

Chapter 2

THE GEOLOGIC SETTING OF MOUSTERIAN SITES IN WESTERN CRIMEA

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INTRODUCTION

The physiographic and geologic settings of the Middle Paleolithic sites reported in this volume are described in this chapter. Detailed descriptions of stratigraphy and sediments at the sites of Starosele, Kabazi II, and Kabazi V are incorporated into their separate chapters.

The Crimean peninsula is situated on the northern Black Sea coast in southern Ukraine and is connected to the mainland by the narrow Perekop Isthmus (fig. 2-1). The center of the peninsula is at approximately 45° N, 34° 30' E. It is almost 300 kilometers wide, and about 179 kilometers from north to south, giving it a total area of about 25,727 m² (fig. 2-2). The eastern coast of the peninsula is that of the Sea of Azov, a shallow basin fed by the Don River. A narrow strait separates easternmost Crimea from the western Caucasus (fig. 2-1). The west coast of the peninsula is of gentle relief, facing the northwestern part of the Black Sea which is fed by the Dniepr, whose delta is ca. 150 kilometers to the west. The coastal waters of the Black Sea, as well as the Kerkenite Gulf, the Sivash Sea, and the Sea of Azov, are all extremely shallow as these are the continuation of the Russian Platform (Daniloff 1905).

Crimea can be divided into three major regions: the steppe of the north, the mountainous regions of the south, and the Kerch Peninsula in the east. The mountainous region, 160 km east-west and 50 km north-south, comprises three ridges: the main, or coastal ridge; the second; and the third, or northern, ridge. The southern coast, particularly in southwestern Crimea, is extremely steep, with bordering mountains that rise abruptly from the sea (fig. 2-2). These mountains are tallest in southwestern Crimea, near Yalta, with elevations of over 1,500 meters. In contrast, the northern half of the peninsula exhibits low relief, and is a loess-mantled extension of the southern Ukrainian steppes (Hoffecker 1987).

The main ridge of the Crimean Mountains is formed of Triassic, Jurassic, and Cretaceous rocks, the summits of which are characterized by karstic terraines (fig. 2-3). Its highest point, 1545 m, is at Mount Roman-Kosh on the Babugan Yaila. The second ridge is formed by Cretaceous and Paleogene rocks with elevations up to 500 m. Separated from this by a longitudinal valley, the third ridge is formed of Paleogene and Neogene rocks, with elevations up to 300 m (fig. 2-4) (Moisseiev 1937).

The steppe zone is characterized by undulating erosional relief, less marked on its eastern and western coasts, with a maximum elevation of 185 m. In the north are found numerous salt lakes—this is an important salt mining area—separated from the sea by narrow sand spits. The northeastern coast is bisected by numerous capes, peninsulas, bays, and gulfs where it adjoins the Sivash Sea, an inland basin. Between the Sivash Sea and the Sea of Azov runs the Akmani Isthmus, which connects the northern steppe zone to the Kerch Peninsula. The Kerch Peninsula is characterized by a southwestern lowland region and a northern and southeastern mountainous region, whose highest points are 182 m in height (Moisseiev 1937).

