

must give rise to a general warmth and uniformity of climate throughout the globe.

Changes in physical geography between the formation of the carboniferous strata and the chalk.—We have evidence in England that the strata of the ancient carboniferous group, already adverted to, were, in many instances, fractured and contorted, and often thrown into a vertical position before the deposition of some of the newer secondary rocks, such as the new red sandstone.

Fragments of the older formations are sometimes included in the conglomerates of the more modern; and some of these fragments still retain their fossil shells and corals, so as to enable us to determine the parent rocks from whence they were derived. There are other proofs of the disturbance at successive epochs of different secondary rocks before the deposition of others; and satisfactory evidence that, during these reiterated convulsions, the geographical features of the northern hemisphere were frequently modified, and that from time to time new lands emerged from the deep. The vegetation, during some parts of the period in question (from the lias to the chalk inclusive), when genera allied to *Cycas* and *Zamia* were abundant, appears to have approached to that of the larger islands of the equatorial zone; such, for example, as we now find in the West Indian archipelago.* These islands appear to have been drained by rivers of considerable size, which were inhabited by crocodiles and gigantic oviparous reptiles, both herbivorous and carnivorous, belonging for the most part to extinct genera. Of the contemporary inhabitants of the land we have as yet acquired but scanty information, but we know that there were flying reptiles, insects, and small mammifers, allied to the marsupial tribes.

A freshwater deposit, called the Wealden, occurs in the upper part of the secondary series of the south of England, which, by its extent and fossils, attests the existence in that region of a large river draining a continent or island of considerable dimensions. We know that this land was clothed with wood, and inhabited by huge terrestrial reptiles and birds. Its position so far to the north as the counties of Surrey and Sussex, at a time when the mean temperature of the climate is supposed to have been much hotter than at present, may at first sight appear inconsistent with the theory before explained, that the heat was caused by the gathering together of all the great masses of land in low latitudes, while the northern regions were almost entirely sea. But it must not be taken for granted that the geographical conditions already described (p. 110., and Plate 2. Fig. 1.) as capable of producing the extreme of heat were ever combined at any geological period of which we have as yet obtained information. It is more probable, from what has been stated in the preceding chapters, that a slight approximation to such an extreme state of things would be sufficient; in other words, if

* Ad. Brongniart, *Consid. Générales sur la Nat. de la Végét. &c.*, Ann. des Sci. Nat., Nov. 1828.