

Route planning in the Palaeolithic?

JULIE SCOTT-JACKSON & WILLIAM SCOTT-JACKSON

Summary

A systematic survey of the western fringes of the al-Ḥajar mountains to the south of Sharjah Emirate, by the PADMAC Unit during 2011, led to the discovery of ten Palaeolithic surface-sites/scatters in an area crossed at several points by the United Arab Emirates/Oman borders. In addition, the central area of the mountains adjacent to this region was surveyed but no stone tools of any description were found. The ten newly discovered Palaeolithic assemblages exhibit affinities to the fourteen Middle Palaeolithic assemblages we had previously found (2006–2008) in a similar context along the western fringes of the mountains, but further north in the Emirates of Sharjah and Ra's al-Khaymah. This interim report examines the implications of these findings as they relate to the understanding of hominin dispersals and use of the landscape in this region, as all twenty-four Palaeolithic surface-sites/scatters occur on a clearly defined north–south line of foothills, with readily available resources of outcropping seams of knappable chert, wadi systems, small caves/rock-shelters, and long views to the west, over what are now alluvial fan gravel plains but areas of which may have been lakes at various times during the Palaeolithic period. The conspicuous distribution pattern of these Palaeolithic surface-site/scatters suggests, perhaps, hominin expansion along the western fringes of the al-Ḥajar mountains — a cognitive process of prediction, in which Palaeolithic people envisaged a suitable future location from a current preferred real location, in essence a ‘Palaeolithic highway’.

Keywords: Middle Palaeolithic, hominin dispersal, United Arab Emirates, Oman, surface-sites/scatters.

Background

The spatial distribution of Palaeolithic surface-sites/scatters (Ps-s/s) and excavated sites across the Arabian Peninsula and around the Arabian Gulf provides the means to formulate and analyse models of Palaeolithic hominin occupations and dispersals, including the hypothesis proposed by several authors (i.e. Lahr & Foley 1994; 1998; Stringer 2000; Petraglia & Alsharekh 2003), with supporting genetic evidence (Forster & Matsumura 2005; Oppenheimer 2011), of a ‘southern dispersal’ of anatomically modern humans (AMH) from the Horn of Africa across the southern end of the Red Sea at the Bab al-Mandab straits, the Arabian Peninsula, and onwards into Eurasia. AMH are generally considered to have been present in East Africa by *c.*200 kya (e.g. McDougall, Brown & Fleagle 2005; Stewart & Stringer 2012), with the initial crossing of the Red Sea by AMH thought to have occurred during Marine Isotope Stage (MIS) 5 (130–71 kya). The suggested optimum date is at the onset of MIS 5e (*c.*130 kya), as at this time the climate had ameliorated but the sea level was relatively low (Rohling

et al. 2009; Blome et al. 2012). Low sea levels in the Arabian Gulf during MIS 5d and 5b and between 74 kya and 14 kya would have provided a land connection between south-eastern Arabia and Iran (Serreze & Francis 2006) and also, genetic evidence (Macaulay et al. 2005) suggests that AMH migrations along the rim of the Indian Ocean occurred rapidly at *c.*65 kya following a coastal route to avoid the hyper-arid deserts of Arabia. The evolutionary history of hominins outside Africa is fragmentary (Reich et al. 2010) and many questions relating to Pleistocene hominin dispersal, particularly in Arabia, remain unanswered. The focus of this interim report is a consideration of Palaeolithic hominin use of the landscape in the al-Ḥajar mountain region of the UAE/Oman (Fig. 1).

Regional setting

The al-Ḥajar mountains, to the east of the UAE, rise to *c.*2000 m before falling away to the Gulf of Oman. On the western side of these mountains are alluvial fan gravels and desert (the northern part of the Rub' al-

