

NATIONAL ACADEMY OF SCIENCES OF UKRAINE INSTITUTE
OF ARCHAEOLOGY CRIMEAN BRANCH

UNIVERSITY OF COLOGNE INSTITUTE OF PREHISTORIC
ARCHAEOLOGY

Palaeolithic Sites of Crimea,
Vol. 3 · Part 2

KABAZI V: INTERSTRATIFICATION OF
MICOQUIAN & LEVALLOIS-MOUSTERIAN
CAMP SITES

Edited by
Victor Chabai, Jürgen Richter and Thorsten Uthmeier

Simferopol – Cologne
2008

Site Catchment Analysis in the Late Middle Palaeolithic of Crimea: a GIS Based Approach

Thorsten Uthmeier, Sonja Ickler & Martin Kurbjuhn

Whereas large scale land use patterns have been investigated intensively in the past (for a summary cf. Chabai and Uthmeier 2006), small-scale analysis has focused mainly on such factors as site formation process, the analysis of evident and latent structures, and artefact and environmental studies (for an overview, cf. Chabai 2004c; Chabai, Richter and Uthmeier, eds. 2005, 2006). The aim of the present article is to elucidate land use patterns on a local to regional scale by analysing Neanderthal site catchment at Kabazi V during phases of different environmental settings. The stratigraphy of Kabazi V includes – at minimum – two cycles of climatic change between stadial and interstadial (Chapter 5, this volume). Within this sequence, Level III/1A and the underlying Level III/2 mark a relatively short period of time characterised by pronounced climatic changes; whereas conditions during the formation of Level III/1A were comparably mild and humid, and are assigned to the Denekamp interstadial, Level III/2 is assumed to represent the Huneborg stadial (Chapters 1 and 18, this volume). The aforementioned stadial is the most arid and coldest environment in the entire vegetational history of Kabazi V. Given the fact that both levels belong to the Crimean Micoquian and are separated by a relatively short period of time, any potential difference in site catchment can hardly be explained by cultural changes alone; instead, if severe differences are observed, these can be understood as Crimean Neanderthal adaptation to climatic change.

METHODS APPLIED: SITE CATCHMENT ANALYSIS AND GIS

C. A. Vita Finzi and E. S. Higgs (1970) first described the method of site catchment analysis. The method itself is based upon distances covered for the acquisition of daily needs between a given archaeological site and areas in which major resources are to be found. The resources itself are divided into “staple food”, e.g. those being an essential part of human diet, and “casual food”, e.g. those which

have a more supplementary character. Staple food resources are an essential part of daily diet. Depending on economy and ecology, these resources might include meat or grain and vegetables, or a combination of both, and are either gathered, hunted, or produced. Equally, they may be consumed immediately or stored for future needs. As such, site catchment analysis makes possible diachronic comparisons.

“Casual food” like spices, delicacies, or medicine and drugs, are considered to be in most cases less relevant for site catchments. Following economical approaches, it is assumed that the reachability of staple food in the “exploitation territory” around a site is important for its choice as a “home base” (Vita Frinzi and Higgs 1970, p. 6), a term that is now widely substituted by “residential camp” (Binford 1980), or as a “transit site”, which would now be called “locations” or “stations” (Binford *ibid.*). Spatial reachability is understood as the distance between the residential camp and the area of resource distribution. A major precondition for this is the assumption that decisions are made on grounds of economically profitable distances, i.e. the energy spent on acquisition should be outweighed by the output of the procurement activity. Thus, amongst identical or similar settings in areas where desired resources exist, short distances will be preferred (Vita Finzi and Higgs 1970, p. 7). C. Vita Frinzi and E. Higgs (1970, p. 7) recommend distances measured in terms of time taken. With reference to ethnographic studies (Table 17-1), they investigated resources that could be reached in a walking time of two hours. M. Walker *et al.* (2004) use 1 hour, 2 hour, 3 hour, and 4 hour walking distances (each understood as a one way distance). In general, preferences will be determined on the basis of long-term minima, rather than temporal maxima, in the abundance of food resources in certain areas around a site. However, tactical considerations, e.g. a particularly suitable relief for given hunting techniques, may also play

an important role. Equally, decision-making may also be influenced by seasonal changes in the availability of staple food resources. If seasonal fluctuations are large, it may be necessary to have more than one exploitation territory. In this case, which is the rule amongst Pleistocene hunter-gatherers, varying numbers of residential camps surrounded by their exploitation areas constitute the annual territory (Vita Finzi and Higgs 1970, p. 7).

In this article the diameters of different walking times are computed using Geographic Information System (GIS), a method which provides an insight into the varying efforts required when moving within different types of relief. For example, distances that can be covered in two hours walking in a plain will differ significantly from those covered in a mountainous landscape. Whereas some tendencies might be foreshadowed by observation of conventional maps, exact values are difficult to estimate. The same applies to the relative amounts of landscape features, such as plateau, steep limestone cliff or flood plain. These are of major importance when reconstructing the potential Pleistocene vegetation, which results from the composition of species in the studies of pollen, spores, snails and small mammals, and their habitat requirements (relief, exposure to sun, etc.). From a methodological point of view, large mammals are a dependent variable of the reconstructed vegetation. It is on the basis of relief and plant cover that the distribution of large mammals is estimated. All GIS calculations were computed with ArcGIS, version 9.2.

	Vita Finzi and Higgs 1970		Walker <i>et al.</i> 2004	this article
	farmer	hunter-gatherer		
average walking distance or time taken for the acquisition of staple food resources (one way)	1 km	2 hours	0.5 hours	1 hour
maximum walking distance or time accepted as “economic” for the acquisition of staple food resources (one way)	3-4 km	10 km (!Kung groups)	2 hours	3 hours (Kabazi II - Bodrak valley)

Table 17-1 Economical rating of walking distances necessary for the procurement of staple food resources as used by several authors in site catchment analyses.

THE SETTING: KABAZI MOUNTAIN

Kabazi Mountain is situated in the second (internal) range of the Crimean Mountains. Altitudes range between 300 and 800 m asl. As the lowermost, third range is hardly visible, the northernmost cuestas of the second range of the Crimean Mountains (including Kabazi Mountain) mark the beginning of a more mountainous landscape. Most cuestas are representative of separate ecotones, i.e. are transitional areas where two or more communities overlap (Vita Finzi and Higgs 1970, p. 5). In the case of Kabazi Mountain, steppe region and medium sized mountains overlap on a large scale, whereas the Alma River and its (wetter) floodplain provide more local to regional components to the environmental diversity. The setting is in so far exceptional in that it favours a combination of complementary resources. The accessibility to steppe and forest species, water and wood (a raw material for many, yet only rarely preserved artefacts, and as fuel) might well explain the fact that major Crimean Palaeolithic sites are situated in river valleys in the lower part of the second range of the Crimean Mountains (Chabai and Uthmeier 2006, Fig. 18-1). Outlier sites such as Karabi Tamchin, situated at an elevation of some 800 m asl., can be explained as exceptions to the rule, possibly reflecting increased aridity leading to nutritious stress among both humans and their prey (Yevtushenko 2003; Chabai and Uthmeier 2006, p. 329). Kabazi V is one of a total of eight Middle Palaeolithic sites known so far from the southern cliffs of the Kabazi Mountain near the small village of Malinovka, some 20 km to southeast of Simferopol (Chabai 2005a, Chapter 1, this volume). Although all sites are situated in a comparable topographical

setting, near the top of the same limestone cuesta, and lie no further apart than 500 m, all look back upon remarkably different site formation processes. Only Kabazi V and the open-air site of Kabazi II are deeply stratified Upper Pleistocene sites. Generally speaking, the most part of present day Crimea lies in the "P2 sub-region" of the "Pannonian-Pontian-Anatolian" vegetation zone with feather grass steppe (Lang 1994, pp. 93-97). On the other hand, due to their higher altitudes, the Crimean Mountains are an important exception, belonging instead to the "Temperate zone" (Lang 1994, *ibid.*). The lower ranges are part of the "T3 sub-region" with sub-Mediterranean and supra-Mediterranean thermophile mixed oak forests, while the higher elevated regions in the south are part of the "T5 sub-zone" described as oriental beech forest. The present day vegetation at Kabazi Mountain itself is classified as "a belt of low mountain forest-steppe, characterized by an alternation of meadow steppes and moderately high forests" (Gerasimenko 1999, p. 115). Although modern humans have severely altered the primal vegetation of the area by felling many trees and destroying many of the tall tree canopies, chernozem-type soils on the plateau show that these were in fact never covered by dense forests (Gerasimenko 1999, pp. 115-117). Instead, the present day vegetation cover of the cuesta plateaus, comprising grasses, some of which are xeric and point to rather dry conditions, must have a long history. Tree vegetation, which is of limited height and is mixed with shrubs, is found at the foot of the limestone cliff. Oaks are dominant, whereas shrub vegetation is quite diverse. The latter also covers the lower parts of the slopes.

THE ARCHAEOLOGICAL SITE: KABAZI V AT THE TIME OF THE FORMATION OF UNIT III

In this section only a brief summary of the site formation process will be given (a detailed description is found in Chapter 1, this volume.). All in all, three major phases can be distinguished (Fig. 17-1). Concerning the first phase it could be shown that water was a dominant element at the site, it running down a sharply inclined floor through the rock-shelter; karstic clay which formed in channels of weathered bedrock is indicative of the presence of a karstic spring (Fig. 17-1, 0). It is not until the second phase that any human occupation is observed (Fig. 17-1, 1). An increasingly horizontal gradient of the rock shelter floor most probably resulted from a combination of massive rock-fall (lithological layer 15) and sedimentation of

fine-grained sediments from weathering of bedrock and limestone walls. During this period, which correlates with lithological layer 14A, remains of only sporadic visits by humans were found. It is only after a second rock-fall (lithological layer 13) that Neanderthals left behind larger assemblages and, *in situ* sediments were preserved, evident structures (Fig. 17-1, II). Despite the generally good preservation of archaeological remains, any interpretation of the sequence was made difficult by fissures and cracks that developed in limestone blocks from rock-fall, and which gradually filled with artefact bearing sediments, as well as water flow. The latter formed not only erosional channels, but in some areas of the excavations

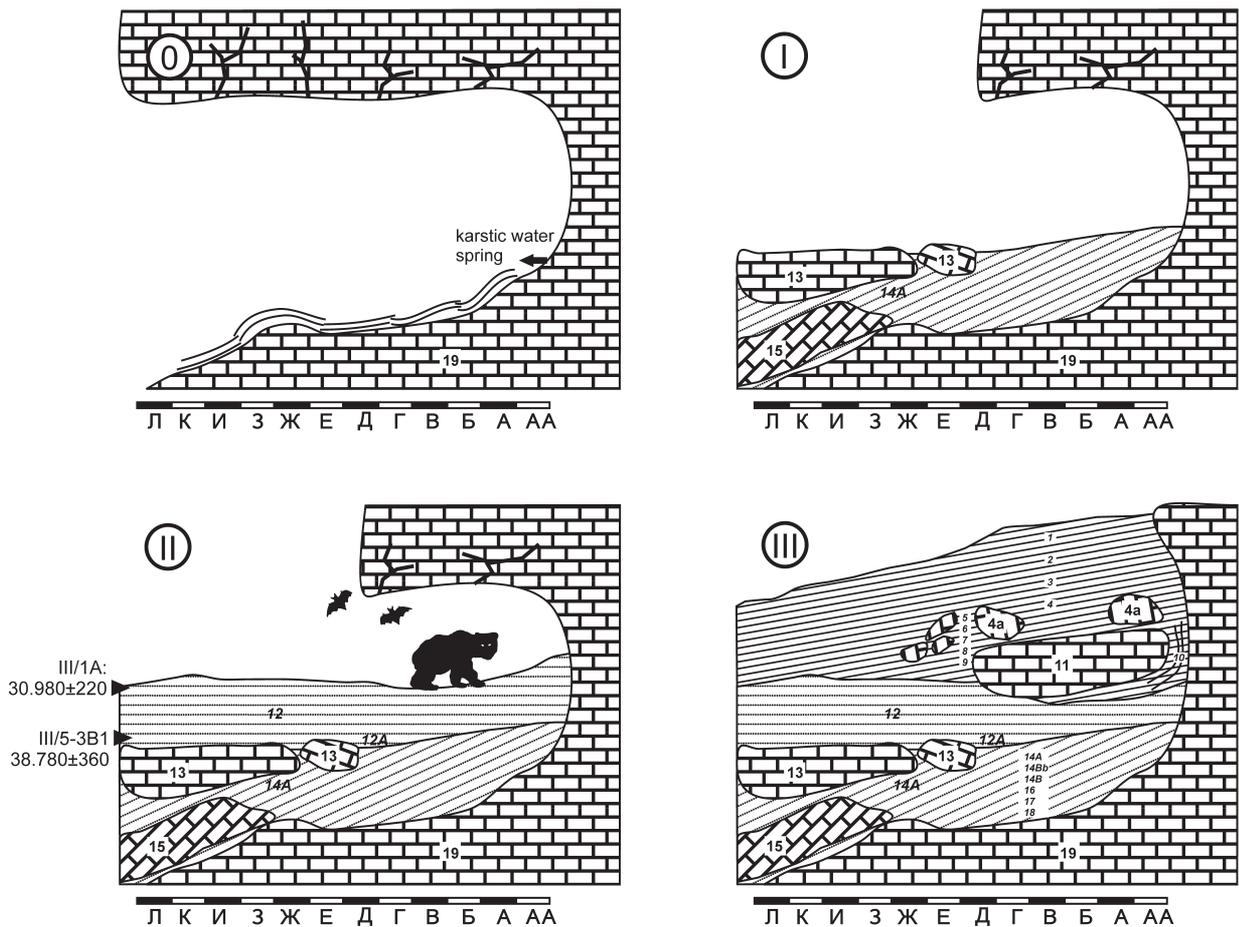


Fig. 17-1 Site formation process at Kabazi V. Levels III/2 and III/1A analysed here were excavated in geological Level 12 (0 development of karstic system with water flowing through the site, I rockfall and sedimentation led to development of a horizontal floor and made possible first human occupations, II phase of more intense usage; the rockshelter is deep enough to host bats and hibernating bears, III collapse of the remaining roof turns Kabazi V into an open-air site).

