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Short communication

New radiocarbon dates for terminal Pleistocene and early Holocene settlements in West Turkana, northern Kenya

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ABSTRACT

The Turkana Basin in northern Kenya is located in an environmentally sensitive region along the eastern African Rift system. Lake Turkana's sensitivity to fluctuations in precipitation makes this an ideal place to study prehistoric human adaptations during key climatic transitions. Here we present eleven radiocarbon dates from two recently excavated sites in West Turkana, Kokito 01 and Kokito 02. The sites span the Pleistocene-Holocene transition, a time of fluctuating lake levels and novel cultural responses within the region. Several scenarios are laid out for the interpretation of site chronologies, and these are discussed with reference to the terminal Pleistocene and early Holocene chronological record for the region. Given the paucity of well-dated sites from this timespan in the Turkana Basin, the new radiocarbon dates are an important step toward establishing human settlement history and associated cultural developments in the region.

1. Introduction

In Africa c. 15 to 5.5 ka (thousands of years ago), shifts in monsoon patterns, driven by orbital precession, led to the African Humid Period (AHP), an era characterized by increased precipitation and enlarged lakes and rivers (deMenocal et al., 2000). Despite an overall increase in humidity, the AHP was frequently interrupted by dry spells that caused fluctuations in water levels throughout the continent (Gasse, 2000; Garcin et al., 2009; Bloszies et al., 2015; Shanahan et al., 2015). The effects of such oscillating conditions on African foragers have not been adequately investigated. The Turkana Basin in northern Kenya (Fig. 1) occupies a vital place in ongoing efforts to understand the nature of ecological changes and human responses that emerged during the AHP. During this era's wet intervals, Lake Turkana's watershed expanded significantly and flowed to the Nile multiple times (Owen et al., 1982; Garcin et al., 2012; Bloszies et al., 2015). Such episodes would have allowed aquatic species exchange between the two basins, enriching the diversity of resources available for human exploitation (Stewart, 1989).

In the 1960s and 1970s, discoveries of early Holocene sites in the Turkana Basin confirmed the importance of the region for the growth of hunter-gatherer-fisher (HGF) communities during the AHP (Robbins, 1974; Phillipson, 1977; Barthelme, 1985). Sites from this era are characterized by abundant fish remains and expedient lithic technology, as well as barbed bone points, interpreted as fishing harpoons. Although significant for understanding early aquatic specializations, all of these sites are unfortunately plagued by problematic chronologies. Dates were often derived from bone apatite, which is susceptible to diagenesis (Ambrose and Krigbaum, 2003), and from lacustrine shells with ambiguous links to human activity. Limitations relating to sample pretreatment and use of the conventional beta-counting method, as opposed to the more recently introduced and precise Accelerator Mass Spectrometry (AMS) technique, have further confounded these sites' chronologies. All previously-obtained dates for early Holocene sites in the Turkana Basin are provided in the Supplementary Online Material (Table S1).

While multiple early Holocene sites are documented in East Turkana, West Turkana has remained archaeologically underexplored for this era. Until recently, there was only one known early

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Holocene site, Lothagam, on the west side of the lake, and despite four radiocarbon dates many questions remain about the site's chronology and culture history (Robbins, 1974; Wright et al., 2015). However West Turkana is now seeing growing research initiatives focused on the prehistory of the past 20,000 years (Shea and Hildebrand, 2010; Beyin, 2011; Hildebrand et al., 2011; Lahr et al., 2016), leading to an increase in dated samples, including twenty-four from the prehistoric "massacre" site of Nataruk (Lahr et al., 2016), and eleven from the sites presented in this paper. These sites span the Pleistocene-Holocene transition, a time period crucial to assess the degree to which Turkana shorelines supported sustained human activities, and to understand how HGF communities lived in this area during the millennia following the conclusion of the last glacial episode. Here we present AMS radiocarbon dates from two recently excavated sites, Kokito 01 (SASES standardized site name: GcJh11) and Kokito 02 (GcJh12) (Fig. 1). We discuss possible interpretations of our dates in light of stratigraphic and artifactual evidence at each site, and we outline the plausible relationships between the sites and Turkana's water level history. While limited in some cases by their stratigraphic integrity, the dates presented in this paper contribute to building an absolute chronology for the region. Ultimately, a more precise chronology, linked to both lake levels and cultural material, will shed light on how people responded to the fluctuating conditions of the AHP.

2. Material and methods

2.1. The sites

The Kokito sites are located about 20 km inland from the current lake margin on the west side of the Turkana Basin (Fig. 1). The study area lies within 420–460 m asl, precisely the kind of landscape that came under direct influence of the fluctuating Turkana lakeshore throughout the AHP. Prominent landscape features in the study area include the Kalokol River, the Lothidok hills and the Kalodir basin. During periods of high lake stands, the Kalodir basin, which lies immediately west of the Lothidok range, would have formed a stable inland bay surrounded by shallow inlets and promontories. Such a setting would have been inviting for human habitation.

