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Spores of coprophilous fungi from under the Dawson tephra (25,300 ^{14}C years BP), Yukon Territory, northwestern Canada

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Abstract

Based on the analysis of pollen and macrofossils Zazula et al. [Zazula, G.D., Froesne, D.G., Elias, S.A., Kuzmina, S., la Farge, C., Reyes, A.V., Sanborn, P.T., Schweger, C.E., Smith, C.A.S., Mathewes, R.W., 2006. Vegetation buried under Dawson tephra (25,300 ^{14}C yr BP) and locally diverse late Pleistocene paleoenvironments of Goldbottom Creek, Yukon, Canada. Palaeogeography, Palaeoclimatology, Palaeoecology 242, 253–286.] reported an *in situ* riparian grassy meadow ecosystem, and regional well-drained steppe-tundra, buried by Dawson tephra (ca 25,300 BP) at Goldbottom Creek in the Canadian Yukon Territory. An additional study of fungal spores in pollen slides from that site was completed. Ascospores of the coprophilous *Sordaria* type, *Sporormiella* type and *Podospora* type, appeared to be of common occurrence, pointing to the former presence of herbivores. The analysis of the various spore types of coprophilous fungi in pollen slides is useful and may lead to further knowledge of the role of different herbivore taxa in past ecosystems.

Keywords: Beringia; Klondike; Palaeoecology; Coprophilous fungi

1. Introduction

Multidisciplinary paleoecological examination of a fossil vegetation surface preserved beneath a thick tephra bed in the Klondike region of west-central Yukon Territory, Canada, presented by Zazula et al. (2006) provided new data on late Pleistocene environments of Beringia. Data from four terrestrial sampling sites included AMS ^{14}C dates (ca. 25,300 ^{14}C yr BP), fossil arctic ground squirrel (*Spermophilus parryii*) middens, vascular plant macrofossils, bryophytes, fossil insects, paleosols and pollen (Figs. 1 and 2). However, no records were made of fossil fungal spores. Unfortunately, spores of fungi are often neglected in paleoecological records and have yet to be identified in Pleistocene deposits within the unglaciated refugium of Beringia. In a series of studies of European sites the first author illustrated, described and interpreted remains of fungi in pollen slides (van Geel, 2001; van Geel et al., 2003 and references therein; Aptroot and van Geel, 2006; van Geel and Aptroot, 2006). Among the recorded fungal spores are those of coprophilous ascomycetes, which are

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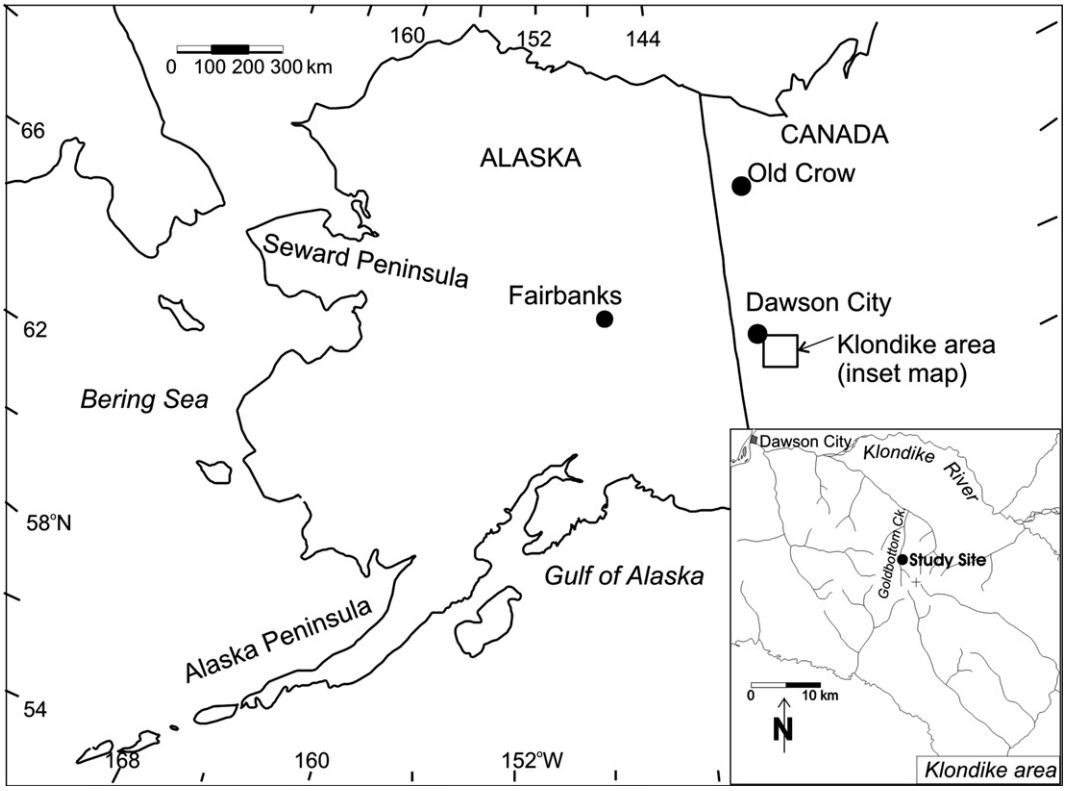

Fig. 1. Site location map showing Eastern Beringia with the Goldbottom Creek study site in the Klondike goldfields region (inset).

linked to the presence of herbivores. Davis et al. (1977), Davis (1987), Davis and Shafer (2006) and Robinson et al. (2005) recorded ascospore cells of the coprophilous fungal genus *Sporormiella* in pollen slides from North American sites, and used Late Pleistocene and Holocene records of the spores as a proxy for megafaunal biomass. Burney et al. (2003) applied this *Sporormiella* approach in cores from Madagascar.

Apart from *Sporormiella* there are various other coprophilous fungal taxa with morphologically characteristic, thick-walled spore types, which occur worldwide (see, e.g. Lundqvist, 1972; Bell, 2005 for extant species) and which do fossilize and represent valuable paleoecological information (Buurman et al., 1995; van Geel et al., 2003; Almeida-Lenero et al., 2005; Blackford et al., 2006; Blackford and Innes, 2006; Graf and Chmura, 2006; Marinova and Atanassova, 2006; Mighall et al., 2006; Mol et al., 2006; van Geel and Aptroot, 2006). Besides *Sporormiella*, the spores of *Cercophora* type, *Sordaria* type and *Podospora* type are the most common ones among the dung fungi, and those can be expected in Pleistocene material as well. Up to now, the emphasis in studies of North American sites was on *Sporormiella*, while other fungal spore types were ignored. This paper presents a preliminary study of spores of coprophilous fungi from fossil vegetation and paleosols recovered at Goldbottom Creek (GBC), Yukon Territory, Canada. We document three types of spores from microfossil residues previously reported by Zazula et al. (2006) with the aim to further encourage the search for these often uderstudied

Fig. 2. Remains of vegetation under the Dawson tephra.