also removed original surfaces. Both processes resulted in the preservation of archaeological material in lenses only (lithological layer 12A). Larger, uninterrupted artefact scatters, which indicate better conditions of preservation rather than a more intensive site use, occur in sub-unit III/4 to sub-unit III/1 (lithological layer 12). During this period of site formation, Kabazi V was used as a residential camp. Carcasses of smaller species like saiga antelope were brought into or near to the rock shelter, where primary and secondary butchering was carried out (Chapter 6, this volume). Larger species, e.g. equids, were dismembered elsewhere, probably at the kill-site, and only meat bearing parts were transported to the camp. The consumption of food resources is substantiated by the presence of hearths, which are also indicative of longer stays. Notwithstanding,

low minimum numbers of individuals (MNI) amongst the prey (Chapter 6, this volume) suggest that visits did not last the entire (summer) season. A fairly restricted duration of some occupations is underlined by the observation that fuel for fireplaces was not totally combusted, but contained large pieces of charcoal and burned bone (Chapter 2, this volume). All in all, stays at the site appear to have been rather short, and group sizes small. The position of the excavation trenches, parallel to the back wall of the rock shelter, makes predictions about its actual size problematic. Nevertheless, the presence of bats (in lithological layer 14A: *Myotis sp.*) and the fact that bears are known to have hibernated in the shelter (lithological layer 12, level III/2) suggests that it was still deep enough to provide considerable areas hidden from daylight. The recurrent arrangement of

hearths near to the back-wall (Fig. 17-2) indicates a use of the latter as a heat reflector. At the same time, the succession of hearths on one and the same occupation surface (Fig. 17-2) as well as the fact that each hearth corresponds to a zone of artefact scatter (Chapter 2, Fig. 2-1 to 2-7, this volume) gives the occupations a spatially interrupted and patchy character. Instead of a large scatter of contemporaneous artefacts and structures, each stay was short and corresponds to a single hearth surrounded by a zone of mixed activities. Nevertheless, as some neighbouring hearths mark one and the same area (e.g. in Fig. 17-2, Levels III/1, III/2, and III/3-3), there was either a shared concept for the use of the elongated, but not very deep rock-shelter, or only short periods of time elapsed between visits. Radiocarbon dates from Level III/5-3B2 and III/1A imply that the most intensive usage of the rock-shelter by humans falls within an approximately 10,000 year period, between $38,780 \pm 360$ BP and $30,980 \pm 220$ BP (Chapter 1 and 3, this volume). To sum up, activities of human agents during the formation of Unit III indicate that Kabazi V was a residential camp used for shorter stays by small to medium sized groups.

At the end of Unit III, the water regime again changed, and running water took away parts of the upper section of lithological layer 12 near to the back-wall. Water flow in this area continued for a while after the remaining parts of the roof collapsed (lithological layers 11 and 4a). From this moment onwards, colluvial and eolian sediments indicate that Kabazi V was no longer a rock-shelter, but became an open-air site (Fig. 17-1, III). Archaeological materials from the overlying lithological layers were disturbed by post-depositional processes to varying extents, or were even transported to a secondary position.

To conclude, during the accumulation of levels III/2 and III/1A, Kabazi V was a not very deep, but probably elongated rock-shelter. The platform at the front of the shelter was never protected from erosion and, therefore, must have been small. To the south-east, the platform would have given way to a more or less steep slope. The part of Kabazi Mountain in which the *abri* formed is today part of the limestone cliff, i.e. the site is near to the top of the cuesta and the plateau, and lies in a commanding position above the Alma river valley. The floodplain of the Alma River itself is known to have had a much higher elevation until MIS 4 or the beginning of MIS 3 when river systems began to cut deep into the landscape following a massive drop in the water level of the Black Sea. The fact that the archaeological levels considered here date several tens of thousands of years after this event is taken as an indication that the present land surface can be used for GIS calculations.

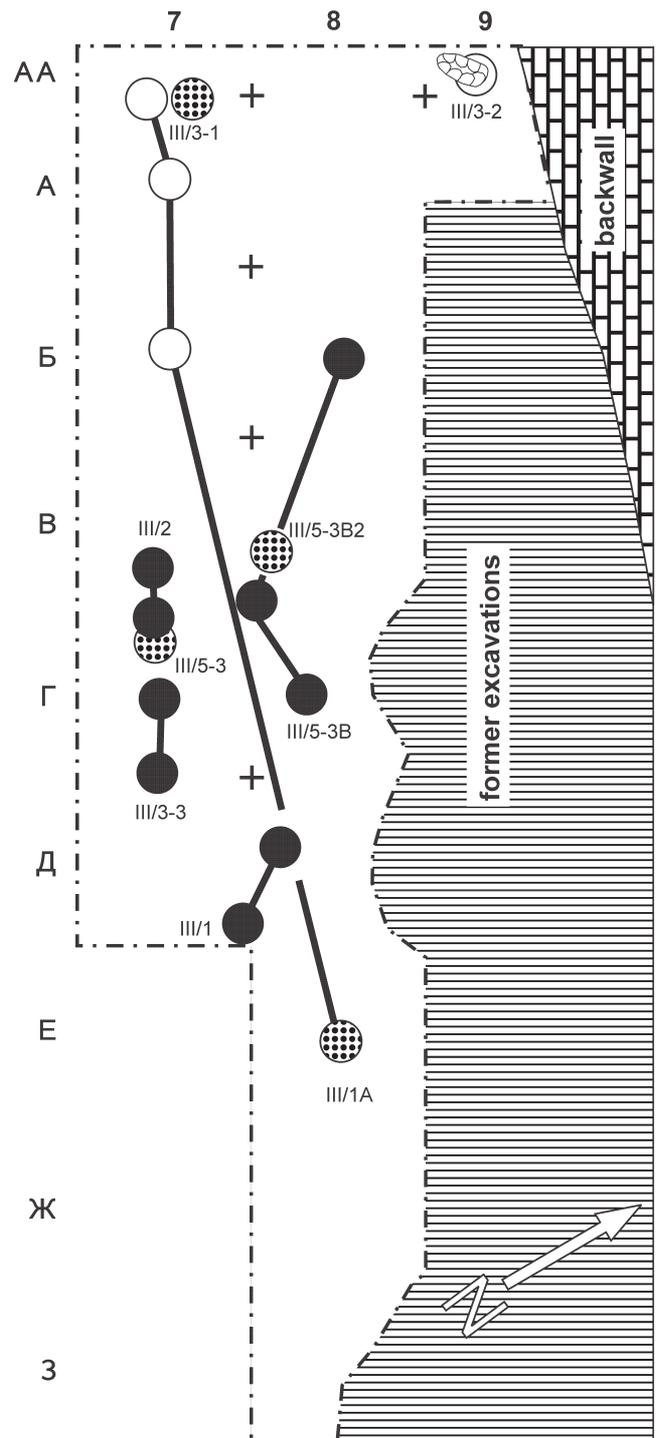


Fig. 17-2 Distribution of evident structures in all archaeological levels of Kabazi V (black = hearth at ground level, grey = fireplaces in natural depressions, white = pit; structures embedded in one and the same level are conjoined). Note that in square 9AA, a pit was filled with the almost complete waste of the production of a bifacial tool (Chapter 16, this volume).

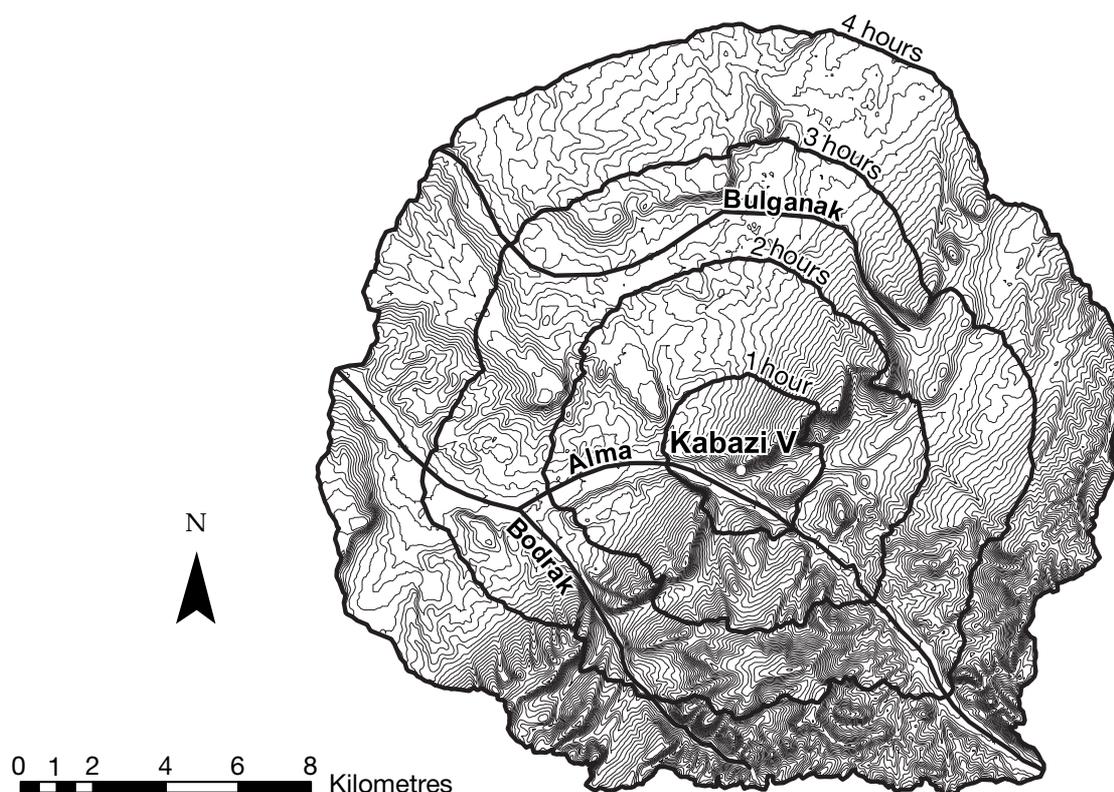


Fig. 17-3 Walking times around Kabazi V, expressed in 1-hour, 2-hour, 3-hour and 4-hour isolines. The inclination of landscape is indicated by grey shading (light grey indicates more even surfaces, dark grey denotes steep limestone cliffs; calculations made with ArcGIS 9.2). Note: the 3-hour isoline represents the foraging radius around Kabazi V in which resources were procured.

GIS-APPLICATIONS: WALKING RANGES AND RELIEF

In most levels of archaeological Unit III, Kabazi V was used as a residential camp. In theory, one has to expect that its topographical position is near to important resources, the number of which would have been determined by the applied subsistence strategies (Binford 1980). Whereas the residential camps of “foragers” are located in the proximity of most staple food resources, those of “collectors” are located near to one or two crucial resources, with others transported to the site over long distances. Elsewhere, it has been argued that the subsistence tactics of Crimean Neanderthals were characterised by a strong focus on just a few species that were hunted at distances hardly exceeding the foraging radius (Chabai and Uthmeier 2006). Except for the last interglacial, no field camps (Binford 1980) have been documented that would point to moves of special task groups to hunting grounds beyond the foraging radius. However, these assumptions are based on raw material transportation distances rather than

walking times. To identify both economically acceptable and unacceptable walking time distances for resource procurement by Crimean Micoquian Neanderthals, diameters of 1, 2, 3 and 4 hours were computed using GIS (Fig. 17-3). Calculations were based on an adult individual carrying 20 kg (Watts et al. 2003, p. 539; the values applied are reported by Van Wagendonk and Benedict 1980). Of course, the load transported during procurement activities differs, i.e. the weights carried on the outward journey would have differed from those carried on the return journey. However, as decisions are made on the basis of minimum values, those modelled for walking times with load are more appropriate. All data refer to the walking time in one direction. As no direct observation is possible, the distance between Kabazi V and flint outcrops in the Bodrak valley is taken as a proxy for the maximum distance accepted as economically efficient for staple food acquisition. These outcrops were recognised as the source for

raw material procurement in the frame of logistical moves in Crimean Micoquian levels of Kabazi II prior to the Moershoofd interstadial (Chabai and Uthmeier 2006, p. 346). According to GIS calculations, the walking time between Kabazi V and the Bodrak valley lies between the 2-hour and 3-hour isoline (Fig. 17-3). Therefore, the 3-hour isoline is taken as the longest walking time considered economically efficient by Crimean Micoquian Neanderthals when procuring resources on a daily basis. In contrast to the conventional radius of 10 km (Binford 1980), distances covered here range between 6 and 8 km. However, the pure amount of walking time of 4 to 6 hours required for both directions seem to be critical for activities that should not last any longer than a day. In general, costly walking distances are more likely to be accepted when activities themselves are not time consuming (e.g. raw material procurement), when the foraging radius does not provide critical resources, or when resources are regarded as extraordinary valuable (e.g. casual resources). Due to the extra time needed for the procurement itself, this also has to be added; more time consuming activities, such as hunting, probably lie within the 2-hour isoline – if conducted on a daily basis.

It goes without saying that distances covered in a given walking time decline towards the southeast where more elevated areas are situated. Furthermore, the accentuation of steep slopes in Figure 17-3

shows that especially towards the south the landscape is characterised by uneven territories with many erosional channels draining into the floodplains. In fact, an imaginary line along the slopes of the cuestas divides the landscape within the 3-hour and 4-hour isolines in two parts. In the northwest, inclined plateaus and broad valleys running parallel to the cuestas form a landscape surface with much lower dynamics than is the case southeast of this line where surfaces are much more fissured. Like today, these differences would have influenced the vegetation and, therefore, the areas in which stable food resources were to be found. However, the general impression is that the impact of landscape on walking distances is less pronounced than one might have expected. At present, several contexts of the Kabazi Mountain ecotone are already reachable within a one hour walk: the steep slope near the rock shelter, large parts of the plateau of the cuesta towards the north, and part of the Alma River floodplain. An investment of 2 hours walking considerably enlarges the contingent, adding more fissured areas in the south. If water supply is a critical factor for the spatial distribution of large mammals as potential prey, than the 3-hour isoline enlarges the diversity quite notably by reaching two additional river valleys, the Bodrak and the Bulganak. In this context it is worth mentioning that its headwater, including the spring, can be reached in 3 hours.

RELEVANCE AND SPATIAL COVERAGE OF ENVIRONMENTAL DATA FROM UNIT III

Any attempt to reconstruct past environments is difficult as it has to consider the spatial coverage of the data used. In part, the spatial coverage is intertwined with agency: whereas most pollen and spores in a given archive are wind-blown, many mammals are taken by carnivores. It follows that pollen and spores are selected more or less at random, their transportation depending on the strength and directions of the wind. On the other hand, carnivorous agents may hunt or scavenge selectively, thus producing non-representative assemblages with unknown procurement distances. In the case of Kabazi V, three sources of information – snails, small mammals and pollen as well as spores – are used for environmental reconstruction (Fig. 17-4).

