

# WARFARE IN THE EUROPEAN NEOLITHIC

by

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## INTRODUCTION

The Neolithic of northwestern Europe has been described as peaceful and idyllic, while the subject of warfare has been given little or no consideration. Warfare is an important factor in social and cultural change, however, and the frequency and scale of warfare had a significant impact on the development of Neolithic society. Warfare is difficult to prove archaeologically, since evidence of warfare, such as skeletons with injuries, may have other interpretations. The question of whether armed conflicts occurred in the Neolithic is linked to the interpretation of the social structure, and anthropological analyses of small-scale warfare in primitive societies are therefore important (1). Anthropological surveys of the prevalence, character and causes of war cannot prove that there was war in the Neolithic, but they might help to explain the patterning of material remains and can demonstrate the social conditions of war.

This article attempts to employ the anthropological theories concerning warfare in an archaeological context. The evidence for violent conflicts is studied, and the development of warfare is traced from its origin to the end of the Neolithic. It is not a complete survey of sites and objects connected to warfare, but merely an attempt to demonstrate that evidence of war can be found throughout northwestern Europe (including Poland, Germany, France, Benelux, Southern Scandinavia and the British Isles). The introduction of agri-

culture did not occur at the same time across the area, so a simplified chronology, based on the terms from mid Germany, is used to designate the different periods (Fig. 1).

## DEFINING WAR

The first important step is to define warfare. War should be considered part of the larger category of conflict, which also includes murders and feuds (Chagnon 1990, 79f.). Warfare is differentiated by being a social activity, sanctioned by society, and directed against another group (Otterbein 1994, 97ff.). The organization separates war from random brawls or simple murder, but war is more than actual combat, and also includes preparations for battle, training, organisation and transport (Ehrenreich 1997, 9). A state of war does not have to end with a battle, the possibility or mere threat of combat can sometimes decide a conflict. Defining the war-making unit is important, in order to distinguish primitive forms of justice, like vendetta and feuds, from warfare against another group (Schneider 1968, 238f.). This is problematic however, since group boundaries are often flexible or unclear. Common language and cultural identity does not necessarily mean that different groups consider themselves part of the same society,

1. The term *primitive* is employed in this article to describe societies that are not urban or literate and which use pre-industrial technology.

5500–4200 BC	Early Neolithic
4200–2800 BC	Middle Neolithic
2800–2200 BC	Late Neolithic

Fig. 1. Simplified chronology.

and some societies wage war on the same groups they trade or exchange marriage partners with (Ross 1983, 174).

In the present context I will use a rather wide definition of warfare, which is relevant to the study of a pre-state society documented through archaeological evidence. War can be defined as *the use of organised lethal force by one group against another independent group*. This definition excludes individual aggression and focuses on the fact that war is a social activity.

#### THE PREVALENCE OF WAR

The frequency and prevalence of war among primitive societies described by ethnographers is an important analogy. If warfare was universal and frequent in societies that can be compared to the Neolithic societies in the archaeological record, it cannot be claimed *a priori* that warfare was non-existent in the European Neolithic. Cross-cultural surveys of primitive societies from around the World give a general picture of the prevalence of war. One survey, with a sample of 50 societies, showed that 15 rarely or never went to war, but that only 4 of these had no military organization, and thus no capability to wage war (Otterbein 1989, 148). In another sample of 90 societies only 11 groups were found to engage in warfare rarely or never, while 53 societies went to war at least once a year (Ross 1983, 182f.). The results indicate that warfare is common among primitive societies, and that only 10% did not participate frequently in armed conflicts. Most of these societies were living in areas with low population densities, were geographically isolated from other groups or were defeated refugees driven from their former territory. Moreover many of the so-called “peaceful” societies had a very high homicide rate. Among agriculturists truly peaceful societies are even rarer, probably because their fields, food stores and possessions keep them from fleeing conflicts, an alternative to war often used by more mobile hunter-gatherers (Keeley 1996, 28ff.).

Some modern anthropologists have nevertheless claimed that warfare is rare in pristine societies, and that the ethnographically documented wars are caused by contact with the western civilisation (Ferguson 1990, 51ff.). If this is indeed the case, then ethnographic sources cannot shed light on the origins of

war. The question of whether war has existed since the birth of mankind can only be answered by archaeology (Haas 1999, 13).

#### WAR IN PRIMITIVE SOCIETIES

Some anthropologists see a fundamental difference between “true war”, distinguished by being serious and deadly wars of conquest fought by civilized states, and primitive warfare, described as being stylized, ritualistic and harmless (Newcomb 1960, 328).

The anthropologist H. Turney-High characterized primitive warfare by, among other things, weak leadership, absence of organized and trained units, ineffective tactics, as well as poor mobilization and logistics. These deficiencies are not caused by military shortcomings, however, but by the social and economic organization of primitive societies. Coercing people into an army, training them to obey orders and arrange supplies to keep the army in the field requires the centralised leadership and economic power of a state. The differences in the conduct of warfare are thus a direct consequence of the weaker authority of leaders, the egalitarian social structure, smaller populations and less surplus production (Keeley 1996, 42ff.).

Primitive warfare was not considered very deadly, since ethnographers observed that most battles were broken off when both sides had suffered a few casualties. This does not describe the mortality of war, but its form, since the number of dead was not compared to the size of the population. In primitive societies the proportion of deaths caused by warfare is 10–40%, while the percentage is below 5% in civilized societies. Because primitive societies have a higher frequency of war and a smaller population, even a few losses per battle can cumulate to a catastrophic level (Keeley 1996, 88ff.).

#### THE CHARACTER OF WAR

Warfare is more than set piece battles between two armies, but can be divided into the following types:

Ambushes and raids is the most frequent form of warfare in primitive societies (Otterbein 1989, 40). They range from elaborate ambushes, where an attacker waits for the enemy; to simply sneaking into

enemy territory, killing anyone encountered. Attacking an enemy village just before dawn is the most common form of raid. The victims of both raids and ambushes are usually surprised, unarmed and outnumbered. Casualties are often relatively few however, since the attacker hurries away before a counter-attack can be mounted, but frequent raiding can result in a high cumulative fatality rate (Keeley 1996, 65f.). Raids are characterised by the fact that most victims are killed when they try to flee, and are therefore attacked from behind, and that a high proportion of the victims will be women or children.

Massacres are surprise attacks whose purpose is to annihilate an entire village or social unit, and are known from several simple societies (Vayda 1968, 280). The casualties rarely amount to more than 10% of the population, but cases of total annihilation are known. Massacres occur only infrequently, but once a generation is not unusual (Keeley 1996, 67f.). The victims of a massacre comprise both men and women, adults and children.

Battles between two armies are often arranged in primitive societies, and usually involve decorative dress and exchange of insults. These features are considered ritualistic in nature, but it is important to remember that all battles require the co-operation of both parties in order to take place (Keeley 1996, 59f.). Most primitive societies used projectile weapons, such as spears or bows, in formal battles, while melee weapons were used only to dispatch a wounded or a fleeing enemy. Advanced tactics and manoeuvres require discipline, training and leaders, so a simple line was often the only formation used in primitive battles (Otterbein 1989, 39f.). War leaders are found in several egalitarian societies, but they lead from the front, instead of directing the battle from behind. Many primitive societies have warriors trained in combat, but they train as individuals, not as co-ordinated units. The weak command systems do not mean that battle plans or tactics were never used. Flank or rear attacks, ruses or co-ordinated manoeuvres by separate groups have been commonly used in primitive societies (Keeley 1996, 42ff.). The victims of a battle are usually only men, since women rarely, if ever, participate in combat.

Campaigns are beyond the logistic capabilities of most primitive societies. They can only provide sup-

plies and ammunition to keep an army in the field for a few days (Newcomb 1960, 328f.), and the use of strategic planning is thus severely limited. The implementation of most strategies were customary rather than deliberate, but primitive societies can be said to have used attrition, by frequently raiding the enemy, while massacres of entire settlements can be termed a total-war strategy (Keeley 1996, 48).

## THE OBJECTIVES OF WAR

The objective of primitive warfare is another element where we find important anthropological analogies. It was once a common assumption that economic and political motives were lacking in the earliest forms of warfare (Malinowski 1968, 259), which were motivated by personal goals, such as obtaining prestige. Cross-cultural surveys indicate, however, that economic motives were predominant in primitive societies as well (Keeley 1996, 115).

*Defence and revenge.* The most frequent and fundamental cause of war in primitive societies is the need to defend against an aggressor, but a few peaceful societies, who always decided to flee rather than defend themselves, are known from the ethnographic record (Keeley 1996, 30f.). Revenge for violations against the group is also a common motivation, but can be regarded as an active form of defence, since it also serves as a deterrent against further attacks (Vayda 1967, 87). Retaliatory strikes may be caused by murder, insults or economic issues, such as theft or poaching, but there is a great deal of variation in the type of offences which calls for revenge (Ferguson 1990, 45).

*Territory and plunder.* Primitive societies also fought over land and the right to use important resources, but complete occupation of an enemy's territory was rare. Frequent losses in warfare could force a group to abandon parts of its territory, allowing the victor to gradually expand into the resulting unsettled buffer zone (Vayda 1976, 30f.). Another important goal in primitive warfare was the plunder of portable wealth, such as livestock, food stores or even prisoners (often woman), but slaves are only found in hierarchical societies (Ferguson 1990, 38).

*Trophies and honour.* Prestige was often a goal in primitive warfare, but not as important as economic

objectives (Otterbein 1989, 66). In many primitive societies status is achieved by showing bravery in battle or by taking trophies, such as heads, scalps or other body-parts. These trophies had a huge symbolic significance, as a proof of the warrior's worth or as an insult to the slain enemy and to enrage his living relatives. In some societies trophies were used in initiation rites or were believed to have spiritual powers that strengthened the possessor (Keeley 1996, 99ff.).

*Conquest and subjugation.* Wars of conquest, where an occupied territory is added to the victor's and the population subjugated, are only fought by states, since pre-state societies do not have the necessary institutions to achieve political control of another society (Otterbein 1989, 68).

#### WAR AND SOCIETY

The character of war is determined in particular by the social structure, and in turn war is an important factor in the development of the social organization. The Neolithic societies in northwestern Europe are usually classified as *tribes* (Milisauskas 1978, 120), a term used by anthropologists to describe relatively egalitarian societies organized by pan-tribal associations, such as kin groups, age-grades or sodalities, and usually incorporating a few thousand individuals. The tribal leader has influence rather than power, unlike the more hierarchical and centralized *chiefdoms*, where the chief controls and redistributes the economic surplus (Keeley 1996, 26f.). Warfare has an enormous influence on the social complexity and the population size of a society. In regions where war is frequent the population will concentrate in larger groups, since there is a tactical advantage in greater numbers. Fear of raiding also increase sedentism, partly because of the advantage of defence works, and partly because an increased group size requires an intensification of production (Ferguson 1994, 88f.). Warfare also creates a need for leaders able to coordinate and organize an army. The status of a war leader often depends on military success, which means they will have a personal interest in warfare, and often seek to institutionalize their authority (Ferguson 1994, 94). A separate class of military specialists can, combined with an intensified production, increase the social stratification (Ferguson 1984, 56f.).

