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Persistence of Middle Stone Age technology to the Pleistocene/Holocene transition supports a complex hominin evolutionary scenario in West Africa

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ABSTRACT

The evolutionary origins of *Homo sapiens* and associated behavioural changes are increasingly seen as complex processes, involving multiple regions of Africa. In West Africa, Terminal Pleistocene/Holocene aged human fossils, demonstrating the late continuity of archaic morphological features in the region have been linked to models of surprisingly recent admixture processes between late archaic hominins and *H. sapiens*. However, the limited chronological resolution of the archaeological record has prevented evaluation of how these biological records relate to patterns of behaviour. Here, we provide a preliminary report of the first excavated and dated Stone Age site in northern Senegal which features the youngest Middle Stone Age (MSA) technology yet documented in Africa. Ndiayène Pendao features classic MSA core axes, basally thinned flakes, Levallois points and denticulates mostly made from chert. Similar technological features characterise several, larger surface sites in the vicinity. From this, it is postulated that populations using 'anachronistic' technologies in the Lower Senegal Valley around the transition to the Holocene may have been widespread, in sharp contrast to other areas of Senegal and West Africa. The chronology and technology of Ndiayène Pendao provides the first cultural evidence to support a complex evolutionary history in West Africa. This is consistent with a persistently high degree of Pleistocene population substructure in Africa and the spatially and temporally complex character of behavioural and biological evolution.

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1. Introduction

Evolutionary and palaeoenvironmental processes in the West African Pleistocene are extremely poorly understood, limiting assessments of the pan-African demographic complexity now invoked in models of the origin of *Homo sapiens* (Gunz et al., 2009; Scerri et al., 2014; Veeramah and Hammer, 2014; Groucutt et al., 2015). This notwithstanding, genetic patterns consistent with late *H. sapiens* and African archaic admixture in West Africa and the regional persistence of 'archaic' morphological features into the Holocene, indicate that the transition to 'anatomical modernity' was complex and long-lasting in West Africa (Hammer et al., 2011; Harvati et al., 2011; Mendez et al., 2013).

The potential for material culture to shed light on these complex evolutionary patterns in West African populations is significant. Material culture is both abundant and a product of learned traditions as well as other factors (e.g. environmental influences) and therefore subject to selective processes affected by the structure and evolutionary dynamics of the population producing it. However, little is known about the Pleistocene archaeology of West Africa. In view of this, a new programme of fieldwork was initiated to map patterns of cultural variability in the Senegal region of West Africa, commencing with the Lower Senegal region (Scerri et al., 2016).

The Lower Senegal River straddles the boundary between the present-day xeric Sahelian savannah to the north and more

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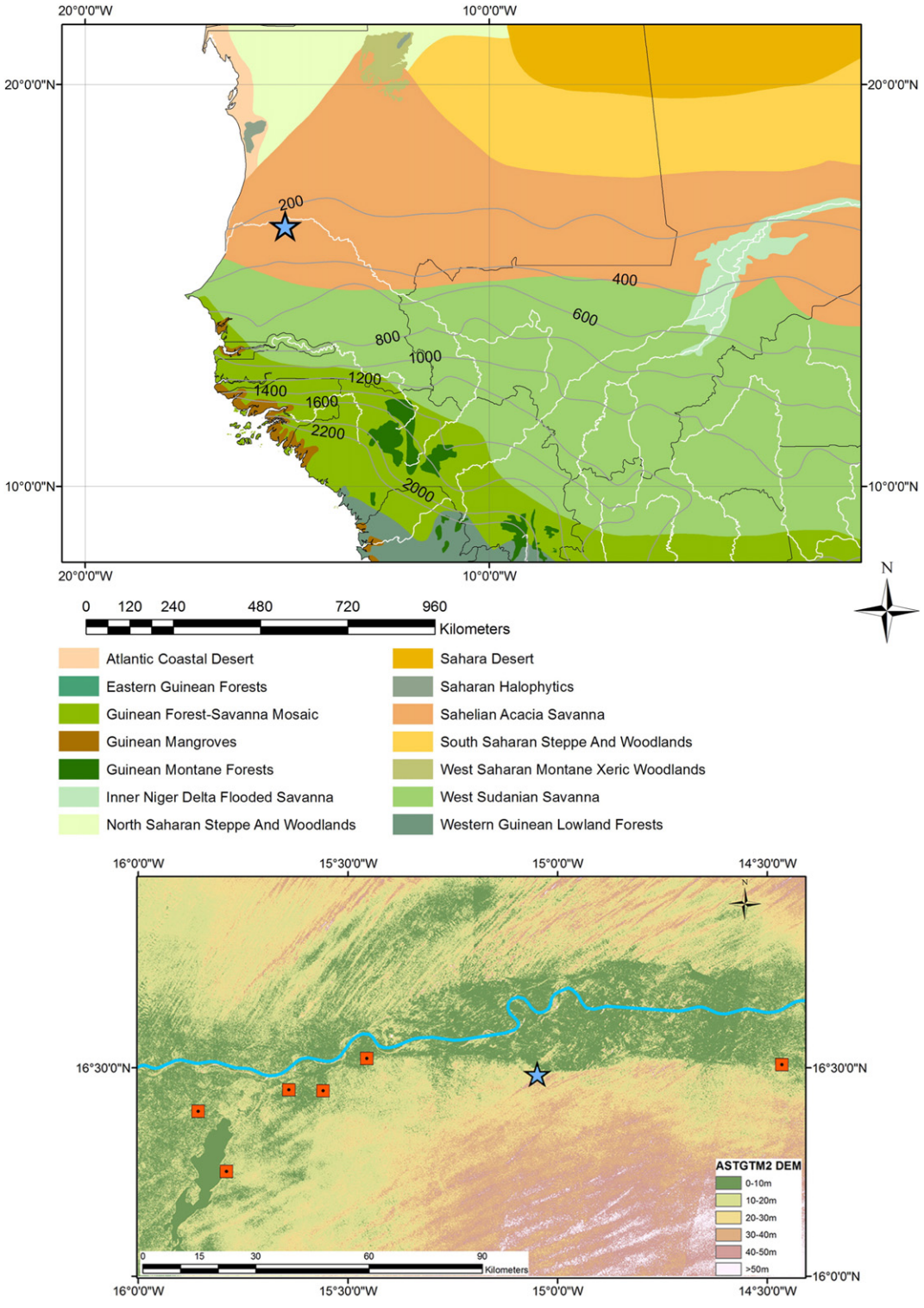

Fig. 1. Top (a): Map illustrating the location of Ndiayène Pendao (blue star) in the Lower Senegal Valley in relation to the West African fluvial network, modern precipitation (isohyets in mm/year) and patterns of modern ecology (WWF Ecozones following Olson et al., 2001); Middle (b): Digital elevation map showing the position of Ndiayène Pendao in the Lower Senegal Valley and similar MSA–type sites (marked as red boxes, see Scerri et al., 2016).

wooded western Sudanian savannah to the south and links today's arid northwest African coast to the tropical forest interior. Early research in the Lower Senegal Valley established a relative framework of geomorphological activity as well as the presence of Middle Stone Age (MSA) sites (Michel, 1973). Here, we report the preliminary results of archaeological, geomorphological and chronometric analyses from Ndiayène Pendao, the first directly dated excavated Pleistocene archaeological site in the Lower Senegal Valley.

2. Ndiayène Pendao

The Ndiayène Pendao quarry (N16° 29′ 03.6″, W15° 02′ 54.4″) is located near Saint-Louis, northern Senegal, and is situated 10 km south of

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