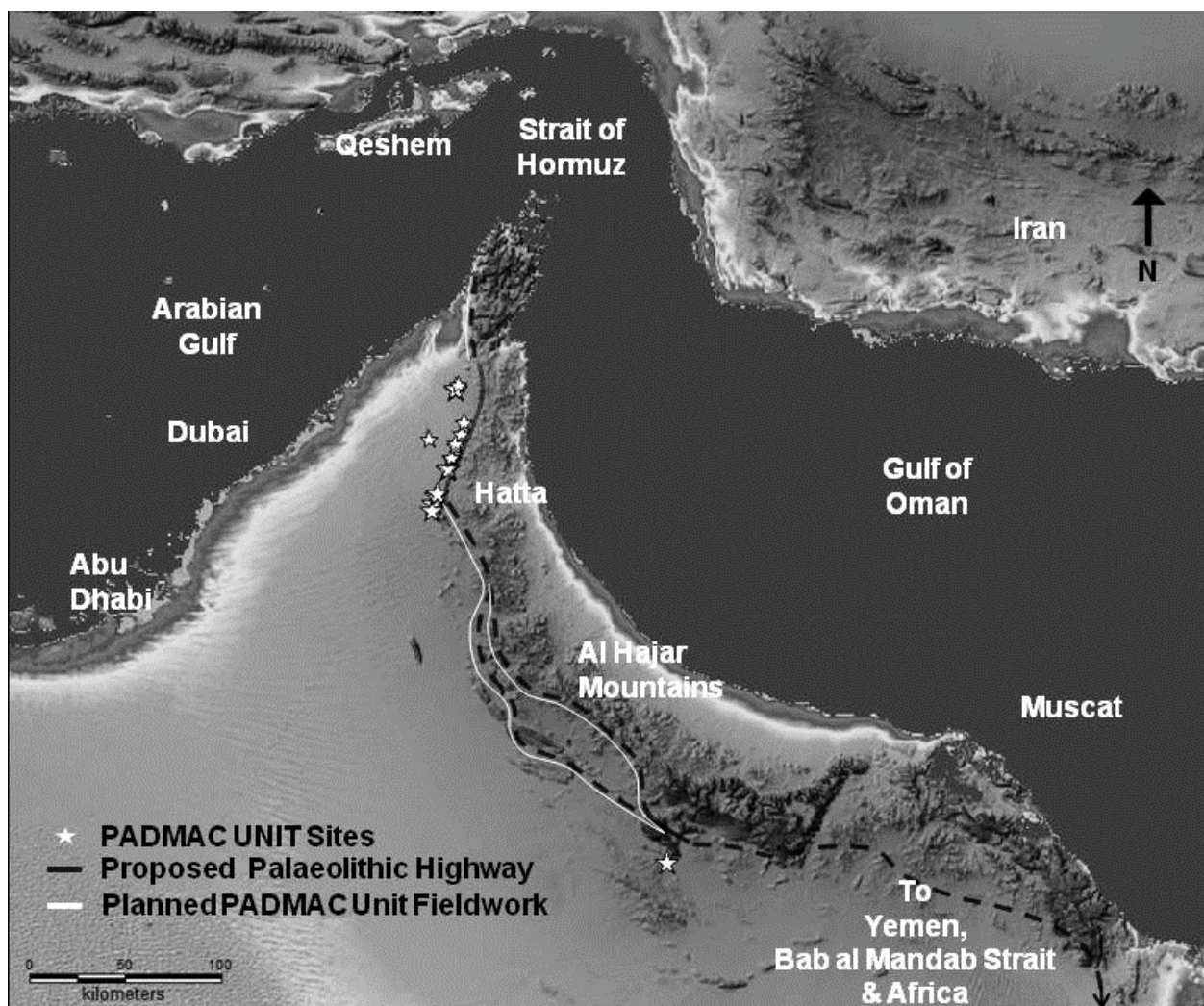


FIGURE 1. A digital terrain map showing Palaeolithic surface-sites/scatters discovered by the PADMAC Unit.

Khālī). Further to the west is the Arabian Gulf and to the north the narrow Strait of Hormuz separating northern UAE from southern Iran. The geology of this region is complex. Large areas of the country are covered with Quaternary sediments, whereas the bedrock geology is well exposed in the al-Ḥajar mountains. On the western fringes of the al-Ḥajar mountains, where the UAE/Oman ophiolite outcrops, there are also isolated bedrock inliers of Cretaceous to Tertiary age and outcrops of highly variable deposits, which occur along the mountain front and as isolated inliers within alluvial fans and the dune fields. Characteristic of these inliers on the western fringes of the mountains are outcropping seams of red/

brown chert as inclusions in the silicified rocks and deposits (Farrant et al. 2006a; 2006b).

Rationale and methods

Well-dated excavated Palaeolithic sites produce site-specific data of international importance but such sites are rare in Arabia. Moreover, data derived from individual excavated sites do not necessarily provide information on Palaeolithic peoples' use of landscape as a whole, as often the only evidence of their presence in a locale or region is Ps-s/s. In order that this evidence can be fully utilized, the PADMAC Unit (Palaeolithic Artefacts

and associated Deposits in a Middle Eastern [Arabian] Context) has developed a varied and evolving suite of techniques and analytical procedures for the investigation of Ps-s/s (Scott-Jackson & Scott-Jackson 2012). The use of these techniques and methodologies produces valuable data and results, especially considering the scarcity of alternative comprehensive approaches.

