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Small Mammal Fauna from Buran-Kaya III

Anastasia K. Markova

The Buran-Kaya III rockshelter is situated in Eastern Crimea, on the second mountain ridge, in the Burulcha River basin. The site is located at 250 m asl and is 8 m above the present Burulcha River water level. Buran-Kaya III includes many cultural layers, which, by archeological industries, are separated into two main groups (Monigal, Chapter 1). The lower (early) group includes archeological Levels E, D, C, and Layer B. Layer B is subdivided into Level B (uppermost) and Level B1 (lowermost) and is associated with lithological layer IV. Level C, containing an Eastern Szeletian/Streletskayan assemblage, is about 4 cm thick and has AMS ^{14}C dates of 32,350 ± 700 (OxA-6672), 32,200 ± 650 (OxA-6869), and 36,700 ± 1,500 (OxA-6868) BP. The Kiik-Koba facies of Layer B has AMS ^{14}C dates from Level B1 of 28,840 ± 460 (OxA-6673) and 28,520 ± 460 (OxA-6674) BP (Pettitt 1998a). The upper (late) group includes, from bottom to top, archeological Levels 6-5, 6-4, 6-3, 6-2, 6-1, and Layer 5, which are all considered to be Upper Paleolithic (Janevic 1998).

The small mammal remains described in this report are from Levels C, B1, B, 6-5, 6-4, 6-3, 6-2, 6-1 (and its sublevels), and Layer 5. These remains were recovered during the 1996 and 2001 excavations of Buran-Kaya III and were given to the author for study in 2001.

Materials

The small mammal bone material in the analyzed levels is relatively well preserved. The angles of the teeth are intact and several mandibles with teeth were found. Most of the bones have a light yellow color, with occasional remains colored black due to burning.

Small mammal bones were collected during excavation and during the screening and washing of sediments from the cultural layers. The number of bones in the deposits is rather high. The small mammal fauna at Buran-Kaya III mostly includes species of rodents (Rodentia), a few insectivores (Insectivora), and lagomorphs (Lagomorpha).

Taphonomy

Most small mammal remains were accumulated in the rockshelter as the pellets and excrement of predator birds and large mammals (Gromov 1961; Andrews 1990). Studies of Crimean predators have shown the main food preferences of the fox *Vulpes vulpes* to be hares and voles. Muridae are second in importance in its diet (Kotovshikova 1936). The remains of open biotope mammal species prevail in the excrement of fox, because of this animal's hunting strategy.

Gromov (1961) has demonstrated that most of

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the small mammal remains in the cultural layers of Crimean sites were deposited by owls. The European eagle owl *Bubo bubo* today in Crimea typically includes among its prey voles of the genus *Microtus*, the hamsters *Cricetus cricetus* and *Cricetulus migratorius*, the hare *Lepus europaeus*, the northern mole-vole *Ellobius talpinus*, mice of the genera *Apodemus* and *Mus*, and the hedgehog *Erinaceus europaeus*. The remains of the large jerboa *Allactaga major*, birch mouse *Sicista*, and white-tooth shrew *Crocidura* are only rarely found in owl's pellets (Gromov 1961). The remains of open landscape species dominate in recent *Bubo bubo* pellets. This bird hunts over a large area, up to 10 kilometers, and takes any animal weighing up to 17 kilograms, even the young roe deer *Capreolus capreolus* (Andrews 1990).

The tawny owl *Strix aluco,* which inhabits rockshelters situated in the forests of the Crimean Mountains, primarily hunts small forest mammals (voles, Muridae, shrews) (Gromov 1961). Its hunting range is about 200 to 700 meters around its nest and it will take any animal weighing up to one kilogram (Andrews 1990).

Thus, the accumulation of the bones of small mammals of differing ecology and size in the cultural layers of sites depends very strongly upon predator preferences. In most cases, however, these concentrations reflect the small mammal faunas from areas a few kilometers around the site. Reconstructed small mammal assemblages thereby provide a broad picture of the environment during the deposition of cultural layers, in contrast to snail fauna, which only reflect the immediate local conditions in the cave or rockshelter.