As snails are not very mobile, they provide information on the environment near the site (Mikhailesku 2005, p. 67). Unfortunately, samples from Unit III of Kavazi V were small, and therefore not representative (Mikhailesku 1999, p. 107).

All that can be said is that steppe-forest surrounded the site, as indicated by xerophile species. The fact that samples also contained mesophile species indicates the existence of small trees and bushes in the immediate vicinity of the site. Locally more humid conditions, probably pointing to ground water or even a nearby spring, are indicated by the presence of *Vitrea subeffusa*. However, it is also possible that their presence simply reflects the absorption of rain and snow water by the surrounding limestone. This is also suggested by *Caeciliooides raddei* that prefers humid cracks of calcareous rocks.

Major parts of small mammals are ecologically specialised (Markova 1999, 2004a, 2005, Chapter 4, this volume). As they are herbivorous, rodents and lagomorphs are closely connected to plant cover and, therefore, can be used as a controlling variable for the studies of pollen and spores. However, more or less strong differences or even contradictions may occur between these two sources of information due to

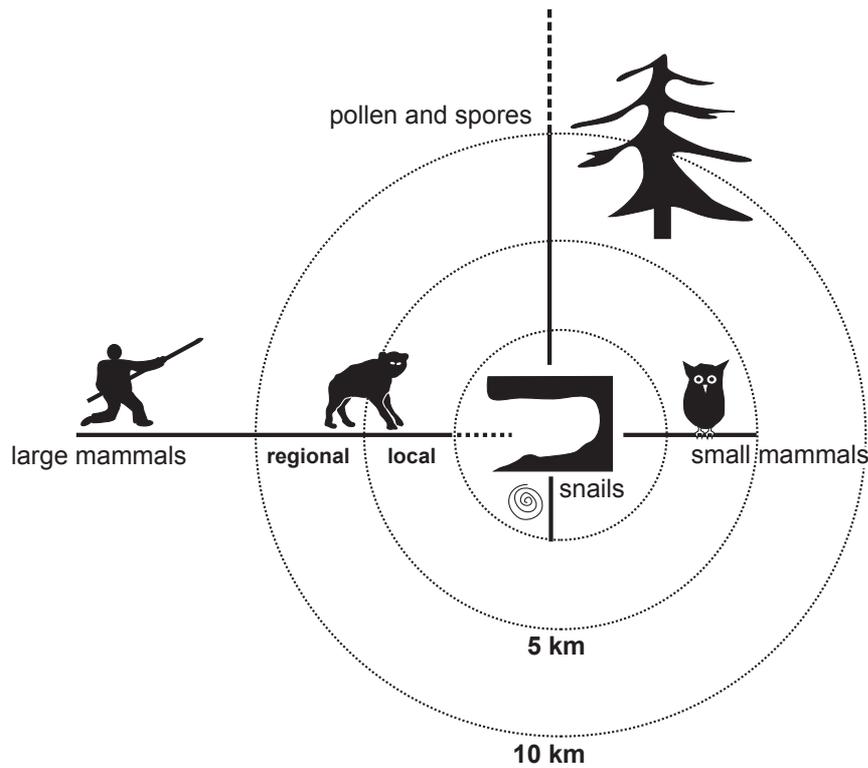


Fig. 17-4 Spatial coverage of environmental data from archaeological archives. Note: the representivity of pollen data is also dependent on the size of the archive, as well as the local relief.

different transportation distances. Most small mammal remains stem from pellets of hunting birds. Especially owls are known to have nests in caves and rock-shelters (Vita Finzi and Higgs 1970, p. 15; Chapter 4, this volume). As their hunting range spans several kilometres, small mammal fauna is indicative of local to regional conditions (Fig. 17-4).

When pollen data is used for environmental reconstructions, the crucial question is in how far the sample taken at a site is representative for the actual vegetation in its proximity. Present day investigations have shown that in general, vegetation zones like “boreal coniferous forests” or “temperate deciduous forests” are easily determinable (Lang 1994, p. 48). Three major factors are important when dealing with prehistoric samples (Lang 1994, *ibid.*): (1) the pollen productivity of the vegetation cover, (2) the transportation mechanisms of pollen, and (3) the preservation of pollen in the sediment. Apart from the simple fact that only blossoming plants are represented in the samples, there are significant differences in the amount of pollen produced by different taxa. The pollen of most common trees and plants are transported in the air, which when

compared to, for example, pollen transported by insects, make up a large part of any sample. However, among the aforementioned trees, pollen productivity can also vary by a factor of 15 or more (Lang 1994, p. 49). Furthermore, pollen productivity can also differ due to variations in rainfall, temperature etc. When air transported pollen are considered, those blown by wind immediately above the treetops are transported between 5 km and 10 km. It is this regional pollen fall-out that would be most representative for the reconstruction of the vegetation (Fig. 17-5). However, local components may well dominate, depending on the relief and the catchment area of the sedimentological trap. Lang (1994, p. 50) refers to lake and peat archives. With a diameter of 30 m, local components dominate lake and peat deposits with percentages of 80% to 100%, whereas a diameter of 1 km leads to a decrease of local pollen to 10% and a dominance of regional transportation distances of 70%. Therefore, pollen data from archaeological sites with terrestrial sediments tend to over-emphasise local components.

The pollen and fauna from Kabazi V itself is heavily influenced by the nature of the site. In

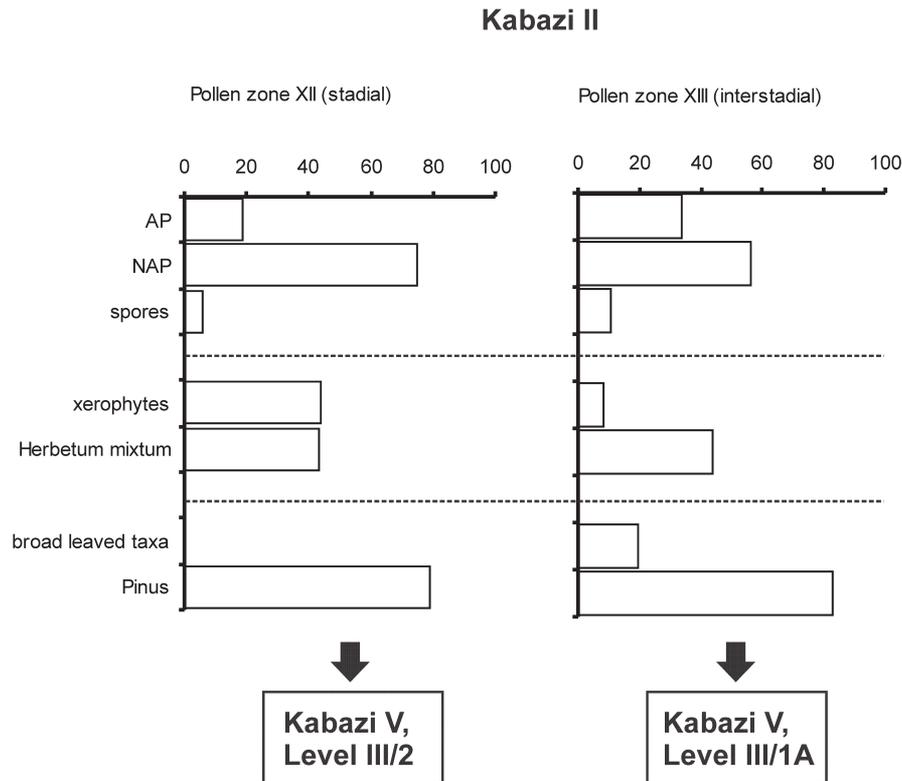


Fig. 17-5 Selected and summarised information of pollen zones from Kabazi II and correlation with Kabazi V, Levels III/2 and III/1A. The relation of arboreal (AP) and non-arboreal pollen (NAP) was used for GIS-based reconstructions of vegetation within the 1-hour isoline.

general, rock-shelters do not preserve pollen and spores very well, and broad-leaved trees are especially affected by this (Chapter 5, this volume). Within the relatively small and poor sample, spores of shade resistant plants characteristic for local environments at the entrance of caves and rock-shelters predominate. The comparably bad preservation of pollen and spores at Kabazi V is underlined by the fact that for Level III/2 no data is available at all. To compensate this deficit, data from the neighbouring site of Kabazi II is used. As the distance between the two sites is only 500 m, air transported pollen and spores found at Kabazi II should also be representative for regional, but not local, conditions at Kabazi V. In this regard, the correlation of layers is of major importance. From the pollen and spores point of view, the incompleteness of the samples from Kabazi V do not allow a secure correlation with pollen zones from Kabazi II. Absolute dates at Kabazi V are, again, somewhat problematic as there is a significant gap between radiocarbon dates and those obtained by U-series and OSL/TL dating methods (Chapter 3, this volume). At present, it is assumed that an AMS

radiocarbon date of (OXA-X-2134-75) $30,980 \pm 220$ is the most reliable estimation of the age of Level III/1A. On this basis, it is assumed that Kabazi V, Level III/1A corresponds to pollen zone XIII at Kabazi II. Such a correlation is also supported by AMS-dates from the Kabazi II sequence (e.g. Chabai 2006, Table 1-1). At Kabazi V, Level III/2 underlies Level III/1A without a hiatus, as such it is correlated with pollen zone XII of Kabazi II.

Large mammals usually have wide ranges and therefore their remains are less indicative for local conditions (Fig. 17-4). Apart from carnivores, which use caves and rock-shelters as dens, or bears that hibernate in such settings, large mammals will have lived at some distance to the excavated area of Kabazi V. Although the presence of carnivores capable of carcass transportation is well documented in the archaeozoological record from Kabazi V by digested bones (from hyena) and gnawing marks (e.g. from fox), the overall impression is that the contribution of non-human agents to the faunal assemblages of Kabazi V were minimal (Chapter 6, this volume). The overwhelming part of large mammal remains results from human activities.

HUMAN STAPLE FOOD RESOURCES

In general, resources essential for the physical survival of humans fall into two main categories, water and food (Table 17-2). For the survival of most large mammals, including humans, water is more important. Depending on the ambient temperature and the intensity of physical activity, the amount of time tolerable without rehydration varies between several hours and three days (Nehberg 2004, p. 320). Times spent without food is reported to have exceeded several weeks: in a temperate climate an average person can survive 50 days without food (Nehberg 2004, p. 149; every kg of body fat equals 9,000 kilocalories). Nevertheless, these are extreme values. Simulations have shown that under Pleistocene conditions, Neanderthals may have required 4,000 kilocalories per day (Churchill 2006). In how far fire was necessary for the preparation of food and/or for the maintenance of body temperature is an open question. However, the relatively frequent occurrence of hearths, or more or less destroyed remnants of these features (Chapter 2, this volume), in the archaeological levels of Kabazi V suggests that they were an integral feature of camps used – at minimum – overnight. Additionally, at Kabazi V water would have been available from the nearby Alma River, and time and energy spent on acquiring fuel for the fire would have largely depended on the availability of wood (or bones).

In the past, several investigations have shown that the diet of Neanderthals in general was based on meat (Bocherens et al. 2005). Crimean Neanderthals relied on the hunting of two species, *Equus hydruntinus* and *Saiga tatarica* (Burke et al. 1999; Chabai and Uthmeier 2006). Only if these species were, for one reason or another, not accessible, would additional species like red deer, giant deer, bovid and caprids have been taken. Such a two-fold classification of meat resources is analogous to the distinction of C. Vita Frinzi and E. S. Higgs (1970, pp. 3-4) between “normal” and “emergency” food resources (Table 17-2). In the following, the variability of species recognised as a human food resource will be compared to the overall list of species documented from contemporaneous Crimean sites. Human food resources include species identified as staple food, and additional large mammal species found in the archaeological levels investigated. For large mammals, the attempt will be made to differentiate

staple food	
<i>normal</i>	<i>emergency</i>
water	red deer giant deer bovid caprid
equid	
saiga antelope	
other resources needed	
fuel for fire (± daily: wood, bones)	
flint raw material (long term needs)	

Table 17-2 Classification of staple resources required by hunter-gatherers.

between the winter and summer season, as most animals of the then environments are thought to have migrated between winter and summer pastures (Fig. 17-6 and 17-8). However, such suggestions are made on grounds of present day behaviour, which might be a misleading analogy (Burke et al. 2007).

All species classified as staple foods were flight animals experienced in detecting carnivorous enemies. This means that a purely steppe vegetation would not have made for ideal hunting conditions. Once on the run, potential prey would have quickly reached high speeds, going out of the reach of lances and spears. Therefore, it is assumed that Neanderthals practised ambush hunting. The notion that successful hunting based on the surprise attack of a few hunters is believed to be valid even for those cases in which driving of herds is considered (Patou-Mathis 1999). With regard to site catchment, Neanderthals would have needed a relief or vegetation in which the group could hide whilst on the hunt. In the following, the habitat and the behaviour of species identified as staple food resource is described in more detail.

ETHOLOGY OF SPECIES IDENTIFIED AS “NORMAL” FOOD RESOURCES

Generally speaking, equids are grazers, but they can also cope with bark, leaves, buds, fruits, and roots if other resources become sparse (MacDonald 2001, p. 471). Dominant males establish territories of approximately 15 km² (MacDonald 2001, p. 472), while the inferior males live in bachelor groups. Essential for the social and spatial organisation is water supply. Therefore, if water resources and advantageous grazing grounds do not occur together then lactating and non-lactating females will split from the herds to secure easy access to water. In these cases, dominant males will try to control either the major thoroughfares to and from the water or the best foraging grounds. Under dry conditions, the different water supply of lactating and non-lactating females hinders the formation of harems. As at almost all other sites, equid remains at Kabazi V that were classified on a species level were attributed to *Equus hydruntinus*. Based upon generalisations for *Equus hemionus*, some features of the social behaviour as well as the habitat of Pleistocene *Equus hydruntinus* can be reconstructed (Burke et al. 2007, pp. 896-898). It is assumed that these equids preferred open grassland, i.e. ranges in valleys and gently sloping hills from 300 to 600 m asl. (Table 17-3). During autumn, winter and spring it is most likely that the animals fed on steppe grasses such as wormwoods. In the dry summer months, *Equus hydruntinus* would have lived on herbaceous plants, and positioned itself at a maximum distance of no more than 10 to 15 km from water sources. In general, the behaviour of equids largely depends on the magnitude of aridity. For example, if resources are scarce, breeding males will defend only seasonal territories during spring and early summer. As far as the pattern of seasonal mobility is concerned, it is assumed that

Equus hydruntinus moved between winter and summer pastures, the distances between these depending on rainfall patterns. For the winter, when the animals are less tied to water, it is expected that limiting factors triggering migration would have been wind chill and snow depths.

