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Title:	Molecular preservation of cenozoic conifer fossil lagerstätten from Banks Island, the Canadian Arctic
Authors:	Gupta, Neal S. (/jspui/browse?type=author&value=Gupta%2C+Neal+S.)
Keywords:	Cenozoic Coniferous tree Eocene Fossil record
Issue Date:	2012
Publisher:	Society for Sedimentary Geology
Citation:	Palaos, 27(5), pp.279-287.
Abstract:	<p>The molecular preservation of exceptionally preserved conifer needles from middle Miocene and Pliocene deposits on Banks Island, Canada, was investigated using pyrolysis gas chromatography-mass spectrometry (Py-GC-MS). Solvent-extracted residues from Miocene <i>Larix</i>, <i>Glyptostrobus</i>, and <i>Pinus</i>, Pliocene <i>Picea</i>, and their associated bulk material, yielded abundant polysaccharide pyrolysis products, such as 2-methylfuran, 2-furaldehyde, and levoglucosan, indicating excellent molecular preservation. Comparison of pyrolysates of individual plant taxa and bulk material from the same deposits revealed the dominance of particular plant taxa in these high latitude floras. Comparison with fossil Lagerstätten from Ellesmere Island (late Paleocene) and Axel Heiberg Island (middle Eocene), both in the Canadian Arctic Archipelago, and Clarkia in Idaho, United States (middle Miocene), demonstrated that the quality of molecular preservation of material from Banks Island is similar to that of Axel Heiberg Island and lies between those of Ellesmere Island and the Clarkia deposit. The ranking of molecular preservation was paralleled by scanning electron microscopy (SEM) observations. Analysis of <i>Larix</i> and <i>Glyptostrobus</i> from different geological ages (Eocene-recent) and locations indicated that age does not correlate with molecular preservation in these fossil Lagerstätten. When relative abundance ratios of vinyl phenol (m/z 91120), guaiacyl (m/z 109124), and levoglucosan (m/z 6073) are used as indicators of the preservation of cutin, lignin, and cellulose, our results suggest that variations in the pyrolysates among several genera reflect different original molecular compositions as well as paleoenvironmental conditions for preservation. The data also illuminate the role of labile biomolecules in the taphonomy of three-dimensionally preserved morphological structures in these Arctic plant fossils.</p>
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