

**LBK REALPOLITIK:
AN ARCHAEOOMETRIC
STUDY OF CONFLICT AND
SOCIAL STRUCTURE IN
THE BELGIAN EARLY
NEOLITHIC**

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Archaeopress Archaeology

Archaeopress

Gordon House
276 Banbury Road
Oxford OX2 7ED

www.archaeopress.com

ISBN 978 1 78491 088 4

ISBN 978 1 78491 089 1 (e-Pdf)

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Printed in England by Hollywell Press Ltd, Oxford

This book is available direct from Archaeopress or from our website www.archaeopress.com

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Preface

The volume is an updated and revised version of my PhD thesis, submitted to the Graduate College of the University of Illinois at Chicago in 2010 under the title *Warfare and Alliance Building during the European early Neolithic, late sixth Millennium BC*. Between the completion of that thesis and the publication of this volume, much has changed in my archaeological career. After nearly a decade of work in northwestern Europe, I embarked on a new set of projects focused on the north coast of Papua New Guinea, an area of the world which, by ethnographic analogy, played an important role in the ethnographic models of conflict, exchange, and social structure presented in my thesis. I also became interested in the possibilities of network analysis in archaeology, a body of theory and method I was not familiar with until after the completion of my thesis. The change in fieldwork location and integration of network ideas into my work have changed my outlook considerably on certain interpretations of the archaeological record which seemed quite obvious to me as of 2010.

I am no longer convinced that archaeological material cultures can be defined as basic analytical units in the way I did in my thesis, particularly the neat distinction between LBK and Mesolithic people that came up as a central theme. While there is no doubt in my mind that the period in question saw dramatic changes in the demographic and genetic composition, social structure and economy of the people occupying the European landmass, it is no longer obvious to me that genetic or material data can be interpreted as indicating a monolithic replacement of populations in Europe coterminous with the first appearance of agriculture. I would instead advocate the understanding of the network structures through which people, ideas, and materials moved at the time as a means of conceptualizing prehistoric social structure, an approach that does not require the pre-definition of etic material cultural categories as a preliminary step in model-building. I have made attempts to integrate this perspective in the present volume, but the theme of farmer-forager interactions remains central to the present work.

This work has been revised from its original version in several ways. Some sections have been condensed, particularly those that presented an encyclopedic view of early Neolithic material culture in Europe, with the intention of drawing out those lines of data that are more directly related to the central arguments of the work. Pertinent new literature that has appeared since 2010 has been incorporated where appropriate, including revision of some interpretations of genetic and isotopic data presented in my thesis. Radiocarbon dates, which were presented without much analysis in the original version, have been analyzed using Bayesian methods to test chronological differentiation between settlement phases in the Hesbayan Bandkeramik, further delineating the difference between early unfortified settlements, and later fortified villages, while materials from some of the Neolithic settlements included in the study have been correspondingly reassigned to different chronological phases where appropriate. All chemical data have been recalibrated using updated values for standards, as this should make the data more useful to other researchers interested in potentially comparing their data to those presented here.

All statistical analysis of ceramic chemistry was reevaluated, resulting in largely the same patterning reported in my thesis. A new section detailing the results of petrographic analysis of some of the sherds studied chemically has also been added. These results were not available when I completed the original version of this work. As a result of revisiting these compositionl data, I have revised some of my original conclusions regarding the likely geographical origins of some of the pottery types identified by chemical analysis. Finally, I have written a new concluding section that hopefully more clearly draws out some of the major conclusions of the work.

The research reported here would not have been possible without the invaluable contributions of Lawrence H. Keeley, Dominique Bosquet, Laure Dussubieux, Eric Goemaere, Ivan Jadin, Peter Bogucki, Patrick Ryan Williams, James Phillips, Laura Junker, Russell Quick, Daniel Cahen, and Frédéric Broes. This study was funded by grants and awards from the University of Illinois at Chicago Graduate College and Office of the Provost, the United States National Science Foundation (BCS0314489), the Wenner-Gren Foundation, and the Lester Armour Foundation.

Chapter 1

Introduction

Understanding why humans resort to war with one another has been a long standing interest of scholars and non-scholars alike, both as a matter of intellectual curiosity, but also more importantly as a means of understanding how to limit its frequency in the future. This was, for instance, the stated goal of Herodotus in his *Histories* (Herodotus 1996: 3), generally viewed as the first work of history written, recounting the wars between the Greek city states and the Persian Empire during the late 6th and early 5th centuries BC.

Relative to other institutions, warfare was for a long time understudied anthropologically, though in cultural anthropology there was an upswing in interest following the Second World War (Ferguson 1984a: 5). However, as Keeley (1996: 4) notes, even though cultural anthropologists studied war, many of them described 'primitive' warfare as being ineffectual, resulting in few casualties, and being engaged in as a sort of amusing diversion resulting from purely psychological causes. Prehistorians have utilized this perspective to write war out of the past, arguing that if it existed, it played only a minor role in shaping human societies and cultures over time, and proceeded to reinterpret obvious examples of weapons and armor, fortifications, and war related burial trauma as largely ritual in function (Keeley 1996: 4, 8-24). In this view of prehistory, early human societies were largely peaceful, and some transformative occurrence shifted the trajectory of human action towards increasing levels of violence—for some, this was simply the crossing of a critical threshold of population density, for others war only began with the advent of state-level social organization.

None the less, prehistorians who are willing to reinterpret enclosures, burial trauma, weapons, and other obvious material evidence of warfare (e.g., Webster 2000) as such are increasingly becoming aware that warfare was relatively frequent in the past, though constant in neither its intensity nor frequency across time and space—archaeology, with its ability to reconstruct long term changes in human society ought to be ideally suited to the task of understanding the factors and conditions that make one society more prone to warfare than another, and several recent works have begun to address factors that contribute to the outbreak of hostilities. In general, however, archaeological work has largely been concerned with simply establishing the presence or absence of warfare in the prehistoric record.

The primary goals of this work are firstly to explore the interconnections between warfare on the one hand, and economy on the other, particularly in the relatively egalitarian societies that can be said to have characterized much of the Neolithic period in Europe. This is achieved by

comparison to the ethnographic record for societies of this type. Secondly, the avenues for exploring economy and its interrelation with warfare developed from ethnographic data are applied to understanding economic patterns of production specialization and exchange among villages of the *Linienbandkermamik* (LBK) culture in the Hesbaye region of eastern Belgium.