Compared to *Equus hydruntinus*, which reached a living weight of 180 to 200 kg (Patou-Mathis 2005, p. 92), *Saiga tatarica* (MacDonald 2001, pp. 564-566) is a small animal. The living weight of a male adult does not exceed 50 kg. Today, saiga antelope is a generalist grazer that feeds on 150 different plants (MacDonald 2001, p. 564) and is known to migrate large distances (Table 17-3). It spends the winter in desert areas with low snow cover and in the spring moves approximately 1,000 km northwards into the steppe region. The huge migrating herds with up to 200,000 individuals split seasonally into groups of tens to thousands, the normal herd size in seasonal pastures counting 30 to 40 individuals. Between April and May, saiga antelopes break their migration to give birth in huge groups. As this happens in a period of 10 days only, predators are literally swamped with the sheer numbers of offspring. Despite its dependency on water supply during the summer, saiga must have been rather difficult to hunt. One reason for this is that saiga antelope move considerable distances to avoid bad weather, food shortage, and predators. Even their average meanderings take them as far as 40 km a day (MacDonald 2001, p. 566). In addition, saiga are among the fastest animals in the world, moving at speeds of up to 70-80 km/h, and are also good swimmers. Neanderthal hunters may have taken advantage of the fact that saiga do not move well over uneven ground, and that they have bad eyes, hearing and smelling constituting the primary senses.

ETHOLOGY OF SPECIES IDENTIFIED AS “EMERGENCY” FOOD RESOURCES

Both the habitat and the behaviour of the extinct giant deer are difficult to predict. The dimensions of teeth (von Koenigswald 2002, p. 72) suggest that its lifeways were close to that of the modern moose. If so, giant deer lived solitary except for the winter when individuals of both sexes assembled to small herds (Table 17-3). Moose prefer mixed forest where they live from leaves, lichens, and bark. In how far these observations apply to giant deer is an open question; while S. Pichler (1996, p. 33) suggests that giant deer lived in open habitats where they were not handicapped by their large antlers (that could

span up to 4 m), von Koenigswald (2002, p. 72) describes them as a species well adapted to interglacial conditions with dense forests. The ubiquitous presence of giant deer during most phases of the Upper Pleistocene underlines the tolerance of certain species towards a whole range of different climates and environments. Nevertheless, the enormous amount of minerals needed for the production of 40 kg of antler points to a (seasonally strong) dependence on high quality food.

Bovid remains from the Crimean Middle Palaeolithic have been classified mainly as *Bison priscus*.

	species	diet	habitat	behaviour	summer pasture	winter pasture
Normal	<i>Equid</i>	grazer	open grassland, valleys and gently sloping hills from 300 to 600 m asl.	- males (seasonally) territorial - bachelor groups and inferior males separated - females and foals near water resource	migrates (in correlation to rainfall)	
				herbaceous plants 10 – 15 km from water source	worm-woods (steppe grasses)	
<i>Saiga</i>	patchy steppe environments		- migrating herds (> 1000) brake in seasonal groups - moves on daily basis up to 40 kms	migrates over long distances		
				steppe region	areas with low snow cover	
Emergency	<i>Bovid</i>	mixed woods with undergrowth and open spaces	- less efficient at feeding on short grasses - water-dependent (wallowing) - female herd-dwellers - solitary males	migrates app. 300 km		
				30 sqkm	80 sqkm	
	<i>Caprid</i>	cliffs	- males live solitary, territorial and defend resources	migrates between different contour lines		
				high altitudes	woodland in lower attitudes	
<i>Giant deer</i>	browser	prefers mixed forest, but can cope with open habitats	- lives solitary except for winter when assembling to small herds	?		
<i>Red deer</i>		woodland and woodland edge	- "concentrate selectors" - herds differentiated by sex	may migrate if environments are patchy		

Table 17-3 Selected features of the ethology of species classified as "normal" and "emergency" staple foods in the Crimean Middle Palaeolithic.

Today, several species of bison are distinguished. The European bison (*Bison bonanus*) lives in mixed woods with undergrowth and open spaces. The American bison (*Bison bison*) is split into two subspecies, the plain bison that prefers grassland and aspen parkland, and the wood bison whose preferred habitat is coniferous forests. However, all species and sub-species are interfertile and represent variants of one and the same species, as has been substantiated by investigations into DNA, blood typing, and protein sequence (MacDonald 2001, p. 541). Bovids belong to the grazers, but are less efficient at feeding on short grasses (Table 17-3). About 90 % of the food supply of *Bison bison* is covered by grass, complemented by sedges, herbs, leaves, lichens, and bark (Pichler 1996, p. 35). Except for winter, when it may cover its water supply by eating snow (MacDonald 2001, p. 532), bison are water dependent. Equally, they need wallowing due to the low number of sweat glands per unit area of skin. If no mud is available, they behave like cattle and seek shade (MacDonald 2001, p. 534). Bison are herd-dwellers. Females live constantly in herds that consist of cows with their offspring. Outside the breeding season, males live alone (MacDonald 2001, p. 540). While usual group sizes in American and European

bison hardly exceed 20 to 60 individuals (MacDonald 2001, p. 534), temporary aggregation happens on particularly favourable feeding grounds, and during the rut. In these cases, herd sizes grow up to 1000 animals (Pichler 1996, p. 34). *Bison bison* migrates between winter and summer pastures over distances of about 300 km, seasonal territories are estimated to measure between 30 square kilometres during the summer, and 80 squarekilometres in the winter.

From a diet point of view, red deer is a “concentrate selector” (MacDonald 2001, p. 508). Much like giant deer, the growth of antlers requires a high mineral intake. Therefore, deer are limited to high quality vegetation (Table 17-3). In general, they are considered to be resident game, having preferred woodlands and woodland edges where they could have fed on herbs, leaves, and lichens (Pichler 1996, p. 33).

If classified to the species level, caprids from the Crimean Middle Palaeolithic have mostly been recognised as chamois (*Rupicapra rupicapra*). These grazers are specialised to steep cliffs (Table 17-3). Males are resource-defenders that, with the exception of the rut, live solitary. At first snowfall, the flocks of females and young disperse and move to woodland winter ranges at lower altitudes.

MODELLING OF SEASONALITY IN STAPLE FOOD RESOURCES

The question whether, and over what distances, a species migrates each season is mainly a question of range quality and, for those species heavily dependent on water, rainfall regime. Often, it is assumed that species that are known to migrate between winter and summer pastures today, also did so under Pleistocene conditions (Pichler 1996). However, this is questionable. For example, if snow cover is the main reason for leaving mountainous regions, then Crimea is no good example. Simulations (Barron, van Andel and Pollard 2003) have shown that snow cover was insignificant even during „cold events“ of MIS 3 – at least in the lower altitudes. Only mountainous species such as caprids that are adapted to high mountain ranges will have been forced by winter snow cover to move into less elevated areas. Here, small valleys provided additional shelter from wintery wind chill. On a large scale, it must be expected that the different altitudes of the Crimean Mountains comprised an enlarged biodiversity – even larger than that of the mosaic character of the Pleistocene “Mammoth steppe” (Guthrie 1990). Archaeozoological analyses have already shown that

the behaviour of Upper Pleistocene species occasionally differed from that of present day analogies. For example, in contrast to Asiatic ass (Burke et al. 2007, p. 896), Interplenigacial *Equus hydruntinus* is known to have spent the winter in the second range of the Crimean Mountains (Patou-Mathis 1999, 2006; Chabai and Uthmeier 2006, Fig. 18-3). Nevertheless, some conventionally migratory species might still have rotated between uplands and lowlands. First of all, this is likely for species with rather large population densities. Saiga, bovid and reindeer might have exploited regional resources up to carrying capacity which then may have forced them to move, even though winter conditions were not very sharp. For saiga antelope this is indeed attested by archaeological evidence, as it is only known from archaeological levels assigned to the warm (summer) season (Chabai and Uthmeier 2006, Fig. 18-3). Perhaps the exclusive presence in the warm period of the year also applies to giant deer, which – despite low population densities – needed large amounts of high quality food, not only to supply its large body, but also to produce its impressive antlers.

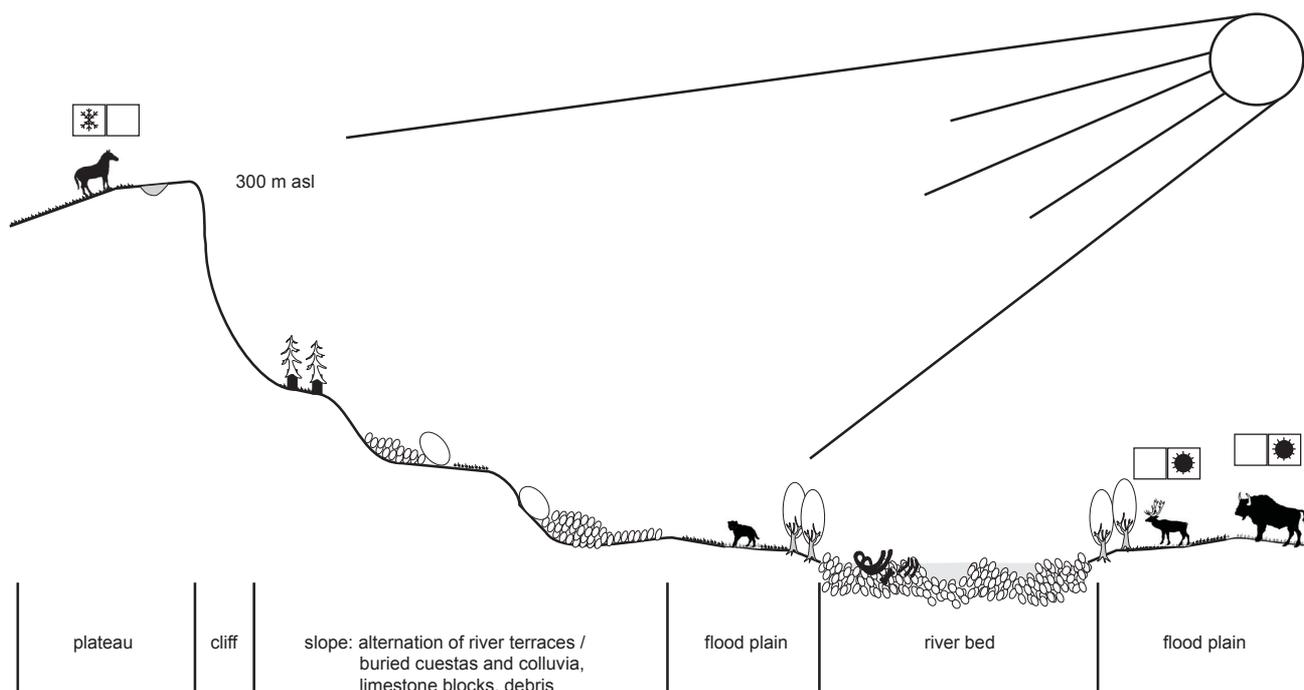


Fig. 17-6 Possible distribution of plants and animals under stadial conditions in a low mountain range.

RECONSTRUCTION OF PLANT COVER AND DISTRIBUTION OF STAPLE FOOD RESOURCES

The main problem in the reconstruction of Pleistocene plant cover is the question in how far the environmental data from the excavated area reflects not only local, but also regional conditions. As discussed above, this is difficult to determine, but much speaks for the assumption that the archives used here are biased towards local conditions. Therefore, a modified model of vegetational zoning in low mountain ranges published by J. Hahn (1983, Fig. 155) was used for data transfer. Its validity for the lower parts of the second range of the Crimean Mountains has been substantiated by pollen data from Kabazi II. For GIS-based reconstructions of local to regional environments of Kabazi V, the following preconditions were made:

- steep cliffs of the cuestas have no vegetation at all;
- slopes below the cliffs have shrubs and, if at all, scattered tree vegetation;
- plateaus of cuestas have grass vegetation;
- river valleys hold humid conditions and, therefore, are indicative of forest vegetation.

It is expected that these preconditions apply for both stadial and interstadial conditions. As far as the river courses are concerned, a buffer of 150 m was set to model flood plains. In this area not only conifers, but also broad-leaved trees such as beech will have survived even during stadials. Other considerations refer to more specific climates. With regard to the amount of forest and steppe vegetation during interstadials it was concluded that inclined surfaces of karstic limestone formations are indicative of more arid conditions. Karstic limestone absorbs rainfall, while at the same time the surface inclination hampers the accumulation of thick sediments capable of storing water. The present chernozem character of the soil cover of the cuestas (Gerasimenko 1999, 2005) supports this scenario. More or less horizontal surfaces, on the other hand, enable the accumulation of aeolian, colluvial or fluvial sediments, which – under moderate climate – will be transformed by pedogenesis. The higher content of clay will store water and provide more humid conditions. Therefore, it is concluded that under interstadial conditions landscape surfaces with an inclination comparable to cuestas were characterised by a steppe vegetation, whereas less inclined ground levels

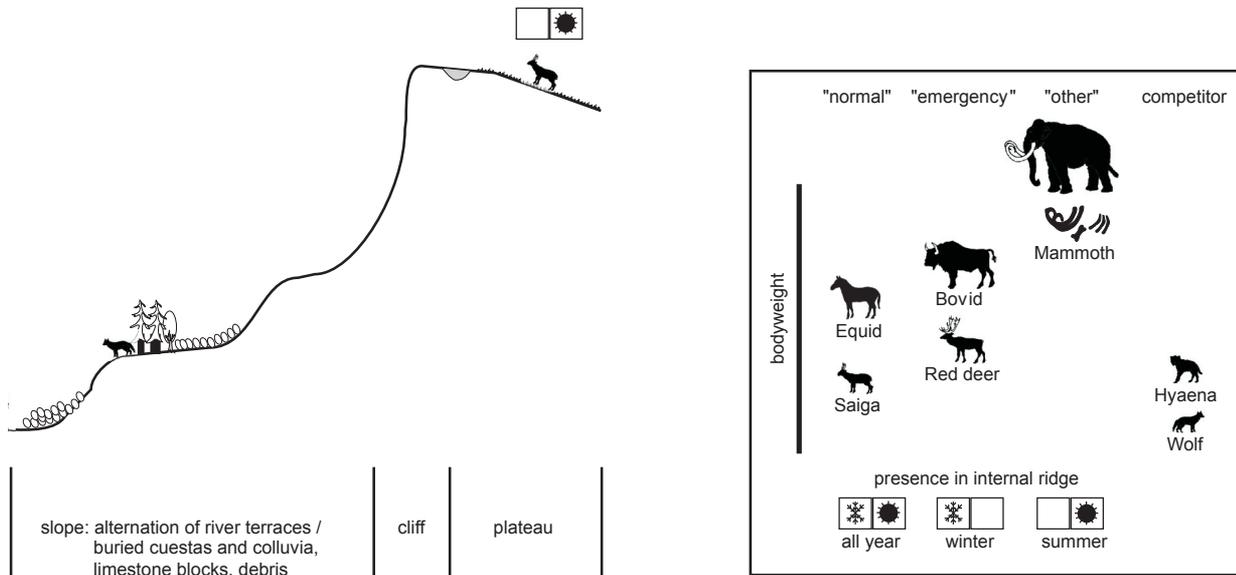


Fig. 17-6 Continued.

provided conditions capable of supporting forests. With these preconditions in mind, the attempt was made to shift the border between inclined (i.e. steppe vegetation) and less inclined (i.e. forest) areas in such a way that the relation between these two vegetation types within the 1-hour isoline corresponded to the pollen record from Kabazi Mountain (for the methods used for GIS-calculations of spatial proportions of vegetation types see Ickler 2007, p. 368).

