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The oldest Stone Age occupation of coastal West Africa and its implications for modern human dispersals: New insight from Tiémassas

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ABSTRACT

Examinations of modern human dispersals are typically focused on expansions from South, East or North Africa into Eurasia, with more limited attention paid to dispersals within Africa. The paucity of the West African fossil record means it has typically been overlooked in appraisals of human expansions in the Late Pleistocene, yet regions such as Senegal occur in key biogeographic transitional zones that may offer significant corridors for human occupation and expansion. Here, we report the first evidence for Middle Stone Age occupation of the West African littoral from Tiémassas, dating to ~44 thousand years ago, coinciding with a period of enhanced humidity across the region. Prehistoric populations mainly procured raw material from exposed Ypresian limestone horizons with Levallois, discoidal and informal reduction sequences producing flake blanks for retouched tools. We discuss this mid-Marine Isotope Stage 3 occupation in the context of the site's unique, ecotonal position amongst Middle Stone Age sites across West Africa, and its significance for Later Stone Age colonization of near coastal forests in the region. The results also support previous suggestions for connections between Middle Stone Age populations in West Africa and the Maghreb, for which the coastline may also have played a significant role.

1. Introduction

Human evolution within Africa increasingly appears a geographically diverse and mosaic process. Recent investigations in North and South Africa have identified fossil and genomic evidence for the origins of *Homo sapiens* stretching to 300 thousand years ago involving multiple regions within the continent, overturning the long-held primacy of East Africa (Hublin et al., 2017; Schlebusch et al., 2017). Genetic evidence also indicates significant, deep population structuration within West Africa (e.g. Mendez et al., 2013), supported by the distinctly late occurrence of archaic cranial morphology evident in the specimen from Iwo Eleru, dating from the terminal Pleistocene (Harvati et al., 2011), but limited fossil records prevent wider investigation. Examination of cultural evidence offers a complementary approach to examine patterns of past population structure and inter-population interaction (Gunz et al., 2009; Scerri et al., 2014). Such an appraisal in West Africa has been prohibited by the limited numbers of chronometrically dated, excavated Pleistocene archaeological sites. Research over the past five years has significantly enhanced chronological resolution for examining patterns of Late Pleistocene behaviour in West Africa (see Scerri et al., 2017). Critically, this has included evidence from a broader geographic range of sites that is necessary to begin to examine spatial and ecological population structuring within West Africa and potential routes of inter-regional interaction.

Middle Stone Age (MSA) sites in West Africa are predominately found within Sudanian savannahs that stretch across the continent as a latitude bound zone, south of the Sahel (Fig. 1). These savannahs are crosscut by extensive river systems, including the Niger, Volta and Senegal rivers. Presently, all dated MSA sites occur within close association with these rivers or their major tributaries that offer likely corridors for dispersal as well as the potential to structure population interactions across the Sudanian savannahs. Examining how and when MSA populations expanded out of the

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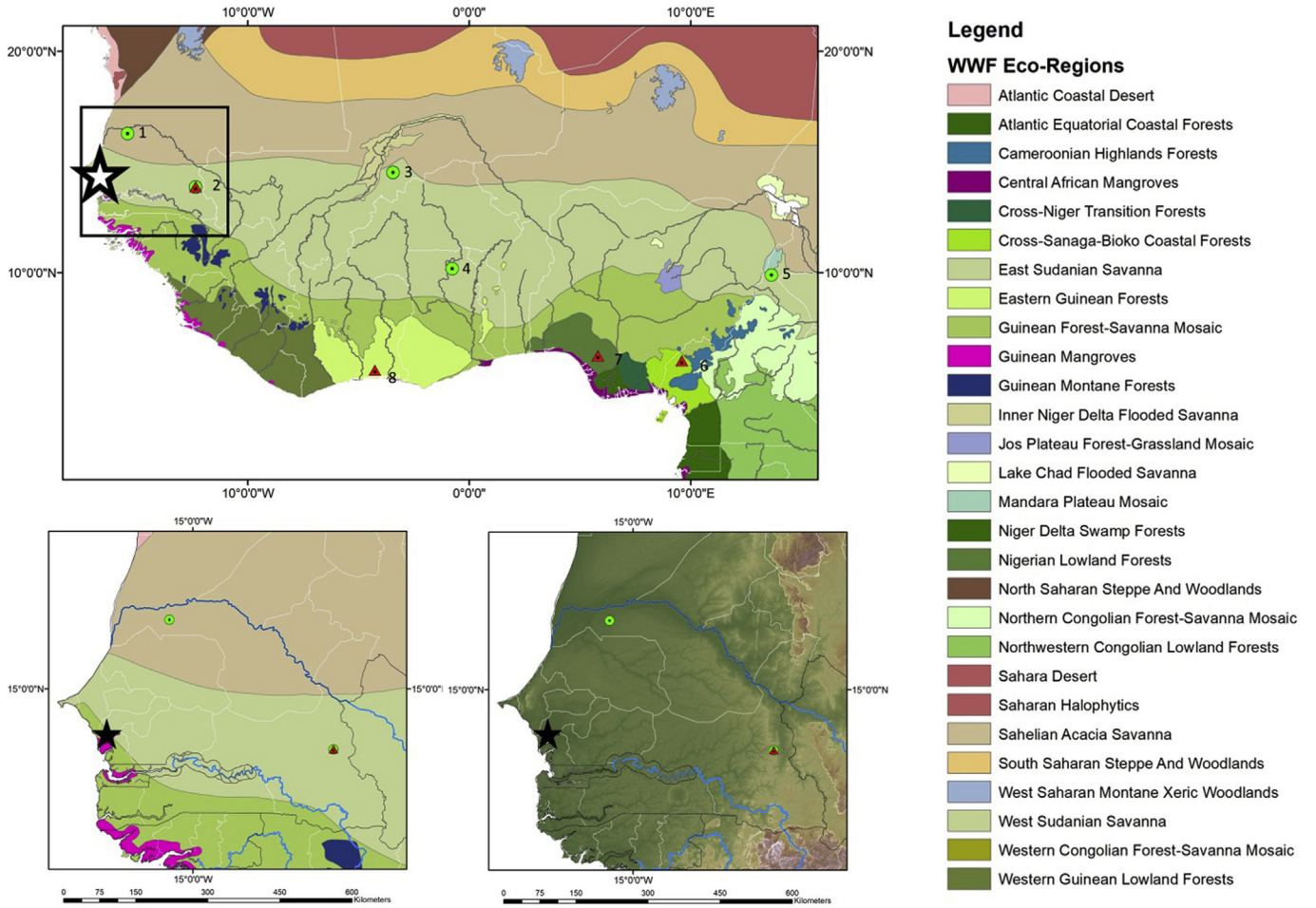

