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CHAPTER 3 I

The Star Carr Fungi

Harry K. Robson

Introduction

'Quantities of a large bracket fungus identified by Mr E. J. H. Corner of the Botany School, Cambridge University, were found. A few specimens adhered to birch stems, but most are presumed to have been gathered. In some examples the flesh has been stripped off, possibly for use, as Mr Corner suggests, as tinder (amadou).'

(Clark 1954, 18)

Although Clark (1954) referenced the original report by Corner (1950), which was based on the fungi recovered from the 1950 excavation campaign, he does not provide any further information on the assemblage. Consequently there is no way of knowing whether any further specimens were recovered during the 1949 and 1951 excavation campaigns. Moreover, neither Corner (1950) nor Clark (1954) stated how many specimens were found or provided any quantification for the number of specimens that were burnt or modified. From the archive mapping undertaken by Milner et al. (2013a), at least 11 specimens are known to exist. A total of nine specimens were recorded in the collections at the Rotunda Museum in Scarborough. In addition, one is presently on display at the Whitby Museum (Milner et al. 2013b), and another one is on display at the British Museum.

Corner's report (1950) states that the large bracket fungus was identified based on the microscopic structure and comparison with recently collected specimens. According to Corner (1950), the absence of spores was attributable to their germination in water or to their decay. However, it was also noted that spores have not been recorded on living specimens, except during the spring, and so it is possible that those from Star Carr may have been collected during the summer or autumn months 'when it is usual for "foresters" to fell trees or to collect bark (in preference to spring when the sap is rising and makes the wood wet and the implement clog)' (Corner 1950, 124).

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Corner (1950) stated that the fungi are likely to have been detached from living birch (*Betula* sp.) trees with ease, procured by felling, rolling, sorting, shouldering, pulling and throwing down of the trunks or branches, or by simply stripping from the bark. He suggested that they were probably purposefully collected because ‘some of the specimens have the flesh (or upper layer of the bracket) stripped off from the tubes’ (Corner 1950, 124). However, he also noted that some of the specimens were still adhering to the birch stems in the archaeological layer, and so their presence indicates that not all of the assemblage was anthropogenically derived.

Regarding use, Corner (1950, 123) cited Ramsbottom (1923):

‘This is the fungus of amadou (soft amadou or German tinder) much used in former times as tinder (for catching sparks engendered by striking steel on flint). It was also employed as a styptic for staunching slight wounds, and for making soft surgical pads: it had its use in dentistry until comparatively recent years. Amadou is used on the Continent for making picture-frames, ornaments, and such like. In certain regions, particularly Bohemia, caps, aprons, chest-protectors, and articles of dress are made from it. The woods of Thuringen are said to produce 1000 cwts of tinder yearly. Amadou is prepared by freeing the flesh from the hard crust and the tubes, cutting it into slices and cooking several hours in lye or soaking in a solution of saltpetre. After drying, the substance is beaten until it becomes lax and spongy.’

Methods

In order to identify what species were present in the assemblage recovered from the recent excavations, the archaeological specimens were compared with modern examples: tinder bracket (*Fomes fomentarius*, Fries 1849), willow bracket (*Phellinus igniarius*, QuéL 1886), razor-strop fungus (*Piptoporus betulinus*, Karst), and cramp balls (*Daldinia concentrica*, Cesati and de Notaris); and by consulting the following works: Garnweidner (2013), Læssø (2013), and Phillips (1981). Where applicable, the specimens were measured according to the criteria set out by Læssø (2013) (Figure 31.1). In order to determine whether any of the specimens exhibited traces of having been burnt or modified, the specimens were cleaned using a soft brush with cold tap water and then examined. To determine whether there were any differences on an intra-site scale, the majority of the specimens were plotted using GIS. Lastly, in order to place these data into the wider European context, a comprehensive literature review concerning the occurrences of fungi recovered from other Mesolithic archaeological sites in north-west Europe was undertaken.

Results

In total, 82 fungi were identified. Of these, 81 were derived from the more recent excavations undertaken at the site (Table 31.1). The other specimen was retrieved from Clark’s backfill by David Lamplough, a local volunteer, and gifted to the University of York in 2013.



Figure 31.1: Photograph of a modern *Fomes fomentarius* specimen showing the measurements that were undertaken (Copyright Harry Robson, CC BY-NC 4.0).

