Africa from MIS 6–2: Population Dynamics and Paleoenvironments

Sacha C. Jones and Brian A. Stewart (eds.)
Vertebrate Paleobiology and Paleoanthropology Series, Dordrecht: Springer, 2016, 424 pp. (hardback), £103.99.
ISBN-13: 9789401775205.

Reviewed by DEBORAH I. OLSZEWSKI
Department of Anthropology, Penn Museum, 3260 South Street, University of Pennsylvania, Philadelphia, PA 19104, USA;
deboraho@sas.upenn.edu

This volume includes papers from a conference held at the McDonald Institute for Archaeological Research in 2010. The aim of the conference was to examine the histories of populations on the African continent through the use of a variety of data sets—archaeology, genetics, paleoenvironments, and paleontology—to reach a more nuanced understanding of hominin skeletal and behavioral evolution, how populations were spatially distributed across Africa, and the impact of climatic factors on group size and movement. The conference participants sought to position data from Africa to aid in the construction of theoretical frameworks and to benefit from frameworks developed elsewhere.

In addition to a preface and introductory chapter, the volume is divided into four parts, three of which organize the papers into broad ecological zones. Part I includes four chapters dealing with coastal areas of Africa, primarily southern Africa where extensive research has been conducted, and one contribution for northwest Africa. Part II features the deserts, with three papers on the Sahara and four papers on desert biomes in southern Africa. Part III focuses on grasslands, woodlands, and rainforests, with two papers on East Africa, one on southern Africa, and two on central Africa. Finally, Part IV presents several overviews—skeletal evidence, African genetics, and an assessment of future directions for research in Africa.

Chapter 1, by B.A. Steward and S.C. Jones, introduces the volume and the rationale for its organization into biomes, as well as the advantages and the data sets still lacking. They are careful to note that each of these general biomes actually contains considerable diversity (topography, sediments, vegetation, water availability, and so forth). In the coastal biome, for example, they observe that there is high vegetation diversity between coastal regions, ranging from areas characterized by tropical forests to those with deserts. Moreover, most research has occurred in South Africa or the Maghreb, yet Africa is a continent with abundant coastlines elsewhere still to be investigated. And, there also is the issue of data now submerged on the continental shelves. Deserts in Africa, on the other hand, offer highly visible archaeology, but do not necessarily lead to good organic preservation, particularly for surface finds which also can suffer from surface deflation and erosion. River systems that once ran through parts of deserts could have been occasional corridors for movement through otherwise arid regions and may have influenced population density and group size. For grasslands, woodlands, and rainforests, they ask if such contexts were biogeographical corridors or instead might have operated as barriers to movement. In particular, rainforests were patchy spots across the landscape during arid periods, and likely not refugia, partly due to significant deficiencies in food resources for hominins.

Part I: The first three chapters in Part I (Coasts) are studies from the coastlines of southern Africa. Chapter 2, by A.S. Carr, B.M. Chase, and A. Mackay, focuses on the Middle Stone Age (MSA) in the southern part of South Africa. It is an overview of the archaeology in the period from 170–55 kya, which is derived primarily from cave and rockshelter contexts. They discuss present-day landscape, coastal geomorphology, and climate, and then examine these aspects during the Quaternary, during which lower sea level added up to 50,000km^2 of land (Agulhas Bank) to current coastlines. During periods of higher sea level, aridification is marked by the formation of sand dunes in some areas. By using data from the transition between the Pleistocene and the Holocene, the authors offer modeling of climate changes occurring during the MSA and the potential influences on hominin populations. They observe that it was local resources that were most critical to site placement and the use of various parts of the landscape rather than fluctuations in the size and density of populations.

