Chapter 11

WESTERN CRIMEAN MIDDLE PALEOLITHIC PALEOENVIRONMENT AND PALEOECONOMY

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INTRODUCTION

The environmental studies presented in this volume cover a relatively large segment of the Late Pleistocene of Crimea: from the Last Interglacial to the Denekamp Interstadial. These studies may be viewed as the beginning of a large-scale environmental reconstruction of the Crimean Pleistocene, since much more work is still needed. The other research presented in this volume mainly deals with various economic activities of the Middle Paleolithic populations in Crimea. Some of these, the patterning of raw material exploitation, for instance, were discussed in the first volume, as well (Chabai and Marks 1998). Now, because of additional available information on Late Pleistocene environments and subsistence activities, our original views need to be revised and expanded.

The paleoenvironmental reconstructions provided by A. K. Markova, C. Mikhailesku, and N. Gerasimenko add much needed insight to western Crimean landscape evolution over the last 100,000 years and give us better control over chronology, especially where the absolute dates fell short. The faunal studies conducted by A. Burke and M. Patou-Mathis highlight the unique nature of Crimean Middle Paleolithic cultures; while others debate whether Middle Paleolithic subsistence was based on scavenging (e.g., Binford 1981, Stiner 1994), the results presented here offer unequivocal proof not just of hunting, but of highly specialized hunting, at least since the beginning of the Last Glacial. Use-wear and residue analyses presented in Part III of this volume further underscore the vast technological adaptations of the Crimean Middle Paleolithic hominids, who were not completely dependent on animal foods, but used a variety of plant and bird resources as well.

This chapter incorporates the results of previous chapters and attempts a synthesis of the paleoenvironment and paleoeconomy of the western Crimean Middle Paleolithic. Its task is four-fold: the correlation of occupations at Kabazi II, Kabazi V, and Starosele based on absolute dates, malacology, microfauna, and palynology; the reconstruction of the changing environment of these three sites; the patterning of subsistence and animal processing; and the reconstruction of land-use patterns.

CHRONOLOGICAL AND PALEOENVIRONMENTAL CORRELATIONS

Chronological correlations among sites have been an important goal of investigations into the Crimean Middle Paleolithic since the end of the 1940s (e.g., Danilova 1946; Pidoplichko 1952; Cherdyntsev and Meshkov 1952). In recent years, these have been largely limited to using absolute dates from AMS, ESR, and U-Series methods (Hedges et al. 1996; Pettitt 1997; Rink et al. 1998; McKinney 1998). Correlations based solely on absolute dates from Kabazi II, Starosele, and Kabazi V, however, now can be refined with the additional data from the pollen, microfauna, and malacofauna studies reported in this volume. While this is a major improvement, all sites do not have the same range of information. Palynological studies were done for the Kabazi II sequence, only; while pollen samples were taken from the profile at Starosele, it will be some time before they can be studied. There were rich microfaunal remains at Starosele, but no microfauna was preserved at Kabazi II, and only small samples were obtained from Kabazi V. The sediments of Starosele were extremely rich in snails; the snail samples from Kabazi V are very limited. Therefore, the detailed environmental information available for each of the three sites is incomplete. Yet, the sites are fairly close to each other—Kabazi II and Kabazi V are located on the same massif and Starosele is only 20 km away—so that it is reasonable to incorporate data from all three sites in reconstructing the paleoenvironments of this area, and, in doing so, also improve our correlations among sites and their archeological levels (fig. 11-1).

The approach taken here will be chronological, using the extraordinarily complete pollen sequence from Kabazi II (see fig. 6-1 and Table 6-1) as the primary framework. This will be complimented by additional information from microfauna, snails, and absolute dates. While all are not always in agreement, the degree of comparability is striking and, as a result, the strength of the conclusions is enhanced.

Last Interglacial

The Last Interglacial was identified by N. Gerasimenko in pollen zones I through IV in the Kabazi II sequence (Chapter 6). Pollen zones I (a xerothermic optimum) and IV (a hygrothermic optimum) are separated by a relatively cold stage represented by pollen zones II and III. These findings are confirmed by the Kabazi II snail samples from the corresponding deposits in the sequence (sample nos. 614 through 629; no snail samples were available for the deposits comprising pollen zone I). The deposits corresponding to pollen zones II and III contain snails indicative of xeric steppe landscapes, such as *Chondrus bidens*, *Ch. bidens natio pygmaea*, and *Helicella dejecta* (snail sample nos. 626-629 [zone II] and 625-619 [zone III], see Table 5-5). An increase of *Helix lucorum taurica*—a snail found in mesophytic steppes—in the snail samples corresponding to pollen zone III indicates that the environment was becoming progressively more humid and bush-small tree stands were becoming larger. Although the malacological sample for the deposits corresponding to pollen zone IV (sample nos. 614-618) is rather small, it does support the palynological results of a hygrothermic optimum. The samples contain only temperate snail species: *Helix lucorum taurica* and *Helix vulgaris*.

On the whole, the period covered by pollen zones I through IV was characterized by warm and humid conditions, as well as by forested landscapes, fully consistent with the conditions expected during the Last Interglacial. A more precise characterization of the Eem in Crimea is presented in Chapter 6.

Our knowledge of human occupation during the Crimean Last Interglacial is very limited. The lowest archeological horizons at Kabazi II (-930; -980; -1037/-1050; -1080; -1100; -1135/ -1145), all from within a Last Interglacial soil, have not yet been excavated beyond a very small, deep test pit which permitted the recovery of a very few artifacts and pollen samples. Due to the limited excavations in this area, the depositional processes of Unit IV are unknown.

Early Glacial Stadial

According to N. Gerasimenko, the cold and humid conditions of this stadial led to a sharp reduction of broad-leaved trees and an increase of shrub-arboreous formations (Chapter 6). The landscapes at this time were characterized by forest-steppe (pollen zone V). The archeological Level III/3 at Kabazi II Unit III was formed during this time. An ESR/LU date

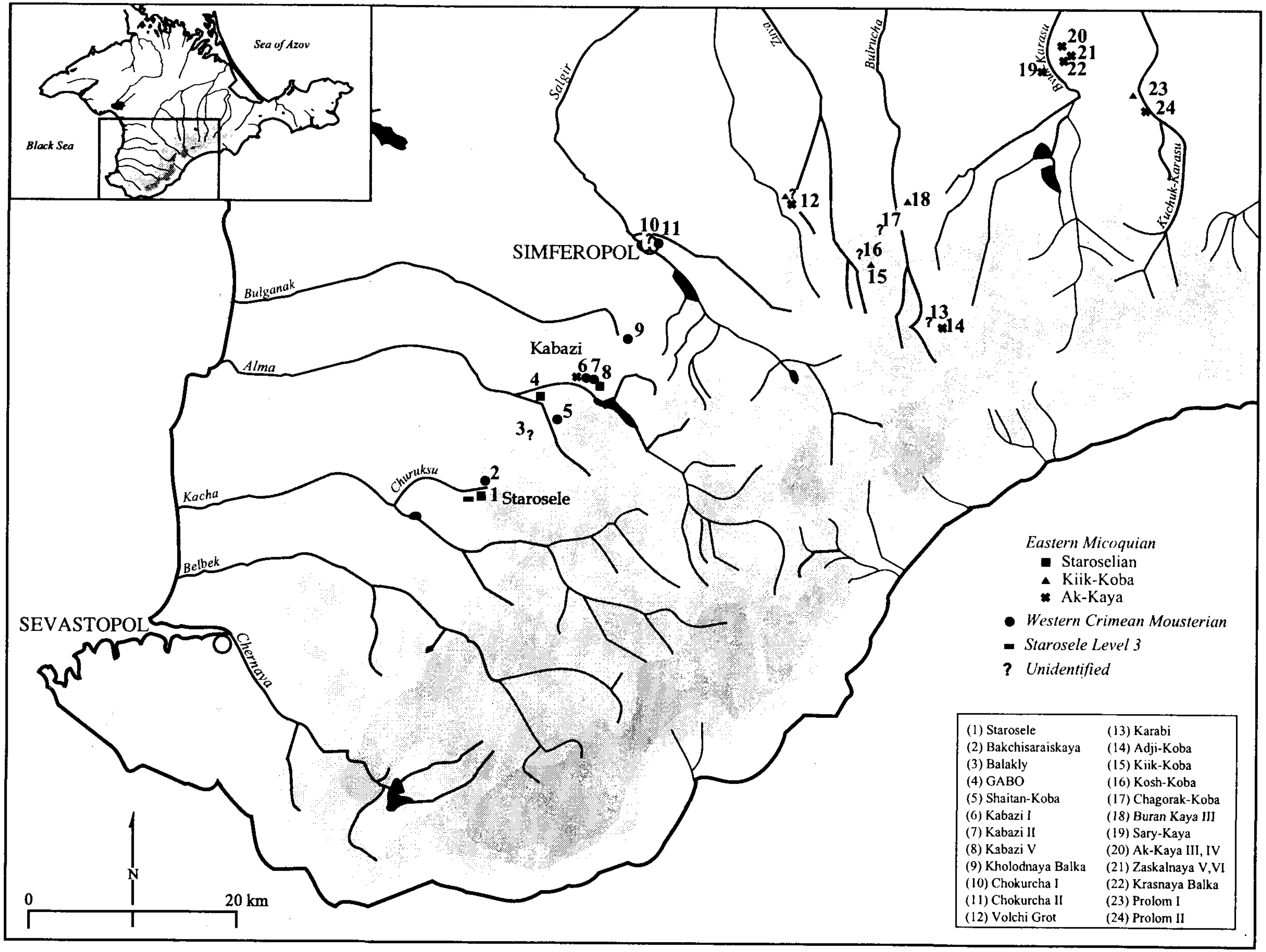

Fig. 11-1—Middle Paleolithic sites and lithic industries of western Crimea

of 69±5 ka from this level (Rink et al. 1998) seems too young for this stadial. In addition, J. Rink proposed two variants of the Level III/3 dating: 53±4 or 70±5 ka, but neither appears acceptable, given the pollen data (Table 11-1). The preceding pollen zone IV corresponds without a doubt to interglacial conditions, and is conspicuous in its high content of broad-leaved tree pollen, while the following pollen zone V shows all of the earmarks of stadial conditions. Based on both pollen content and correlations with firmly dated sequences in neighboring regions, it would appear that these two zones represent the Eem Interglacial and the Early Glacial stadial, and we therefore would expect the corresponding archeological levels at Kabazi II to be dated before 100,000 BP.

