

The conditions described and illustrated on the map make it apparent that the Interior Continental Sea opened westward toward the Pacific, but not eastward over temperate latitudes toward the Atlantic; and hence that migrations to those seas from Eurasia should have been chiefly from the west rather than from the east. On the contrary, New England and eastern Canada remained still open toward the Atlantic and Europe, and hence differences in the cotemporaneous faunas of this eastern part of North America and of the Continental Interior should be expected.

1. NIAGARA PERIOD.

ROCKS—KINDS AND DISTRIBUTION.

The beds over New York referred to the *Medina epoch*—the earlier part of the Niagara period—include, to the eastward, a seashore formation, called the *Oneida conglomerate* from Oneida in central New York, and an offshore sand-flat formation, called the *Medina sandstone* from Medina in the western part of the state.

The Oneida conglomerate is a hard light-gray rock made of quartz pebbles and sand. It covers large areas in Oneida and Herkimer counties, N.Y., but thins out eastward to 15 to 20 feet at Rondout on the Hudson. It comes up again in Ulster County (southeastern New York), owing to an uplift along the Shawangunk (pronounced *Shong-gum*) Mountains, and is there called the Shawangunk grit. This range commences near the Hudson, southwest of Kingston, and to the southwest, between New Jersey and Pennsylvania, becomes the Kittatinny Mountains. The grit makes the crest and southwest front of these mountains, and the beds dip westward 30°–40°. Thence the conglomerate, or grit, stretches on southwestward through Pennsylvania into Virginia, where “it makes the bony axis of the principal Appalachian ridges” (Rogers), and beyond into east Tennessee, where it is the Clinch Mountain sandstone of Safford. In Ulster County, N.Y., near Red-bridge, the Shawangunk grit has afforded galena and copper pyrites in large masses, and fine crystals; but the mine is not now worked. The *Medina sandstone* is ordinarily a gray to red mottled sandstone, fine-grained, thin-bedded, somewhat argillaceous, especially so to the westward, and bears evidence of having originated as a great sand-flat formation in shallow waters, as first described by Hall; for its layers are often covered with ripple-marks, wave-marks, and rill-marks, evidences of exposure above the waters, perhaps with the retreat of the tide, and in many places of gentle wave action on a slightly inclined beach. In making the rill-marks (page 95), the retreating undertow swept past worn shells of *Lingula cuneata* or small pebbles in the surface sands of the beach.

The beds are not found in eastern New York near the Hudson, but mainly to the west of Oneida County. They border Lake Ontario to its western extremity, and constitute the lower half of the Niagara bluffs at Lew-