In Chapter 3, by A. Mackay, the main focus is the technological flexibility inherent in the MSA lithic assemblages from the southern African sites of Diepkloof, Hollow Rock Shelter, Klein Kliphuis, and Klipfonteinrand, and how the use of these technologies was a strategy for responding to changes induced by climatic variation through time, rather than lithics used as markers in a culture history approach. Although the notion of flexibility is set within a technological framework, the actual lithics used in the analysis are retouched tools, particularly backed pieces, and unifacial and bifacial points. Technology is thus defined somewhat differently than it is in other literature, where technology refers to how the lithic pieces are manufactured. Here, technology has more to do with the form and choice of stone raw material of the pieces, and thus perhaps by implication, how they may have been hafted and used. Mackay notes that only bifacial points do not reoccur through the stratigraphies of the four sites, as these are confined to assemblages classified as Still Bay. The fact that the other types (backed elements, unifacial points) do reoccur through time is the basis for arguing for flexibility in choosing between various options available in order to meet particular challenges, a

  ISSN 1545-0031
doi:10.4207/PA.2016.REV155

point made also by Lombard (2012) for the MSA.

The following chapter (Chapter 4) is by J. Sealey, and uses information from hunter-gatherer groups as documented over the past 100 kya to assess the models and interpretations proposed by various researchers when they investigate and interpret MSA groups and populations. In particular, Sealey focuses on whether or not issues of demography influence the appearance of innovations in the MSA. She examines the complexity (or not) of tool kits from Still Bay, Howieson's Poort, and several Later Stone Age (LSA) traditions (e.g., Robberg, Oakhurst, Wilton, and post-Wilton). Data from four recently excavated sites for the MSA (Apollo 11, Diepkloof, Sibudu, and Umhlatuzana) provide only a sparse record of this important period; however, the archaeological record of the LSA is much more substantial, allowing better comparisons of demography and tool kit complexity. The LSA record, in fact, suggests that demography is not the main driver for innovation or more complex tool kits, particularly as there are examples indicating that population increase can correspond to simpler tool kits.

Finally, Chapter 5 shifts the coastal focus to the Gebel Akhdar region in northern Libya in northwestern Africa. The authors (S. Jones, A. Antoniadou, H. Barton, N. Drake, L. Farr, C. Hunt, R. Inglis, T. Reynolds, K. White, and G. Barker) report on the results of surveys which located both MSA and LSA sites that stretch from Haua Fteah (recently re-excavated and reassessed) on the coast to the mountains of Gebel Akhdar and then to the interior pre-desert and desert. Examination of each survey section indicates differing frequencies for sites of the two periods, for example, in the coastal section there are 44 sites (34% MSA and 14% LSA, along with 9% MSA/LSA and 43% nondiagnostic), while the mountain region yielded 85 sites (8% MSA and 38% LSA, with 2% MSA/LSA and 52% nondiagnostic). The 44 sites in the pre-desert tend to be MSA (53%) or MSA/LSA (18%) in age compared to 16% LSA; and, despite the presence of a paleolake in the desert survey section, only 8 sites were identified (mostly MSA or MSA/LSA). These patterns are suggested to reflect the potential habitability of some areas, particularly the pre-desert and desert which would lack abundant water during arid intervals, such as much of the Holocene, and thus help explain the relative lack of LSA sites there. Interestingly, they argue that proximity to stone raw material sources was a major factor in the location of MSA sites. Paleo-rivers (during pluvials) would serve as corridors for movement of people from coastal regions (which were refugia during arid periods) into and through the Sahara.

Part II: The second section of the book—on deserts—begins with a contribution (Chapter 6) by N. Drake and P. Breeze, who consider how climate changes impacted the Aterian MSA occupation of the Sahara. They consider the issue of a "green Sahara" by modeling humid intervals to suggest when corridors in the desert would be available for both hominins and animals. They note that the period from 129–92 kya was especially humid and that paleolakes were present. Based on assessments of data from 26 Aterian sites (from both the Maghreb and the Sahara), Drake and Breeze conclude that the Aterian was not an adaptation to aridity but rather to savanna ecologies.

