

even in the tropics present arctic conditions at their peaks. Less elevation has similar effect in proportion to its height and often a rise of a few hundred feet will produce conditions that otherwise would only occur at considerable distance to the north. Not only do hill and mountain ranges thus project long tongues of northern faunas into southern localities but on the retreat of the ice at the end of glacial epochs they formed northern oases for the retreating cold-loving forms as they withdrew from the gradually warming lowlands. We thus have true arctic "relicts" of an ancient order isolated on mountain tops far from their natural geographical habitats,—boreal islands in a sea of more southern life.

The general outline of zonal life distribution is well known. All are familiar with the fact that tropical life differs from temperate and from arctic. Close study, however, shows that besides these broad and obvious associations are minor ones. Various attempts have been made to map them out, and perhaps the most successful and generally accepted one for our purposes is that by Dr. C. Hart Merriam. This divides North America into three regions, a Boreal, Austral and a Tropical one, with the first two each divided into three life zones: the Arctic, Hudsonian and Canadian zones for the Boreal region and the Transition, and Upper and Lower Austral zones for the Austral Region. In Canada we have five of these zones represented—from the north: the Arctic, Hudsonian, Canadian, Transition and Upper Austral. These extend across the continent, roughly agreeing with latitude, but thrown out of regularity, as previously indicated, by local conditions and agreeing closely with the mid-summer isotherms or temperature belts.

The Arctic zone is the so-called "barren land" of the far north, treeless and almost shrubless, and extends south to include all the north shore of the continent as well as the islands above. The distinctive land mammals of this zone are the polar bear, the musk ox, Barren Land caribou, arctic fox, arctic hare and lemming. Amongst the characteristic birds are snow buntings, ptarmigan, longspurs, snowy owl and the gyrfalcons. This is the great nesting ground for many of our waders and more northern ducks and geese. There are few residents, as most forms migrate in winter.

The Hudsonian zone is the land of scrub forests, small stunted trees, mostly coniferous, and scattered dwarf willows and poplars. The southern boundary of this zone extends from the north shore of the gulf of St. Lawrence to near the mouth of James Bay, thence in a wavy curve to Great Slave lake where it drops south suddenly to a latitude about on line with the lower point of the Alaska Pan-handle, and thence to near the coast. It thus includes the southern Ungava peninsula, a narrow belt extending northwest from James bay, the Yukon, northern British Columbia and southern Alaska. It is penetrated from the north by the Arctic zone which persists on the mountains of the Yukon and from the south by the Canadian zone which follows up the valleys of the Mackenzie and Peace rivers. It is shut off from the sea on the Pacific side by the Alaska Pan-handle which has an intrusive Canadian