Star Carr

[TA 028 810]

Potential GCR site

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Introduction

Star Carr, North Yorkshire is the most important, exceptionally rich and well-documented, British Mesolithic site. It has been discussed, reviewed and re-interpreted more than any other such site and arguably is the most re-interpreted site in European prehistory (Meliars and Dark, 1998). Discussions of the British Mesolithic usually have relied on the information from the original site monograph (Clark, 1954) and this work influenced excavation techniques and site interpretation throughout the world (Legge and Rowley-Conwy, 1988). Although the investigations by Clark (1954) were a model for their time they left many important questions unanswered . More recent work, summarized by Mellars and Dark (1998), has shown that the site is almost 1000 years older than previously believed. It has demonstrated a complex and repeated pattern of occupation spanning at least three centuries and has documented evidence for the repeated and apparently deliberate burning of the reedswamp vegetation to improve access to the lake and perhaps attract animal populations. There also is evidence for a substantial wooden trackway leading to the lake edge, which is the oldest evidence for systematic carpentry so far documented in Europe. It has been used as a kind of field laboratory for testing different interpretative models of hunter–gatherer sites (Mellars and Dark, 1998).

The site lies at the eastern end of the Vale of Pickering where the 'carr' lands of the vale are formed from calcareous and organic mud and peat accumulated under conditions of a high water level, which overlie till and solifluction sediments from the Late Devensian (Walker and Godwin, 1954). The valley floor is about 3.5 km wide at Star Carr, with low hills to the north and south. The vale is blocked to the east by the Flamborough end moraine. Late Devensian geology has been discussed in Catt (1987a) and Cloutman (1988a, b). Devensian ice impounded glacial lake Pickering and during deglaciation, glaciofluvial sands and gravels were deposited and a substantial post-glacial lake was left at the eastern end, called 'Lake Flixton' (Moore, 1951). The lake at this time had maximum dimensions of around 4.5 km from east to west and 2.0 km from north to south, with at least four associated islands. Star Carr lay at the western limit of this lake, only 500 m east of the main outflow channel from the lake into the Hertford River ((Figure 8.37)a). The vale has been drained artificially and the original site was found in 1947 during field ditch cleaning. The so-called 'Flixton 1' and 'Flixton 2' were excavated by Moore (1950, 1954) and the nearby site of 'Flixton 4' in the Star Carr by Clark (1954; (Figure 8.37)b).

Plans to establish a waste-disposal plant 1.3 km to the north of Star Carr at Seamer Carr stimulated the Seamer Carr and Vale of Pickering research project in 1975. The results and development of the sampling programme have been documented (Schadla-Hall, 1987a, b, 1988, 1989; Schadla-Hall and Cloutman, 1985) and the overall results put into context by Mellars and Dark (1998) and Schadla-Hall and Lane (in press). In 1985 the Vale of Pickering Research Trust was set up to survey the site and systematically test-pit sample the whole of the area around the western and southern shorelines of the former lake and to extend the survey towards the east. This has located ten major new concentrations of early Mesolithic material and the recovery of significant faunal remains from four sites. There also has been a new programme of detailed stratigraphical and palaeoecological research in the lake deposits to investigate the area between Star Carr and Seamer Carr and to re-investigate the limited information published by Walker and Godwin (1954) for Star Carr. This included the excavation of an 18 m long trench, about 20 m to the east of the original excavations and extending from the zone of 'dry-land' deposits on the former lake shore into the deeper organic deposits of the lake-edge zone (see Cloutman, 1988a, b; Cloutman and Smith, 1988).

Description

At Star Carr a wide and rich variety of organic materials were found (including wood, bone and antler, and artefacts made from each, (Figure 8.38)), although the archaeological horizon over the occupation area was under 50 cm thick. Within this the platform 'made by the throwing down of birch brushwood, stones and wads of clay' (Clark, 1954) was thought to be the focus of human occupation ((Figure 8.37)b), although no traces of structures were found on it, because it was considered that only the lowest, continuously waterlogged part had survived. The flint assemblage comprised 248 microliths, 326 end scrapers, 334 burins, 107 awls, transversely sharpened axes and over 14 000 fragments of flint 'waste'. The site is noted for its bone and antler industry, with over 220 finished artefacts, together with over 100 fragments of discarded red deer antlers from which multiple strips for the production of barbed points had been removed. There were 191 slender, barbed, antler points, six heavy elk antler mattocks, 11 apparently skin-scraping tools made from split metapodial aurochs bones and 21 red deer antler frontlets. The latter were worked by thinning the antlers but retaining their frontal profile and by piercing the skull cap as though for attachment to the human head by means of cords.

Two trunks of birch may have been part of a short trackway leading from the occupation zone to the lake itself (Clark, 1954), but there were few wooden artefacts, such as a fragmentary wooden paddle and a number of tightly wound birch bark rolls. There were few decorative items, including shale beads, two perforated animal-teeth and amber.

Walker and Godwin (1954) state that the occupation at the Star Carr 4 ('Flixton 4') site was upon the muddy gravels of an earlier solifluction episode, where a low mound was formed at the lake margin ((Figure 8.39)a). They showed the accumulation of calcareous muds over these gravels, which passed up into peaty detritus muds containing *Phragmites communis* stems, which at the southern end of the excavated trench graded into fine detritus mud with *Phragmites* and the sedge *Cladium mariscus.* This is overlain by a mud with dominant *Cladium* and then by a coarse woody detritus mud marking the growth of fen woodland. The platform appears to have rested on the reedy lake margin and is associated with the *Cladium* mud and the underlying calcareous muds. Pollen analysis showed that the site falls at the very end of pollen zone IV and at the transition to zone V, which agrees with the ^{14}C dates (9488 ± 350 years BP and 9559 ± 210 years BP (Q-14) (Libby, 1952) from the platform). The pollen record (Figure 8.39) indicated to Walker and Godwin (1954) 'closed birch forest clothed the hillsides and the drier parts of the valley bottom ... only in the small gaps between the water's edge did a few open communities persist, represented in our records by a very few pollen grains and spores.' There was no evidence that the human occupation had any environmental impact and it was concluded that the occupants of the site 'were taking advantage of the rich fauna of the forests, whilst still leaving the forest itself untouched' (Walker and Godwin, 1954). Day (1996) and Mellars and Dark (1998) confirm that the earliest lake deposition stages go back to an early stage in the Late-glacial, probably around 13 000–14 000 years BP and lake levels were probably 25 m OD, allowing lake clays to accumulate to at least this height in the channel between the two main excavated areas at Star Carr. Lake-level fluctuations occurred during the Late-glacial and early post-glacial.