Anthropological and Archaeological Perspectives on Warfare

For prehistorians, even defining what constitutes 'warfare' has proved a challenge. Many semantically limit which forms of violence may be termed warfare, typically by arguing that 'true' warfare exists only in state level societies that invest in maintaining large standing armies. Turney-High (1949) wrote of a 'Military Horizon' beyond which true warfare existed, largely linked to the social organization of the society in question. Those without centralized government and ability to field armies to engage in organized battles could not be considered as engaging in 'true' warfare (Turney-High 1949: 23). Similarly, Otterbein (1970: 104-105) has argued that 'military sophistication' increases with social complexity—state level warfare is therefore more effective, deadly, and has broader social and economic ramifications than 'primitive' warfare (Keeley 1996: 11-15). Keegan (1993), for instance, argues that warfare only began during the classical period in Greece, when modern tactics become recognizable. In the context of non-state societies, violence is written off as homicide or else internal feuding (Kim and Keeley 2007: 2054-2055). This largely semantically limits warfare to those societies existing at levels of social, political, and economic integration sufficient to produce a particular logistical capability, and therefore places the beginnings of warfare no earlier than the advent of state level organization in the late fourth millennium BC, yet does little to address the actual presence or absence of violent inter-group conflict, levels of violence, and what relationship warfare may therefore have had with other social institutions (Keeley 1996: 175).

Recently, Kelly (2000) has argued that warfare largely arose with the development of segmentary societies and the concept of 'social substitutability'—the transference of culpability for killing from the actual killer to any member of their social group, which marks the transition from feuding to warring. Intensive and sustained violence among hunter-gatherer bands occurred only when population density and pressure on resources moved beyond certain critical levels, particularly in circumscribed environments where expansion onto new land was hemmed in either by natural boundaries, or the presence of other social groups

(Kelly 2000: 148, 159-160). Based loosely on this line of reasoning, some archaeologists have inferred origins for warfare in their respective research areas coeval with the appearance of settled agricultural villages. Flannery and Marcus, for instance, argue that war only began in the valley of Oaxaca with the first evidence of village life and surplus accumulation around 2800 BP (Flannery and Marcus 2003: 11801-11802). Parkinson and Duffy (2007: 100) explain the onset of fortification construction during the Neolithic period in Europe as resulting from the development of segmentary social organization and intensification in fighting.

Ferguson and Whitehead (1992) move the onset of truly intensive warfare even further into the present—they have proposed that observed patterns of warfare in ethnographically studied societies are the outcome of interactions with states, in particular Western European ones. Warfare occurs in the ‘tribal zone’ created by the catastrophic consequences of the introduction of disease and incipient integration into state-level economies. They argue that ethnographically observed patterns of fighting are therefore not applicable to past societies prior to contact with states (Ferguson and Whitehead 1992: 26-28). Although not ruling out the existence of pre-state warfare (Ferguson 1995: 14), the implication is that warfare was far less intense and frequent in prehistory than among ethnographically studied groups.

I here utilize the definition of warfare proposed by Ferguson—‘organized, purposeful group action, directed against another group that may or may not be organized for similar action, involving the actual or potential application of lethal force’ (Ferguson 1984a: 5). This definition highlights several important characteristics. Warfare generally involves at the very least conflict between minimal social units, and more than one individual, and may involve material and social response even when actual violence does not occur. Ferguson’s definition roughly omits homicide, but allows activities such as feuding, though occurring within at least partially unified social groups, to still be analyzed structurally as a variant of warring. At the same time, it is broad enough to encompass any kind of socio-political unit and its corresponding logistical capabilities—it does not semantically limit warfare to those societies that are capable of fielding standing armies, fighting year-round, or engaging only in a classic western conception of military strategy or battlefield etiquette.

What then is the nature of non-state warfare, as evidenced in the ethnographic record? Early anthropologists primarily focused on formalized battles such as the Enga ‘Great Wars’ that were conducted according to specific rules, and were broken off upon the infliction of a few casualties on either side (Heider 1970: 105-114). However, the majority of killing in non-state warfare occurs during ambushes and small raids on villages. In contrast to formal ‘battles,’ which have rules of engagement, raids and ambushes typically have few rules—the goal is simply to kill as many of the

enemy as possible without suffering any casualties. The most extreme expression of this is the attempted massacre of entire villages (Keeley 1996: 65-68).

In contrast to the expectation of researchers who limit warfare to state level societies, warfare is both frequent and deadly in non-state societies, in fact, more so than in most state-level war. Non-state societies are at war on average slightly more frequently than state-level societies (typically at least once per year), have far higher rates of mobilization (almost all prime-age adult males), and on average experience casualty rates that are an order of magnitude higher than those typical of state level societies (Keeley 1996: 88-94, tables 2.4, 2.5, 2.6, 4.1, 6.1; LeBlanc and Register 2003: 224). Excluding those groups pacified by state intervention, Ember and Ember (1998: 5) found that only some 9% of the 186 cultural groups included in their ethnological study could be considered as having rarely or never engaged in warfare. Warfare extends across the entire socio-political spectrum, and though slightly less bellicose than settled agricultural societies, foragers and hunter-gatherers still frequently engage in warring, with some 70% of such societies for which data is available ‘continuously’ or ‘frequently’ engaging in conflict with their neighbors (Keeley 1996: 32-33, table 2.2). Prehistoric hunter-gatherers may have been more conflict prone. As Ember and Ember (1997: 11-12) note, modern foragers in marginal environments may not be representative of prehistoric foragers, often being surrounded by far more powerful neighbors, meaning that the potential risks of fighting far outweigh any benefits.

Ethnographically studied tribal groups are even more conflict prone. Of a sample of twenty-five tribal groups, some 80% are categorized by Otterbein as having been ‘continuously’ at war, with a further eight percent ‘frequently’ at war (Keeley 1996: 32-33, table 2.1; Otterbein 1970: 84-86). The ethnographic record regarding areas such as highland New Guinea (Berndt 1964; Heider 1970, 1997; Meggitt 1977; Morren 1984), Amazonia (Chagnon 1997; Ferguson 1995), the sub-Arctic and Arctic (Burch 2005), American Southwest (Ford 1972), and American Great Plains (Biolsi 1984) all provide abundant evidence of tribal warfare that was intense and deadly. For instance, among the Achuará Jívaro, one study found that 59% of all adult males, 27% of adult females, and 12% of all children had been killed during one period of ethnographic research (Ross 1984: 96), which is one of the highest rates recorded in any society. Although this is extreme even for tribal warfare, typical rates still fall between 2% and 20%, far higher than in modern state-level societies (Keeley 1996: 89-91, table 6.2).