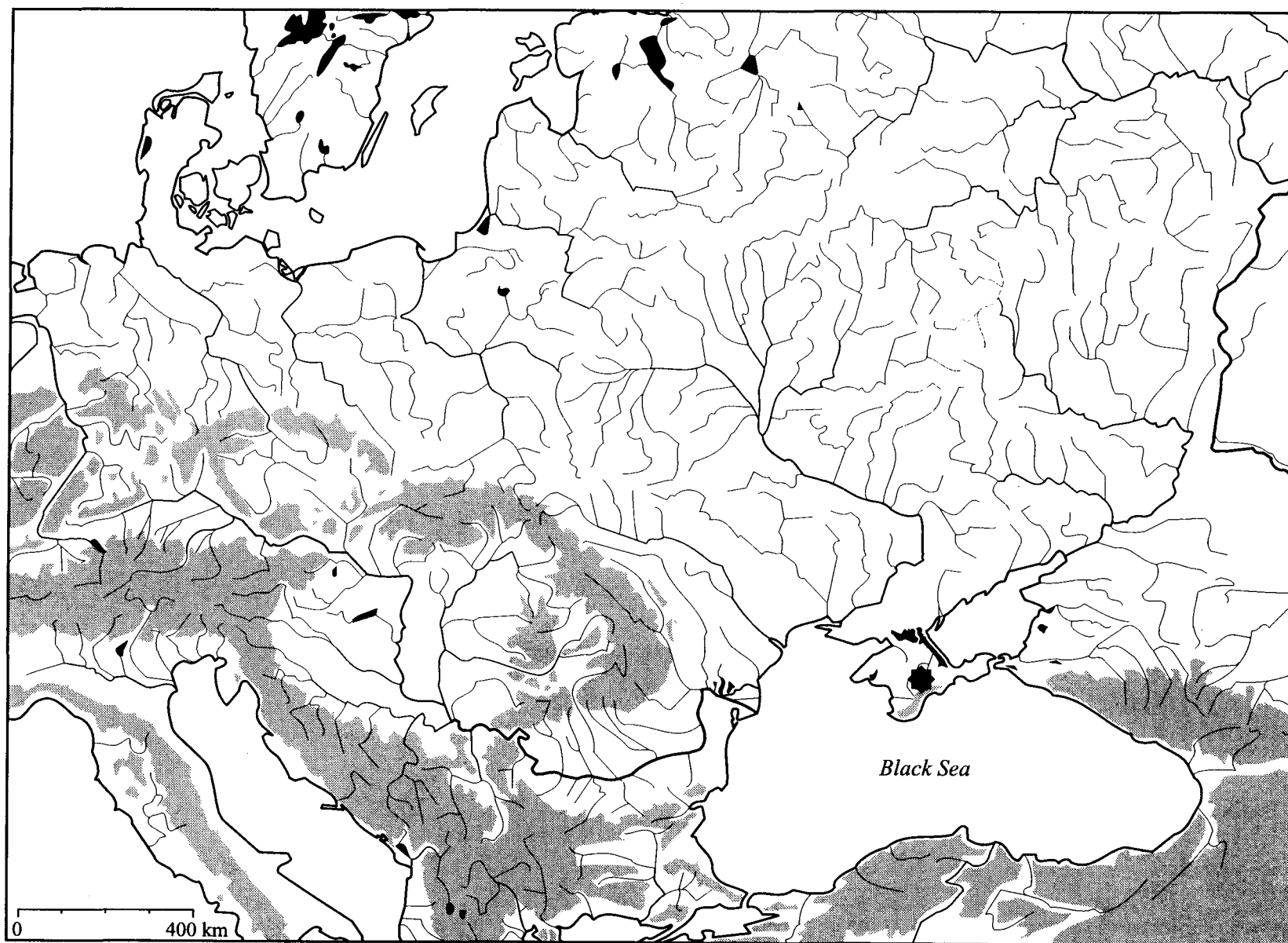


Fig. 2-1—Map of Central and Eastern Europe, showing location of the Crimean peninsula.

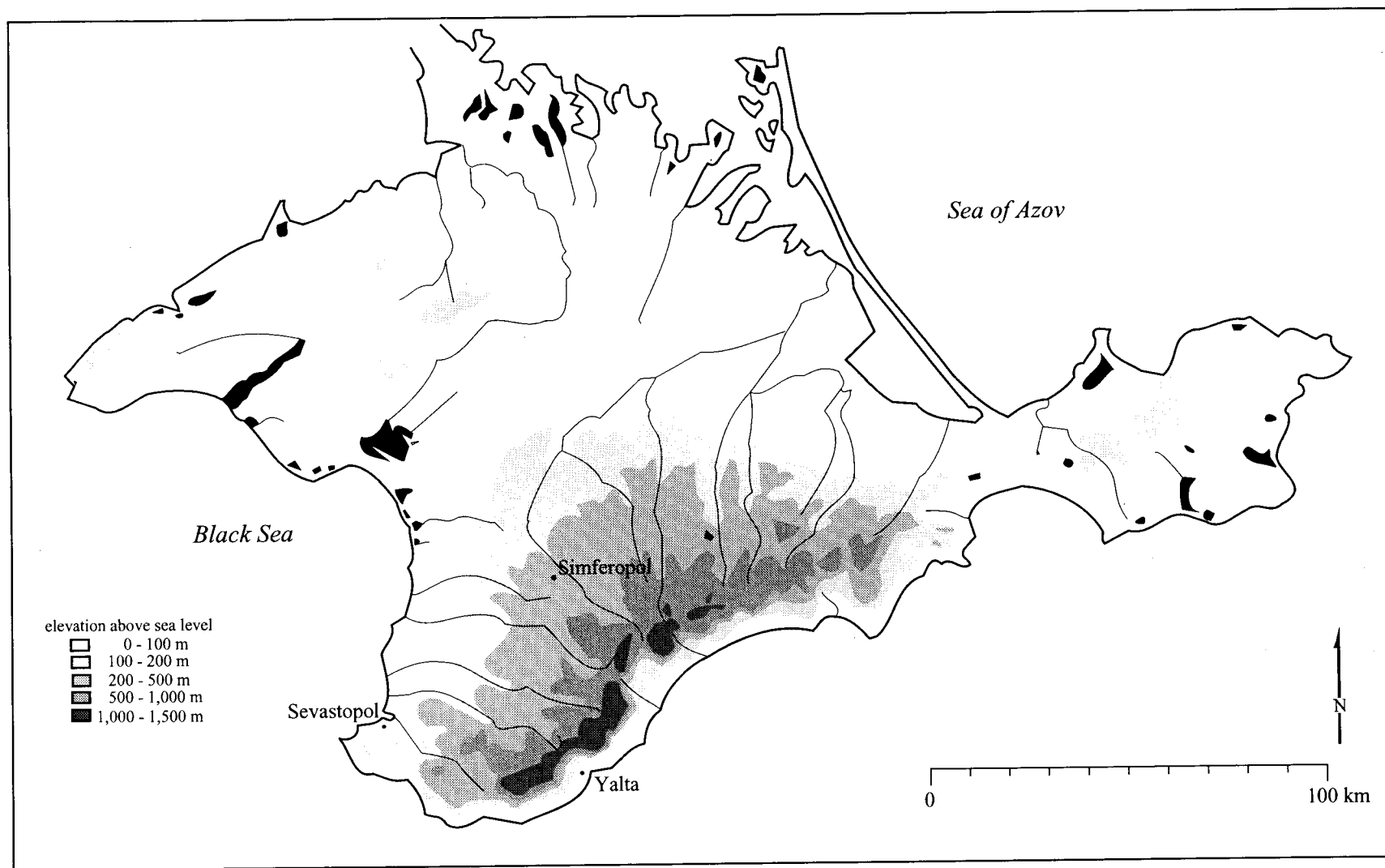


Fig. 2-2—Map of Crimea.