Recent palaeoecological research has been detailed in Day (1993, 1996) and Mellars and Dark (1998). The Late-glacial and Flandrian pollen diagrams from the lake-centre core indi cated on (Figure 8.37)a are illustrated in (Figure 8.40) and (Figure 8.41) and they have been subdivided into a number of local pollen assemblage zones, as indicated in these diagrams. At site K (Seamer Carr, (Figure 8.37)a) there is evidence of the presence of an early phase of occupation, stratigraphically separated from the overlying early Mesolithic level by an intervening layer of soliflucted sand and associated with a well-defined hearth. Dating of this level (11 000 years BP) confirmed the Late-glacial age of this occupation (Schadla-Hall, 1989).

Analysis of the original faunal remains was carried out by Fraser and King (1954), who discussed the animal groups species by species, with comparisons made with modern and other prehistoric specimens. There were at least 80 individual red deer, 33 roe deer, 11 elk, 9 aurochs and 5 wild boar. Some birds were present, but fish remains apparently were entirely lacking. The biostratigraphical importance of the assemblage was stressed and comparisons made with the Danish Mesolithic faunal remains.

Interpretation

Sediment accumulation at Star Carr probably began shortly before 13 000 years BP (Day, 1996) in a Windermere Interstadial landscape that initially was open and dominated by Poaceae and Cyperaceae. Areas of bare, disturbed soils were colonized by pioneers such as *Artemisia* and *Thalictrum.* Scattered dwarf *Salix* and possibly *Betula* were soon replaced by low *Juniperus communis* scrub, although substantial open herb-dominated areas remained. The establishment of open *Betula* woodland was followed by a possible period of burning of the vegetation (Day, 1996) and a later phase, with no significant quantities of charcoal and increases in Poaceae, *Rumex acetosella, Artemisia* and mineral inputs, suggests temporary cooling. This also can be found in both the pollen and the coleopteran record at Gransmoor (Walker *et al.,* 1993). This was followed by a recovery in climate, as reflected in the *Betula* curve and a minor increase *in Juniperus communis.* The cessation of marl formation at 507 cm is taken to represent a major climatic deterioration, along with the increase in soil disturbance indicators and a decrease in *Filipendula.* At 456 cm the change to clay with pebbles, followed by increases of *Artemisia* and *Thalictrum* suggest frost disturbance of soils and gelifluction.

The Flandrian onset is marked by a sharp drop in minerogenic inputs and successive peaks of Poaceae, Rubiaceae, *Plantago media, Filipendula* and *Salix* as different plant communities formed in response to the rapid temperature rise. Aquatic plants showed a marked response, beginning with a major phase of vegetative growth of *Chara,* which may have preceded the response of terrestrial vegetation to climatic warming. Birch woodland then spread rapidly, leading to a decrease of herbs. The first arrival., of hazel has been dated to around 9400 years BP (Day and Mellars, 1994), which formed a dense woodland about 9000 years BP and was soon joined by elm and then oak, lime and ash by about 7600 years BP. The increase of *Alnus glutinosa* about this time followed the switch from marl accumulation to detritus mud as the lake shallowed. The coincidence of evidence of local burning and the *Alnus* increase is important because Smith (1970) suggested that human activity was involved in the general expansion of this tree in Britain. In some of the lake-edge communities at Seamer Carr the alder rise also seems to be associated with a charcoal-rich horizon (Cloutman, 1988b). Day (1996) suggests that despite the evidence for human activity around the lake in the early Flandrian, including burning of the reed-swamp communities, the overall course of woodland development appears not to have been significantly affected. This contrasts with the Late-glacial burning, which appears to have resulted in the decline of birch and therefore it appears that the Late Palaeolithic peoples may have had a more significant effect on the local environment at Star Carr than the early Mesolithic population.

There is strong evidence for human interference in the local vegetation cover provided by the distribution of charcoal particles in transect A ((Figure 8.37)a). The great majority of these derive from the leaves or stems of *Phragmites,* suggesting that this charcoal results from the burning of reedswamp *in situ,* but was this deliberate burning? Mellars and Dark (1998) suggest that it was carried out intentionally because of the apparent frequency of burning, the apparently localized nature of the burning and the commonsense rationale that any human group occupying a lakeside location would wish to maintain a clear view and easy access over open water.