Research questions

The PADMAC Unit's ongoing research (from 2006 to date) has been aimed at identifying areas with Palaeolithic potential (PP) and locating Ps-s/s (predominately in the UAE) with the challenge of rendering repeatable, testable datasets which can address questions particularly associated with Palaeolithic hominin habitat range and location. For example: 'Where did these hunter-gatherers go and why did they choose specific areas?' Other questions relating to the provision of resources across the whole landscape are: 'What resource (or resources) in any one place was the focus of their choice? Also, what were their concerns in making those choices?' For example: 'What type of raw material did they generally use, in that area, to make stone tools?'

As previously noted, the effect of eustatic lowering of sea levels facilitated the dispersal of Palaeolithic hominins out of Africa and into southern Arabia. A low sea level (at any one place and time) does not necessarily equate to an unobstructed/unimpeded coastal route, for example, where mountains rise directly from the sea, a situation that exists in the northernmost region of Oman (the Musandam peninsula). Here, the rugged al-Ḥajar mountains, which jut out into the Gulf of Oman and the steep continental margin, may well have proved an obstacle to hominin coastal dispersal, even when sea levels were relatively low. Although subsequent rising sea levels are thought to have destroyed/buried much Palaeolithic coastal archaeology in both Yemen and Oman, within these countries there is abundant Palaeolithic archaeology (Rose et al. 2011).

UAE fieldwork projects 2006–2011

From 2006 to 2009, we reported (Scott-Jackson, Scott-Jackson & Jasim 2007; Scott-Jackson JE et al. 2008; Scott-Jackson, Scott-Jackson & Rose 2009) the discovery of fourteen clearly delineated Middle Palaeolithic surface-sites/scatters (MPs-s/s) on inliers of karst-like silicified deposits (with outcropping seams of knappable red/brown chert) along the western fringes of the al-

Ḥajar mountains in the Emirates of Sharjah and Ra's al-Khaymah (Fig. 1). The five *in situ* Middle Palaeolithic sites found on high ridges or hilltops were ideally placed for the manufacturing of stone tools (from locally available chert) and for observing the movements of animals and/or perhaps other hunters across the plains and/or wadis below. The other nine MPs-s/s were found as discrete scatters on low hills or wadi terraces associated with the outcrops of chert, from which the artefacts were made. The linear distribution pattern of these fourteen MPs-s/s alludes to a conjecture that if Palaeolithic hunter-gatherers were facing increasing difficulties and obstructions as their occupation expanded northwards through Oman, they may well have avoided the coast and moved inland into/through the mountains.

Our 2011 research/fieldwork project was therefore aimed at identifying evidence of PP in the central/eastern region of the al-Ḥajar mountains and of a possible route through the mountains that may have relevance to the fourteen MPs-s/s in Sharjah and Ra's al-Khaymah. The most appropriate area to begin the search was the central southern region (CSR) of Ra's al-Khaymah (Fig. 2), particularly as this area had not previously been surveyed for Palaeolithic archaeology (Christian Velde, personal communication 2011). In this region there is an ancient route through the mountains known as the Hatta Gap (Wādī Ḥattā) that links the coast of Oman to the western side of al-Ḥajar. Prior to fieldwork, we conducted a detailed desk-based assessment of the al-Ḥajar mountains in the CSR of Ra's al-Khaymah. This included a virtual (3D-projected) walk through the mountains, with particular reference to the recorded geology, sedimentology, and geomorphology and the targeting of specific areas with a known PP (i.e. ridges, high and low foothills, and wadi terraces). Similar locations are recorded for Palaeolithic archaeology in other areas of the Arabian Peninsula (e.g. Smith 1997; Rose & Petraglia 2009).

In December 2011 (following the desk-based assessment), we undertook an extensive survey in the mountainous CSR of Ra's al-Khaymah, radiating out from Ḥattā and taking transects across different landscape regimes: ridges; high and low foothills (of various geology); wadi terraces; chert outcrops; areas with knappable stone; and wadi bottoms and gullies were all investigated but we failed to find stone tools of any description.