Chapter 7 also concerns how Pleistocene climates impacted environment and population in desert areas, spanning from the Early Stone Age (ESA: Oldowan and Acheulian), through the MSA and later. In this contribution, E. Cancellieri, M. Cremaschi, A. Zerboni, and S. di Lernia examine the archaeology of southwestern Libya, including several sites (e.g., MT22, Uan Afuda, Uan Tabu, and Uan Telocat) and hundreds of archaeological units recorded during surveys of targeted regions. The concept of archaeological unit (grids on the surface) allowed the survey to record everything from isolated artifacts to dense concentrations of artifacts ("sites"). They note that the presence of Mode 1 Oldowan is speculative, being based on the presence of choppers and chopping tools (which have the potential to be present in all time periods) rather than dated assemblages. On the other hand, the Acheulian (also undated, but marked by distinctive bifacial tools such as handaxes) is present, especially the Late Acheulian. In the MSA, it is the Aterian that is most distinctive industry, and Cancellieri and colleagues suggest that the Aterian is an arid lands adaptation (contra Drake and Breeze, see above). They do so in part because of TL and OSL dates from the Aterian assemblages at Uan Afuda and Uan Tabu that indicate MIS 4 occupations, and in part because they note that there are many econiches in the Sahara, even today. Thus, the Sahara was not a monolithic paleoenvironment and "dry" does not equal "abandonment." There is less certainty in their opinion about LSA attributions of artifacts because these often are based on the presence of blade/bladelet technology, but blades/bladelets also are known from earlier periods.

P. Van Peer discusses the MSA of northern Africa in Chapter 8. One of his main points is that the so-called differences in the technological systems of the MSA are due in part to different research traditions which use dissimilar nomenclatures. He argues that this process results in masking similarities in the MSA. There are two exemplars. The first is from the Middle Pleistocene and deals with discoidal and bifacial technologies involved with core-axes of the Sangoan; by MIS 6, these become part of the Lupemban, which also features bifacial foliates and blade technology. The second is the Nubian Complex of the MIS 5 period. Here, Van Peer argues that the Nubian Levallois technology is geared to the production of Levallois points, being found in northeastern Africa and the Arabian Peninsula. The Aterian MSA is said to be a desert variant (of the Nubian Complex) originating in the eastern Sahara rather than the Maghreb. This chapter has a decidedly traditional approach, being focused on tracing historical trajectories (read "people") using lithic assemblages. It also assumes that certain lithic technologies and types can only be "invented" once and then they spread to other regions, a supposition that runs counter to at least some recent thought on how lithic assemblages might be interpreted (e.g., Serwatka and Riede 2016; Shea 2014; Will et al. 2015).

In Chapter 9, S.L. Burrough examines the paleoclimate

and paleoenvironment of the Kalahari in southern Africa. As she notes, it is rainfall in adjacent regions that affects water availability and distribution in the Kalahari itself, especially rainfall in Angola. If rainfall is relatively high there, then it appears as surface water associated with the Okavanga delta; prehistorically this terminus held the Makgadikgadi megalake (66,000km^2) and a variety of ESA, MSA, and LSA sites are associated with this and other paludal contexts in the Kalahari. Lake level high stands and regressions can be measured and dated to suggest periods that were wetter (i.e., 131, 105, 92, and 17 kya) and those that were drier (i.e., 64, 39, and 27 kya). Such wetlands ameliorated an otherwise relatively arid landscape and provided resources for both animals and humans in localized areas, as well as providing corridors through which people and animals could traverse from the interior to the coasts.

L.H. Robbins, G.A. Brook, M.L. Murphy, A.H. Ivester, and A.C. Campbell, in Chapter 10, also discuss the archaeology and paleoenvironment of the Kalahari during MIS 6–2. In their contribution, they focus on new OSL dates obtained for the site of White Paintings Rockshelter in the Tsodilo Hills area, using these as a framework for understanding changes in the lithic assemblages that likely are related to shifts in subsistence strategies. The stratigraphic sequence includes MSA at the base, overlain by a transitional MSA/early LSA industry with large blades, which is overlain by a microlithic Early LSA ("Lower Fish" deposits). They suggest this sequence represents a shift from spear hunting of large herd animals (MSA) to possibly predation on solitary browsers (transitional MSA/Early LSA) to a broadening of food resources to include spawning fish and a wider array of animals now hunted using bow-and-arrow technology (Early LSA). Robbins and colleagues also offer several issues for consideration, among them, whether or not megalake Makgadikgadi was a barrier that resulted in the isolation of populations and whether or not the presence of the megalake encouraged or discouraged trading networks (i.e., for stone raw materials).