The argument for seasonal occupation associated with the deer antlers suggests that as the red deer antlers were attached to pedicels then occupation at some period of the year between October and April was indicated because only then are the deer carrying antlers, and shed antlers would have been collected in about April ((Figure 8.42)a). Since the original work, Clark (1972) reviewed the site and in particular considerable use was made of work on red deer in the Scottish Highlands by Darling (1937) and in Norway by Ingebrigtsen (1924). This suggested a parallel to deer availability in the Vale of Pickering and provided grounds for the size of the likely hunting territory by means of size catchment analysis (Higgs, 1975). The pattern of seasonal migration observed in the modern deer also reinforced Clark's (1954) model of both deer and human migration from the proposed winter base at Star Carr to upland summer territories in the hills to the north and south and even to the Pennines. However, Caulfield (1978) suggested that red deer were less important in the diet of the Star Carr occupants than Clark (1954, 1972) had suggested. Red deer antlers were thought to be imported to the site as raw material and doubt was cast on the red deer migration model. He thought the site was a butchering station and possibly a kill site. Jacobi (1978) expressed some reservation about the deer migration model too, the fragmentation of bones implied the production of bone grease, which combined with the bone counts, was used to argue that the site was a base camp. Pitts (1979) suggested that the nature of the settlement indicated a lakeshore, industrial complex, with antler and skin working. Clark's arguments for seasonal occupation were rejected, with a pattern of intermittent use in most of the seasons suggested in its place. Andersen *et al.* (1981) again rejected the single occupation season and argued that the body part representation suggested a butchering site, with the animals being

killed close by. The particular location of the site, on a gravel spit into the lake, suggested that game driving may have been important. Grigson (1981) questioned the usefulness of the red deer antler as a seasonal indicator and the roe deer were used to suggest summer occupation, as was the presence of summer migrant birds. Price (1982) suggested that much of the material recovered had been thrown or dumped into the lake, and rejected the original case for winter occupation. Instead the wide range of mammalian species and artefacts was used to support the base-camp idea. The whole issue of the precise pattern of occupation and seasonality at Star Carr remains controversial.

Legge and Rowley-Conwy (1988) re-analysed the main food animal bones from Star Carr and their main conclusions were:

1. strong support for the use of the site only in late spring and summer;
2. evidence that the cull of red and roe deer was biased towards three- and one-year old animals respectively, for reasons connected with the behaviour of those species;
3. evidence that there is no bias towards the hunting of male red deer, so that the antlers cannot be included in any discussion of seasonality or sex ratios;
4. a revision of the meat available and a downwards reduction of the occupation scale;
5. a more tentative suggestion that the site was a hunting camp from where meat was removed to a base camp elsewhere.

It is clear that the inhabitants obtained their deer by hunting (Legge and Rowley-Conwy, 1988) and it is probable that the animals were hunted singly or in small groups, rather than large-scale planned drives, with no evidence for the herding economy suggested by Jarman (1972). The seasonal indications from tooth eruption, neonatal specimens and red deer skulls with recently shed antlers combine to indicate early summer occupation. No specimens point to winter visits and only a single young elk mandible may indicate a visit later in the summer or autumn. Following their arguments that the bone representation is not that expected of a base camp, Legge and Rowley-Conwy (1988) interpret Star Carr as a hunting camp to which many short visits were made, mainly in the early summer. The main camps might have been where the flint scatters are on the North Yorkshire Moors, which formed ideal summer sites as long as Star Carr was thought to be a winter base camp. However, the coastal zone, less than 15 km from Star Carr, seems likely to have been important, where alternative resources would have been available, probably at seasons complementary to that in which Star Carr is known to have been occupied. The wide range _of manufacturing indicated by the artefacts suggested to Mellars (1976) that the site was a base camp and Dumont (1987) confirmed that a wide range of manufacturing activities was carried out on the site. However, one study of a briefly occupied, Eskimo hunting stand by Binford (1978a, b) has shown that a wide range of activities, particularly connected with hunting equipment, may take place. The red deer frontlets may have had a practical or a ritual function, and the two explanations usually are presented as equally likely (Clark, 1954). Legge and Rowley-Conwy (1988) suggest that the ritual function seems more likely as they argued that the site was occupied mainly in early summer, a time of year when the red deer stags had just shed and were beginning to regrow their antlers. This is the one time of year when a hunting disguise would not be likely to include antlers as the deer themselves would have partly grown antlers at most, and hence the ritual function seems more feasible.

Legge and Rowley-Conwy's (1988) evidence is summarized in (Figure 8.42)b. Carter's (1997) study of the lower jaws of roe deer, based on X-ray analysis of the jaws to reveal the patterns of unerupted as well as erupted teeth, and comparative studies of modern samples suggest that the majority of Star Carr jaws derive from ani mals between 10 and 11 months in age. Therefore they probably were killed in the period from March to April, rather than May–June as estimated in Legge and Rowley-Conwy (1988). Three additional pieces of evidence point to activity in the early spring months. The analysis of the burnt reeds (Hather, 1998) has revealed several pieces from tightly rolled leaf stems, which must derive from plants burnt during the early growing phase around March–April. The identification of clearly charred bud scales of aspen catkins (Dark, 1998a) indicates that they are most likely to have been burnt during, or shortly after, the period of shedding between April and June. Some of the cakes of birch-bark resin recovered from the original Star Carr excavations appear to show high sugar levels, which would point to bark collection during the late April to early May period, when the sugar content in the bark peaks (Mellars and Dark, 1998).

There also have been a number of reassessments of specific aspects of the Star Carr evidence, such as Noe-Nygaard's (1975) study of hunting lesions on two of the elk scapulae, Wheeler's (1978) discussion of the absence of fish remains (which he attributed to the delayed colonization of river systems by fish in the early post-glacial period) and the analyses of the stable carbon isotope composition of the remains of domestic dog from Seamer Carr (Clutton-Brock and Noe-Nygaard, 1990). The latter study was undertaken initially to assess the possibility of a component of coastal occupation in the annual settlement pattern of the Vale of Pickering groups, but the results perhaps could reflect much more local isotopic variations in the food consumed by the dogs (Day, 1996).

