

1. Lithic Raw Material Economy in Late Glacial and Early Postglacial Western Europe: Introduction

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Strategies of lithic raw material acquisition, transport and use are an important source of information about regional organization of hunter-gatherer land use. A growing literature in hunter-gatherer archaeology has developed around discussions of how lithic raw material use can shed light on prehistoric territorial organization, mobility and communication, as well as the overall character of regional and inter-regional connections between social groups. A fundamental premise throughout the present volume thus is that regional and inter-regional patterns in the use and procurement of lithic raw materials from well-defined sources provide reliable information on hunter-gatherer mobility, territorial organization, and inter-group communication. To a comparative study of the highly mobile hunter-gatherers of late glacial and early postglacial Western Europe, such an approach brings major advantages.

Large parts of Western Europe were covered by ice in the Pleniglacial and only (re-) colonized during late glacial and early postglacial times. Mobility strategies, territorial organization and communication patterns must have been particularly vital aspects of the contemporary socioeconomic systems. Moreover, past hunter-gatherer mobility and settlement patterns are likely to have changed significantly during this period as a reflection of major environmental changes. Within a few millennia, landscapes throughout Europe changed markedly from open tundra, steppe, taiga or steppe-woodland to more densely wooded habitats, and it is widely accepted that the increased density of Boreal forests must have led to a wide array of changes in resource distribution and in hunter-gatherer settlement and subsistence systems.

Evidently, the late glacial and early postglacial comprise a period of major socioeconomic and cultural changes. These changes are also reflected in the relationships between the management of lithic raw material and other resources, subsistence-settlement systems, and social organization. Given the presumably great environmental and cultural variability within an area the size of Western Europe during the period in question it is

reasonable to expect some spatial and temporal differences with respect to these issues on a macro-regional scale. By encouraging discussion of analogous or contrasting patterns in lithic raw material economy among geographically and geomorphologically different areas (Poland, Belgium, Paris Basin, Central Germany, Southern Germany, Southern France, Northern Spain, Central Portugal), this volume aims at a detailed inter- as well as intra-regional comparison and contrast of approaches and results.

The following eleven chapters address various aspects of late glacial and early postglacial raw material economy in regions spanning much of continental Europe, from Poland to Portugal (Figure 1). The papers provide case studies and/or exhaustive reviews of currently available data on the use and procurement of lithic raw materials in relation to subsistence-settlement systems and socioeconomic organization of prehistoric hunter-gatherer groups.

To assure a certain degree of coherence and consistency throughout the volume authors were asked to address aspects of the following questions:

1. How is the acquisition of lithic raw materials used for tool production organized around other activities in a subsistence-settlement system and in a social system?
2. What is the relation of lithic raw material use to scheduling of activities, social organization (control of resources, specialization of production), and management of resources (quarrying, heat treatment, etc.)?
3. How much can raw material distributions on an archaeological landscape tell us about the range and organization of hunter-gatherer mobility?
4. Over what distances are lithic raw materials transported in the late glacial and early postglacial (compared to other materials)?
5. Can we distinguish between exchange and direct acquisition through mobility?

Authors were very cooperative in orienting their contributions toward these questions, which might explain the high degree of uniformity among approaches. We find, for instance, that a recurrent

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theme throughout the volume is the scheduling of activities, i.e., the question of planning ahead in anticipation of future lithic raw material needs. Virtually all chapters address this issue more or less explicitly.

On the other hand, the high degree of uniformity of approaches may also largely be a reflection of methodology. Although the contributions are derived from several different research traditions, several broadly shared analytical and methodological approaches unite the contributions.