In the final desert section contribution (Chapter 11), G. Dewar and B.A. Stewart synthesize data from Namaqualand, which is the southern extension of the Namib Desert in South Africa, concentrating on the Succulent Karoo Biome in which the recently excavated site of Spitzkloof Rockshelter A is situated. In assessing the archaeological record, they note that ESA occupations are present prior to MIS 6, but both MIS 6 and MIS 5 have no known sites (except for Erb Tanks [MIS 5] in the greater Namib Desert area to the north), although there are many heavily patinated surface artifacts that possibly represent these intervals. It is during MIS 4 that hominin occupation becomes much more apparent, with both greater numbers of sites and types of sites (including Still Bay and Howieson's Poort); this interval is cooler but humid. In the following MIS 3, paleoclimatic conditions fluctuate between arid and humid with overall cooler temperatures. This impacts hominin presence, with some periods of greater land use and others where sites are quite rare. For MIS 2, the paleoclimatic conditions are quite favorable at the start (cool and humid), but then trend to more aridity. Dewar and Stewart note that arid conditions do not necessarily result in abandonment of Namaqualand, as at least some of these arid periods do contain evidence for at least intermittent occupation of the region.

Part III: This next section deals with the archaeology of areas characterized by grasslands, woodlands, and rainforests. In Chapter 12, M.M. Lahr and R.A. Foley observe that East Africa has a range of biomes which present a mosaic of ecologies for hominins in the context of hominin evolution. They synthesize information from genetics, fossils, and archaeology, noting that the earliest known fossils of anatomically modern humans are from this region (Omo Kibish, Herto, Singa, Mumba, Aduma, Dire Dawa [Porc Epic], and Garba III, with Melka Kunture being too fragmentary). They argue that East Africa provided the framework for the conditions under which the human phenotype was adaptive and therefore undergoing positive selection, with one result being that by MIS 5, anatomically modern humans had expanded their geographical footprint to other parts of Africa. This expansion also coincides with the appearance of a number of regional traditions in lithic assemblages. By MIS 3, behaviorally modern humans were expanding out of Africa, while MIS 2 is characterized by increased aridity, perhaps enhancing the role of East Africa lakes as refugia.

J.T. Faith, C.A. Tryon, and D.J. Peppe, in Chapter 13, examine the role of ungulate biogeography in early human (MSA) movements by focusing on sites associated with the Kenyan side of Lake Victoria. Using faunal assemblages from Rusinga and Mfangano Islands, they identify a grasslands signature with a much reduced and/or dessicated Lake Victoria. They note that the species (Grevy's zebra, oryx, white rhinoceros, southern reedbuck) each have different ranges today, and their sympatric association during the MSA in this region is suggestive of one large super community. The MSA archaeology on these two islands includes small bifacial points, that are somewhat similar to sites in the Rift Valley, and which appear to be a technology associated with exploitation of grasslands biomes. On the other hand, there also are Lupemban artifacts as far east as the northeastern shore of Lake Victoria; Lupemban is usually thought to represent adaptations linked to a forest biome. Its presence, along with the small bifacial point MSA, indicates the long-term biome shifts that occurred in the Lake Victoria area during the course of the MSA. These shifts may have facilitated population movements (as with those of the ungulates) during some intervals.

Chapter 14, by B.A. Steward, A.G. Parker, G. Dewar, M.W. Morley, and L.F. Allot, concerns hominin use of the Maloti-Drakensberg Mountains systems in southern Africa, which has an archaeological record at least as early as MIS 5. The primary source of data is from the archaeological sequence at Melikane Rockshelter, situated at ca. 1800masl. Steward and colleagues suggest that warmer and more humid intervals document the movement of coastal populations into the mountains, while drier intervals witnessed the mountains occupied by populations from the interior plateau, who followed river systems such as the Orange/Senqu to their sources. Using phytolith data, they track pa-

leoclimate changes in the Melikane deposits which record MIS 5a, 4, 3, and 2. Occupation gaps occur in early MIS 4 (80–61 kya), initial MIS 3 (60–50 kya: although nearby sites such as Sehonghong are occupied), the end of MIS 3/beginning of MIS 2 (38–24 kya), and during the Last Glacial Maximum and following millennia (24–10 kya). The most intensive set of occupations occurred during a very arid period (46–38 kya) in MIS 3. The attraction of mountain habitats included a stable source of water and food resources.