Species Composition of Small Mammals from Level C and Layer B

The small mammal fauna recovered from Buran-Kaya III Level C and Layer B includes 10 species of Rodentia, Lagomorpha, and Insectivora. Five hundred small mammal remains have been analyzed, of which about two hundred have been identified to species. Six species of rodents, one insectivore, and one lagomorph have been identified.

Small Mammals from Level C

Level C includes seven species of rodents and lagomorphs (Figure 3-1, Table 3-1). The bones of little suslik (ground squirrel) *Spermophilus pygmaeus*, great jerboa *Allactaga major* (Figure 3-1: *1*), water vole *Arvicola terrestris* (Figure 3-1: *5*), yellow steppe lemming *Eolagurus luteus* (Figure 3-1: *2*), narrow-skulled vole *Microtus (Stenocranius) gregalis* (Figure 3-1: *4*), and the "obscurus" vole *Microtus obscurus* (Figure 3-1: *3*) were identified. Also, the remains of the European hare *Lepus europaeus* were found.

The favorite habitats for the little suslik are various types of semi-deserts (sand, clay-sand, and loess semi-deserts) and dry, arid steppes with wormwood. It is also found in deserts. The little suslik inhabits the low mountain steppe belt as well, but it does not live above 400–500 m asl.

The great jerboa is a typical representative of arid steppes and semi-desert landscapes. It prefers biogeocoenoses with solid (dense) soils having thin vegetation. Sometimes the great jerboa penetrates into forest-steppes, using dry open slopes with thin grass cover (Ognev 1948). *Allactaga major* still inhabits Crimea. The remains of great jerboa have been found in interglacial and glacial Pleistocene faunas on the Russian Plain. For example, its remains have been found in the deposits of the Bryansk Interstadial soil (33–24,000 BP) in the Upper Dnieper basin (Desna River basin) in the site of Arapovichi, together with lemmings, narrow-skulled voles, and steppe lemmings

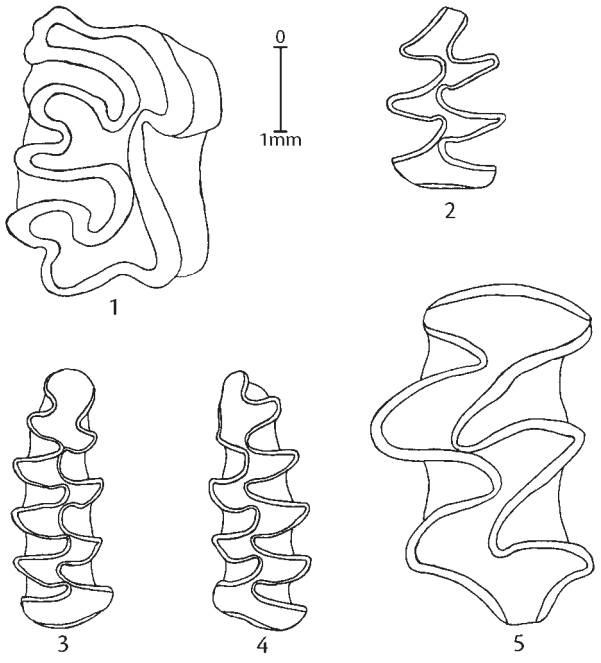

Figure 3-1—Buran-Kaya III Level C: *1*–M1 *Allactaga major*; *2*–m2 *Eolagurus luteus*; *3*–m1 *Microtus obscurus*; *4*–m1 *Microtus gregalis*; *5*–M1 *Arvicola terrestris*.

