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Incisor avulsion, social identity and Saharan population history: New data from the Early Holocene southern Sahara

Christopher M. Stojanowski *, Charisse L. Carver, Katherine A. Miller

Center for Bioarchaeological Research, School of Human Evolution and Social Change, Arizona State University, PO Box 872402, Tempe, AZ 85287, USA

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ABSTRACT

After an extended occupation hiatus the Sahara Desert was re-populated during the Early Holocene humid phase, a process that likely involved groups from multiple distinct source populations in northern Africa. Previous research has used material culture and craniometric analyses to infer population movements into and throughout the Sahara. Here, we present new data on Saharan population history using an independent data type: the presence and pattern of incisor avulsion, documented for the first time at sites in the southern Sahara Desert. At Gobero (Republic of Niger) both males and females were affected with no side or arcade preference. The frequency of affected individuals did not change through time; however the practice became exclusively male-focused and expanded to include the lateral incisors during the Middle Holocene. Comparison of the pattern and prevalence of avulsion at key Late Pleistocene sites from throughout northern Africa indicates the practice was restricted to the Maghreb. Our interpretation of these data suggests some Maghrebi migrants re-settled the southern Sahara, but over time, new groups entered the Sahara initiating a complex, multi-ethnic community dynamic in which some individuals enhanced the signal of social identity by extracting a greater number of teeth, thus producing a highly visibly modified countenance.

Introduction

Beginning around 10,000 years ago, the Sahara Desert was re-populated following several millennia of harsh, arid conditions that prevented human occupation. Previous archaeological and physical anthropological research suggests that this was a complex, multi-directional process involving source populations with distinct origins in the African continent. The Early (circa 10–8 kya) and Middle Holocene (circa 8–5 kya) Sahara was thus a large zone of interaction in which diverse language communities and social identities formed and interacted, contributing to the genetic and ethnic diversity we observe among modern North African peoples today. This paper adds to our understanding of Saharan prehistory by incorporating important new data on incisor avulsion from recently excavated sites in the southern Sahara Desert. Incisor avulsion is the intentional removal of healthy teeth and is a social practice with both cultural and biological relevance (Alt and Pichler, 1998; Milner and Larsen, 1991; Robb, 1997). The practice has now been documented in numerous archaeological samples with a near global distribution (Becker, 2011; Connah, 1976; Cook, 1981; Crawford, 1967; Domett and O'Reilly, 2009; Domett et al., 2013; Freedman and Lofgren, 1979; Fujita and Choi, 2008; Haverkort and Lubell, 1999; Hawkey, 2003; Hrdlička, 1940; Hudson, 1992; Humphrey and Bocaege, 2008; Kaifu et al., 2011; Kricun, 1994; Kusaka et al., 2008, 2009; Nelsen et al., 2001; Prokopec et al., 1994; Santoni et al., 2006; Takenaka et al., 2001; Tayles, 1996; Tayles et al., 2000; Temple, 2007; Temple et al., 2011; Temple and Larsen, 2007; Vincent, 2003; Webb, 1994; Wysocki and Whittle, 2000) with most scholars agreeing that avulsion was highly salient to its practitioners and was reflective of some aspect of individual or group identity. It is an invasive procedure resulting in a highly visibly changed countenance (Eli et al., 2001; Mower, 1999) that modified speech patterns and was effected through a relatively painful process that involved breaking or chipping of the erupted tooth (see also Geller (2006) for information on the transformative, religious and offertory power of pain). It was not something that could easily be hidden, reversed, manipulated or misrepresented once performed. Indeed, as Humphrey and Bocaege (2008:110) note, "the visual impact of [incisor avulsion] is very striking and would have been immediately obvious to other individuals from the same or different community." This opinion is supported by Van Reenen's clinical work in Africa in which he noted, "Tribes living in fairly close proximity to each other could speak each other's language.

* Corresponding author. Fax: +1 480 965 7671.
E-mail address: christopher.stojanowski@asu.edu (C.M. Stojanowski).

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Sometimes these were similar enough for them to be uncertain whether or not a visitor was a member of the tribe. The style of tooth mutilation, however, soon established the identity of the visitor…" (Van Reenen, 1986:161). Research from throughout the African continent confirms that, while the specific meaning may have varied from group to group, incisor avulsion and dental modification, in general, was an important part of "being" in many traditional African societies (Bachmayer, 1982; Briedenhann and Van Reenen, 1985; Ritchie, 1958; Singer, 1953; Van Reenen, 1978a, 1978b, 1986; Van Reenen and Briedenhann, 1985) and continues to impact the dynamics of personhood and identity in modern African migrant communities (Willis et al., 2005a, 2005b, 2008). Avulsion may also reflect a costly signaling display, and the ritual associated with incisor removal may help promote group cohesion and prosocial behavior (Henrich, 2009; Xygalatas et al., 2013).