Early Glacial Interstadials

It is not clear which interstadial or interstadials are defined in the Kabazi-II sequence as pollen zone VI. Taking into account the possible correlation of the Kabazi II and Molodova I sequences (Chapter 6), it is most probable that pollen zone VI corresponds to the Krutitsa Interstadial (Amersfoort + Brörup). On the other hand, there is some discussion whether or not what has been recognized as the Krutitsa in Eastern Europe might comprise both interstadials of the Early Glacial (Amerfoort-Brörup and Odderade) In any case, this pollen zone clearly precedes the beginning of the Pleniglacial (pollen zone VII).

Pollen zone VI is characterized by forest-steppe vegetation of a specific type: broad-leaved and birch formations in combination with meadow grass coenoses. This type of vegetation occurs only during relatively humid and moderate climatic conditions. Malacofauna from Kabazi II Level III/2, within pollen zone VI (sample no. IIIe), indicates conditions more humid and warm than seen in the snail fauna in the immediately succeeding stadial of Levels III/1A-III/1 (sample nos. IIIa-IIId). C. Mikhailesku also describes the snail sample from Starosele Level 4 as corresponding to more humid and colder climatic conditions than prevail today. His conclusion that the malacofauna from Starosele Level 4 dates to the Mikulino (Eem) disagrees with his own interpretation of the climatic conditions that existed during formation of this level (Chapter 5). Unfortunately, these samples from Kabazi II (sample no. IIIe, 16 shells) and Starosele Level 4 (467 shells) are quite different in size and are thereby difficult to correlate with each other. According to Mikhailesku, however, the landscapes near Starosele at this time were more forested than today—a conclusion in good agreement with the pollen data indicating the Early Glacial interstadials. The same kind of agreement is seen in the microfaunal studies, which indicate meadow steppe conditions for the time of the Starosele Level 4 sedimentation (Chapter 4). The large mammal fauna assemblage from Starosele Level 4 exhibits a mixture of woodland (*Cervus sp.*) and steppe (*Equus*, *Saiga tatarica*, Bos/bison) animals, with the latter type dominating (Chapter 1). Finally, Level 4 is situated at the very top of an interglacial soil, which is in secondary position (Marks et al. 1998). From this, it is clear that Level 4 at Starosele formed after the Last Interglacial.

For Kabazi II Level III/2, neither the ESR nor U-series dates correspond to the generally accepted dates for the Early Glacial interstadials. The same is true of Starosele Level 4 as dated by ESR/LU (linear uptake). The ESR/RU (recent uptake) and U-Series dates for Starosele Level 4, however, do correspond to the expected date for the end of the Early Glacial (Table 11-1).

The archeological occupations associated with these Early Glacial interstadials are therefore Kabazi II Level III/2 and Starosele Level 4.

ka BP	Glacial Stage	Vegetation/Climate	Kabazi II Levels	Kabazi II U-Series	Kabazi II ESR	Kabazi II AMS	Starosele Levels	Starosele U-Series	Starosele ESR	Starosele AMS	Kabazi V Levels	Kabazi V U-Series	Kabazi V ESR
32	Arcy (Denekamp)	forest-steppe; climatic amelioration	horizon -195										
35	Stadial	xerophytic steppe; arid and cold; harsh continental climate	II/1A II/1 II/2 II/3 II/4 II/5	39.8±5	32±6	31.55±.6 35.1±.85 32.2±.9 33.4±1							
38	Les Cottés	pine forest, shrubs and steppe; inclement continental climate	II/6--II/7 II/7AB II/7C--II/7E		32±2								
42	Hengelo	forest-steppe vegetation, broad-leaved forest (birch) +pine + meadow steppe; moderate climate	II/7F8 II/8C IIA/1		39±3		1 2	about 60 (?)	>41.2±3.6	41.2±1.8 42.5±3.6			
58	Stadial	pine forest, shrubs and steppe; inclement continental climate	IIA/2 IIA/2-3										
62	Moershoofd	forest-steppe vegetation, broad-leaved forest + meadow steppe, moderate climate	IIA/3-IIA/3B IIA/4					?			II/3 through II/4A; (II/7 ?)		
78 (?)	Stadial	xerophytic steppe, continental climate	IIA/4B III/1A-III/1				3	about 67.5 (?)	42±4.7		III/1; III/1A III/2; III/3	73.3±6	55±4
105	Odderade (?) Brörup Amersfoort	forest-steppe vegetation, broad-leaved (birch) forest + meadow steppe, humid moderate climate	III/2	54±3	61±1 (LU)		4	>80	48±11 (LU) 77±6 (RU)				
118	Stadial	shrub-arboreous formations, cold and humid	III/3		53±4 or 70±5 69±5 (LU)								
	hygrothermic optimum	broad-leaved forests, warm and humid	IV										
	Eem	pine and broad-leaved forests, an increase in humidity	horizon -930										
		pine and broad-leaved forests, cooler and slightly drier	horizons: -980; -1037--1050;										
128	xerothermic optimum	warm hornbeam-oak forests	-1080;1100; -1135--1145										

Table 11-1—Correlation of glacial stages, the Kabazi II pollen sequence, and archeological levels of Kabazi II, Starosele, Kabazi V

Stadial: The Beginning of the Pleniglacial

Pollen zone VII at Kabazi II corresponds to the stadial at the beginning of the Pleniglacial. The vegetation during this stadial was characterized by a drastic depletion of broad-leaved trees and an increase of generally mesic grass coenoses, but with prominent features of xerophytization. The landscape becomes steppic and the climate becomes continental (Chapter 6).

Malacofauna from the same stratigraphic position in the Kabazi II sequence also indicate steppic landscapes (sample nos. IIIa-IIId). The increasing aridity and predominance of steppe landscapes has been noted in the snail and microfaunal samples from Starosele, in the sterile layer between Levels 4 and 3, and in Level 3 (Chapters 4 and 5). The same is true for the snails and microfaunal samples from Kabazi V Unit III. Furthermore, according to A. K. Markova, some microfauna species found in Kabazi V Levels III/3 and III/2, such as the yellow steppe lemming *Eolagurus luteus*, are characteristic of dry steppic, desert, or semi-desert areas (Chapter 4). On the other hand, the faunal analyses note the presence of woodland (*Cervus elaphus*) and forest (*Sus scrofa*) dwelling species both in Starosele Level 3 and Kabazi V Unit III (Chapters 1 and 2). It is the only case when the megafauna indicate the simultaneous presence of woodland, forest, steppe (*Equus*, *Saiga tatarica*), and boreal species (one possible example of *Rangifer sp.* from both Starosele and Kabazi V). Such a mixture of terrains appears to be a characteristic feature of environmental conditions at the beginning of the Pleniglacial.

The U-series dates of 73.3±6 ka (Kabazi V Level III/1) and "about 67.5 ka" (Starosele Level 3) are reasonably consistent with each other (McKinney 1998), as well as with the known beginning of the Pleniglacial (Table 11-1). These dates are not, however, consistent with the ESR dates for Starosele Level 3 and Kabazi V Levels III/1 and III/1A (Rink et al. 1998), which are too late to correspond with the beginning of the Pleniglacial. In addition, the ESR dating for Kabazi V shows an unreasonable hiatus between Levels III/1 and III/1A (Chabai and Marks 1998: 356). According to J. Rink, the best age for Level III/1 is about 26 to 30 ka (Rink et al. 1998: 339). If that date for Kabazi V Level III/1 were accepted, it would mean that Unit III would date to the Denekamp Interstadial and the uppermost levels of Kabazi V Unit II would be at least as young or even younger. Taking into account the climatic characteristics of the Denekamp Interstadial (see below) and the implications for the malacofauna and microfaunal samples from Kabazi II Units II and III, such a correlation is untenable.

