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An evolutionary perspective on coastal adaptations by modern humans during the Middle Stone Age of Africa



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ABSTRACT

The Middle Stone Age (MSA) of Africa documents the earliest and longest record of marine resource use and coastal settlements by modern humans. Here, we provide a long-term and evolutionary perspective of these behaviors. We propose a definition of “coastal adaptations” rooted in the principles of evolutionary biology as a workable analytical device and review the MSA archaeological record from Africa to characterize the specific nature of coastal adaptations by *Homo sapiens*. On this basis we evaluate current models addressing the importance of coastal adaptations for human evolution and formulate new hypotheses within the larger framework of evolutionary causality by linking these behaviors directly to reproductive success. While the current archaeological record suggests that modern humans occasionally consumed marine resources during the late Middle Pleistocene, systematic and optimized gathering of a variety of marine food items dates to MIS 5 and 4. Archaeozoological studies show that people exploited marine resources in a methodical manner on the Atlantic, Indian, and Mediterranean coasts of Africa during this time frame. Despite the similarities in coastlines, mobile hunter–gatherers also integrated these variable coastal landscapes into their settlement strategies for more than 100 ka, as shown by evidence for stable, repeated and planned occupations. Additionally, elements of complex material culture, such as bone tools and shell beads, occur particularly often in (near-) coastal MSA sites. The specific nature of coastal adaptations by modern humans can thus be characterized by their systematic nature, long duration and verifiable impact on the overall adaptive suite. By combining archaeological data with ethnographic, nutritional and medical studies we propose several evolutionary scenarios for how modern humans could have increased survival and fecundity rates by their specific adaptations to coastal environments. In order to test these hypothetical scenarios for the selective advantages of coastal adaptations for *Homo sapiens*, we need more data deriving from an expanded spatiotemporal archaeological record, just as much as more formal evolutionary models and research strategies.

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1. Introduction

The Middle Stone Age (MSA) of Africa provides the earliest and longest record of marine resource exploitation by modern humans, spanning more than 100,000 years. These coastal adaptations are associated with different populations on various parts of the African continent, particularly in southern Africa. Due to their spatial and temporal extent, they have become important topics in the

study of the biological and behavioral evolution of *Homo sapiens* (e.g., Stringer, 2000; Walter et al., 2000; Parkington, 2001, 2003; Broadhurst et al., 2002; Marean et al., 2007; Cunnane and Stewart, 2010; Parkington, 2010; Klein and Steele, 2013; Will et al., 2013; Kyriacou et al., 2014; Marean, 2014).

As early as the late 1960s, scholars recognized the importance of marine resources in coastal MSA sites in South Africa such as Klasies River Main site (Speed, 1969; Voigt, 1973), Hoedjiespunt 1 and Sea Harvest (Volman, 1978). Since then, archaeologists have excavated many additional sites with shellfish-bearing strata in Africa dating to the MSA. The most important localities (Fig. 1) lie on the southern coast of South Africa along the Indian Ocean (Singer and Wymer, 1982; Thackeray, 1988; Grine et al., 1991; Marean et al.,