What of the past? Are Ferguson and Whitehead correct in arguing that warfare in modern tribal groups is largely the outcome of contact with states, or are comparable rates of violence evident in the deep past? Ignoring for the time being the question of whether pre-modern hominin species such as *Homo neanderthalensis* engaged in warfare (Guilaine and Zammit 2005: 41-45), there is abundant

evidence to suggest violence between prehistoric hunter-gatherers prior to the appearance of agriculture (Keeley 1996: 32-33, 36-38; Thorpe 2003: 150-160; Walker 2001: 585-586), including embedded projectile points in Paleolithic human remains from Europe (Bachechi *et al.* 1997) and Natufian burials from the Levant (Bocquentin and Bar-Yosef 2004). Limited burial evidence during the Pleistocene and early Holocene makes it difficult to systematically reconstruct casualty rates over time. However, the mass burial of war victims at Gebel Sahaba (c. 12,000-14,000 BP), in the modern Sudan, where over 40% of all individuals had at least one embedded projectile point, indicates that this violence sometimes took the form of inter-group conflict, and was not restricted to isolated homicide (Keeley 1996: 37-38).

Such evidence is no less prevalent in regards to prehistoric tribal societies, and warfare has been documented in virtually all regions of the world, including the American Southwest (Billman *et al.* 2000; Haas 1990, 1999; Kuckleman *et al.* 2002; LeBlanc 1999), American Great Plains (Vehik 2002), American Southeast (Larson 1972), Arctic and sub-Arctic (Maschner and Reedy-Maschner 1998), Greece (Kokkinidou and Nikolaidou 1999), the Balkans (Vencl 1999), and England (Mercer 1999), among others. While systematic studies of casualty rates have been undertaken in only a handful of cases (Walker 2001: 584), when such studies have been conducted on large burial populations, traumatic injury rates of 20% or more are not unknown (Golitko and Keeley 2007: 335; LeBlanc and Register 2003: 224).

The available data indicate that where sufficient evidence has been collected, there is little to differentiate archaeologically documented patterns of violence from those observed in modern ethnographically studied tribal groups. This is true even of cultures dating to well before the development of state level societies anywhere in the world, for instance the early Neolithic *Linienbandkeramik* culture that is the subject of the present study (Golitko and Keeley 2007: 333-336; Petrasch 1999: 508-509). While Ferguson and Whitehead may be correct in identifying the disruptive impact of western contact as a major factor impacting the frequency of warfare in current tribal societies, it is clear that this cannot be the sole historical explanation. If warfare that was as intense and deadly as that currently observable existed well into the past, then explanations must be sought that are more general across time.

Explaining the Occurrence and Frequency of Warfare

Despite generally high rates of traumatic injury in ethnographically studied societies and in past cultures for which there is adequate data, warfare was constant in neither intensity nor frequency in the past, and there are times in which there is little or no evidence of warfare having occurred with any regularity (Keeley 1996: 38; LeBlanc 1999: 309; Vehik 2002: 58: 42-43; Walker 2001: 588). The question of what causes warfare, and why it is

more prevalent and intense in one period versus another has been a central research topic in a variety of disciplines, including anthropology (LeBlanc 1999: 10-14).

A variety of types of theories have been proposed to explain the propensity for warring between human societies. Theories of inherent human aggression see warfare as the outcome of behaviors that have been present in humans since early in our evolutionary history. Evidence of organized group aggression among chimpanzees (e.g., Wrangham and Peterson 1996) and comparison with hunter-gatherer warfare (Gat 1999: 577-578) has been utilized to argue that warfare may be explained as part of the general hominid adaptation. Leroi-Gourhan, for instance, argued that warfare was simply the 'hunting of men,' suggesting that the human adaptation towards hunting resulted in warfare as a natural behavioral extension (Clastres 1994: 149-150). Some researchers suggest that warfare is an external 'safety valve' for society, allowing for a release of inherent aggression by channeling it towards other societies (Vayda 1961: 346). As with many theories of warfare, inherent aggressiveness only explains the potential for warfare, but cannot explain variability in frequency of warfare over time (Ferguson 1984a: 12). In every culture, boys and young men must be intentionally psychologically conditioned to endure the stress of combat, and even in highly bellicose societies, there are a substantial number of individuals who express a strong distaste for warfare and a desire to limit its occurrence. For instance, among natives of the Aleutian chain, children were intentionally involved in the torturing of captured prisoners to inure them to the horrors of warfare (Maschner and Reedy-Maschner 1998: 39), while actual experience of combat can make participants less willing to repeat the process. Among the Yanomamo, famous in the anthropological literature for their propensity towards violence, older men who have previously experienced active combat often attempt to dissuade younger more eager men from initiating conflict with neighboring villages (Ferguson 1995: 11, 211).

The socio-biological theory of warfare is a variant on theories of inherent aggression. Most closely associated with Chagnon and colleagues, it is a Darwinian approach to explaining warfare, in which successful warriors are more reproductively successful in the long term, producing a selection for aggressiveness and warring (Chagnon 1990: 102-104; Ferguson 1984a: 11-12). One of the primary mechanisms of this reproductive success, and thus a common cause and goal of war, is the capturing of women, increasing the reproductive opportunities for the attacker, and reducing them for those attacked. Maschner and Reedy-Maschner (1998: 40) argue this as a primary cause of warfare in the Aleutian chain, but there are numerous examples of warfare in which the abduction of women is documented only in rare cases (Burch 2005: 67). Some studies have shown that individuals who frequently engage in warfare are on a whole actually *less* reproductively successful than those who do not (Ferguson 1995: 355-362; Moore 1990: 329-330).

Social structure and demography are important factors in explaining the relative propensity for violence between different societies. For instance, societies or cultures characterized by strong fraternal interest groups, primarily associated with patrilocality, patrilineality, and polygyny, have been demonstrated as being more prone towards internal warfare (i.e. feuding)—these societies are sometimes described as ‘organized for war,’ because these structures allow for the rapid massing of young men who share common family and economic interests (Ember and Ember 1998: 9). Societies that emphasize ‘cross-cutting ties,’ for instance matrilocality and matrilineal descent systems, are consequently less prone to internal warfare because the interests and loyalties of men are divided between families and/or villages. However, these factors make external warfare (between social units not linked by a significant number of marriage ties) more likely, as cross-cutting ties allow for the massing of far larger groups of men for combat (Ferguson 1984a: 16). Sahlins (1961: 342), for instance, argued that segmentary lineage systems were associated with militarily expansive societies such as the Tiv. It has been questioned to what degree social structure causes violence, and to what degree it is a result of or response to increasing violence (Ember and Ember 1998: 9-10; Ferguson 1984a: 17).