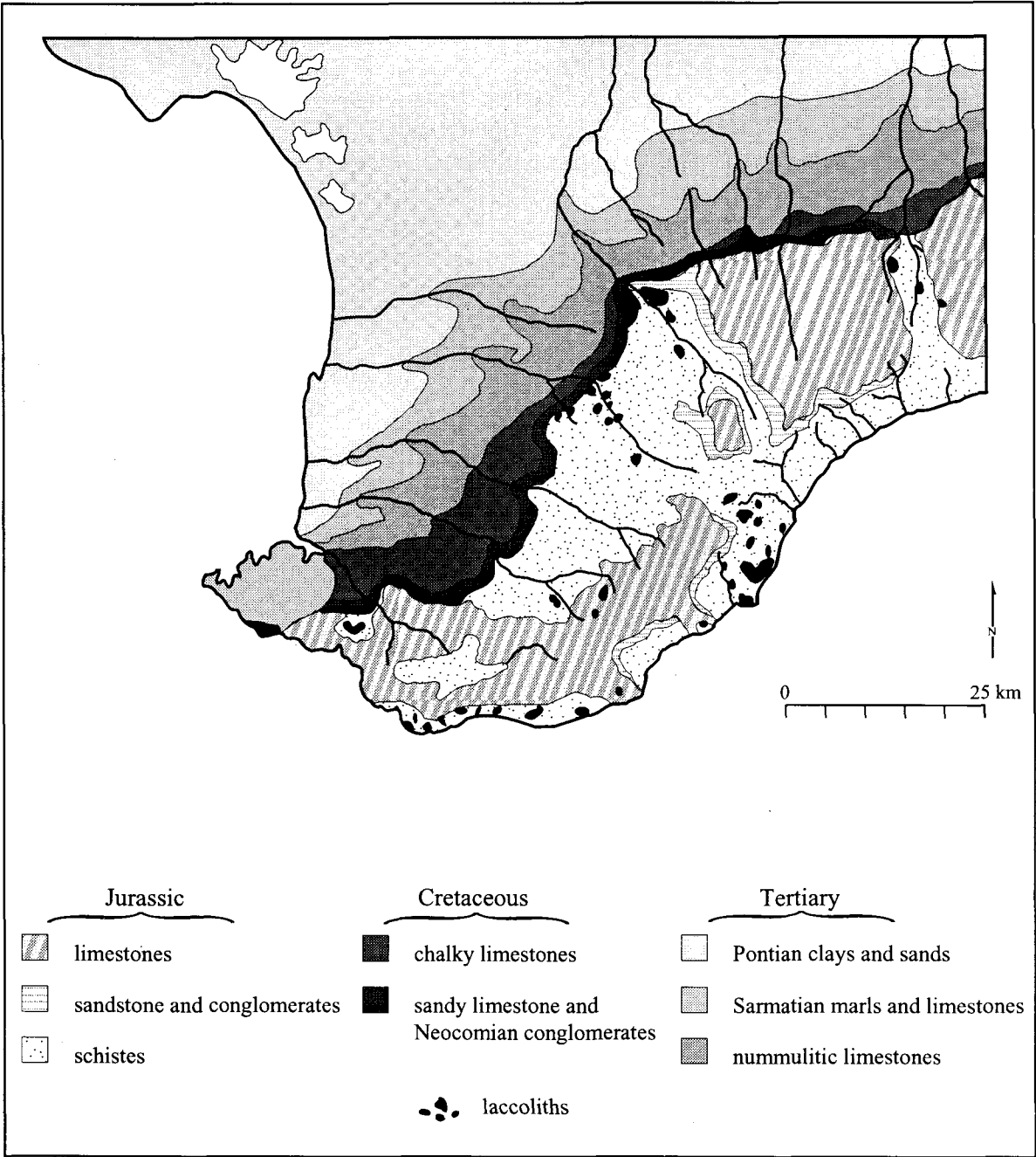


Fig. 2-3—Lithology of Crimea (redrawn from Daniloff 1905: map V).

