Arctic Barren Grounds Floral Region

Botanically, the Canadian Arctic is generally regarded as comprising the treeless region along the northern mainland and the numerous islands of the Arctic Archipelago (see map). Its southern boundary, shown in the map by Porsild (1951a, p. 11), coincides with the northern limits of the transcontinental boreal coniferous forest, and is so indicated in the maps referred to above, as well as in the map plotted by Hustich (1953) showing the northern limits of white and black spruce. Rousseau (1952) has used plants as the basis of his separation of the Quebec–Labrador area into arctic, hemiarctic, and subarctic divisions, each with several subdivisions.

Many species are endemic (confined) to the Arctic, some have alpine stations farther south and others are of wide distribution in Canada. Porsild (1957 and 1964) has published maps of the ranges of the 340 species and major geographical races found in the Canadian Arctic Archipelago (representing 115 genera distributed among 38 families). In an earlier paper, basing his calculations on the total of 327 species then known in the Archipelago, Porsild (1955) classed 143 species (43.9 p.c.) as belonging to a widely distributed circumpolar group (33 high-arctic, 42 arctic-alpine, and 68 low-arctic). North American species comprised 58 North American Radiants, 10 Cordilleran Endemics, 26 Arctic Archipelago Endemics, 10 Western Arctic Endemics, 16 Eastern Arctic Endemics, 15 Amphi-Beeringian species, 17 northern Amphi-Atlantic species, and 31 southern Amphi-Atlantic species. The significance of these categories is pointed out in the discussion entitled "Plant Distribution" (p. 51). Polunin (1940) lists 297 species for the botanical Arctic east of about 97° West Longitude. For a general account of the vegetation and ecology of the Canadian eastern Arctic, see Polunin (1948).

In addition to climatic factors of the botanical Arctic dealt with in a general manner in the discussion of "The Plant Environment", two features deserve special attention—permafrost (permanently frozen ground) and the effect on vegetation of soil frost phenomena.

The map accompanying the paper by Jenness (1949) indicates the southern limits of permafrost in Canada as roughly coinciding with the −5° C isotherm of mean annual temperatures. Extensive areas of permafrost are depicted as extending as far south as Fort Severn on the south coast of Hudson Bay, while patches are shown as far south as the middle of James Bay. Jenness writes that, "Permafrost seems to affect vegetation mainly in two ways. Wherever the active layer is shallow, the frozen ground represses all deep-rooted species and limits growth to those that have shallow roots. Of Canadian trees, spruce (both black and white), balsam, poplar and the birches are all shallow-rooted, and all will grow above the permafrost. . . . The second way in which permafrost affects vegetation is through its influence on drainage. Because it provides an impervious base to subsurface water, it confines drainage to the shallow active layer. . . In such areas ground-water eliminates all but the most water-loving species. . . . Porsild believes, however, that were the soil not so waterlogged, it would revert to barren desert on account of the climate. And it is the permafrost that keeps it waterlogged." By "active layer" is meant the top section subject to annual freezing and thawing, thus not part of the permafrost proper.

According to Benninghoff (1952), "Soil surfaces are in places rendered unavailable to plants or to certain kinds of plants because of soil stirring, sorting and transport by frost action. Patterned ground, i.e., surfaces with polygons, pitted tundra, soil stripes, and similar features, gives striking demonstrations of these effects. . . . Plants affect soil frost phenomena most significantly through controls exercised on the thermal regime of the soils, and these controls and resultant effects are probably different for all natural sites. . . . Plant succession in temperate regions tends to establish more mesophytic conditions in which drainage relations are less extreme. But in regions of severe frost climate, plants commonly generate conditions of extreme lack of drainage and greatly intensified soil frost. . . . Because of soil frost changes following disturbance, the affected surface and the local environment may be so greatly modified that entirely different communities occupy the site for unknown periods of time."