The contributions to this volume share a strong

central focus on conceptualizing technology as a cultural system. For example, although the French concept of '*chaîne opératoire*' or operational sequence (Geneste 1991) and the Anglophone notion of technological organization (Nelson 1991) diverge in their overarching theoretical goals (Perlès 1993), they tend to converge in analytical approaches that emphasize 1) modeling technological processes in terms of a series of steps including raw material acquisition, processing, use and discard, 2) considering the various alternatives or perceived costs and benefits that might have influenced or determined choices made by prehistoric



Figure 1: Map showing the location of the case studies in Europe.

flintknappers at each of these steps, and 3) exploring variability in these choices in different seasonal and/or socioeconomic contexts. Work within these three shared areas constitutes a growing body of specifically archaeological theory focused on technological choices. This body of theory is rooted in empirical observations drawn from ethnoarchaeology (Binford 1979; Yellen 1977). Accordingly, most of the authors make use of the collector-forager model of mobility organization in hunter-gatherer societies (Binford 1979, 1980; Kelly 1983), and a set of technological constructs such as embedded procurement, curation/expediency, and “gearing up”. Archaeological tests of these models have led to some revisions and criticism (e.g., Odell, ed. 1996; Thacker, this volume), but it cannot be denied that these ideas have created a lively and growing area of debate that has profoundly affected our thinking on prehistoric technology.

In addition, most of the papers share methodological limitations in the identification of raw materials. Virtually all observations and discussions with respect to sourcing are based on macroscopic examinations of the lithic raw materials. This methodological bias was not intended from an editorial point of view. It is rather a reflection of the widespread use of more inexpensive methods (macroscopic examination) by comparison to costly laboratory methods (microscopic analysis, trace element analysis, emission spectrometry, neutron activation analysis, etc.). Laboratory methods generally are expensive and time-consuming and results are accordingly limited. Only very few researchers have applied such methods in the study of late glacial and early postglacial lithic inventories from Western Europe (for references see for instance Affolter 1991 and Grünberg 1988). A very productive direction in lithic studies that can be seen in several contributions in this volume, though, is the use of systematic survey for locating raw material sources. The papers by Floss, Olive and Taborin, Otte *et al.*, and Thacker all draw on results of major field research aimed at locating and describing raw material sources.

Another similarity of approach in many chapters is the focus on exploring relationships between variations in core technology (e.g., reduction sequences, core preparation) and variations in raw material quality or availability (Hahn, Thacker, Bicho), site function (Valentin *et al.*), or settlement mobility (Hahn). The papers in nearly all cases present detailed information on the uses of various kinds of raw materials under varying circumstances. The result is a large body of data that can be used to assess different sources of variation in core technology across regions. The methodological homogeneity of the chapters allows for almost direct comparison of both data and results concerning lithic raw material procurement

strategies among prehistoric hunter-gatherer groups. The volume thus confirms the existence of common tendencies as well as regional diversity in lithic raw material economy in late glacial and early postglacial Western Europe.

It seems widely accepted that lithic raw materials in the late glacial and early postglacial were obtained primarily through embedded procurement, that is, raw materials were gathered and transported by hunter-gatherers in the course of their other activities, without significant travel motivated purely by the search for raw material. However, contributions to this volume also provide evidence for late glacial quarry workshop sites from Poland (Sulgostowska), Belgium (Otte *et al.*), the Paris Basin (Olive and Taborin, Valentin *et al.*), and Portugal (Thacker). The model of Magdalenian raw material economy in the Middle Rhine region presented by Floss also implies a logistic pattern of long distance raw material transport which is more than just a question of embedded procurement.

It is also generally assumed that lithic raw materials were typically not traded during the period in question. At the same time, papers in this volume clearly show that the relationship between distance to raw material sources and hunter-gatherer seasonal or annual ranges is not a simple one. Several interesting questions are raised.

