

Evaluating claims for an early peopling of the Americas: the broader context

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It is not necessary for extraordinary claims to have extraordinary proofs—they just need to be robust; the more extraordinary the claim, the more robust the proof must be. Table S1 in the online supplementary material (OSM) presents some of the more frequently cited objections to the Cerutti Mastodon site and the notion of hominins in the New World at 130 kya. The very persistence of the controversy implies that the proofs are not as robust as they should be. In the absence of unambiguous evidence, what is the fall-back position? A background of plausibility. This revolves around three issues:

- Is there a plausible hominin background for migration at the Marine Isotope Stage (MIS) 6–5e transition *c.* 127 kya?
- Is there plausible archaeological evidence to support this?
- Is there a plausible interpretation that explains Late Pleistocene hominin activity at the site?

The hominin background

Holen and colleagues (2017) identify several hominins as potential candidates for the Cerutti hominin. Following the authors, I discount *Homo floresiensis* as a contender. I also discount Neanderthals, as although present as far eastwards as Denisova Cave at = <140 kya (Douka *et al.* 2019), they are currently unknown east of the Altai Mountains. While Middle Palaeolithic horizons at the cave pre-date this, they may not have been made by Neanderthals. A selection of the better-known fossil evidence is presented in Table S2, which shows that the Asian skeletal record is sparse for the key period of the MIS 6–5e transition, around 127 kya.

Homo erectus

The latest Erectines in China date to 400 kya. All three Chinese sites in Table S2 lie to the north or north-east of the vast sub-tropical forest characterised by the *Stegodon-Ailuropoda* fauna (extinct forms of elephant, giant panda, gibbons and *Gigantopithecus*). Ciochon and Bettis (2009) argue that the Erectines were not adapted for this environment, being better suited to the drier, open plains of the Loess Plateau to the north of the Qinling Mountains. It would have been from here that Erectines would have ventured northwards into the New World. With no definitive evidence for them post-dating this time, however, this species is not a plausible contender.

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The Hexian jaw bares a close resemblance to the more recent Penghu 1 mandible from Taiwan (Chang *et al.* 2015; Liu *et al.* 2017; see also Table S2). Penghu establishes the possibility of relict Erectine populations surviving into the Late Pleistocene (Yokoyama *et al.* 2008; Liu *et al.* 2017). Although a relict population could potentially have migrated northwards into Beringia, there is no supporting evidence for this north of the Quinling range.

Homo sapiens

Logically, our own species, with its sophisticated cultural frameworks, is a more suitable candidate for the Cerutti hominin. Chronologically, it is difficult to establish a definitive Sapiens presence in China at the beginning of MIS 5e, let alone in western Beringia. The oldest-reputed moderns in China are from Fuyan Cave (Liu *et al.* 2017; Martín-Torres *et al.* 2017; Table S2). Concerns have been raised about the validity of the upper age limit (*c.* 120 kya)—an absolute date established from faunal remains (Michel *et al.* 2016). While the age range for Zhiren is narrower, the ranges for Fuyan and Luna are very broad, and it is unclear which end of their ranges the sites should occupy. All three sites are in southern China and are thus unlikely to represent viable source populations for migration into Beringia. Dennell (2015) has argued that Fuyan represents a movement of Sapiens along a southern migration route.

The remaining two, frequently quoted, early Sapiens sites are Huanglong Cave and Liujiang Cave in central and southern China, respectively. Huanglong Cave (Liu *et al.* 2010) lies within the *Stegodon-Ailuropoda* zone, suggesting that, by the Late Pleistocene, modern humans had adapted to the challenges of the semi-tropical forests of Southern Asia. The difficulties in dating the site are reflected in the ages generated by different techniques (Table S2). The same faunal species accompany the Liujiang remains (Shen *et al.* 2002). It should be noted that, as with earlier hominins, cultural adaptation of these early Sapiens is represented by a basic core-and-flake technology (Table S2). More sophisticated Middle Palaeolithic/Levallois technologies do not move eastwards until much later (Li *et al.* 2018; but for temporally isolated evidence of Levallois in southern China at 170 kya, see Hu *et al.* 2019).