The ESR dates for Starosele result in similar problems: Levels 3 and 1 are statistically the same age, about 40 ka (Rink et al. 1998: 331). Should these be correct, we would need to assume that Starosele Levels 1, 2, and 3 date to the Hengelo Interstadial. If this assumption were accepted for Levels 1 and 2 (see below), the microfauna and malacofauna data from Level 3 would not correspond with any of the known interstadials. While it might be possible to correlate Starosele Level 3 with the stadial conditions between Moershoofd and Hengelo, this stadial was characterized by more mesic microfauna and malacofauna than is seen at Starosele Level 3. Thus, it is most likely that Kabazi II Levels III/1 and III/1A, Starosele Level 3, and Kabazi V Levels III/1, III/1A, III/2, and III/3 all fall into the first stadial of the Pleniglacial.

Moershoofd Interstadial

Pollen zone VIII at Kabazi II corresponds to the Moershoofd Interstadial and is characterized by a combination of broad-leaved forests and meadow steppe; in other words, it was a time of forest-steppe landscapes and moderate climatic conditions (Chapter 6). The microfauna from Kabazi V Unit II are characterized by species preferring more favorable conditions than those of Unit III. According to A. K. Markova, the rodents from Kabazi V Unit II were associated with forest-steppe landscapes. The presence in the microfauna assemblage of such species as the yellow-necked mouse (*Apodemus flavicollis*), indicates the growth of broad-leaved forests in the vicinity of the Kabazi cuesta. Moreover, these forests had to contain the yellow-necked mouse's preferred foods of nuts, acorns, and seeds produced by such trees as beech, oak, hazelnut, maple, and lime (Chapter 4). At least three of these five trees (beech, oak, and hazelnut) were found in the pollen spectra of pollen zone VIII (Chapter 6). Consistent with this, Mikhailesku noted the mesophilic character of the malacofauna from Kabazi V Unit II (Chapter 5).

At the same time, in the snail sample from Starosele Level 2, xerophile species predominate, although the number of mesophile species in the level is significantly greater than those in Level 3. C. Mikhailesku also noted the progressive increase in mesophile snails from Level 3 to Level 1 at Starosele. A. K. Markova, using the rodent data, reconstructed the local environment as containing a meadow steppe landscape and a moderate climate. Therefore, both the snails and rodents from Starosele Level 2 indicate a moderate climate, which might be associated with interstadial conditions. In addition, the megafauna at Starosele Level 2 and at Kabazi V Unit II suggests a mixture of woodland (*Cervus sp.*) and steppe (*Equus, Saiga tatarica*) environments. It should be noted that the variety of woodland species is more pronounced in the faunal assemblage of Kabazi V (*Cervus elaphus, Sus scrofa*), than it is at Starosele Level 2, but this may be a factor of small sample size at the latter site.

Two tooth samples from Starosele Level 2 produced U-series ages from 47.5 to 63 ka, with U/Th plots indicating an age of about 60 ka (McKinney 1998: 350). This date corresponds well with the Moershoofd Interstadial (Table 11-1). However, the overlying Level 1 corresponds to the Hengelo Interstadial and there is no visible stratigraphical break, sediments, or fauna between Levels 2 and 1 which might be associated with the stadial that falls between the Moershoofd and Hengelo. In fact, the two levels are separated by a single episode of cliff exfoliation, indicating no significant temporal differences between the two. McKinney (1998) also noted that the 60 ka date may be unreliable because only two teeth were plotted and that further confirmation of it is needed. Thus, the correlation of Starosele Level 2 with the Moershoofd Interstadial is still uncertain. In any case, Starosele Level 2 indicates interstadial conditions: it might be Moershoofd or, more likely, Hengelo.

In sum, Kabazi II Levels IIA/3-IIA/3B and IIA/4, Kabazi V Unit II, and possibly Starosele Level 2, were occupied during the Moershoofd Interstadial (Table 11-1).

Middle Glacial Stadial

Pollen zone IX at Kabazi II appears to correspond to a stadial between the Moershoofd and Hengelo Interstadials (Table 11-1). The deterioration of the climate towards more continental conditions resulted in the contraction of local forest belts and a meadow steppe landscape. While the decline of arboreous and broad-leaved pollen definitely points to stadial conditions, the climate was not as harsh as the previous and following stadials. The climate of this stadial was less harsh than during the preceding and following stadials (Chapter 6). Two levels, IIA/2 and IIA/2-3, at Kabazi II are associated with this stadial. The faunal assemblage from Kabazi II Level IIA/2 consists mainly of steppe species, but the existence of some nearby woodland is attested to by a few bones of *Cervus elaphus* (Chapter 4). Unfortunately, the levels belonging to this stadial are not dated.

Hengelo Interstadial

Pollen zone X at Kabazi II corresponds to the Hengelo Interstadial. The landscapes were covered by a forest-steppe vegetation, consisting of broad-leaved trees and meadow grasses. In addition, pine was an important element in the pollen spectra. A decrease of xerophytes suggests relatively humid conditions and the presence of broad-leaved trees and pine suggests a mild or moderately continental climate (Chapter 6).

The Starosele Level 1 microfauna and malacofauna document increasing humidity, as compared with the lower levels (Chapters 4 and 5). The rodent assemblage from Starosele Level 1 comprises both forest and open landscape species. The former include the yellow-necked mouse *Apodemus flavicollis*, seen in the previous interstadial at Kabazi V Unit II, and is a typical dweller of broad-leaved forests. The common vole *Microtus arvalis obscurus* is prominent in this level; it prefers meadow and steppe biotopes. Overall, the microfauna in Starosele Level 1 suggest climatic warming connected with an interstadial. In spite of the pronounced predominance of steppic megafauna (equids, *Saiga tatarica*, Bos/bison), the faunal assemblages from both Starosele Level 1 and Kabazi II Level II/8 contain some woodland-dwelling animals, such as *Cervus elaphus* (Chapters 1 and 3; Chabai 1998a).

The archeological occupations of Starosele Level 1 and Kabazi II Levels IIA/1, II/8C, and II/7F8 (II/8) correspond to the Hengelo Interstadial. The AMS and ESR dates for these levels do not contradict this proposed correlation (Table 11-1). It is also probable that Starosele Level 2 corresponds to Hengelo, as well (see above: Moershoofd Interstadial).

Les Cottés Interphasial

Pollen zone XI at Kabazi II was recognized as belonging to an interphasial; that is, having conditions transitional between an interstadial and a stadial. The landscapes were characterized by forest-steppe. The forest vegetation consisted mainly of pine trees, with a significant decrease in broad-leaved trees in comparison with Hengelo Interstadial. Thus, the climate was becoming more inclement, although not rigorously so: grass coenoses were mesophytic (Chapter 6). Malacofauna from the corresponding deposits at Kabazi II (sample nos. II and IId) predominates in *Helicella dejecta*, *Chondrus bidens,* and *Helicella krynikii,* all steppe xerophiles, suggesting arid and probably colder climatic conditions (Chapter 5).

Archeological occupations of Kabazi II Levels II/7E, II/7D, II/7C, II/7AB, II/7, and II/6, correspond to the Les Cottés Interphasial. The ESR and U-series ages for Levels II/7B and II/ 7, however, are not completely reliable. According to C. McKinney, the age of Kabazi II Unit II, as a single unit, is 39.8±5 ka (McKinney 1998: 348). The ESR/LU produced two dates of 34±2 ka and 29±3 ka. The mean ESR/LU date for Level II/7B was calculated by J. Rink as 32±2 ka (Rink et al. 1998: 333, Table 13-4). In addition, he suggests that the lack of thermoluminescence dosimetry "may bias the ages in the direction of being too young" (Rink et al. 1998: 337). In any case, all these dates are not in dramatic disagreement with the commonly accepted age of the Les Cottés Interphasial (Table 11-1). The upper limit of this stage at Kabazi II has been recorded by two AMS dates for the uppermost Levels II/5 (33.4±1 ka) and II/4 (32.2±9 ka) that correspond to the pollen hiatus between zones XI and XII (Chapter 6; Hedges et al. 1996).

Middle Glacial Stadial

Pollen zone XII corresponds to the stadial environment that falls between Les Cottés and Arcy (Denekamp). The vegetation of that stadial was of typical steppe type, with a predominance of xerophytic grasses. The broad-leaved forests and even the pines had almost disappeared, indicating cold and arid environmental conditions. The climate becomes one of harsh continental type (Chapter 6). The pollen results are corroborated by the snail fauna from Kabazi II (sample nos. IIa and IIc). According to C. Mikhailesku, these samples are characterized by a predominance of xerophile species, indicating to him a cold and arid environment (Chapter 5).

Levels II/3, II/2, II/1, and II/1A at Kabazi II are associated with this stadial (Table 11-1). The faunal assemblages from these levels, studied by N. Belan, show the presence of only steppic species (Chabai 1998a). The presence of *Cervus elaphus* was noted for Level II/5 (pollen hiatus). This could be evidence that Level II/5 belongs to Les Cottés Interphasial, rather than to this stadial.

An ESR/LU date of 32±6 ka for Level II/1A does not discount—but does not prove—this proposed correlation. Both AMS dates for Levels II/1 (31.55±.6) and II/2 (35.100±.85) are in good agreement with the commonly accepted age for this stadial (Hedges et al. 1996). At the same time, it is worth noting that the AMS date for Level II/2 is not consistent with the AMS dates for Levels II/4 and II/5 (Table 11-1). According to J. Rink's analyses of the AMS and ESR dates, the age of these levels (II/1 down to II/5) lies in the range of 30-35 ka (Rink et al. 1998: 336). That conclusion does not contradict the proposed correlation.

