

# Bavtajohka Interglacial, the oldest Pleistocene vegetational record from Norway

LARS OLSEN & SYNØVE F. SELVIK

L. Olsen & S.F. Selvik, Norges geologiske undersøkelse, Postboks 3006 - Lade, 7002 Trondheim, Norway.

In 1988 a more than 1 m-thick bed of gyttja and gyttja silt was found underlying 10 m of sand, gravel and till beds at Sargejohka on Finnmarksvidda, northern Norway (Fig.1; Olsen 1988, 1989a,b). It was first thought that the organic horizon could be correlated with a Weichselian interstadial locally named the Sargejohka interstadial (Olsen 1988). Based on pollen data the correlation of the horizon was changed to the last interglacial (Olsen 1989a,b). However, further investigation in the area revealed that the lithostratigraphy, particularly the position of an interglacial palaeosol in a higher stratigraphical level and separated from the organic horizon by both waterlain sediments and one till bed, could not be compatible with a last interglacial (Eemian) age for the organic horizon. This conclusion was also supported by TL-/OSL-dates of more than 200 ka for the gyttja and adjacent sediments (Olsen 1993).

## Pollen and macrofossil data

Pollen and macroscopic plant remains in the organic horizon, which represent the Bavtajohka interglacial (Olsen 1993), give indications of the climatic and vegetational conditions. Particularly the presence of several imprints of leaves of arboreal birch (Fig.2; *Betula pendula/pubescens*), and some high representations of *Pinus* pollen (>20 % in a core from the central part of the basin), indicate an interglacial rather than a temperate interstadial environment. *Pinus* sp. most probably grew in the area as today, in a pattern with scattered single trees or groups of trees (Olsen 1989a,b; Olsen & Selvik 1990).

The pollen data from a core in the northern end of the gyttja deposit reflects a vegetation dominated by birch (*Betula* spp.) species (Fig.3). The high frequencies of *Pinus* pollen in samples from the central part are not found in this part of the basin. The analysis of sediment samples from the southernmost and deepest part of the basin is in progress (Selvik, in prep.). A more complete palaeobotanical record from these sediments can be reported when the distribution of pollen, macroscopic plant remains and diatoms are documented.

## Age and correlation

The results so far indicate an age of the organic horizon (the Bavtajohka interglacial) corresponding with oxygen isotope stage 7 (or 8-7) in the deep sea record. It may also correlate with the oldest marine interglacial horizon which has recently been recorded at Jæren, southwestern coastal Norway (Larsen et al. 1994). No comparable stratigraphies from inland areas of southern Norway are known at present.

Possible relative deposits exist in Finland and Sweden. Sediments with an organic horizon recorded during excavation at Naakenavaara in northern Finland represent a pre-Eemian interglacial (Hirvas et al. 1988, Hirvas 1991). This is correlated with the Holsteinian based on general stratigraphy and the presence of plant fossils that are not found in sediments younger than the Holsteinian in central Europe (Hirvas 1991). However, the complexity of the Holsteinian is

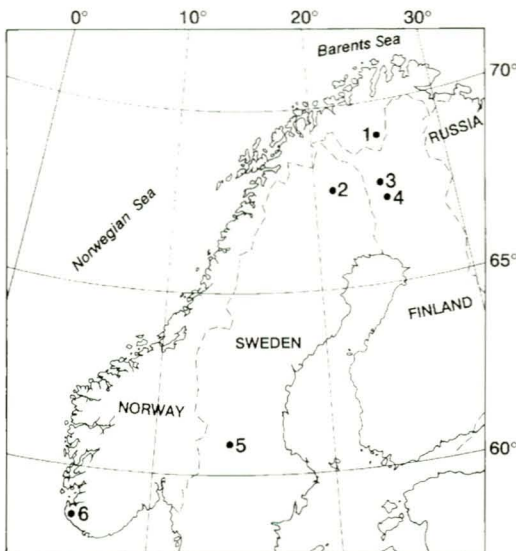


Fig. 1. Map of Fennoscandia with the location of Sargejohka (1; Bavtajohka), Leveäniemi (2), Tepsankumpu (3), Naakenavaara (4), Öje (5) and Jæren (6) indicated.