First is the question of the temporal and spatial scale of mobility reflected in raw material assemblages. Since stone raw materials may be rapidly exhausted and “drop out” of a mobile technological system, transport of lithics may represent only relatively short-term mobility (Eriksen). In areas with abundant raw materials, an overall focus on local raw materials may obscure differences in mobility between time periods (Straus). A second area of interest is the scheduling of tool production in a mobile activity pattern. Are stone raw material acquisition and lithic production distributed relatively evenly across space and time, or are these activities (or particular stages of work) clustered at sites where flintknapping is a major activity (Olive and Taborin, Otte *et al.*, Valentin *et al.*)? Third, several papers tackle the problem of understanding superimposed patterns of long- and short-distance transport of materials in a region, as a function of the technical requirements of making different tools (Otte *et al.*, Thacker), or in a context of “macro-” and “micromoves” (Hahn). Finally, Sulgostowska notes the possibility that changes in raw material distribution in the early postglacial may reflect the presence of territorial boundaries or other social barriers to movement of materials.

Overall, discussions of raw material acquisition strategies in this volume move well beyond the simple dichotomy of embedded vs. direct procurement. The distance over which raw

materials are transported by mobile hunter-gatherers should be affected by a number of factors, including the seasonal and annual range of hunter-gatherer groups, the distribution of raw materials on the landscape, stone tool needs, and tool use lives. The complexity of these possible contributing factors suggests a need for careful consideration of modes of transport.

One very productive direction for research indicated by several authors (Eriksen, Olive and Taborin, Sulgostowska) is in comparison of differences in distance and mode of distribution of stone raw materials versus other materials and objects such as mollusks, jet, and ochre. This comparative perspective provides an empirically based approach to understanding the role of various transport mechanisms in prehistory. Sulgostowska's contribution is interesting in making a link between lithics and other transported materials, in the special case of very wide distribution of chocolate flint, which might be symbolically associated with extraction and distribution of ochre. This suggests a context for exploring variations in distance of lithic transport in terms of regional social networks.

Modes of transport of raw materials are a major focus of work in most papers in the volume. This approach should shed light on the significance of data on raw material distributions in terms of mobility and possibly in terms of social networks. However, due to general limitations of available data, the question initially posed concerning the social organization of lithic production was taken up for consideration by fewer authors. Indeed, one of the major challenges facing the stone age archaeologist is—how to extract information about past sociocultural and socioeconomic relationships from find assemblages consisting almost exclusively of lithic artifacts. The extraordinary record of behavior provided by intrasite spatial analysis and refitting on some Paris Basin Magdalenian sites provides an unusual perspective on use of stone raw materials by interacting residential groups (Olive and Taborin). Analysis of raw material use by different residential groups suggests variation in skill, productivity of knapping, and in the quality of raw materials used. At the same time, it is clear that lithic production among the highly mobile Magdalenian hunter-gatherers varied in response to seasonal changes in activities (Valentin *et al.*).

The papers as a group document considerable regional and temporal variation in raw material procurement and use. Most papers deal with long-term chronological aspects or the question of change or continuity in raw material procurement strategies during a period of several thousand years, i.e. either the Pleniglacial (Floss, Otte *et al.*, Valentin *et al.*, Thacker) or the late glacial and early post-glacial (Sulgostowska, Fisher, Eriksen, Otte *et al.*,

Straus, Bicho). Interestingly we find that many authors do observe an increase in the opportunistic use of locally available raw materials in the early postglacial. Several authors also note marked changes in the scheduling of lithic production in the early Holocene. These observations are independent of geographical region and might perhaps be related to the marked climatic and paleo-environmental changes during the period in question and the accompanying adaptive changes in weapon and tool design (Fisher, Otte *et al.*), as well as mobility and land-use patterns (Sulgostowska, Floss, Eriksen).

Given the extent of the region covered in this volume, regional diversity understandably is marked, but this is at least in part due to geological and geomorphological differences. That is, differences in raw material types, quality, and not least availability, account for a major part of the observed regional variation in raw material use and procurement strategies. The studies in this volume also show differences in the distances over which raw materials were transported in the southern (tens of kilometers) versus northern continental regions (hundreds of kilometers) of Europe.

