

ferns indicates an extremely moist, equable, and temperate climate, and the absence of any severe cold; for such are the conditions which, at the present day, are found to be most favourable to that tribe of plants. It is only in the islands of the tropical oceans, and of the southern temperate zone, such as Norfolk Island, Otaheite, the Sandwich Islands, Tristan d'Acunha, and New Zealand, that we find any near approach to that remarkable preponderance of ferns, which is characteristic of the Carboniferous flora. It has been observed that tree ferns and other forms of vegetation which flourished most luxuriantly within the tropics, extend to a much greater distance from the equator in the southern hemisphere than in the northern, being found even as far as 46° S. latitude in New Zealand. There is little doubt that this is owing to the more uniform and moist climate occasioned by the greater proportion of area of sea. Next to ferns, the most abundant vegetable forms in the coal formation are the Calamites, Lepidodendra, Sigillariæ, and Stigmaria. These were formerly considered to be so closely allied to tropical genera, and to be so much greater in size than the corresponding tribes now inhabiting equatorial latitudes, that they were thought to imply an extremely hot, as well as humid and equable climate. But recent discoveries respecting the structure and relations of these fossil plants, have shown that they deviated so widely from all existing types in the vegetable world, that we have more reason to infer from this evidence a widely different climate in the Carboniferous era, as compared to that now prevailing, than a temperature extremely elevated.* Palms, if not entirely wanting when the strata of the carboniferous group were deposited, appear to have been extremely rare.†

"In regard to the geographical extent of the ancient vegetation, it was not confined," says M. Brongniart, "to a small space, as to Europe, for example; for the same forms are met with again at great

* The Calamites were formerly regarded by Adolphe Brongniart as belonging to the tribe of Equisetaceæ; but he is now inclined to refer them to the class of gymnogens or gymnospermous exogens, which includes the Conifera and Cycadæ. Lepidodendron appears to have been either a gigantic form of the lycopodium tribe, or, as Dr. Lindley thinks, intermediate between the lycopodia and the fir tribe. The Sigillariæ were formerly supposed by Ad. Brongniart, to be arborescent ferns; but the discovery of their internal structure, and of their leaves, has since proved that they have no real affinity to ferns. According to the view now taken of their structure, their nearest allies in the recent world are the genera Cycas and Zamia; while Corda, on the other hand, maintains that they were closely related to the succulent euphorbias. Stigmaria is now generally admitted to have been merely the root of sigillaria. The scalariform vessels of these two genera are

not conclusive in proving them to have a real affinity with ferns, as Mr. Brown has discovered the same structure of vessels in Myzodendron, a genus allied to the misletoe; and Corda has lately shown that in two species of Stigmaria, hardly distinguishable by external characters, the vessels of the one are scalariform, and of the other dotted.

† Mr. Lindley has endeavoured to show in the "Fossil Flora" that Trigonocarpum Noeggerathii, a fruit found in the coal measures, has the true structure of a palm-fruit; a determination which Ad. Brongniart thinks very doubtful. nor is the French botanist satisfied that some specimens of supposed palm-wood from the coal-mines of Radnitz in Bohemia, described by Corda, really belong to palms. On the other hand, Corda has proved Flabellaria borassifolia of Sternberg to be an exogenous plant, and Brongniart contends that it was allied to the Cycadæ. See Tableau des Genres de Végétaux Fossiles. Paris, 1849.