Excavation season	Number of specimens
1949 (Lamplough collection)	1
SC06	2
SC10	9
SC13	19
SC15	51
Total	82

Table 31.1: Table showing the number of specimens recovered per excavation campaign at Star Carr examined in this study.

Family	Genus and species	Common name	Habitat
Hymenochaetaceae	<i>Phellinus igniarius</i>	Willow bracket	Parasitic on willow
Polyporaceae	<i>Fomes fomentarius</i>	Tinder bracket	Parasitic on hardwood tree species
Fomitopsidaceae	<i>Piptoporus betulinus</i>	Razor-strop fungus	Parasitic on birch

Table 31.2: Identified fungi species with habitat data (Læssø 2013).

The identified fungi taxa are listed in Table 31.2. Of the 82 specimens analysed, 78 could be identified to the genus and species levels. The four specimens that could not be identified were fragments and included the specimen recovered by David Lamplough, two that were recovered during the 2010 excavation campaign and a further one recovered in 2015. *Fomes fomentarius* (Figure 31.2) dominates the assemblage (NISP = 76; 97.4%). There is also one *Phellinus igniarius* specimen and one *Piptoporus betulinus* specimen (Figure 31.2). The data provided in Table 31.3 are based on those 78 specimens and have been divided according to excavation campaign.

In total, 28 of the specimens could be measured: 27 *Fomes fomentarius* and one *Piptoporus betulinus*. Bracket diameters range from 61 to 233 mm, bracket depths measure from 47 to 203 mm and bracket thickness ranges from 20 to 119 mm. The summary statistics for the measured specimens are provided in Table 31.4.

Of the 81 specimens recovered during the more recent excavations, only one was found adhering to a tree; the others may have been removed from their host tree either by people or fallen naturally.

A total of 54 specimens exhibit signs of modification. Modified specimens included the interior or a strip from a fruit body, or a specimen that exhibits removal of the outer surface (Figure 31.2). Of the 54 specimens, one has at least two very clear incision marks. In total, 41 of the specimens appear to have been charred. However, the degree of charring is not uniform. Whilst some of the specimens have been partially scorched or charred, others have been heavily charred and have become carbonised (Figure 31.3). In addition, the location of the heat exposure varies from isolated areas of the specimen to the complete fruit body, and from portions of the interior to intentionally removed strips.

Of the 82 specimens analysed in this study, 64 can be spatially plotted using GIS (five fungi have no spatial data and 13 were recovered from Clark's backfill). It can be seen that there are two main concentrations of fungi deposition at Star Carr: one in Clark's area and a second in the detrital wood scatter (Figure 31.4). In addition, those specimens that have been either burnt or modified were found in both areas. Although the majority of modified specimens are located in Clark's area, the sample size is not large enough to suggest significant patterning (Figure 31.5).

Discussion

In order to place these data into the wider European context, a literature review was undertaken (Table 31.5). Although the majority of archaeological sites that have yielded fungi are dated to the Late Mesolithic Ertebølle



Figure 31.2: Photograph showing the three different species of fungus that were identified in the assemblage. Clockwise from top right: burnt *Fomes fomentarius* specimen, the one *Phellinus igniarius* specimen, the one *Piptoporus betulinus* specimen and a larger and modified *Fomes fomentarius* specimen that has had its outer surface intentionally removed (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

Excavation season/genus and species	SC06	SC10	SC13	SC15	Totals
<i>Phellinus igniarius</i>			1		1
<i>Fomes fomentarius</i>	2	6	18	50	76
<i>Piptoporus betulinus</i>		1			1
Totals	2	7	19	50	78

Table 31.3: Identified fungi per excavation campaign with quantification.

Sample group (sample size)	Diameter (cm)	Depth (cm)	Thickness (cm)
All fungi (n=28)	12.0 ± 5.1	9.9 ± 4.0	5.9 ± 2.6
<i>Fomes fomentarius</i> (n=27)	12.2 ± 5.1	10.1 ± 3.9	6.0 ± 2.5
<i>Piptoporus betulinus</i> (n=1)	6.1	4.7	2.8

Table 31.4: Summary statistics for the various categories of fungi analysed in this study.