TABLE 3-1
Small mammal remains from Buran-Kaya III Level C and Layer B

	Level C	*Level B1*	*Level B*
Insectivora			
Sorex araneus Linnaeus (Eurasian common shrew)	—	2 mandibles with teeth	—
Lagomorpha			
Lepus europaeus Pallas (European hare)	9 molars, 12 incisors	2 molars, 2 incisors	—
Rodentia			
Spermophilus pygmaeus Pallas (little suslik)	13 molars	25 molars, 20 incisors	20 molars, 10 incisors
Allactaga major Kerr (great jerboa)	1 M1	2 m2	—
Cricetulus migratorius Pallas (grey hamster)	—	1 mandible with m2 and fragment of m1; 1 maxilla with M1	—
Ellobius talpinus Pallas (northern mole-vole)	—	—	1 m2
Lagurus lagurus Pallas (steppe lemming)	—	1 m1	3 m1
Eolagurus luteus Eversmann (yellow steppe lemming)	1 m2	—	1 mandible with m1, m2; m1
Arvicola terrestris Linnaeus (water vole)	1 M1, 3 incisors, mandible fragment	—	1 M1, 2 m1, 1 m2
Microtus (Stenocranius) gregalis Pallas (narrow-skulled vole)	1 m1, mandible with m2	—	—
Microtus (Microtus) obscurus Eversmann (M. arvalis group) ("obscurus vole")	1 m1, mandible fragment	mandibles with m2, 2 m1, 2 m2	1 M1, 1 M3, 4 m1, 1 m2
Microtus sp. (vole)	8 incisors	20 incisors	10 incisors
Total number of species	7	7	6

(Markova 1985; Markova, Simakova, Puzachenko, and Kitaev 2002). The small mammal composition of this locality belongs to a typical periglacial community. However, there are also many indications for the presence of *Allactaga major* bones among typical interglacial faunas (Markova 1982a). The most important factor for this animal was therefore the presence of open landscapes with thin vegetation, rather than temperature.

The yellow steppe lemming *Eolagurus luteus* now inhabits only Middle Asia, Mongolia, and China, where it lives in open landscapes (Figure 3-1: *2*). Today it prefers semi-deserts, dry steppes, and even deserts (Ognev 1950; Gromov and Erbaeva 1995). During the Last Glacial, its area of distribution was very wide and included the central and southern Russian Plain, as well as Crimea. This species was typical for the so-called "mixed" periglacial faunas, not only of the Valdai Glacial, but also of earlier glacials (Markova 1998). Yellow lemmings of different evolutional levels (species) have been found among interglacial Early, Middle, and Late Pleistocene faunas in Eastern Europe (Agadjanian and Markova 1983; Markova 1982; Rekovets 1994). The *Eolagurus* range remained rather broad during the Holocene, and even into the nineteenth century, the yellow steppe lemming existed in the Lower Volga River drainage basin and in the deserts of Kazakhstan. Thus, the presence of the remains of this animal in Level C indicates, most of all, dry open landscapes near the site.

Three species of voles were found in Level C. The water vole *Arvicola terrestris* inhabits the banks of rivers and other water reservoirs. This species has an intrazonal range and inhabits sub-aquatic biotopes over wide areas of Eastern Europe, from steppe zones to forest-tundra. It is absent today only in the tundra and arctic zones (Ognev 1950). The presence of this animal indicates the proximity of some surface water near the site.

The narrow-skulled vole *Microtus (Stenocranius) gregalis* is an inhabitant of various types of open landscapes. *M. gregalis* now lives in tundra and steppe zones. This animal is practically indifferent to low temperatures. During the Valdai Glacial, its range was very wide and *M. gregalis* was one of the characteristic members of the mammoth faunal complex (Markova 1982b; Baryshnikov and Markova 1992). More recently, after the degradation of the Valdai ice sheet, its range separated into two parts: tundra and steppe. The morphology of first lower molar of *M. gregalis* found in Buran-Kaya III Level C (Figure 3-1: *4*) has the typical "*gregalis*" morphotype without the additional angle on the anterior loop of the anteroconid complex. Such morphology is more characteristic of the late Middle Pleistocene narrow-skulled voles and of the modern steppe populations. This morphotype is rare in Valdai Glacial *Microtus gregalis* populations of the central Russian Plain, for which a more complicated structure of the first lower molar of the narrow-skulled vole was typical (Motuzko 1992; Rekovets 1985; Markova 1982a, 1992).