Sub-Unit III/2, Level III/2

As mentioned previously, snail fauna from Kabazi V is only badly preserved and, in general, not very informative. Among the malacofauna, the presence of *Vitrea subeffusa* may go back to a spring near the site.

The Altaian vole, which is typical for meadow-steppe, dominates the small mammal remains from Level III/2. It by far outnumbers remains of other identified taxa. Among these, *Arvicola terrestris* indicates banks of water reservoirs, such as the Alma River. Small mammals from steppe-like environments are much more diverse, including steppe lemming species and great hamsters. *Lagurus lagurus*, which

is a steppe mammal, and the semi desert species *Pygeretmus pumilio* point to the aridity of the stadial environment (Chapter 4, this volume). The presence of forest species, though in small numbers, shows that some forested areas must have existed. Seeing as pollen and spores are not preserved at Level III/2 of Kabazi V, it is necessary to use data from the neighbouring site of Kabazi II (Gerasimenko 1999). At the time of Kabazi V, Level III/2, pollen and spores at Kabazi II show a severe decline of forested areas (Fig. 17-5), which will not have existed in the nearer vicinity of the site (pollen zone XII: Gerasimenko 1999, p. 133). Later on, birch, buckthorn shrubs, and even conifers such as pine grew in refugia only. At Kabazi II, samples from the middle and upper sections of pollen zone XII contain no pollen of broad-leaved trees at all. Others indicate that, even under these relatively cold and dry conditions, alder still survived adjacent to the Alma River. Apart from such sheltered sections, steppe grasses with a strong component of xerophytic species dominate the plant cover. Therefore, major parts of pollen zone XII are classified as steppe vegetation (Gerasimenko 1999, p. 125). In sum, it is interpreted as the equivalent of the Huneborg stadial (Gerasimenko 2005).

The environmental model used as the basis for GIS-calculations is shown in Figure 17-6. The resulting reconstruction of vegetation cover (Fig. 17-7) shows that the plant cover within the 4-hour isoline was dominated by steppe and meadow-steppe. Major exceptions were the flood plains where tree vegetation would have been found. The pollen data from Kabazi even shows some broad leaved trees can be expected close to the river, although pine trees would have been the most common taxa. Apart from the flood plains, also slopes and foothills below the steep cuesta cliffs would have provided improved conditions necessary for plant growth (Schultz 2002, p. 125). Small patches of snow or ice, as well as ponding rainfall, would have survived longer in shaded or leeward positions of limestone formations and boulders, thus providing increased (and prolonged) humidity. Especially when exposed to the south, more sunlight would have increased ground temperature. Therefore, it is expected that shrubs would have been found in the foothills.

The small amount of tree vegetation would have influenced the distribution of staple food resources (Fig. 17-6). Although being adapted to woodland and woodland edge (Table 17-3), red deer was generally present at Crimean sites dating to the Huneborg stadial (Chabai and Uthmeier 2006, Fig. 18-2). During the Huneborg stadial, red deer must have been confined to forested floodplains. Given the restriction in wooded areas, this species was almost certainly forced to move within its seasonal range in search of sufficient food. Much like red deer, also bovids (e.g. *Bison priscus*) would have lived near to the river valleys. Although being grazers, they also sojourn in mixed woods with undergrowth, and require water sources for wallowing during the summer months. Ambush at the preferred wallows would have promised a higher success rate for the hunt at this time of the year. Especially red deer, but probably also bison, would have migrated seasonally due to snow cover or as a consequence of low carrying capacity in the forests along the river courses. Saiga and equids are adopted to open vegetation, which – in this scenario – prevailed. The whereabouts of saiga antelopes would thus be difficult to predict. Best chances to target them would have been the game passes when they headed for water. The territorial behaviour of equids would have simplified hunting. In the uniform steppe vegetation, these animals would have chosen as grazing grounds higher elevated plateaus near river valleys. As their carcasses are rather heavy, Neanderthals most probably tried to find hunting locations as near to the residential

camp as possible. With regard to the existence of red deer, it is not easy to explain why more undemanding species like reindeer or caprids do not appear in the faunal record of archaeological sites. The main reason for this will be the choices of carnivorous agents. If mammoth were food at all, then animals were scavenged, but much speaks for a use of mammoth remains as fuel for fireplaces (Chapters 2 and 6, this volume).

Sub-Unit III/1, Level III/1A

Several aspects of the small mammal fauna of Level III/1A is comparable to those of the underlying Level III/2. Equally, open steppe and meadow steppe species are most numerous, with some species indicating areas with forest and shrubs. As far as pollen and spores are concerned, sample #22 from Kabazi V, level III/1A (Chapter 5, this volume) contained mainly spores of mosses (*Bryales*) and ferns (*Filicales*). The pollen fraction consists of many unidentified herbs, and arboreal pollen which include pine, birch, and buckthorn. What can be deduced from this is a dominance of green mosses at the entrance of the rock-shelter, and woods that covered part of the slopes. More open sections of the landscape were covered by meadow-steppe vegetation. At Kabazi II, Kabazi V, Level III/1A accumulation corresponds to pollen zone XIII (Fig. 17-5), which at the same time is interpreted as equivalent to the Denekamp Interstadial (Gerasimenko 1999, p. 139). Meadow grasses replaced the undemanding steppe assemblages of the preceding stadial and indicate comparably humid conditions (Gerasimneko 1999, p. 125). Beside pine trees (*Pinus*), which dominate with up to 83 %, broad-leaved trees like hornbeam (*Carpinus*) and oak trees (*Quercus*) spread from their refugia. The environment around Kabazi II is of a forest-steppe type. Soil formation visible in the profiles of the excavation area shows that herbaceous vegetation covered the middle part of the slope. Again, an environmental model was used to reconstruct vegetation cover by GIS-based calculations (Fig. 17-8). The results are given in Figure 17-9. As in the previous stadial, the steep limestone cliffs had no vegetation at all, and the foot of the slopes were, much like today, overgrown with shrubs. Open vegetation consisting of steppe and - following small mammal fauna – meadow grasses dominated within the 4-hour isoline. In addition, the wooded vegetation in the floodplains again recalls the situation described for Level III/2, but this time broad-leaved trees would have occurred in greater number. Surfaces less inclined than the plateaus of

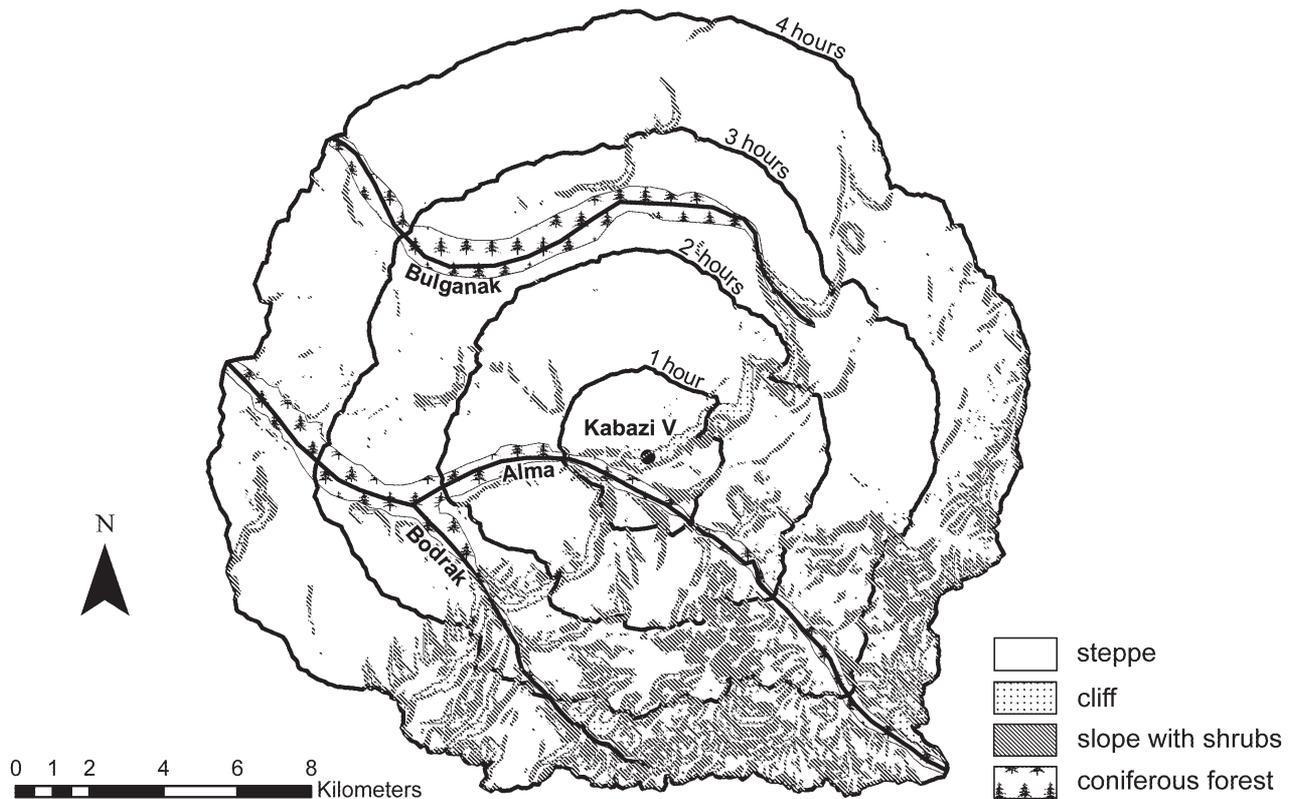


Fig. 17-7 Distribution of vegetation classes during the Huneborg stadial of Level III/2 in isolines representing walking hours around Kabazi V. Note: the 3-hour isoline represents the foraging radius of Kabazi V in which resources were procured (calculations made with ArcGIS 9.2).

the cuestas are thought to have provided conditions that favoured the growth of coniferous forest vegetation. If the inclination indicative for the border between steppe and forest vegetation is set as such that forest vegetation accounts for approximately 40 percent within the 1-hour isoline (which fits best to the local character of the pollen data), then it covers only 20 percent of the area within the 4-hour isoline. The main reason for this lies in the low altitude differences between hinterland and floodplain along the Bulganak River, which simply did not cut as deeply into the landscape as the Alma and Bodrak.

Potential prey, i.e. grazers, would have found good living conditions in this environment (Fig. 17-8). With regard to hunting strategies, small areas of optimal grazing grounds separated from one another by patches of forest may have facilitated the location of herds. Given the large amount of reconstructed steppe environment, the territorial equids could have spent the entire year in the investigated area, a notion that is supported by archaeozoological data from Kabazi II, levels III/2 and II/8

(Chabai and Uthmeier 2006, Fig. 18-3). With regard to the large herd sizes during periods of seasonal migration, *Saiga tatarica* must have been more numerous than equids. Even though seasonal herds were much smaller, this highly mobile species would have moved to other pastures within the summer range to avoid concurrence. The same may apply to bovinds, though this species would have been able to cope with some alternatives to grass. Giant deer and red deer with their preference for forest environments would have found rather good conditions during the Denekamp interstadial. However, the still restricted amount of forest will nevertheless have led to seasonal migrations between summer and winter pastures, especially for the larger giant deer. Caprids would have frequented the area during the winter only, after spending the summer in higher altitudes of the Crimean Mountains. Carcasses of mammoth, which was mainly used as a source for fuel, most likely accumulated near water resources, where old, diseased, or injured individuals probably retreated to die.