The demographic structure of a given society comes into play as well—many studies have suggested a link between societies weighted towards young men demographically and a propensity for both internal and external violence, particularly when economic opportunities are limited (Fleisher and Holloway 2004: 287). In the vast majority of cases, it is young men who engage in warfare (Walker 2001: 588)—in addition to simply being more physically suited to combat, younger men typically have less to lose and more to gain by engaging in warfare (Maschner and Reedy-Maschner 1998: 22).

Materialist theories of warfare include a broad set of approaches that in one way or another link the interaction of people and their use of the material environment to changes in the intensity and frequency of warfare. Such theories therefore encompass a broad range of factors including subsistence, economy, environment/climate, and technology. Perhaps the most commonly argued materialist cause of warfare is demographic pressure—roughly, the human propensity to produce more population than a given region can support given the technological capabilities of that population (Keeley 1996: 117-118).

While the relationship between the propensity for conflict and contemporaneous absolute population density is a weak one, a strong correlation has been demonstrated between demographic pressure and violence when violence is time-lagged relative to population density (Turchin and Korotayev 2005). However, other factors likely must be taken into account to explain how demographic pressure may incite warfare, principally a detailed understanding of resource availability, productivity of a given economic system, and the distribution of resources (Keeley

1996: 119). Groups that are under-populated relative to subsistence resource availability also fight (Ferguson 1984a: 30-31), and reaction to resource scarcity typically occurs well before any hypothetical carrying capacity is reached—it is enough for people to perceive a decline in the availability of a resource, or periodic shortages, to initiate response (Vayda 1961: 353-354).

The rate of population growth may also be an important factor in inciting violence. Rapid increase of population, in addition to creating potential subsistence strain, creates rapid increase in the social needs for certain goods, such as payment of bridewealth or dowries and other social obligations that existing social and economic systems may not be able to cope with. Rather than leading to an increased investment in production, it may become easier to simply ‘extract’ resources from one’s neighbors (Keeley 1996: 119). Resource uncertainty, or the fluctuating availability of critical resources, is in fact one of the strongest correlates of warfare frequency (Ember and Ember 1992: 256-257, 1998: 8-9).

The role of climate change in producing warfare is perhaps the most commonly encountered explanation for warfare in the archaeological literature. For instance, LeBlanc and Register (2003) argue that most warfare in the past can be explained by climatic downturns, which by reducing resource availability, cause populations in ecological balance to rapidly move into a state of over-population relative to productivity, sparking warfare over increasingly less productive territory, a position echoed by Haas (1999: 24) and Lambert (2002: 230). LeBlanc (1999: 313-314) also stresses the role of rapid changes in climatic conditions and resource availability—more gradual changes may often be accommodated by changes in production organization, social organization, and other social institutions rather than warfare.

Climate change need only occur in localized areas to affect larger regions (Vehik 2002: 43). One group may be forced to expand or attack by declining local conditions, forcing their neighbors to respond in kind. This may create what Keeley refers to as ‘Rotten Apples’ or ‘Raiding Clusters’ (Keeley 1996: 127-130). Historically, an example of this may be seen in the repeated incursion of central Asian pastoralists against the agricultural societies on the edges of their territory in China, the Middle East, and Europe.

In this regards, warfare has been conceptualized by some as an adaptive institution that periodically reduces population and restores ecological balance—basically one part of the classic Malthusian formulation of human demography (Ferguson 1984a: 30; Keeley 1996: 15). Hickerson for instance, argued that warfare between the Chippewa and Sioux resulted in the creation of an unoccupied buffer zone between the two groups that functioned as a game preserve, increasing available food resources that would otherwise have been over-hunted (Hickerson 1962, 1988), and this same argument has been expanded to the tropical lowlands of Amazonia (Harris 1984: 111), as part of a

debate about the role of protein deficiency and competition for hunting territory as a motivation for warfare (Ferguson 1995; Harris 1984; Lizot 1977). Although not the only explanation for warfare, competition for land and access to other subsistence resources is a commonly documented reason for conflict between ethnographically studied societies (Ember 1982: 84; Keeley 1996: 108-112), for instance between groups occupying differing ecological zones (Baleé 1984: 252; Biolsi 1984: 155; Ferguson 1984b: 270). None the less, archaeologists have often conceptualized interactions between groups occupying differing ecological zones as largely ‘mutualistic’—a sort of peaceful symbiosis in which exchange occurs to the benefit of both groups (Vehik 2002: 37-39). Such models largely ignore the fact that trade disputes are one of the most common reasons ethnographically studied societies engage in warfare with one another (Keeley 1996: 121-126).

The fluctuating frequency of warfare and its occurrence across time periods, social forms, environmental types, and levels of technology suggests that a variety of factors contribute to determining how war prone a particular group of people are. As Keeley writes:

‘Though many partisans in these debates (regarding the occurrence, frequency, and intensity of warfare) imply that the warfare of a particular region—or even all warfare—has a single cause, no complex phenomenon can have a single cause. There are efficient, formal, material, and final causes, as well as necessary and sufficient conditions... The complexity of the concept of cause means that seemingly contradictory views are often actually complementary because they focus on different categories. The anthropological debates about the causes of warfare may represent a classic case of unacknowledged complementarity’ (Keeley 1996: 17).

The inter-linkage between different institutions in human societies means that it is almost impossible to separate causes from effects, and feed-back between differing institutions can either act to intensify or dampen the intensity of violence over time. Warfare is a process that occurs over time, and the goals and motivations of groups actively engaged in warfare change over time, even while engaged in active hostilities (Vayda 1976: 37-38). While humans clearly have the capacity for violence, their actual degree of aggressiveness is controlled by a series of environmental, technological, social, economical, and cultural factors that converge to cause individuals or societies to choose violence or peace as the most beneficial strategy in a given situation. Once initiated, warfare tends to impact all other aspects of society, including marriage patterns, residence patterns, demography, and economy. These institutions in turn shape future decisions regarding war and peace.

None the less, much of anthropological and archaeological thought regarding causes remains strongly shaped by the view of Turney-High that warfare in non-state societies

is primarily motivated by non-material causes such as accusations of sorcery (Rappaport 1973: 110), revenge (Burch 2005: 64-66), acquisition of prestige (Maschner and Reedy-Maschner 1998: 22), or else by culturally specific ritual needs (LeBlanc 1999: 14). From the perspective of prehistory, there are thus two basic viewpoints. The first is what Keeley has referred to as the ‘pacified past,’ in which warfare was of limited import in prehistory, and primarily motivated by non-material causes (Keeley 1996: Chapter 1). Alternatively, warfare in the past may be seen as comparable to that observable both historically and ethnographically—in other words, relatively frequent, spurred on by real material motivations, and with important social ramifications. Differentiating between these two viewpoints on the human past requires in depth study of both frequencies of conflict in the past, as well as correlating these with observed prehistoric economic patterns.