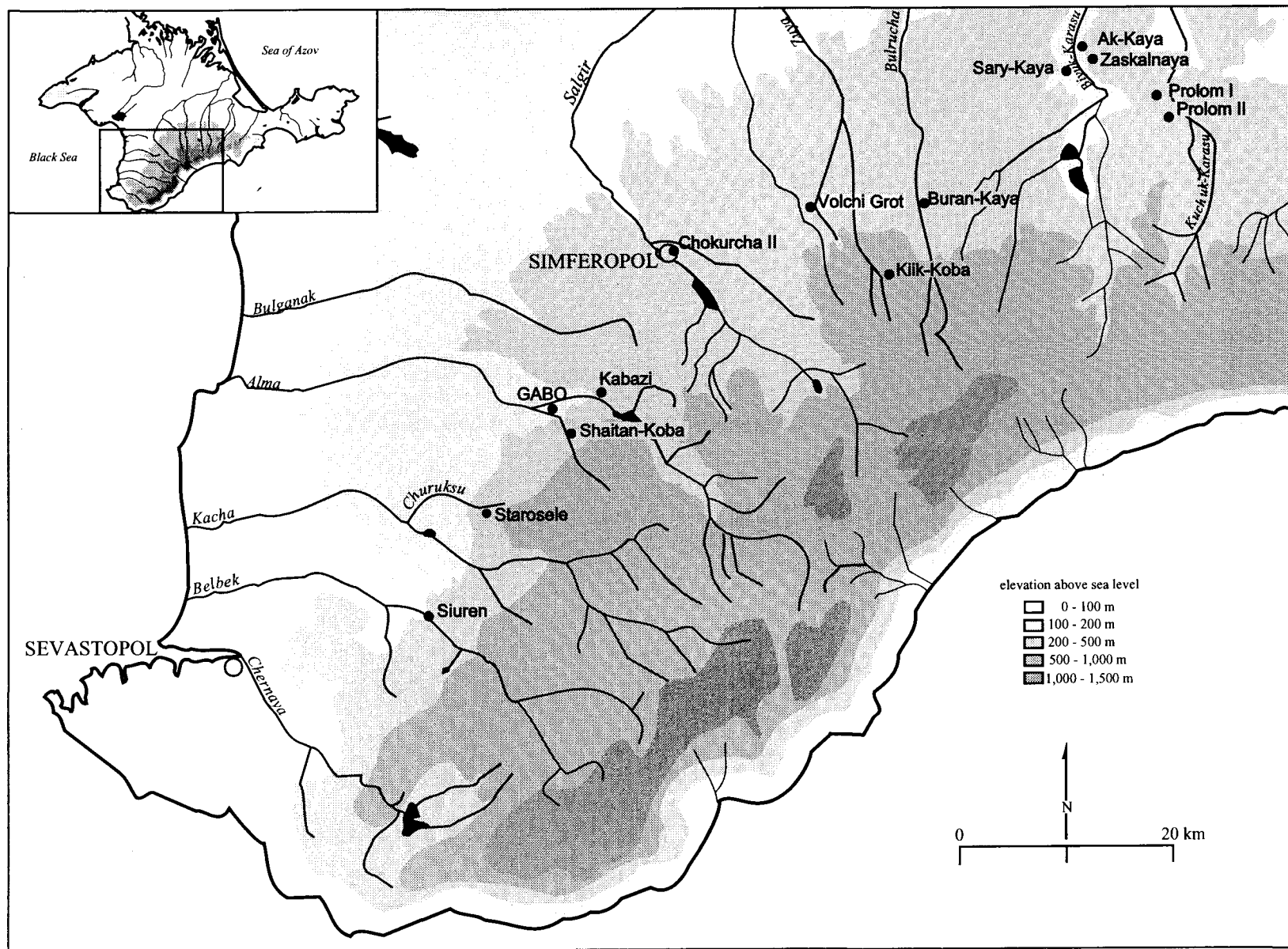


Fig. 2-4—Map of the mountainous Crimea, with Paleolithic site locations.

DRAINAGES

The rivers of Crimea are dependent both on weather conditions and the topography of the peninsula. As a general rule, Crimean rivers are poor in water, and during the summer in drought years can dry up completely in their lower courses. Three classes of drainages can be distinguished depending on where they are found: mountainous Crimea, the steppe plateau, and the Kerch peninsula.

The karstic system of the Main Ridge of the Crimean Mountains feeds all the major rivers of Crimea. The north and south sides of the ridge have distinct hydrologies; the former includes that region on the northern side of the Yaila and the schistic areas, and is fed by the karstic system and drainoff from the mountains, resulting in shallow basin, gentle rivers. The southern side includes the coastal area and the southern side of the limestone plateau; its rivers have short, narrow basins with much higher velocities.

The rivers, from their sources in the Yaila, descend rapidly and consequently towards the north-west until they enter the zone of Tertiary strata at edge of the steppe, where they deviate west into the Yevpatoria Gulf, or east into the Sivash Sea (Daniloff 1905). The north side feeds the Chernaya, Belbek, Kacha, and Alma rivers, all found in southwestern Crimea and draining into the Black Sea. The north side also feeds the Salgir River, with its important tributaries Angara, Beshterek, Zuya, Bulrucha, Biyuk-Karasu, draining west; and the Bulganak and Indol rivers, draining east into the Sea of Sivash. The rivers in this system are fairly rapid at their headwaters, but as they reach their lower courses, the valleys widen, become more shallow, and the waters are more tranquil.

Chernaya. The Chernaya is formed from three tributaries; the source for the southern two is in the Baïdari Valley and crosses the zone of Jurassic limestones. The third, the Chouliou, has a longitudinal course; its source is near Adim-Chokrak where it cuts through the Middle Cretaceous, neocomian, and Jurassic limestones, and joins the other two affluents at Tchorguna (Favre 1877). Although the headwaters of the Chernaya are shallow, it never completely dries up, however, its affluents frequently do in the summer months (Daniloff 1905).