Figure 31.3: Close-up photograph of a charred *Fomes fomentarius* specimen that is likely to have been initially removed from the original fruit (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

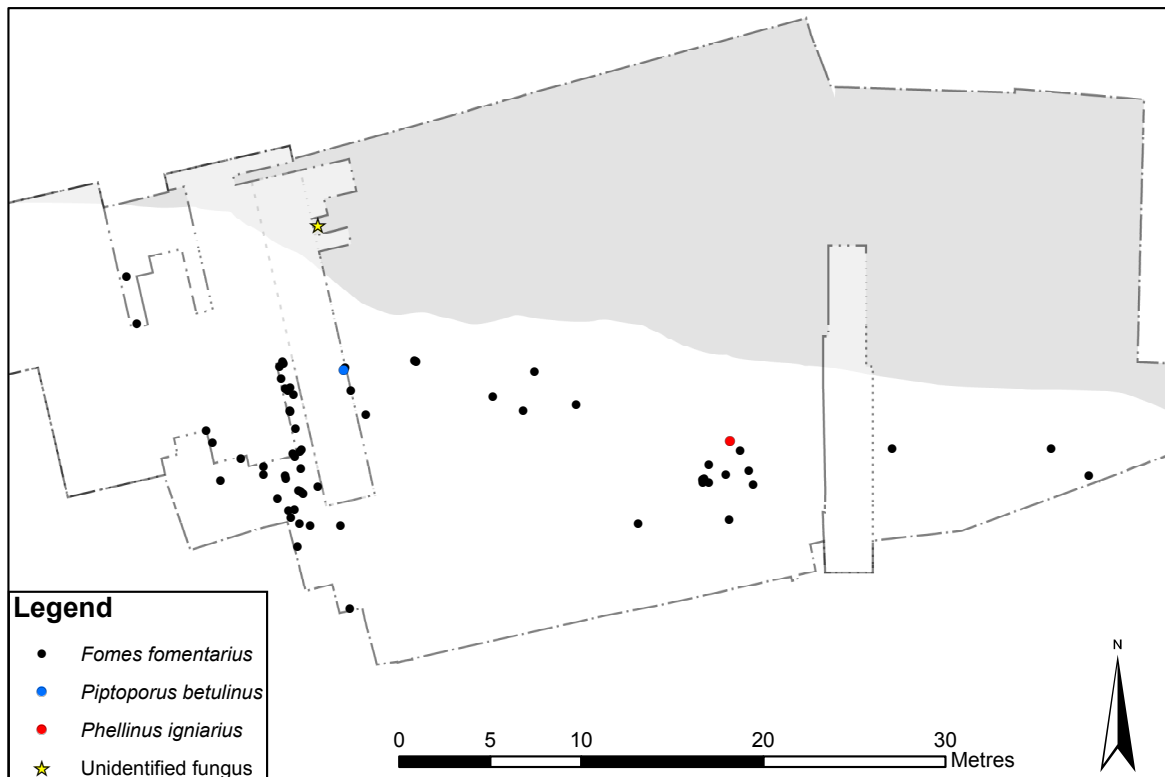


Figure 31.4: Distribution map for the majority of the fungi recovered from the recent excavations at the site. The one *Piptoporus betulinus* specimen was recovered in Clark's cutting II, whilst the one *Phellinus igniarius* was recovered from the detrital wood scatter to the west of the VP85A trench (Copyright Star Carr Project, CC BY-NC 4.0).

