

latitudes. It was towards the close of this period that the seas of the northern hemisphere became more and more filled with floating icebergs often charged with erratic blocks, so that the waters and the atmosphere were chilled by the melting ice, and an arctic fauna enabled, for a time, to invade the temperate latitudes both of N. America and Europe. The extinction of a considerable number of land quadrupeds and aquatic mollusca was gradually brought about by the increasing severity of the cold; but many species survived this revolution in climate, either by their capacity of living under a variety of conditions, or by migrating for a time to more southern lands and seas. At length, by modifications in the physical geography of the northern regions, and the cessation of floating ice on the eastern side of the Atlantic, the cold was moderated, and a milder climate ensued, such as we now enjoy in Europe.*

Proofs from fossils in secondary and still older strata.—A great interval of time appears to have elapsed between the formation of the secondary strata, which constitute the principal portion of the elevated land in Europe, and the origin of the eocene deposits. If we examine the rocks from the new red sandstone to the chalk inclusive, we find many distinct assemblages of fossils entombed in them, all of unknown species, and many of them referable to genera and families now most abundant between the tropics. Among the most remarkable are reptiles of gigantic size; some of them herbivorous, others carnivorous, and far exceeding in size any now known even in the torrid zone. The genera are for the most part extinct, but some of them, as the crocodile and monitor, have still representatives in the warmer parts of the earth. Coral reefs also were evidently numerous in the seas of the same periods, and composed of species belonging to genera now characteristic of a tropical climate. The number of very large chambered shells also leads us to infer an elevated temperature; and the associated fossil plants, although imperfectly known, tend to the same conclusion, the Cycadeæ constituting the most numerous family.

But it is from the more ancient coal deposits that the most extraordinary evidence has been supplied in proof of the former existence of an extremely uniform, moist, warm, and equable climate in those latitudes which are now the colder, and in regard to temperature the most variable regions of the globe. We learn from the researches of Adolphe Brongniart, Goeppert, and other botanists, that in the flora of the carboniferous era there was a great predominance of ferns, some of which were arborescent; as, for example, *Calopteris*, *Protopteris*, and perhaps *Psaronius*; nor can this be accounted for, as some have supposed, by the greater power which ferns possess of resisting maceration in water.† This prevalence of

* For an account of the more modern changes of the tertiary fauna and flora of the British Isles and adjoining countries, and particularly those facts which relate to the "glacial epoch," see an admirable essay by Prof. E. Forbes. *Memoirs of Geol. Survey of Great Brit.*

vol. i. p. 336. London, 1846. To this important memoir I shall have frequent occasion to refer in the sequel.

† See a paper by Charles J. F. Bunbury, Esq. *Journ. of Geol. Soc. London*, No. 6. p. 88. 1846.