#### MILITARY ORGANISATION

The military organisation of primitive societies are determined by kinship patterns and the social structure. Social institutions, such as patrilocality, that unite men into fraternal interest groups gives a higher frequency of internal warfare or feuds, since these groups are able to use force when settling disputes (Otterbein 1980, 204ff.). If men's loyalties are divided, by matrilocal postmarital residence for example, the frequency of internal war is reduced, but this creates cross-cutting ties between different groups which enables the mobilization of larger forces, thus increasing the likelihood of external warfare against other societies (Ferguson 1994, 16ff.).

The use of professional warriors and the degree of subordination are also important aspects of the military organisation. Political centralization is not a prerequisite for the existence of professional warriors, but they are most common in centralized societies, which can redistribute resources to an army (Otterbein 1989, 20ff.). Professional warriors might belong to a standing army, age-grades or military sodalities, while societies without professional warriors commonly have a military organisation consisting of every adult male. Professional warriors frequently have a high subordination, but even in egalitarian societies the war leader's commands are usually followed (Otterbein 1989, 25). Though participation in war was voluntary in tribal societies the mobilized part of the male population was often higher than in modern states (Keeley 1995, 34f.).

#### WAR AND EXCHANGE

Warfare obviously have a profound effect on the relations between different societies, but war does not preclude peaceful interactions, such as trade or even the exchange of marriage partners (Keeley 1996, 121ff.). Exchange and trade are therefore not an indication of the absence of war.

Alliances are another important relation between independent groups, they can provide reinforcements, intelligence, logistic support or a safe refuge. Alliances are thus of decisive importance in a conflict, and might be necessary in order to have secure flanks when fighting an enemy. It is primarily by the negotiation of military alliances that leaders gain a per-

sonal influence on warfare and the opportunity to increase their authority. Durable alliances can also lead to the formation of a tribe (Ferguson 1994, 96ff.).

#### THE CONSEQUENCES OF WAR

War has a major impact on the social structure, but also affects other aspects, such as settlement patterns and demography. Casualties in war can lower the size of a group, but the assimilation of prisoners of war can actually increase the population (Vayda 1968, 280f.). Warfare often leads to replacement of groups, when defeated groups are forced to flee their territories; this might create unsettled buffer zones between hostile groups. Settlement nucleation is another result of warfare, since larger groups are able to defend themselves better, but on the other hand warfare might also lead to a dispersal of the population, in order to reduce the risk for each settlement.

The economic consequences of war are enormous, in addition to the loss of life a defeated group might have their food stores plundered, livestock stolen and houses and fields burned to the ground. A successful raid can increase the wealth of the victor, however, providing moveable valuables and other resources. Warfare has costs in itself, though, such as expenses for the army's equipment and supplies, or by requiring labour to the construction of fortifications (Ferguson 1994, 90f.).

The ideology of a society is also affected by warfare, and psychological accommodations are often necessary to accustom people to a regular use of violence. Belligerent societies emphasise martial values, such as bravery in battle, and cultivate personal aggression. Warriors usually have a high social status and might demonstrate their military accomplishments by taking war trophies (Ferguson 1990, 44ff.). Warfare is often accompanied by rituals and religious symbolism, such as the use of magic to weaken the enemy or divining the outcome of a battle. Rituals are frequently used to maintain the resolve of the warriors, but are also needed before warriors returning from battle can re-enter the society (Ehrenreich 1997, 10ff.). These psychological adjustments create an ideology that justifies violent conflict and the costs of war, and makes war seem "natural" to society (Ferguson 1994, 98ff.).

A warlike society influences neighbouring societies, forcing them to use violence in order to defend themselves. The only alternative is to flee the area, and this is not always a feasible solution, especially for agricultural societies, which depend on their livestock, crops and food stores. Societies with an aggressive neighbour will have to develop a more efficient military organization, or be destroyed, thus intensifying the warfare in an entire region (Keeley 1996, 127ff.).

The conduct of war also changes when the social complexity increases. Centralized and hierarchical societies have a greater military sophistication and are more successful in war (Otterbein 1989, 104ff.). They use professional warriors, develop better tactical systems, have a higher subordination and often use armour and shock weapons instead of missile weapons (Otterbein 1989, 73ff.).

#### THE CAUSES OF WAR

The cross-cultural surveys mentioned above clearly demonstrate that war was common in many primitive societies, but they also show that peace was possible. Why do some societies make war, when others do not? What are the causes of war?

A number of popular theories explain warfare as a result of individual human aggression, postulating that all humans are born with an innate "killer instinct", which means that aggression and warfare are natural and unavoidable. This does not explain the great variations in how aggression manifests itself, and social or cultural influences are not considered (Holloway 1967, 33ff.). Cultural values have a great impact, however, by selecting for particular personality types or through child rearing patterns. Aggression can also be explained using psychological approaches instead of biology. The frustration-aggression hypothesis argues that aggression is always induced by the environment, while the displaced aggression hypothesis describes how internal conflicts within a group can be redirected to external groups (Brothwell 1999, 26). Psychological theories are often used implicitly to explain the motivations for warfare, such as a desire to gain revenge or prestige, but these theories do not exclude other explanations (Ferguson 1984, 14f.).

Sociobiological theories are based on the assumption that natural selection takes place between indi-

viduals, not between groups or cultures, and that reproduction is as important as survival (Chagnon 1990, 78f.). Reproductive success is gained not only by having children, but also by helping relatives with similar genes (a concept called inclusive fitness). Conflicts of reproductive interests and competition over resources are inevitable, but striving for prestige and status can also result in conflicts, since high esteem usually leads to reproductive success. Conflicts begin at the individual level, but has the potential to escalate to war between different groups, though hostilities can also be resolved by means other than violence (Chagnon 1990, 93ff.).

Cultural ecology describes how populations adapt to environmental constraints, and resource scarcity is regarded as the primary cause of war. War is part of a response mechanism in a functional system, which can re-establish a balance between population and resources, although the functions and consequences of war may not be recognized by the individual actor (Ferguson 1984, 28ff.). The ecological theories have been reformulated, however, and the functional models are now de-emphasised. Materialist theories are based on the premises that the infrastructure has causal primacy, that selection takes place between groups, which means that groups with less efficient military practices may be eliminated, and finally that war is motivated by material objectives (Ferguson 1990, 28f.). The infrastructure describes a society's environment, demography and technology, and these factors explain why war occurs and how it is practised. Structural factors, such as kinship patterns, economy and politics, explain the social patterning of war (like the military organization) and determines why a particular war starts. The superstructure is the perceptions and beliefs of a society, which may reinforce the warriors' resolve and make them more willing to fight, but they are not the actual causes of war (Ferguson 1994, 87ff.). The development of more hierarchical societies means that the infrastructural constraints are lessened, and structural factors will have an increasing influence on war (Ferguson 1990, 48f.).

Finally, there are researchers who claim that each war has its own historical context, and that there are no universal causes of war. The different theories indicate some of the factors and conditions which leads

to war however, and further research may demonstrate some of these causes in the archaeological record from the European Neolithic.

#### THE ORIGINS OF WAR

Warfare is a social phenomenon, and leaves only indirect traces in the archaeological record. The acknowledgement of warfare thus depends on the interpretation of the archaeological sources. There are three main sources to demonstrate the existence of war: Weapons, fortifications and injuries on skeletons. Weapon traumas are the most direct form of evidence, while both offensive and defensive weapons, as well as fortifications, have been interpreted in many different ways. Another source is iconographic representations, which might show weapons made from materials that are rarely preserved, or even battle scenes, perhaps allowing a glimpse of tactics.

A general problem in the study of prehistoric warfare is the visibility and preservation of the archaeological record. A battle will rarely generate any certain material remains, because bodies and weapons are often removed from the site, or will not be preserved if they are left on the battlefield (Vencl 1999, 69). Most objects of organic materials, such as bows, slings and spear shafts, have disappeared from settlements and graves, but it is still important to remember the existence of these perishable objects (Vencl 1984, 122ff.).

The earliest signs of human aggression, in the form of traumas, come from the Palaeolithic, but they are few, scattered and often uncertain (Keeley 1996, 36f.). The oldest recorded case suggestive of interpersonal violence is a skeleton from Israel (Skhul IX), dated to the Upper Palaeolithic, which has perimortem injuries probably inflicted by a spear (Fruyer 1997, 183). The earliest evidence of injuries possibly caused by warfare is from Jebel Sahaba in Sudan. Site 117 is a cemetery with 107 burials dated to the Late Palaeolithic (12–10,000 B.C.). Weapon traumas and projectile points imbedded in, or associated with, the skeletons suggests that about half the people buried at the site died a violent death (Wendorf 1968, 992f.).

There is more evidence of mortal injuries caused by violence in the Mesolithic. Likely cases of homicide are known from Tévéc in France, where an adult

man had two arrowheads imbedded in the spinal column, or from a triple grave on Henriksholm/Bøgebakken, Denmark, where one male had been killed by a bone point in the throat (Frayer 1997, 183). The first example of what might be a mass murder is the “skull nests” from the Ofnet cave in Bavaria, where 38 heads had been placed in two pits and heavily stained with red ochre. Women and children constituted most of the individuals and some of the skulls, especially the male, had elliptical holes probably caused by a blunt weapon. The exact number of skulls is still under debate, and it is not clear whether the heads were placed in the pits on a single occasion or added one at a time. The site has been interpreted as the remains of a massacre, where part of a population was killed and decapitated (Frayer 1997, 207f.), but the demographic characteristics might also suggest a regular burial (Peter-Röcher 2002, 8f.).

Weapons known from the Palaeolithic and the Mesolithic are hunting gear, such as spears and bows, or tools, like axes of stone or antler, but such tool-weapons can easily be used in warfare (Chapman 1999).

The earliest example of fortifications is from the Near East. Around 7,500 B.C. (in Pre-Pottery Neolithic A) the city of Jericho was protected by a rock-cut ditch 9 metres wide and 3 metres deep and a solid 1.7 metres wide stonewall, preserved to a height of up to 4 metres, with a 8.5 metres tall stone tower (Roper 1975, 304ff.). The fortifications of Jericho have been regarded as the first evidence of warfare in the world, but the wall has also been interpreted as flood protection (Keeley 1996, 38 note 32). In Europe the earliest fortifications are found in Greece at the beginning of the 7th millennium B.C., where the Tell of Sesklo was defended by a wall (Höckmann 1990, 58).

Iconographic evidence of warfare is known from eastern Spain, in the form of rock paintings. These paintings have been considered the most substantial evidence for Mesolithic warfare, but they should probably be dated to the Neolithic (Beltrán 1982, 73f.). Some pictures shows groups of archers attacking each other, such as in a picture from Les Dogue, Ares del Maestra (Castellón) where eleven standing archers are being attacked by seventeen running archers, rendered in another style. At a scene from Cueva del



Fig. 2. Neolithic archers. Rock painting from Cueva del Roure, Morella, Spain (Beltrán 1982).

Roure, Morella (Castellón) four archers are confronted by three others, whose attentions are centred on the leader. One of the four attackers seems to be executing a flank attack (Fig. 2). Other pictures show wounded archers or scenes that can be interpreted as executions, where a row of archers stand in front of a wounded or dead person. Bows and arrows are the most common weapons, but javelins are also depicted. The arrows are rather long, and held in the hand, while the bows are a little shorter than the height of a man (Beltrán 1982, 44ff.).