The Lupemban MSA of Central Africa is the focus of Chapter 15, by N. Taylor. This contribution is an overview of all the known Lupemban occurrences in the Congo Basin, where Taylor notes that the majority of finds were made during the 1960s and 1970s by a small handful of researchers including L.S.B. Leakey and J.D. Clark. Most of these are surface materials and are parts of palimpsests of Modes 2, 3, 4, and 5 artifacts types. Although the Lupemban is traditionally associated with a rainforest/woodlands habitat, there are only three dated sites, all of which are beyond the rainforest boundaries (Kalambo Falls [in a deciduous miombo forest], Twin Falls, and Sai Island). To address some of the issues, Taylor applies a series of filters (removal of sites that lack stratigraphic data, removal of surface sites, removal of sites with minimal descriptions of assemblages, removal of sites with "stone-lines," removal of sites with probable "stone-lines," and removal of sites with geomorphic disturbance). As he notes, once these filters are applied, no Lupemban sites remain in the Congo Basin, a rather harsh fact pointing out the myriad of problems with the Lupemban. Given these constraints, he asks whether or not the Lupemban should be considered a real entity, and somewhat surprisingly concludes that it is, based on the facts that Kalambo Falls has a Sangoan to Lupemban sequence and that about a quarter of the known sites were researched by one scholar (J.D. Clark).

The final paper (Chapter 16) in the grasslands, woodlands, and rainforests section is by E. Cornelissen. This contribution examines mainly the MIS 2 period in the Congo forest and the possible role of river systems in both archaeological and genetic distribution patterns. The data are mostly from collections of isolated artifacts held in museums. There are some dated sites, such as Katanda, Ishango, and Matupi Cave (all beyond the current forested study area), which provide a general framework for lithic industries. LSA materials are dominated by quartz lithics, a pattern also found in the MSA. Cornelissen notes that the genetics of pygmy hunter-gatherers suggest that their population was originally much more widely spread than today. Due to cooler and more arid intervals that reduced connectivity of forested areas, these populations became more fragmented and isolated after 70–60 kya. Populations of the period around 25–20 kya do not appear to be genetically linked to those hunter-gatherers in the region today. Most importantly, lithic industries characterized by the use of quartz raw material are widespread in a variety of paleohabitats and thus are not a chronological or habitat specific diagnostic.

Part IV: As the last section in the volume, this part deals with broader perspectives that are syntheses of anatomical and archaeological data, as well as observations about future research agendas in Africa. In Chapter 17, F.E. Grine provides an overview description and discussion of hominin skeletal materials. In reviewing the many specimens, Grine notes that, based on morphological diversity of the fossils, they indicate the presence of multiple lineages. In the interval from MIS 6–2, there are 50 sites that have yielded hominin fossils. These are contextualized with dating (if known), and stone artifact and faunal associations (if present). His Table 17.2 summarizes the fossil materials found and assigns them to larger MIS intervals (in some cases, to several MIS stages), with some assignments for MIS 5 being to the smaller intervals within it, for example, Grotte des Contrebandiers is MIS 5d–5c and Eyasi is to MIS 5c. Grine also notes that the emergence of modern humans is difficult to link to climate change as a major factor, and that the wide morphological diversity that includes both archaic and modern traits could be due to hypotheses such as interbreeding between archaic and modern populations, mosaic mixes of archaic and modern traits due to phyletic gradualism, or to the presence of contemporary archaic and modern populations in which the modern populations replace archaic ones over time. He also notes that recent genetic evidence suggests that the Khoe-San are the first modern humans to diverge (ca. 130–110 kya) from the lineage that led to all other modern populations, perhaps indicating a South African origin for modern humans.

