extremely localized in eastern North America. Conversely, an orchid, the hooded ladies'-tresses (*Spiranthes romanzoffiana*), is of transcontinental range in North America, with a few 'relic' stations in Ireland and northern Scotland. He believes that amphi-Atlantic species were formerly essentially circumpolar, with their area reduced by the last glaciation to the present one. Many of these species are apparently identical on both sides of the Atlantic but some are represented in one of the areas by closely related but morphologically distinct species or varieties, in this latter case forming pairs of 'vicariads' or corresponding but geographically widely separated forms.

Hultén (1960) has also published maps showing the ranges of 228 circumpolar plants, most of which occur in Canada (a few only in the United States in North America). He had previously published (1937) a treatise with maps entitled *Outline of the History of Arctic and Boreal Biota during the Quaternary Period*, dealing with "their evolution during and after the glacial period as indicated by the equiformal progressive areas of present plant species". His Plate 11 of North Beringia Radiants, for example, superimposes upon one another the ranges of 28 species of plants supposedly derived from an original "centrum" in the Bering Sea region. Of these, those still confined to Alaska are only slightly differentiated from similar more widespread species found elsewhere, and are considered by Hultén as doubtless young species that have arisen probably not earlier than during the last inter-glacial period. Mountain avens (*Dryas integrifolia*) and three-toothed saxifrage (*Saxifraga tricuspidata*), however, now range across Canada to Greenland, and, being extremely characteristic and well differentiated, must be very old species. Their areas were reduced during the several phases of glaciation but they still had large areas at their disposal, spread from there during inter-glacial phases and, following the last ice-sheet, the Wisconsin, have spread southward over the formerly glaciated area. Hultén's Plate 16, likewise, indicates the probable derivation of 74 "Western American Coast Radiants" from a centrum in the Bering Sea region, while his Plate 17 indicates a similar centrum for species some of which now range as far east as Manitoba and Ontario. Such work is of great interest in helping to solve problems of migration of Canada's plants, being reflected in Sheet 38 of the *Atlas of Canada* (1937), compiled by A. E. Porsild and the present writer, showing the "progressive areas" in Canada of several species in each of the following groups: high-arctic; arctic; Arctic Archipelago endemics; eastern Arctic endemics; western Arctic endemics; arctic-alpine; low-arctic; amphi-Atlantic (northern element); amphi-Atlantic (southern element); amphi-Beringian; boreal forest; Pacific coast; prairie and foothill; and disjunct species.

Concerning this sheet of maps, Porsild (1958) writes: "When the ranges of the plants of which the flora of Canada is composed are plotted on maps, it at once becomes clear that the species may be sorted into regional groups having similar ranges. Climate, soil and topography affect the local ranges of the species within the groups, but the groups themselves obviously have a common historical background. Some species thus have a distinctly eastern and some a distinctly western range, others are wide-ranging, whereas still others again are peculiar or endemic to smaller and restricted areas". He notes that many North American plants occur also in Eurasia (often their main area) and that many plants of northwestern North America also occur in eastern Asia, these plants having been present in North America before the ice age because a wholesale transatlantic migration in post-glacial time was impossible.

The areas of North America generally accepted as having served as plant refugia during at least the last stage of Pleistocene glaciation are large parts of Alaska and Yukon, the northern tip of the Queen Charlotte Islands, some alpine regions of British Columbia, the northern islands of the Arctic Archipelago, and probably at least some of the higher mountains of Labrador, these together forming a 'rainbow' within whose hollow plant life was virtually eliminated.

Much interest was aroused among plant geographers by the publication by Fernald (1925) of a lengthy paper entitled *Persistence of Plants in Unglaciated Areas of Boreal America*. Fernald pointed out that the Gulf of St. Lawrence region (particularly the calcareous plateau of the Long Range of western Newfoundland and the calcareous sea-cliffs