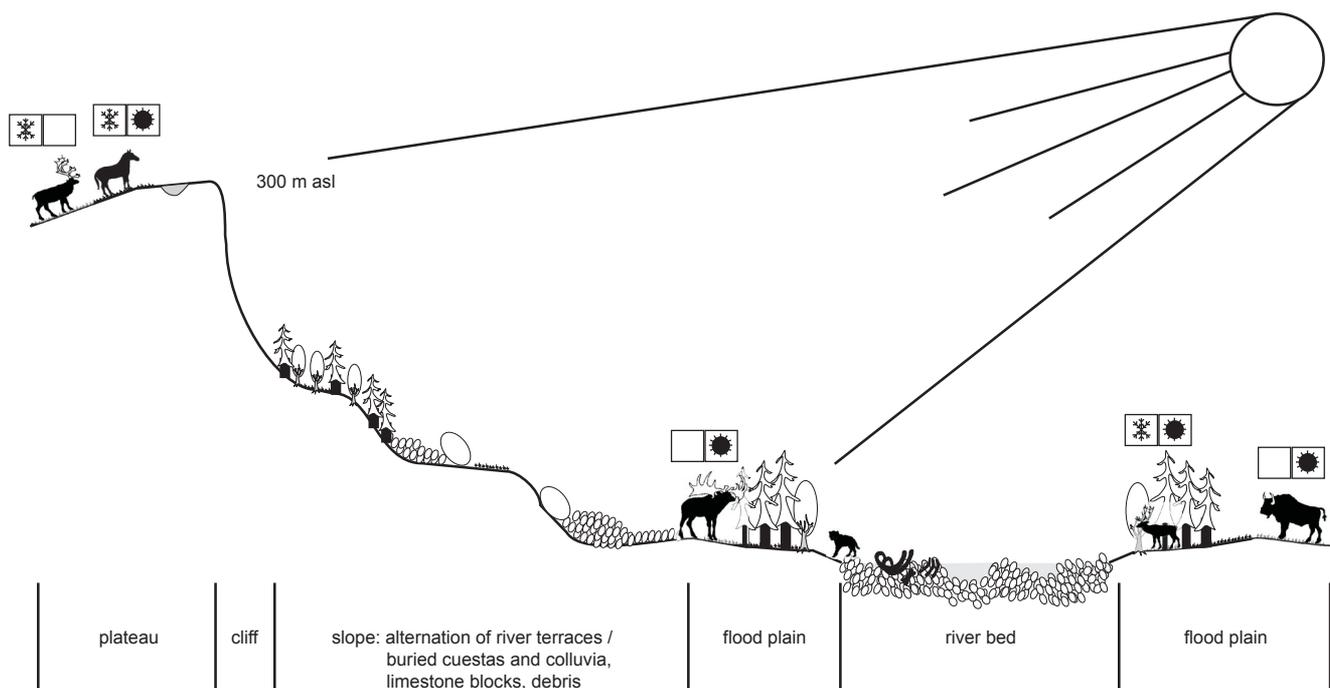


Fig. 17-8 Possible distribution of plants and animals under interstadial conditions in a low mountain range.

SITE CATCHMENT AT LEVEL III/2

Neanderthals who occupied Level III/2 ate mainly the normal staple food, e.g. *Equus hydruntinus* and *Saiga tatarica* (Table 17-4). Different states of preservation of the bone surfaces of the two species show that they stem from two different episodes (Chapter 6, this volume). As equids were killed in spring, whereas the season of death of saiga was the end of summer, the two occupations were separated by at least several months. This is attested by the high degree of fragmentation of faunal remains, which stems not only from the extraction of marrow by humans, but also from trampling. Although it is difficult to estimate the actual time between the two episodes with any certainty, it must have been long enough to allow for the weathering of the bones left on the surface. On the other hand, the still visible traces of the hearth on squares 8B-8Γ from an earlier phases of site use within Level III/2, which was later destroyed by trampling (or low energy erosion) (Chapter 2, Fig. 2-3, this volume), underlines that the period could not have been very long.

In contrast to the bones of saiga, which show a much better state of preservation, faunal remains of equids were exposed to weathering and, therefore, correspond to an earlier occupation. These pieces stem from three individuals of *Equus hydruntinus* (Table 17-4). Two of these, a juvenile and a mare pregnant

with a foetus which died at the age of 24 weeks, were doubtlessly hunted. M. Patou-Mathis (Chapter 6, this volume) suggests that the second female was scavenged. In the case of active hunting, kill and butchering sites were located at some distance to Kabazi V, as only meat bearing parts were transported to the rockshelter. However, the carcasses of *Equus hydruntinus* were heavy, which is not indicative of long transportation distances. Faunal remains of saiga antelopes, which were without exception actively hunted by humans (Chapter 6, this volume), were distributed in more or less the same part of the excavation area (Fig. 17-10). Judging from the composition of age and sex, the individuals found at Kabazi V were members of a herd of females with their offspring, i.e. all individuals were probably killed in one event (Table 17-4). As the living weight of these animals is low, whole carcasses were transported from the kill site to the rockshelter. The exploitation of saiga was complete and included the consumption of meat, the extraction of marrow, and the use of the skin. The nearest hunting ground for both equids and saiga, indicated by water sources and uneven landscapes near to grazing grounds with open vegetation, appear to have been situated in the Alma floodplain, at a distance of less than 1 hour walking time (Fig. 17-7). Large limestone boulders, shrubs on the slopes

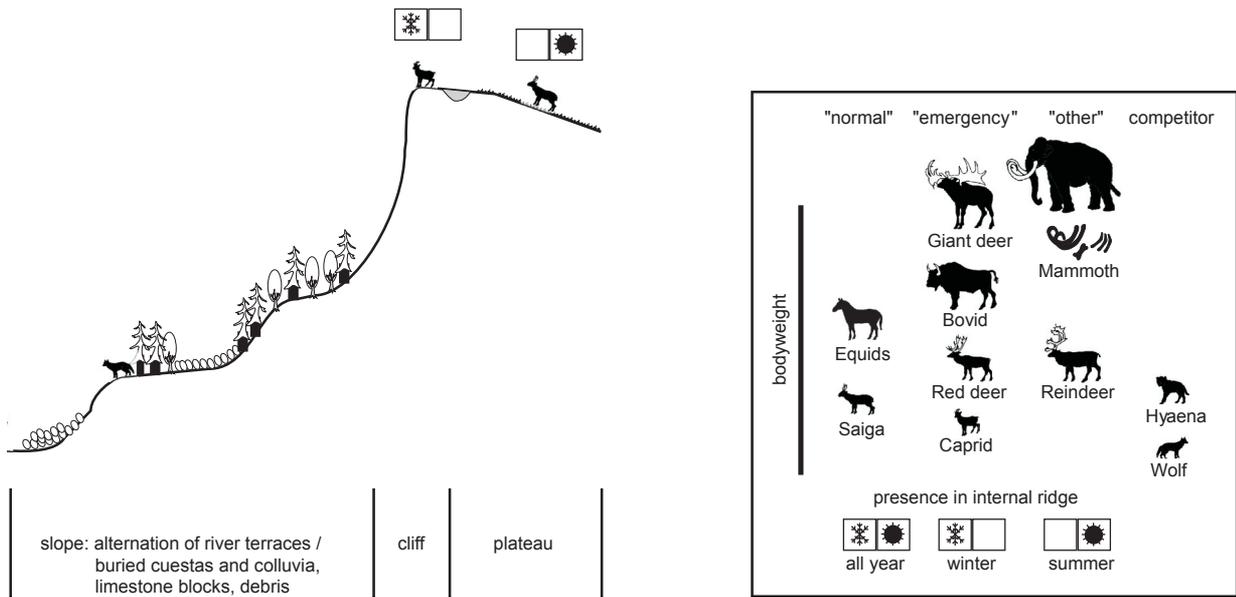


Fig. 17-8 Continued.

and trees along the river offered good opportunities for ambush hunting. If deep river passages through the limestone formation of the cuestas were preferred hunting grounds for this species, then comparable topographical situations were also to be found at distances of 2 to 3 hours from Kabazi V at the Bodrak River (Fig. 17-7; however, this value is already close to, and possibly even beyond, the critical value for walking distances thought to be relevant to Neanderthal hunting activities. It is uncertain whether the Bulsanak River provided a comparable setting. At least in the reconstruction, the narrow headwater did not allow the development of a forested floodplain that would have made ambush hunting easier. With regard to the amount of staple food resources procured, both occupations were short (Table 17-4). Given the fact that only one fireplace existed at a time, it is fair to imply that only small social units, most probably (nuclear) family groups of five persons, used Kabazi V. For these groups, the amount of meat from equids of 250 kg would have lasted for little more than 10 days (calculated after Chabai and Uthmeier 2006, p. 341). Similarly, the second occupation, connected with the consumption of saiga, would not have lasted longer than about a week.

The extent to which all other species were associated with one of the two hunting episodes

described above is unclear (Chapter 6, this volume). Species discussed as food resources include one hare and the remains of a red deer, which was probably scavenged (Table 17-4). Elsewhere, it has been suggested that a selection of hare as small game may indicate nutritious stress, because the output of hunting these fast but small animals is relatively low (Stiner et al. 2000). However, this does not apply to the Crimea, where small prey was never important. Nevertheless, hare cannot be regarded as a staple food. Both in occurrences and numbers, this species is generally rare in Crimean Middle Palaeolithic faunal assemblages. Apart from Buran-Kaya III, Level C (Laroulandie and d'Errico 2004), it is reported in low MNI from Kabazi II, Level V/5, Zaskalnaya V, IV, Zaskalnaya VI, III, Chokurcha I, IV-M, Kiik-Koba, upper, and Prolom sites I and II (Kolosov et al. 1993; Patou-Mathis 2004), all of which are attributed to the Crimean Micoquian. Whereas hare was most probably killed on the plateau near the site, red deer would have inhabited the forested flood plains. In the environment of Level III/2, larger forested areas would have been found only north of the confluence of the Bodrak and Alma rivers. Therefore, it is expected that the red deer remains stem from areas located at walking distances of 2 to 3 hours from the site (Fig. 17-7). Perhaps, the comparably low

Level III/2										
staple food							fuel		other agents	
normal					emergency					
<i>Equus hydruntinus</i> (+ <i>Equus cf.</i>)			saiga (<i>Saiga tatarica</i>)*			red deer †	hare	mammoth †	wholly rhinoceros †	bear
♀	♂	♀/♂	♀	♂	♀/♂	♀/♂				
juvenile		1			1***			1		1****
sub-adult										
young adult										
adult		2**		2						
senile					1	1				
undetermined							1		1	
Σ	3		4			1	1	1	1	1
amount of meat	juvenile = 50 kg adult = 100 kg 250 kg		juvenile = 12.5 kg adult = 25 kg 87.5 kg			selected parts only		no food resources		
days with meat (4 kg/day)	62.5 days		21.8 days							
* weathered bone surfaces ** 1 pregnant (age of foetus at death 42 month ~ spring time) *** 4 months (death at the end of summer) **** deciduous tooth † scavenging										

Table 17-4 Different aspects of prey taken by Neanderthals in Level III/2 (differentiation of age and sex according to Chapter 6, this volume; days with meat were calculated for one adult Neanderthal individual). Note: equids and saiga antelope were killed during two different occupations.

measurable outcome of the hunting-gathering activities that resulted in the procurement of red deer and hare can be taken as an argument that they were somehow related to the two main occupations. Nevertheless, they may also indicate separate, extremely short stopovers. Bones of mammoth and rhinoceros were collected as fuel for fireplaces (Table 17-4). Presumably, most of the undetermined small bone fragments and splinters in the faunal assemblage of Level III/2 also come from these species; 95% of these were burned, and they stem from large sized mammals.

By and large, Neanderthals of Level III/2 made use of most of the resources available in the foraging

radius of within 2 to 3 hours walking distance from the site. Compared to species that were included in other faunal assemblages of that time (Chabai and Uthmeier 2006, Fig. 18-2), only bovid was not represented (Fig. 17-11). Most of the food procurement is expected to have taken place near to Kabazi V, probably within the 1-hour isoline. With regard to the vegetation cover, humans from Level III/2 lived in a continuous environment (Fig. 17-12). The relation between forest and steppe hardly changed, even if the activity radius around Kabazi V was increased. With 90 percent or more, steppe environments are by far dominant within all analysed walking-distance contour lines.

Level III/1A											
staple food								fuel	other agents		
normal				emergency							
<i>Equus hydruntinus</i> (+ <i>Equus cf.</i>)			saiga (<i>Saiga tatarica</i>)			red deer (†?)	reindeer (†?)	bovid (†?)	mammoth †	wolf	bear / hyeana
♀	♂	♀/♂	♀	♂	♀/♂	♀/♂					
juvenile		1 (+1)			1			1			
sub-adult		(+1)	1								
young adult									1		
adult	2*	(+1)			2	2		1		1	
senile					2		1				
undetermined											1
Σ	6		6			2	1	2	1	1	1
amount of meat	juvenile = 50 kg adult = 100 kg 450 kg		juvenile = 12.5 kg adult = 25 kg 125 kg			selected parts only			no food resources		
days with meat (4 kg/day)	112.5 days		31.2 days								
* pregnant (death at spring) † scavenging											

Table 17-5 Different aspects of prey taken by Neanderthals in Level III/1A (differentiation of age and sex according to Chapter 6, this volume; days with meat were calculated for one adult Neanderthal individual). Note: equids and saiga antelope were killed during two different occupations.

SITE CATCHMENT LEVEL III/1A

Much of the site catchment of Level III/1A recalls that of the underlying Level III/2. Again, remains of equids and saiga antelopes dominate the faunal assemblage by far (Table 17-5), and, once again, whereas only meaty parts of equids were transported to the site, saiga reached Kabazi V as entire carcasses (Chapter 6, this volume). Equally comparable to Level III/2 is the impression that the two species were killed and consumed in the course of different occupations. Otherwise, the well-sorted distribution of faunal remains and artefacts in two separate concentrations (Fig. 17-13) would be difficult to explain. In the western part of the excavated area, saiga remains concentrated near two destroyed hearths,

while in an easterly square metre, equid remains were found around a hearth in a natural depression (Chapter 2, this volume). The fuel used to run the hearths extends the list of similarities between the two levels under analysis. As in Level III/2, most mammoth remains were fragmented and burned. Among equid remains, three individuals of *Equus hydruntinus* were identified (Chapter 6, this volume); one juvenile was accompanied by two adult females, both of which were pregnant and, therefore, killed in the spring (Table 17-5). Skulls and meat bearing parts were transported to the rock-shelter after primary butchering at the kill site. Three additional equids did not allow a classification at the species level.

