

International Cooperation in Treeline Research

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Northern circumpolar treeline research and its topicality were discussed informally at the Circumpolar Conference on Northern Ecology in Ottawa in 1975. The representatives of the Kevo Subarctic Research Institute in Finland (PK) and Abisko Scientific Research Station in Sweden (MS) offered to organize a conference to examine the present knowledge of the ecology of forests with a marginal distribution in subarctic areas and to define major fields of research on a national and international basis.

In the Fennoscandian Subarctic, a wide zone of birch forest covers northernmost Finland, Norway and Sweden, the northern Kola Peninsula and the Scandes, extending to the southern part of Norway. Birch forest also occurs sporadically in Iceland and Greenland. The birch zone is the scene of "subarctic birch evolution". Three *Betula* species occurring in Fennoscandia (*B. pubescens*, *B. pendula* and *B. nana*) constitute the gene pool for the evolution of the mountain birch, *B. "tortuosa"*. Another characteristic feature of the Fennoscandian forest and treeline is the presence of the pine (*Pinus sylvestris*) as the northernmost conifer intruding into the subarctic zone, which has been studied since the time of Wahlenberg (1812).

The Fennoscandian Tree-line Conference was held at Kevo and Abisko in September 1977 with economic support from the Nordic Cultural Fund, the Ministry of Education in Finland and the Nordic Publishing Board in Science in Sweden. The 29 participants represented Canada, Denmark, Finland, Iceland, Norway, Poland, Sweden and the U.S. The proceedings of the conference were published in 1979 in the journal *Holarctic Ecology* 2(4).

A post-conference visit was arranged to the new research station of Forsheim, on Skjomen Fjord near Narvik, Norway. At Forsheim discussions were held regarding permanent cooperation between field stations in northern Fennoscandia, Iceland and Greenland. The outlines for such collaboration on ecological research into subarctic birch forests were further developed at meetings in Tromsø, Norway, in autumn 1977 and at Abisko, Sweden, in 1980. The most recent meeting was held at Tvärminne, Finland, in November 1981, when several possible projects were discussed along with economic and other practical questions. An executive committee with representation from Finland, Norway and Sweden was selected to continue investigating the possibilities.

Northern Québec Treeline Conference

The second conference was organized in 1981 by Prof.

Serge Payette under the auspices of the Université Laval in Québec. The site of the conference was Poste-de-la-Baleine (Great Whale River or Kuujuaapik), where the university field station is situated (Fig. 1). The 20 lectures were presented by participants from Canada, Finland, Norway, Sweden and the U.S.; many local researchers at the station participated informally.

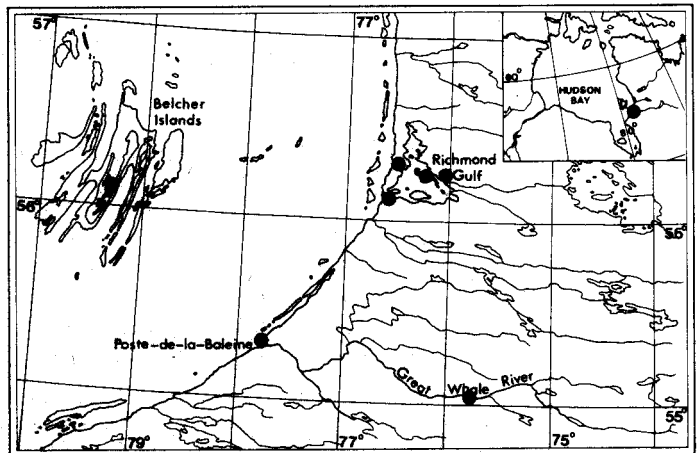


FIG. 1. Poste-de-la-Baleine with the sites visited during the second treeline conference.

At Poste-de-la-Baleine the circumpolar northern forest line reaches its southernmost point at a latitude of approximately 55°30'N. In the immediate area of the field station white spruce predominates; black spruce and tamarack are present but more scattered. Birch is represented by *Betula glandulosa*. Forest fires have been one of the most important factors controlling vegetation and the treeline, and provide one of the main research topics for the station. Forest-line history and paleoclimatology have also been studied in northern Québec in other areas, especially in the Leaf River area (ca. 58°15'N, 72°W), where black spruce and tamarack form the northern line. In the Richmond Gulf area balsam poplar stands have been studied from the historical point of view. Historical fluctuation of the forest line was one of the dominating themes of the conference: paleoecological data from the Canadian north indicate rapid changes, "tidal movements", of the distribution line of black spruce since late glacial time. The forest-tundra line west of Hudson Bay is very sharp, with a transitional zone only 10 km wide. This sharp limit is caused by an expansion of the tundra towards the south, probably attributable to forest fires.

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Birch problems strongly dominated in papers given by the Finnish and Swedish participants, the ecophysiology and herbivory of birch being the most central topics. Introgression has given the Fennoscandian mountain birch properties which seem to be of adaptive value in the Subarctic, including its low crooked shape and a well-developed defence mechanism against herbivores. In many places a high incidence of birches less than 40 years of age at the treeline is related to an increase in temperature since 1930. The importance of herbivory for the evolution of the mountain birch was stressed.

The proceedings of the conference will be published in the publication series of the Centre d'Études Nordiques of the Université Laval, edited by S. Payette and P. Morisset, and will appear in winter 1983.

During the conference excursions were made both near the station and to the Richmond Gulf area, where the last black and white spruce stands grow on the shore and where isolated stands of balsam poplar exist. A palsa bog on permafrost was also visited. One of the northernmost jack pine (*Pinus banksiana*) stands, originating following a period of major forest fires, was seen on Great Whale River some 100 km inland. *Betula papyrifera* stands and *Prunus pennsylvanica*, the distribution of which is also apparently related to forest fire, were found at the same site. Belcher Island in Hudson Bay was also visited by plane. It is an island with treeless tundra vegetation, the only large shrubs (0.5 m high) being *Salix callicarpea*. The drier tundra was in full flower (e.g. *Saxifraga oppositifolia* and other *Saxifraga* spp., *Rhododendron lapponicum*, *Loiseleuria* and *Drabas*) while the many sedges, cotton grass, graminoids and *Petasites* spp. of the wet tundra were still at a very early phase on 30 June.

During the final session of the meeting, chaired by Ilmari Hustich, a group of representatives from different countries was nominated to coordinate international forest-line research activity, and to provide information to the general public, to other scientists, and to governments. Names and addresses of the committee members follow this report.

The development of circumpolar cooperation was discussed, and a wider scientific exchange program among northern in-

stitutions was seen as one important means of achieving this. It was proposed that the next meeting should be organized by the U.S.A. (Alaska), perhaps in cooperation with Canada, so that neighbouring sites in both countries could be visited.

The recommendations formulated at the first treeline conference summarize the focus of this attempt to build international cooperation:

- 1) The scientific institutions in the north should cooperate;
- 2) There is a need for more knowledge about the ecology of the delicately balanced transition zone between the forest and the treeless part of the north. A wide-scale study of the treeline belt needs intensive, interdisciplinary effort between northern countries; and
- 3) The terminology of basic ecological concepts related to the Subarctic is confusing and needs clarification. This will form part of the programme for forest-line research.

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