and (3, 4a, 4b) overlying Lower Silurian strata. Such sections of Cambrian strata over the upturned Archæan are proof that the mountain-making in the region preceded the Cambrian era. It is probable that the Adirondacks were made at the close of Archæan time. They were, from the first, great mountains, for the highest of the summits, Mount Marcy, now stands 5000 feet above the Cambrian seashore, or the lowest Cambrian beds, and this is the height remaining after long ages of denudation. For the original height, 8000 feet above the Cambrian tide-level can hardly be too high an estimate.



From the south side of the St. Lawrence in Canada, between Cascade Point and St. Louis Rapids: 1, gneiss; 2, overlying Potsdam sundstone; 3, calciferous sand-rock; 4a, Trenton limestone; 4b, Hudson slates. Logan.

The fusion of beds by the heat in the lower and hotter part of the geosyncline would have made, by the escape of the liquid rock alone, fissures, veins of igneous rock in the metamorphic region, and also inclosures of the broken schists of the upper and less heated part of the mass (page 448). Such igneous eruptions are of the same age as the metamorphism.

How many epochs of upturning occurred in the course of Archæan time is unknown. In the vicinity of lakes Huron and Superior (and probably also farther east) there was one at the close of the Laurentian period.

Over the Archæan area of New Jersey, and of Orange and Putnam counties in New York, there are several long belts of Cambro-Silurian rocks, occupying what were originally valleys of Archæan time, having the northeastward trend of the rocks. They are fossiliferous in New Jersey, and partly metamorphic in Putnam County, N.Y., north of Peekskill. They once spread more widely over the Archæan Highlands, and, perhaps, covered the whole when the Coal-measures were finished, as considered probable by J. P. Lesley. The upturning the beds have undergone took place in spite of resistance to fracture or compression in the underlying Archæan rocks.

SUBSEQUENT ALTERATIONS OF ARCHÆAN ROCKS.

Archæan rocks have in many places undergone changes in their minerals. They were made at higher temperatures, under greater atmospheric pressures, and with slower rates of cooling, than ordinarily obtain now at the earth's surface; and these changed conditions, and especially those due to heat from orographic movements, have occasioned alterations in some constituents.

Many Archæan rocks that are now hornblendic were originally pyroxenic. Since other pyroxene rocks have remained unchanged, some circumstances must have intervened to commence the alteration; and it may be that it was a heating up of the rocks to 1000° F., through fracturings, faultings, and crushings attending earth-movements or mountainmaking. Besides the above-mentioned change, chrysolite, pyroxene, hornblende, and