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# Early hominins in north-west Europe: A punctuated long chronology?

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ABSTRACT

In light of changing views regarding the identity and evolutionary positions of Europe's Lower Palaeolithic hominins, a re-consideration of the hominin occupation of north-west Europe from *c.* 1 million years ago (mya) to *c.* 400 thousand years ago (kya) is timely. A change in the scale and character of the overall European Palaeolithic record around *c.* 800–600 kya has been well documented and argued over since the mid-1990s. Hominin expansion into the European north-west, potentially from southern Europe, Africa or south-western Asia, has been linked to the introduction of a new lithic technology in the form of the biface. We evaluate three potential drivers for this northern range expansion: changing palaeo-climatic conditions, the emergence of an essentially modern human life history, and greater hominin behavioural plasticity. Our evaluation suggests no major changes in these three factors during the *c.* 800–600 kya period other than enhanced behavioural plasticity suggested by the appearance of the biface. We offer here a model of hominin occupation for north-west Europe termed the 'punctuated long chronology' and suggest that the major changes in the European Lower Palaeolithic record that occur at a species-wide level may post-date, rather than precede, the Anglian Glaciation (marine isotope stage (MIS) 12).



## 1. Introduction

The hominin occupation of north-west Europe is a complex and important story for understanding hominin abilities to adapt to novel environments and the implementation of the plastic behaviours that were first developed on the savannahs of Africa and Eurasia (Dennell, 2003; Dennell and Roebroeks, 2005; Grove, 2011; Potts, 2013). North-west Europe is important due to the unique challenges that faced hominins within the higher latitude belt in terms of that region's distinctive flora, fauna and seasonality. The earliest hominin occupation of Europe has traditionally been seen through the long, short, and modified short chronologies (Carbonell et al., 1996; Dennell and Roebroeks, 1996; Dennell, 2003; Roebroeks and van Kolfshoten, 1994, Table 1), recently enriched through the Eurasian perspective (Dennell, 2004).

The long and short chronologies have been hampered by the resolution and scale of the archaeological record and uncertainty whether evidence for hominin presence and absence in north-west Europe prior to 800 kya is a genuine behavioural pattern or the result of research and/or taphonomic bias (Roebroeks and van Kolfshoten, 1994). However, discoveries at a number of sites including Dmanisi, Georgia (Lordkipanidze et al., 2007); Orce and Atapuerca, Spain (Carbonell et al., 1995, 2005; Toro-Moyano et al., 2013); Pirro Nord, Italy (Arzarello et al., 2007); Pont-de-Lavaud and Lunery-Rosières, France (Despriée et al., 2011); and Happisburgh III, UK (Ashton et al., 2014; Parfitt et al., 2010) have been instrumental in challenging the notion of a hominin absence in Europe pre-800 kya. Happisburgh III has also challenged the notion of early hominin intolerance for harsh climatic conditions. There are, however, still clear arguments to be made in regards to the sustainable nature of early forays substantially above the 45°N mark (MacDonald et al., 2012).

A related question concerns the increasingly complex role of *Homo antecessor* in the earliest human occupation of north-west Europe. It is *Homo antecessor* that has been put forward as one of the contenders for the pre-800 kya human presence at Happisburgh III (Ashton et al., 2014). Although their fossil evidence is limited to the Iberian Peninsula, it is possible that a series of short-lived dispersal events by this species above 45°N may have been the cause of the sparse archaeological record in Europe before 800

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**Table 1**
Summarising the long, short and modified short chronologies, as originally proposed (Carbonell et al., 1996; Dennell and Roebroeks, 1996; Gamble, 1999; Roebroeks and van Kolfshoten, 1994).

| Model | Long Chronology (Carbonell et al., 1996) | Short Chronology (Roebroeks and van Kolfshoten, 1994) | | Modified Short Chronology (Dennell and Roebroeks, 1996) |
|---|---|---|---|---|
| Summary | Europe occupied in the Early Pleistocene, and in some cases before *c.* 1.5 mya | "No undisputable proof for human occupation of Europe prior to about 500,000 years ago" (Roebroeks and van Kolfshoten, 1994: 500) | | "Hominids might have occasionally moved into southern Europe well before 500,000 years ago, as and when conditions permitted" (Dennell and Roebroeks, 1996: 540) |
| Evidence | | | | |
| **Timeframe** | **Before 780,000 years ago (pan-Europe)** | **Before 500,000 years ago (pan-Europe)** | **After 500,000 years ago (pan-Europe)** | **Before 780,000 years ago (Southern Europe)** |
| Archaeological signature | Small assemblages (typically 10s and 100s of artefacts) | Small series of isolated pieces selected from a natural pebble background | Large collections from excavated knapping floors with conjoinable material | Small assemblages (typically 10s and 100s of artefacts) |
| Context | Cave(?) and open-air sites (pan-Europe) | Disturbed secondary contexts | Primary context sites (fine-grained matrix) | Cave(?) and open-air sites (Iberia) |
| Assemblage character | Flake and pebble tools | Contested 'primitive' assemblages | Uncontested Acheulean and non-Acheulean industries | Flake and pebble tools |
| Human Remains | Occasional | No human remains | Human remains common | Occasional |

kya.