The excavations of the new trench at Star Carr found a dense scatter of flint artefacts and faunal remains, associated with a deliberately laid trackway of split and worked timbers (Mellars and Dark, 1998). Clark (1954) originally interpreted the finds in terms of a closed-spaced succession of occupations by relatively small numbers of hunters, which he estimated from the total extent of the occupied zone to be about 20–25 people. However, Mellars and Dark (1998) show that the total distribution of occupation material at Star Carr extends over a much greater area than Clark (1954) envisaged and they documented in fine detail the precise character and topography of the pre-occupation land surface on which the site was established. Clark (1954) nevertheless estimated that the occupation had spanned a substantial period and documented a clear stratigraphical separation of at least two of the major forms of barbed point recovered, but overall the total chronological span remained uncertain. However, close chronological control of the new investigations east of Clark's investigations ((Figure 8.37)a) has been provided by 12 AMS radiocarbon dates. The overall range of the artefacts and faunal remains extends from *c.* 10 700 to 10 400 calibrated years BP in absolute terms, a period approximately 1000 years earlier than that implied by the original, uncalibrated radiocarbon dates (Mellars and Dark, 1998).

The most remarkable archaeological find in 1985 was the concentration of large timbers of aspen or willow, all lying at the same stratigraphical level close to the base of the organic deposits and closely associated with the earliest occurrences of both flint artefacts and charcoal particles. Most of the timbers show a regular, essentially parallel, arrangement and in several cases represent segments of 'planks' split along either one or both faces. The most plausible explanation is that it is a trackway laid down during the initial stages of the Mesolithic occupation to facilitate access between the occupation area and the open lake water. It is unique in the European Mesolithic period. The archaeological material (flints from in-situ knapping activities, and red deer antlers) from the 1985–1989 excavations represent a separate zone of human activity compared with Clark's (1954) excavations, although it is considered to be rather later in age (Mellars and Dark, 1998).

Clark (1954) saw the site as a base camp location for a few nuclear families and serving as a central focus for a wide range of both subsistence and technological activities. Others, such as Andersen *et al.* (1981) and Legge and Rowley-Conwy (1988), suggested that it was a briefly occupied hunting location. However, the latter's assumption that virtually the whole of Clark's (1954) excavated area represents a 'toss' zone of material discarded from a main centre of activity located beyond the limits of Clark's excavation seems highly unlikely (Mellars and Dark, 1998). There is no doubt that the site served as a major centre for hunting activity and the large-scale manufacture of hunting equipment. However, to suggest that the whole of Clark's excavation area represented a waste-disposal zone as opposed to an area of in-situ activities presents insuperable obstacles (Mellars and Dark, 1998). Firstly, there is a clear pattern in ethnoarchaeological studies of 'toss' zone accumulations in hunter–gatherer sites, in which only the larger refuse fragments are tossed away whereas most of the smaller refuse is allowed to accumulate on the spot in a 'drop' zone (Binford, 1978a, 1983). This presents a marked contrast with Star Carr, where Clark recorded high frequencies of both microliths and flint debitage within the central areas of his excavations. Secondly, the overall distribution and varying densities of the flint artefacts recorded by Clark seems inconsistent with any 'toss' zone hypothesis. He shows four separate areas of high density distribution separated by zones of clearly lower density distribution. Finally, a close analysis of the material represented within each of the artefact concentrations reveals contrasts in the relative frequencies of different tool forms (Mellars and Dark, 1998).

Many different aspects of the evidence suggest that the Star Carr total occupation sequence spans a substantial period, probably over 300 years. These include the stratigraphical spread of the artefacts recorded in both Clark's and the recent excavations, over a depth of 30–40 cm; the clear separation of the two major forms of barbed antler points (types A and E) documented in the original excavations; the overall spread of the radiocarbon dates; and the vertical distribution of

macroscopic and microscopic charcoal fragments. The charcoal record points to at least two major episodes of repeated burning at or near the site, the first probably extending from *c.* 10 700 to 10 620 calibrated years BP, and the second from 10 550 to 10 430 calibrated years BP, with the possibility of a third more isolated burning phase at *c.* 10 200–10 300 calibrated years BP The apparently continuous charcoal input into the deposits during the first major phase would suggest activity either on or close to the site at fairly closely spaced intervals, conceivably on an annual basis (Mellars and Dark, 1998).

In the re-analysis of the faunal remains from Clark's excavations, Legge and Rowley-Conwy (1988) suggested the minimum number of animals at no more than 75 individuals, which translates into a total edible meat-weight of *c.* 12 000 kg. Despite the problems with this kind of analysis related to the food supplies, even if the quantities are doubled this would be sufficient only to support a human group of the size estimated by Clark over a period of continuous occupation for at most two years.

The specific site location of Star Carr seems to have been important for settlement and as Mellars (1998) suggests there are several factors involved. Firstly, the unusual steepness of the early Mesolithic shoreline at this point on the lake edge (Cloutman and Smith, 1988), the narrow reedswamp zone and therefore short distance to open water would have allowed easy access to the lake for various activities and allowed open visibility over the lake. Secondly, the location close to the western end of the lake would have allowed rapid land access to the adjacent western and southern lake shore and therefore exploitation of a long stretch of lake-edge within a relatively short distance. Thirdly, the position close to the end of a major promontory into the lake could have played a role in hunting strategies, such as a means of corralling, or driving game (Andersen *et al.,* 1981), and this type of site location has been found at other sites in Denmark. Fourthly, a feature of Star Carr and sites at Seamer Carr is that the main occupation areas are directly to the south-west of higher ground areas and are sheltered, and they are on the northern lakeshore, where there is maximum sunlight and warmth.

Recent surveys suggest that there are at least ten major Mesolithic artefact concentrations similar in technology and typology to Star Carr in the Vale of Pickering lake basin and more are likely to be found in areas not yet surveyed systematically. The ecological and environmental context of this settlement was within the birch-dominated forests, before the hazel expansion in the Boreal period (Dark, 1998b). The reasons for it being such an attractive location are detailed in Mellars (1998) and probably are related to ease of mobility and visibility across the lake zone; economic productivity and diversity of lake-edge habitats; hunting methods; and the wider food resources available in the immediate surroundings, such as the coast only 12 km to the east, the Wolds and the North Yorkshire Moors.