Belbek. The Belbek starts on Mount Balikli, near the village Koutchouk-Ouzenbach, where its upper course is also referred to as the Ouzenbach. The Belbek Valley enlarges considerably just below its source and serpents through alluvial terraces until it passes the Gavri Village, where the valley narrows again and the river enters a narrow pass in the Cretaceous cliffs.

Kacha. The Kacha begins in the western flanks of the Yaila and the Babugan Yaila with the confluence of three streams the Biyuk-Ouzène, the Pissara, and the Donga. Two affluents join it at Adjikoï (the Stelia) and lower, at Bissala (the Marta). Its tributary, the Churuksu, joins it near Bakchisarai, where it cuts into the Middle Eocene nummulitic limestone and the underlying Lower Paleogene and Upper Cretaceous strata. The discharge of the Kacha is less than that of the Alma.

Alma. The Alma begins on the northern flank of the Babougan-Yaila; at the headwaters, the river is rapid and capricious in a narrow winding valley. One of its principle affluents is the Bodrak.

Salgir. The Salgir, the most important river on the peninsula, is considerably longer—181 km—than the rivers of the southwest, which are about 60-70 km in length. This lengthening of the Salgir is due to it entering the Tertiary zone at Simferopol, where it brusquely deviates to the east and enters the steppe. As it enters the steppe (which comprises two-thirds of its length) the character of the river, up to this point very active, changes radically and becomes quite sinuous, with a low discharge which frequently dries up during the summer.

The rivers of the south side of the Main Ridge actively erode the limestone summits, and the arêtes between the rivers are abraded easily so that the rivers join each other. These rivers are only active in the spring, when the permeable calcareous ground reaches capacity. They all have short courses and are poor in water.

CLIMATE

Today, Crimea has a subhumid, Mediterranean type climatic regime and, due to the influence of the surrounding seas, the climate is much milder than that of southern Ukraine. The mean annual precipitation is ca. 530 millimeters, with the maximum in early summer, and there is a soil moisture deficit for most of the year (fig. 2-5). The peninsula experiences extreme variability in climate depending upon the latitude and altitude of any particular locality.

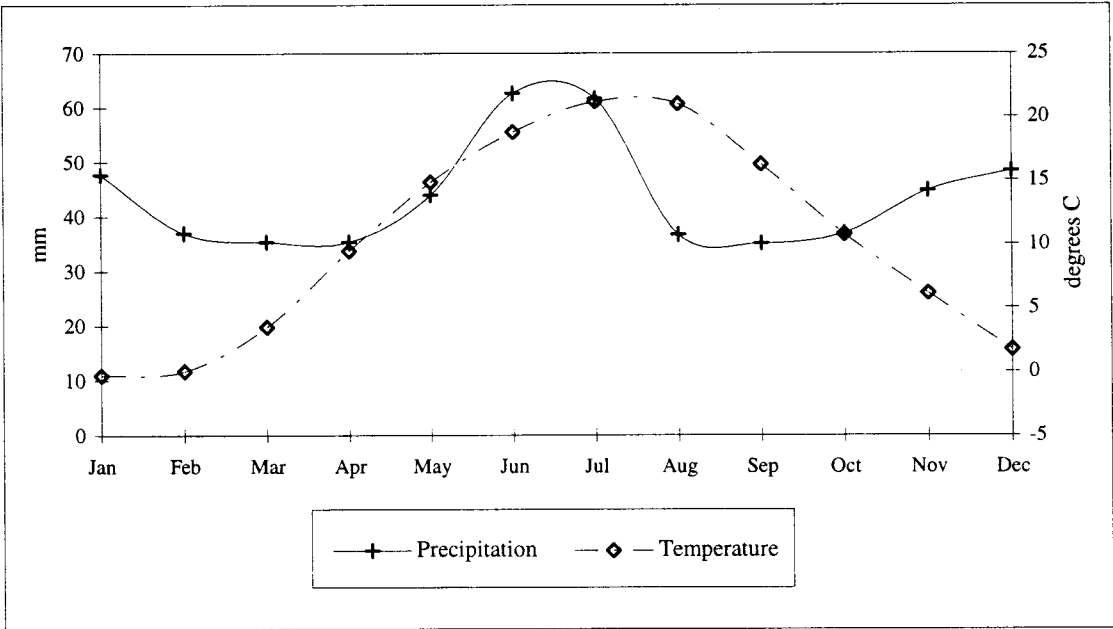


Fig. 2-5—Climatic data for Simferopol, Crimea: average monthly precipitation (mm) for the years 1901-1988, average monthly temperature (degrees Celsius) for the years 1821-1993 (NOAA 1997).

The steppe zone, unprotected from the winds blowing from the north, experiences severe winters, with frequent snow and a maximum low temperature of -20° C (Moisseiev 1937). The mean annual temperature at Askanija-Nova is just over 9° C (NOAA 1997). Temperature differences between the steppe and southern Crimea are considerably less dramatic in the summer months when the steppe is less than one degree cooler than more southerly regions. This area receives less rainfall than the more southerly areas, with a mean annual precipitation of 387 mm.