## SKELETONS

Perimortem trauma on skeletons is the most direct evidence of the consequences of war. Anthropological analyses can indicate which weapon types have caused the injuries, the location of the wounds can show how the battle was fought and the frequency of injuries can indicate how large a proportion of the population died as a result of warfare. The interpretation of weapon traumas depends largely upon the preservation of the skeleton, because a mortal blow does not necessarily damage the large bones that are most often preserved (Vencl 1984, 127). Projectiles

often hit the soft part of the body, and will therefore be found detached among the bones. An arrowhead in a grave might thus represent the cause of death, rather than a gift.

Burials might also show indirect evidence of warfare. Mass graves containing several individuals are most likely a result of war or homicide, instead of epidemic diseases or accidents, especially if one or more persons have injuries indicating a violent death. Signs of cannibalism and ritual treatment of body parts might also be relevant to the study of warfare, since the victims are often provided through war or murder (Frayer 1997, 181ff.). There might also be a link to rituals connected with warfare (Keeley 1996, 103ff.). Finally biological anthropology can provide information on demographics and the populations health, as well as identify different populations.

#### EARLY NEOLITHIC (5,500–4,200 B.C.)

Many graves are known from the Linear Pottery culture (LBK), often from regular cemeteries. The predominant burial rite was inhumation, with the corpse placed in a hocker position, but cremation was also used. Only a few injuries have been identified on skeletons from burial grounds (Petrasch 1999, 507), but several mass graves have been found.

In Herxheim near Landau, Germany, excavations have uncovered a LBK settlement from around 5,000 B.C. that was surrounded by two parallel ditches. The remains of at least 180 individuals were found at the site, 4% in the village, 32% in the outer ditch and 64% in the inner ditch. Only a few individuals have been given a regular burial, but many skulls have been placed in “nests”. The examined skeletons all show signs of trauma, cutmarks and old healed injuries (Häussler 1998, 47f.).

In Vaihingen (see Fortifications below) over 100 hocker-graves were placed in an old ditch surrounding a village. In pits between the houses human bones from a more robust population were found. Two physiologically different populations, buried in different ways, could well suggest a less than friendly relationship between two distinct ethnic groups (Krause 1998, 8f.).

A Linear Pottery enclosure from Schletz/Asparn in Austria had a two metre deep ditch in which at least

67 skeletons were found. The skeletons are very fragmentary and show marks from predators, which indicates they must have been lying above ground for several months. All the skulls show trauma caused by blows from a stone axe. The massacre is dated to the end of the LBK, and marks the final settlement at the site (Petrasch 1999, 508).

At the end of the Linear Pottery culture, at Talheim, Kr. Heilbronn, Germany, 34 persons were thrown into a large pit, among them 18 adults (9 men and 7 women) and 16 children/subadults. At least 18 individuals have holes in the skull caused by blows from polished adzes and axes, and 10 of these have several fractures. The injuries show that most of the victims had been struck down from behind, such as an older man who had been hit in the back by an arrow, and a young man who had an arrow point embedded in the neck. The victims have not been able to defend themselves, since the normal traumas resulting from close combat, namely injuries on the arms or shoulders, are absent. The sex ratio indicates that a normal group was attacked and wiped out (Wahl & König 1987).

Several examples of massacres are thus known from the Linear Pottery culture, but skeletons are also found in the ditches of the Kreisgrabenanlage (enclosures) from the following Lengyel culture. In a partially excavated ditch at Ruzindol-Borová 10 skeletons were found. They had all suffered a violent death, and calculations show that the ditch might contain 60–70 individuals (Vencl 1999, 64).

#### MIDDLE NEOLITHIC (4,200–2,800 B.C.)

Interments still dominate, but the burial customs become more varied in the Middle Neolithic: Flat or earth graves, common graves in pits (some inside settlements), long mounds and megalithic tombs are found throughout the Neolithic cultures of north-western Europe (Whittle 1996, 241ff.). The focus on large communal graves, sometimes monumental, and recurring burials in passage graves is new, but unfortunately means that the skeletal material has been disturbed and is often in a very fragmentary state (Midgley 1992, 451ff.).

Arrowheads embedded in bones are known from an allée couverte at Castellet, France, where an arrow



point was embedded in a vertebra, and from the cave of Villevénard, where an arrowhead shows that a person had been hit in the stomach (Cordier 1990, 464ff.).

In Porsmosen, north of Næstved, Denmark, a 35–40 years old man from the Funnel Beaker culture (TRB) had been hit by bonetipped arrows in the upper jaw and the sternum (Bennike 1985, 110ff.). The arrows must have been fired from a position obliquely above the victim, which indicates he was killed in an ambush.

A young man clutching a small child in his arms was found in the ditch surrounding the Stepleton enclosure in Dorset, England. After being shot in the back with an arrow he had fallen forward into the ditch, smothering the child beneath him, and both were covered by rubble from the burning fortification. Two other skeletons were only partly covered by the rubble collapse and show signs of being gnawed by scavengers, while a robust young man was buried in a pit (Mercer 1989b, 8).

Graves from the Michelsberg culture are very rare, but skeletons have been found in ditches from enclosures and pits at settlements. The frequency of trauma is high, compared to the low number of finds, and injuries are known from both children and adults, men and women (Nickel 1997, 121). Heidelberg-Handschesheim is a communal grave from the Michelsberg culture. In a hollow, at the bottom of a pit, six individuals were found: An adult man and a woman, one older man, two children and a baby. Injuries caused by the blunt end of a stone axe were found on the skulls of four individuals, and the left humerus of the adult man also had a wound. The find probably represents a family group which was attacked and killed (Wahl & Höhn 1988, 167ff.).

In a “Totenhütte” at Schönstedt from the Walternienburg-Bernburger culture 64 individuals, from all age groups, had been buried. Most were placed in hocker, but two male skeletons were buried differently and both showed perimortem fractures on the skull, probably made by a stone axe. Another male skeleton had a trauma on the left lower arm (Bach & Bach 1972, 103f.). In another Totenhütte from Niederbösa three skulls with lethal injuries have been found, while a right humerus from an adult male has an arrow point embedded in the bone. The man survived the

wound, however, since the bone shows signs of healing (Feustel & Ulrich 1965, 195ff.).

#### LATE NEOLITHIC (2,800–2,200 B.C.)

Burial rites in the Corded Ware and Bell Beaker cultures were mainly single graves, sometimes under small mounds, and often at burial grounds, but reburial in passage graves still occurs (Probst 1991, 398ff.).

A skeleton from the Bell Beaker culture, found in Weimar, Germany, shows fractures from a killing blow to the left parietal bone (Bach 1965, 218ff.).

A young man, from the English Bell Beaker culture, lay in a ditch at Stonehenge. He had been hit by three arrows, from different directions, and had a wrist guard on the left forearm (Harrison 1980, 96). At Fengate, England, a grave with four individuals from the Peterborough culture was found: A young woman, two children and a young man with a leaf-shaped arrowhead embedded between two ribs (Pryor 1976, 232f.).

At Vikletice, a burial ground from the Corded Ware culture, six skulls have fractures at the left side (Vencl 1999, 72). The skeletal material from the site shows that young men (15–30 years old) died 15% more frequently than they should have done naturally. The most likely explanation for the high mortality among young men is warfare (Vencl 1999, 64).

In a tomb at Roaix, in the south of France, more than 100 persons had received a hasty burial. Both sexes and all age groups are represented, and the skeletons were found in anatomical connection, which indicates that they were buried at the same time. Many of the skeletons had arrow points embedded in the bones, suggesting that they were killed in a war (Mills 1983, 117).

#### RITUAL TREATMENT OF SKELETONS

The most common form of what can be termed “ritual behaviour” seen on the skeletal material is trepanation, where a part of the skull is removed by scraping a hole, or cutting out a disc. Trepanations are known sporadically from the Mesolithic, but become more frequent in the Neolithic. Most trepanated skulls show signs of healing, indicating that the sur-

vival rate was high (Piggott 1940, 119). A “real” trepanation is made on a non-damaged skull, probably because of magical-religious beliefs or as a surgical attempt to ease pains in the head (Grimm 1976, 274). Another possibility is that trepanations were done in order to smooth splintered bone and remove bone fragments from a fracture. This interpretation is supported by the fact that most trepanations are found on male skeletons and on the left side of the skull, i.e. the side where one is hit by a right-handed attacker (Bennike 1985, 98).

Many trepanated skulls have been found in France, where more than 200 trepanations are known from the Seine-Oise-Marne culture in the Paris basin. They are found in communal graves in megalithic tombs and caves, but many were discovered already in the 19th century and are poorly documented. The proportion of skeletons with trepanations was very high, however, in some graves almost 8% (Piggott 1940, 116). Another concentration of trepanations is found in Germany. In the Walternienburg-Bernburger culture many skulls have trepanations, and 92% of these are male skeletons (Probst 1991, 380). Several trepanations are also known from the Globular Amphora and the following Corded Ware culture, again generally situated on the left side of the skull (Ullrich 1971, 50).

It has been suggested that several Neolithic cultures practised cannibalism. A cave burial from the Linear Pottery culture at Jungfernhöhle, by Tiefenellern in Germany, containing 38 women and children, many of whom have injuries, has been interpreted as proof of human sacrifice and ritual cannibalism (Probst 1991, 263f.). At least 44 individuals, which had been cut up and burned, were found in another cave burial at Hohlenstein, Baden-Württemberg, dated to the Rössen culture (Probst 1991, 296). Cutmarks and fractures have also been ascertained on 16 skeletons from the Furfooz cave in Belgium, dated to the Michelsberger culture (Probst 1991, 322). The anthropological analyses are not conclusive however, and weapon trauma or cultic manipulation of bodies might also cause the fractures found on the above-mentioned sites, perhaps during rituals connected to warfare (Petrasch 1999, 511). Special burials of skulls, known for instance from the Baalberger culture (Probst 1991, 340), are often interpreted as an indi-

cation of ancestral worship, but could also be war trophies (Keeley 1996, 100).

#### THE EVIDENCE FROM THE SKELETAL MATERIAL

Even though many fractures and weapon traumas are known from the Neolithic in northwestern Europe it is very difficult to estimate the frequency of warfare. The palaeopathological literature provides plenty of individual cases, but few regional syntheses with a perspective on population (Walker 2001, 584). The number of injuries seems to rise in the Neolithic, however, and traumas are most often seen on male skeletons (Vencl 1999, 71). This indicates that culture, and not just random accidents, which might be distributed equally among both sexes, conditions the injuries. Warfare is the most logical explanation, because the ethnographic record shows us that this is mostly a male activity. The frequency of injuries has only been calculated for the Linear Pottery culture, where nearly 20% of the skeletal material suffered from trauma (Petrasch 1999, 509). Most of the skeletons with injuries were found in a few mass graves, so the actual figure might be significantly lower.

Anthropological analyses of trauma can also give information about the character of war. The man from Porsmose shows the result of an ambush, but single skeletons with injuries, can also represent the victims of an ambush. The Early Neolithic mass graves often contain many women and children, and the location of the injuries show that many individuals have been struck down from behind (Wahl & König 1987, 175ff.). A similar pattern is seen in the massacres described in anthropological sources. Massacres are also known from the later parts of the Neolithic, e.g. the mass grave with more than 100 individuals from Roaix, and the number of victims often corresponds to the size of an average group or settlement (Keeley 1996, 68f.). The skeletons with trauma interpreted as evidence for cannibalism could also represent the, perhaps mutilated, victims of a massacre. Regular battles are suggested by the many fractures and trepanations on the left side of the skull, probably a result of close combat with a right-handed opponent (Bennike 1985, 98).