Using the same methods and techniques (Scott-Jackson & Scott-Jackson 2012), we next explored the western fringes of al-Ḥajar, but this time in the most southerly part of Sharjah Emirate and south of the earlier PADMAC

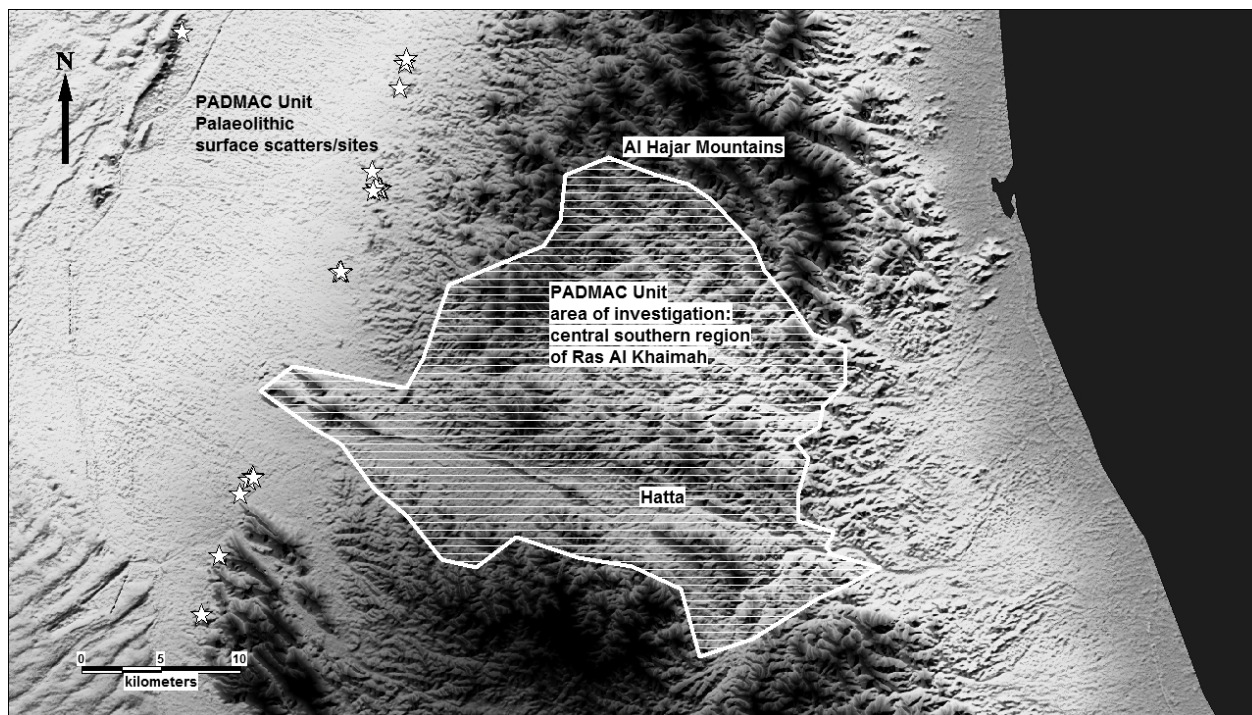


FIGURE 2. A digital terrain map showing the PADMAC Unit area of investigation in the al-Hajar mountains (the central southern region of Ra's al-Khaymah).

Unit investigations (Scott-Jackson, Scott-Jackson & Jasim 2007; Scott-Jackson JE et al. 2008; Scott-Jackson, Scott-Jackson & Rose 2009) in an area crossed at several points by the UAE/Oman borders (Fig. 1).

Within just two days of surveying this area we discovered four *in situ* Palaeolithic assemblages on high-level ridges (two ridges were heavily eroded); three discrete Ps-s/s on lower hills; and three Ps-s/s on wadi terraces (Fig. 1). These ten newly identified Ps-s/s (full techno-typological analysis is ongoing) exhibit notable affinities (including Levallois unipolar points, Levallois centripetal reduction, blade proportioned blanks) to the fourteen MPs-s/s we had discovered previously (i.e. five *in situ* Middle Palaeolithic assemblages on high-level ridges [one ridge was heavily eroded]; eight discrete MPs-s/s on lower hills; and one MPs-s/s on a wadi terrace [Scott-Jackson, Scott-Jackson & Rose 2009]). All twenty-four assemblages were found on inliers of silicified karst-like deposits with locally outcropping seams of knappable red/brown chert and all the artefacts were made from this locally available material. Furthermore, these twenty-four Ps-s/s (and the stratified dated Palaeolithic site at Jabal Fāyah [Armitage et al. 2011], which is less than 18

km to the west of the PADMAC Unit sites) occur on a clearly defined north–south line along the western fringes of the al-Hajar mountains (Fig. 1) where there are wadi systems, small caves/rock shelters, and long views to the west over alluvial fan gravel plains, areas of which may well have been lakes during the Palaeolithic period (Ash Parton, personal communication 2012).