The shrinkage and impeded lake access is likely to have acted as a deterrent to continued lakeside occupation from the later stages of the Boreal onwards (Walker and Godwin, 1954; Cloutman, 1988a, b; Cloutman and Smith, 1988), but the most critical ecological factor is likely to have been the massive hazel woodland colonization of the dry-land areas. This is reflected in the pollen record by increases of 80–90% (Dark, 1998b) and would have resulted in animal biomass decline (Mellars, 1998).

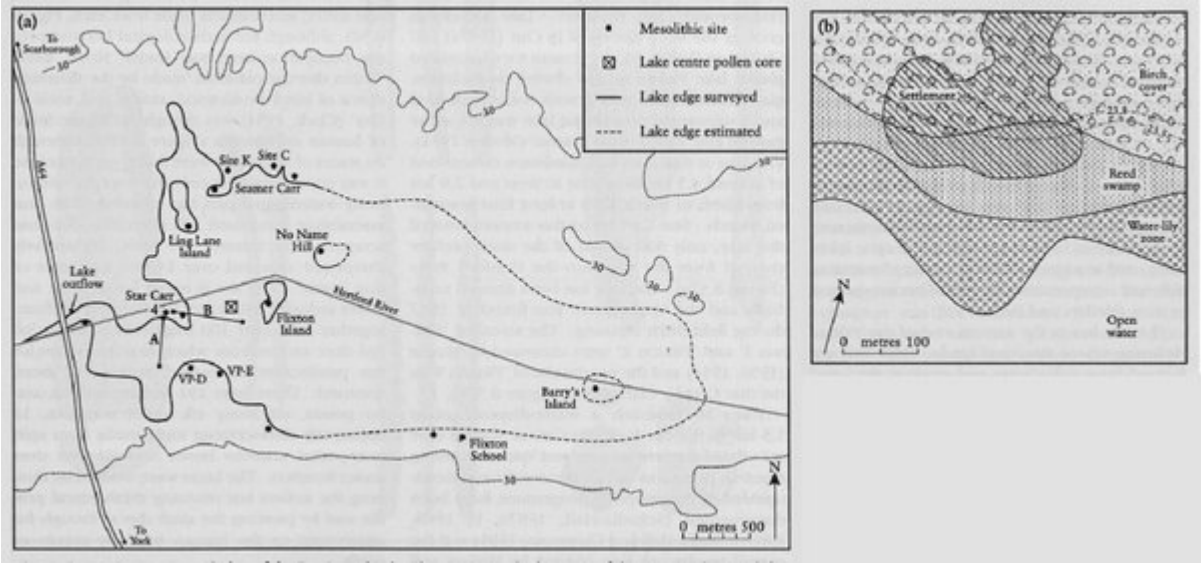
Mellars (1998) argues that the carefully controlled burning of the reedswamp around the edges of the lake would have substantially increased the quantity and nutritional quality of the new plant growth and hence increase the numbers and predictability of animals feeding at the lake-edge. By selectively burning small areas, hunters could concentrate hunting activities to these areas.

The question of seasonal and annual mobility patterns of the Star Carr population has been reviewed by Mellars (1998). The evidence for the exploitation of upland habitats adjacent to the Vale of Pickering seems strong (Jacobi, 1978; Mellars, 1998), but evidence for the exploitation of coastal locations remains enigmatic. There now seems some evidence for winter occupation, as the excavated site of Barry's Island (Figure 8.37)a includes remains of two animals killed at some point during the winter or early spring, together with a much higher overall percentage of red deer remains and a much higher frequency of heavily fragmented bones than at Star Carr (Rowley-Conwy, 1995).