Injuries are very important to the analysis of Neo-

lithic warfare, but it is difficult to estimate the frequency of war. Some skeletons showing indications of a violent death also have older healed wounds, which testify that war was not always a unique incident (Wahl & König 1987, 177). Though victims left on a battlefield are hardly ever preserved and it can be very difficult to detect trauma, the skeletal material clearly shows that violent conflicts took place in the Neolithic period of northwestern Europe.

## WEAPONS

Weapons are the most important technological condition for war, and the character, distribution and frequency of weaponry shows the importance of warfare. There are two types of weapons: Shock weapons used in close combat, and missile weapons used at a distance. These weapon types are used differently in battle, and are therefore an indication of the form of combat. In addition to offensive weapon types there was defensive weaponry, such as armour and shields. Transportation is also of great tactical and strategic importance: Horses or war chariots can be used in battle, and increases mobility, while boats, wagons or even roads facilitate the movement of armies and their logistical support.

It can be very difficult to distinguish between weapons and tools or hunting gear, which might also be used in battle, but cannot be considered proper evidence of warfare. Specialized weapons of war are a relatively late phenomenon and a result of a standardization in the conduct of warfare and the use of armour (Vencl 1999, 65). Weapons can therefore be divided into the following categories: Tool-weapons are multi-functional and can be used in both domestic work and warfare. Weapon-tools have primarily a military function, but other uses are possible, while specialized weapons are only usable in combat (Chapman 1999, 103f.).

## BOWS AND ARROWS

A bow is actually a piece of highly advanced technology, with very exact properties. The heaviest possible impact, a long range and a flat trajectory are desirable in both warfare and hunting, and even simple bows, made of one piece of wood, have a

range of several hundred metres. An arrow has a low striking energy, but because it has a relatively high weight and a cutting edge, it makes a deep, open wound, which causes the target to bleed to death (Rausing 1967, 29f.).

Neolithic bows were simple segment bows made from the core of yew trees, or from shadow grown elm in Northern Europe. Many longbows are known from the Cortaillod culture in Switzerland and the north European wetlands, they have a D-formed cross section with a flat back and rounded sides and belly. The length is around 170 cm, i.e. a little larger than the average height (Rausing 1967, 132ff.). The existence of composite bows, made of layers of horn, wood and sinew, are inferred from a rockcarving in a Corded Ware tomb in Gölitzsch near Merseburg, depicting what is probably an angular non-reflex composite bow (Rausing 1967, 38f.).

Complete arrows are very rare, but most of the discovered arrow shafts are more than 70 cm long (Clark 1963, 72ff.). Many different types of projectile points are known from the Neolithic, they are generally made of stone (flint), but bonepoints are also found. Transverse arrowheads are found in the western part of the Linear Pottery culture, as well as the Funnel Beaker and the SOM culture. Pointed bifacial pressure-flaked arrowheads are common in the Middle Neolithic: Triangular points are known from the SOM and Altheim cultures for example, and leaf or lozenge shaped arrowheads in the Chasséen and Windmill Hill cultures (Clark 1963, 71). In the Late Neolithic the Bell Beaker culture had triangular arrowheads, often barbed and tanged, but sometimes hollow-based (Harrison 1980).

Other forms of equipment can also demonstrate the significance of archery. Wrist guards and arrow shaft smoothers are sometimes found in graves from the Bell Beaker culture. Wrist guards are often found together with copper daggers, but rarely with arrow points (Harrison 1980, 53). The existence of wrist guards, which shields the wrist from the lash of the bowstring, was perhaps connected to the use of powerful composite bows in the Late Neolithic (Rausing 1967, 47). Wrist guards were also used in the Middle Neolithic, however, and they might also have been made of materials such as bone, leather or wood, which are not preserved (Clark 1963, 77).

The distribution of bows and arrows can be an indication of the prevalence of warfare. Arrowheads are only found in the western part of LBK for instance, but since hunting was just as rare as in Eastern Europe, the arrows were probably used in warfare (Kruk & Milišauskas 1999, 298). It is difficult to determine the function of an arrow based on the shape of the arrowhead, but war points were often barbed or connected to the shaft in such a way that they remained in the wound when the arrow was extracted. The popular broad triangular arrow points are probably meant for warfare rather than hunting (Keeley 1996, 54ff.).

#### AXES

Polished flint axes are found during the entire Neolithic period and their occurrence in graves and hoards might suggest they also had a symbolic significance. They were probably tools for woodworking, but perfectly usable in combat (Whittle 1996, 277) and can therefore be considered as tool-weapons.

Bone and antler axes with shaft-hole and a sharp edge or point were also used in the Neolithic. They were tool-weapons used as hoes or weapons of war (Chapman 1999, 109).

Polished stone adzes are known from the Linear Pottery culture, in the form of shoe-last adzes and flat adzes. Use-wear analyses show that they were used for woodworking, but they could also have been used in combat (as demonstrated by the Talheim mass grave). Stone axes used as grave goods show that they were also a status symbol for men (Vencl 1999, 65). Battle-axes in many shapes have been found from the last part of the Early Neolithic onwards. They usually have one edge, but double-edged axes are also known, while others have a flat or knob-shaped neck usable as a hammer (Zápotocký 1992, 154ff.). Some researchers believe that battle-axes were ritual or symbolic objects and not used for practical purposes, because of their small size or slight shaft-hole. The variation in size is the same as ordinary Iron age axes, and the shaft-hole is not any narrower than that on antler axes from the Mesolithic. There is a group of miniature battle-axes however, that can only have had a symbolic or ritual function. The great morphological variation and the elaborate edges indicate that stone battle-axes were weapon-tools, or weapons,

while the hammeraxes likely were tool-weapons. A few finds suggest that the battle-axes had 50–60 cm long shafts, and they were probably held in one hand. The edge was not sharp enough to cut, so the battle-axes were likely used as a crushing weapon (Zápotocký 1992, 158ff.).

Copper axes are known from the Middle Neolithic, in the Funnel Beaker culture for instance, and battle-axes made of copper (so-called “Hammeräxte”) have been found on sites from the Altheim culture, while others probably belong to the Corded Ware culture (Müller-Karpe 1974, 234f.). Copper axes from southeastern Europe are the most likely models for many battle axe types. The solid copper axes can be described as tool-weapons, since some have use-wear from woodworking or mining, but their greater value and weight makes it improbable that they were not used in combat like the stone axes (Chapman 1999, 111).

#### MACES

The simple wooden club is probably one of mankind’s oldest weapons, but they are rarely preserved. Polished stone maceheads with a drilled shaft-hole are known from the Early Neolithic onwards, but they are most common in the Corded Ware culture, where they are round, with a smooth surface and a conical shaft-hole (Beková-Berounská 1989, 219ff.). Stone maces can be considered the first specialized weapon, or perhaps a weapon-tool, but other uses than combat is hard to imagine. A mace is a crushing weapon, and the small maceheads might have been used to finish off a wounded enemy (Chapman 1999, 110f.).

#### SPEARS

A spear is a very effective weapon that can be used both in a melee and at a distance. Spear points are relatively rare in most of the Neolithic period, but spears made entirely of wood might have been used (Vencl 1979, 688f.). Wooden spears have been found in Switzerland, while a 1,85 m long pointed spear made of hazel was found in Somerset, England (Green 1980, 170).

Flint points weighing more than ten grams were probably meant for spears rather than arrows (Raus-

ing 1967, 164). Examples might be the large leafshaped points (up to 10 cm long) from England or from the Altheim culture. Bifacial pressure-flaked flintpoints, which can also be interpreted as spears, are found in several Middle Neolithic cultures. Long blades are known from the SOM culture, but they could also have been used as daggers (Howell 1983, 71). Spears become much more common in the Late Neolithic, where they are found in the Corded Ware culture, for instance (Müller-Karpe 1974, 233). In the Middle Neolithic copper spear points were used in southeastern Europe, at the same time as points made of stone and bone, which can be considered lower-status imitations of the metal weapons (Chapman 1999, 128ff.).

#### DAGGERS

Knives made of flint and bone are known from the entire Neolithic period, but daggers are relatively late. Blades of Grand-Pressigny flint are known from the SOM culture (Howell 1983, 71), while pressure-flaked flint daggers are known from the end of the Late Neolithic in Denmark and England (Harrison 1980, 103).

Daggers have the widest distribution in the Corded Ware and the Bell Beaker cultures, where they are made of flint or copper. In the Globular Amphora and the Corded Ware cultures leafshaped rivetted copper daggers are found in hoards, often with battle-axes (Müller-Karpe 1974, 237). Daggers are especially known from the Bell Beaker culture where tanged flat copper knives, sometimes with rivet holes, are found as grave goods (Müller-Karpe 1974, 237).

#### DEFENSIVE WEAPONS

Only one defensive weapon is known from the Neolithic, a wooden shield from a Late Neolithic Globular Amphora tumulus in Langeneichstädt, Kr. Querfurt, Germany (Vencl 1999, 66). The earliest forms of armour were probably just reinforced clothing, using several layers of covering or stiff leather. Shields could have been made of wood, either solid or a frame of wood covered with leather. Such types of defensive armour are made of organic materials and have therefore disappeared from the archaeological record (Vencl 1979, 692). Armour, shields and helmets are

fully developed in the Bronze Age, however, so primitive versions have probably existed in the Late Neolithic, if not before.

#### TRANSPORTATION

According to some researchers the horse was domesticated on the Pontic steppes around 4,000 B.C., based on the appearance of wear traces on horseteeth (Anthony & Brown 1991, 35f.). The evidence is not conclusive, however, and the date still under debate. The use of horses is often connected to a pastoral subsistence strategy, but they are also of great military importance. Horses provide tactical manoeuvrability and allows rapid surprise attacks and raids at a longer distance. The use of horses would therefore have had a profound influence on warfare in the Neolithic, but there is no decisive evidence for a military use of horses or the appearance of mounted warlike pastoralists (Chapman 1999, 134ff.). The Globular Amphora culture and other Late Neolithic cultures might have used horses, and horse burials are known from the Corded Ware culture in Poland (Kruk & Milisauskas 1999, 339).

The use of wagons is indicated by double burials of cattle (probably draft animals), clay models and pictures of wagons from the Middle Neolithic, but the earliest wagon parts are from the Late Neolithic (Sherratt 1981, 263ff.). Parts of two-wheeled vehicles with wooden wheels have been found in Holland, Denmark and Germany. These carts were likely pulled by oxen and were very slow (Kruk & Milisauskas 1999, 322f.), but they could have been logistically important during raids. The use of wagons is also suggested by the presence of roads built through bog areas, such as a one kilometre long and four metres wide track way built of wood in Meerhusener Moor in Niedersachsen, Germany (Probst 1991, 239f.). Finally dug-out boats could have provided transportation along rivers or coasts, and allowed an attacking force to carry more supplies, thus increasing its effective range, and to transport more plunder.