Microtus obscurus prefers open meadow-steppe landscapes, and its range now includes Crimea and the Caucasus Mountains, the Volga River basin, and the Urals (Malygin 1983; Zagaradniuk 1991). This species was identified by fossil materials only during the most recent studies of small mammals from Crimean Paleolithic sites (Markova 1999, 2000).

Lepus europaeus today inhabits different open landscapes: forest-steppe, steppe, and semi-desert. It can also live in the forest zone, but only in open glades and on their edges (Ognev 1940; Gromov and Erbaeva 1995).

Thus, all of the small mammal species found in Buran-Kaya III Level C indicate dry open landscapes near the site. Arid steppes with patches of semi-desertic vegetation are suggested. The presence of water vole points to the existence of a stream near the site.

Small Mammals from Layer B

Buran-Kaya III Layer B (Levels B and B1) represents the only cultural layer with a Kiik-Koba type industry. The separation of these levels was first noted during the 1996 excavations based on the difference in the saturation of burned bones. In this report, the fauna from these levels is analyzed jointly, although the distribution of material from Levels B and B1 is enumerated separately in Table 3-1.

The fauna from Layer B includes eight species of Rodentia, one species of Lagomorpha, and one species of Insectivora (Table 3-1).

Two mandibles of the Eurasian common shrew (*Sorex araneus*) (Insectivora) were identified from this layer (Figures 3-2: *1*; 3-3: *3*). The range of *Sorex araneus* has recently been wide, including tundra-forest, forest, and forest-steppe zones. It prefers forests of different types and bushes, but also inhabits grasslands with high grasses. The common shrew is abundant in the floodplains of rivers, creeks, and other water reservoirs, which are its favorite biocoenoses (Gromov and Erbaeva 1995). Its presence in Layer B most likely indicates the proximity of some surface water near the site.

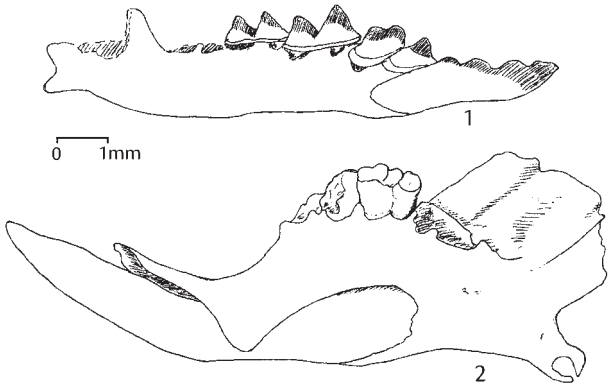

Figure 3-2—Buran-Kaya III Level B1: *1*–*Sorex araneus* mandible; *2*–*Cricetulus migratorius* mandible.