Discussion

Although no evidence of a Palaeolithic route through the al-Hajar mountains in the CSR of Ra's al-Khaymah was found during our 2011 survey, we are mindful that the absence of evidence is not necessarily evidence of absence. In contrast, however, the accumulated evidence derived from our systematic surveys indicates that Palaeolithic hunter-gatherers' essential resources (i.e. knappable stone from the chert outcrops on inliers of karst-like silicified deposits, fresh water from the wadis, and game in the foothills and wadis) could easily be obtained along the western fringes of the al-Hajar mountains. The previous comparative techno-typological analysis of the UAE Middle Palaeolithic assemblages identified technological

and typological affinities and differences (Scott-Jackson, Scott-Jackson & Rose 2009; Armitage et al. 2011) but, in the absence of fossil evidence, it could not provide definitive information as to which particular species of hominin manufactured the stone tools. The question then is, do the Palaeolithic assemblages in this region of the UAE represent an isolated AMH presence within which technological development occurred in a self-contained and independent social and spatial world? Or are they indicative of something more complex? Was this region of the Arabian Peninsula a *refugium* for various stone-tool culture groups of AMH and/or Neanderthals or conversely, a gateway into, and out of, Eurasia for both AMH and Neanderthals?

Low sea levels (Serreze & Francis 2006) provided an opportunity for AMH to cross the Arabian Gulf at the Straits of Hormuz from the UAE to the southern coast of Iran and into the Zagros Mountains. Equally, Neanderthals could have arrived in the UAE by the same route or perhaps along the southern coast of the Arabian Gulf. Dashtizadeh (2009) reports finding Late Lower/Middle Palaeolithic stone tools on the Iranian island of Qeshm in the Straits of Hormuz (Fig. 1) and MPs-s/s have also been found in the southern Zagros region of Iran (Rose 2010). The possibility that AMH and Neanderthals coexisted in the UAE region has been considered by

Oppenheimer (2011). Based on the genetic evidence, he subscribes to the view that the Jābāl Fāyah Palaeolithic toolmakers (Armitage et al. 2011) could very well be Neanderthal, and also to the proposal by Green et al. (2010) that a Neanderthal admixture into the population ancestral to both West and East Eurasians (although not definitive) was most likely to have occurred in southern Arabia.

Certainly, the clearly defined north–south linear distribution pattern of the twenty-four Ps-s/s, together with the Jabal Fāyah site, perhaps suggest hominin expansion along the western fringes of the al-Ḥajar mountains — a cognitive process of prediction, in which Palaeolithic people envisaged a suitable future location from a current preferred real location, in essence a ‘Palaeolithic highway’.

The PADMAC Unit will undertake further research to substantiate this ‘Palaeolithic highway’ hypothesis.

Acknowledgements

The PADMAC Unit would especially like to thank Dr Christian Velde of the Ra’s al-Khaymah Department of Antiquities and Museums and Dr Sabah Jasim, Director of Antiquities in Sharjah, for their advice on, and support of, these projects.

References

- Armitage S.J., Jasim S.A., Marks A.E., Parker A.G. et al.
2011. The southern route ‘Out of Africa’: evidence for an early expansion of modern humans into Arabia. *Science* 331: 453–456.
- Blome M.W., Cohen A.S., Tryon C.A., Brooks A.S. et al.
2012. The environmental context for the origins of modern human diversity: A synthesis of regional variability in African climate 150,000–30,000 years ago. *Journal of Human Evolution* 62/2: 563–592.
- Dashtizadeh A.
2009. Palaeolithic remains from the north coast of the Persian Gulf: preliminary results from the Jam-o-Riz plain, Bushehr Province, Iran. *Antiquity* 83: 319.
- Farrant A.R., Arkley S.L.B., Ellison R.A., Styles M.T. & Thomas R.T.
2006a. *Geology of the Al Hiyar area 1:100000 map sheet, 100-3, United Arab Emirates*. UAE: Ministry of Energy.
2006b. *Geology of the Al Dhaid area 1:100000 map sheet, 100-2, United Arab Emirates*. UAE: Ministry of Energy.
- Forster P. & Matsumura S.
2005. Did early humans go north or south? *Science* 308: 965–966.
- Green R.E., Krause J., Briggs A.W., Maricic T. et al.
2010. A Draft Sequence of the Neandertal Genome. *Science* 328: 710–722.