#### THE IMPORTANCE OF WEAPONS

Weaponry in the Early Neolithic can, as mentioned, be described as tool-weapons, which were primarily

used for woodworking or hunting. The bow was the most sophisticated weapon, and ranged combat probably dominated. In due time specialized battle-axes and maces were developed, showing that close combat was now perhaps of greater importance, and that the intensity of conflicts increased. Shock weapons are very effective, but they also put the wielder in great risk of being killed or wounded. In the Late Neolithic the number of burials containing battle-axes rises dramatically, probably corresponding to an increase in warfare (Kruk & Milisauskas 1999, 328ff.). Other melee weapons, such as spears with a flintpoint and daggers, are also commonly found, and the development of protective armour might have started in this period. The dagger could have been used to deliver a coup-de-grâce to a wounded enemy, and might indicate that warfare had become more deadly. Another interpretation might be that warfare became more ritualised, since the use of a dagger would have required an extremely close fighting situation. The bow dominates again in the Bell Beaker culture, where wrist guards and arrowheads in the graves show its importance.

The use of weapons as grave goods appears to have been mainly symbolic, and weapon sets cannot be inferred from the burial data, but weapons were clearly seen as status symbols. Stone axes and adzes are found in male graves as early as the Linear Pottery culture (Whittle 1996, 173), and they are prevalent in the Corded Ware culture. In the last part of the Late Neolithic the battle-axe was replaced by the dagger as the main status symbol (Harrison 1980, 37). The symbolic nature of buried weaponry has led to the conclusion, that they had no practical function whatsoever. Maces for example are described as symbols of power, rather than weapons (Dolukhanov 1999, 82), and copper axes as a form of money. The symbolic importance of weapons must have a reason, however, and the most likely explanation is their use in warfare.

## ENCLOSURES

Fortified sites indicate the need to defend against enemies, and therefore demonstrate the importance of warfare. This type of Neolithic structure has many terms (enclosures in English, Einhegungen in German

and enceinte in French), but not all enclosures are defensive in nature. Fortifications can be either fortified settlements or refuges without occupation, but enclosed sites also include structures with other functions, such as folds for animals, ritual centres or central assembly places. Defended sites provide evidence of many different aspects of Neolithic warfare. The character of the defensive structures and the topographical placement of the sites might indicate their defensive or offensive significance as well as the relation to important resources, and lines of communication can possibly show the strategic importance. The co-operation necessary to build large-scale fortifications also provides evidence about the structure of society.

### EARLY NEOLITHIC (5,500–4,200 B.C.)

The first farming settlements in northwestern Europe belong to the Linearbandkeramik (LBK) Culture (5,500–5,000 B.C.), which settled on the loess soils from southeastern Europe to the Rhine. In the beginning the enclosures consisted of a single rectilinear ditch, like Eilsleben in the northern Harz, Germany (Höckmann 1990, 67). From the later phases of LBK several enclosures are known (60 according to Höckmann 1990), and they are usually placed prominently, such as on promontories near several settlements. The enclosures are surrounded by a palisade fence and a ditch (V-shaped, pointed or flat-bottomed). They are often rounded and the size is usually 1 hectare, but larger enclosures are known (Andersen 1997, 174). Some of the structures surround houses, while others have no occupation (Keeley & Cahen 1989, 158).

In Vaihingen an der Entz parts of a fortified settlement have been excavated. In the first phase the settlement was composed of several houses, but later one to two palisades and a flat-bottomed ditch (1.5–2.5 m wide and 1–1.3 m deep) surrounded an area of nearly two hectares. The ditch lay open in one or two generations before it was reused as a burial ground (see Skeletons) (Krause 1998, 6ff.).

Darion in Belgium is a similar enclosure from late LBK (Fig. 3). The oval enclosure consists of a series of interrupted pointed ditches (1.5–2.5 m deep) in front of a palisade (in some places a double palisade),



Fig. 3. The Darion enclosure in Belgium (Andersen 1997, 176).

and surrounding four Linear Pottery houses. In the southern end a “baffled” gate protects an opening, and in the northern end a rectangular structure might be interpreted as a tower. Darion is 1.6 hectare large, but the northern part seems to have been used for pasture (Keeley & Cahen 1989, 160ff.).

On the Aldenhovener Platte several settlement clusters, as well as nine enclosures, has been uncovered. Langweiler 8 for instance had three concentric ditches, while Langweiler 9 consisted of a single ditch interrupted by three entrances (Whittle 1996, 174). The sites had no traces of palisades or occupation, but small vertical stakes in the bottom of some of the ditches might represent sharpened stakes used as a form of defence (Modderman 1988, 103).

Köln-Lindenthal from the last part of the LBK Culture consists of a sequence of enclosures, among them a large enclosure with a more than one metre deep ditch and a palisade, and a smaller enclosure surrounded by a pointed ditch. More than 30 houses have been found at the site, which also had open areas (Probst 1991, 254), but the occupation phases might not be contemporary with the defensive structures.

Today the Linear Pottery sites are usually regarded as cult places, contrary to earlier interpretations as animal pens or fortifications (Andersen 1997, 177). The use of the LBK enclosures as fortifications might be supported by their distribution, however, since most enclosures are found in the western parts of the culture and along the limits of the LBK settlement zone. This suggests that the enclosures were built as a defence against the Mesolithic hunters living beyond the loess soils. In Belgium there is also a no-man’s land between the Mesolithic and the LBK settlement, even in areas where there were no geographic barriers (Keeley 1997, 306ff.). The critical situation is noted at the Oleye enclosure, in the same area, where the first Neolithic settlement was destroyed by fire, and subsequent houses were surrounded by a ditch and a palisade (Keeley & Cahen 1989, 164f.). Several facts thus suggest that the relations between the western part of LBK and the local hunter-gatherers were less than peaceful.

In the last part of the LBK, around 5,000 B.C., the culture dissipates into several local groups, such as Lengyel in the eastern part of central Europe, Stichbandkeramik in parts of Germany and Poland as well

as Hinkelstein and Grossgartach near the Rhine. These groups are superseded by, for example, Rössen in Germany and Cerny in northern France (Whittle 1996, 177).

A number of characteristic enclosures are found in the Stichbandkeramik and Early Lengyel cultures. A “Kreisgrabenanlage” or “Rondel” has up to three concentric circular ditches and palisades, and usually four symmetrically placed entrances (Andersen 1997, 155). The ditches are often pointed, about one metre deep and one to ten metres wide (Petrasch 1990, 449ff.). Sometimes the entrances are marked by a curve in the ditches, seen for example at Svodin in Slovakia, or they are connected by a trench, as at Künzing-Unterberg in Bavaria. The larger structures have a higher number of ditches and palisades. At some sites the material from the ditches have formed a rampart behind a palisade, but at Svodin the soil lay between a triple palisade, thus forming a four metres high and eight metres wide wall (Petrasch 1990, 473ff.). The enclosures are placed in the same locations as ordinary settlements, but they show no signs of occupation. The “Kreisgrabenanlage” are usually interpreted as religious or political centres (Petrasch 1990, 512f.).

Enclosures are also known from the latest part of the Early Neolithic in France and Germany. They are often oval or circular in shape, with a ditch and sometimes a palisade, but generally without traces of occupation. Causewayed ditches begin to appear and some enclosures are now positioned in high, conspicuous places. Barry-au-Bac in the northeastern France was a circular earthwork with a diameter of 140 metres, it had a shallow ditch in front of a palisade, probably with a rampart behind. The only entrance was one metre wide, and four timber buildings were found in the interior (Ilett 1983, 29f.). Fortified settlements are also known from the Rössen culture. A settlement at Goldberg in Baden-Württemberg was fortified on the approachable western side with a ditch and a palisade, but the site was destroyed by a conflagration (Probst 1991, 293).

#### MIDDLE NEOLITHIC (4,200–2,800 B.C.)

Middle Neolithic enclosures are known from several different cultures all over northwestern Europe, such



as Chasséen in France, Michelsberg in the western parts of Germany and the Funnel Beaker culture in Germany and Poland. Agriculture also spread to the British Isles and Scandinavia in this period, where enclosures are known from the Windmill Hill and Funnel Beaker cultures respectively (Andersen 1997, 183).

Many enclosures are found in the western part of France, belonging to the Chasséen culture and its many local variations (especially the Matignon and Peu-Richardien groups, 3,800–2,900 B.C.). The enclosures are often of considerable size, with one to five causewayed ditches and sometimes a rampart, wall or palisade. The shape is circular or semicircular and the size ranges from one to nine hectares. The enclosures are sometimes placed very close together, often near wetlands or on neighbouring hills. The most common form of enclosure is characterized by a special type of gate with a protective outwork called “pince de crabbe”, seen for example at Chez-Reine, Semussac (Fig. 4) (Andersen 1997, 233ff.). Another type of enclosure is Champ Durand, which had three causewayed ditches. The innermost ditch was rock-cut, five metres wide and 2.5 metres deep, while the other ditches were successively smaller. Dry-stone foundations suggest there might have been stone walls and a stone tower, while postholes indicate substantial timber constructions at the gate (Scarre 1983, 254ff.).

In eastern France enclosures are known from the NMB culture (Néolithique Moyen Bourignon, 3,800–3,400 B.C.). The enclosed sites are often located on high ground, and typically consist of a stone rampart and a ditch, which cut off a promontory. Some of the sites were possibly occupied, while others were refuges (Andersen 1997, 216f.).

Similar enclosures are also found in southern France, while the Fontbousse culture built enclosures surrounded by stone walls with circular towers (Andersen 1997, 143). Boussargues in Hérault was 30 m x 45 m and had six circular bastions attached to the dry-stone enclosure wall. The site was located on a prominent topographical position (Mills 1983, 121ff.).

The many enclosures belonging to the Michelsberg culture (4,300–3,400 B.C.) were located on sloping ground, on plateaus or beside rivers. The form was oval or curved, with one side protected by the local topography. The size was typically 5–5.75 hectares,

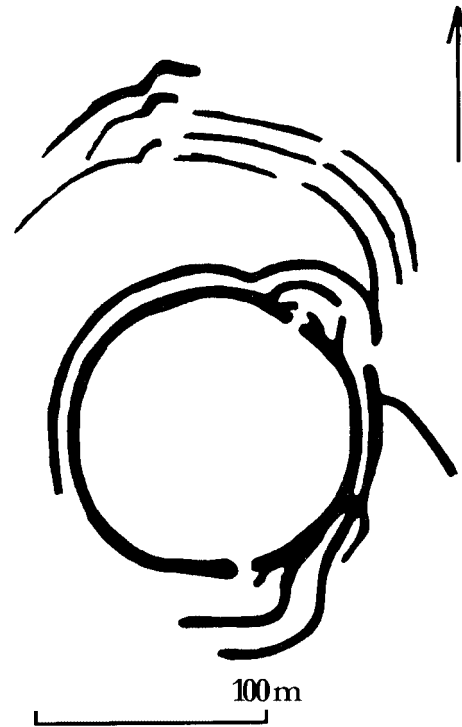


Fig. 4. Chez Reine from France, with outworks protecting the gates (Scarre 1983, 255).

but both smaller and much larger enclosures are known (Andersen 1997, 185ff.). The sites were surrounded by a palisade and up to five causewayed ditches, both elements can be found separately or in combination (Eckert 1990, 408). Ramparts were rare, but the palisades were of considerable size, with posts up to 85 cm in diameter and a height of five or six metres (Andersen 1997, 196f.). Urmitz is a large semi-circular enclosure beside the Rhine. It was composed of two causewayed ditches and a single palisade, perhaps constructed in several phases (Eckert 1990, 402). Ten bastions, i.e. small projecting passageways or rectangular enclosures, were found at the causeways of the innermost ditch. They might have served as extra protection of the gate or have been used for special activities, and are also known from several other Michelsberg enclosures (Andersen 1997, 198).