As previously mentioned, papers in this volume also allow for a detailed *intra*-regional comparison and contrast of approaches and results. The Paris Basin is the object of two papers presented by prominent exponents of the French school of lithic research. The single site case study of the Magdalenian site Etiolles (Olive and Taborin) is complemented by a more general view on lithic raw material economy through time in the late glacial Paris Basin (Valentin *et al.*).

Southwestern German data, on the other hand, has been looked at through three different types of glasses: a German presentation of the Magdalenian site Buttenthalhöhle (Hahn) is here complemented by two more general views from abroad—an Anglo-American study of raw material choices in the context of changing tool design goals over time (Fisher) and a continental, North-European study on the use and procurement of non-local lithics and materials used for personal adornment (Eriksen). The professor (Hahn) and his two foreign students (Fisher and Eriksen) here look at largely the same group of sites from both a common perspective (the Tübingen school of lithic research) and from three quite independent research traditions.

In the case of Southwestern Germany we find this possibility for *intra*-regional comparison and contrast of different research traditions highly rewarding in the way it opens up new directions for joint research on past hunter-gatherer mobility. This would also seem to be the case with respect to the Portuguese Estremadura where Bicho's suggestion that increased logistic mobility can be attributed generally to the period 12,000 - 9,000 BP contrasts

with Thacker's proposition that increased logistical mobility associated with longer occupation of camps and diversified resource use occurs only in the early postglacial. This difference in interpretation invites further examination of intersite variation in raw material use in the Late Magdalenian in this region.

The intra-regional comparisons reveal that some of the variation between case studies may be attributed partly to past sociocultural and socio-economic differences and partly to differing scholarly traditions. The evidence of differential use of materials by different residential groups in the late glacial Paris Basin is thus first and foremost the result of endless hours of meticulous refitting of inventories. Analogous observations could very likely be made in other regions if equally exhaustive analytical techniques were applied.

At least one fundamental conclusion may be drawn from the contributions in this volume: the fact that raw material studies cannot stand alone. They need to be combined with other analytical approaches providing information on, for example, season, duration, extent and function of the occupation as reflected in the archaeological remains. The use and procurement of lithic raw materials for tool manufacture must be seen within the broader context of hunter-gatherer subsistence and settlement systems.

References Cited

- Affolter, J.
 1991 Analyse pétrographique du silex: origine des matières premières. *Cahiers d'archéologie jurasienne* 2:81-89.
- Binford, L. R.
 1979 Organization and formation processes: Looking at curated technologies. *Journal of Anthropological Research* 35:255-273.
 1980 Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45:4-20.
- Geneste, J.-M.
 1991 Systèmes techniques de production lithique: variations techno-économiques dans les processus de réalisation des outillages paléolithiques. *Techniques et culture* 17-18:1-35.
- Grünberg, J. M.
 1988 *Das Rohmaterial der Steinartefakte von Andernach: Ein Beitrag zur Anwendung naturwissenschaftlichen Verfahren in der Archäologie*. British Archaeological Reports, International Series 448. BAR, Oxford.
- Kelly, R. L.
 1983 Hunter-gatherer mobility strategies. *Journal of Anthropological Research* 39:277-306.
- Nelson, M. C.
 1991 The study of technological organization. In *Archaeological Method and Theory, Volume 3*, edited by M. Schiffer, pp. 57-100. University of Arizona Press, Tucson.
- Odell, G., editor
 1996 *Stone Tools: Theoretical Insights into Human Prehistory*. Plenum Press, New York.
- Perlès, C.
 1993 Ecological determinism, group strategies, and individual decisions in the conception of prehistoric stone assemblages. In *The Use of Tools by Human and Non-Human Primates*, edited by A. Berthelet and J. Chavaillon, pp. 266-277. Clarendon Press, Oxford.
- Yellen, J. E.
 1977 *Archaeological Approaches to the Present*. Academic Press, New York.