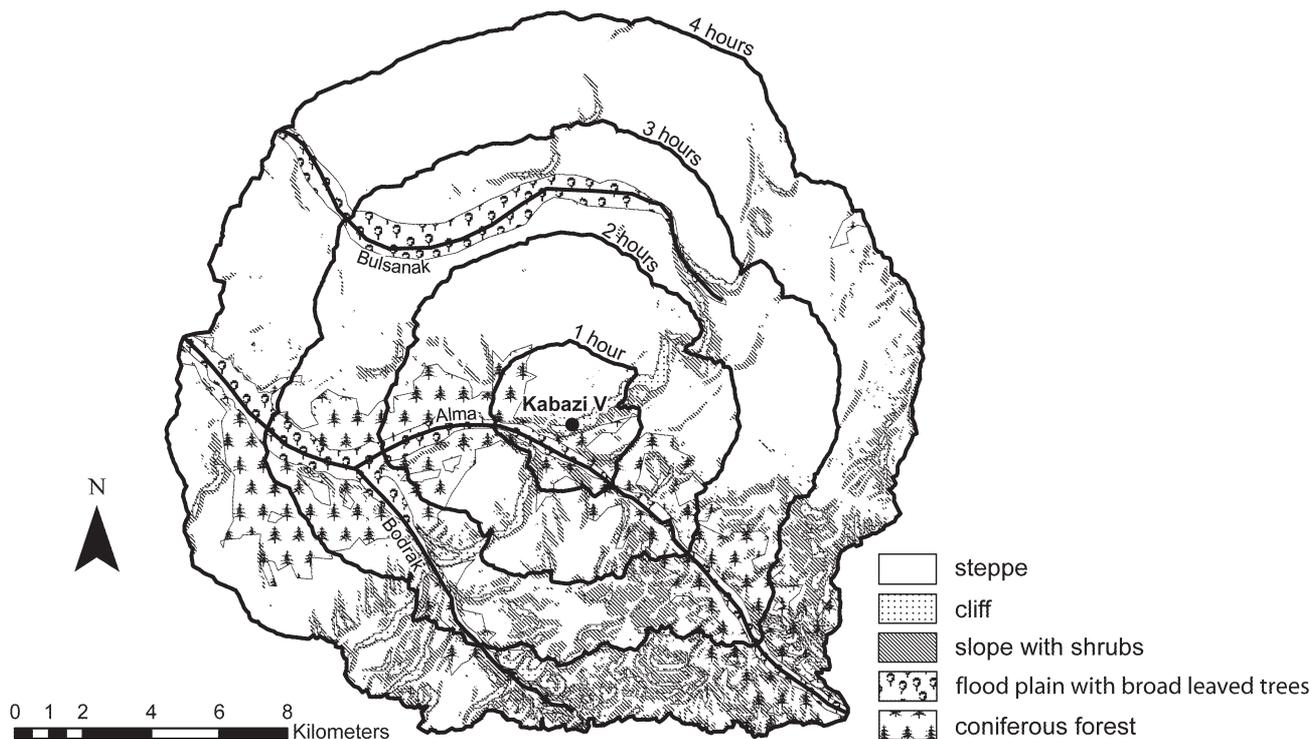


Fig. 17-9 Distribution of vegetation classes during the Denekamp interstadial of Level III/1A in isolines representing walking hours around Kabazi V. Note: the 3-hour isoline represents the foraging radius of Kabazi V in which resources were procured (calculations made with ArcGIS 9,2).

They account for one young, one sub-adult and one adult animal (Table 17-5). For saiga, the season of death is not known (Chapter 6, this volume). The animals that were brought into the rock-shelter as entire carcasses comprise one juvenile, one sub-adult, two adult and two senile (Table 17-5). Under the precondition that the individuals were killed at the same time, the meat of equids would have lasted (for a nuclear family) for approximately 3 weeks (Table 17-5). The meat of the saiga, however, would have provided sufficient calories for no more than one week. Where were the staple food resources procured? Within the foraging radius (i.e. within the 3-hour isoline), it seems unlikely that the grazing grounds of these species would have been situated between the Alma and Bodrak valleys (Fig. 17-9). In this region, the landscape was either hilly with many slopes, or divided by forest. Towards the northwest, large portions of steppe would have been characterised by the vegetation within the 2-hour isoline, which in the direction of the Alma bordered on woodland. Apart from the slopes near to the site which conjoin the cliffs with the Alma valley and offer good hunting opportunities near

to possible watering places, conditions for ambush hunting therefore would have been equally good in some distance towards Kabazi V.

One reindeer, two bovids and two red deer complement human staple food resources, though it is unknown whether these animals were hunted or scavenged. Be this as it may, red deer would most certainly have been killed in, or in the proximity of forest. Forest is frequent within the 1-hour isoline, but still larger continuous sections of forest were situated towards the west, at the confluence of the Bodrak and the Alma, some 2 to 3 hours walking distance from Kabazi V (Fig. 17-9). With much higher probability Neanderthals found herds of red deer, or a fresh kill, in this area of the foraging territory. On the other hand, bovid and reindeer are steppe dwellers, roughly found in the same steppe habitat as saiga antelope. However, reindeer is – like the hare in Level III/2 – relatively rare for the Crimean Middle Palaeolithic. Other occurrences of reindeer are reported with low MNI from Zaskalnaya VI, Units II, III and IV, Karabi Tamchin, Units IV and V, and Prolom I and II (Kolosov et al. 1993; Burke 2004). With a high degree of certainty these

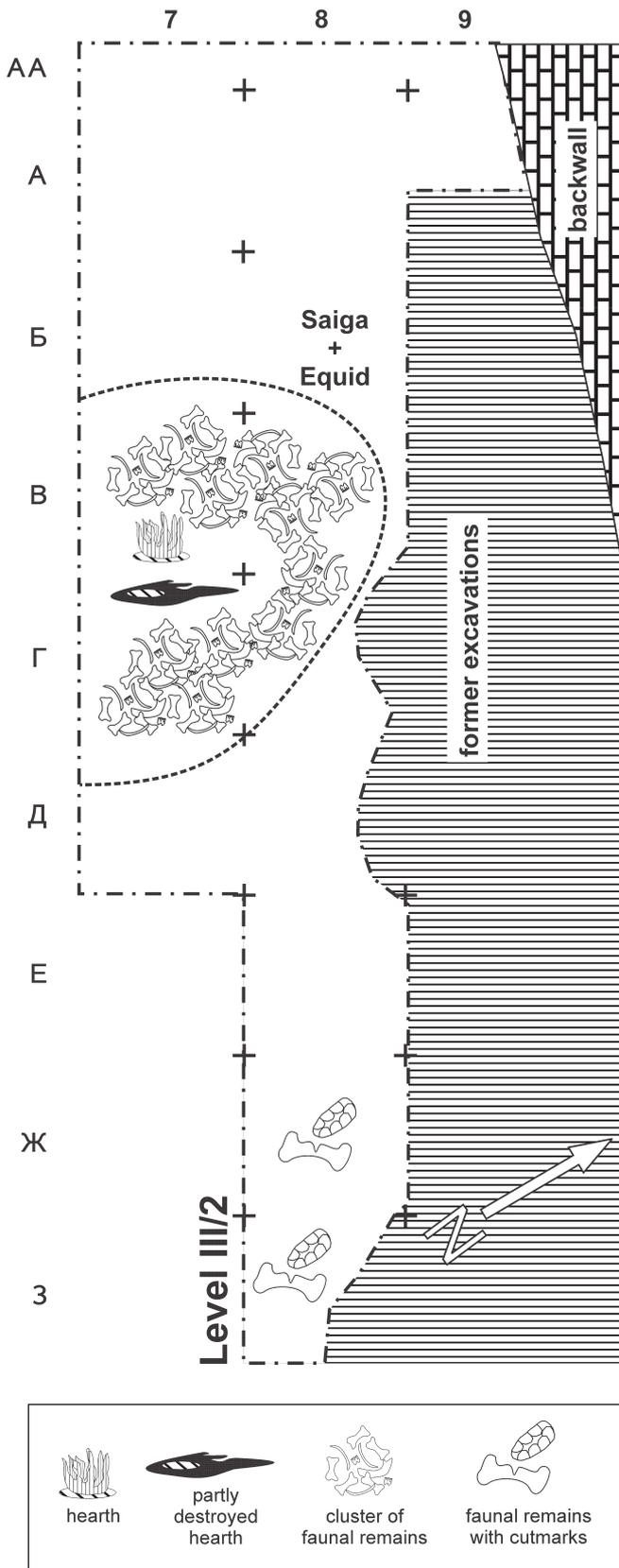


Fig. 17-10 Evident structures of Kabazi V, Level III/2.

animals were not part of the staple food repertoire. The remains of wolf and hyena (or bear) stem from the alternating use of the rock shelter by humans and carnivores. The occasional occurrence of digested bones (from hyena) and traces of gnawing on some bone surfaces point indirectly to the presence of carnivores. However, carnivores never used the rock shelter as a den; their teeth very rarely affected bone surfaces. The fact that Crimean Neanderthals had common ranges with hyena and wolf is in accordance with Middle Palaeolithic faunal analyses from other parts of Europe (Mussi 1999). This finding is interpreted as substantiation of the ability of Middle Palaeolithic humans to concur with large Pleistocene carnivores for the best habitats; Crimean Neanderthals were, without a doubt, at the top trophic level of the ecosystem.

In conclusion, Neanderthals of Level III/1A exploited major habitats found in the foraging radius of Kabazi V. These included forested areas (red deer), areas with more open vegetation, but still with some trees (bovids), as well as open steppe environments (equids, saiga and reindeer). On the basis of species documented in other faunal assemblages from contemporaneous Crimean sites (Chabai and Uthmeier 2006, Fig. 18-2), giant deer and caprids were not taken (Fig. 17-11). Interestingly, the amount of forest declines with the additional surfaces of each contour line of walking time (Fig. 17-12). Within the 1-hour line, the amount of woodland amounts to 40 percent. Within the 2-hour and 3-hour isolines, thought to be representative of the maximum walking distances in the foraging radius, it constitutes just 27 and 28 percent of the area, respectively. The decrease in the contingent of wooded areas points to the fact that the camp was positioned intentionally near to steppe and forest resources, the latter being linked to water resources. The reasons for this have already been discussed in greater detail, i.e. water supply, habitat demands of staple food species, and requirements for ambush hunting. Comparable conditions were to be found at the Bodrak valley, slightly beyond the 2-hour iso-line, but not in the shallow Bulganak valley.

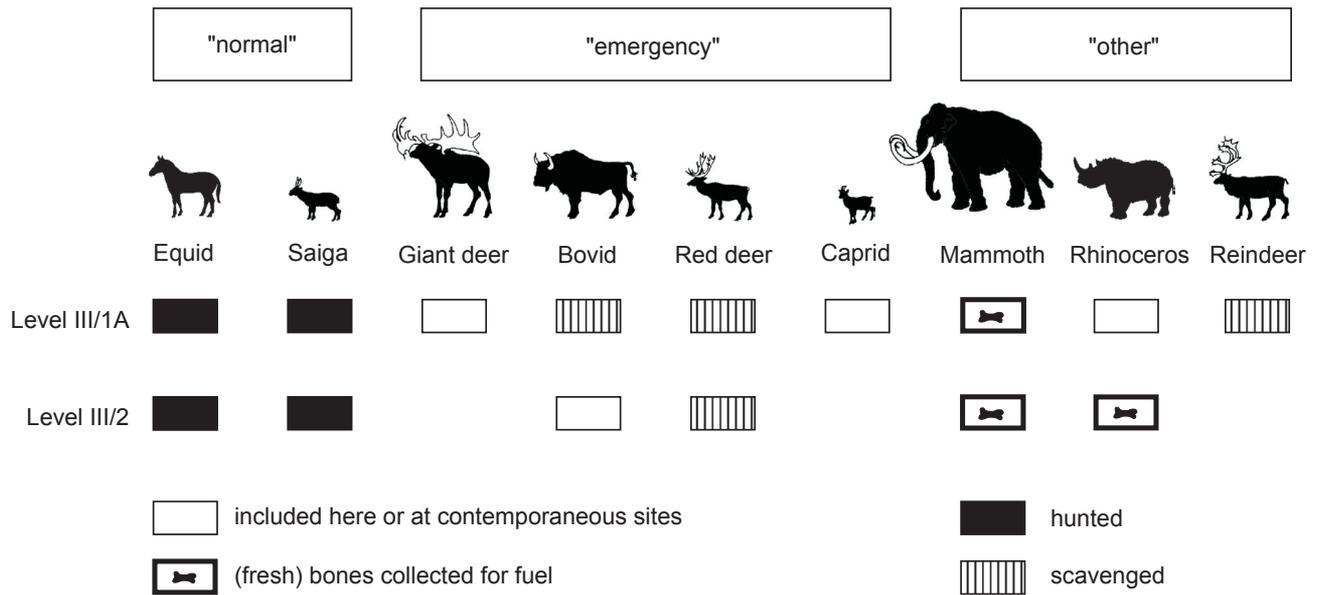


Fig. 17-11 Staple food resources taken and ignored at Kabazi V, Levels III/2 and III/1A.

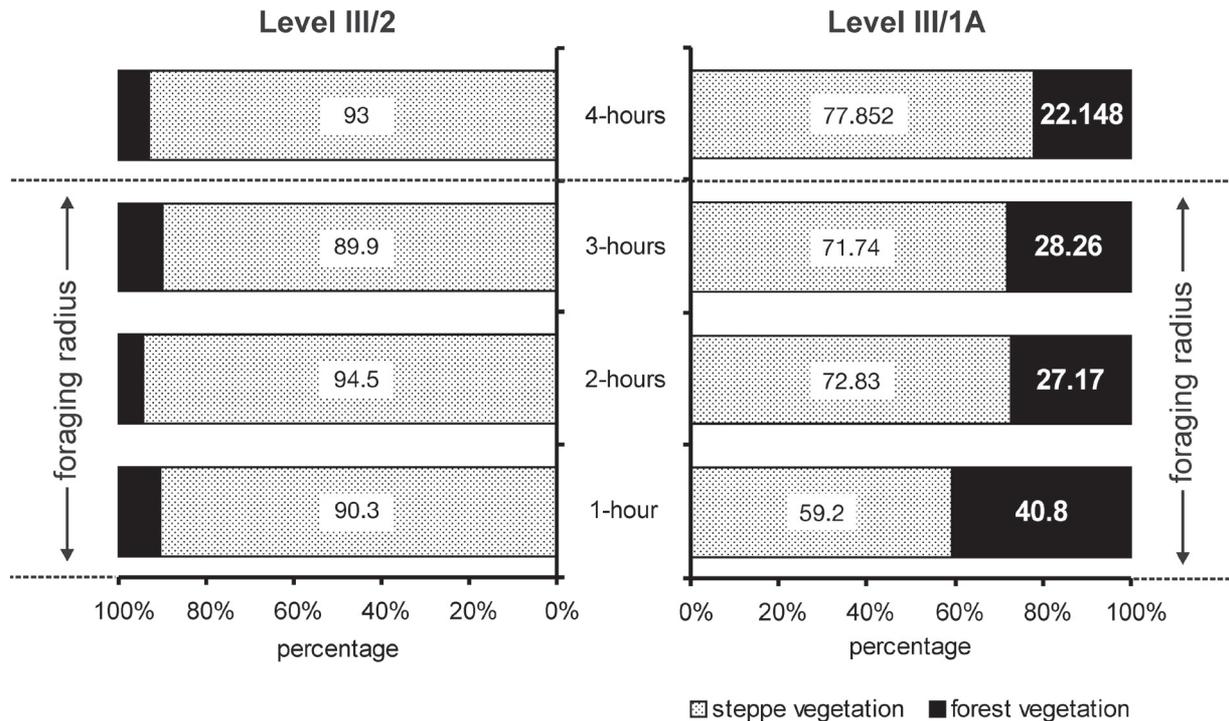


Fig. 17-12 Relative amount of forest and steppe vegetation in isolines of walking distances around Kabazi V (surfaces of each isoline of increased walking distance was added to the previous; calculations made with ArcGIS 9,2). Note: the 3-hour isoline represents the foraging radius of Kabazi V in which resources were procured.

