

Earliest Europeans: Integrating Perspectives from Archaeology, Palaeoanthropology and Palaeoclimatology

The papers in this VSI emerged from a three-day workshop at the University of Brighton in February 2017. The workshop, *Coping with climate: the legacy of Homo heidelbergensis*, explored a variety of questions surrounding the species in its European context — their environmental ranges and tolerances, material behaviours, dietary strategies, biological variability, and population structures. The workshop was especially timely in light of recent palaeoanthropological and palaeogenetic developments, which have raised question-marks over the status and definition of *Homo heidelbergensis* (e.g. Stringer, 2012; Meyer *et al.*, 2016). In the discussion below *H. heidelbergensis* is therefore treated *sensu lato*.

Various discussion points arose from the meeting, many of which are reflected in the papers that follow. These points can be broadly grouped into three areas, environments and landscapes, material behaviours, and hominin palaeobiology and demography.

Environments and landscapes:

- It is important to consider humidity variations as well as temperature (e.g. is cooler and drier more appealing to hominins than warmer and wetter?);
- It is important to explicitly consider the contrasts between open and closed environments (and the definitions of both) and the potential impacts of those conditions upon hominin activity;
- There is considerable value in palaeoenvironmental records from those Middle Pleistocene sites without associated archaeology – e.g. in terms of demonstrating the ranges of conditions which hominins were/were not able to tolerate;
- What do zooarchaeological assemblages mean in terms of habitat reconstructions? Longstanding assumptions of species' habitat preferences, based on extant populations, are being increasingly challenged by isotopic and dental micro-wear studies. An explicit consideration and understanding of plasticity in animal behaviour is also important;
- Understanding of the patterns in the archaeological record needs to start from geological and geomorphological history, informed by taphonomic studies of site and landscape formation processes;
- There is too much emphasis on north to south variations in Lower Palaeolithic archaeology and conditions. What about south to north or east to west/west to east variations for example?

Material behaviours:

- The impact of fire on dietary and subsistence practices is a complex issue with social and technological implications – e.g. the advantages for processing food sources vs the costs (e.g. time, materials, tethering) of their maintenance;
- Variations in climate do not always result in changes to technology. It can be profitable to decouple these two issues;
- What does the archaeological record (e.g. technology, site distributions, dietary evidence) look like when *H. heidelbergensis* were 'struggling' or 'comfortable' (and what is meant by those terms)?
- Is there a need to be more explicit about the differences between what *H. heidelbergensis* could have been eating as opposed to what can be demonstrated that they were eating (from on-site evidence; e.g. the demonstrated faunal record for meat eating vs. the often-invisible issue of plant exploitation)?

Hominin palaeobiology and demography:

- There appear to be tensions between the Lower Palaeolithic site-specific material culture records (which suggest that hominins were very adaptable) and the climatic, palaeoanthropological and regional archaeological records (which suggest fragmentation and periods/places where *H. heidelbergensis* was absent/only present in very low numbers);
- Understanding of hominin variability, including the impacts of population fragmentations and re-combinations, is strongly influenced by understanding of group sizes and/or mobility;
- Might “bottlenecks” in the genetic record reflect both population crashes and/or fragmentation of regional populations?
- Was the Acheulean introduced from outside north-west Europe or does it represent local innovation(s)? This issue should be considered at a range of scales and timeframes. The appearance(s) and dispersal(s) of technologies also need to be considered with reference to movements in all directions (e.g. north to south as well as south to north).

The first of these themes is reflected in the papers by Blain *et al.*, Bynoe, Margari *et al.*, Rivals & Ziegler, and Szymanek & Julien. Szymanek & Julien summarise the environmental conditions associated with a range of hominin and non-hominin sites in central Europe, highlighting the relatively mild nature of the conditions, and thus clearly highlighting the longstanding questions as to why the Lower Palaeolithic record east of the Rhine appears relatively sparse in comparison to that further west (see also Romanowska, 2012). Far to the south-west, Blain *et al.* reviews the rich environmental records now available from the Iberian Peninsula, spanning MIS 22 to MIS 6, highlighting key patterns around the mid-Brunhes event (and outstanding chronological gaps). Such patterns are of especial interest given the long-term evidence for sustained Lower Palaeolithic occupation in the region (e.g. Garcia *et al.* 2011; Rodríguez *et al.* 2011). With reference to the key Italian site of Ceprano, Margari *et al.* highlight the spatially heterogeneous nature of ecosystem responses to climatic change, and emphasise its significance for hominin occupation patterns. These were most likely associated with specific habitats and local conditions rather than entire regions, with key implications for refugia behaviour and longer-term evolutionary patterns. Rivals & Ziegler explore the question of Lower Palaeolithic animal communities, using dental micro and macro-wear from the key sites of Steinheim and Heppenloch to explore animal palaeodiet and habitat preferences and co-associations. As has been demonstrated also in later periods (e.g. Rivals *et al.*, 2007), it is increasingly clear that Lower Palaeolithic ecosystems were more complex than modern animal parallels would suggest, in terms of both animal dietary flexibility and habitat mixtures. Exploring the lost landscapes of Lower Palaeolithic Europe, Bynoe reviews the evidence for, and future potential to enhance our knowledge of, occupation of the submerged landscapes of north-west Europe, with a particular focus on the southern North Sea. While this portion of the archaeological record presents considerable methodological challenges, Bynoe demonstrates the scope of both direct and remote survey methods which may enable us to test the potential of coastal and low-lying landscapes for hominins (e.g. Cohen *et al.*, 2012), and explore their landscape characteristics (e.g. Cohen *et al.*, 2014).

