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Guest Editorial

The Middle Palaeolithic in the desert and its implications for understanding hominin adaptation and dispersal

1. Introduction: into the desert

The mid-latitude desert belt extending from the Atlantic coast of North Africa, through the Middle East and deep into Asia is one of the fundamental environmental and biogeographical features of the modern world. Although today much of this region can only be inhabited as a result of complex cultural adaptations to these arid environments (e.g. irrigation, camel domestication, etc.), a rich variety of archaeological evidence attests to the occupation of the desert belt during the Pleistocene. The aim of this volume of *Quaternary International* is to explore the Palaeolithic occupation of this desert belt, and highlight these regions as critical to understanding changes in hominin behaviour and demography that have occurred during the Middle and Upper Pleistocene.

As several papers in this volume discuss, the mid-latitude desert belt has undergone profound climatic and environmental changes in the Pleistocene, which continue in the Holocene. This dynamism is clearly one of the central features of this area. Deserts are typically defined as regions receiving less than 250 mm mean annual rainfall, with semi-arid regions receiving between 250 and 500 mm mean annual rainfall (MAR). Fig. 1 shows average modern rainfall values. However, behind such averages lies dramatic annual, decadal and centennial variability in rainfall that can have profound impacts upon contemporary occupants of these drylands at a generational scale.

During the Middle and Upper Pleistocene, there was significant variability in humidity at millennial timescales, somewhat removed from the experience of the hominin inhabitants of these regions. Within these broad scale variations finer scale fluctuations would also have occurred. For the purposes of this introduction, we refer to those regions that experienced arid ($<\sim$250 mm MAR) conditions during the LGM as the 'desert' (e.g. Braconnot et al., 2003), although many now are characterised by semi-arid conditions. It must also of course be noted that we have a poor grasp on past precipitation levels. Short and long term variability in humidity in these desert regions is likely to have played a driving role in the colonisation and occupation of the mid-latitude arid belt by hominin populations, as well as, ultimately, their extirpation. Previous publications on the archaeology of desert environments include Barker and Gilbertson (2000), Veth et al. (2005) and Mol and Sternberg (2012). Most previous research has focussed on the Holocene, and significant questions remain in relation to the Pleistocene occupation of arid environments.

As the mid-latitude desert belt separates the African and Eurasian landmasses, these landscapes are likely to have been the location of major changes in hominin demography during the Pleistocene. These demographic changes relate to both the expansion and dispersal of hominin populations and changing patterns of behaviour and hence survivability. The dispersal of *Homo sapiens* from sub-Saharan Africa into Eurasia must have involved the colonisation and occupation of the mid-latitude arid belt. Given the analogous environmental and climatic settings of North Africa and southern Asia, the binary opposition of Africa and Eurasia appears to be an unproductive approach to understand how hominins were able to expand into new, diverse habitats. Rather than the current focus upon modern human dispersals 'Out of Africa', we suggest a reorientation towards understanding the dispersal of hominins 'Into the Saharo-Arabian Belt'.

It is important to recognise that the opportunities to exploit new resources made available in the deserts by the onset of enhanced humidity were not solely the preserve of modern humans. The colonisation of these desert environments during periods of humidity did not only occur from Africa, but also from Eurasia, in what Dennell (2009, 2013) have characterised as the "scramble for Asia". It is within these desert landscapes that the earliest contact between modern humans and Neanderthals, including potential interbreeding (e.g. Green et al., 2010), may have occurred. Given this situation the organisational heuristic of the 'Middle Palaeolithic' offers a more objective way to compare hominin behaviour in the desert belt than framing variation in terms of inter-species contrasts, when hominin fossil material is rare and spatially biased. Simple associations of forms of technology and particular hominin species should be avoided.

The Middle Palaeolithic covers the period from around 300,000 to 30,000 years ago. We use the term Middle Palaeolithic synonymously with Middle Stone Age, in contrast to many recent debates on the use of these terms and the purportedly European character of the former and African character of the latter. Such dichotomies (e.g. Africa equals *H. sapiens* and Europe equals Neanderthals) are typically formulated at the expense of Asia. They also downplay the complexity of the evolutionary process in areas like Africa. The creation of the term 'Middle Stone Age' reflected the early 20th century belief that although broadly comparable to the Eurasian Middle Palaeolithic the MSA was both younger and more short-lived. Goodwin and Van Riet Lowe (1929) are quite explicit in their claim that the MSA reflected the dispersal of either ideas or populations of 'Mousterians' from the north. Now that the initial premises for the separation of the MSA have been disproven, the distinction between 'Middle Stone Age' and 'Middle Palaeolithic' is largely arbitrary, and the latter term has taxonomic precedence, although we respect the

