Pleistocene Periglacial Environment in Indiana[1]

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Extensive tundra vegetation around the margins of the Pleistocene continental glaciers in central Europe is known from studies of pollen spectra in lake sediments. Apparent absence of a similar tundra zone adjacent to the North American ice sheets has been questioned by some geologists and paleobotanists.

Mollusks recovered from loess deposits in Indiana indicate that the vegetation south of the advancing early Wisconsin glacial ice provided cover for species of woodland snails that now live in central Ontario and southward.

An interstadial loess between two tills of Wisconsin age contains a small snail fauna, three species of which, *Columella alticola*, *Vertigo alpestris oughtoni* and *V. modesta*, are now restricted to the latitude of northern Ontario in eastern North America. All other species of this fauna also live in northern Ontario, but range farther south as well. Pollen from one of these loess deposits consists of 69 percent non-tree genera and 31 percent *Larix*, *Picea*, and *Salix*. The snails and pollen indicate that few trees existed on the newly-deglaciated surface and the mean annual temperature was cooler than that of central Indiana today. Because no similar record has been found in bogs in Indiana, this "waldtundra" probably lasted only a few decades to a few hundred years and, when a soil had been sufficiently developed, gave way to spruce forests.

A few patches of patterned ground and fossil involutions, which might have formed in the active layer above perennially frozen ground, suggest that the mean annual temperature near the ice margin may have been from 0°C to —3°C. The snails found in the interstadial silts will survive in this temperature range but it is a few degrees lower than the temperature indicated by snails in the loess beneath earliest Wisconsin till. This evidence agrees with Manley's (1955) suggestion that the mean annual temperature at the ice margin in Indiana was about —1°C. The periglacial climate in Indiana was at no time so severe, however, that coniferous forests were displaced by tundra around the advancing ice margin. In Europe, Scandinavian and Alpine glaciers and the temporary disappearance of the North and Baltic Seas greatly reduced the inland movement of moist Atlantic air, thereby permitting development of a climate appropriate to the latitude.

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