Fig. 2. Photo of fossil imprints of leaves of arboreal birch (*Betula pendula/pubescens*) in a slab of sediments from the Bvatajohka interglacial deposits by the river Sargejohka, northern Norway (see Fig.1).

well known, and it is widely disputed whether this interval represent one or several interglacial-interstadial periods (Sibrava 1986). The Holsteinian may correlate with either a part of or the total interval from oxygen isotope stage 7 to 11. TL dates of the Naakenavaara interglacial sediments indicate an isotope stage 6-7 age for the Naakenavaara interglacial (K. Mäkinen, pers. comm. 1991). Based on this and the discussion above, it is quite possible that the Bvatajohka

and the Naakenavaara interglacials can be correlated. However, this is not supported by similarities in the general pollen content.

Organic beds underlying Late Pleistocene deposits at Øje in central Sweden represent a pre-Eemian interglacial, possibly the Holsteinian (Garcia-Ambrosiani 1990). The Øje interglacial beds are not dated, but as a working hypothesis they may also be correlated with the Bvatajohka interglacial. The pollen signature from the Øje interglacial deposits indicates a warmer climate than that reflected by the pollen data from the Bvatajohka interglacial. However, this may be explained by a climatic N-S gradient comparable to the present, and the latitudinal distance between Øje and Sargejohka (Bvatajohka), as these localities are located at ca. 61°30'N and ca. 69° N latitudes, respectively.

In general, very few Fennoscandian pre-Eemian interglacial deposits are reported to date, and only one or two other Finnish and Swedish localities with possible pre-Eemian interglacial deposits may be correlated with the Bvatajohka interglacial beds. Despite the fact that lithostratigraphy and datings indicate a pre-Eemian age for the Bvatajohka interglacial, the pollen signature seems to accord well with those from some interglacial deposits correlated with the Eemian. For example, it resembles the last

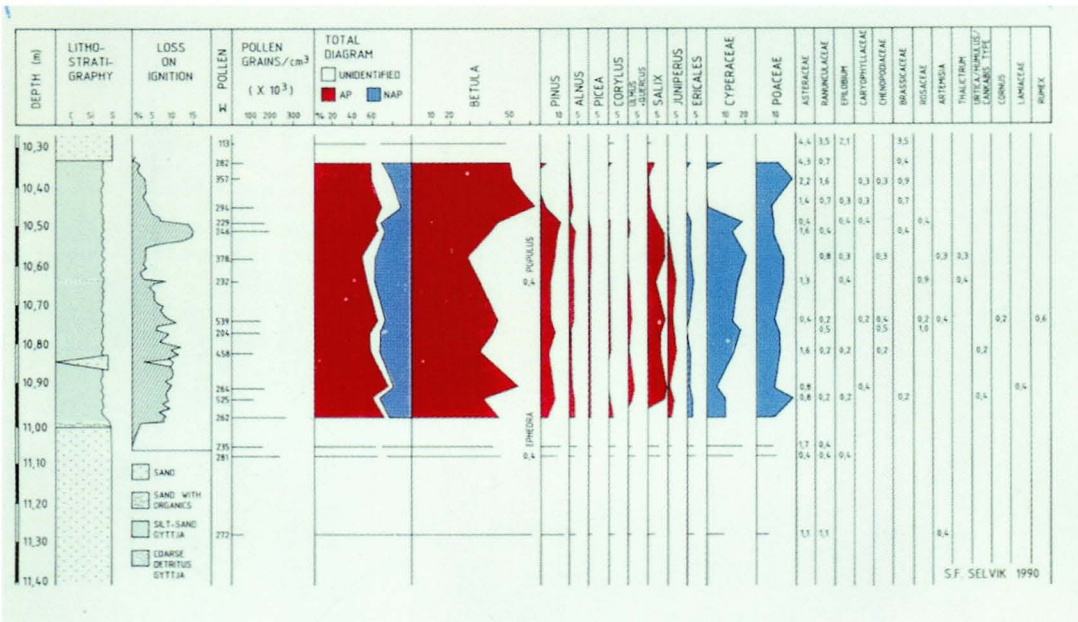


Fig. 3. Pollen diagram from the Bvatajohka interglacial sediments. The investigated samples are from a core taken in the northern end of the NE-SW trending interglacial sedimentary basin.

part of the pollen diagram from the Leveäniemi (Eemian) interglacial in northern Sweden (Fig. 1; Lundqvist et al. 1971); and it also resembles the initial part of the pollen diagram from the Tepsankumpu (Eemian) interglacial in northern Finland (Hirvas 1991). Neither the Leveäniemi nor the Tepsankumpu interglacial deposits have been dated. It is therefore necessary to continue the discussion about the vegetational and climatic conditions, as well as correlation possibilities for the Bvatajohka interglacial, for the time being.

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