Archaeological Correlates of Warfare

Warfare leaves a number of material correlates that make it suited to archaeological study. Evidence of traumatic injury in burial populations provides perhaps the most effective means of both demonstrating the presence of prehistoric warfare, and measuring changes in its intensity over time. Embedded projectile points, blunt force cranial trauma, and parry fractures are all typical results of combat. While often unhealed and hence the likely cause of death, in many cases individuals display a variety of healed and unhealed injuries of this sort, indicating repeated engagement in conflict over the course of a lifetime (Keeley 1999: 340; Keeley and Quick 2004: 110; Milner *et al.* 1991: 589). Rates may sometimes be underestimated because not all war injuries leave skeletal evidence. Milner calculates that only 30% of all arrow wounds damage the skeleton itself, for instance (Milner 2005: 150), and other types of projectile injuries may result in even lower rates of skeletal injury (Walker 2001: 584). Though more amenable to alternative explanations, evidence of intentional skeletal manipulation in the form of cannibalism, trophy heads/skulls, or severe mutilation, in conjunction with other lines of evidence, can be another strong indicator of inter-community violence (Golitzko and Keeley 2007: 339; Kim and Keeley 2007: 2057).

The fortification of settlement sites is another particularly strong line of evidence for warfare. While enclosures may be built for a number of reasons, including animal penning, crop protection, restriction of access to market areas, or ritual, a number of features found on prehistoric enclosures are specifically military in function. V- or Y-profiled ditches, particularly when backed by a wall, berm, or palisade, are constructed because they offer minimal protection to any potential attacker, allowing defenders to rain projectiles down from above. However, moats require the construction of flat bottomed ditches with straight walls, which erode more slowly, and as such non V-profiled ditches should not be assumed to be non-defensive. Complex gates (crab-claw, curtained, flanked, baffled)

are unnecessarily complicated to enter and exit for normal every day purposes, yet are common on fortifications, forcing attackers to traverse longer paths into settlements, emerge from blind corners, and expose the unprotected (non-shield carrying) side of their bodies to internal defensive fire. Bastions function to eliminate ‘dead-zones’ in which defensive fire cannot reach attackers. Any one or combination of these features on an enclosure indicates that defense was at least one of its functions (Keeley *et al.* 2007: 87-88).

However, the absence of fortified settlements does not automatically rule out warfare. Fully mobile or semi-sedentary groups typically find it easier to simply move than to invest effort in building fortifications. Settlement massing or aggregation may be enough to deter would be attackers (Rowlands 1972: 13), or else settlements may be moved to naturally defensible locations such as promontories and headlands, mesas or bluff edges, or along water courses that protect one or more sides of the site. Refuges such as lava tubes in proto-historic Hawaii (Kolb and Dixon 2002) or refuge rocks in the sub-Arctic (Maschner and Reedy-Maschner 1998: 32) may be used instead of settlement fortifications. Both Neolithic Anatolian villages (de la Croix 1972: 14) and Southwestern Pueblos (LeBlanc 1999: 31-33) utilized exterior building walls as defensive features rather than constructing additional structures for defense. The nature of fortifications that are deemed necessary is dependant both on the residence patterns of the culture in question, as well as the offensive capabilities of potential attackers (de la Croix 1972: 57; Kim and Keeley 2007: 2058). Another frequent indication of conflict is the opening of

unoccupied unoccupied buffer zones between settlements (Keeley 1996: 111-112; LeBlanc 1999: 69).

The presence of obvious tools of war, i.e., weapons and armor, is particularly useful as an indicator of warfare, but only in cultures that produce specialized military kit. In Europe, for instance, this primarily coincides with the development of metal weaponry and armor in the Bronze Age and later. In non-metal using cultures, implements with other more prosaic uses, for instance arrows and axes, often doubled as the primary instruments of warfare (Keeley 2001: 2540; Keeley and Quick 2004: 115) and weapons and armor made of organic materials (wood, bone, antler, etc...) may not preserve in the archaeological record (Vencl 1984: 126). However, in some cases ‘killing’ arrows can be distinguished from ‘hunting’ arrows, because they are designed to either slip from their hafting with ease, or else break off in the victim’s body, making them difficult to remove, promoting infection, and generally increasing their lethality (Maschner and Reedy-Maschner 1998: 31). The absence of specialized military equipment is therefore not necessarily evidence of the absence of warfare.

The Linienbandkeramik in Belgium

This study is not a cross-cultural examination of prehistoric warfare and its motivations, but rather focuses on a particular cultural entity, the early Neolithic *Linienbandkeramik* (LBK) culture in eastern Belgium. The approximate distribution of the western LBK is shown in Figure 1. Further east, the LBK distribution extends into parts of the Ukraine, Moldova, Hungary, and Romania.