Arcy (Denekamp) Interstadial

The Arcy (Denekamp) climatic amelioration is documented in pollen zone XIII at Kabazi II. The landscapes surrounding the site become forest-steppe, where the forests consist of broad-leaved trees and pines. The steppe was characterized by the predominance of mesophytes and was of meadow character (Chapter 6). Archeological Horizon -195 at Kabazi II corresponds with this pollen zone. Neither ESR nor AMS dates are available for this horizon.

No archeological level is associated with the final stadial of the Kabazi II pollen sequence documented in pollen zone XIV.

Paleoenvironment of the Western Crimean Middle Paleolithic

This brief summary of the paleoenvironmental reconstructions covers about 100,000 years: from the Last Interglacial to the Arcy (Denekamp) Interstadial. As was noted by N. Gerasimenko, the evolution of Late Pleistocene climates in Crimea shows a cyclical pattern. All stages of Crimean vegetation evolution correspond to both the vegetational succession documented for the Eastern European Plain, as well as to the major climatic stages of the Late Pleistocene. The Crimean Peninsula, however, possesses regional climatic peculiarities due to its latitude (45° North) and influence of the Mediterranean regime, and was always milder than the regions directly to the north. During the Last Interglacial and Early Glacial interstadials, the climatic conditions were mild to moderate, but always humid. Forest and/or forest-steppe landscapes predominated. A decrease in temperature and an increase in aridity, as well as a predominance of open steppe landscapes are well documented for the following Pleniglacial, and especially for the second half of the Pleniglacial. The harshest continental conditions were seen in the stadial between Les Cottés and Arcy (Denekamp). Yet, the absence of arcto-boreal vegetation suggests that the environmental conditions of the Crimean foothills were milder than were the ones of the Eastern European Plain (Chapter 6).

SUBSISTENCE

The faunal studies of Kabazi II, Kabazi V, and Starosele all indicate that hunting was highly specialized and focused upon herd species, such as horse and saiga, which lived in the open landscapes of the Crimean steppe. Although other species of steppe, woodland, riparian, and mountain environments may have provided additional food resources, they were never significant—frequently represented by only a few bones per individual—relative to equids and saiga. These two species provided the economic base for the inhabitants of all these sites over the whole span of their occupations, from early Würm through the Denekamp Interstadial (Chapters 1-3; Chabai 1998a).

Within this uniform dependence on steppe forms, their exploitation and processing do show a number of differences, as well as similarities, from site to site and occupation to occupation, ranging from simple primary butchering to the more extensive treatment of carcasses. Unfortunately, while the faunal analysis for Starosele is complete, that for Kabazi II is ongoing; to date only 4 levels have been analyzed in detail (II/7E, II/8C, IIA/1, IIA/2). For Kabazi V, only some of the levels in Units II and III have been analyzed; Unit IV, only recently uncovered, has not been examined. The analysis for Kabazi V Unit I is complete, but these are disturbed and mixed deposits that have little relevance for this summary. Given the data currently available, occupation levels at the three sites fall into two groups: primary butchering (Kabazi II Levels II/7E, II/8C, IIA/1, and IIA/2 and Starosele Levels 1, 2, 4) and extensive carcass treatment (Kabazi V Units II and III, Starosele Level 3).

Primary Butchering

In spite of their quite different settings in the landscape, primary butchering appears to have been the dominant activity during most occupations at Kabazi II (Levels II/7E, II/8C, IIA/1, and IIA/2) and Starosele (Levels 1, 2, and 4). In these occupations, freshly killed (either quite nearby or on-site) animals were dismembered and summarily butchered. In most cases, it appears that there was some consumption of meat, but the important meat-bearing units were then taken off-site. The occupations falling into this site type also differ from the second butchering strategy described here by their focus on very few prey species.

Species Representation at Primary Butchering Stations

Equids, almost exclusively *Equus hydruntinus*, dominate the faunal assemblages from Kabazi II Levels II/7E-II/A2 and Starosele Levels 1, 2, 4, in both number of remains (NISP) and the minimum number of individuals (MNI) (fig. 11-2). In the faunal assemblages of Kabazi II, equid NISP ranges from 95.0% to 99.5%, while the equid MNI ranges from 81.8% to 88.9%. A similar pattern characterizes the faunal assemblages of Starosele Levels 1, 2, and 4: the equid NISP (prey species only) is 92.8% to 98.2%, while the MNI's are lower at 50.0% to 63.2%. In this, Starosele exhibits slightly greater species diversity: four to five prey species were identified there, compared with the prey species from of Kabazi II Levels II/7E (3 species), II/8C (2 species), IIA/1 (2 species), and IIA/2 (4 species).

The "secondary" species at Starosele—*Cervus elaphus*, *Rupicapra rupicapra*, saiga, and Bos/bison—are represented by relatively few bones in comparison to the overall sample sizes (see Chapter 1), but are certainly not out of place in this area of Crimea with nearby steppe, woodland, mountainous, and riparian terrains. They might represent evidence of opportunistic hunting or of carnivore activity after humans left the site.

For the occupations exhibiting primary butchering activities, carnivores occur in significant number only at Starosele Level 1, where four species were identified: fox, hyena,

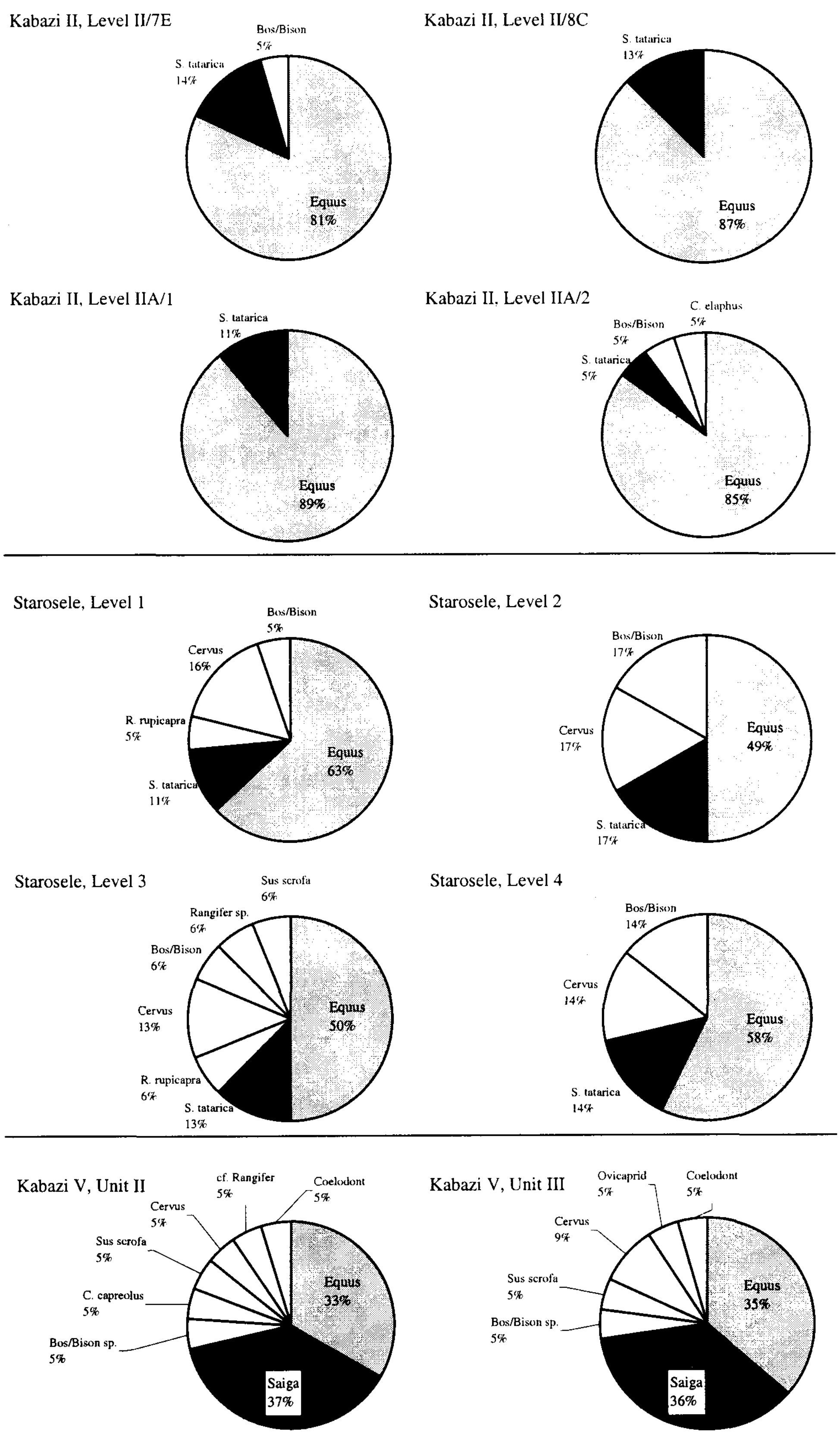

Fig. 11-2—Percentages of prey species (in MNI) at Kabazi II, Starosele, and Kabazi V.

wolf, and bear (MNI=1 in all cases). Such non-prey species representation is matched only in Starosele Level 3, which exhibits a different butchery strategy. Evidence for gnawing by hyena or hyena-sized scavengers in Level 1 was identified on 9.3% of identifiable bone, there was a negligible number with dissolution due to partial digestion (3 of 3652 bones), and six bones showed surficial polishing which might be due to carnivore regurgitation or licking.