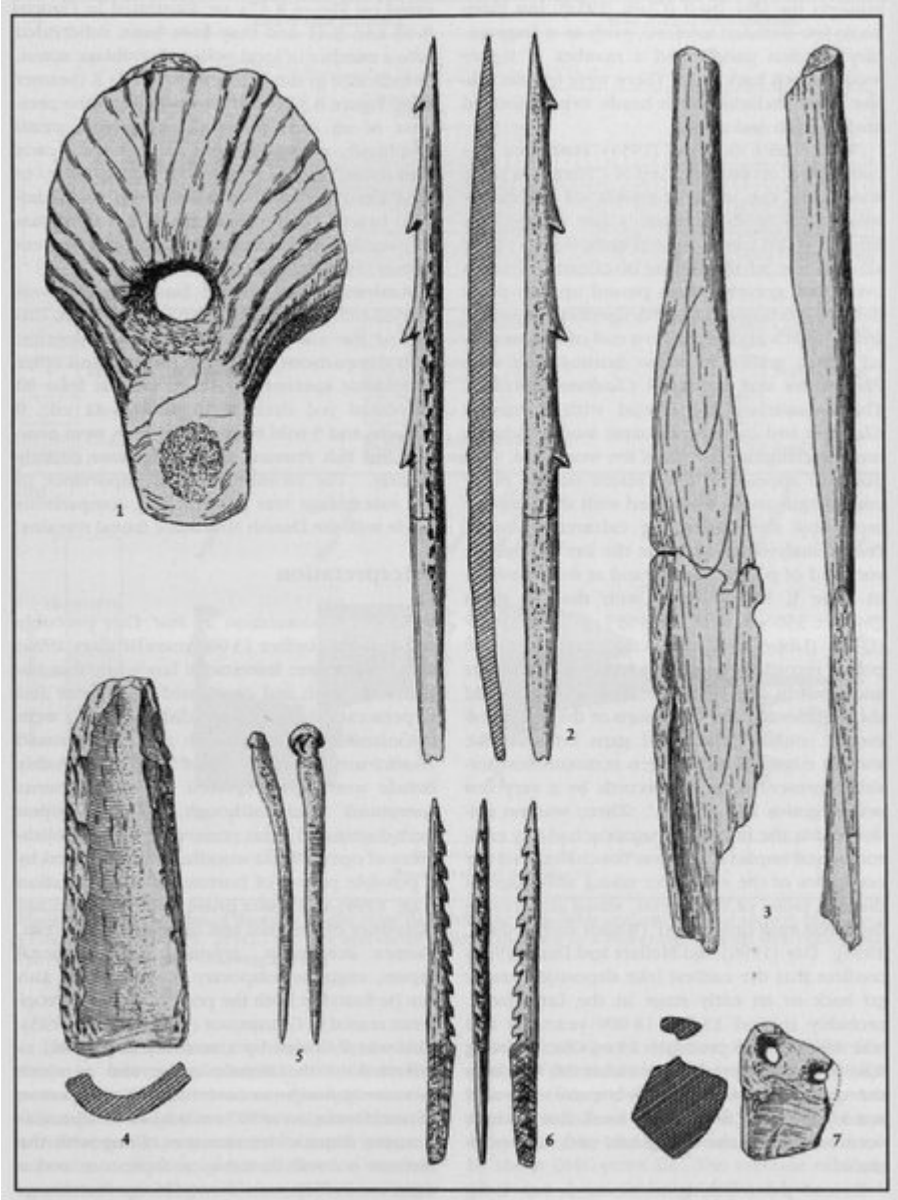
Conclusions

Star Carr undoubtedly is the most important early Mesolithic site in Britain and has provided a wealth of archaeological and palaeoenvironmental detail, which has been reviewed and reinterpreted repeatedly. It particularly is important for the range and type of antler artefacts, the evidence for deliberate vegetation modification, for its wooden trackway and for its continued provision of detailed palaeoenvironmental evidence for the Vale of Pickering throughout Late-glacial and Flandrian times. There is no doubt that in the future it will continue to provide further evidence to elucidate a wide range of Quaternary and archaeological problems.

