystals, 249.
Snow field, 137.
Snow line, 96.
Soil, 16; glacial, 154; importance of, to plants, 338; lava, 130; New England, 299; residual, 43.
Solar system, 3; heat in, 9.
Solid, 19.
Sounding, 174.
South America, 24; coast of western, 206; fauna of, 363.
Southeast trades, 259.
Southern ocean, 26; weather of, 293; winds of, 261.
South magnetic pole, 418.
South temperate zone, climate of, 293.
Spain, peninsula of, 25.
Spectrum, colors of, 232.
Sphagnum, 168.
Spits, 213.
Spread of animals, 360.
Springfield, 300.
Springs, 59.
Spring tides, 189, 417.
Stacks, 223.
Stalactites, 60, 409, 410.

T.

Tableland, 83.
Tacoma, 316.
Talus, 44, 97.
Tanganyika, Lake, 162.
Tasmania, 25.
Temperate zones, man in, 385; climates of, 285-293; fauna of, 356; flora of, 340.
Temperature, daily range in, 241; difference in, on earth, 239; effect of altitude

on, 240; effect of, on animals, 353; importance of, to plants, 336; influence of cyclones and anticyclones on, 265; measurement of, 420; of ocean, 182; seasonal range in, 243; in temperate zones, 285.
 Terminal moraines, 139, 148.
 Terraces, river, 63.
 Thaws, 289, 292.
 Thermograph, 421.
 Thermometers, 420.
 Thousand Islands, 330.
 Thunder, 268.
 Thunderstorms, 267, 268, 280, 289, 291.
 Tidal currents, 187, 188, 210.
 Tidal range, 187.
 Tides, 187-190, 416; effects of, 189; work of, 210.
 Till, 142, 152.
 Timber line, 96, 343.
 Time and longitude, 404.
 Toledo, 166, 313.
 Topographic maps, use of, 432.
 Topography, influence of on climate, 279.
 Tornadoes, 268, 289.
 Toronto, 166, 313.
 Torrid zone, climatic belts of, 279-284.
 Trachyte, 411.
 Trade winds, 259; belts, rainfall of, 280, 281; desert belts, 281.
 Transparent, 234.
 Trap, 411.
 Trenton, 75.
 Tropical fauna, 337.
 Tropical flora, 342.
 Tropical zone, man in, 385.
 Trough of waves, 185.
 Troy, 303.
 Tufa, 409, 410.
 Tulare, Lake, 67.
 Tundra, 76, 168, 340, 384.
 Tunis, peninsula of, 25, 207.
 Tuscarora deep, 175.
 Typhoons, 269.

U.

Underground water, 19, 50, 59, 132; work of, 39.
 Undertow, 185, 210.
 Ungava Bay, tides of, 187.

United States, physiography of, 298-317; reasons for development of, 390-392; rivers of, 320-334; western, 314.
 Unsymmetrical folds, 37.
 Utica, 303.

V.

Valley breezes, 256.
 Valley glaciers, 137-142; distribution of, 141; former extension of, 141.
 Valleys, filling of, 67; young, 55.
 Vapor, 15, 19; measurement of, 423, 424; water, 230.
 Vaporization, heat of, 238.
 Venezuela, plains of, 77.
 Vernal equinox, 400.
 Vesuvius, 115-118, 123, 129.
 Vicksburg, 61, 328.
 Victoria Nyanza, 162.
 Victoria, peninsula of, 25.
 Vienna, 376.
 Volcanic ash, 34, 112, 122, 412.
 Volcanic bombs, 122.
 Volcanic cones, forms of, 123.
 Volcanic plug, 126.
 Volcanoes, 101, 112-130; cause of, 125; distribution of, 123; importance of, 129; in sea, denudation of, 129; life history of, 128; materials erupted from, 122.

W.

Warm-blooded animals, 333.
 Warming of air, 238.
 Warming of land, 237.
 Warming of water, 238.
 Wash deposits, 139, 142.
 Washington, 75, 102, 307.
 Wash plains, 149.
 Water, 18, 19; forms of, 244-250; influence of, on climate, 277; need of, by plants, 337; underground, 19, 39, 50, 59; warming of, 238.
 Waterfalls, 53; of glacial origin, 155.
 Water gaps, 95, 103, 309, 391.
 Water hemisphere, 27.
 Water plants, 344; texture of, 339.
 Water power, effect of glacier on, 155; New England, 299, 300.
 Waterspouts, 269.
 Water vapor, 230.

INDEX.

Water wave, hurricane, 271; volcanic, 119.
 Waves, accompanying hurricane, 271; earthquake, 186; iceberg, 186; wind, 184; work of, 210.
 Weather, 275-295; desert, 282; eastern United States, summer, 291; winter, 292; influence of cyclones and anticyclones on, 265; southern ocean, 293; vane, 420.
 Weather Bureau, 426.
 Weather maps, 426.
 Weathering, 38-44; agents of, 38; aid of organisms in, 40; results of, 42; influence of underground water, 39; rate of, 41.
 West coasts, climate of, 286.
 Westerlies, prevailing, 260.
 Western America, coast of, 206.
 Western United States, 314; mineral in, 108; volcanoes in, 124, 125.
 West Indies, 20, 98, 297, 222; eruptions of 1902 in, 113.
 West wind drift, 193.
 Whitecaps, 185.
 White race, 382, 383.
 Wilkes Barre, 109, 309, 376.
 Wind-formed current, 186.
 Wind gaps, 104.
 Winds, 255-262; aid of, in distribution of animals, 360, 362; aid of, in spreading plants, 345, 346; as barriers to spread of plants, 346; cyclonic storm,

Y.

Yellow race, 382, 383.
 Yellowstone Falls, 326.
 Yellowstone Park, 316, 326; geysers of, 132; lava of, 126.
 Yellowstone River, 325, 326.
 York Peninsula, 25.
 Young, care of, by animals, 360.
 Young coast line, 221.
 Young mountains, 102.
 Young plain, 79.
 Young stream valleys, 55.

Z.

Zone of fracture, 18.
 Zones, of animal life, 364; of heat, 275.