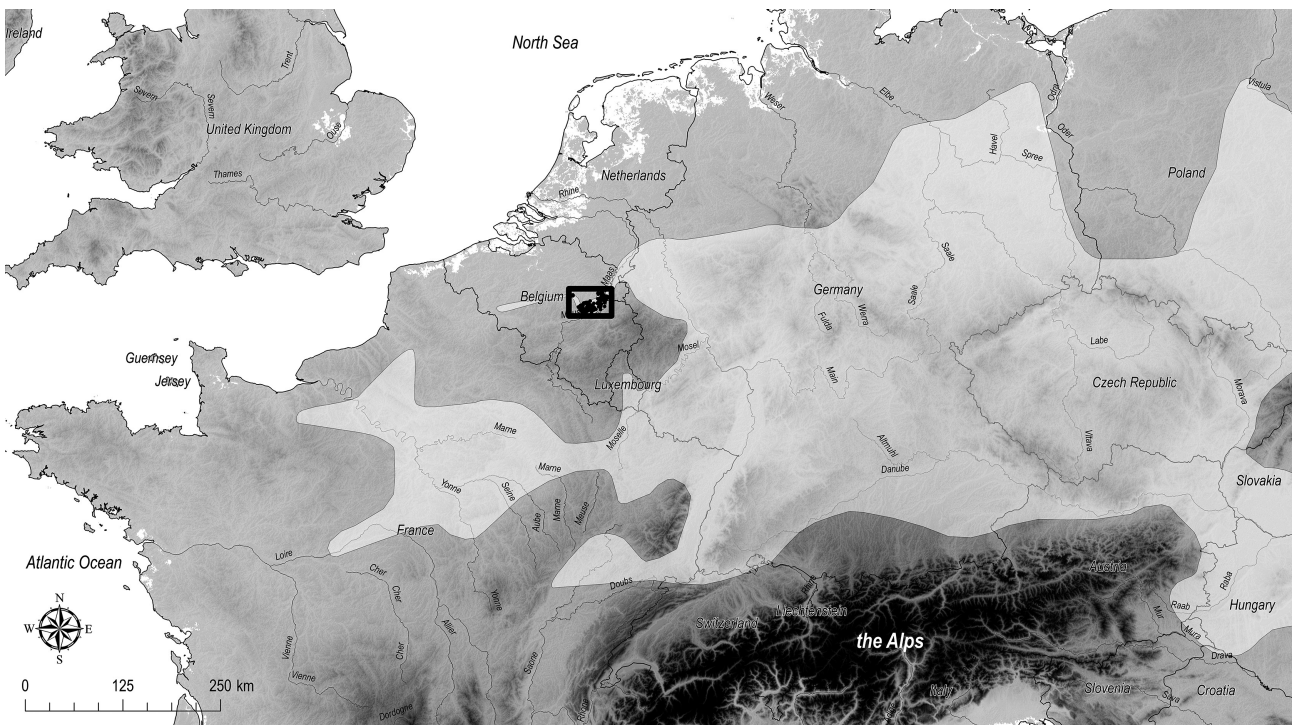


FIGURE 1. MAP OF NORTHWESTERN EUROPE, SHOWING THE DISTRIBUTION OF THE LBK CULTURE. THE HESBAYE REGION OF BELGIUM IS INDICATED BY A BLACK SQUARE.

LBK sites are not continuously distributed within the limits of this distribution, but are primarily located in loessic lowland areas, and rarely appear in regions above approximately 400m in elevation.

The LBK is a suitable test case for modeling material causes and responses to warfare in the past—not only does the LBK predate the appearance of state-level political organization, it is also one of the best studied Neolithic cultures in Europe, and perhaps one of the best studied prehistoric tribal agricultural society in the world as the result of over a century of intensive research (Keeley and Golitko 2004: 260-261). As a result, the distribution of resources utilized by LBK villages are generally well understood, as is the distribution of fortifications and rates of traumatic injury, both spatially and chronologically (Golitzko and Keeley 2007; Höckmann 1975; Höckmann 1990; Lüning 1988; Petrasch 1999).

LBK sites first appeared in the vicinity of Lake Baláton on the Hungarian Plain at *c.* 5650 calBC, and rapidly spread northeast and northwestward. Within no more than 200 years, LBK villages had spread into the Rhine valley to the west as far north as modern day Frankfurt, and to the east into southern Poland. Subsequent expansion had by 4900 calBC spread LBK sites down the Mosel valley into Alsace/Lorraine, Luxembourg, and the Paris Basin, through the middle Rhine valley into the Cologne area, the Dutch Limburg, and Belgium, across the Ukraine into Moldova and almost to the shores of the Black Sea, and northwards onto the north European Plain in Poland (Gronenborn 1999: 145-150; Keeley and Golitko 2004: 259-260).

LBK material culture is characterized by distinctively decorated pottery (the characteristic incised bands of which lend their name to the culture), large post-built long houses, large blade technology, characteristic ground-stone axes called *Schuhleistenkeile* (shoe-last axes), and a mixed-farming subsistence economy based almost entirely on the use of domesticated resources ultimately derived from the Near East. LBK villages are typically, though not always located on loessic soils, often at the mid-point of low hills. They are typically located along stream courses in so-called *Siedlungskammern* (settlement cells) consisting of upwards of forty villages (Keeley and Golitko 2004: 261-262).

This material culture contrasts with that of late Mesolithic hunter-gatherers of central Europe, and combined with the rapidity of spread and simultaneous appearance of a totally new way of life, and considerably higher population densities that quickly developed after the appearance of LBK sites, most researchers, though not all, continue to view actual physical migration of new people as the most likely mechanism by which LBK communities appeared in new areas (Bogucki 2000: 210; Keeley 1992: 92-93; Price *et al.* 1995: 98-99). It was once believed that LBK communities were largely peaceful and economically self-sufficient, but a wealth of data collected in recent decades

has overturned this view. Not only were LBK villages connected by intensive, and often long-distance networks of exchange in diverse materials (Keeley and Golitko 2004: 263), but warfare was also frequent and resulted in very high rates of traumatic injury. This is particularly the case at later LBK sites in the Rhine valley and further west, where 20% or more of all burials display evidence of war-related injuries. There is compelling evidence that this warfare occurred not only between LBK communities, but also with indigenous Mesolithic hunter-gatherers (Golitzko and Keeley 2007: 334-336; Keeley 1998: 306-312).

Both warfare and exchange patterns are particularly well documented at a regional level in the Hesbaye region of Belgium (Figure 2), at the far northwestern boundary of LBK expansion. The Hesbaye is today one of the most agriculturally productive parts of Belgium, and the rich loessic soils there are presumably what drew LBK migrants there as well. The region was settled by LBK migrants who most likely originated in the Belgian/Dutch Limburg area of LBK settlement or further east at approximately 5200 calBC.

Over a century of amateur and professional work in the Hesbaye has uncovered more than 100 LBK sites in the region (Jadin 2003: Chapter 1), mostly focused along two streams, the Upper Geer/Faux Geer and Yerne. This work has uncovered substantial evidence of violent conflict in the region during the early Neolithic. Excavated villages at Darion-*Colia*, Waremme-*Longchamps*, Oleye *al Zépe*, Remicourt *en bia flo II*, Fexhe le haut Clocher-*Voroux-Goreux*, and Vaux-et-Borset-*Gibour* were all fortified for a time with deep, V-profiled ditches interrupted by complex defensive gates (Bosquet *et al.* 2004; Caspar *et al.* 1991; Keeley and Cahen 1989). Detailed studies of site chronology on the basis of pottery assemblages and pollen profiles have demonstrated that these fortifications were not constructed until after an initial phase of settlement of the region (Bosquet *et al.* 2008).

Over thirty years of intensive field survey have failed to uncover any evidence of sites, Neolithic or Mesolithic, in a 25-30km wide strip of land to the north of the area of Hesbayan LBK settlement. This unoccupied buffer zone is likely indicative of conflict between the two groups as is the distribution of fortified sites, which cluster particularly along the northern boundary of the Hesbaye (Keeley 1996: 137-139, 1998: 308-310). In contrast, there is little evidence to indicate intensive exchange between the two groups—occasional LBK objects are found north of the Hesbaye, and small numbers of Mesolithic stone tools have been recovered from some Hesbayan LBK sites. Additionally, non-LBK style pottery, some of it assignable to the Limburg style—which may have been produced by indigenous hunter-gatherers—is also recovered in small amounts (Keeley 1992: 91-92; Price *et al.* 1995: 100-102).