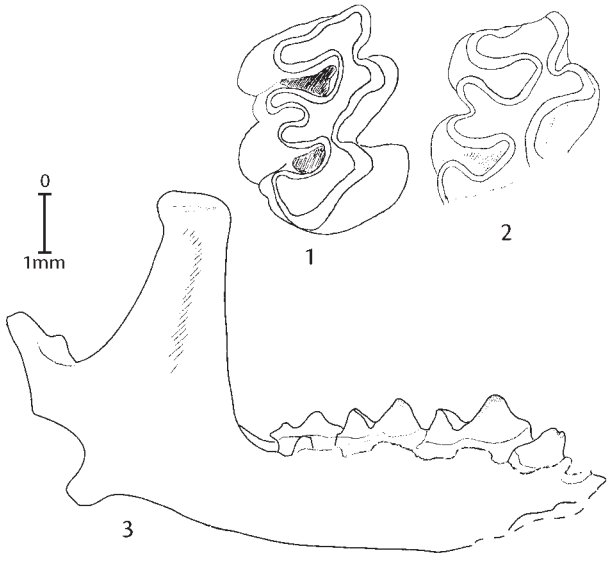

Figure 3-3—Buran-Kaya III Level B1: *1, 2*–m2 *Allactaga major*; *3*– *Sorex araneus* mandible.

Several remains of *Lepus europaeus* were found in this layer. Its ecology has been described above.

Many remains of little suslik (ground squirrel) *Spermophilus pygmaeus* were discovered in Layer B, indicating a wide distribution of open landscapes near the site. The great jerboa (*Allactaga major*) also inhabited the environs during the accumulation of Layer B (Figure 3-3: *1–2*). The description of its ecology was presented above.

Two mandibles of the grey hamster (*Cricetulus migratorius*) have been found in this layer (Figure 3-2: *2*). This species now inhabits open landscapes of different types. Its modern range includes the central and southern Russian Plain, Crimea, and Middle Asia. The grey hamster favors plain and mountain steppe habitats, but it is common in forest-steppes and semi-deserts as well. *Cricetulus migratorius* burrows rather simple holes, and it often uses rocky areas in the mountains, where it lives in hollows. The subspecies *Cricetulus migratorius phaeus* now lives in Crimea. The presence of grey hamster bones indicates that there were open steppe landscapes—and possibly rocky areas—near the site.

A lower second tooth of a northern mole-vole (*Ellobius talpinus*) was found in Layer B (Figure 3-4). *Ellobius talpinus* prefers open landscapes, mostly steppes and forest-steppes with rich soils. Today this animal inhabits the northern part of the Crimean Peninsula. Its range also includes steppes and semi-desert between the Ingul and Molochnaya Rivers (southern Ukraine) and the steppes of the Northern Caucasus. Its range extends eastward to the Aral

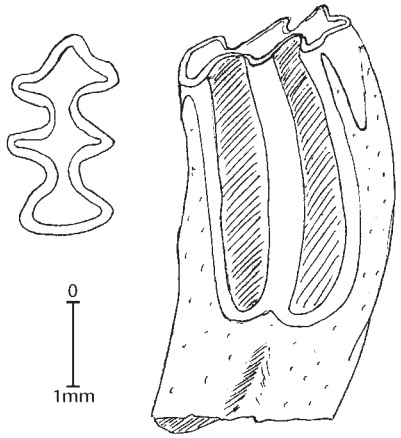

Figure 3-4—Buran-Kaya III Level B: m2 *Ellobius talpinus*.

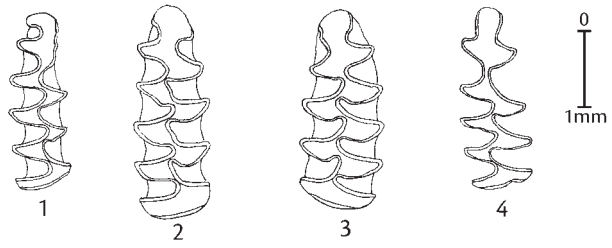

Figure 3-5—Buran-Kaya III Level B1: *1*–m1 *Microtus gregalis*; *2, 3*–m1 *Microtus obscurus*; *4*–m1 *Lagurus lagurus*.