An overview of the African genetic record is presented in Chapter 18, by P. Soares, T. Rito, L. Pereira, and M.B. Richards, who focus on mtDNA studies to examine the possible origin region within Africa for modern humans, the potential or probable migrations of populations within the African continent, and the issue of out of Africa and return to Africa migrations in prehistory. They provide a very helpful explanation of clades, subclades, and haplogroups, which are the basis for their thematic discussions, and observe that haplogroup L is African; this haplogroup has two basal clades, one of which is L0, which appears to have a South African origin. Other haplogroups such as L1 have some subclades that East African in origin and others that Central African, and yet others that are West African. Haplogroup L3 is either Central or West African. Unlike Grine's perspective (see above) that modern human origins are most likely to be in southern Africa, Soares and colleagues note the difficulties involved in determining the African region in which modern humans originated; e.g., different genetic studies reach different conclusions for origin area, highly diverse genetics such as are found in Central and West Africa could be due to processes such as admixture or bottlenecks, and there is no genetic bottleneck ca. 200 kya, the point at which modern humans presumably appeared. What Soares et al. do conclude is that by about 140 kya, there seem to be two groups of modern humans, one in South Africa (haplogroup L0) and one in either Central/West or East Africa (haplogroup L1); this division of human populations is, of course, much later than the origin point of modern humans. The emergence of haplogroup

L3 occurs ca 70–60 kya and is the source (it includes the M and N subclades) for all ancient non-African mtDNA lineages. Within Africa, haplogroup L0 moves into East Africa between 130–75 kya, just prior to the appearance of haplogroup L3 in Central/West Africa. The North African region contains no mtDNA lineages that date to the MSA, and the haplogroups (M1 and U6) there represent a repopulation after 55–35 kya, possibly from the Arabian Peninsula or Gulf regions of the Middle East. The authors also examine later populations movements throughout Africa at the Pleistocene-Holocene boundary and more recently, including the Bantu expansion.

The final contribution of the volume, Chapter 17 by P. Mitchell, addresses potential future research about the dynamics of earlier African hunter-gatherer populations and the paleoenvironments in which those groups were situated. Mitchell divides these into six basic themes—improving the quality of the databases (especially chronology), understanding what it is that we think we know about the data, thinking about past populations and paleoenvironments in dynamic ways rather than in monolithic stadial boxes, attempting to refine information about paleoenvironments through detailed assessment of temperatures and patterns of rainfall, looking at not just population continuity but also population isolation, and the use of ethnographic analogies in the search for modern human behavior in the deep past and the challenges such an approach raises. These themes offer opportunities for increasing the understanding of variability and diversity in material culture, genetics, and fossils; eschewing unilineal thinking; recognizing the many avenues and/or pathways that were available to prehistoric groups for subsistence, economy, spatial organization, technology, and so forth; and examining connections between regions within Africa. Mitchell ends his chapter by describing how research on the interval from MIS 6 to MIS 2 can be of use to Africans today (e.g., addressing local issues related to the larger problem of global warming).

Overall, this volume is a very interesting set of contributions. There are many chapters that dovetail together either because they examine different aspects of the same region or because they address similar questions using disparate data sets. The conclusions of some authors are sometimes partially contradicted by the conclusions of other sets of authors, making for that ultimate desired goal—scientific discourse; the reader can then decide which presentations might be closer to whatever those prehistoric realities really were. There are some small issues, for example, the side labels in Figure 3.3 (p. 55) are not correct and Figure 18.2 (p. 387) would have been much more visually interesting in color (because there are numerous color images throughout the volume, presumable generating a few more would not have been an issue). For anyone interested in African prehistory, populations, and paleoenvironments/paleoclimates, *Africa from MIS 6-2: Population Dynamics and Paleoenvironments* is a must read.

REFERENCES

Lombard, M. 2012. Thinking Through the Middle Stone Age of Sub-Saharan Africa. *Quaternary International* 270: 140–155.

Serwatka, K. and F. Riede. 2016. 2D Geometric Morphometric Analysis Casts Doubt on the Validity of Large Tanged Points as Cultural Markers in the European Final Palaeolithic. *Journal of Archaeological Science: Reports* 9: 150–159.

Shea, J.J. 2014. Sink the Mousterian? Named Stone Tool Industries (NASTIES) as Obstacles to Investigating Hominin Evolutionary Relationships in the Later Middle Paleolithic Levant. *Quaternary International* 350: 169–179.

Will, M., A. Mackay, and N. Phillips. 2015. Implications of Nubian-Like Core Reduction Systems in Southern Africa for the Identification of Early Modern Human Dispersals. *PLoS One* 10(6): e0131824.

Springer

http://www.springer.com/series/6978

Vertebrate Paleobiology and Paleoanthropology
Series Editors: Delson, E.; Sargis, E.J.
ISSN: 1877-9077