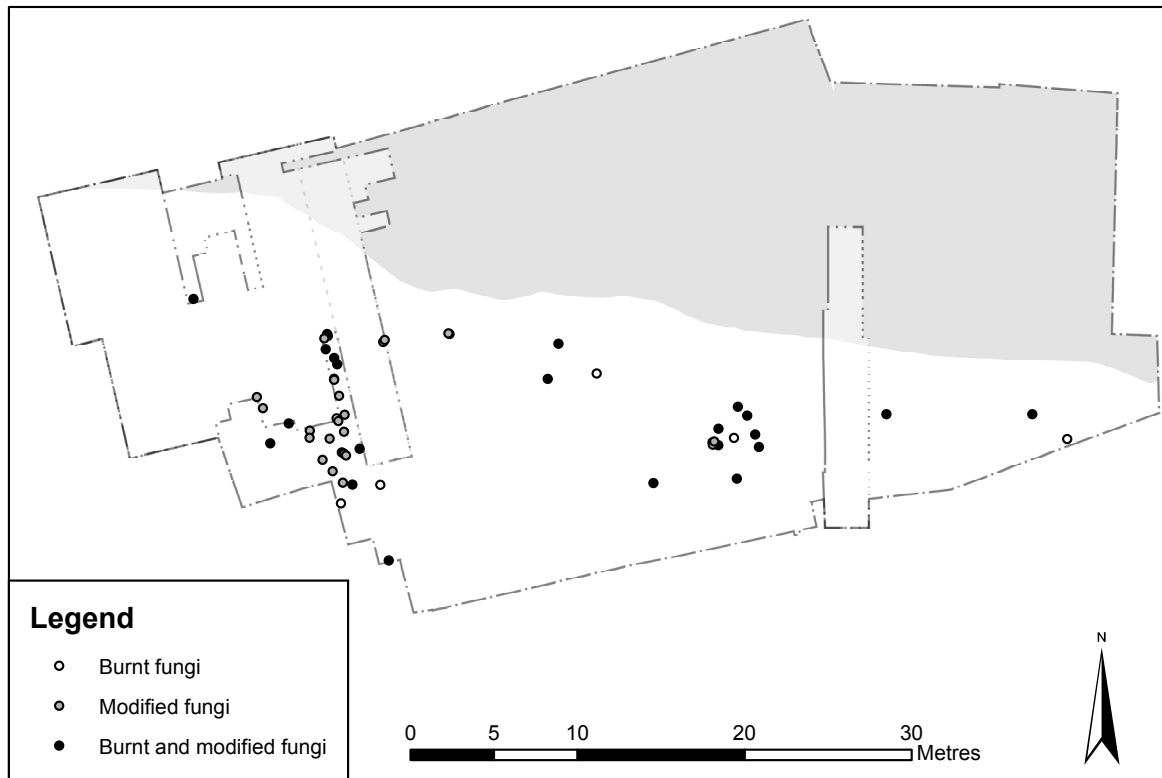


Figure 31.5: Distribution map for the burnt, modified, as well as burnt and modified fungi recovered at Star Carr (Copyright Star Carr Project, CC BY-NC 4.0).

and Swifterbant cultures (n=13), there are at least four Early Mesolithic Maglemosian sites: Mullerup and Ulkestrup Lyng in Denmark, and Friesack IV and Hohen Viecheln in Germany (Gramsch 1973; Sarauw 1903; Schuldt 1961; Andresen et al. 1981; Gramsch pers. comm. 2016) and one Middle Mesolithic site: Vis I in Russia (Burov 1989).

Despite a lack of detail concerning the number of specimens recovered from the four Early Mesolithic sites, ‘many’ specimens were recovered from Friesack IV (Gramsch 1973; pers. comm. 2016), including fungi from the Polyporaceae family (bracket fungus) (Burov 1989, 400), whilst those from Hohen Viecheln are mentioned in the publication by Schuldt (1961). According to Sarauw (1903, 193), fungi from Mullerup, identified as willow bracket (*Phellinus igniarius*), were encountered in the settlement layers of the site and had probably been harvested, brought to the site and used as fire starters (Sarauw 1903, 193, translation by Theis Zetner Trolle Jensen). Similarly, although it is not stated how many specimens were found at Ulkestrup Lyng, one tinder fungus was recovered from the refuse layer.

A number of younger Mesolithic sites have also produced evidence, for example Vis I in Russia (Burov 1989) as well as sites in Denmark and Northern Germany, including Bloksbjerg, Grube-Rosenhof, Møllegabet II, Neustadt, Timmendorf-Nordmole I and Tudse Hage. Again, it is unknown how many specimens were encountered (Westerby 1927, 124; Skaarup and Grøn 2004, 91–92; Lotz 2008; Andersen 2013, 115; Pedersen 2014). However, of these localities, it has been noted that a couple of the specimens recovered from the submerged North German site at Neustadt had been modified, possessing scrape marks on their lower surface (Hirsch et al. 2008, 35).