Homo heidelbergensis/archaic Homo sapiens

On the face of it, therefore, an early New World hominin is likely to be somewhere between the Erectines and Sapiens. This evolutionary ‘morpho-space’ is usually occupied by *H. heidelbergensis* (*sensu lato*), although whether Heidelberg reached China is a matter of debate (Bae 2010). The best candidate is currently the Dali skull, *c.* 270 kya (Sun *et al.* 2017). Many Chinese palaeoanthropologists, however, favour an *in situ* evolution from Erectines to Sapiens, through what is often broadly labelled as ‘archaic *Homo sapiens*’. A key fossil is that from Xujiayao in northern China, with a mean age of 260–370 kya (Ao *et al.* 2017). The teeth and skull suggest a position somewhere between Erectines, Sapiens and Neanderthals; Ao and colleagues (2017) propose that they are early Denisovans (Callaway 2019), or at least show the admixture of species traits characteristic of this genetic lineage (Martín-Torres *et al.* 2017). Denisovans are present at Denisova Cave between 195 and 76–52 kya, and used a Middle Palaeolithic toolkit (Douka *et al.* 2019).

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In terms of plausibility, of all the candidates for the earliest hunter-gatherers in the New World, the later archaic Sapiens/Denisovans seem the most probable. The Zhoukoudian and Jinniushan hominins, however, are the most northerly archaics so far found (Table S2), and most of these specimens would be the antecedents of a colonising group. Current evidence offers no support for the presence of Denisovans or other archaics north of the 40th parallel, or north-east of the 120th meridian at the MIS 6–5e transition.

The archaeological background

Graf and Buvit (2017) provide a comprehensive overview of the earliest human occupation of Siberia and eastwards into Beringia. The earliest occupation of Siberia dates to under 50 kya, although the authors note concerns with the published dates. Pitulko *et al.* (2016) have argued that the Zhenya/ Sopochnaya Karga mammoth—now dated to 48 kya (cal BP; Maschenko *et al.* 2017)—represents a convincing case for mammoth butchery on the central Siberian Arctic coast. Maschenko *et al.* (2017), however, demonstrate otherwise. The early Upper Palaeolithic occupation of Siberia is probably associated with two warm phases in MIS 3, and is accompanied by cultural adaptations that facilitated the occupation of new landscapes at difficult latitudes, including bone, stone and antler tools, needles and awls for clothing, storage pits and sites of sufficient size and density to suggest long-term encampments. Personal adornment may imply extended population networks (Gamble 1999). The presence of unifacial blade points suggests composite weaponry and skilful laminar technology. Essentially, this is the exact opposite of the toolkit of the early Sapiens in China (Table S2).

The push eastwards into Beringia came later—probably after 35 kya (Graf & Buvit 2017). Here, the oldest site is the Rhino Horn Site on the Yana River, dated to between 33 and 31 kya based on a middle Upper Palaeolithic toolkit (although Pitulko *et al.* (2016) report a younger date of 28 kya). A potential earlier site is Bunge Toll, also on the Yana River, which Pitulko *et al.* (2016) suggest is the same age as Sopochnaya Karga (45 kya by their dating). The Yana River sites lie just to the east of the Verkhoiansk Mountains, on the very western edge of Beringia. Following this, humans penetrate no farther east until after the Late Glacial Maximum.

The message is clear—Beringia was not occupied by hominins until the Upper Palaeolithic, and only sporadically in the early phases. Perhaps it is overly simplistic to suggest that Beringia could not have been occupied without the aid of a sophisticated and technologically frame-worked communal lifestyle, and in sufficient population numbers to make occupation viable. In other words, not by Erectines, Archaics/Denisovans or early Sapiens. Holen *et al.* (2017) posit that occupation could have come eastwards from Siberia, rather than northwards from China, yet the same lack of evidence for occupation at the MIS 6–5e transition remains. If I interpret Holen and colleagues correctly, they assert that Siberian sites such as Diring Yuriakh are proof that hominins could live in high latitudes from early on—long pre-dating 130 kya. Although Diring Yuriakh is at a latitude equivalent to the southern edge of the Beringian land bridge, it is more than 2800km away from the Bering Straits, and there are too many concerns with the site's dating and artefacts for it to contribute to this debate (Carlson 2001).

