1. Introduction

1.1. The necessity of studying cuisine and food values.

The shift from a hunting and gathering way of life to an agricultural one is considered perhaps one of the most important alterations in human history. A focus on limited, but intensively exploited staples is a foundation of modern industrial society, which allowed overseas colonial expansion that ultimately resulted in an ethic of economic free-enterprise, and capitalism. In this capacity as a lynch-pin in global socio-political history, interpretations of the transition to agriculture have accommodated many western assumptions about the values of food; what is important to modern cuisines is often literally projected on Late Mesolithic and Early Neolithic cultures. In its most influential form these assumptions have dictated *which* foods should be focused on; manipulating recovery strategies during excavation, recording precision, as well as the selection of species for reference collections. Nowhere is this more apparent than in the analyses of plants across the transition, and a preoccupation with 'cereal-finding' prevails.

The comeuppance of this is generally two-fold: firstly it has meant that as a discipline we do not possess a rounded understanding of *what* plants and animal foods made up cuisine. Species that make up a broader dietary contribution are often only recorded as incidental contributors. Secondly, it has generated challenges to interpreting the *relative importance* of different foods across the transition. This thesis seeks to explore techniques for documenting a wide-range of plant and animal foods that were used across the transition to agriculture in the context of pottery, in southern Scandinavia. The focus of study is to document *what* changes occurred in cuisine, and suggest *why* they happened. Cuisine is understood as 'food values', and as well as the often invoked calorific/energy properties of foods, I explore how extra-cultural appreciations of foods can include many other values including medicinal, consciousness-altering, polluting, cleansing, and aesthetic possibilities.

With an expanded understanding of food values through cuisine a potential for food to be engaged in *multiple* processes of change across the transition becomes clear. Explanations of the transition to agriculture tend to emphasise a singular, linear process, that of domestication. This has been invoked in a literal capacity with

studies that document morphological changes that result from beneficial characteristics in plants and animals, as well as more metaphorical forms such as the domestication of the wild through place-making, or *Domus* (Hodder, 1990). Ideas about the values of food are certainly at the heart of interpretations of the Mesolithic-Neolithic transition, to the extent that interpretations of other artefact forms often orbit the singular process of domestication, reinforcing it. A case in point is the inclusion of Danubian shaft-hole axes into the tool repertoire, which enter the record relatively synchronously with cultivated animals and plants. These large stone tools are conventionally interpreted as prestige-exchange artefacts (Fischer, 1982) that opened exchange routes with southern farming groups facilitating later food gift-exchange.

This thesis considers food values to be multiple and potentially varied, motivating many food-related changes that occurred across varying scales of time. In southern Scandinavia the inception of these changes to an agricultural cuisine are targeted on the centuries around the late 5th-early 4th millennia BC, but are part of a palimpsest of social processes that extends to include the first uses of pottery in the region c.4700-4600 BC (Andersen, 1991, 2000), and for the purposes of this investigation projects into changes that were perhaps more fully realised in the later Neolithic. It is suggested that these food-related processes were initially not motivated by a desired outcome of domestication or larger plant/animal size, but were instead stimulated by other important values and properties of the food constituents of cuisine.

1.2. Rationale for studying cuisine.

In order to rectify the problems that limited foods are over emphasised in interpretation, and that preservation variability across the southern Baltic makes it difficult to know how representative food assemblages, such as floral macrofossils, are, this thesis aims to exploit the microscopic and biomolecular remains conserved in pottery residues. Pottery is a common constituent of settlement evidence, and southern Scandinavia is relatively rare in Europe for possessing pottery in both a hunter-gatherer context as well as early Neolithic one. The typological difference between the two periods is well-established; Mesolithic pottery has pointed bases, whilst there is a proliferation of forms in the early Neolithic, all of which adhere to flat-based style. With the support of an ever-expanding programme of radiocarbon

dating, ceramics offer a temporally contextualised medium for understanding food changes across the transition to agriculture.

