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Pollen and preservation at Star Carr: A 60-year perspective

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A B S T R A C T

The early Mesolithic site of Star Carr, North Yorkshire, is well known for the exceptional preservation of a wide range of organic artefacts in the waterlogged deposits at the edge of a former lake, and for the richness of the associated palaeoenvironmental record – the subject of research by pollen analysts for more than six decades. Recent concerns over the effects of drainage on these deposits prompted a new phase of fieldwork (2004–2015) and environmental evaluation that sought to characterize the nature and extent of degradation of organic materials at the site. This included production of a new pollen series which, compared against sequences previously produced by the writer in the 1990s, suggested significant deterioration in pollen preservation in the intervening *c.* 20 years. It is, however, possible to provide a longer-term perspective on changing conditions at the site by consideration of the 1950 pollen sequence produced in association with the original excavations at Star Carr, but never fully published. Comparing these sequences, analysed over a 60-year period, indicates significant loss of palynological information at Star Carr in the latter half of the twentieth century, amounting to approximately 1000 years of environmental change, and highlights both the problems and potential of using pollen analysis to monitor long-term change in preservation conditions at wetland archaeological sites.

1. Introduction

Star Carr, in the Vale of Pickering, North Yorkshire, is one of the best known early Mesolithic sites in Europe, famous for the exceptional preservation of a wide range of organic artefacts – including barbed antler points and antler ‘head-dresses’ – in the waterlogged deposits at the edge of a former lake (Clark, 1954; Mellars and Dark, 1998). Recent concerns over the effects of ongoing drying and acidification of these deposits on organic artefacts remaining in situ have prompted a new phase of excavation and sedimentological analyses of the site and its environs (Milner, 2007; Milner et al., 2011; Conneller et al., 2012; Milner et al., 2015). An important aspect of determining the significance and rate of the deterioration now apparent is comparison with the state of preservation of biological remains retrieved in previous work at the site. This has so far been achieved by comparative analysis of antler from Clark's site and from recent excavations (Milner et al., 2011), assessment of geochemical indices in archived and recent sediment/peat samples (Boreham et al., 2011b), and comparison between the writer's pollen sequences from samples taken 1989–92 (Dark, 1998a) with a more recent sequence (Albert et al., 2016). While these studies demonstrate marked desiccation, oxidation and acidification of some of the deposits, and degradation of the pollen archive, over the intervening two decades, it is unclear whether these changes are part of a longer-term trend or result specifically from recent events. This contribution provides a longer-term perspective on the question of organic preservation at Star Carr, particularly with reference to the original pollen data from the site (Walker, 1950; Walker and Godwin, 1954) – which have never been fully published – demonstrating the potential of pollen analysis to provide an objective quantified index of long-term change in preservation conditions at wetland sites.

2. Star Carr in context

The site of Star Carr lies at the edge of a large former lake (‘Lake Flixton’) which occupied the eastern end of the Vale of Pickering, in what it is today agricultural land, flanked to the north by the North York Moors and to the south by the Yorkshire Wolds. The lake accumulated a succession of minerogenic, marl and organic deposits throughout the lateglacial and early-mid Holocene, with colonization by reedswamp and fen carr as the waters shallowed (Walker and Godwin, 1954; Day, 1996; Dark, 1998d; B. Taylor, 2011).

The subsequent history is unclear due to drying and disturbance of the upper deposits. By the mid-nineteenth century the area had undergone extensive drainage, indicated by the systems of drainage cuts/field boundaries shown on early (surveyed 1850) 6″ Ordnance Survey maps. John Moore, who discovered the site of Star Carr in 1948, described the area: ‘Abounding hereabouts are many ditches nearly all of which serve as field boundaries draining what is mostly quagmire of varying depth. These empty their waters into the Hertford river or Muston Drain, a canalised version of an ancient stream which rises near the coast and flows directly inland’ (Moore, 1950, p. 101). Local agriculture in the

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twentieth century, while predominantly pastoral, included some arable since at least the late 1940s – Walker and Godwin (1954, p. 27) described how their transect of borings running south from the Star Carr excavation crossed the ancient bed of the Little Hertford River (by then a drainage ditch) and was then deflected east 'to avoid a field of corn' – and by the mid 1980s much of the peat around the margins of the former lake had been ploughed (Schadla-Hall and Cloutman, 1985). The field in which Star Carr lies was itself ploughed in 2001 (Milner et al., 2011), at about which time sub-surface land drains were installed (Brown et al., 2011; Emerick, 2011). Peat drying and shrinkage due to increased drainage has now progressed to the extent that previously sub-peat contours of the former lake-edge are becoming visible as surface features. Since 2011 the site has been a Scheduled Ancient Monument, and the field in which it lies used as pasture (Emerick, 2011).

The main archaeological remains excavated by Grahame Clark (1954), and subsequently by Tim Schadla-Hall and Paul Mellars at a site slightly to their east (Mellars and Dark, 1998) (Fig. 1), occupied what would have been a zone of lake-edge reedswamp fringed by fen carr woodland in the early Mesolithic period, around 9600 BP (*c.* 9000 cal BC) (Dark, 2000; Dark et al., 2006). The remarkable preservation of the organic remains resulted from the fact that subsurface deposits had remained waterlogged despite local drainage and agriculture. In drawing comparisons with more recent excavations it should be remembered, however, that even within the area of Clark's excavations preservation was variable, as discussed below.