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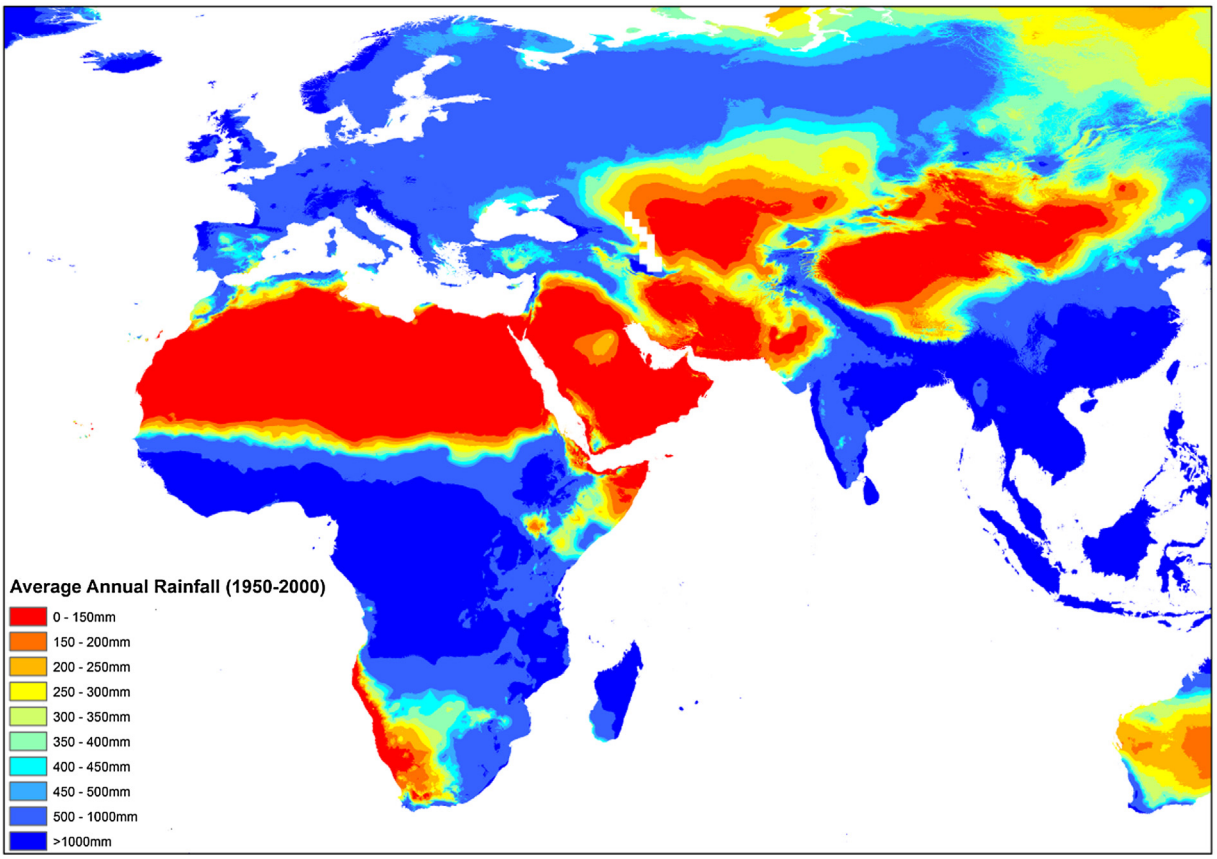

Fig. 1. Average annual rainfall between 1950 and 2000 (following Hijmans et al., 2005).

choice of scholars to use terminology of their own choosing. For this reason in this introduction we often use the terminology the authors of the particular paper being discussed use.

Previous publications have addressed particularly regions within the desert belt, including North Africa (Hublin and McPherron, 2012), North Africa and the Levant (Wendorf and Marks, 1975), and Arabia (Petraglia and Rose, 2009). More thematic concerns have included the nature of Levallois technology (Dibble and Bar-Yosef, 1995) and 'transitions' in the Middle Palaeolithic (Hovers and Kuhn, 2006). While our knowledge of the Middle Palaeolithic has improved dramatically in recent years, a number of significant biases remain. In spatial terms, most of our knowledge of the Middle Palaeolithic comes from Europe, the Levant and South Africa. This volume contributes towards a partial restoration of this bias. Likewise, much of our understanding comes from deeply stratified cave sites (e.g. Tabun). Open air and surface sites are common parts of the record and all forms of material culture need to be studied in order to understand the past.

This focus upon colonisation of desert landscapes by hominins, and the interaction of dispersals and behavioural evolution, has a number of ramifications. Firstly, the directionality of hominin colonisation of the deserts will be linked to resource availability, rather than any pre-determined destination. As a result, the dispersal of human populations to the Maghreb should be placed on equal footing with their dispersal to the Thar Desert, particularly as similar distances are covered from a potential East African area of endemism. Developing a broader understanding of how Pleistocene hominins were able to adapt to these environments will enable a more detailed assessment of particular hypotheses proposed by researchers (e.g. whether modern humans first passed through the Sinai or crossed the Red Sea at the Bab-al-Mandab).

Secondly, as the availability of water is a limiting factor upon the occupation of these desert landscapes, developing a more detailed, regional understanding of chronometrically constrained palaeoenvironmental variability is critical. Orbital scale global climatic changes form a coherent backdrop to Middle and Upper Pleistocene palaeoenvironmental variability, well characterised by ^{18}O marine and ice cores such as SPECMAP. However, localised terrestrial proxies present evidence for how a particular region has responded to these large-scale climate changes. Significantly, a millennium of humidity in the desert belt may not be apparent in records from the North Atlantic, but may have had dramatic impacts upon hominin demography, and the archaeological record for occupation of these regions.

Thirdly, the means to compare archaeological assemblages between North Africa and southern Asia are paramount to the investigation of hominin dispersal and evolution. The majority of the desert belt, such as much of the Sahara, Arabia and Iranian Plateau, are known through rare excavations and a larger number of deflated surface assemblages. Any assessment of the archaeological record of the mid-latitude desert belt must transcend both the diverse nature of the archaeological record, and the terminologies that have been developed to describe it.

The key to addressing a number of these issues is to promote engagement between archaeologists and palaeoenvironmental researchers working across the mid-latitude desert belt. This volume of *Quaternary International* comprises the proceedings of the Middle Palaeolithic in the Desert conference, held at Wolfson College, University of Oxford, on the 13th and 14th January 2012, with the aim of promoting such engagement. In total, 27 papers were presented over two days at the conference, by teams based in 13 different nations, and working across the Sahara, Arabia, the Levant,