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Environmental, Structural and Stratigraphical Evolution of the Western Carpathians

Abstract Book

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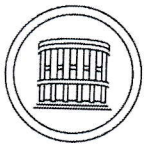

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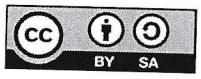

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Holocene environmental changes revealed by subfossil Chironomidae and biomarkers from an alpine lake in the High Tatra Mountains (Western Carpathians)

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A paleolimnological investigation of Popradské pleso (1,494 m a.s.l., High Tatra Mts.), a lake of glacial origin, was conducted to determine the timing of deglaciation and the influence of Holocene climatic oscillations. The uppermost 250 cm of a 638 cm sediment core, spanning the last ~10,100 years, was analysed for subfossil chironomids, biomarkers, total organic carbon, and total nitrogen. The oldest studied deposits date back to the Early Holocene and consist of fine laminated mud. The chironomid assemblages were species-poor and dominated by *Micropsectra radialis*-type and *Pseudodiamesa nivosa*-type, which indicate very cold, ultra-oligotrophic and oxygen-rich lake conditions. Biomarker results revealed a tundra environment in the lake catchment, typified by the presence of lithophythic lichen and *Sphagnum* moss, without higher vegetation. These conditions likely resulted from the continued presence of a glacier in the upper Zlomisková dolina valley, from which the Ľadový potok stream feeds lake Popradské pleso. The transition from a glacially influenced lake system occurred at ~9,900 cal years BP, and lasted until ~9,700 cal years BP, with sediments consisting of homogenous mud. The progression towards a warmer and more productive system is evident from the decreasing abundances of previously dominant chironomid taxa and the increasing proportions of *Tanytarsus lugens*-type. At the same time, the abundance of diploptene, a biomarker indicative of soil cover development, increased, followed by rising levels of coniferous vegetation biomarkers. After the transition, the organic-rich gyttja deposits recorded an overall increase in chironomid taxonomic richness, with the community dominated by the more thermally plastic *Tanytarsus lugens*-type, *Psectrocladius psilopterus*-type and *Heterotrissocladius marcidus*-type. Until mid-Late Holocene, the composition of chironomid assemblages remained relatively stable and was characterised by high proportions of rheophilic taxa, which along with the high abundance of *Sphagnum* biomarkers, indicate higher precipitation levels. Starting around 2,800 cal years BP, and until the present, a decline of both rheophilic chironomid taxa and *Sphagnum* moss suggests a shift towards a drier climate. Finally, the lower productivity and colder temperatures of the Little Ice Age were reflected in the chironomid record by an increased abundance of *Heterotrissocladius marcidus*-type, identified in the youngest analysed deposits.

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