A range of eight sites are proposed for study, including both inland and coastal examples (figure 1.1). The sites were utilized for samples from both mundane and more ritualised contexts. The glacial history of southern Scandinavia has resulted in excellent waterlogged conditions for organic preservation at both the coast and in inland locations. The relative increase in sea level since the last glacial maximum combined with isostatic rebound of the landmass has submerged many coastline settlements from the Mesolithic and Neolithic in the southern Baltic. In addition, samples from the inland Åmosen peat bog show similar levels of preservation of organic material allowing ceramic samples to be drawn from these different biotope sources of foods.

Figure 1. 1. A map of the sites from which ceramic and foodcrust samples were taken.

These spatially extensive locations with excellent conditions for organic preservation allow for the investigation of differences in the relative importance of foods at the regional scale. As well as biomolecular remains that have absorbed into the fabric of the ceramic during cooking and other processing activities, it is common at all of the sites studied to recover extant surface deposits, termed ‘foodcrusts’, from the

original use of the vessel (figure 1.2). Both foodcrust and absorbed biomolecules are amenable to lipid residue analysis; a combination of techniques from organic-geochemistry that collectively extract lipids, separate the compounds, provide identification information on the molecular characteristics of those lipid molecules, and analyse the collective or singular isotopic signature of compounds. These techniques of gas chromatography (GC), gas chromatography- mass spectrometry (GC-MS), and gas chromatography-combustion-isotope ration mass spectrometry (GC-C-IRMS) are advanced at identifying a range of animal fats and animal products such as milk. Challenges are still posed for the high resolution identification of plants using lipid residue analysis though, and a focus of this research is to explore the recovery and identification potential of plant microfossils such as starches and phytoliths from the foodcrusts. In combination the results of these analyses allow patterns of ceramic use to be discerned, and explorations of the food choices to be made. These lead the investigation into interpretations of the values of different foods, based on their selective combinations or proscribed mixing, their importance in a *pottery* cuisine as opposed to other culinary processing methods, and the selective manipulation of their properties to fulfil specific social roles.

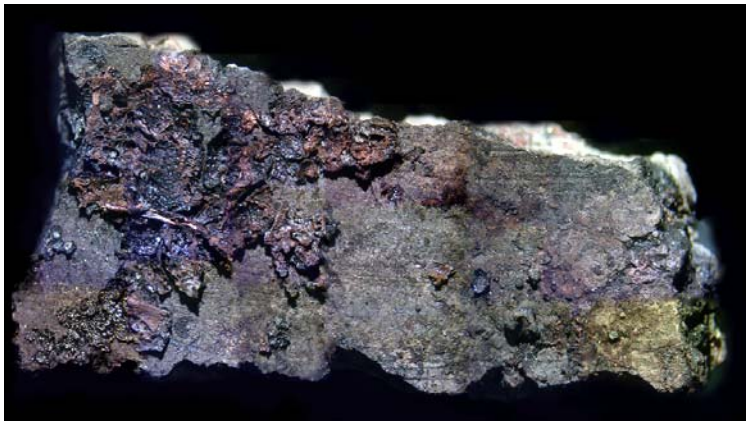

Figure 1.2. An example of a sherd from Neustadt with surface deposit or 'foodcrust' adherences.

1.3. Overview of the thesis.

Chapter 2 introduces the interpretations of the transition to agriculture that have received the greatest acceptance. Four main explanations prevail; population displacement or colonisation which is a legacy of the Neolithic 'package' or artefacts, population pressure forcing the adoption of more energy-efficient foods,

