

leaves, also, are attached in many instances to the trunks or branches*; and leaves we know, in general, are soon destroyed when steeped in water, although ferns will retain their forms after an immersion of many months.† It seems fair to presume, that many of the coal-plants grew upon the same land which supplied materials for the sandstones and conglomerates of the strata in which they are imbedded. The coarseness of the particles of many of these rocks attests that they were not borne from very remote localities, and that there was land therefore in the vicinity wasting away by the action of moving waters. The progress also of modern discovery has led to the very general admission of the doctrine that beds of coal have for the most part been formed of the remains of trees and plants that grew on the spot where the coal now exists; the land having been successively submerged, so that a covering of mud and sand was deposited upon accumulations of vegetable matter. That such has been the origin of some coal-seams is proved by the upright position of fossil trees, both in Europe and America, in which the roots terminate downwards in beds of coal.‡

To return, therefore, from this digression, — the flora of the coal appears to indicate a uniform and mild temperature in the air, while the fossils of the contemporaneous mountain-limestone, comprising abundance of lamelliferous corals, large chambered cephalopods, and crinoidea, naturally lead us to infer a considerable warmth in the waters of the northern sea of the Carboniferous period. So also in regard to strata older than the coal, they contain in high northern latitudes mountain masses of corals which must have lived and grown on the spot, and large chambered univalves, such as *Orthocera*, which indicate, even in regions bordering on the arctic circle, the former prevalence of a temperature more elevated than that now prevailing.

The warmth and humidity of the air, and the uniformity of climate, both in the different seasons of the year, and in different latitudes, appear to have been most remarkable when some of the oldest of the fossiliferous strata were formed. The approximation to a climate similar to that now enjoyed in these latitudes does not commence till the era of the formations termed tertiary; and while the different tertiary rocks were deposited in succession, from the eocene to the pliocene, the temperature seems to have been lowered, and to have continued to diminish even after the appearance upon the earth of a considerable number of the existing species, the cold reaching its maximum of intensity in European latitudes during the glacial epoch, or the epoch immediately antecedent to that in which all the species now contemporary with man were in being.

* Fossil Flora, No. X.

† This has been proved by Mr. Lindley's experiments, *ibid.*, No. XVII.

‡ I have treated of this subject in my *Elements of Geology*, and still more fully in my *Travels in N. America*, vol. ii. p. 178. For a luminous and philosophical dissertation on the facts at present known, and the theories entertained

by the most eminent geologists and botanists on this subject, see Mr. Horner's Anniversary Address to the Geological Society of London, February, 1846. Consult also Sir H. de la Beche, on the formation of rocks in South Wales, *Memoirs of Geol. Survey of Great Brit.* 1846, p. 1 to 296.