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Fluvial deposits as an archive of early human activity: Progress during the 20 years of the Fluvial Archives Group

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ABSTRACT

Fluvial sedimentary archives are important repositories for Lower and Middle Palaeolithic artefacts throughout the 'Old World', especially in Europe, where the beginning of their study coincided with the realisation that early humans were of great antiquity. Now that many river terrace sequences can be reliably dated and correlated with the globally valid marine isotope record, potentially useful patterns can be recognized in the distribution of the find-spots of the artefacts that constitute the large collections that were assembled during the years of manual gravel extraction. This paper reviews the advances during the past two decades in knowledge of hominin occupation based on artefact occurrences in fluvial contexts, in Europe, Asia and Africa. As such it is an update of a comparable review in 2007, at the end of IGCP Project no. 449, which had instigated the compilation of fluvial records from around the world during 2000–2004, under the auspices of the Fluvial Archives Group. An overarching finding is the confirmation of the well-established view that in Europe there is a demarcation between handaxe making in the west and flake–core industries in the east, although on a wider scale that pattern is undermined by the increased numbers of Lower Palaeolithic bifaces now recognized in East Asia. It is also apparent that, although it seems to have appeared at different places and at different times in the later Lower Palaeolithic, the arrival of Levallois technology as a global phenomenon was similarly timed across the area occupied by Middle Pleistocene hominins, at around 0.3 Ma.

1. Introduction

Artefacts recovered from fluvial deposits, especially the Pleistocene gravels forming aggradational river terraces, have provided

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much of the evidence for early human occupation of regions throughout the 'Old World'. In Europe, research on this topic extends back to the days of Victorian polymaths, who combined interests in many aspects of the Earth and natural sciences, as well as human history. Of considerable influence were the visits paid by the British geologist Joseph Prestwich (1860, 1864) and archaeologist John Evans (1863, 1872), later in the company of John Lubbock, to the artefact-bearing gravels of the River Somme, in northern France, under the guidance of Jacques Boucher de Perthes (1847–1864; cf. Grayson, 1983; Bridgland, 2014). As well as sparking an awareness of the great antiquity of early humans in NW Europe, this pioneering work was a prelude to over a century of monitoring and recording of exposures in fluvial gravels, by Palaeolithic archaeologists in the main, many of them amateurs (e.g., Commont, 1909, 1910; Breuil, 1932, 1939; Breuil and Zbyszewski, 1945; Wymer, 1968; White et al., 2009). Such activity was most productive during the time before mechanical extraction of aggregates began, with huge collections of artefacts being assembled and (in part) accessioned into museums. The abovementioned mechanization led to a significant decline in the rate of new discoveries, since when attention has turned to using the existing collections as resources for study (e.g., Roe, 1968a, 1981; Wymer, 1968, 1985, 1999; Lycett and Gowlett, 2008), supplemented with data from selected (sometimes targeted) excavations and investigations of various types (e.g., Martins et al., 2010a; Santonja and Pérez-González, 2010; Harding et al., 2012; Antoine et al., 2015, 2016a).

Thus Palaeolithic archaeologists were frequent earlier instigators of research on Pleistocene river-terrace gravels. Indeed, before the development of geochronological techniques, the dating of the Palaeolithic was closely linked to artefact occurrences in the various terrace sequences of NW Europe. This approach was subsequently applied (both successfully and erroneously) to other parts of the Old World through historical/colonial impact in India, Africa and other regions. With the condensed chronostratigraphies that prevailed before the marine oxygen isotope ($\delta^{18}O$) record became the global template, however, little sense could be made of the complexities of these sequences, a problem that thwarted the prescient attempts by Roe (1968b, 1981), for example, to make progress in that respect. Great advances have now been made in terms of geochronology (see Rixhon et al., 2017/this issue), although arguably the extended 'climato-stratigraphy' provided by the $\delta^{18}O$ record (e.g. Shackleton and Opdyke, 1973; Bassinot et al., 1994; Lisiecki and Raymo, 2005) has been the most important advance. This added the additional climate cycles that allowed artefact-bearing river terraces to be correlated with glacial–interglacial climatic cyclicity, in turn allowing a climatic mechanism for terrace formation to be envisaged with confidence (e.g. Zeuner, 1945, 1959; Wymer, 1968; Bridgland, 2000).

