

Post-glacial history of Siberian spruce (*Picea obovata*) in the Lake Baikal area and the significance of this species as a paleo-environmental indicator

E.V. Bezrukova^{a,*}, A.A. Abzaeva^a, P.P. Letunova^a, N.V. Kulagina^b, K.E. Vershinin^a,
A.V. Belov^c, L.A. Orlova^d, L.V. Danko^c, S.M. Krapivina^a

^aLinnological Institute, Siberian Branch of Russian Academy of Sciences, Irkutsk 664033, Russia

^bInstitute of the Earth Crust, Siberian Branch of Russian Academy of Sciences, Irkutsk 664033, Russia

^cInstitute of Geography, Siberian Branch of Russian Academy of Sciences, Irkutsk 664033, Russia

^dUnited Institute of Geology, Geophysics and Mineralogy, Siberian Branch of Russian Academy of Sciences, Novosibirsk 630090, Russia

Available online 28 March 2005

Abstract

The relative abundances of Siberian spruce (*Picea obovata*) and total arboreal pollen in pollen spectra from the Lake Baikal region and calculation of a steppe-forest vegetation index place constraints on the past climatic conditions related to permafrost, summer temperatures, precipitation and soil moisture availability. Here we review the data on *Picea* pollen in sub-recent spectra, the present-day distribution of *Picea obovata*, and sedimentary records from a number of sites to arrive at a coherent picture of evolution of regional vegetation since the late glacial. The expansion of Siberian spruce along with steppe vegetation dates back to the undivided Bølling-Allerød interval, when this species became dominant in arboreal vegetation. Steppe landscapes persisted in a large part of the Lake Baikal watershed prior to 9.2–9 ka when the expansion of arboreal vegetation took place. Following the Younger Dryas (which seems to have had little effect on regional vegetation and peat accumulation), the role of Siberian spruce steadily declined until 8.6–6.8 ka. In the late Holocene, the abundance of *P. obovata* rarely exceeded the present-day ratio of ca 2% total arboreal pollen. Departures towards higher *Picea* abundance and higher steppe-forest index at ca 6–5 and 3–2.5 ka in Selenga Delta area appear to reflect periods with decreased temperatures and higher moisture availability in the southern part of the Lake Baikal watershed.

© 2004 Elsevier Ltd and INQUA. All rights reserved.

1. Introduction

1.1. Objectives of the current study

The presence of significant amounts of Siberian spruce (*Picea obovata*) pollen in bottom sediments of Lake Baikal and peat sections along the shores of the lake has been demonstrated by a number of palynological studies (Zubarev, 1981; Savina, 1982; Belova, 1985; Kulagina and Trofimov, 1995; Kremenetzki et al., 1996; Bezrukova et al., 1996, 2000; Bezrukova, 1998a,b;

Tarasov et al., 2002; Kataoka et al., 2003). Along with larch and birch, Siberian spruce remained an important element of forest vegetation preserved in refugia in South Siberia during the last glacial. During the late glacial, it was one of the first tree species to re-occupy open post-LGM landscapes, which were covered by tundra vegetation during the last glacial. Previous palynological works did not specifically address the role of Siberian spruce in the post-glacial expansion of forest vegetation in the Baikal watershed, aside from merely stating the presence of *P. obovata* in the pollen spectra. However, comparison of the relative abundance of *Picea* pollen in different sedimentary sections in the Lake Baikal watershed suggests that during the late glacial

*Corresponding author. Tel.: +3952 425312; fax: +3952 425405.

E-mail address: bezrukova@lin.irk.ru (E.V. Bezrukova).