Based on past ethnographic research throughout Africa we argue, then, that spatiotemporal patterns of avulsion can be used as a *marker* of population interaction dynamics, whether this reflects the diffusion of an idea, culture contact, or the physical migration of specific peoples across the landscape. And while mapping identities onto patterns of dental modification may not be straightforward among modern African peoples because of how widespread such traditions are (or were), we contend that avulsion does serve as an appropriate biocultural marker in North Africa where Late Pleistocene (~20–12kya) human populations of the Maghreb removed their maxillary central incisors almost without exception (Balout, 1955; Balout and Briggs, 1949a, 1949b; Barton et al., 2008; Boule and Vallois, 1932; Briggs, 1953, 1954; Camps-Fabrer, 1975; Chamla, 1968, 1970; Cole, 1928; Ennouchi, 1953; Ferembach, 1961, 1965; Humphrey and Bocaege, 2008; Marchand, 1936; Petit-Maire, 1979; Vallois, 1952). Because of its saliency in the Late Pleistocene of the Maghreb and the absence of human occupation in the Sahara until the Early Holocene, plotting the distribution of incisor avulsion among Late Pleistocene populations of northern Africa (Maghreb, Nile Valley, tropical West Africa, East African rift system) and the central and southern Sahara informs the highly complex history of North African population dynamics over the last 10,000 years (Drake et al., 2011; Dutour, 1989a,b; Irish, 1997, 1998a,b,c, 2000; Kuper and Kröpelin, 2006; Lubell, 2001; Lubbell et al., 1984; MacDonald, 1998). Importantly, incisor avulsion practices are independent of other sources of data (phenotypic, genetic, linguistic, and stylistic) that have previously been used to infer Saharan population interaction and migration, and as such, new data on its prevalence adds considerably to the existing literature.

In this paper, we present new evidence documenting incisor avulsion from the Early Holocene of the southern Sahara Desert and summarize existing case reports from the circum-Saharan region to contextualize the patterns we record. These data derive from a series of recently excavated cemeteries from the Gobero region of central Niger (Sereno et al., 2008), located approximately equidistantly from the four regions with documented Late Pleistocene human occupation: the Maghreb, the Nile Valley, East Africa and West Africa (Fig. 1). We present new data on the prevalence and patterning of incisor avulsion at Gobero and consider variation with respect to age and sex. We then compare these data across two occupation phases at the site to ascertain how the pattern and frequency of avulsion changed through time. These results are compared to broader patterns of avulsion throughout northern Africa, thus illuminating the processes by which the Sahara was repopulated and how this population history relates to modern African language distributions (Blench, 2006; Ehret, 1993).

Saharan population history

North African prehistory is intimately linked with climate (Brooks et al., 2005; Wendorf et al., 2007), which poses a unique problem given that climatic variation reflects complex global inputs inferred from an array of data sets that sometimes produce conflicting results. The general chronology, however, suggests an arid phase between 18 and 12 kya (correlated with the end of the Last Glacial Maximum and Heinrich Stadial I), climatic improvement after 11.5 kya (generally correlated with the end of the Younger Dryas), and the establishment of numerous deep water lakes, rivers, deltas, and re-charged aquifers throughout the Sahara between about 10 and 5 kya (the African Humid Period) (Adkins et al., 2006; Damnati, 2000; deMenocal et al., 2000; Drake et al., 2011; Gasse, 2000; Gasse and Van Campo, 1994; Hassan, 1997; Kuper and Kröpelin, 2006; Kutzbach et al., 1996; Street and Grove, 1979). Although local sequences of humid/arid phases are variable, there is broad evidence for an interruption of the African Humid Period by a sharp, arid spike between 8.2 and 7.5 kya (Alley et al., 1997; Adkins et al., 2006; Cremaschi and Zerboni, 2009; Guo et al., 2000; Kobashi et al., 2007; Lal et al., 2007; Mercuri et al., 2011; Wendorf et al., 2007), which is roughly coincident with the appearance of domesticated cattle. After about 4.5 kya arid conditions were re-established as part of the long-term trend leading to the Sahara we know today.

Evidence from a number of sites across the Sahara suggests a rapid human response to the expanding surface waters during the African Humid Period, which provided new areas of resource extraction that were previously unavailable during the terminal Pleistocene. Initial archaeological emphasis on broad material culture similarities from the Nile westward into the Sahara led researchers to define an "aqualithic" culture (Clark, 1980; Sutton, 1974, 1977) characterized by its focus on aquatic (riverine and lacustrine) resources and a package of technologies including bone harpoons, fishing gear, grinding stones, and very early and ubiquitous "wavy line" and "dotted wavy line" ceramics. Such "aqualithic" sites were first documented in the eastern Sahara and Nile Valley (Arkell, 1949; Close, 1995; Haaland, 1992, 1995, 1997, 2009; Haaland and Magid, 1995); similar sites have now been documented throughout north Africa as far west as Senegal (Close, 1995; Roset, 1987; Sereno et al., 2008) leading some to emphasize an east-to-west process of migration out of the Nile Valley or East Africa during the African Humid Period (Haaland, 2009; Sutton, 1974, 1977). The overlapping distributional ranges of early ceramics, barbed harpoons, grinding stones, and modern Nilo-Saharan languages suggest a convenient packaging of cultural traits that is hard to ignore (see Drake et al., 2011); however, researchers are increasingly recognizing the diversity of technologies contained within these sites (Garcea, 1998; Holl, 2005; Jesse, 2002, 2003, 2010; Mohammed-Ali and Khabir, 2003). Although the monolithic nature of the African "aqualithic" has been questioned, the general process of an east-to-west movement of peoples into the Sahara remains the dominant archaeological paradigm explaining the distribution of peoples and technologies during the African Humid Period (see Becker, 2011 for a complete review of this literature).

Lithic analysis of sites throughout North Africa suggests an alternative model for Saharan re-population. As summarized by Clark (1980), the distribution of Ounanian points and other specialized forms of hafted arrow elements suggests, "that this Epi-Paleolithic tradition was carried into the desert by groups repopulating the Sahara from the north, from the eastern Maghreb and, perhaps, Cyrenaica" (Clark, 1980:564). Drake et al. (2011) consider both perspectives. In a comprehensive analysis, these authors combined satellite imagery and digital topographic data with linguistic data, the presence of specific taxa from in situ archaeological sites, and the distribution of key material culture technologies to affirm a bi-directional re-populating of the desert. They argue that the Sahara was re-populated by two distinct groups of people with two distinct adaptive strategies: (1) bow and arrow hunters