At the Danish locality of Møllegabet I at least one *Fomes fomentarius* specimen was recovered, which is currently on display in the Langeland Museum (Andersen 2013). One large tinder fungus was also recovered from within the prow of a dugout canoe at the site of Margrethes Næs, Denmark (Myrhøj and Willemoes 1997). Interestingly, it was noted that:

	<i>Daedalea quercina</i>	<i>Fomes fomentarius</i>	<i>Fomes</i> or <i>Polyporus fomentarius</i>	<i>Ganoderma appplanatum</i>	<i>Glocephyllum trabeum</i>	<i>Kretzschmaria deusta</i>	<i>Phellinus igniarius</i>	Polyporaceae	Unknown	Totals
Early Mesolithic										
Friesack IV, Germany		X						X		Unknown
Hohen Viecheln, Germany								X		Unknown
Mullerup, Denmark							X			Unknown
Ulkestrup Lyng, Denmark		X								Unknown
Middle Mesolithic										
Vis I, Russian Federation								X		Unknown
Late/Terminal Mesolithic										
Bloksbjerg, Denmark		X								Unknown
Hardinxveld-Giessendam De Bruin, Netherlands		2		12	1	9			1	25
Grube-Rosenhof, Germany		X								Unknown
Margrethes Næs, Denmark		1								1
Møllegabet I, Denmark		1								1
Møllegabet II, Denmark		X								Unknown
Neustadt, Germany		X								Unknown
Rødbyhavn, Denmark		20								20
Ronæs Skov, Denmark		8								8
Smakkerup Huse, Denmark			>10							>10
Timmendorf-Nordmole I, Germany		X								Unknown
Tudse Hage, Denmark		X								Unknown
Tybrind Vig, Denmark	1	13								14
Totals	1	>45	>10	12	1	9	?	?	1	>79

Table 31.5: Table detailing the number of identified specimens recovered from the 18 known Mesolithic archaeological sites in northern Europe (X indicates presence).

‘on this fungus a piece of bark from the host tree (a birch) was preserved. The pores of the fungus were at a right angle to the line of the bark. It must therefore have grown on a fallen birch log.’ (Myrhøj and Willemoes 1997, 163)

From Ronæs Skov, Denmark, eight specimens identified as *Fomes fomentarius* were recovered. The specimens measured between 7.5 and 21.0 cm in diameter. Unlike those from Star Carr there was no evidence of charring or modification (Andersen 2009). However, there was one example that was recovered from within a hearth. At the Danish site of Smakkerup Huse a number of large pieces of tree fungi or polypores (*Fomes* or *Polyporus fomentarius*) were recovered. It was stated that more than 10 specimens were recovered during the excavations. In addition, whilst one specimen had a diameter of between 13 and 22 cm, the others were greater

than 10 cm in diameter (Mason 2005, 82–83). At the Dutch site of Hardinxveld-Giessendam De Bruin, 25 specimens were recovered. Of these, 24 were identified to the genus and species levels (Louwe Kooijmans 2001, 395–397; Adema 2002). At least 20 specimens of *Fomes fomentarius* are known from the recent excavations at Rødbyhavn in Denmark (Sørensen 2017). Remarkably, one had been decorated (in the form of cross hatching) (Sørensen 2017). Although this form of decoration is frequently encountered on Late Mesolithic artefacts, for instance bone and antler tools (Andersen 1971), it has not been previously encountered on fungi.

Perhaps the most informative account of Mesolithic fungi is provided by Andersen (2013) in his monograph on the renowned Late Mesolithic site of Tybrind Vig, Denmark. In total, 14 pieces were recovered from within the archaeological deposits and according to the original analyst, Christian Lange, the specimens were very well preserved (Andersen 2013, 115). A total of 13 were identified as *Fomes fomentarius*, whilst the remaining specimen was identified as *Daedalea quercina* (Andersen 2013). Two of the specimens measured 4.6 and 6.0 cm in diameter, whereas the remainder were larger; the largest being 20 × 27 cm (Andersen 2013, 115). They all possessed a very small attachment surface, although they were lacking any traces of the host tree to which they had once been attached: this suggests that the fungi were cut from the trees while fresh and that they had been systematically selected (Andersen 2013, 115). Two had been connected to the underside of a branch, which may have enabled easier procurement. In addition, one specimen was charred and one specimen exhibited scrape marks on its lower surface where the tinder is located. Andersen (2013) stated that it was difficult to ascertain whether or not they represented a natural phenomenon or had been intentionally collected and then discarded by the inhabitants at the site; it was noted that the smaller specimens may have been washed in with the branches and logs that were also encountered in the gyttia deposits. However, given their relative abundance, and the fact that two had been modified, Andersen (2013) suggested that they had probably been intentionally gathered.

Ethnography

Throughout the northern boreal forest, the flesh of *Phellinus igniarius* has in the past been used as ‘chew-ash’. Once roasted to ashes and mixed with chewing tobacco, or tea leaves, this fungus was used to produce a masticant or chew (Kroeger et al. 2012).