East of the Michelsberg culture, in Germany and Poland, there were several different subgroups of the Funnel Beaker culture (TRB), many of which had enclosures. Fortified sites located on high ground are

called Höhensiedlungen, but the term includes both normal and fortified settlements (Midgley 1992, 346f.). In the Elbe-Saale area, for example, 20–30% of the settlements are fortified (Kruk & Milisauskas 1993, 314). The enclosure Dölauer Heide near Halle probably belongs to the Baalberger culture (4,200–3,500 B.C.), and lay on a high plateau like most enclosures from this culture (Fig. 5). Up to six ditches and ramparts in front of a single palisade enclosed an area of 25 hectare. Only three gateways provided access to the interior, which unfortunately has not been excavated, so the function of the site is not known (Andersen 1997, 208). Altheim is a 0.24 hectare large enclosure from the Altheim culture in southern Germany (3,800–3,400 B.C.), with three ditches, a palisade and two entrances. In the up to five metres wide and 2 metres deep ditches broken pottery, 174 arrow points and at least twenty skeletons were found. The finds are interpreted as sacrifices at a cult site or as the traces of a battle (Petrasch 1999, 505f.).

In the Alps several different cultures, like Cortaillod in Switzerland for example, were contemporary with Michelsberg. Large fortified sites are unknown, but small settlements near lakes or wetlands were often built on piles and surrounded by palisades (Probst 1991, 476ff.).

Enclosures and Höhensiedlungen continued to be built in the last part of the Middle Neolithic, and are known from the Wartberg, Chamer and Walternienburg-Bernburger cultures for example. The sites were often settlements located on high ground, with up to five parallel ditches and a palisade. The form varies and often depends on the local topography (Probst 1991, 368ff.). Enclosures with no traces of occupation are also found, like Calden from the Wartberg culture, which had two ditches and two palisades enclosing an area of 14 hectare. There were seven gateways, but two were blocked by projecting bastions (Fig. 6) (Andersen 1997, 204ff.). The enclosures from the Walternienburg-Bernburger culture were smaller (up to 3.5 hectares), but varied greatly in form and construction. Langer Berg, for example, was an oval enclosure with a palisade and a ditch. The palisade was double on one side, forming a 35 metres long entrance passage (Andersen 1997, 213ff.).

The northern part of the TRB culture also began to construct enclosures with causewayed ditches and

palisades. They were placed on hilltops or promontories, like Sarup on Funen, Denmark, often close to wetlands. Objects found at the sites seem to have been specially selected and suggest that the sites were used for rituals (Andersen 1997, 270ff.). Recent finds indicate that a second generation of enclosures were constructed in the late Funnel Beaker culture and the Battleaxe Culture. These enclosed sites consisted of single or multiple palisades, but lack ditches. The palisade enclosures probably had multiple functions, including defence, ritual activity and axe production (Svensson 2002, 45ff.).

In England 63 enclosures are known from the Windmill Hill culture, most from the southern parts of the country. These sites generally have up to four causewayed ditches and are placed in prominent positions relative to the local topography (Andersen 1997, 244ff.). At Hambledon Hill in Dorset several enclosures have been excavated, the main enclosure was located on the top of the hill and had a causewayed ditch surrounding an area of nine hectares (Fig. 7). The occurrence of burials and prestige objects suggests that this enclosure served as a cult place. At the southeastern spur of the hill was the Stepleton enclosure, which covered one hectare and was almost circular. Stepleton had a 1.5 metres deep causewayed ditch and a rampart encased in a timber framework, no buildings were discovered in the interior, though domestic rubbish suggests it was occupied. The site was still in use when the fortifications were greatly enhanced. The whole hilltop of Hambledon, an area of 60 hectares, was enclosed by a causewayed ditch and a rampart revetted with timber. Later two lesser ditches and a rampart were added on the south side, where the hill was most easily approached. In spite of these massive fortifications the site seems to have been attacked, and at least 120 metres of the timberworks on the rampart were destroyed in a conflagration (Mercer 1989b, 6ff.) (see also Middle Neolithic skeletons). Crickley Hill, a small enclosure near Cheltenham, had a causewayed ditch and a low bank with a palisade behind (during one phase). More than 400 arrow points were found at the site, and their distribution indicates that archers attacked the enclosure (Fig. 8). Concentrations of arrow points were found near the entrances and along the palisade, which seems to have been used as a breastwork (Dixon

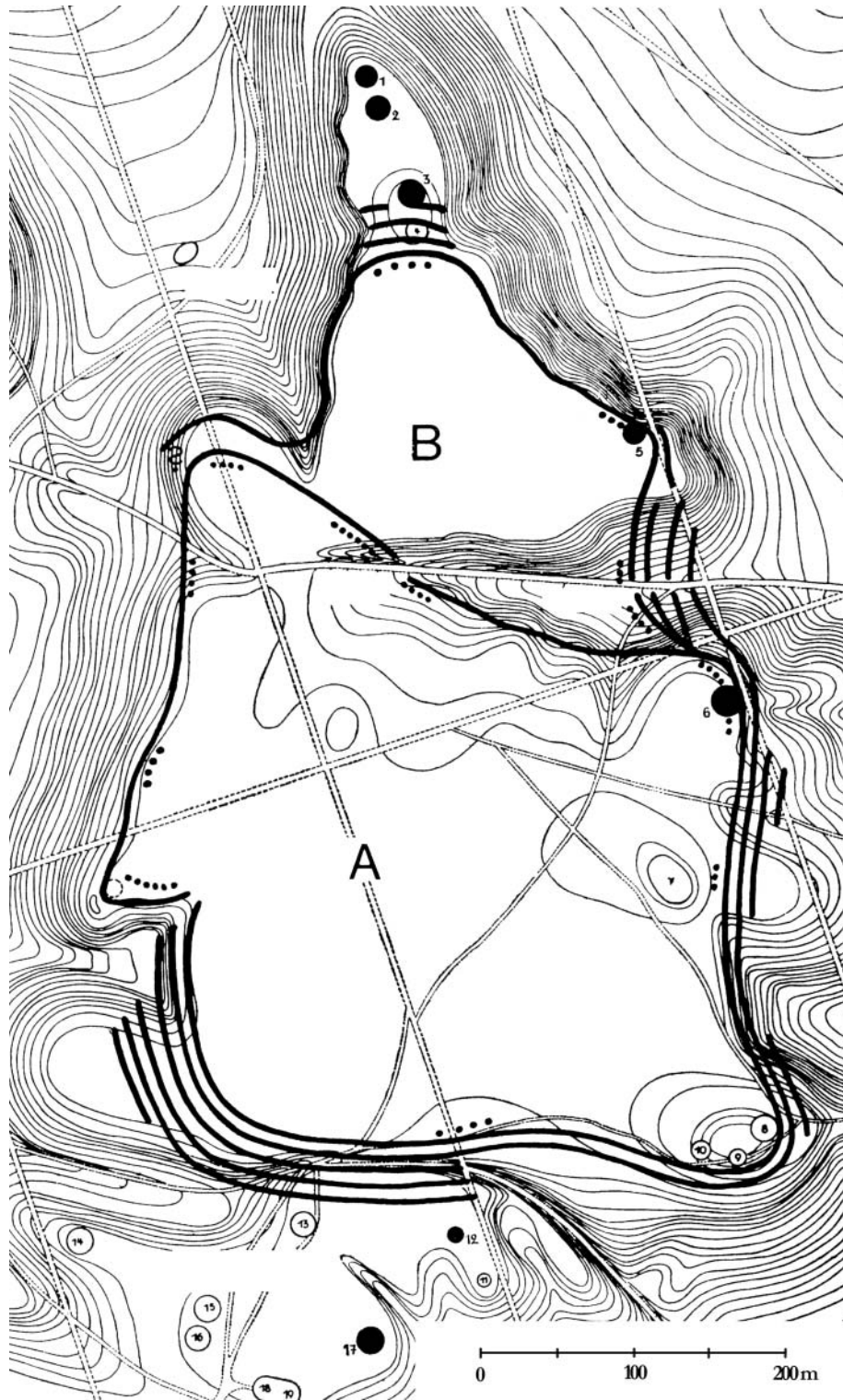


Fig. 5. Dölauer Heide near Halle, Germany (Andersen 1997, 209).

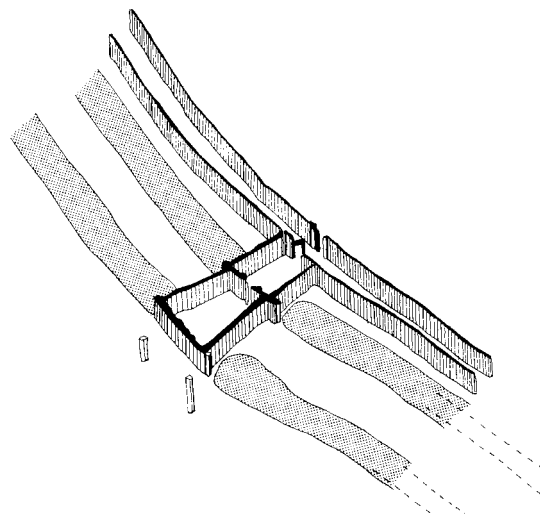
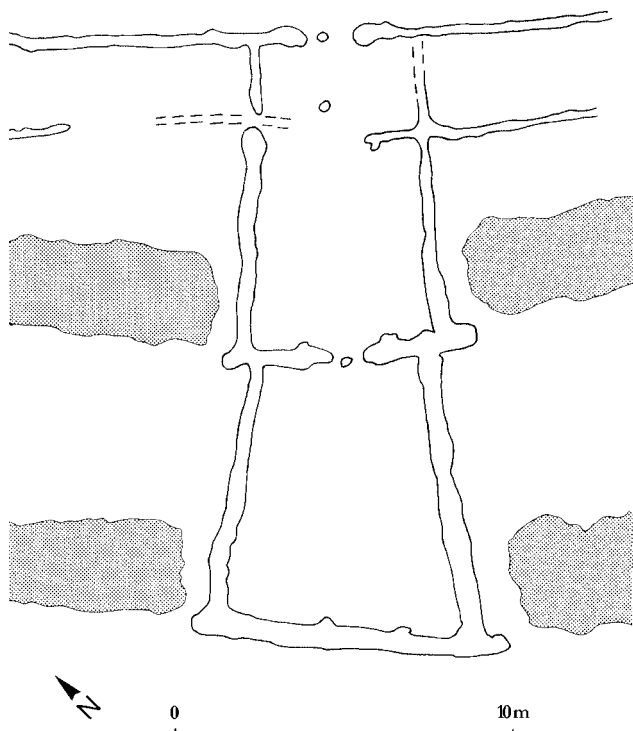


Fig. 6. Bastion at the Calden enclosure near Kassel, Germany (redrawn from Andersen 1997, 204).

