

CHAPTER VIII.

ON FORMER CHANGES IN PHYSICAL GEOGRAPHY AND CLIMATE.

Geographical features of the northern hemisphere, at the period of the oldest fossiliferous strata—State of the surface when the mountain limestone and coal were deposited—Changes in physical geography, between the carboniferous period and the chalk—Abrupt transition from the secondary to the tertiary fossils—Accession of land, and elevation of mountain chains, after the consolidation of the secondary rocks—Explanation of Map, showing the area covered by sea, since the commencement of the tertiary period—Astronomical theories of the causes of variations in climate—Theory of the diminution of the supposed primitive heat of the globe.

IN the sixth chapter, I stated the arguments derived from organic remains for concluding that in the period when the carboniferous strata were deposited, the temperature of the ocean and the air was more uniform in the different seasons of the year, and in different latitudes than at present, and that there was a remarkable absence of cold and great moisture in the atmosphere. It was also shown that the climate had been modified more than once since that epoch, and that it had been reduced by successive changes, more and more nearly to that now prevailing in the same latitudes. Farther, I endeavoured, in the last chapter, to prove that vicissitudes in climate of no less importance may be expected to recur in future, if it be admitted that causes now active in nature have power, in the lapse of ages, to produce considerable variations in the relative position of land and sea. It remains to inquire whether the alterations, which the geologist can prove to have *actually taken place* at former periods, in the geographical features of the northern hemisphere, coincide in their nature, and in the time of their occurrence, with such revolutions in climate as might naturally have resulted, according to the meteorological principles already explained.

Period of the primary fossiliferous rocks.—The oldest system of strata which afford by their organic remains any decisive evidence as to climate, or the former position of land and sea, are those formerly known as the *transition rocks*, or what have since been termed Lower Silurian or “primary fossiliferous” formations. These have been found in England, France, Germany, Sweden, Russia, and other parts of central and northern Europe, as also in the great Lake district of Canada and the United States. The number and magnitude of the multilocular or chambered univalves, and of the corals, obtained from the limestones of these ancient groups, recal the forms now most largely developed in tropical seas. Hitherto, few, if any, contemporaneous vegetable remains have been noticed; but such as are men-