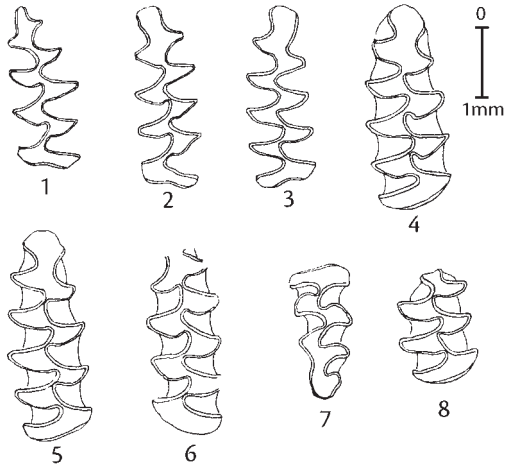

Figure 3-6—Buran-Kaya III Level B: 1-3–m1 *Lagurus lagurus*; 4-6–m1 *Microtus obscurus*; 7–M3 *Microtus obscurus*; 8–m2 *Microtus* sp.

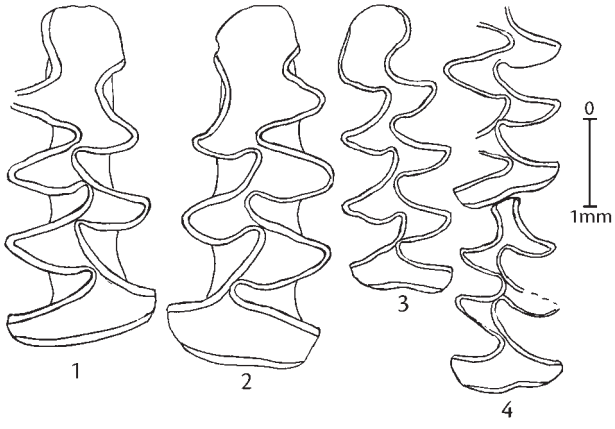

Figure 3-7—Buran-Kaya III Level B: *1, 2*–m1 *Arvicola terrestris*; 3–m1 *Eolagurus luteus*; *4*–m1 (fragment) and m2 of *Eolagurus luteus*.

Sea and the Amu-Darya River basin. The northern mole-vole is a zonal representative of steppes and semi-deserts. Its range also extends into forest-steppes, where it inhabits open areas. *Ellobius talpinus* burrows deeply and lives an underground life. Plant roots are the mainstay of its diet. It can make burrows in different types of deposits: in soft soils, in sands, and even in rocky deposits (Gromov and Erbaeva 1995; Ognev 1950).

The first lower tooth of a steppe lemming *Lagurus lagurus* was found in Layer B (Figures 3-5: *4;* 3-6: *1–3*). The morphology of the tooth is typical for *Lagurus lagurus*, with well-differentiated enamel and the trefoil form of the anterior loop. This species (and its ancestral forms) was very characteristic of open landscapes of different types, including periglacial steppes and forest-steppes of the glacial stages, as well as the steppe-like landscapes of the interglacial epochs (Markova 1982b, 1998; Rekovets 1994). During the Valdai Glacial, it was widely distributed in the northern hemisphere and penetrated far to the north and to the east from its modern distribution. Steppe lemmings were found during this time as far away as the British Islands. *Lagurus lagurus* was a consistent member in the mammoth faunal complex of the second half of the Late Pleistocene (Baryshnikov and Markova 1992, 2003).

A northern mole-vole *Ellobius talpinus* lower second tooth was found in Layer B (Figure 3-3). The lower molars of the yellow steppe lemming *Eolagurus luteus* are typical in their structure (Figure 3-7: *3–4*). The ecology of this animal was described above.

The first lower molars of the water vole (*Arvicola terrestris*) are rather large and have positive enamel (Figure 3-7: *1–2*). These features permit an attribution of these remains to the modern species *Arvicola terrestris*. The presence of this animal indicates surface water near the site.

Only one species of the genus *Microtus* was discovered in Layer B. It was attributed to the "obscurus" vole, *Microtus obscurus* (Figure 3-6: *4–8*). This mammal prefers steppe and meadow conditions.