The origins of Lower Palaeolithic archaeology in NW Europe, particularly Britain and France, was predicated by the occurrence there of handaxes of the Acheulian industry, whereas further into the heart of Europe contemporaneous tool-making had relied on smaller-sized, more impoverished raw material and thus the artefact record, flakes and cores of Clarke's (1969) 'Mode 1' technology, is less conspicuous. Handaxe industries (Clarke's 'Mode 2) also occur in Iberia, North Africa and the Levant, where their appearance was evidently earlier and perhaps part of a south-to-north spread of technology (see Schreve et al., 2015 for a recent review and source of references). In India and the wider S & E of Africa, Acheulian industries are perhaps largely separate from and of greater antiquity than those in Europe (see below), whereas the Mode 1 industries are globally more widespread and probably of the greatest longevity (e.g. Clark et al., 1994; Dennell, 2008; Barsky, 2009; Chauhan, 2010a). The advent of prepared-core (Levallois) knapping technology, 'Mode 3' of Clarke (1969), is a more recent phenomenon globally, generally appearing during the Middle Pleistocene, although 'precocious' Levallois is seen in many Acheulian assemblages before the full emergence of the former and Mode 3-type technologies are associated with Oldowan industries in Africa as early as 1.5 Ma (e.g., White et al., 2011). Indeed, the widespread appearance of Mode 3 technology at ~300–250 ka is used to define both the beginning of the Middle Palaeolithic in Europe and the Middle Stone Age (MSA) in Africa (Porat et al., 2002; Tryon, 2006; Tryon et al., 2006; White et al., 2011).

With the advent of mechanical aggregates extraction, coupled with the development of new techniques such as for geochronological dating, the attention of Lower and Middle Palaeolithic specialists turned somewhat away from fluvial contexts, in which the artefacts are often more or less abraded and secondarily derived from previously inhabited land surfaces. Some fluvial sites, nonetheless, yield primary-context archaeology, especially where hominins have accessed river-bed gravel bars to obtain raw material for stone-tool making and/or to hunt and butcher animals. For example, Devès et al. (2014) have demonstrated how the relationship between hominin landscape behaviour and herbivore distribution during the Lower Palaeolithic in the southern Levant can be revealed by documenting various edaphic factors, including soils that retain water. River-terrace sites can have another benefit; they often occur within fluvial sequences that have great value as regional templates for the terrestrial record of the Quaternary (Wymer, 1999; Bridgland, 2000, 2006; Bridgland et al., 2004, 2006; Mishra et al., 2007). For archaeologists, fluvial contexts are valuable for another reason: to ascertain the contextual integrity of Palaeolithic sites and assess fluvial sorting of lithic assemblages using various methods (e.g. Bertran et al., 2012; Byers et al., 2015). A unique benefit of secondary fluvial contexts is in pinpointing provenance or locating primary contexts upstream or nearby from where the transported material may have originated and is eroding out. In fact, pinpointing contextual integrity may now have an even larger role to play in helping to establish archaeological integrity in some cases. For example, recent behavioural studies on wild bearded capuchin monkeys in Brazil indicate that they unintentionally produce cores and sharp-edged flakes that are not utilized, but are virtually indistinguishable from classic Oldowan flakes (Proffitt et al., 2016). Using proxies to reconstruct palaeoecological conditions in association with such specimens may help confront and mitigate such interpretative challenges.

There is also a strong tradition for archaeologically motivated study of river-terrace sequences in other regions of the Old World, notably in the Levant and Turkey, where much of the work took place in the mid–late 20th Century and was instigated by western European and Russian researchers (see below, Section 5). A similar observation can be made for the history of prehistoric research in Africa (see de la Torre, 2011) and India (e.g. de Terra and Paterson, 1939), where initial surveys were along major rivers and their tributaries. In India, the focus shifted to regions between river valleys comparatively late. Nonetheless, Palaeolithic archaeologists continue to target fluvial contexts for multiple reasons: exposures of lithics and vertebrate fossils in primary context and the potential to date such contexts with new methods, especially luminescence tecniques (see Rixhon et al., this issue/2017). In India, the earlier historical focus was on linking various lithic assemblages with corresponding fluvial terrace deposits, not only for geochronological purposes but also to understand and establish technological successions.

The FLAG organizers encouraged multi-disciplinary participation in the activities of the group from its outset; archaeologists were present at the inaugural meeting in Durham and Palaeolithic localities and assemblages have been included in many FLAG