Economic patterns in the region are characterized by what Keeley and Cahen (1990) have labeled ‘arbitrary village level production monopolies’—maintenance of

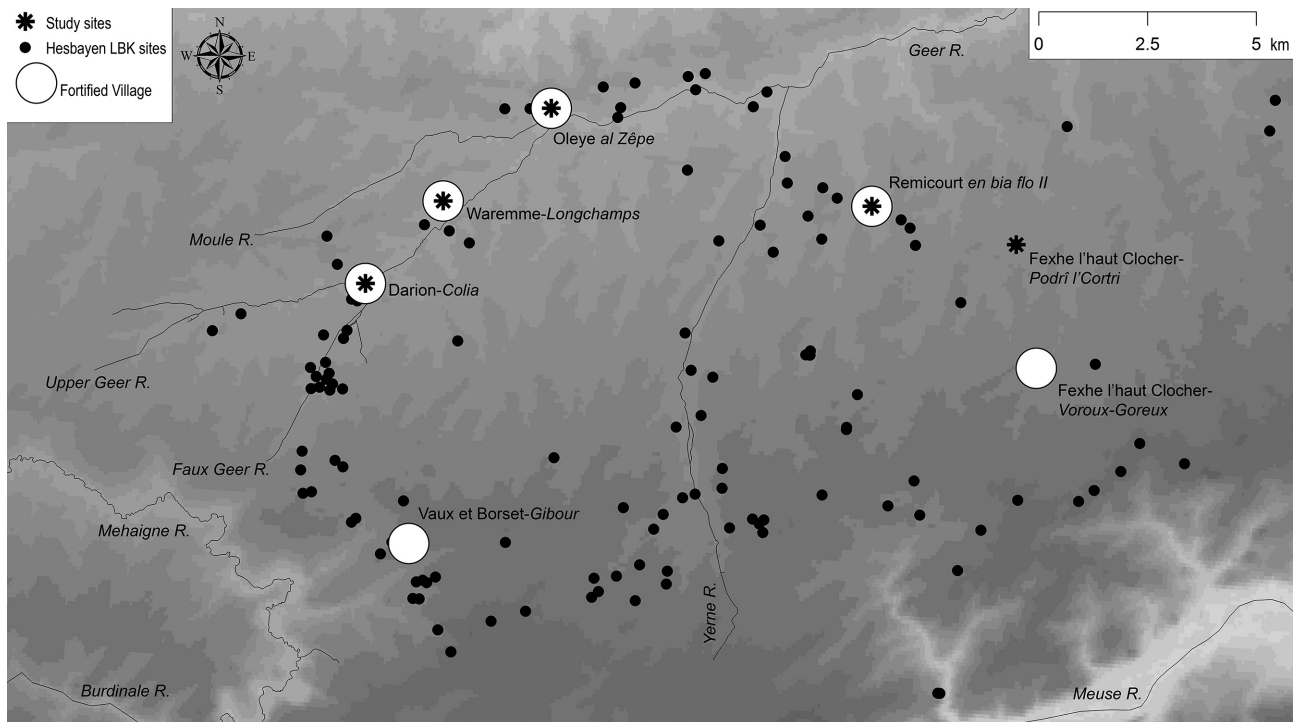


FIGURE 2. MAP OF THE HESBAYEN LBK DISTRIBUTION, SHOWING DISTRIBUTION OF ENCLOSED SITES AND SITES INCLUDED IN THE PRESENT STUDY.

production monopolies at particular villages, despite the generally availability of raw materials utilized in their manufacture. At Darion-Colia, large atelier pits full of lithic debitage were unearthed, while at the other excavated sites, debitage was rare relative to the number of finished tools present (Cahen *et al.* 1990: 139-141). Darion-Colia also seems to have specialized in the production and use of a special sort of tool referred to as a frit, likely used for specialized hide working (Sliva and Keeley 1994: 96). Similar specialization in lithic manufacture has been uncovered at Harduémont ‘Petit Paradis’ and other villages near the head of the Yerne stream (Allard 2005: 217-218).

Ceramic production may also have been limited to certain villages, with other villages obtaining their pottery by exchange. Definitive evidence of ceramic manufacture has been recovered at only one site to date, Oleye al Zêpe. Excavations there yielded evidence of possible firing wasters (coarseware), as well as a potter’s atelier pit containing an unusual grinding stone and jars full of prepared but unused clay and temper materials. In contrast to Darion, Oleye provided virtually no evidence of having produced lithic tools (Cahen *et al.* 1990; Keeley and Cahen 1989: 165-166, 172-173). van Berg has demonstrated in several cases that ceramics made at one Hesbayen LBK site were traded to another. Two fineware (thin-walled, decorated) pots made by the same potter in the same firing batch—the vessels were of identical form, evidenced the same surface clouding associated with firing, and the same decorative motif, made with the same four tooth comb with one half-broken tine—were found, one at Oleye al Zêpe and one at Darion-Colia (van Berg 1987b, 1987/1988).

Further potential evidence of specialized economic activity has been recovered at Remicourt *en bia flo II*, where an abnormally large number of silo pits and pits containing charred grain were excavated, and at Ans à Alleur, where pits in which intensive burning had occurred were excavated, however, it is unclear what exact activities this evidence might relate to (Bosquet *et al.* 2004: 83-84, 88-89). Three villages outside of the primary Hesbayen distribution, to the north along the Petite Gette stream, provide evidence of groundstone axe manufacture using material from a lydite (locally referred to as phtanite) source near the modern town of Ottignies (Lodewijckx 1989, 1990). Interestingly, these sites are not themselves near the source of phtanite, which is approximately 40km further to the east. No LBK site has ever been found near the source, but there are late Mesolithic sites in the area.

Sites located along the Yerne, as well as in the southeastern Hesbaye primarily utilized a different material, gres micaceous (an indurated sandstone) the source of which is located around the modern villages of Horion and Hozémont in the southeastern Hesbaye. Analysis of surface collections indicates that phtanite axes are more common along the Upper Geer and in other portions of the western Hesbaye, while gres micaceous is more common elsewhere (Toussaint and Toussaint 1982: 533-534). The two materials are of roughly equal working quality, and are even quite similar in appearance, yet LBK communities in the Upper Geer drainage chose to exploit a source some 40km further distant and go through middlemen to obtain phtanite. Keeley (2002: 389) argues that this indicates a

clear social division between the two groups of sites, and potentially conflict.

