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RESEARCH ARTICLE

Histological investigation of burnt bones: A case study of angulate tortoises from the archaeological site, Diepkloof Rock Shelter, Western Cape, South Africa

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Abstract

The current study examined burnt and unburnt tibiae of angulate tortoises from the intermediate and late Howiesons Poort levels at Diepkloof Rock Shelter (DRS) of Western Cape, South Africa, to ascertain heat-induced osteohistological changes. Three types of bone damage caused by fire were recognized: (a) external color change in the bones but otherwise consistent osteological and histological features to unburnt bones; (b) partially burned bones with osteological features obliterated, but histological details still preserved, and carbon inclusions visible along the bone margins and within pore spaces; and (c) completely burned bones with obliterated osteological features, but overall shape is maintained, and except for the presence of cracks and carbon accumulations within pore spaces and around the periosteal margin, histological features are evident. Comparisons with other studies of burnt bone suggest that the bones at DRS were subjected to high temperatures of about 600°C to 900°C. Despite exposure to fire, histological features were intact in all the bones, permitting life history deductions for these angulate tortoises. During early ontogeny, uninterrupted fibrolamellar bone tissue (indicative of rapid growth rates) was deposited, whereas later in ontogeny, slowly formed parallel-fibered bone tissue formed and growth ceased periodically. A minimum age of 10 years was deduced for two individuals, and closely spaced growth marks suggest that the sexual maturity was attained at 7–8 years. Based on the comparisons with modern angulate tortoises, it appears that DRS tortoises had slower growth rates, suggesting less optimal environmental conditions for growth prevailed at the time.

KEYWORDS
bone histology, Diepkloof Rock Shelter, Middle Stone Age, skeletochronology, South Africa, tortoise

1 | INTRODUCTION

Tortoises are a common faunal component of Palaeolithic archaeological and/or historical sites, presumably collected as food resources, as well as for making use of their shells (Blasco, 2008; Blasco & Fernández Peris, 2012; Thompson, 2010; Thompson & Henshilwood, 2014). As such, they are often studied to examine palaeodemographic data and dietary preferences (Klein & Cruz-Uribe, 1983; Stiner et al., 2000). Thermally altered bones are often key components of such sites, offering vital information regarding cremation practices and/or cannibalism (Cain, 2005; Kalsbeek & Richter, 2006), as well as information about how