- Lahr M. & Foley R.
1994. Multiple dispersals and modern human origins. *Evolutionary Anthropology* 3: 48–60.
1998. Towards a theory of modern human origins: geography, demography, and diversity in recent human evolution. *Yearbook of Physical Anthropology* 41: 137–176.
- Macaulay V., Hill C., Achilli A., Rengo C. et al.
2005. Single, rapid coastal settlement of Asia revealed by analysis of complete mitochondrial genomes. *Science* 308: 1034–1036.
- McDougall I., Brown F.H. & Fleagle J.G.
2005. Stratigraphic placement and age of modern humans from Kibish, Ethiopia. *Nature* 433: 733–736.
- Oppenheimer S.
2011. A single southern exit of modern humans from Africa: Before or after Toba? *Quaternary International* 258: 88–99.
- Petraglia M.D. & Alsharekh A.
2003. The Middle Paleolithic of Arabia: implications for modern human behaviour and dispersals. *Antiquity* 77/298: 671–684.
- Reich D., Green R.E., Kircher M., Krause J. et al.
2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468: 1053–1060.
- Rohling E.J., Grant K., Bolshaw M., Roberts A.P. et al.
2009. Antarctic temperature and global sea level closely coupled over the past five glacial cycles. *Nature GeoScience Letters*. Published online 21 June 2009 (accessed 26 April 2012). www.nature.com/naturegeoscience.
- Rose J.I.
2010. New Light on Human Prehistory in the Arabo-Persian Gulf Oasis. *Current Anthropology* 51/6: 849–883.
- Rose J.L. & Petraglia M.D.
2009. Tracking the Origin and Evolution of Human Populations in Arabia. Pages 1–14 in M. Petraglia and J. Rose (eds), *The Evolution of Human Populations in Arabia*. Dordrecht, NY: Springer.
- Rose J.I., Usik V.I., Marks A.E., Hilbert Y.H. et al.
2011. The Nubian Complex of Dhofar, Oman: An African Middle Stone Age Industry in Southern Arabia. *PLoS ONE* 6/11 e28239. doi: 10.1371/journal.pone.0028239
- Scott-Jackson J.E. & Scott-Jackson W.B.
2012. Methods for identifying, recording and analysing Palaeolithic surface scatters/sites. *PADMAC Unit Working Paper*, Oxford, UK. <http://users.ox.ac.uk/~padmac/rschinfo.htm>
- Scott-Jackson J.E., Scott-Jackson W.B. & Jasim S.
2007. Middle Paleolithic — or what? New sites in Sharjah, UAE. *Proceedings of the Seminar for Arabian Studies* 37: 277–279.
- Scott-Jackson J.E., Scott-Jackson W.B. & Rose J.I.
2009. Palaeolithic Stone Tool Assemblages from Sharjah and Ras al Khaimah in the United Arab Emirates. Pages 125–138 in M. Petraglia and J. Rose (eds), *The Evolution of Human Populations in Arabia*. Dordrecht, NY: Springer.
- Scott-Jackson J.E., Scott-Jackson W.B., Rose J.I. & Jasim S.
2008. Upper Pleistocene stone-tools from Sharjah, UAE. Initial investigations: interim report. *Proceedings of the Seminar for Arabian Studies* 38: 43–54.
- Serreze M. & Francis J.
2006. The Arctic Amplification Debate. *Climatic Change* 76/3: 241–264.
- Smith G.H.
1997. New prehistoric sites in Oman. *Journal of Oman Studies* 3: 71–81.
- Stewart J.R. & Stringer C.
2012. Human Evolution Out of Africa: The Role of Refugia and Climate Change. *Science* 335: 1317–1321.

Route planning in the Palaeolithic?

Stringer C.

2000. Coasting out of Africa. *Nature* 405: 24–27.

Authors' addresses

Julie Scott-Jackson, Director of the PADMAC Unit, Institute of Archaeology, University of Oxford, 36 Beaumont Street, Oxford, OX1 2PG, UK.

e-mail julie.scott-jackson@arch.ox.ac.uk

William Scott-Jackson, Landscape Archaeologist, the PADMAC Unit, Institute of Archaeology, University of Oxford, 36 Beaumont Street, Oxford, OX1 2PG, UK.

e-mail william.scott-jackson@arch.ox.ac.uk