The climate of the mountainous region varies by altitude. At Simferopol, in the second ridge of the Crimean mountains, the mean annual temperature is 10° C (NOAA 1997). Winters are moderate, with 2 months of freezing temperatures, but rare snow. Summer temperatures are somewhat cooler here than both the steppe and the coast, thanks to its sheltered location, with an average of 21 degrees during July and August. Rainfall in the northern ranges varies from 400 - 700 mm per year.

The high summits in the first range of the Crimean mountains are very cold as a function of altitude; the Yaila summit at Ai Petri, for example, has a mean annual temperature of 5.8° C.

These areas often drop below freezing at night even in summer, whereas daytime temperatures can surpass 20° C (Favre 1877). Precipitation often exceeds 1,000 mm a year. At the same time, it is these summits which protect the low-lying coast from the northern winds, and enables the exceptionally pleasant climate there, making it a popular resort area. Winters along the coast are very mild, barely falling below 4° C in the coldest months, and snowing only in exceptional years. Temperature variations are not particularly drastic. The mean annual temperature here is 13° C, approaching that of Venice, and just slightly cooler than Nice. The coastal climate is moderately dry, with an average of only 70 rainy days per year (Moisseiev 1937).

SOILS

The Isthmus of Perekop and the area around the Sivash Sea are mantled by alkaline soils and salt marshes, well-developed chernozem soils are found throughout the steppe, and mountain-forest, meadow, and chernozem soils are distributed throughout the mountainous region (Moisseiev 1937).

VEGETATION

Today, the steppe area of Crimea is covered by grassy vegetation. In the northern mountain ranges, there is a forest-steppe zone grading into timber forests, which include oak, white beech, maple, ash, beech, and pine as one moves further south (Moisseiev 1937). The summits of the mountain ranges, often stony plateaus, are covered by grass—they are referred to as “Yailas” or summer pastures (Permyakov and Maidanovitch 1984). Vegetation along the coast includes cypress, magnolia, and palms, and olives and grapes are commonly cultivated; it is similar to the Mediterranean flora. The present day vegetation has been grossly modified by agricultural, herding, and forestry management. However, the forested southwestern Crimean hills of today are reflective of the late Quaternary character of the region, contrasting with the steppic vegetation of northern Crimea (Khotinskiy 1984).

REGIONAL GEOLOGY

The Crimean Peninsula is a tectonically uplifted landmass extending from the mainland of Ukraine into the Black Sea (fig. 2-1). In its broadest context, Crimea is an orogenic component of the progressive closure of the Tethys Sea, tectonically associated with the Caucasus Mountains to the East. (Nalivkin 1973; Belov 1989). The elevated landmass of Crimea is the northern limb of an anticline, formed during the convergent plate movements. The southern limb of the anticline is submerged about 2,000 meters below the surface of the Black Sea.

While the mountains of the southwestern Crimea register the orogenic uplifts, the rocks generally represent the various pre- and syn-orogenic marine environments. Together, it is the combination of the bedrock lithology, the structural configuration of the mountains, and the post-orogenic erosional history of those features that broadly define the archeological site settings in this region.

The bedrock of southwest Crimea is comprised of Mesozoic and Cenozoic rocks (Nalivkin 1973). Because of their structural deformation into the large anticline, the oldest rocks, of Triassic age, crop out along the Black Sea coast. The other exposed rocks are progressively younger from south to north, with the rolling steppe region of northern Crimea underlain by Miocene and Pliocene marine clays.

For the present discussions, it is convenient to distinguish three major components of the bedrock geology of southern Crimea: (1) the Triassic-Jurassic (T-J) clastic-dominated suite of

the coastal mountains, (2) the Cretaceous-Eocene (K-E) carbonate-shale suite adjacent to and north of the older rocks, and, (3) the shale-dominated terrane farther north, corresponding with the Crimean steppe. All of the Mesozoic and Neogene rocks under consideration dip strongly to the north or northwest, and also exhibit numerous faults, including those that are perpendicular or oblique to the main structural trend.

The T-J rocks of the southern mountains are dominated by 7,000-9,000 meters of late Tr and early Jr flysch (mainly shales, but with thin sandstone and conglomerate). These are overlain by ca. 1,500 meters of middle Jr marine clays and continental deposits. The upper Jr rocks are 1,100 meters of reef limestones. These rocks form the highest peaks in the southern mountains and are overlain by ca. 1,600 meters of massive lower Cretaceous limestone which crop out to the north of those peaks at lower elevations.

Because of their lithology and high erosion rates, the southern mountains generally comprise poor settings for site formation, although it is not clear how much this low site potential has been verified by archeological survey. Furthermore, lithic raw materials are apparently much less common there, with only a few cherts noted in the thin lower Jr limestones of the area (Nalivkin 1973: 584).

The K-E terrane, as informally defined here, corresponds with the second ridge of the Crimean Mountains. These rocks are composed of late Jr and early K massive limestones in the southern part of the area, cropping out near the sites of Siuren, Starosele, and Buran Kaya (fig. 2-4). In the southwestern part of the area, where uplift has apparently been the greatest, these rocks have been incised by streams forming deep canyons, as at Starosele (fig. 2-6). East of Simferopol there is much less relief, and the limestone terrane merges quite gradually with the steppe to the north. Along the drainages, these rocks are excellent settings for rockshelter formation, as illustrated by sites such as Siuren. They contain some cherts, but the extent and character are not known to the writer.