resource stresses local to southern Scandinavia driving the adoption of external foods, and the introduction of domesticates as exotic, prestige gifts. A critical commentary is made on the theoretical perspective taken to value in these interpretations, and is woven into the commentary. Case studies are presented of ethnographic situations where more varied values are extended to the idea of cuisine. Concepts of value in explanations of the transition have been bound into formalist and substantivist debates; that is, changes in the economy are argued to be more or less embedded in wider social changes. Many of the issues of the formalist-substantivist debate were never resolved, for example, explaining group motivation to (re)produce society. Post-processual approaches largely circumvented these challenges, and in doing so generated a theoretical arena where *meaning* came to stand for *value*. It is argued, however, that readings of key post-structuralist theories about the structure of meaning, specifically Derrida's 'theory of writing', misrepresent value. Meaning has been espoused as insubstantial, in a constant state of flux between signifiers, its nature inherent in the *relationship between* signifiers. However, this nullifies substance, or Object which is essential in order to appreciate *relative importance* in the past, and therefore explain motivation to change. A re-evaluation is made of the 'theory of writing', and an ontological balance struck to reintroduce Subject into meaning-value discourses.

A theoretical emphasis on food value, or cuisine, is necessarily dependent on the generation of a dataset that can support interpretive claims. Not least this is because I am arguing that the fragmentary record that documents food practices in the past actually represents *multiple* processes of change, and the dataset must therefore be detailed enough and extensive enough to *represent* these multiple processes. Chapter 3 evaluates the advances in organic geochemistry that have been made in recent years, that are pertinent to achieving high resolution identifications of foods in residues, in a robust fashion that is applicable across a number of site situations. In light of the difficulties in identifying plants using lipid residue analysis, this chapter progresses to evaluate the potential for recovery of the plant microfossils starch, phytoliths and calcium oxalate crystals. Assessments are made of the usefulness of these sub-disciplines in terms of identification resolution, robusticity, and suitability to studies of temperate European regional flora. A strategy of combined techniques

is proposed, with phytolith analysis playing an experimental role since it has limited application in northern Europe and its potential is the most difficult to assess.

Successful application of these techniques in order to query how cuisine and food values changed across the transition to agriculture are to an extent dependent on the selection of ceramics to be analysed, and the contextual site information for interpretive integration . The sampling strategy is the subject of Chapter 4 which establishes the typological research that has been done to classify ceramics from Late Mesolithic Ertebølle and Early Neolithic Funnel Beaker contexts, and describes the criteria employed to distinguish Ertebølle from Funnel Beaker on technological grounds. The chapter develops to detail the supporting evidence from sites chosen for investigation. Each of the sites under study is published to varying degrees, in the case of Stenø for example, the site is newly excavated and contextual information about floral and faunal macro-remains is not forthcoming. In other cases, such as Tybrind Vig, non-ceramic cuisine is detailed as species lists without quantitative estimations for comparison to ceramic residue data.

Details of the strategy for analysis are developed in the methodological Chapter 5. Lipid residue analyses were carried out at Bradford University. Plant microfossil investigations were carried out by the author at the BioArch facility, University of York. In order to design a dataset to interrogate cuisine across the transition, three practical questions are posed for microfossil analysis. These include: are microfossils able to survive cooking, are they representative of vessel use, can they be identified? A programme of experimental cooking was carried out to test whether starches and phytoliths survive modern cooking. Archaeological candidates for starches were confirmed by degradation of a sub-sample with the enzyme α-amylase. Comparisons of interior wall deposits with exterior wall deposits were used to test whether there was significant contamination from the burial environment. At Neustadt soil samples were available to compare starch counts against ceramic deposits.

Identifications of starches are conventionally carried out by ‘manual’ observations of granule features such as size and shape. The subjectivity of this approach was supplanted by a quantitative technique of automated classification of northern European starches, developed in partnership with Julie Wilson (University of York) for this project. The programme was trained to classify starch granules from modern

reference species', each of which displayed varying *sensitivity* to classification and *specificity* to a particular species, measurable parameters. Using this method it was possible to quantify the proportions of different starches in each foodcrust. Phytoliths were also recovered from archaeological samples and manually measured for consistency with modern reference species.

Over 150 absorbed residues were analysed, including over 90 foodcrusts. The results are discussed on a site-by-site basis in Chapter 6, because variation in food choices is apparent between sites, especially during the early Neolithic. The results suggest that although the syntax of food at the scale of individual meals is not possible, cuisine is represented in traditions of pottery use.