In the interests of fairness, it should be noted that fieldwork in northern Siberia and Beringia is difficult (Graf & Buvit 2017) and focuses near settlements and roads for logistical reasons. An absence of evidence should therefore be treated with caution. The very fact that today's inhabitants find the landscape challenging, however, merely underscores the problems that earlier hominins would have faced in moving towards the Bering Straits. Currently, there is no evidence to suggest an eastwards movement of peoples in late MIS 6–5e. While a potential window for crossing the Bering Straits may have existed, the hominins may not have been present to cross over.

Site interpretation

The lack of archaeology at Cerutti and the explanation for this is the least plausible aspect of the site's interpretation. As I have not seen the lithic material, my comments are restricted to general observations. Holen and colleagues (2017, 2018) suggest that hominins encountered a carcass and (in the absence of cut marks indicating butchery) broke open bones for marrow, and splintered bone and teeth for use as blanks for tool manufacture. Saccà (2012) notes that evidence for proboscidean limb bone fracture in the Lower to Middle Palaeolithic is relatively scarce. In elephant and mammoth femora, there are no non-negligible medullary cavities, as found in artiodactyl limb bones (G. Haynes *pers. comm*). Marrow is present either in small pockets where the cancellous bone is less dense, or is distributed throughout the cancellous bone itself. Presumably this is the same for mastodons. Sophisticated techniques are necessary to extract the marrow from this dense, spongy bone, and evidence for such practices occurs in the archaeological record only in the Upper Palaeolithic and later. Thus, marrow extraction seems unlikely.

I know of no Middle/early Late Pleistocene Afro-Eurasian large mammal carcass exploitation that is focused solely on the utilisation of hard tissue. This type of activity-specific processing is not a part of the Heidelberg/archaic-Sapiens repertoire. Although Holen *et al.* (2017: supplementary data) describe examples of bone-tool manufacture to support their Cerutti interpretation, for Erectines or Heidelbergs, these tools are almost always Acheulean handaxes made from limb-bone fragments when suitable tool-stone was not available. Yet Cerutti is not lacking in suitable tool-stone; an experienced knapper should be able to reduce the andesite cobbles into cores and flakes sufficient to butcher a carcass (Clark & Haynes 1969). Alternatively, the big andesite anvils could be flaked for blanks for large cutting tools. I have knapped andesite myself, and while it is hard as hell to flake, it does take and hold an edge, and its use in the Acheulean is amply attested (Sharon 2008). It is only with Sapiens—and less so Neanderthals—that the extensive use of bone and teeth or ivory for tool-making or personal items appears in the archaeological record. As noted above, neither species are good candidates for the Cerutti hominin.

This leaves the possible interpretation of the Cerutti evidence as butchery for meat and soft tissue—a notion excluded by the authors due to a lack of cut marks. Saccà (2012) notes that experimental data establish that cut marks rarely appear on the bones of very large mammals due to the thickness of the tissues involved. The lack of butchery marks on the Cerutti material therefore need not imply it was not butchered. But then I know of no butchered large mammal carcass—particularly in reference to Middle Pleistocene *H. heidelbergensis*—that is not associated with *at least* a small background scatter of cores and

flakes (Saccà 2012; Wenban-Smith 2013; Agam & Barkai 2018) of the types made by all the hominins listed in Table S2. In short, a specialised carcass-processing activity site does not currently seem a plausible interpretation, and butchery is either discounted by the lack of cut marks or other stone tools, despite the presence of suitable tool-stone for the production of flakes or the blanks for larger cutting tools (Clark & Haynes 1969; Sharon 2008).

Returning to the question of plausibility, and mirroring Magnani *et al.*'s (2019) interpretations, the weight of current evidence does not support a background of plausibility for hominins in the New World at 130 kya.

Supplementary material

To view supplementary material for this article, please visit <https://doi.org/10.15184/aqy.2019.52>

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