

EPEIROGENIC CHANGES DURING THE QUATERNARY.

The upward continental movements of the early Quaternary and the late Tertiary, by which the greater mountain regions of the globe were elevated from 10,000 to more than 20,000 feet, and, following this, the wide-reaching but feeble downward movement of the Middle Quaternary, and then the more limited elevation closing the Champlain period, and, last, the settling back of the land to the degree of equilibrium characterizing Recent time, brought gradually and grandly to an end the earth's mountain-making. The movements were epeirogenic, and involved the whole sphere. It has been thought incredible that the orographic climax should have come so near the end of geological time, instead of in an early age, when the crust had a plastic layer beneath, and was free to move; yet the fact is beyond question. The event is made, on page 392, a legitimate effect of lateral pressure in the contracting crust; and the coral-island subsidence, or, in more general language, the deepening of great areas over the oceanic basin, is set forth on the same page as the counterpart.

Why, in the upward movement, the colder latitudes, or those outside of the parallel of 40°, should have been most affected, as the distribution of fiords and other facts make evident, is wholly unexplained. The interest of the problem is greatly enhanced by the new facts proving that the Antarctic Continent also was elevated and greatly enlarged, — probably to four times its present area; that not only the lands of the high northern latitudes were affected, but also their antipodes in the high southern latitudes. Under these conditions the earth's polar diameter would have received a considerable increase of length, and the waters would have been deepened over the lower latitudes.

The idea of Croll, that the Glacial periods of the northern and southern hemispheres followed one another, has no support from geological facts, and few supporters among geologists.

The Champlain subsidence following the elevation has been attributed, on the principle of isostasy, as stated on page 379, to the weight of the load of ice over the glaciated land. The cause is good in principle, but of doubtful sufficiency. The facts stated on page 980, with regard to the departure of the ice from the United States before the subsidence had made much progress, indicate a great lagging in the effect, far greater than is compatible with the results of a load. Moreover, the coast region of California subsided deeply (page 985) although it had not been covered by ice; and the land which joined South America with Cuba and probably Florida, and that uniting Africa to Malta and Sicily disappeared, although far outside of the ice-limit. The dry land across the British Channel between England and France continued emerged long after the mild climate, which favored migration of warm climate Mammals, set in; and it became submerged although the land either side was never under the ice-sheet. France and