Fig. 1. (Top) Map of modern West African ecology and the location of dated Late Pleistocene sites, illustrating Middle Stone Age sites located within Sudanian savannahs (green circles; 1: Ndiayène Pendao; 2: Toumboura, Missira and Ravin des Guepiers; 3: Ounjougou; 4: Birimi; 5: Mayo Louti) and Later Stone Age sites in distinct coastal forest habitats (red triangles; 2: Toumboura; 6: Njuinye and Shum Laka; 7: Iwo Eleru; 8: Bingerville Highway); (bottom left) close up showing the position of Tiémassas (black star) in Senegal at the ecotone between Sudanian savannah, Guinean forest-savannah mosaics and Guinean mangrove habitats; (bottom right) close up showing the physiographic position of Tiémassas in Senegal. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

wide, contiguous Sudanian savannahs and into more regionalized habitats is not only important to understand patterns of cultural change and adaptation in the region, but also to explore how ecology and geography may have helped to preserve or create structure within the region's population. In contrast, the oldest Later Stone Age (LSA) sites in the region are predominately found within diverse lowland and coastal forest habitats, for which the coastline may have offered an alternative to riverine corridors of population movement. Identifying earlier occupations of the West African coastline is therefore a critical step to explore how these new habitats were colonized and the patterns of behaviour involved. Here, we present the first dated evidence for MSA behaviour on the West Africa littoral, from the site of Tiémassas, and explore the potential role of the coastline and coastal habitats in mediating population interactions across West Africa and beyond.

2. The Tiémassas study site

Tiémassas, named after a local, intermittent river, is located near Nianing, M'Bour Department, Senegal, located 85 km south-east of Dakar. Having been first identified in 1952, the site has been subject to numerous surface surveys and limited excavation in the 1960's and 1970's (Descamps, 1979, Guillot and Descamps, 1969, Davies, 1967 Diagne, 1986). The combination of unsystematic surface collection methods, absence of diagnostic artefacts recovered from excavations and the lack of chronometric dating have complicated assigning the site to a particular cultural phase, and it has been variably ascribed to MSA, LSA Age or the Neolithic periods. Recent examination of artefact collections from these earlier surveys indicated that the majority of artefacts can best be described as MSA, with the mixing of small numbers of later artefact types partially resulting from methods of recovery (Niang and Ndiaye, 2016). Considering the presence of typological elements suggestive of inter-regional contacts in the MSA, renewed examination at Tiémassas has focused upon resolving site formation processes, chronology and the nature of the lithic technology.

Survey of a 1600 × 850 m area, split into four quadrants labelled A-D, surrounding the seasonal stream identified 19 sites, all yielding surface artefacts. While 9 of them can be easily linked to MSA technological traditions, the absence of diagnostic pieces and the low density artefacts of the other sites deny any precise chrono-cultural attribution. No featuring LSA artefacts have been recovered but, two *loci* (B2 and D1) yielded ceramic fragments out of stratigraphy. At site B1 a rich surface collection was made and an 8 × 8m grid was set out over the gently eroding surface. Four 1 × 1m squares (G2; G8; E4; C8) were excavated to depths varying between 1.57 and 2.1 m and revealed a common stratigraphic sequence (Fig. 2). Sediment samples were recovered at 5 cm intervals in trench G2, and subject to standard analyses (LPSA, LOI,

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