

2. *Changes at the close of the Lower Cretaceous.*—After the earlier Cretaceous, the emergence of the Mexican plateau took place, shutting off the Atlantic waters from the Pacific; and at the same time, movement change occurred in Texas. According to Hill, faults and flexures were produced, especially in the vicinity of Austin. The general direction of the faults in the region is N. 20° E. The amount of displacement is generally less than 100 feet; but in the chief fault it is 500 to 750 feet, and the course is marked by an escarpment 100 to 250 feet high. Along the faults the beds are in some places flexed, and the limestone is rendered crystalline. Moreover, there is an abrupt transition in species in passing from the Lower to the Upper Cretaceous. The Potomac beds, of the Atlantic border, underwent some change in level and some surface erosion; but no upturning.

On the California coast the continuity of the Shasta-Chico series indicates that the general subsidence mentioned by Diller as in progress during the Cretaceous period was not interrupted at the close of the Lower Cretaceous. But in Western British America, the increased subsidence which introduced the Upper Cretaceous, and spread the sea over the Continental Interior, is supposed by G. M. Dawson (1890) to be marked in a deposit of marine conglomerates, occurring in many places in the southern part of British Columbia, in the Queen Charlotte Islands, northward about the Upper Yukon, and eastward along the line of the Rocky Mountains. Dawson reports also that at this stage of the Cretaceous, or near it, there was renewed volcanic activity in the Queen Charlotte Islands and in the Rocky Mountain Range.

#### BIOLOGICAL CHANGES AND PROGRESS.

Part of the biological history of Mesozoic time has already been reviewed. Still greater changes took place in this later portion, and these now come under consideration.

*Plants: Cycads, Angiosperms, Palms.*—The Cycads, the most characteristic feature of the Triassic and Jurassic, had their maximum development during the latter period. They were still prominent, however, in the forests of the Early Cretaceous, and flourished even in the Arctic regions on Greenland, Spitzbergen, and Alaska; but they were subordinate to the Conifers, and, in the Upper Cretaceous, to the Angiosperms. At present there are only about 50 species of Cycads.

The line leading up to Angiosperms is uncertain. It is a notable fact that remains of plants of this class are wholly absent from the Wealden of England and from the Kootanie of America, and that only one species of doubted locality has been reported from the Neocomian of Europe. The 75 species identified by Fontaine from the fossil leaves of the Potomac formation of eastern America show that the trees were then well established in the American forests, although Conifers were by far the more numerous. But still, as Fontaine shows, they leave their origin unexplained.