High quality flint litters the ground in the Hesbaye, much of which sits on Cretaceous age flint-bearing chalk deposits, providing no geographical reason for the localization of flint tool manufacture to one site rather than another. LBK peoples at sites such as Oleye *al Zépe* could have manufactured these tools, yet did not. Similarly, axe material manufacture and possibly ceramic manufacture were similarly distributed in a way that is not clearly linked to geographical proximity to sources. Keeley and Cahen argue that this pattern of ‘arbitrary’ craft specialization was undertaken as a means of creating and maintaining social and particularly military alliances (Keeley and Cahen 1990; Sliva and Keeley 1994: 98). In contrast, Allard argues that specialization in the Hesbaye largely developed as a means of supplying LBK communities in flint-poor regions with needed stone tools (Allard 2005: 218-219).

Research Significance

The present research is concerned with reconstructing intra- and extra-regional exchange patterns, and the social linkages implied by these across time in comparison to the observed increasing evidence for conflict over time in the Hesbaye. Does exchange decline in frequency with increasing violence, as mutualistic theories would predict? What of evidence for exchange with the indigenous hunter-gatherers of Belgium? Does specialization and exchange appear related to alliance building in the face of this conflict, as Keeley and Cahen suggest? Is there evidence that resources were at the center of conflict? Can the economic patterns evident in the Hesbaye best be explained as the outcome of economic competition between villages? Answering these questions not only allows for an improved understanding of LBK social structure and economy, but serves as an archaeological test case on a broader theoretical level regarding the intersection between warfare and economy in tribal, pre-state social groups—was warfare an ephemeral phenomenon in the past, with limited ramifications for the evolution of economy and other aspects of culture, or was warfare motivated by material needs, even in the ‘egalitarian’ societies that characterize much of human history?

Additionally, the present research contributes to the long standing debate in the social sciences over the role of economic specialization—the division of labor as it is often termed—and its development, which has been seen as a fundamental shift in how human society is organized, a hallmark to some of the end of economic self-sufficiency and the beginnings of stratified societies, able to produce surplus and support not only the existence of craft specialists, but also of political elites. Interest in the division of labor and its role in social change dates back to Adam Smith, who pointed out its importance in the rise of urbanism and political classes (Smith 1993: 5-10, 102), and was central to Durkheim’s concepts of ‘mechanical’

and ‘organic’ solidarity as sources of social cohesion in tribal and state-level societies (Durkheim 1966: 54-55, 173). Marx and Engels, in contrast, viewed the division of labor in a more negative light, as a means by which people were ultimately alienated from the fruits of their labor and forced to depend on broader economic systems to satisfy their wants and needs (Engels 1978: 234; Marx 1978: 265), a view point which has been highly influential in archaeological models of how ‘complex’ societies have developed (Earle 1997: 71), and thus interest in understanding how economic specialization develops in small scale, non-stratified societies remains strong (Clark and Parry 1990; Costin 1991; Stark 1995).

Project Methodology

As outlined by Earle and Ericson, archaeological reconstruction of exchange networks involves several components—developing models of prehistoric exchange, identifying exchanged objects, mapping the distribution of exchanged objects, reconstructing production organization, and combining all lines of evidence to arrive at an interpretation of exchange dynamics (Earle 1982: 2-8; Earle and Ericson 1977: 4-11). In addition to developing models of exchange dynamics as they relate to warfare on the basis of ethnographic data, the following study relies on tracing the production and exchange of ceramics at five LBK villages in the Hesbaye—Darion-*Colia*, Waremmel-*Longchamps*, Oleye *al Zépe*, Remicourt *en bia flo II*, and Fexhe le haut Clocher-*Podri l’Cortri*. Four of these villages were fortified during later stages of Hesbayen LBK settlement, while no evidence for fortification has been uncovered at Fexhe le haut Clocher-*Podri l’Cortri*, although the site remained occupied throughout the duration of Hesbayen LBK settlement. All are located roughly on the northern boundary of the Hesbayen LBK *Siedlungskammer*. Three of these sites are along the Upper Geer/Faux Geer system, and thus hypothetically belong to a social group identifiable by primary usage of phthanite axes and adzes, while the other two are east of the Yerne, and thus hypothetically belong to the gres micaceous using sites of the eastern and southeastern Hesbaye. Additionally, a small number of non-LBK style vessels, including ‘Limburg’ style pots, were included in the analysis to test the theory that these represent vessels produced by Mesolithic hunter-gatherers. Additional data on both site by site ceramic assemblages, as well as lithic production and raw material usage from villages for which data is available was incorporated to analyze the intensity of production and directionality of exchange, comparing the earlier periods of settlement, when warfare is poorly attested, to later settlement, when there is abundant evidence of conflict in the region.

While in certain cases, style can be utilized to identify the movement of ceramics or other archaeological materials, the LBK pottery of the Hesbaye is stylistically homogenous, and coarseware pottery is generally undecorated. As such, a physical method of identifying production and distribution of pottery was utilized—389

ceramic samples, roughly eighty from each study site, were analyzed by Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS). These samples were selected so as to represent both identifiable phases of settlement in the region, as well as both fineware and coarseware pottery types. LA-ICP-MS is capable of rapidly measuring a broad suite of major, minor, and trace elements with very low detection limits, and the rapidity and minimal cost of analysis permits collection of data from larger sets of samples than is practical by other techniques (Kennett *et al.* 2001: 23; Speakman and Neff 2005: 4), which is critical for source determination for ceramics (Glascock 1992: 11). An intensive survey of local clays was conducted, and these clays also chemically measured by LA-ICP-MS.

Overview

This work is organized into six further chapters. In Chapter 2, the ethnographic record is explored to identify areas of linkage between socioeconomic behavior and conflict in order to develop a framework for interpreting measures

of social linkages between Hesbayen LBK villages in the context of variable levels of violence. Chapter 3 provides an overview of the LBK archaeological culture, focusing on ceramic and lithic industries, evidence pertinent to understanding socioeconomic structure, and evidence for conflict. Chapter 4 reviews available evidence for settlement in the Hesbaye region specifically, focused on the chronology of fortification construction, evidence for production specialization and trade, and evidence for both internal and external social linkages with other LBK communities and foraging groups. Chapter 5 reviews the principal chemical, mineralogical, and statistical methods employed in the study, as well as the sampling strategy employed for selecting ceramic and geological samples. Chapter 6 presents the results of compositional analysis of ceramics. Chapter 7 reviews the evidence for changing patterns of inter-community exchange and production, conflict, and social structure in the Hesbaye. Finally, Chapter 8 reviews the principal conclusions of this study as well as providing future research directions and broader implications of the principal findings.