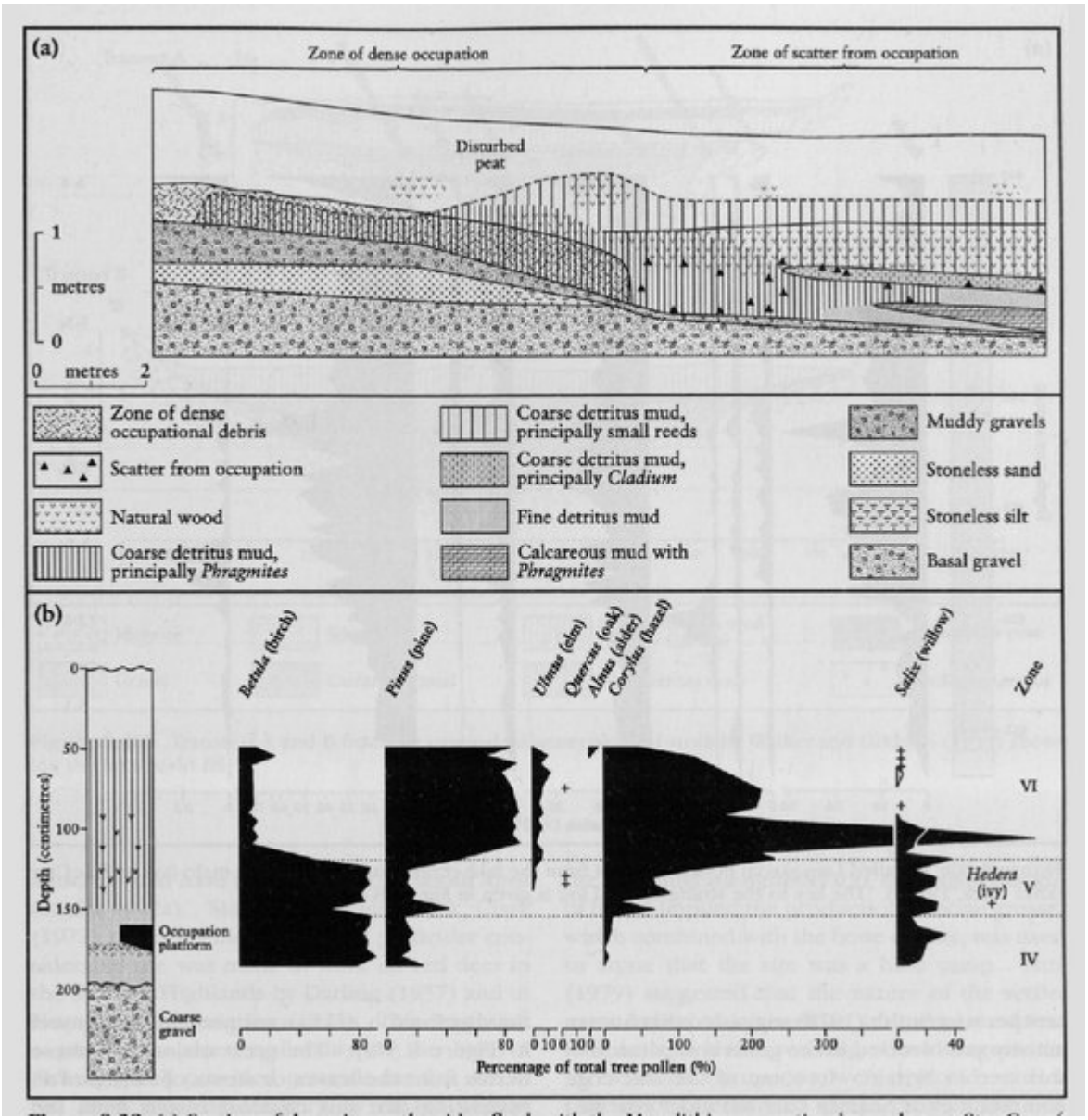
References



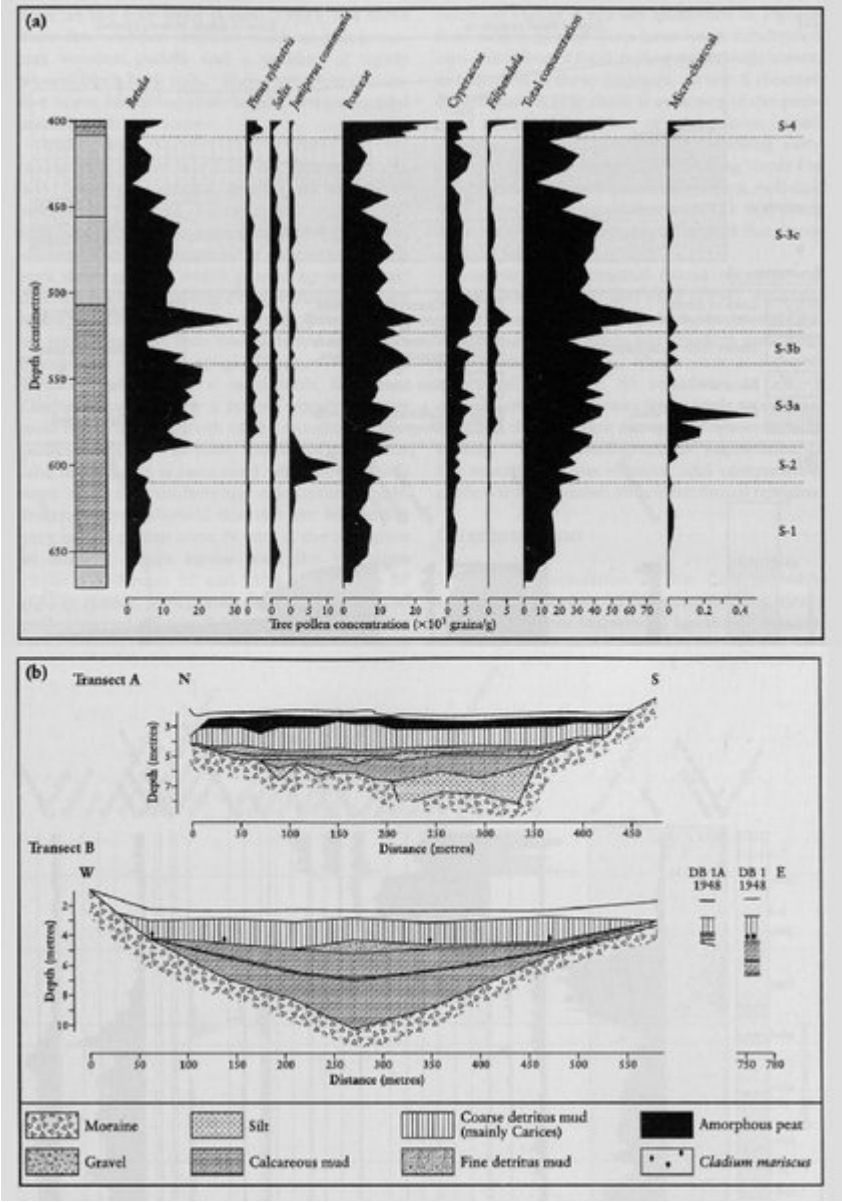
(Figure 8.37)a Reconstructed plan of the Pre-Boreal Lake Flixton. Note the location of the main early Mesolithic sites, the transects A and B (see (Figure 8.40)b) from Walker and Godwin (1954) and the pollen core (see (Figure 8.40)a) from Dark (1996, 1998a, b). (After Clark, 1954; Mellars and Dark, 1998). b. Clark's (1954) location of the Star Carr 4 (Flixton 4') settlement, between the reed swamp and the birch woodland.



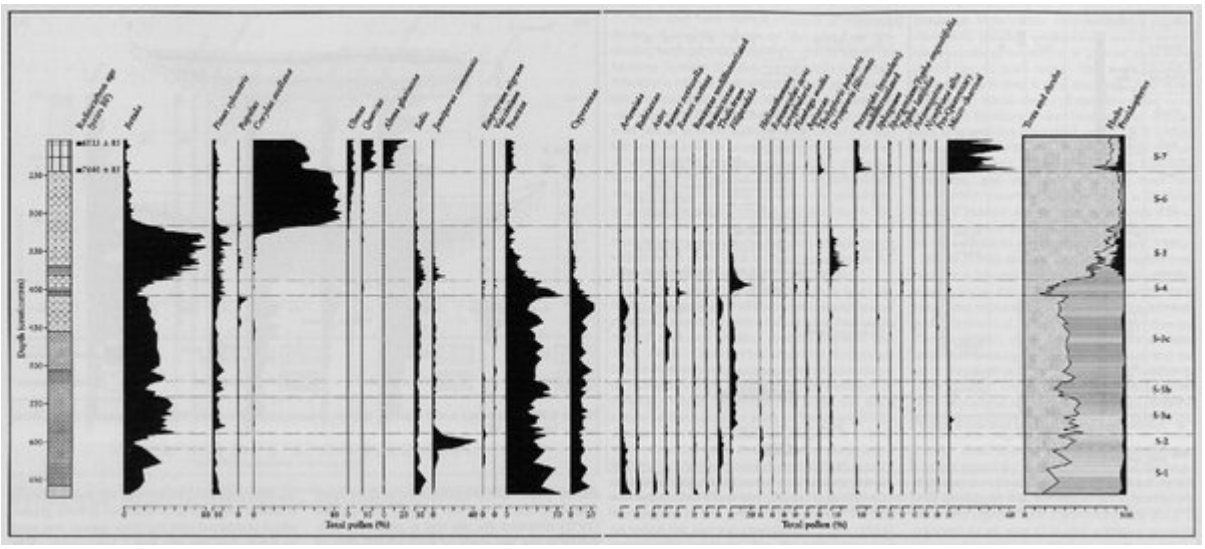
(Figure 8.38) Artefacts from the original Star Carr excavations: 1. elk-antler mattock head; 2. barbed antler point (type A); 3. birch-wood 'paddle'; 4. aurochs metapodial scraper; 5. elk metapodial awl; 6. barbed antler point (type E); 7. amber pendant. All half size, except 7, which is actual size (after Clark, 1954).