Element representation patterns of equid in Starosele Levels 1 show no indication at all of carnivore ravaging, suggesting that carnivores played a small role in the history of the faunal assemblage. The presence of these carnivores at Starosele Level 1 probably relates more to the specific topographic situation at the site and to the probable presence of surface water in the box canyon, compared to its probable absence in the immediate vicinity of Kabazi II and Kabazi V. The absence of carnivores at Starosele Level 4 and at Kabazi II Levels II/8C, IIA/1, and IIA/2 may well relate, in the case of Level 4, to a small sample size and to the probable rapid covering of that surface by additional fluvial aggradation. In the case of the Kabazi II Levels II/8C, IIA/1, and IIA/2 occupations, they were covered quickly: only a single panther was identified in Kabazi II Level II/7E, and by only two bones, which may have washed in from the slope above.

Seasonality in Primary Butchering Stations

On the basis of herd age structure, three main seasons of hunting were identified for the primary butchering sites: springtime for Kabazi II Levels II/7E and IIA/2; winter for Kabazi II Levels II/8C and IIA/1; and late summer/fall for Starosele Levels 1, 2, and 4 (Chapters 1 and 3). This strongly indicates that horses were available on the second ridge of the Crimean Mountains year-round, at least during the improved climatic conditions of the Hengelo interstadial (Kabazi II Levels II/8C and IIA/1, Starosele Level 1) and the Les Cottés Interphasial (Kabazi II Level II/7E).

Patterns of Primary Butchering

After initial processing, two kinds of provisioning strategies were used at Kabazi II (Chapter 3). In Levels II/7E and IIA/2, element representation suggests that the most nutritious bones were taken off-site, while the bones with less nutritive value were left behind, for a "reverse gourmet strategy" (Binford 1978). A quite different pattern ("reverse bulk strategy") was employed at Kabazi II Levels II/8C and IIA/1, in which all of the more or less nutritious elements were taken out of the site. As described by M. Patou-Mathis (Chapter 3), the reverse gourmet strategy corresponded to springtime hunting, while the reverse bulk strategy corresponded to wintertime hunting. In addition, the amount of bones smashed for marrow was much greater in the levels employing the reverse gourmet strategy than in those employing the reverse bulk strategy, indicating that marrow, as well as the choice parts of the animals, may have been taken off site or consumed on-site.

Element representation patterns of equids at Starosele Level 4 (Chapter 1) indicate that the occupants also transported meat-bearing units off-site. The absence of axial skeleton elements and upper limb bones in this assemblage points to an "reverse gourmet strategy." Elements most rich in marrow—metapodials, ulnae, tibiae and phalanges—make up the better part of the assemblage, and the degree of fragmentation, plus evidence of green bone flaking, suggests that these bones were processed on-site for marrow extraction. The high percentage of heads may also indicate their processing for tongue and brains. While at the site, the occupants probably consumed the meat on the pelvis, scapula, and lower limbs; all of these are less useful in terms of meat utility and less likely to be transported. Although very small in number, the bones of *Cervus*, saiga, and Bos/bison appear to follow a similar pattern: these species are represented by only the marrow-rich lower limb units (A. Burke personal communication).

For the "secondary" species in Starosele Levels 1 and 2, in spite of the very small sample sizes, there does appear to be transport of heads and lower limbs into the site. With the exception of *Rupicapra rupicapra* (represented by a radius and ulna in level 1), the other species would have been killed at some distance from the site (that is, probably not within the box canyon) and so it is expected that they would display some differential transport. On the other hand, according to A. Burke (Chapter 1), equid bone was neither transported to or away from the site at Starosele Levels 1 and 2. Based on element representation of equids and numerous bones displaying cut marks, whole carcasses were butchered on-site, and presumably, either consumed or only the meat taken off-site. These levels also display significant numbers of bones with cut marks indicative of disarticulation and chopping. The degree of bone fragmentation (up to 70% of the bone was less than 25% complete), as well as the high density of fragmented bones in the site area, might be evidence of on-site marrow extraction in both Levels 1 and 2. As Level 1 contained a good amount of bone charcoal, at least a portion of the fragmented bone may be attributed to the production of suitable bone for fuel.

More Intensive Faunal Exploitation at Secondary Stations

While the polar opposite of primary butchering might be seen in the extremely extensive processing of prey animals at a true base camp, there are intermediate stages along this continuum where carcasses are more fully processed than at primary butchering sites, but are less intensively utilized than at base camps. At such stations, one would expect to find differential representation of meat units transported to the site for secondary processing and extensive disarticulation and meat removal. Secondary processing activities might also include processing requiring more time and energy, such as the extraction of marrow, grease, tongue, and brains. These activities are seen at Starosele Level 3 and at Kabazi V Units II and III.

Species Representation at Secondary Butchering Stations

Kabazi V Units II and III display far more species diversity than seen in any of the other occupations described here: eight prey species in Unit II and nine in Unit III (fig. 11-2). In spite of such diversity, it is still equids and saiga that dominate the assemblages by far; other prey species (including Bos/bison, *Capreolus capreolus, Sus scrofa, Cervus, Ovicaprid*, and *Coelodonta*) account for only 5-9% each of the MNI of prey species in these units. Because of severe bone fragmentation, elements definitely attributable to *Equus hydruntinus* account for 9.7% of NISP (prey species only) in Unit II and for only 10.87% in Unit III. *Equus caballus* (0.8% NISP) is even rarer, occurring only in Unit II (Chapter 2). Thus, the horse bone is mainly identified only to genus; *Equus sp.*=41.2 % in Unit II and 46.7% in Unit III. Given the faunal assemblages at the other sites, it is most likely that the vast majority of these bones actually refer to *Equus hydruntinus*. In NISP of prey species, the combined equid bones dominate the fauna assemblages of Unit II (51.7%) and Unit III (57.6%), while saiga varies from 38.7% (Unit II) to 35.9% (Unit III). On the other hand, by the number of individuals, saiga and *Equus* are nearly identical: 33% MNI each in Unit II, and 33% *Equus* and 38% saiga in Unit III. Thus, in contrast to the other occupations described here, both *Equus* and saiga were the preferred prey species during these occupations. The other prey species were most likely hunted as they were encountered in the valley below the site.

The other distinctive feature of the Kabazi V Units II and III fauna assemblages is a relatively high percentage of carnivore remains, including *Crocuta crocuta, Ursus sp., cf. Vulpes,* and canid. Combined, they represent 13% (Unit II) and 15% (Unit III) of the total MNI. In spite of this rather significant presence of carnivores at the site, each species is represented by only one to five identifiable bones, and the very extensive taphonomic analysis performed by A. Burke (Chapter 2) found carnivore damage on only 0.9% and 0.7% of the identifiable bone in Units II and III. Carnivores, therefore, contributed insignificantly to the accumulation and destruction of the Kabazi V faunal assemblages, and probably only occupied the site intermittently, when humans were not present.

At Starosele Level 3, as at all other occupations, the dominant prey species is *Equus hydruntinus* (Chapter 1). Here, however, it represents only 50.0% MNI and 87.8% NISP of prey animals. Other prey species represented in Level 3 include saiga, *Cervus elaphus, Rupicapra rupicapra,* Bos/Bison, pig, and possibly, reindeer, which is represented by a single bone fragment (fig. 11-2).

As at Kabazi V, there is a relatively significant number of carnivores in the Starosele Level 3 assemblage, including hyena, bear, fox, and canids. With the exception of two *Vulpes vulpes*, the MNI's for each of these is 1. Although the element representation indicates no significant carnivore ravaging, equid humeri do reflect some carnivore patterning of the assemblage. Gnaw marks were observed on 7.2% of identifiable bones, along with a few exhibiting partial digestion. On the other hand, the faunal assemblage as a whole demonstrates patterning that can only be due to humans, there is some evidence for gnaw marks overlying human-caused cut marks on bone, and the preservation of the *Vulpes vulpes* shows that it had denned at the site, so carnivores probably came to the site only after humans had left it and did not contribute to the prey-species assemblage.

Seasonality in Secondary Butchering Stations

While mortality and season of death were not extensively investigated in this site type, the age of fetal remains in Kabazi V Units II and III show that gravid equids were being hunted in the late summer/early fall. Juvenile saiga remains represent both late summer and winter deaths. Bone charcoal in these units might be evidence of a fall-winter occupation, as well. Taken together, along with the evidence for processing activities, it appears that Units II and III had a number of short-lived occupations from summer through early winter. This is similar to the pattern at Starosele Level 1, where a series of fetal equid remains indicate occupation of the site for one to three months during late summer/fall (Chapters 1 and 2).