1988, 82). Carn Brae in Cornwall was a small 1-hectare enclosure, surrounded by a greater enclosure composed of a ditch and a stone revetted rampart with complex gates (six hectares). The inner enclosure had a more than two metres high stone wall, built of massive boulders, and housed a small settlement. Carn Brae was destroyed in a fire and at least 800 arrow heads left on the site suggest it was attacked by a large force of archers (Mercer 1989b, 2ff.).

#### LATE NEOLITHIC (2,800–2,200 B.C.)

The construction of enclosures almost ceased in the northwestern parts of Europe during the Late Neolithic. The settlement pattern changed and the Corded Ware and Bell Beaker cultures are characterized by small and dispersed settlements (Starling 1985, 34f.). Enclosures continued to be built in England, however, in the form of so-called Henge Monuments, which were circular structures composed of ditches and timber posts or stones (like Stonehenge)

(Andersen 1997, 265f.). In the Mediterranean small enclosures with stone walls and bastions were constructed up until 2,000 B.C. (Andersen 1997, 145).

#### THE FUNCTION OF ENCLOSED SITES

Enclosures have been interpreted as refuges, fortified settlements, corrals (so-called kraals) or centres used for ceremonial, social or economic activities. Today most enclosures are regarded as cult sites, on account of the finds of pottery and parts of skeletons in the ditches. It is also claimed that the sites have no traces of proper occupation and that the physical barriers did not have a defensive function (Andersen 1997, 301ff., Whittle 1996, 266ff.).

There are two types of enclosures: Fortified settlements and enclosures without occupation. Houses and settlement waste has been found at many sites, but it can be difficult to ascertain that the settlement and defensive structures are contemporary. There are several examples of regular fortified settlements, how-

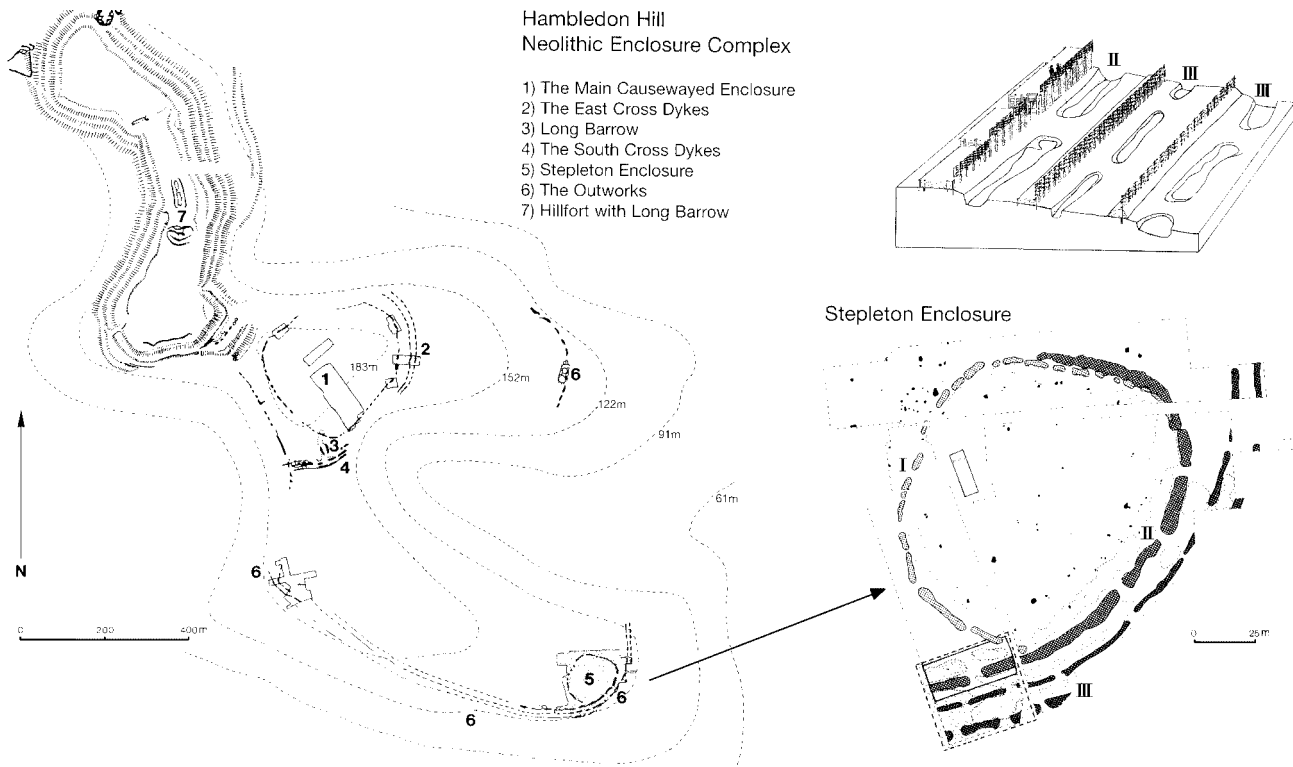


Fig. 7. Hambledon Hill in Dorset, with reconstruction of the Stepleton enclosure (redrawn from Andersen 1997, 245).

ever (some of which have been mentioned above), but ditches and palisades can also be a symbolic marking of the settlement, rather than a defensive structure, and are therefore not irrefutable proof of warfare (Chapman 1999, 107). It is even more difficult to determine the function of enclosures with no trace of occupation. Kraals are often used to protect animals from being stolen, and thus might be an indication of raiding (Modderman 1988, 103), but the often very complex structures contradict an interpretation as corrals (Keeley & Cahen 1989, 170). The interpretation of the enclosures as central assembly places or ceremonial sites is supported by the fact that some enclosures seem to have had no defensive function, like the Langweiler sites which only had a single ditch, or Kreisgrabenanlage without palisades. At some Middle Neolithic sites the ditches seem to have been deliberately refilled (Andersen 1997, 287f.), which excludes that the ditch had a defensive function and the existence of a rampart. But is it really possible to determine whether 5–6,000 year old ditches have

been refilled immediately or after a few years? The specially selected objects and the many causeways are also traits, which have been used as arguments against a defensive function, but some of the causeways are not entrances, since there is no opening in the palisade behind the ditch (seen for example at Urmitz). Objects found in the ditches have often been deposited after the construction, and therefore do not necessarily reflect the original function of the site.

One of the major problems with the interpretation of the Neolithic enclosures is that the same model is used on a large and very diverse group of sites. It is therefore more appropriate to examine which features might be of defensive importance, rather than discuss whether the enclosures were exclusively for ritual activities or fortifications.

Fortifications are composed of three elements: A ditch, a rampart and a palisade or wall, either separately or in combination. Several consecutive barriers can be termed a “defence in depth” (Mercer 1989a, 16f.). The palisade probably had the greatest distri-



Fig. 8. Distribution of arrows at Crickley Hill (redrawn from Dixon 1988, 83).

bution and importance in the Neolithic, ramparts are found at many sites while stone walls are very rare. Ditches alone do not protect the defender from missile attacks, but they can slow down a charge.

Fortifications can be characterized by the following features: Traces of fighting, such as weapons, fire, or signs of destruction. The presence of entrances, which restricts and controls access to the interior. Multiplication of defensive barriers, especially at vulnerable places, which reveals a concept of defence in depth. Protection of the palisade or wall by flanking towers or bastions. Placement at inaccessible locations with a good view (Vencl 1999, 68f).

Weapons are rarely found at enclosures, apart from

the arrowheads found at some English enclosures, but signs of destruction are known from several sites, Goldberg and Stepleton for example. The weakest point in a fortification is the entrance, and several Neolithic enclosures have elaborate gate constructions, such as an extra palisade which shields the entrance (as at Darion and Langer Berg) or the protective outworks, called “*pince de crabbe*”, found on the Middle Neolithic enclosures in France. A defence in depth is known from many enclosures, such as the six ditches at one side of Dölauer Heide (Fig. 5). This type of barrier delays the enemy and keeps them in a “killing zone”, where the defenders may dispatch them with missile fire before they reach the palisade

(Mercer 1989a, 16f.). The bastions found at some enclosures might have functioned as flanking towers, while the open bastions might have been some kind of gate protection. The placement of the enclosures also shows their tactical importance, since most are placed at inaccessible locations, especially at high points, but also beside wetlands or rivers, often with a natural boundary on one or more sides (Andersen 1997, 281f.). They often provide a good view of the surrounding landscape, which is a necessity if an approaching enemy is to be spotted in time.

Even though most of these features are missing an enclosure might still have served as a fortification, since some forms of defences, like impenetrable undergrowth or aboveground timber structures, leave no traces in the archaeological record. Another often neglected factor is the active role of the defenders. Archaeologists only find traces of the passive structures, whose importance is therefore often overestimated, but the value of a fortification is largely dependent upon the strength, skill and motivation of the defenders (Vencl 1999, 67f.). While few defenders could stop a small raiding party, the defence of a large enclosure against a determined army would demand a huge number of men. Even a small enclosure like Darion in Belgium probably required 80–100 defenders (Keeley & Cahen 1989, 168). The construction of most enclosures would also have required the collaboration of several settlements, and therefore shows the existence of a chief or some form of social organization, which comprise different groups (usually based on kinship structures). Though an enclosure was used as a fortification, it does not preclude other functions. It is only natural that a large structure, whose construction would have required the cooperation of several settlements, also gained an economic, social and ritual significance. The fortification only protects a small area, which therefore attains a special importance (Chapman 1999, 107).

The tactical use of Neolithic enclosures might have differed a great deal from the use of fortifications of later times, so an interpretation cannot be based on modern military principles (Petrasch 1990, 512). It is impossible to build an impregnable fortification, but the defences can prevent a direct assault and force the enemy to lay siege. Neolithic fortifications were not built to withstand a prolonged siege, however,

since most enclosures had no source of drinking water inside the defences (Andersen 1997, 301f.), but neither did the attacker have the logistic capability to keep an army in the field for more than a short time (Keeley 1996, 44). Thus, the primary function of the defensive barriers was to slow down and delay the attacker. Fortifications from historic times sought to prevent the attacking force from reaching the wall or palisade, keeping them in a killing zone where they could be eliminated with missile weapons, but this requires a sentry ledge or a rampart behind the palisade. This can be seen at Champ Durand, for example, where the defenders could fire over the lower outer defence-works (Fig. 9) (Scarre 1983, 254ff.), and at Crickley Hill, where the distribution of arrow heads shows that the palisade was used as a breastwork (Dixon 1988, 82). Some Neolithic enclosures, especially the fortified settlements, did not have a rampart, however, so the defensive barriers could only prevent access and afford protection against missile fire. This is not a military shortcoming, which prevented the enclosures from being used as fortifications, but a reflection of the nature of war in the Neolithic.

#### NEOLITHIC WARFARE

A single find of a weapon or a skeleton with injuries is not necessarily evidence of warfare, and of the social, economic and ideological changes caused by war. Anthropological sources show that warfare is common in most primitive societies, however, while Neolithic weapons and fortifications from northwestern Europe demonstrate that the necessary technology and social organisation were present for warfare to occur. When the archaeological evidence, in the form of injuries on skeletons, weapons and fortifications, is put together, it clearly proves that war was not infrequent in the European Neolithic.