The remainder of the Cretaceous-Eocene sequence of rocks includes much thinner stratigraphic units and beds of intercalated shales, clays, marls, chalks, and, in the Eocene, the distinctive nummulitic limestone. Uplift and erosion of these rocks have resulted in the formation of in-facing cuestas, notably in the region between Bakchisarai and Simferopol (fig. 2-4). Near Simferopol, streams such as the Alma river are superposed over the structures, but have also exploited the shale-marl-clay beds to form broader valleys behind the ridges (fig. 2-7). The drainages west of the Alma, such as the Bodrak near GABO, become progressively narrower and steeper.

The in-facing cuesta scarps expose the alternating beds of limestone, chalk, marl, and shale mentioned above, creating ideal settings for rockshelter formation (fig. 2-8). They additionally expose chert-bearing limestones, such as near Kabazi. Shelters such as Kabazi I and Kabazi V have formed just below the nummulitic limestone, near the top of the cuesta on the north side of the Alma Valley (figs. 2-8, 2-9, 2-10). Kabazi II, on the other hand, accumulated deposits behind a huge rock slab that fell to rest on a bench formed at the contact between a hard limestone and a clay bed. Specific geologic histories of these sites are included in the following chapters.

In addition, these differentially resistant rocks have also been eroded into benches and sloping platforms, as in the Alma Valley near Kabazi (fig. 2-7). Some of these are capped by alluvial gravel as strath terraces, while thick alluvial deposits are generally limited to very low positions along the streams behind the ridge capped by the nummulitic limestone. Broader terraces occur beyond that ridge where the streams cross softer rocks.

Thus, southwestern Crimea is geologically and environmentally distinct from the rest of the peninsula. This distinctive character is important in terms of both environmental contexts and site formation settings.



Fig. 2-6—Photograph of the site of Starosele. Note steep canyon walls in background.



Fig. 2-7—Photograph of Alma River Valley. View is to the south, taken from top of the Eocene nummulitic limestone above Kabazi I. Note steep in-facing cuesta slope, limestone benches along valley, and peaks of the southern mountains in the distance.



Fig. 2-8—Photograph of the cuesta overlooking the Alma River Valley. View is to the east, with Kabazi I and Kabazi II on slope below thick Eocene nummulitic limestone. Note vegetated bench on slope, defining position of Kabazi II.