Patterns of Secondary Butchering

The results of the Kabazi V faunal analysis shed little light on butchery patterns at the site since the archeological levels within each unit were collapsed and the counts of element representation include all taxa, both prey and non-prey species. While all body parts appear to be represented in Units II and III (see Table 2-3), indicating that whole carcasses or large portions of carcasses were brought to the site and presumably, consumed, it is impossible to know whether this is the case for the prey species, or whether the inclusion of non-prey species in the table is skewing the data. There does appear to be a clear over-representation of podial elements and skulls, signifying that units that are poor in meat and requiring more intensive processing were brought into the site. Cutmarks are concentrated on the podial elements and lower limb bones show a high degree of fragmentation suggesting that they were smashed for marrow extraction and then used as fuel. Therefore, at the very least, extra limb units were brought to the site, disarticulated, and processed for meat, marrow, and grease. Skulls have a middling meat utility index but might be differentially transported to the site for tongue and brains. This was certainly the case in Unit III where the number of lower teeth present is three times that of upper teeth. The Kabazi V occupations were, however, almost assuredly ephemeral and must represent secondary butchering patterns given the very low ratios of bones to individual animals.

In Starosele Level 3, the element representations of equids display a high proportion of mandibles and axial skeleton elements. A. Burke (Chapter 1) further notes that marrow weight appears to be a significant factor in the element representation in Level 3, and that there was transport into the site of additional units rich in marrow. Concomitant with these findings, long bones show a very high degree of fragmentation. It appears, then, that along with processing of freshly killed equids, some additional units requiring more processing, including those rich in marrow and mandibles, were brought to the site. This is the case not only for equids, but also for the other, less important prey species: saiga, cervid, red deer, and chamois.

These butchering and transport activities, the prey-species diversity, evidence for a longer period of site occupation are all expected characteristics of a base camp. Other factors, such as the presence of only a single fireplace, a moderate density of lithic artifacts, and clear clustering of lithic materials, however, all indicate that Starosele Level 3, and probably Kabazi V, was not intensively or consistently enough occupied to be considered a true base camp, but does display more complex economic activities than the primary butchering type occupations.

Western Crimean Middle Paleolithic Faunal Exploitation

Kabazi II and Starosele Levels 1, 2, and 4 provide clear evidence for a highly specialized hunting strategy focussed on a small horse, *Equus hydruntinus,* over a significant amount of time: from the Early Glacial stadial to the Denekamp Interstadial. Without question, this horse was not the only animal available for hunting in Crimea; in fact, it was not the only herd animal during that time span. The Kabazi II, Starosele, and Kabazi V sequences document at least four steppe-dwelling herd species (*Equus hydruntinus, Equus caballus, Saiga tatarica,* and Bos/bison), two woodland species (*Cervus elaphus* and *Capreolus capreolus*), one forest-dwelling species (*Sus scrofa*), and one mountain-dwelling species (*Rupicapra rupicapra*) (fig. 11-2). Moreover, the faunal assemblage from Formozov's excavations at Starosele included *Mammuthus primigenius* (Vereshchagin and Baryshnikov 1981), which was widespread in eastern Crimea, at least to the east of the Salgir River (Ernst 1934; Kolosov 1986). All of these animals were preyed upon by humans, without apparent specialization, during the Middle Paleolithic in eastern Crimea, as well as in the Northern Caucasus, which has similar paleoenvironmental conditions to those in Crimea.

How then can the true dominance of *Equus hydruntinus* in the western Crimean assemblages be explained? Without question, the topographic setting of western Crimean Middle Paleolithic sites, and as allowed by their hunting equipment, permitted hunters to drive small groups of animals into the enclosed areas along cuestas cliffs, such as the Kanly-Dere box canyon at Starosele, where they killed them. Taking into account the Kabazi II data, where the occupations of Levels II/7E, II/8C, IIA/1, and IIA/2 might represent single kill and butchery episodes for each level, this hunting method permitted killing from 7 to 18 horses at a time (Chapter 3).

It appears that during the spring, the slaughtered groups were larger (16 to 18 kills per hunt), compared with the winter when from 7 to 8 horses were killed at a time. The difference is most probably explained in the seasonal shifts in horse herd composition over the year, with a greater abundance of larger horse herds during the spring than during the winter. This reflects the types of primary butchering seen at Kabazi II. With an abundance of well-fed animals available in the spring, only the choice parts were taken away; during the winter, when fewer and thinner animals were available, all body parts were taken away from the kill sites and, presumably, taken to occupation sites nearby.

The processing of horse carcasses at Kabazi II and Starosele exhibit some differences in the apparent consumption vs. transport of meat. Both patterns of primary butchering, reverse bulk strategy and reverse gourmet strategy, employed at Kabazi II, resulted in the transportation of meat-bearing parts off-site. Marrow, after being extracted, was either taken off-site or was immediately consumed. In sum, the main site function was limited to primary butchering. Such site use is valid not only for the levels reported in this volume, but for the whole sequence at Kabazi II (Units II, IIA, and III) (N. Belan, A. Burke, and M. Patou-Mathis, personal communication).

Primary butchering took place in all of four levels of Starosele, followed by varying amounts of more intensive secondary processing, and, in the case of Level 4, transportation of meat-rich parts off-site. In Levels 1, 2, and 3, it is probable that horses were consumed on-site or, at least, meat on the bone was not taken off-site. What cannot be answered, however, is whether other soft tissue items, such as hides were taken off-site. Certainly, in terms of meat consumption based on bone presence, it is unlikely that these occupations at Starosele functioned as specialized meat procuring loci. This does not mean, however, that they saw a full range of activities normally associated with a base camp. Rather, compared with those occupations at Kabazi II, the ones at Starosele probably saw somewhat longer visits with their concomitant increase in different activities.

At Starosele Level 3, primary butchering was supplemented both by the importation of additional units requiring intensive processing into the site area, as well as by secondary butchering. Again, there is no evidence for element transport off-site. In this sense, Level 3 is further along the continuum toward a base camp than any of the other occupations at Starosele and Kabazi II. The presence of some primary butchering at Starosele most probably relates to box canyon, itself, where nearby kills can be posited.

The faunal assemblages at Kabazi V indicate that the occupants practiced specialized hunting of two species, *Saiga tatarica* and *Equus*, and brought portions of these carcasses to the site for secondary processing, and presumably, consumption.

Thus, the occupations at Kabazi II, Kabazi V, and Starosele represent many activities along the continuum from the initial processing of freshly killed animals to consumption of body parts requiring extensive processing. In a number of occupations, there is evidence for transport of meat or marrow rich units out of or into the sites. The occupations at Kabazi II, Kabazi V, and Starosele showing transport must therefore be parts of a complex of sites, since none can exist alone. The head and feet of equids at Kabazi V and Starosele Level 3 must have been obtained at primary butchering sites, while the meat bearing parts of animals butchered at Kabazi II and Starosele Level 4 must have been taken to some other locality for consumption. The situation at Starosele is more complex and probably relates to the topography around the site, as well as to the nearby presence of surface water. Here, the purity of the idealized extremes of faunal exploitation seen above becomes blurred by a mixture of site functions. In this regard, all these sites indicate that Middle Paleolithic land use in western Crimea was varied and complex.

Settlement Types

The reconstruction of settlement systems for the Middle Paleolithic of Western Crimea is a rather futile endeavor considering the small of the area and the paucity of sites with securely known temporal, economic, and lithic patterning (Kabazi II, Kabazi V, Starosele, and to some extent, Shaitan Koba). Reconstruction is further hampered by the great temporal spread of the known occupations, from the beginning of the Early Glacial to as late as the Les Cottés Interphasial. Using only "contemporaneous" sites would result in extremely small samples and make any conclusions overly speculative.

On the other hand, all Middle Paleolithic sites in western Crimea, regardless of age, shared the same topographic situation and had essentially the same resources (with a few temporally associated exceptions). The major difference through time was climatic; the expansion and contraction of the forest cover at the edge of the Crimean Mountains, as well as fluctuations in water sources. Yet, in spite of these climatic fluctuations, there was very little change in the dominant prey species, and throughout the Last Glacial, steppe animals were hunted almost to the exclusion of other forms.

Thus, it seems reasonable to view these many occupations in terms of site type, where animal exploitation and raw material economy are seen as factors determining the nature of site occupations and functions. Previous attempts to reconstruct settlement patterns for all of Crimea (Chabai et al. 1995; Chabai and Marks 1998) were based on raw material economy, since virtually no reliable information on faunal exploitation was available for the western Crimean sites (better data were, however, available for a number of sites in eastern Crimea). In the first attempt, only the sites of Shaitan-Koba, Kabazi I, Kabazi II (Unit II), and Chokurcha II were used for western Crimea (Chabai et al. 1995: 69-70), since Kabazi V was still being studied and Starosele, as published by Formozov (1958), was problematic. With the limited data available, it is perhaps not surprising that all these sites fell within a single "occupation type" characterized by low occupational intensity. On the other hand, what little faunal data were available suggested two patterns of exploitation: one wherein two prey species dominated and there was a moderate ratio of bones per MNI, and the other wherein a single prey species dominated and there was a high ratio of bones per MNI.

With the additional data presented in this volume, the question of western Crimean site types may be revisited more productively. While the initial observations were valid, it is now clear that greater complexity was present in western Crimea, although two basic patterns do pertain throughout. The first of these is that *Equus hydruntinus* is always the dominant prey species, although the degree of dominance varies, as discussed above. The second pattern, which is uniform for western Crimean sites, is that all sites represent non-intensive occupations. While there is variability in the intensity of occupation, none of the occupations can be considered a base camp as the center of a radiating settlement system, as envisioned by Mortensen (1972).