It is very difficult to estimate if warfare was a common phenomenon, the best indication possibly being the frequency of injuries. The number of skeletons with injuries is influenced by the frequency of anthropological surveys and the preservation of the material (Petrasch 1999, 509ff.). Casualties left on the battlefield are rarely preserved, for example, so the injuries which are archaeologically visible probably only represents a small part of the victims of Neolithic warfare

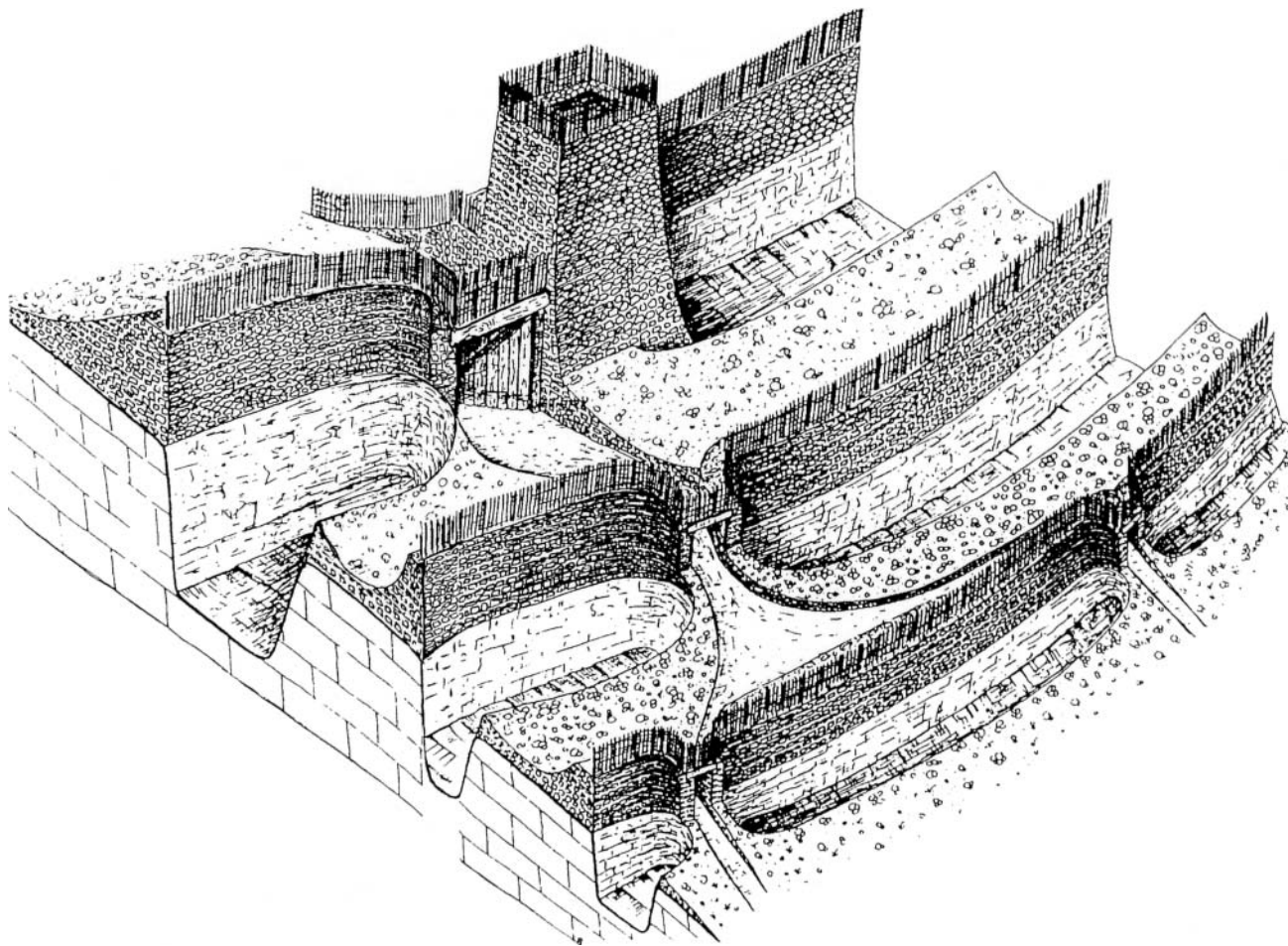


Fig. 9. Reconstruction of Champ Durand, France (Andersen 1997, 238).

(Vencl 1999, 57f.). The skeletal material from the Linear Pottery culture is well documented and shows that up to 20% of the individuals died as a result of violence (Petrasch 1999, 509), but figures are not available for the later parts of the Neolithic. The distribution of weapons might indicate if warfare was frequent, but many types of weapons have no doubt also been used as tools. A fortification requires an enormous amount of labour to build and therefore suggests that war was considered a serious threat, but the sites could also have had other functions. The development of specialized weapons and the construction of fortifications testify that war was a very important aspect of Neolithic society, even though it might have been a rare occurrence in some phases.

Anthropological theory indicates that the acqui-

sition of material resources is one of the most common causes of war. The introduction of agriculture increased the possibilities of storing food in the form of grain or livestock, but also made it possible to plunder food stores. The growing importance of domesticated animals in the Middle Neolithic probably also led to an escalation of warfare (Sherratt 1981, 297). A primary function of many enclosures might have been to protect livestock from raiders, and cattle in particular would have been an important form of mobile wealth, because it was central to the Neolithic economy and easier to lead away than other domestic animals (Mercer 1989a, 17f.). Many enclosures also played an important role in the production and distribution of axes (Svensson 2002, 49). Raw materials were another disputed resource, as they are often un-



evenly distributed and some groups would have to trade or steal resources such as hard stone, flint, salt or copper.

In addition to conflicts over scarce resources, there is also an increased frequency of war near borders between different groups and when warfare becomes a way of life (Chapman 1999, 140f.). The distribution of enclosures and arrowheads from the Linear Pottery culture, for example, suggests that the LBK farmers were fighting local hunter-gatherers (Keeley 1997, 306ff.). The appearance of military specialists have a self-reinforcing effect on the frequency of war, since these take a personal interest in warfare. Weapon graves might indicate a personal identity as a warrior; a distinct class of warriors is suggested by the graves from some areas of the Corded Ware culture, where battleaxes are found in 10% of the graves (Zápotocký 1992, 167ff.).

The military organization in the Neolithic was probably based on the kinship structure, and the use of common tool-weapons suggests that everyone could participate in a war. Weapon graves and the development of specialized weapons might indicate the presence of trained warriors, but there is no evidence of a professional army. The character of war was conditioned by the limited economic and logistic capabilities of the Neolithic society, since a large surplus would have been necessary to supply a standing army. Neolithic warfare was therefore characterized by rapid assaults or short raids, generally lasting no more than the few days it would take before the attacker ran out of supplies. If the conflict was prolonged, the attackers own economy would begin to suffer and his home would be left unprotected against attacks from other enemies. A Neolithic warband had a limited range, since boats or slow wagons were the only means of transportation, and each warrior would consequently have to convey his own supplies.

It is difficult to estimate the size of armies in the Neolithic, but most offensive armies were probably small raiding parties. It would have required a considerable force to attack or defend one of the larger enclosures, however, and there are some archaeological indications of larger armies. Perhaps more than 1000 arrowheads were found at the Carn Brae enclosure, conceivably fired against the fortification by a large number of attackers, while the mass grave at

Roaix contained the remains of more than 100 persons who suffered a violent death, presumably at the hands of an attacking force of at least the same size. In the beginning of the Neolithic warfare was limited to local raids against nearby groups, but larger armies became possible when the social complexity increased. The changing social structure is evidenced by the construction of large-scale enclosures, which required the co-operation of several villages. These cross-cutting ties allowed the mobilization of armies capable of attacking the centres of neighbouring societies, while smaller armies were able to make long-distance raids without leaving their homes unprotected.

The anthropological analogies and the analyses of weapons, injuries and fortifications can indicate the Neolithic way of war. Missile weapons dominated in the beginning of the period, as they did in most primitive societies, but close-combat weapons were used to finish a fleeing or wounded enemy, as can be seen at Talheim (Wahl & König 1987). Shock weapons became more common in the Middle Neolithic, but the bow was probably still the most important weapon, as evidenced by the construction of fortifications designed to protect against archery.

Neolithic fortifications could not withstand a siege, since they often had too many entrances, no sources of drinking water inside the defences and sometimes even lacked a platform from which the defenders could attack the enemy. The defences gave protection against missile weapons, however, and they could break up and delay a direct assault, because the enemy would be forced to climb out of a ditch and over a palisade. The remains of an archery attack can be seen at Crickly Hill (Fig. 8), which also indicates a possible function for the causewayed ditches. During an assault the enemy will typically concentrate their attack on the entrances, since they are the weakest part of a fortification. The causeways would thus have functioned as narrow “killing zones” where the crowded enemy could be dispatched. It is also important to remember the psychological aspects of warfare, especially since a Neolithic raiding party probably consisted of volunteers who might be reluctant to sacrifice their lives by being the first attacker to scale the defences. Even a simple palisade provides the defender with considerable psychological and tactical

advantages, by obstructing the attacker's line of sight and by providing cover. In addition to hindering access a palisade would also make it much more difficult for an enemy to run away (especially if they were carrying booty), thus increasing the risk of getting killed. The defender, on the other hand, would need an escape route in case they were losing the battle, which is probably one of the reasons why many fortifications have several entrances, even though they weaken the defences. The conclusion is that Neolithic fortifications had very important military functions, and their design reflects the character of Neolithic warfare. They were primarily designed to protect against archery attacks and to deter the enemy from making a direct assault. The enclosures were thus proof against most raiding parties, but a determined army might be able to breach the defences.

In the Late Neolithic, melee weapons became more prevalent and new types, such as daggers and spears with stone points, were taken into use. The more lethal close combat weapons are often associated with high status and the use of military specialists, since the user is put at great risk. Defensive weapons might have been used as protection, but the earliest finds are from the Bronze Age where they, on the other hand, are fully developed (Vencl 1999, 66). Weapon graves demonstrate that battleaxes were widespread in the Corded Ware culture, while the somewhat later Bell Beaker culture emphasised bows and daggers. The bow was supplemented with wrist guards and barbed arrows, which are difficult to extract from a wound, while the dagger could have been used to

deliver a coup-de-grâce to a wounded enemy. Warfare seems to have become deadlier and more specialized in the Late Neolithic, but fortifications were no longer constructed. Considering that the enclosures were designed to protect against raids, this might indicate that the character of war had changed and that true battles became more common. It could also be an indication of a more mobile form of warfare within or between larger political units, which made a local stronghold ineffectual. The dispersal of the settlement in the Late Neolithic indicates the control of larger territories and might suggest that the population size increased. As a consequence it would have been necessary to increase the number of fortifications, but as an alternative to this costly enterprise the population was dispersed in order to reduce the risk for each settlement.

Warfare thus became more sophisticated and institutionalized during the Neolithic, and may have led to an increased social stratification. It is therefore important to consider war as a factor in the development of hierarchical chiefdoms. But warfare can also have a great impact on the fundamental aspects of a society, such as settlement patterns and subsistence. Analyses of the consequences of warfare requires investigations on a local or regional scale, since the frequency and intensity of warfare seems to have varied a great deal. This is perhaps the most important lesson: Even though war was prevalent in the Neolithic there are regions or periods where the evidence of war is scarce or absent, indicating that some Neolithic societies were able to solve conflicts without resorting to warfare.

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