The pace and rhythms of early hominin dispersal in Europe are therefore varied and challenging to decipher. What is clear however is that hominin development must have occurred in conjunction with changes in climate and environment. It is the understanding of the specific climatic and environmental challenges to hominin survival in north-west Europe, and potential solutions to those challenges, which forms the focus of this paper.

## 2. How to survive Pleistocene north-west Europe

Delays in the occupation of northern Eurasia, above *c.* 45°N, after the initial dispersals or range expansions of *H. erectus* (*s. lato*) beyond Africa, suggest that a sustained presence in the north presented significant new challenges to Lower Palaeolithic hominins. Modern ethnographic, ecological and climatological studies would suggest that those challenges were principally increased seasonality, lower mean temperatures, contrasting oceanic and continental zones, reduced plant food resources, and more dispersed and clustered animal food resources (Gamble, 1986; Hosfield, 2016; Kelly, 1995; Roebroeks, 2001, 2006). How might these challenges be met? The 'solutions' can be grouped into two broad categories: firstly, increased animal food contributions to the diet, with implications for the reliability of foraging strategies, the sizes of territories and the knowledge required of landscapes and resources, hominin mobility, social group organisation, and technology. Secondly, enhanced insulation, which can be cultural (encompassing some or all of pyrotechnology, whether managed or opportunistic, 'clothing' or other forms of body covering, and shelter) and/or physiological (e.g. elevated BMR [basal metabolic rate], increased muscle mass, body hairs, elevated brown adipose tissue levels; but *cf.* Aiello and Wheeler, 1995; Aiello and Wheeler, 2003).

These 'solutions' can be most easily described as changing hominin behaviours (i.e. increasingly efficient dietary and insulation strategies). Yet our clearest material insights into hominin behaviour (the lithic record) shows relatively little evidence for major changes across the duration of the Lower Palaeolithic (Klein, 2000), and while Acheulean technology may be absent from the repertoire of the earliest Europeans, it already had a long history in Africa and western Asia by the time of those first dispersals into the Mediterranean. We therefore propose three other potential forms of change which may also be key factors in the pre-/post-800kya settlement patterns in northern Eurasia (Table 2), and explore these within a European framework: (i) changes in the palaeoclimate and palaeoenvironmental context; (ii) changes in hominin life history; and (iii) changes in behavioural plasticity.

### 2.1. The palaeoenvironmental context

To what extent may changing palaeoclimatic and palaeoenvironmental conditions underpin the changes in scale in the northern European settlement record? Such arguments have been widely explored. Turner (1992) emphasised the changing large carnivore guild around 500kya and the gradual emergence of the 'mammoth steppe' after MIS 12 (Guthrie, 1990), linked to the changing length of glacial/interglacial cycles during the Mid-Pleistocene Transition (Head and Gibbard, 2005). However, many of these models have tended to primarily emphasise long-term trends. While these are undoubtedly important, the emphasis in this paper is upon the daily, seasonal and yearly challenges to hominins: e.g. low winter temperatures, the degree of seasonality, short-term climatic shifts (e.g. on decadal scales), the diversity or homogeneity of habitats at a local scale, and the condition and availability of plant and animal foods across the seasons. These are increasingly well understood through micro-fauna (e.g. Coope, 2006a), palynology, and the multi-disciplinary investigations of key sites (Bigga et al., 2015; García and Arsuaga, 2011; Parfitt et al., 2005, 2010; Rodríguez et al., 2011; Urban and Bigga, 2015), enabling us to consider the nature of the hominin life experience 'on the ground'. We are taking this approach not least because while the

**Table 2**
Key chronological phases and selected northern European sites (after Ashton, 2015).

| Period | Chronology | Sites |
|---|---|---|
| Later Early Pleistocene | *c.* 1.3–0.78mya | Happisburgh III, Lunery-Rosières, Pont-de-Lavaud |
| Early Middle Pleistocene | *c.* 0.78–0.5mya | Abbeville, Boxgrove, Happisburgh I, High Lodge, Kärlich G, La Genetière, La Noira, Miesenheim, Pakefield, Warren Hill |
| Later Middle Pleistocene | *c.* 0.5–0.3mya | Beeches Pit, Bilzingsleben, Clacton, Hoxne, Schöningen, Soucy, Swanscombe, |