

PHYSICAL CHARACTERISTICS OF CANADA.

in front of the glacier, being unable to survive under arctic conditions, was also forced to move southward and to cede the ground to the invading arctic types. When the cold reached its maximum, those parts of the United States which now are temperate thus had a typical arctic flora, *i.e.*, a flora almost identical with the circumpolar flora of the present time. With the return of a warmer climate, the arctic plants gradually retreated northward, followed by more temperate and southern types. Generally speaking, the Canadian plants can therefore all be looked upon as immigrants gradually taking possession of the country after the glacial period, the different species establishing themselves in regions where the climatic conditions met their specific requirements.

The glacial period, furthermore, explains readily a few striking features in the present distribution of Canadian plants, *viz.*, the occurrence of identical species in localities separated by hundreds or even thousands of miles of land, across which, under present conditions, migration is impossible. Thus, a number of species occur in the Rocky Mountains which are identical with species living in Arctic Canada or in Labrador and Eastern Quebec, but occurring nowhere else in the Dominion. These facts may be explained in the words of Darwin, as follows:

As the warmth returned (after the glaciation had reached its height) the arctic forms would retreat northward, closely followed up in their retreat by the productions of the more temperate regions. And as the snow melted from the bases of mountains, the arctic forms would seize on the cleared and thawed ground, always ascending higher and higher, as the warmth increased, whilst their brethren were pursuing their northern journey. Hence, when the warmth had fully returned, the same arctic species, which had lately lived in a body together in the lowlands . . . , would be left isolated on distant mountain summits (having been exterminated on all lesser heights) and in the arctic regions. . . .

With regard to British Columbia, a few words may be said in explanation of the diversity of the flora. Although glaciation may not, at any time, have been general, it is nevertheless highly probable that its flora, at the time of the glacial period, was subjected to the necessity of migration in a north and south direction. At any rate, the British Columbia flora is most closely related to the flora south of the province, genera and species occurring which extend as far south as to New Mexico and California.

The most characteristic feature of the flora of British Columbia is, however, not so much its general relationship to the flora to the south as the existence of different floristic provinces more or less sharply defined. The existence of different "floras" is due not only to the highly diversified climatic conditions, but perhaps still more to the presence of mountain chains and desert-like areas which act as barriers checking the free migration of the plants.

Arctic Zone.—Botanically, the Arctic zone is the region lying north of the tree line. In Canada it extends far to the south of the Arctic circle, especially in the eastern parts of the Dominion. Its southern limit is, roughly, a line running from the estuary of the Mackenzie river to the mouth of the Churchill river, on the west coast of Hudson bay. East of Hudson bay, the tree line runs from about lat. 52° on