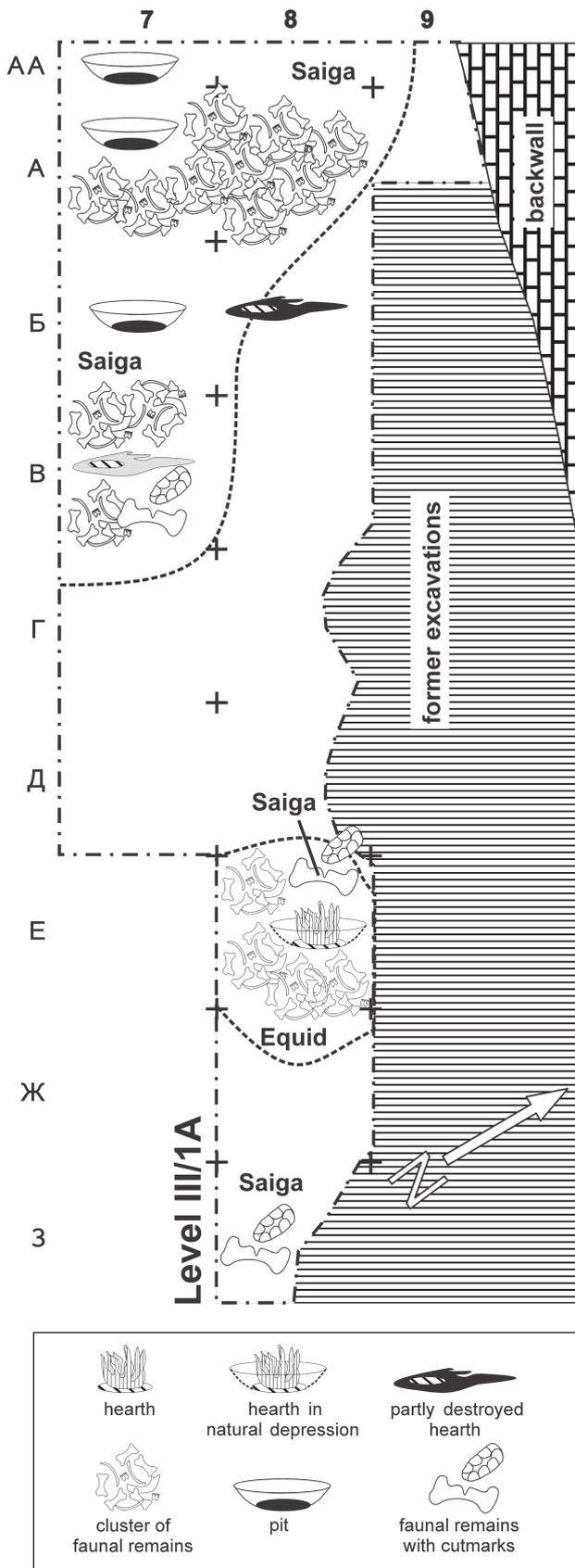


Fig. 17-13 Evident structures of Kabazi V, Level III/1A.

DISCUSSION AND CONCLUSION: SITE CATCHMENT AT KABAZI V

In both investigated levels, Neanderthals consciously decided to hunt and gather in an ecotone characterised by large amounts of steppe bordering on forested areas and, perhaps more importantly, on a river surrounded by slopes and uneven ground. Within these landscapes they attempted to make comprehensive use of accessible food resources (Fig. 17-14) by concentrating on two species, *Equus hydruntinus* and *Saiga tatarica*, and at the same time took advantage of a relatively large variety of other opportunities which included the hunting of small and large game, as well as scavenging.

In the setting near to a river, the availability of fresh water was no problem, which – on a large scale – accounts for many other localities in the second range of the Crimean Mountains. Due to the landscape gradient, cuestas drain into numerous small to medium sized rivers. Regarding pollen data, proximity to river streams was conterminous with the availability of wood. The question why bones were nevertheless used as fuel is difficult to answer. Perhaps, bone fires had advantageous properties. Experiments (Hahn 1989, pp. 65-66) have revealed that although fresh bones do not burn as hot as log fire, they do burn remarkably constantly. In any case, a severe “shortage” of wood must be excluded, as it is also clear that considerable amounts of wood were needed to light the fire (ratio of wood to bone lying at 1 : 2). Whereas water procurement was less problematic, the distance between the site and hunting grounds were certainly important factors with regard to decisions relating to the site catchment. One species of normal staple food was *Equus hydruntinus*. The estimations of eatable meat per hunting event suggest that *Equus hydruntinus* was – when compared to saiga – a much more effective game. Provided that the average energy invested in hunting and killing one individual did not differ too greatly, it is fair to conclude that *Equus hydruntinus* was the preferred staple food. In both levels investigated, Neanderthals concentrated on female equids with their offspring. As these lived separately in small herds and had an increased water supply, such a strategy would have maximized the outcome of each hunting trip. Saiga is the second most important source of normal staple food. Also a steppe grazer, this animal is in so far complementary to equids as it is not territorial. It cannot be excluded that from time to time the territorial equids were punctually overexploited by carnivores, especially when jump kills conducted by humans were successful, or when animals got into trouble during extraordinary dry or cold years.

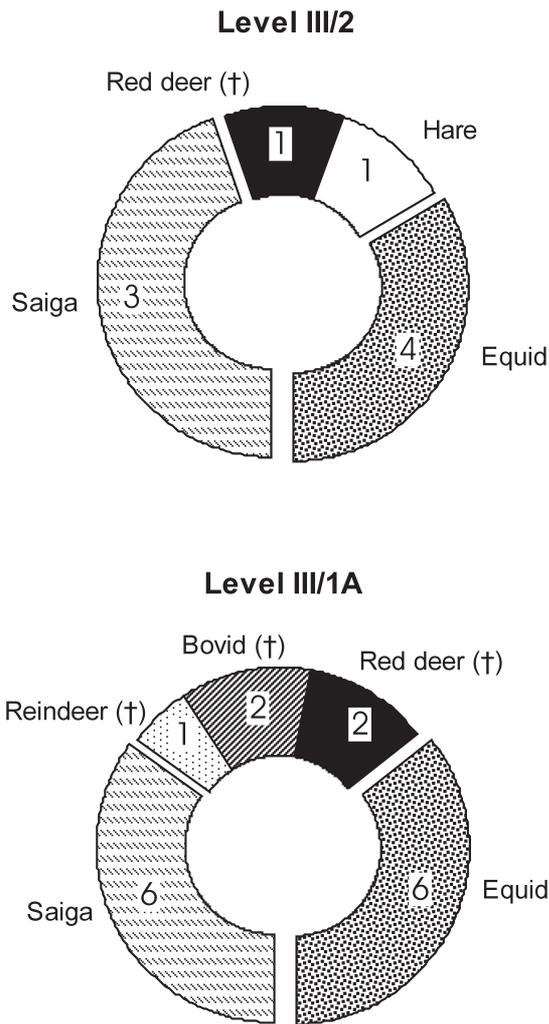


Fig. 17-14 Amount of prey in Levels III/2 and III/1A of Kabazi V in absolute numbers (MNI).

In a simulation, J. Hahn (1995) has shown that last glacial habitats in low mountain ranges had much lower carrying capacities than previously expected. According to Hahn, the killing of 5 to 6 horses at the same time (as seen in Kabazi V in Level III/1A) may have been a severe ecological burden for local equid herds. *Saiga tatarica*, however, was probably less vulnerable in this respect, particularly as population sizes were larger, and seasonal migration distances were greater. In order to avoid the breakdown of local herds of *Equus hydruntinus*, or perhaps as a reaction to it, Neanderthal regularly hunted saiga antelope as an alternative species with similar habitat and behaviour. Nothing can be said about the relation between normal and emergency staple foods. It cannot be excluded that the

hunting and scavenging of the latter occurred independently of the procurement of saiga and equids. Normal staple food resources were acquisitioned within the 1-hour isoline, and emergency resources within the 2-hour to 3-hour isolines. In theory, the recurrent switch to emergency staple resources could be interpreted as a consequence of the complete exploitation of local normal staple foods.

In both levels discussed in this chapter, the resulting meat did not last any longer than a few weeks. Instead of long-term seasonal camps provisioned by long-distance hunting parties, the short-term character of the occupations at Kabazi V points to a strategy of high residential mobility to position hunters near to resources. Equally, in both investigated levels, humans returned to Kabazi V after a relatively short period of time, whereby trampling destroyed fireplaces and faunal remains from previous stays. In Kabazi V, Level III/2, occupations occurred at different times of the year – in fact, it might have been the same group which returned months, or even years later to hunting grounds known from previous stays. It is hard to say whether the shift in prey species visible in both levels was merely a coincidence, i.e. the first game encountered on forays. Alternatively, this pattern could have resulted from long-term planning of an exploitation of resources in a seasonal cycle, or may have been enforced by natural causes (i.e. the local decline of a particular species). What can be deduced from the recurrent pattern of short-term visits is that Neanderthals were regularly returning to known foraging territories in search of food resources. In conclusion, the site catchment of Crimean Neanderthals at Kabazi V was guided by a preference of ecotones in the proximity of water streams which provided high biodiversity in a small area. In addition, the proximity to limestone cliffs assured topographical parameters suitable for ambush hunting at passes between grazing grounds and watering places. Apart from this, it was important to access prior knowledge. It is conceivable that during the summer, when equids were most dependent on water, Neanderthal (family) groups moved their residential camp along the same line of cuestas from one potential territory of equids to the other. In general, river valleys and – perhaps afterwards – edges of forests (towards the steppe) were frequently chosen with ambush hunting in mind. Game was mainly taken within a foraging radius of walking distances up to 2 hours from the site. Only if these strategies failed was the radius increased to 3 hours (one way) walking distance from the site, and emergency staple food was obtained not only by hunting, but also by scavenging.

АБСТРАКТ

РЕСУРСНЫЕ ТЕРРИТОРИИ СТОЯНОК В
ФИНАЛЕ СРЕДНЕГО ПАЛЕОЛИТА КРЫМА
(НА ОСНОВАНИИ ГЕОГРАФИЧЕСКОЙ
ИНФОРМАЦИОННОЙ СИСТЕМЫ)

УТМАЙЕР Т., ИКЛЕР С., КУРБЮН М.

В настоящей главе проведен анализ ресурсных территорий поселений Кабази V, III/1A и III/2. Для времени отложения горизонта III/1A характерны относительно мягкие климатические условия интерстадиала Денекамп, тогда как горизонт III/2 образовался во время более холодного и аридного климата стадиала Хунеборг.

Метод анализа мотивации выбора стоянок состоит в определении расстояний между поселением и районами, содержащими основные ежедневно потребляемые ресурсы. Расчет расстояний произведен при помощи географической информационной системы (GIS) и состоит в определении расстояний, которые может преодолеть пешеход за 1, 2 и 3 часа. Расстояние, покрываемое за 3 часа, составляет радиус зоны заготовок необходимых ресурсов. Ресурсы подразделяются на два типа. К первому типу относятся ресурсы составляющие основу пищевого рациона. Второй тип ресурсов составляет случайная добыча или «критический пищевой ресурс». Гидрунтинусы и сайга являются основным пищевым ресурсом для практических всех крымских среднепалеолитических стоянок, тогда как бизоны, гигантские и благородные олени составляют критический пищевой ресурс. Виды, составляющие критический пищевой ресурс, зачастую попадали на территории стоянок в результате сбора падали.

Условия окружающей среды во время бытования Кабази V, III/1A и III/2 были реконструированы на основании географической информационной системы (GIS), результатов палинологического анализа, изучения фаунистических коллекций мелких млекопитающих и сухопутных моллюсков. Дополнительные основания для реконструкции получены в результате анализа данных геоморфологии и современного растительного покрова. В целом, наиболее существенное различие между реконструированными условиями окружающей среды состоит в степени распространения облесенных участков. Во время аккумуляции культурных остатков горизонта III/2 древесная растительность была сконцентрирована в речных долинах, тогда как во время образования горизонта III/1 лесами были покрыты значительные участки водораздела рек Альма и Бодрак. Обитатели обоих горизонтов предпочитали охотиться и заниматься собирательством на границе степных пространств и облесенных участков. Также для выбора места стоянки значительную роль играло наличие реки, окруженной участками пересеченного рельефа. Данные ландшафты изобиловали двумя основными промысловыми видами *Equus hydruntinus* и *Saiga tatarica*, которые составляли основу пищевого рациона неандертальцев. Вероятно, во избежание кризиса популяции *Equus hydruntinus*, или же в виде реакции на такой кризис, неандертальцы регулярно охотились на *Saiga tatarica* – вид, занимающий ту же, что и лошади, экологическую нишу. В то же время неандертальцами использовались возможности охоты на другие виды, а также сбор падали. Основной пищевой ресурс был доступен в радиусе одного часа ходьбы, а критический пищевой ресурс – в радиусе 2-3 часовой ходьбы.

В обоих горизонтах добытый мясной ресурс обеспечивал обитателей в течение не более нескольких недель. Неандертальцы после короткого отсутствия регулярно возвращались

на место предыдущих поселений. Время отсутствия было настолько коротким, что ранее оставленные очаги и фаунистические остатки не были перекрыты седиментами и подвергались «вытаптыванию». В свою очередь, это свидетельствует о рекуррентной модели использования ранее известных территорий. Предположительно, что летом, когда лошади были зависимы от водных источников, неандертальцы передвигали свои лагеря вдоль линий куэст от одной занимаемой гидрунтинусами территории к другой. В случае отсутствия гидрунтинусов неандертальцы охотились на сайгу. Если же такая двувидовая стратегия не срабатывала, то ресурсная зона увеличивалась до 3-х часовой, и задействовался критический пищевой ресурс, добываемый охотой и / или сбором падали.