The second of the themes, material behaviours, is explored in the papers by Baena *et al.*, Karen Hardy, Bruce Hardy *et al.*, Hosfield & Cole, and Serangeli *et al.* A holistic approach to the life cycle of the Acheulean biface is presented by Baena *et al.*, from raw material exploitation to final discard, with a focus on the large flake Acheulean. Such an approach acknowledges that the Acheulean is not a single cultural entity and recognises differences in typology, technology and chronology. The paper extends an important discussion point from the meeting regarding scales of analysis and recognising that the archaeological record is more complicated and nuanced than often portrayed. Karen Hardy’s paper emphasises the diverse potential of plant use in the Lower (and Middle) Palaeolithic,

highlighting dietary, medicinal and technological applications. While the direct evidence for plant use at this time is often sporadic (although dental calculus approaches are providing an increasingly rich window into this aspect of Palaeolithic life; e.g. Hardy *et al.*, 2018), Hardy makes a strong argument for their use on both archaeological and dietary requirement grounds, and in doing so extends one of the key discussion points from the meeting. The potentially diverse range of material, and tool, uses in the Lower Palaeolithic is also explored by Bruce Hardy *et al.*, through use-wear approaches applied to the French site of La Noira. Their key conclusions, that a diverse range of resources were being exploited, using a wide range of tools that were used flexibly, are strikingly reminiscent of recent Middle Palaeolithic studies (e.g. Hardy, 2004; Rots, 2013) which have also emphasised the diverse and flexible uses of tools (beware the typological straitjacket!). Serangeli *et al.* focus on the site of Schöningen, Germany, which has produced an astonishing palaeoenvironmental, climatic and behavioural record from the Middle Pleistocene through to the present. The Lower Palaeolithic layers uniquely preserve evidence of wooden tool kits, stone and bone artefacts, as well as faunal remains with impact scars and cut marks. These demonstrate the impressive behavioural repertoire of *Homo heidelbergensis* and provide valuable insights into the life on the ground of a much-debated but nonetheless important hominin ancestor. Finally our own paper re-explores the short/long chronology question (Roebroeks & van Kolfschoten, 1994; Dennell & Roebroeks, 1996; Carbonell *et al.*, 1996), exploring possible explanations (behavioural plasticity, environmental transformation, and changing life history models) for the seemingly enduring settlement pattern that only sees sustained Lower Palaeolithic occupation north of the Alps after around c. 600kya.

The last of the themes, palaeobiology and demography, is reflected in the papers by Buck *et al.*, Jaouen, and Welker. Buck *et al.* explore the question of ecogeographical variability in hominin bodies, with reference to the macaque populations of Japan. Their key conclusions, that their skeletons follow the common trends for mammals and hominins (i.e. Allen's and Bergmann's Rules), are of course fascinating in the context of European climatic variations (a key theme throughout the workshop), and may be highly relevant to the diversity that has long been recognised to characterise those fossils assigned to *H. heidelbergensis*. Jaouen usefully reviews the array of chemical techniques that help to reconstruct hominin diets where organic preservation is absent. The review demonstrates that combinations of techniques such as trace elements in dental enamel and carbon isotopes may help to bridge the information gap where collagen (for example) is absent, although there is still more work to be done to test the robustness of these techniques before analysing hominin samples. Welker also produces a valuable review of how the developing field of Palaeoproteomics may contribute to our understanding of past hominins as an alternative to the use of DNA. The review identifies specific knowledge gaps within the existing analytical techniques and provides potential avenues for future research.

