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Palynology of badger coprolites from central Spain

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Abstract

This paper presents pollen analysis of badger coprolites from Cueva de los Torrejones, central Spain. Eleven of fourteen coprolite specimens showed good pollen preservation, acceptable pollen concentration, and diversity of both arboreal and herbaceous taxa, together with a number of non-pollen palynomorph types, especially fungal spores. Radiocarbon dating suggests that the coprolite collection derives from badger colonies that established setts and latrines inside the cavern over the last three centuries. The coprolite pollen record depicts a mosaic, anthropogenic landscape very similar to the present-day, comprising pine forests, *Quercus*-dominated formations, woodland patches with *Juniperus thurifera*, and a *Cistaceae*-dominated understorey with heliophytes and nitrophilous assemblages. Although influential, dietary behavior of the badgers does not preclude palaeoenvironmental interpretation of the coprolite pollen spectra.

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1. Introduction

Copropalynology has greatly contributed to filling the gap of Quaternary landscape reconstruction studies in poorly known territories (Davis, in press). Palynologists have succeeded in extracting pollen from consolidated dung of extinct megafauna (Thompson et al., 1980; Davis and Anderson, 1987; Mead et al., 1986), caprids (Mead et al., 1987; Rasmussen, 1993;

Karg, 1998; Akeret et al., 1999; Alcover et al., 1999; Yll et al., 2001), hyenas (Scott, 1987; Carrión et al., 2000b, 2001a; González-Sampériz et al., 2003; Scott et al., 2004; Yll et al., in press), rodents in North America (Davis and Anderson, 1987; Betancourt et al., 1989; Cole, 1990; Smith and Betancourt, 1998), South America (Holmgren et al., 2001; Kuch et al., 2002; Latorre et al., 2002), Australia (Green et al., 1983; Pearson, 1999; Allen et al., 2000; Pearson and Betancourt, 2002), and southern Africa (Scott and Cooremans, 1992), and hyraxes (Scott and Vogel, 1992; Scott, 1994; Carrión et al., 1999). Other promising materials include vitrified cow dung (Carrión et

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al., 2000a), owl pellets (Fernández-Jalvo et al., 1999), avian coprolites (James and Burney, 1997), and bat guano (Bui Thi Mai and Girard, 2000; Leroy and Simms, 2002; Maher, 2002; Carrión et al., in press).

This paper presents pollen analysis of Eurasian badger (*Meles meles*: Mustelidae, Carnivora) coprolites from Cueva de los Torrejones, central Spain. To our knowledge, badger coprolites have not been used hitherto for pollen analysis.

2. Setting and present-day vegetation

Los Torrejones is a karstic, sac-like cavern situated at 1100 m asl in Upper Cretaceous limestones of the Ayllón Massif (eastern Sistema Central), near the village of Tamajón, northwest of Guadalajara province, central Spain (Fig. 1). The fluvial basins of the Sorbe, Jarama, and Henares rivers extend southwards

of the massif. The cave is part of a two-entranced, 60-m deep karst network with several chambers that are interlinked by a complex system of galleries and deck pipes (Fig. 2). The cavity is partially filling up, and the ceiling height ranges from 1 to 5 m. A 16 m² area in the Entrance gallery was excavated during 1993–1995, discovering abundant bone remains of early Upper Pleistocene faunas, and Middle Palaeolithic utils (Arribas et al., 1997; Arribas and Jordá, 1999).

Hundreds of well-preserved coprolites (Fig. 3), and fragmented specimens occur exposed on the surface of the cave sediments, being especially abundant at the rear in the Tejones Chamber, 25–27 m deep into the cavern (Fig. 2). The bed comprises clays, and brown silts without evidence of plant macrofossils. Abundant bone remains of *M. meles* (Fig. 4) have been found accumulated in the same area with less abundant bone fragments of a diversity of animals like *Erinaceus europaeus*, Chiroptera, *Apodemus*, *Pity-*

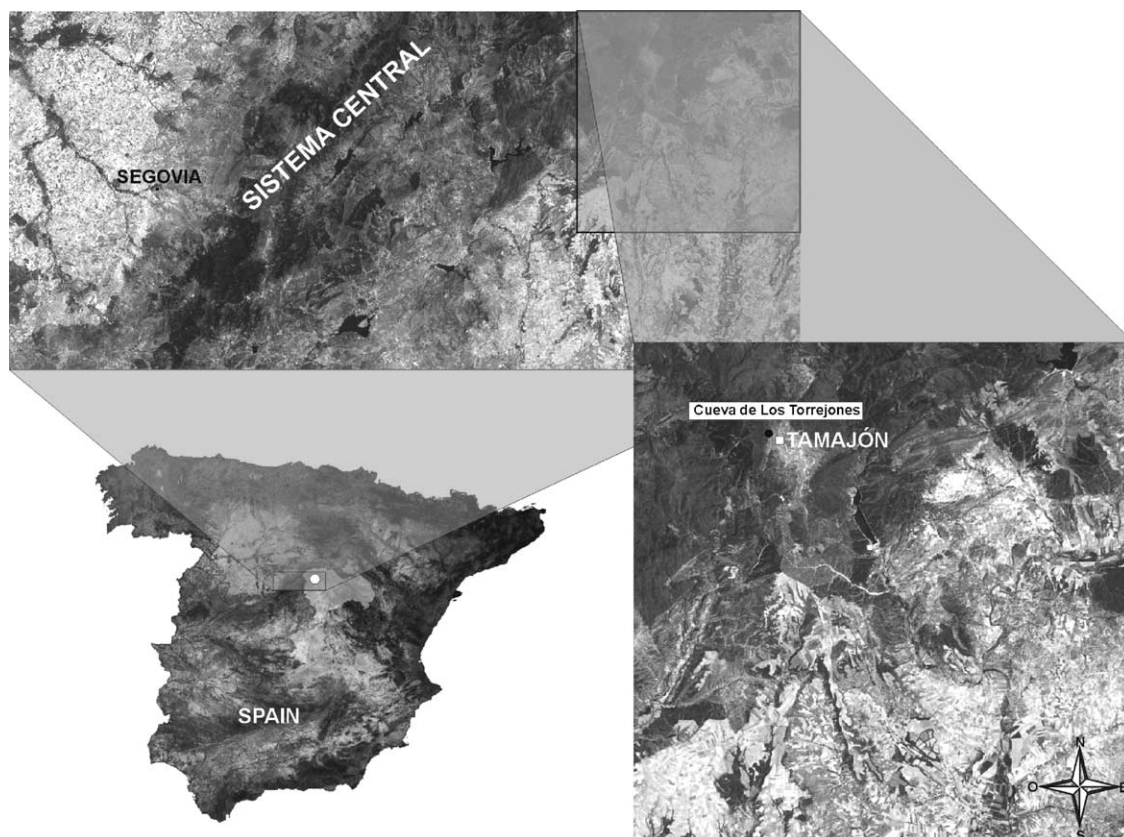


Fig. 1. Location of Cueva de los Torrejones in the eastern plateau of the Sistema Central region of Spain.

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