3. Grahame Clark's excavations (1949–51)

Clark found considerable variation in the state of preservation of organic artefacts in his trenches, which ran from the former edge of dry land out towards the open waters of the lake, depending both on horizontal distance from the former shore and vertical height in the sequence. In deposits closest to what would have been dry land, the few 'scraps of antler and bone' were 'dark in colour and soft as leather' (Clark, 1954, p. 1) and 'wood survived only where carbonised' (Clark et al., 1949, p. 56), whereas in the deepest and most waterlogged deposits 'fungi and birch leaves were preserved in an excellent state' (Clark et al., 1949, p. 56).

The spatial variability of preservation is illustrated by the distribution of antler and bone barbed points, which were recovered in 'firm' condition in the southern (lakeward) half of Clark's trenches, but were soft or absent in the northern (shoreward) half (Clark, 1954, Fig. 5) (Fig. 1). The height in the sequence at which preservation declined is less clear, but Clark's section drawing from Cutting II (Clark, 1954, Fig. 2, p. 3) marks the position of several barbed points, the condition of which is described in the 'schedule of barbed points' (Clark, 1954, pp. 128–136). From this it appears that all points from the northern half of the trench – which subsequent borings (Boreham et al., 2011b) place above the 23.5 m OD subsurface contour (Fig. 1) – were in soft condition right to the base of the sequence, whereas even the stratigraphically highest barbed point recovered from the lakeward end of the trench (P73, 1.6 ft/48.6 cm) above the gravel (Clark, 1954, Fig. 6, p. 10) was well preserved.

More detailed information about the sediment stratigraphy is provided in Donald Walker's section drawing of Cutting II (Walker, 1950, Fig. 7, p. 120; Walker and Godwin, 1954, Fig. 27a, p. 59). Here, the upper part of the sequence is described as 'disturbed peat', shown to vary in depth between *c.* 50 and 85 cm. This overlay up to1 m of detritus mud, which in turn overlay a thin layer of 'calcareous mud' at the lakeward end of the trench.

A single pollen sequence was produced by Donald Walker (Walker, 1950; Walker and Godwin, 1954, Fig. 27b, p. 59) from samples taken by Harry Godwin in 1949 from Cutting I (Walker, 1950, p. 121). Given the variability in preservation of organic artefacts across the site, the precise location of the pollen sampling point is important in relation to the extent of pollen preservation at the time of sampling, and in comparison with pollen sequences produced subsequently. There is no section drawing from Cutting I in the final excavation report, but a drawing of the east face of the trench in the 1949 interim report (Clark et al., 1949, plate viii) shows two pollen sampling points towards the southern end of the section. The pollen sequence itself was published the following year (Walker, 1950), but with no indication of the precise sampling point and, in contrast to the situation for the other pollen sequences in the monograph, with no detailed stratigraphic description

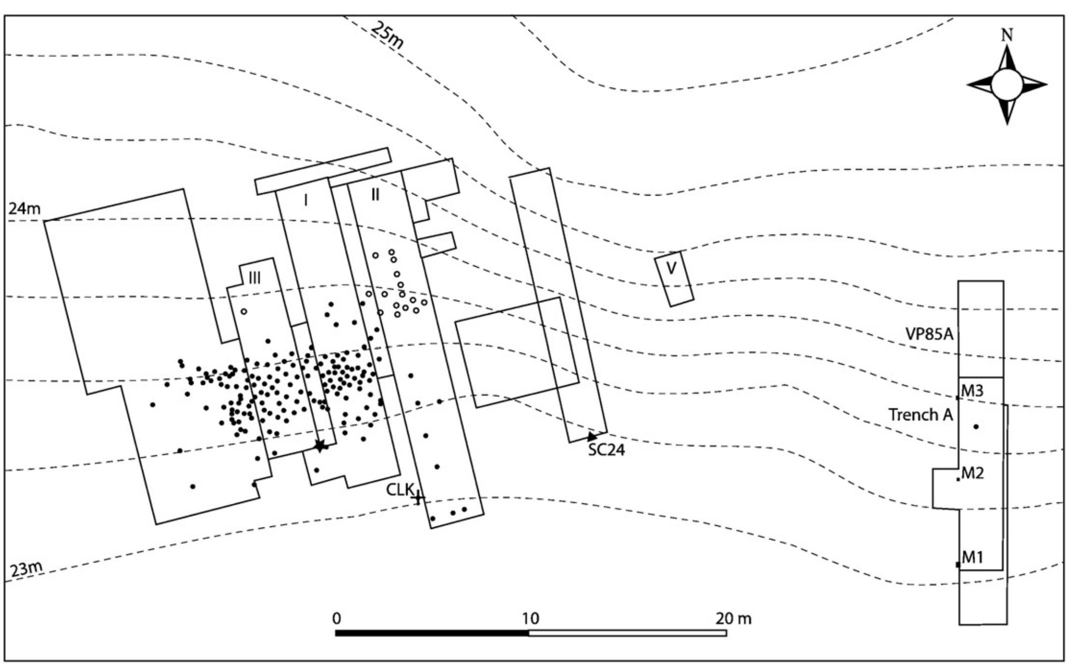

Fig. 1. Location of excavation areas and sampling points discussed in the text: Clark's site (Clark, 1954), with the location of Walker's pollen sequence shown by a star; VP85A/Trench A (Mellars and Dark, 1998); and SC24 (Milner et al., 2011; Albert et al., 2016). Clark's distribution of barbed points and their condition is shown (filled circles = 'firm', open circles = 'soft'), as is the location of the barbed point from Trench A (condition uncertain). Subsurface contours are indicated, following Boreham et al. (2011b).