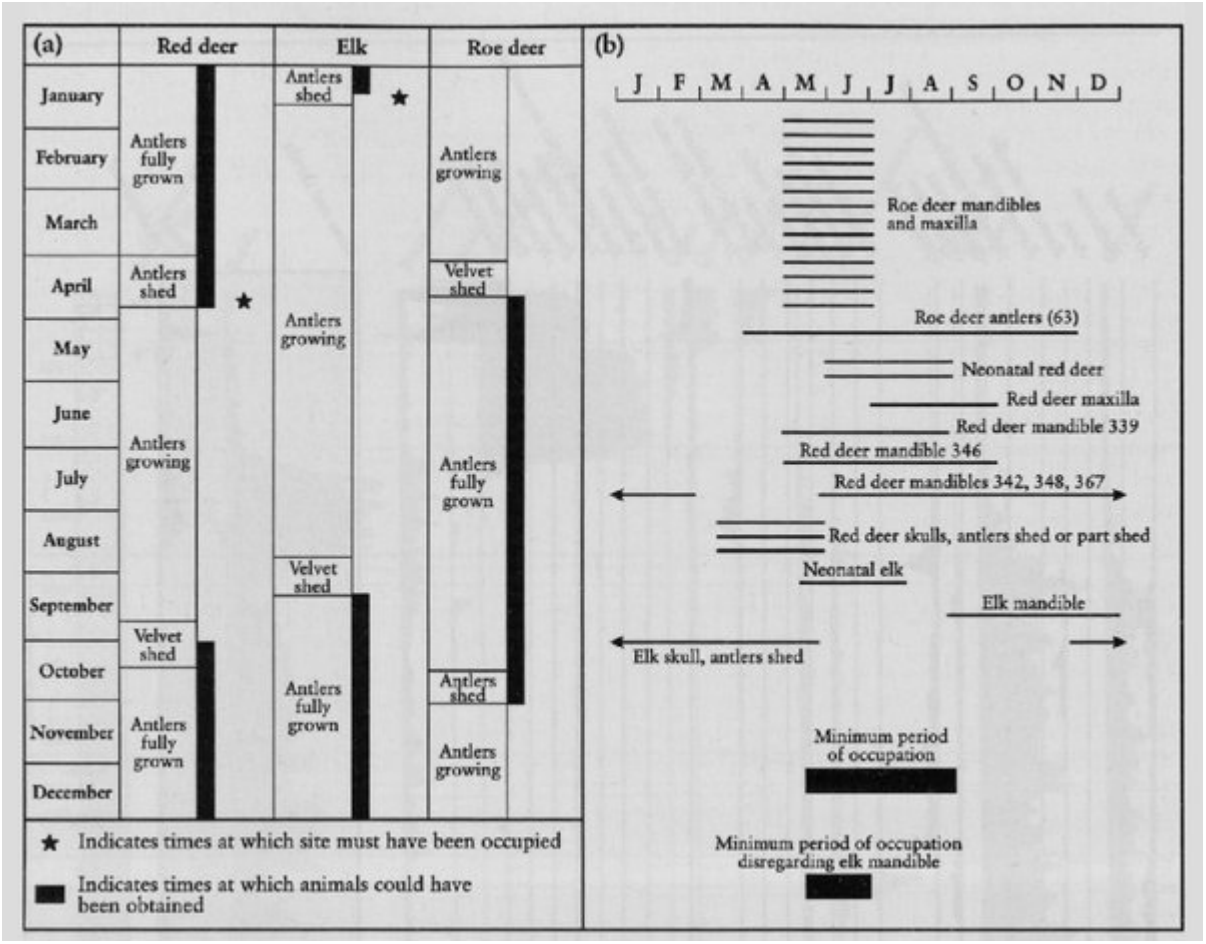
(Figure 8.39) (a) Section of deposits on the ridge flank with the Mesolithic occupation layer shown: Star Carr 4 (Flixton 4') (after Clark, 1954). (b) Tree and shrub pollen expressed as a percentage of total tree pollen, Star Carr (after Walker and Godwin, 1954).



(Figure 8.40)a Detailed Late-glacial pollen diagram from the lake-centre core showing the main taxa at Star Carr (after Dark, 1996a). The key to the stratigraphical log is given in (Figure 8.40)b. b. Transects A and B from the original palaeoecological work by Walker and Godwin (1954) showing the lake basin fill.



(Figure 8.41) Percentage pollen diagram from Star Carr lake-centre core showing all taxa occurring at over 1% of the pollen sum. For Alnus glutinosa early records are represented by closed circles (after Dark, 1996a). See (Figure 8.39) for key to the stratigraphical log.



(Figure 8.42) (a) Original argument for seasonality from the deer antlers based on the growth patterns and the shedding of red deer, roe deer and elk antlers (after Fraser and King, 1954). (b) Season of main occupation at Star Carr summarized from the faunal material (after Legge-Rowley and Conwy, 1988).