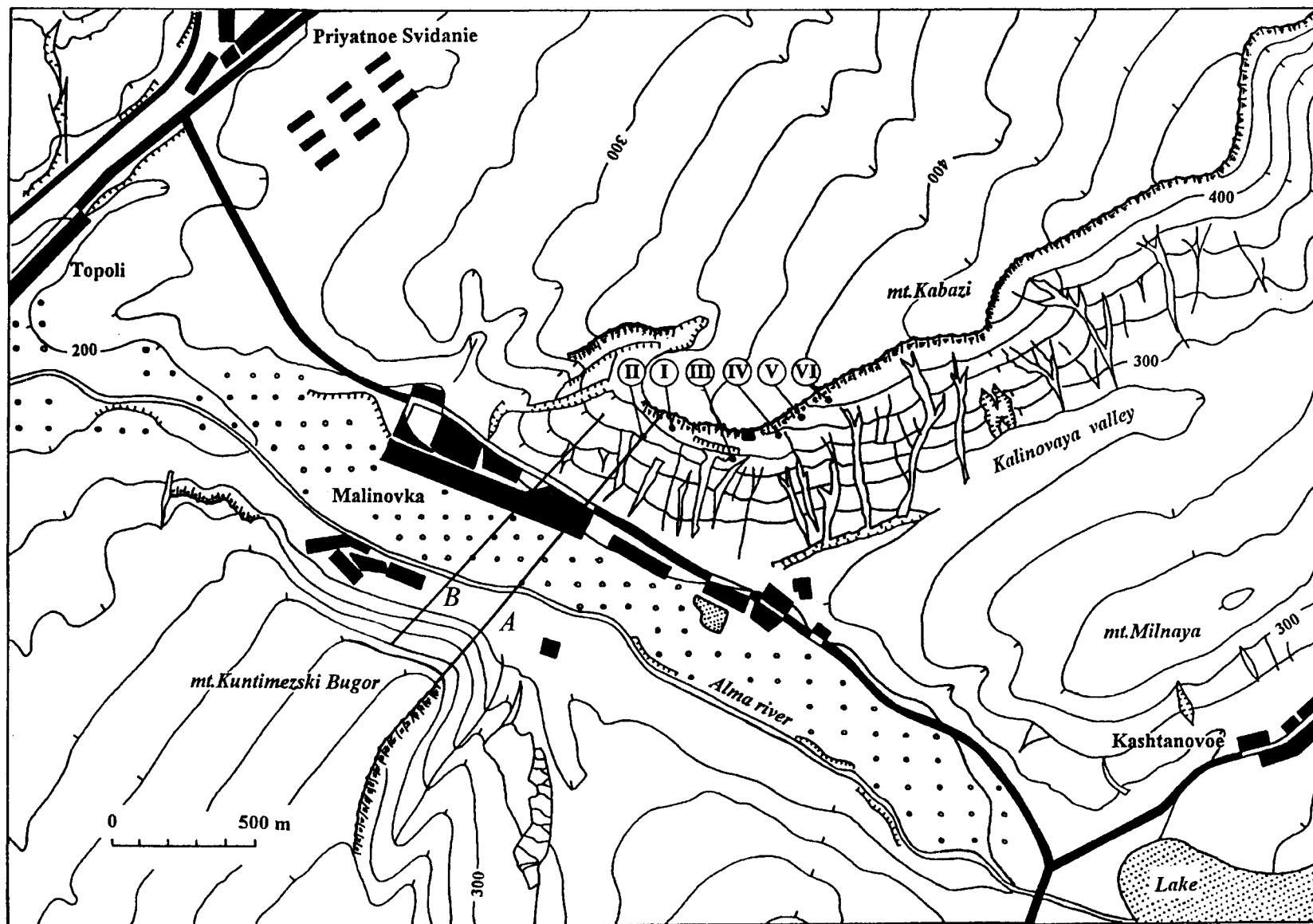


Fig. 2-9—Map of the Alma River Valley near Kabazi Sites. Note locations of topographic cross-sections of figure 2-10. Roman numerals indicate positions of Kabazi sites.

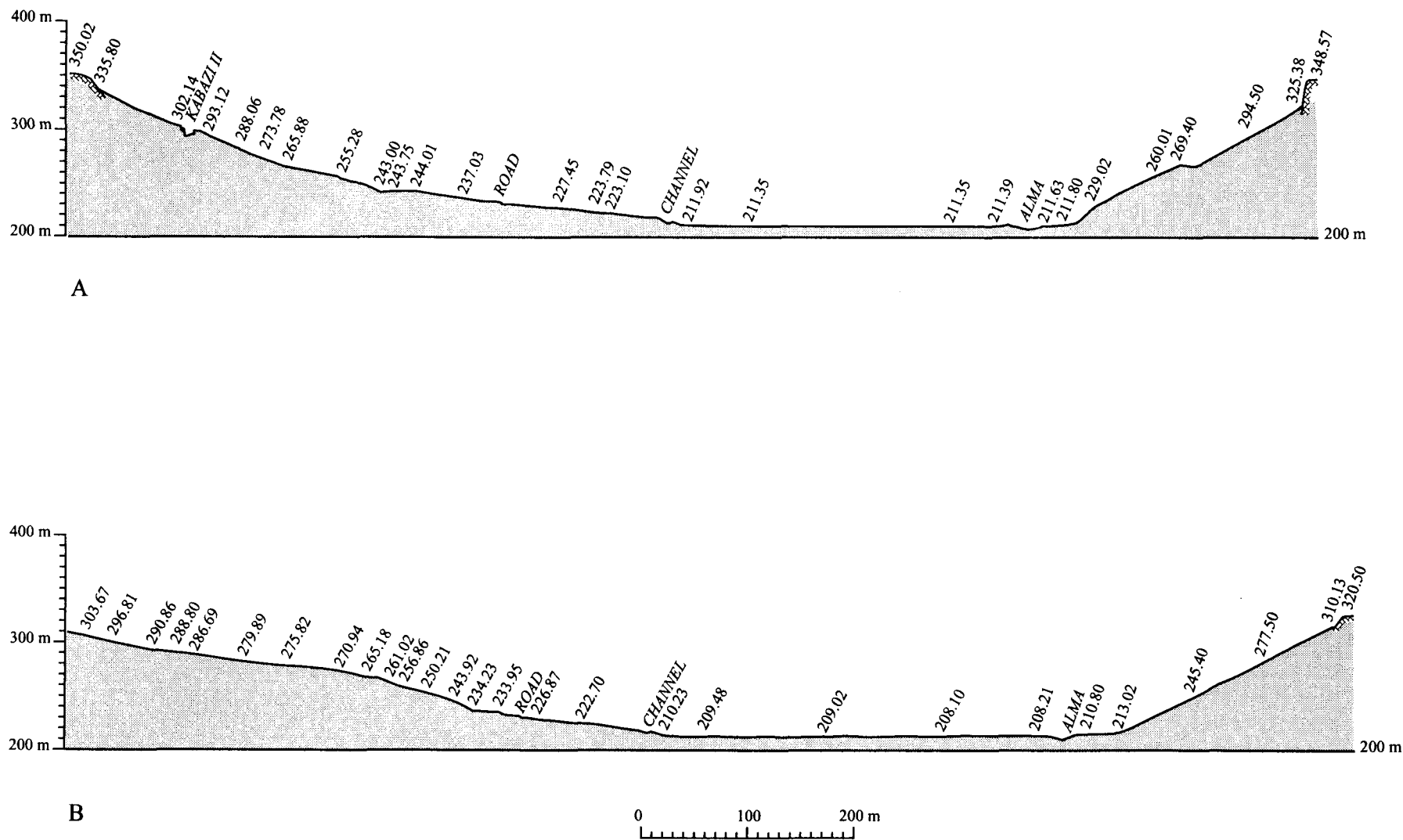


Fig. 2-10—Topographic cross-sections across the Alma River Valley: *A*—cross-section through Kabazi II; *B*—cross-section through cemetery (third terrace).