Whilst the bark of the fungus *Fomes fomentarius* is grey, thin and very hard, it is well-known that the flesh (which is soft, pale brown and of a corky appearance) can be used as tinder for fire starting (Cave-Browne 1992, 53; Læssø 2013). In addition, its flesh in the past has, and continues to be used for, hat manufacture and other items of clothing (Læssø 2013).

Regarding the extraction of tinder, Cave-Browne (1992, 53) states:

‘To prepare this tinder, first remove the spore tubes until you reach the soft ‘flesh’, which is seldom more than 6 mm thick (what you now have resembles a quarter of a globe). Either soak this item for two days or boil it for c. two hours. With care the thin, hard bark can now be chipped away from the flesh with a sharp blade: the natural sharp edge of a strong flint flake will work quite well. Remove the part of the flesh that had been attached to the tree. Now start gently pounding the flesh that remains with a smooth fist-sized pebble, using another smooth rock as an anvil. Gently stretch the flesh with the fingers until it resembles coarse chamois leather. Dry it gently as too much heat hardens it. Char that part that will receive the first sparks, having first made ready a suitable air-tight container in which to extinguish the smouldering amadou.’

The *Piptoporus betulinus* bracket fungus has previously been used for sharpening razors, and for polishing in the watchmaking industry (Læssø 2013), whilst Turner (1998) stated that the aboriginal groups in British Columbia would ignite the corky inner flesh of the fungus, and transport it since it can smoulder for many hours. Since *Piptoporus betulinus* was recovered from the fire-making tool kit used by Ötzi (Chapela and Lizon 1993; Peintner and Pöder 2000; Pöder et al. 1994), it is assumed that a similar practice was undertaken in northern Europe. Furthermore, it has been demonstrated that this species ‘could have been ingested as a vermifuge’ (O’Regan et al. 2016, 140) in the past as the fungus possesses antibacterial properties (Carpasso 1998; Mears and Hillman 2007). Alternatively, the fungus may have been used for hafting lithics, as has been demonstrated in experimental research undertaken by Diederik Pomstra as part of this project (Figure 31.6).



Figure 31.6: Photograph showing a blade that has been hafted in the inner fruit of a birch polypore (Copyright Aimée Little, CC BY-NC 4.0).

It has also been documented that the First Peoples of British Columbia would transport the flesh of polypores for use as tinder within clam shells, cedar bark, or birch bark rolls (Turner 1998), whilst the flesh from another polypore (agarikon), *Laricifomes officinalis* (Kotlaba and Pouzar 1957), has in the past been used as a purgative (Deur and Turner 2005) or as shaman grave guardian figures (Kroeger et al. 2012).

Some aboriginal groups use a type of fungus, possibly a species of the *Ganoderma* genus, for tanning buckskin, whilst others use burnt bracket fungi as a smudge against insects (Turner 1998). Other groups use the felt-like mycelium of a fungus to caulk canoes and boxes made from wood, and the Squamish use the corky inner flesh of another unknown bracket fungus for washing their hands (Turner 1998). Kroeger et al. (2012) state that the Haida use powdered *Echinodontium tinctorium* mixed with pitch as cosmetic face paint or for skin protective purposes from sunburn and insects (Turner 2004). Finally, a very different type of practice is undertaken by the Bella Coola (Kroeger et al. 2012) and Nuxalk peoples, who ‘painted faces on large specimens of bracket fungi, attached miniature bodies of cedar bark to them, and used them as dance symbols in a special ‘fungus dance’ of the Kusiut ceremonials’ (Turner 1998, 56).

Conclusions

Given the numerous uses of fungi documented in this chapter, it is likely that those recovered from Star Carr had probably been intentionally gathered by the site’s inhabitants. This is supported by the fact that of the 82 specimens examined only one was found adhering to a tree. In addition, since the majority of the assemblage exhibits signs of burning and/or modification, *Fomes fomentarius* were probably preferentially selected for their tinder and primarily used as fire starters, which could have even been assisted with the use of small bows (Burov 1989), as has been suggested for other sites in Europe (Andersen 2009; Andersen 2013; Dal 2002; Gramsch 1973; Louwe Kooijmans 2001; Sarauw 1903; Schuldt 1961; Skaarup and Grøn 2004).