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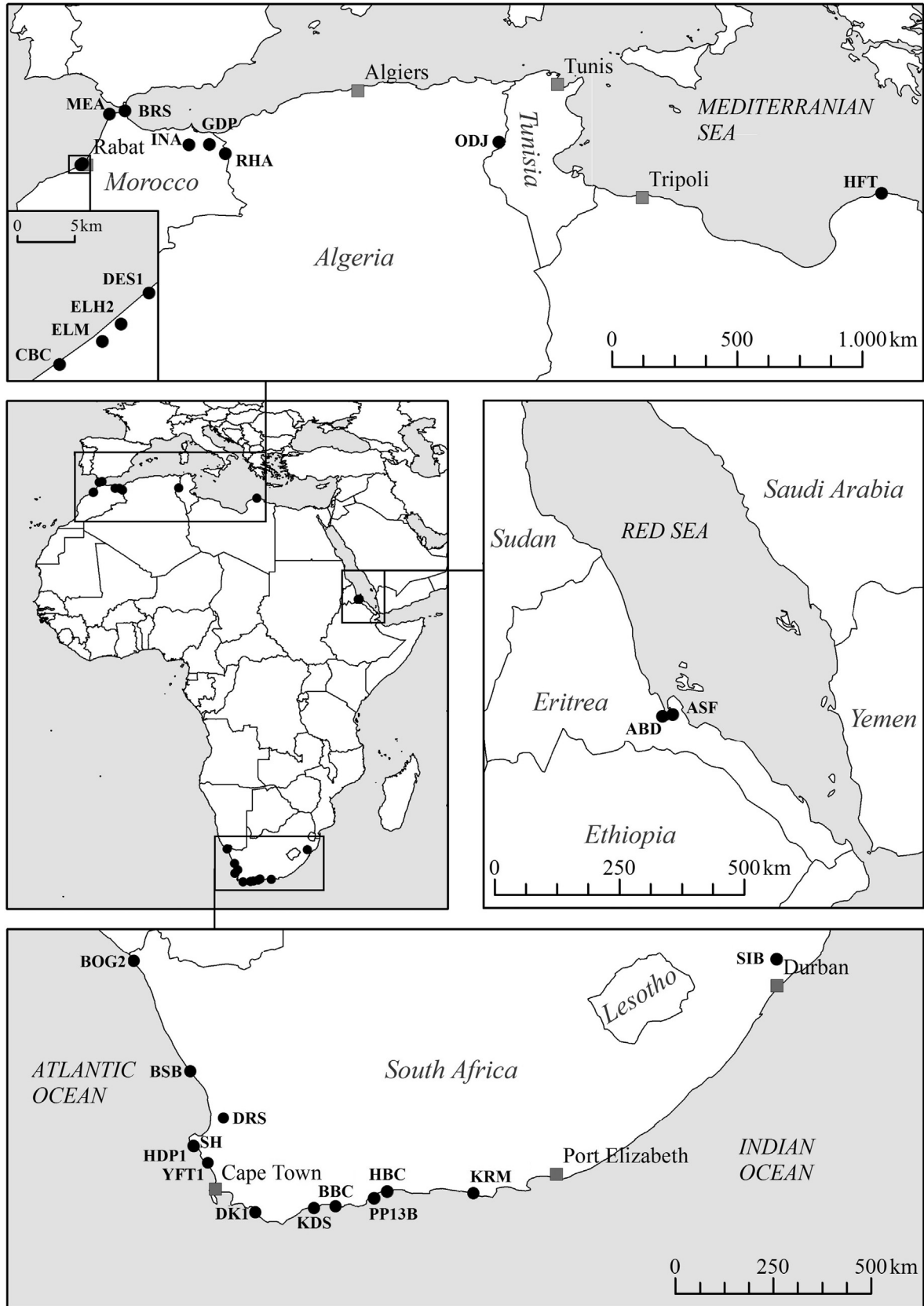


Fig. 1. Location maps depicting MSA sites in Africa with evidence for coastal adaptations (ASF-Asfet; ABD-Abdur; BBC-Blombos Cave; BOG2-Boegoeberg 2; BRS-Benzú Rockshelter; BSB-Brand se Baai; CBC-Contrebandiers Cave; DES1-Dar es Soltane 1; DK1-Die Kelders 1; DRS-Diepkloof Rockshelter; GDP-Grotte de Pigeons; ELH2-El Harhoura 2; ELM-El Mnasra; HBC-Herold's Bay Cave; HDPI-Hoedjiespunt 1; HFT-Haua Fteah; INA-Ifri n'Ammar; KDS-Klipdrift Shelter; KRM-Klasies River Mouth; MEA- Mugharet el 'Aliya; ODJ-Oued Djebbana; PP13B-Pinnacle Point Cave 13B; RHA-Rhafas; SH-Sea Harvest; YFT1-Ysterfontein 1). (map by E. Schmalz).

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