Overall the papers that follow, like the workshop, highlight many of the outstanding questions that remain, but also the increasing battery of methods and approaches available to us in our attempts to resolve them. To borrow and slightly update a quote from Prof. Clive Gamble (1996, 69): "these are exciting times to be studying [at least!] half a million years of [Lower Palaeolithic] prehistory".

Finally, we thank all those who attended the workshop (and the linked session, *MIS 13-11: a major transformation in the European Lower Palaeolithic?*, at the UISPP 2018 conference in Paris), for their many valuable thoughts and ideas, some of which are reflected in the papers that follow. All views expressed above, while in many cases deriving from the workshop, are of course our own.

References

- Carbonell, E., Mosquera, M., Rodríguez, X.P., Sala, R., 1996. The first human settlement of Europe. *Journal of Anthropological Research* 52, 107–114.
- Cohen, K.M., MacDonald, K., Joordens, J.C., Roebroeks, W., Gibbard, P.L., 2012. The earliest occupation of north-west Europe: a coastal perspective. *Quaternary International* 271, 70–83.
- Cohen, K.M., Gibbard, P.L., Weerts, H.J.T., 2014. North Sea palaeogeographical reconstructions for the last 1 Ma. *Netherlands Journal of Geosciences* 93(1–2), 7–29.
- Dennell, R., Roebroeks, W., 1996. The earliest colonization of Europe: the short chronology revisited. *Antiquity* 70(269), 535–542.
- Gamble, C., 1996. Hominid Behaviour in the Middle Pleistocene: an English Perspective. In: Gamble, C.S., Lawson, A.J. (Eds.), *The English Palaeolithic Reviewed*. Wessex Archaeology Ltd., Salisbury, pp. 61–71.
- García, N., Arsuaga, J.L., 2011. The Sima de los Huesos (Burgos, northern Spain): palaeoenvironment and habitats of *Homo heidelbergensis* during the Middle Pleistocene. *Quaternary Science Reviews* 30, 1413–1419.
- Hardy, B.L., 2004. Neanderthal behaviour and stone tool function at the Middle Palaeolithic site of La Quina, France. *Antiquity* 78(301), 547–565.
- Hardy, K., Buckley, S., Copeland, L., 2018. Pleistocene dental calculus: Recovering information on Palaeolithic food items, medicines, palaeoenvironment and microbes. *Evolutionary Anthropology: Issues, News, and Reviews* 27(5), 234–246.
- Meyer, M., Arsuaga, J.L., de Filippo, C., Nagel, S., Aximu-Petri, A., Nickel, B., Martínez, I., Gracia, A., de Castro, J.M.B., Carbonell, E., Viola, B., 2016. Nuclear DNA sequences from the Middle Pleistocene Sima de los Huesos hominins. *Nature* 531(7595), 504–507.
- Rivals, F., Solounias, N., Mithlacher, M.C., 2007. Evidence for geographic variation in the diets of late Pleistocene and early Holocene Bison in North America, and differences from the diets of recent Bison. *Quaternary Research* 68(3), 338–346.
- Rodríguez, J., Burjachs, F., Cuenca-Bescós, G., García, N., Van der Made, J., Pérez González, A., Blain, H.A., Expósito, I., López-García, J.M., García Antón, M., Allué, E., Cáceres, I., Huguet, R., Mosquera, M., Ollé, A., Rosell, J., Parés, J.M., Rodríguez, X.P., Díez, C., Rofes, J., Sala, R., Saladié, P., Vallverdú, J., Bennisar, M.L., Blasco, R., Bermúdez de Castro, J.M., Carbonell, E., 2011. One million years of cultural evolution in a stable environment at Atapuerca (Burgos, Spain). *Quaternary Science Reviews* 30, 1396–1412.
- Roebroeks, W., Van Kolfschoten, T., 1994. The earliest occupation of Europe: a short chronology. *Antiquity* 68(260), 489–503.
- Romanowska, I., 2012. Ex oriente lux: A re-evaluation of the Lower Palaeolithic of central and eastern Europe. In: Ruebens, K., Romanowska, I., Bynoe, R. (Eds.), *Unravelling the Palaeolithic: 10 years of Research at the Centre for the Archaeology of Human Origins*. BAR, Oxford, pp. 1–12.

Rots, V., 2013. Insights into early Middle Palaeolithic tool use and hafting in Western Europe. The functional analysis of level IIa of the early Middle Palaeolithic site of Biache-Saint-Vaast (France). *Journal of Archaeological Science* 40(1), 497–506.

Stringer, C., 2012. The status of *Homo heidelbergensis* (Schoetensack 1908). *Evolutionary Anthropology: Issues, News, and Reviews* 21(3), 101–107.