Kokito 01. Located at an elevation of 447 m asl, Kokito 01 covers an area of ~3000 m^2 and has been subjected to systematic surface artifact collection and excavation. Six units (A–F) were excavated, of which the Units A and D profiles are selected to illustrate the subsurface stratigraphy and associated dates (Fig. 2). The

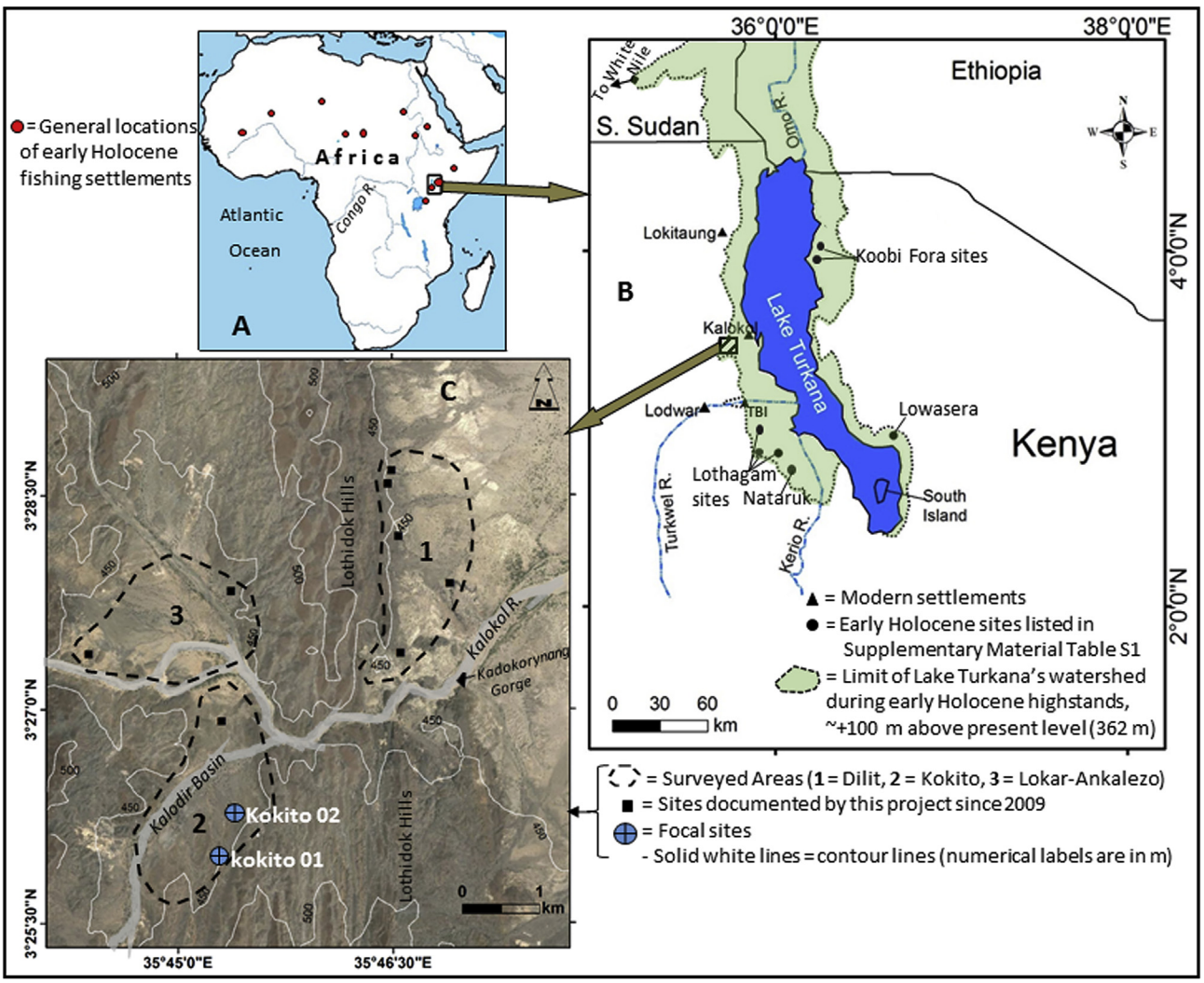

Fig. 1. Location of the focal sites. Sources: A) ESRI® World Map, 2004 ed.; B) Lake Turkana's water level at present and during the AHP, drawn from Feibel and Schwindinger, Rutgers University, http://media.education.nationalgeographic.com/assets/photos/000/307/30768.jpg (retrieved July 12, 2015); C) Project Area, image ©Google Earth-Image Landsat/Copernicus (retrieved April 4, 2017); Contour layer: courtesy of David Wright.

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