Based on patterns of hunting and carcass processing, distance to raw material, and the amount of on-site tool production, five types of stations can be identified. As with the types of butchering patterns, site types are not discrete, but fall along the continuum from clearly ephemeral to true base camps.

With the new faunal data, it is now possible to document what might best be called ephemeral butchering stations. At these "occupations," mainly *Equus hydruntinus* was killed and butchered, followed by transport off-site of meat-bearing bones; the amount and type of meat taken away was dependant upon the season of the year. At the "purest" of these—with the fewest number of activities—finished tools were brought to the loci where horses were killed and butchered. There is almost no evidence for core reduction or even tool rejuvenation and, given the small numbers of tools present, it is possible that some tools were even taken away after use. During these occupations, the nearest raw material was about 5 km distant.

This extreme ephemeral, single activity site type is present at Kabazi II for both the Western Crimean Mousterian and the Crimean Micoquian occupations (Levels IIA/2-III/3), and the Crimean Micoquian occupation at Starosele Level 4. It is not associated with any particular environmental setting, since it is found during the first stadial of the Last Glacial

(Kabazi II Level III/3 and Starosele Level 4), during an interstadial of the Early Glacial (Kabazi II Level III/2), during the first stadial of the Pleniglacial (Kabazi II Levels III/1 and 1A), during the moderate climatic conditions of the Moershoofd Interstadial (Kabazi II Level IIA/4), and during the stadial before the Hengelo Interstadial (Kabazi II Level IIA/2). It is most likely, therefore, that this site type was associated with the specific topographic relationships among the Kabazi Mountain slope, the position of the Alma River relative to that slope, and the prevailing vegetation along the slope and in the bottom of the valley. These characteristics must have made this place particularly advantageous for hunting horse. It is possible that the whole of the Kabazi Mountain western slope might have been equally productive, with Kabazi II being a fortuitous remnant of a much larger killing/butchering field.

A similar ephemeral site type is also present at Kabazi II and, perhaps, at Chokurcha II, as well. At these sites (another 15 occupations at Kabazi II), the dominant activity remained killing and primary butchering but, in addition, raw materials were carried onto the sites, and core reduction and tool production took place there. All of these occupations belong to the Western Crimean Mousterian and all post-date the extreme ephemeral site type described above.

With this site type, too, there is no correlation with environmental conditions. The earliest occurrences are found during the Hengelo Interstadial (Kabazi II Levels IIA/1, II/8C, and II/7F8 [II/8]), they continue during the Les Cottés Interphasial (Kabazi II Levels II/7E through II/6), and end during the stadial conditions between Les Cottés and Denekamp (Kabazi II Levels II/4 through II/1A).

How, then, can this apparent shift in raw material economy be accounted for when there was no shift in the type of animal exploitation? Is it some indirect indication of the developmental changes that took place during the Western Crimean Mousterian (Chabai 1998a, 1998b)? In fact, the most parsimonious explanation is quite mundane. The rich flint outcrop on the southern slope of Mt. Milnaya, just a kilometer upstream from Kabazi Mountain, was not exposed prior to the Hengelo Interstadial. While this was hypothesized (Chabai and Marks 1998: 365), new palynological data confirm that the Alma River Valley saw the beginning of major down cutting only during the Moershoofd. Its effects would have been clear by the Hengelo, at which time the flint source would have been available for exploitation. Before then, raw materials appear to have been acquired from the Bodrak Valley, some 5 km distant. While both sources would normally be considered "local" (Geneste 1985), the difference between one and five kilometers appears to have been sufficient so that raw material transport costs became negligible. Thus, this apparent shift can be associated with the effects of immediately available raw material, without appealing to any changes in basic raw material economy. The differences seen are no more than the predictable range of variation predicated by distance from raw material, within a single raw material economy.

On the continuum from highly ephemeral single activity kill/butchering sites to true base camps, there are numerous intermediate possibilities. One of these is seen at Starosele Levels 1 and 2. In these cases, the same basic activity took place as in the ephemeral site types: killing and primary butchering, mostly of horses. Yet, because there is no evidence for transport off-site of meat-bearing bones, it is assumed that the meat and marrow were consumed on-site. In addition, at least one multiple-use fireplace was found in Level 1 (the shape of the fireplace was distinct but there was a spread of bone charcoal around the fireplace, indicating that it had been previously used). Both of these factors, along with seasonality data (see above) suggest somewhat longer periods of occupation than seen at Kabazi II. Aside from the omnipresent equids, a minor amount of bones of *Saiga tatarica*, *Cervus elaphus*, *Cervus sp.*, Bos/bison, and *Rupicapra rupicapra* occur in these assemblages as well. This also suggests longer occupations than seen at Kabazi II in that there might have been time for encounter hunting around the site. Thus, both the faunal remains and site features suggest that the Starosele Levels 1 and 2 occupations may be considered short-term, multi-activity camps, rather than single activity loci.

Following the logic used for Kabazi II, the additional time spent at Starosele should be reflected in a wider range of raw material use than seen at ephemeral stations. At Starosele, there is poor quality flint immediately available, but the nearest source of good flint was most likely in the Bodrak Valley, some 10 to 12 km from the site. The lithic materials from Starosele Levels 1 and 2 clearly show that the vast majority of raw material was imported into the site as either finished tools or as blanks for tool production (Marks and Monigal 1998). In this, these occupations are similar to the highly ephemeral single activity occupations of the pre-Hengelo periods at Kabazi II. A major difference is apparent, however. In the Starosele assemblages, there is ample evidence for on-site bifacial foliate production and rejuvenation, plus unifacial tool production on the waste from these. Such patterns of tool production reflect a longer period of residency at Starosele than at Kabazi II, but it must be borne in mind that the Starosele assemblages fall within the Crimean Micoquian (Staroselian) with its developed bifacial reduction technology. The bifacial foliate tools function both as tools and as cores, providing blanks for unifacial tool production. Therefore, the pattern of raw material economy at Starosele is not quite comparable with either of those seen in the Kabazi II Western Crimean Mousterian and Crimean Micoquian.

Additional data from use-wear (Chapter 8) and residue analyses (Chapter 9) reinforces the notion that a wider range of activities, including some non-lithic tool maintenance, and even some hide processing, also took place. In this, it is possible that the absence of evidence for exportation of meat-bearing bones merely reflects a more complex and extensive exploitation of horse carcasses than seen at Kabazi II.

Starosele Level 1, and probably Level 2, dates to the Hengelo Interstadial. The box canyon where Starosele is found would have been an excellent place to hunt horses, by driving small groups into the canyon, and it is likely that surface water was available at the bottom of the canyon during part of the year. This would have made it a relatively attractive place, in spite of the winds, for camping for more than a few hours.

Another type of site is seen at the eight occupations of Kabazi V Units II and III, and, most likely, at Shaitan Koba, in the occupations of the lower and upper horizons. This site type might best be thought of as a temporary camp, unassociated with primary butchering.

These occupations at Kabazi V and Shaitan Koba show an absence of primary butchering, the importation of the meat-bearing or marrow-rich skeletal elements, a dominance of horse but with a significant component of saiga, and are located in true rock shelters. Other uniting elements are the rather ephemeral nature of the individual occupations, although fireplaces are common, and the presence of minor numbers of bones from forest animals. Here, as at Starosele, however, the presence of carnivores complicates the interpretation of these forest-dweller skeletal remains.

The two sites differ, however, in resource availability: the nearest flint to Kabazi V was 5 km distant, while Shaitan Koba lies within the flint-rich Bodrak Valley. This difference is clearly reflected in the raw material economy of each site, a difference that is compounded by Kabazi V being Crimean Micoquian, while Shaitan Koba is Western Crimean Mousterian. Again, the difference between a unifacial and a bifacial technology is clearly seen here. At Kabazi V, most artifacts were imported into the site, although in some cases the imported items were either blocks or early stage cores which permitted some on-site blank and tool production. At Shaitan Koba, there are good numbers of cores, as well as debitage from core reduction and tool production. Thus, the sites are linked more by the nature of their animal processing, than by their assemblages.

As for all the other site types, the temporary camps are not associated with a single time period or glacial stage. Kabazi V Units II and III extend from the first stadial of the Pleniglacial to the Moershoofd Interstadial. Shaitan-Koba is not well dated but, based on technological patterns, including Levallois cores and a high degree of platform faceting, it would correlate with Kabazi II Levels IIA/2 through II/7, which span the time from the stadial preceding the Hengelo to the Les Cottés Interphasial.

Finally, a single occupation, Starosele Level 3, seems to fall somewhat further along the continuum toward a true base camp, without actually reaching that status. The faunal exploitation includes primary and secondary butchering of mainly *Equus hydruntinus*, as well as the importation of marrow rich bones into the site area. The number of prey-species represented in the faunal assemblage (seven) is similar to that seen in Kabazi V, but other than horse (50% of the total MNI), the prey-species are represented by few individuals per species (fig. 11-2). The lithic assemblage is completely different both technologically and typologically from all other assemblages: it simply has no analog in Crimea. This makes comparisons difficult, but certain patterns are clear. Although raw material was imported into the site, it was not as tools or preforms, but as small river worn cobbles. In addition, the people utilized some immediately available nodules of poor quality raw material, a trait foreign to other occupations. While the technology of Level 3 was wholly unifacial, there is no indication of either Levallois technique or of purposeful production of elongated blanks (as seen in the unifacial Western Crimean Mousterian). The Level 3 assemblage displays considerably less technological and typological complexity than any of the other assemblages described here, yet use-wear and residue analyses clearly document a wider range of site activities, including extensive animal, bird, plant, and wood processing, plus cutting and hide scraping.

