

Late glacial vegetation and palaeoenvironment in the northwestern Rila Mountains, Bulgaria: the pollen record of Lake Ribno

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Pollen analysis was conducted on the lateglacial section (200 cm) of a core retrieved from the glacial Lake Ribno (2184 m a.s.l.) situated in the cirque of the Seven Lakes in the northwestern Rila Mountains. The palynological data supported by a series of AMS radiocarbon dates from bulk sediment allowed reconstruction of the vegetation dynamics and palaeoenvironmental conditions at high altitudes during the Lateglacial period. The vegetation and climate changes established were bound to a detailed chronological framework for the time interval 16500–11500 cal. yrs. BP. Around 17000-16000 years ago the landscape in the study area was dominated by mountain steppe vegetation composed of *Artemisia*, *Chenopodiaceae*, *Poaceae* species and other cold-resistant herbs. Scattered stands of *Pinus* and *Juniperus-Ephedra* sbrubland were also found. This vegetation pattern was determined by the harsh climatic conditions. An important result was the delimitation of an interstadial/stadial cycle, analogous with the Bølling/Allerød–Younger Dryas from Western Europe, which correlated well with the global data from Greenland ice cores. From a biostratigraphical point of view the improvement of the climate after 15000 cal. yrs. BP in the Rila Mountains during the Bølling/Allerød interstadial (15000-12800 cal. yrs. BP) was characterized by a rise in the quantity of tree pollen from *Pinus*, *Pinus peuce*, *Betula*, *Alnus* and *Juniperus*. Meanwhile the herb vegetation partly retreated confirmed by the decline of *Artemisia* and *Chenopodiaceae* pollen values. At lower altitudes deciduous trees such as *Quercus*, *Corylus*, *Carpinus betulus*, *Tilia* started to spread from their refugial places. The first appearance of *Picea*, *Abies* and *Fagus* was also recorded. During the Younger Dryas stadial (12800-11500 cal. yrs. BP) a final revert of the glacial conditions in the mountain has occurred clearly documented by the re-advance of the mountain-steppe herb vegetation and the retreat of trees downslope. The local radiocarbon chronology indicated precisely the termination of the Lateglacial and the onset of the Holocene period. The new palynological and radiocarbon data obtained from the lateglacial sediments of Lake Ribno were also compared with the information from two other glacial lakes Trilistnika and Sedmo Rilsko located in the same cirque above and below the study site, respectively, and a good conformity of the results was established. In addition, the correlation of the palynological data with the available geomorphological evidence, the reconstruction of the respective snowline and precipitation anomalies during the Last Glacial Maximum and the Lateglacial in the Rila Mountains confirmed that the three lakes studied have become free of ice before 16500 cal. yrs. BP when accumulation of grey silt, poor in organic content, and not suitable for radiocarbon dating has started.

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