PRESERVATION AND ORIGIN OF SACCHARIDES FROM THE MESOZOIC AND CENOZOIC LIGNITES

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Mono-, di- and polysaccharides are very common constituents of living organisms, but their origin and state of preservation in geological materials have rarely been considered. Here, we show the identification of mono-, di- and anhydrosaccharide in Cretaceous and Cenozoic lignites. The high content of holocellulose (up to 55 wt%) and co-occurrence of such monosaccharides as arabinose, xylose and mannose in the Miocene fossil wood suggests that not only cellulose, but also hemicellulose was preserved in xylites (Marynowski et al., 2018). Methanolysis experiments (Bertaud et al., 2002) and the GC-MS analysis of the products confirms the occurrence of hemicellulose remnants in xylites, showing besides α- and β-glucose also occurrence of α- and β-mannose, α- and β-xylose and methyl α- and β-mannopyranoside (Fig. 1).

Moreover, trehalose, mannitol and arabitol were identified in extracts of Cretaceous and Cenozoic sedimentary rocks. The co-occurrence of these three compounds suggests their fungal origin, because these sugars are major compounds present in most modern fungi (Marynowski et al., 2019). Primary character of fungal saccharides was confirmed by DNA

Fig. 1. Total ion current of xylite methanolysis products showing diverse monosaccharide distribution.
study. No DNA was isolated from the samples of lignites and overlying sediments, whereas it was abundant in the control samples of maple, birch and oak wood degraded by fungi. The preservation of mono- and disaccharides in geological records implies that compounds previously thought as unstable can survive for tens to hundreds of millions of years without structural changes in immature rocks unaffected by secondary processes.

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References