The occupation has one rather amorphous fireplace; artifact densities are not high but clustering is evident (Marks and Monigal 1998). These factors suggest that, although a number of activities were carried out on-site and food was brought into the site, the duration of occupation was not very long. Had it been, the artifact densities would have been higher, the artifact clustering would have been less distinct, and, one presumes, additional fireplaces would have been found. Yet, it should not be forgotten that the area exposed was quite limited and was apparently at the southern edge of what must have been a considerably larger concentration (Marks et al. 1998). Thus, it might well be that the apparently contradictory elements seen in the excavated area would not have been present in the center of the site and that this occupation might represent a true base camp.

Since the lithic assemblage is neither Western Crimean Mousterian nor Crimean Micoquian, its relevance to the other Crimean industries is unknown. The assemblage is associated with stadial climatic conditions, and probably dates to the first Pleniglacial stadial. It might therefore be contemporary with Kabazi V Unit III.

Western Crimean Middle Paleolithic Land Use

The relationships, or lack thereof, among lithic industries, environmental conditions, temporal placement, raw material economies, and fauna processing patterns engender both expected and some unexpected conclusions. Perhaps the most striking conclusion is that regardless of the industry involved or the environmental conditions that pertained, all sites show strong evidence for an almost single-minded emphasis on the hunting of *Equus hydruntinus*. This is true even during those interstadials when woodland-dwelling species would have been relatively abundant. The only significant variation from this is the hunting of saiga at Kabazi V. It is also abundantly clear from the evidence that there was no relationship between lithic industry and site type. This should not be a surprise, but the clarity of the data is striking. It is particularly marked at Kabazi II, where highly ephemeral, single activity kill/butchering loci are associated with both the Western Crimean Mousterian and the Crimean Micoquian through a number of different environmental settings. This is repeated for a different site type for the Crimean Micoquian at Kabazi V and the Western Crimean Mousterian of Shaitan-Koba.

While consistent inter-site correlations are hard to find, there are some striking intra-site correlations. Thus, while there are two industries present at Kabazi II over a very long period, during which climatic conditions swung from stadial to interstadial conditions, all occupations were essentially highly ephemeral single activity loci where horses where killed, butchered and, in part, taken away. At Kabazi V and at Shaitan-Koba, multiple discrete occupations were all of the same type: meat was brought in, raw material was reduced and tools produced. At Starosele, two different industries, one Crimean Micoquian and the other unknown and unnamed, show both greater tendencies for longer occupations and for more activities taking place during the occupations than at the other three sites.

It seems clear that the basic economic strategy of both the Western Crimean Mousterian and Crimean Micoquian was the specialized hunting of *Equus hydruntinus*. There is evidence for this taking place virtually year-round. It is not surprising, therefore, that the localities most favorable for such hunting would be visited and revisited by hunters. Yet, such localities have other aspects that make them more or less unsuitable for habitation beyond hunting. The open slope of Kabazi Mountain, situated between the Alma River and the cliffs of the mountain, must have provided a narrow band through which horses had to pass as they headed in or out of the narrow but sheltered valley upstream of the mountain. While hunting apparently was optimal along this band, it is not likely to have provided any protection from the weather or any immediately available surface water. It is not unexpected, therefore, that meat-bearing parts of the butchered horses were carried off. The distances may not have been far. Certainly, during interstadials, there must have been well-developed gallery forests along the Alma River, where habitation sites might have existed. Given the massive erosion of the valley bottoms during Moershoofd/Hengelo, as well as during the Upper Paleolithic (Ferring 1998), any evidence of such sites would be long gone.

The case of Starosele is different. The box canyon itself, not to mention the steep cliffs forming it, would have been an excellent area in which to either trap small groups of horses or to run them off the cliffs into the box canyon. Yet, unlike Kabazi Mountain, the box canyon is sheltered and contained surface water, at least during part of the year. As such, it would have been more suitable for longer periods of residence; perhaps not for permanent occupations, since in the winter, the winds through the box canyon must have been ferocious, but for long enough periods that a greater range of activities became archeologically visible. It certainly would not have mattered whether the inhabitants were of the Western Crimean Mousterian or Crimean Micoquian affiliation; the advantages of the setting itself would have encouraged similar site uses.

The same pattern can be seen at Kabazi V and Shaitan-Koba. These are the only true rock shelter sites studied and that alone must be partly responsible for some of the similarities. The multiple but quite separate and rather sparse artifact levels point strongly to traditional, yet ephemeral places to camp. That either or both raw material and faunal remains were imported into these sites indicates that some other factor made them desirable for temporary habitation. While the view today of the Alma Valley from Kabazi V is spectacular, prior to the erosion beginning in Moershoofd the rock shelter would not have been far above the bottom of the mountain slope. In both cases, it may have been a combination of the rock shelter itself and their positioning near the mouths of narrow valleys along which animals may well have passed with some regularity. Being even slightly above the valley floors, they would not have been places for actual kills or for primary butchery and this certainly can explain their apparent absence at both sites. In spite of the variability discussed above, the overall conclusion must be that the combination of specific local topographic and resource distributions tended to define the types of sites most suitable in each setting regardless of the "industry" involved.

A second conclusion is that, aside from the anomalous Starosele Level 3, not a single site could have functioned without different types of sites in the surrounding landscape. At the most obvious level, the Kabazi II and Starosele Level 4 kill/primary butchering sites exported the meat bearing animal parts to somewhere else. Kabazi V and Shaitan-Koba had to be supplied with meat and, in the case of Kabazi V, with raw material, as well, from other places. Even in the case of Starosele Level 1, where both primary and secondary butchering took place, along with local consumption, that occupation could not have existed without some other localities where raw material was acquired and made into the tools and preforms carried into Starosele. In short, during all periods and for both the Western Crimean Mousterian and the Crimean Micoquian, the settlement patterns must have been rather complex, involving a number of complimentary site types that permitted effective exploitation of the landscape. This clearly indicates that a circulating settlement system, as defined by Mortensen (1972), was not used in western Crimea. Whether a radiating system with true base camps existed cannot be determined with the data presently available, or likely to be available, given the post-occupational, massive down-cutting within the Alma and adjacent valleys. Yet, this possibility should not be dismissed, since there are indications of such a system in eastern Crimea at Zaskalnaya (Kolosov 1986). Only when it is possible to integrate western and eastern Crimea, using data of comparable quality, might this question be resolved.

CONCLUSIONS

The absolute dating of the western Crimean Middle Paleolithic is essential to our understanding of the area, since it does not show the great temporal depth seen in the adjacent Near East, or in parts of Western Europe. On the other hand, it lasts considerably longer than the Middle Paleolithic in many other areas, including the Near East. The earliest Middle Paleolithic, the Crimean Micoquian, dates only to the first stadial after the Last Interglacial. The latest Crimean Micoquian in the west is dated to ca. 40,000 BP, although in eastern Crimea it lasts until after 30,000 BP (Marks in press; Pettitt 1997) and may well be as late in the west.

The Western Crimean Mousterian is not as long lived as the Crimean Micoquian, appearing only during the stadial between Moershoofd and Hengelo, but it lasted until the stadial between Les Cottés and Denekamp. Thus, these two "industries" overlapped for some considerable time.

The Crimean Micoquian appears to be part of a larger cultural zone that included the northern slope of the Caucasus. The Western Crimean Mousterian, on the other hand, appears to have no base in either Crimea (it is unknown in eastern Crimea) or the Caucasus. Rather, it would appear to be related to the Molodova I and Molodova V Levallois-Mousterian, which disappears about the time the Western Crimean Mousterian appears in western Crimea.

Although Crimea underwent major climatic changes from the first stadial after the Last Interglacial until the end of the Les Cottés Interphasial, with corresponding changes in vegetation, the fauna exploited by all people throughout this period remained essentially the same. Not only was emphasis placed on steppe animals, but *Equus hydruntinus* was preferred over other horses and over saiga, not to mention mammoth and even reindeer. Given the climatic changes, it is unlikely that this preference always reflected the mere numerical dominance of that species on the steppe and in the valleys of the second range of the Crimean Mountains. Rather, it appears that it was deliberately chosen for extensive exploitation from a wide range of available prey.

In western Crimea, both the Western Crimean Mousterian and the Crimean Micoquian maintained similar site types over long periods of time that were more determined by local resource patterning and a basic tendency for mobility than they were by any specific "cultural" tradition. It is clear that western Crimea is too small to have supported the two viable, ongoing populations of the Western Crimean Mousterian and the Crimean Micoquian. In fact, the seemingly habitable parts of the whole Crimean Peninsula are too small. Thus, Crimea must be viewed as part of larger areas in which the two industries existed. Yet, before whole areas can be considered, the relationships between western and eastern Crimea must be elucidated. A good start has been made, but a great deal more work will be required before a true understanding of the complexities of the Crimean Middle Paleolithic can be achieved.