The majority of the Layer B small mammal species were inhabitants of different types of open steppe and semi-desert landscapes. Only the water vole and the European common shrew prefer periaquatic biotopes. The absence of *Microtus gregalis* possibly indicates some warming, compared with the Level C assemblage. This warming could be correlated with the Bryansk Interstadial.

Species Composition of Small Mammals from Level 6-5 through Layer 5

The small mammal fauna recovered from the Upper Paleolithic part of the Buran-Kaya III sequence includes 10 species of Rodentia and Lagomorpha.

Small Mammals from Levels 6-5, 6-4, and 6-3

Six species of small mammals were found in Level 6-5 (Table 3-2). They belong to two orders: Lagomorpha and Rodentia.

European hare *Lepus europaeus* is the only lagomorph present. Rodentia remains include *Spermophilus pygmaeus*, *Ellobius talpinus*, *Eolagurus luteus*, and *Microtus obscurus*, all representatives of open steppe-like and semi-desert-like landscapes (Figures 3-8 and 3-9). The ecology of these species was described above. The remains of water vole *Arvicola terrestris* in Level 6-5 indicate that there was surface water near the site (Figure 3-8: *2*). The absence of bones of the narrow-skulled vole *Microtus gregalis* may suggest interstadial conditions.

The overlying Level 6-4 includes the remains of five species: *Lepus europaeus*, *Spermophilus pygmaeus*, *Ellobius talpinus*, *Eolagurus luteus*, and *Microtus obscurus* (Table 3-2; Figures 3-10 and 3-11). All of the species found in Level 6-4 inhabit various types of open landscapes. Remains of the narrow-skulled vole *Microtus*

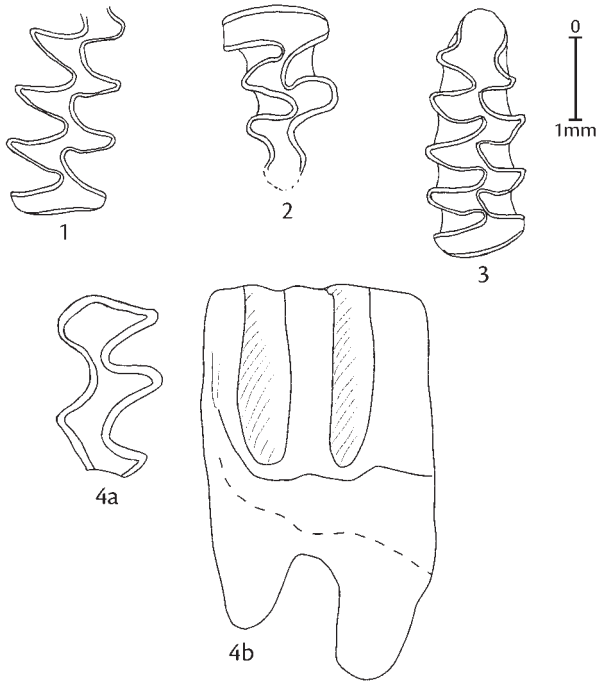

Figure 3-8—Buran-Kaya III Level 6-5: *1*–m1 *Eolagurus luteus*; *2*–M3 *Arvicola terrestris*; *3*–m1 *Microtus obscurus*; *4a* and *4b*–M2 *Ellobius talpinus*.

TABLE 3-2
Small mammal remains from Buran-Kaya III Levels 6-5, 6-4, and 6-3

	Level 6-5	*Level 6-4*	*Level 6-3*
Lagomorpha			
Lepus europaeus Pallas (European hare)	10 molars, 5 incisors	14 molars, 9 incisors	3 molars, 2 incisors
Rodentia			
Spermophilus pygmaeus Pallas (little suslik)	1 molar	5 molars, 8 incisors	—
Ellobius talpinus Pallas (northern mole-vole)	1 M2, 1 m2, 1 m3	1 M1, 1 M3, 3 incisors	—
Eolagurus luteus Eversmann (yellow steppe lemming)	1 m1, 1 m2, 1 M1	1 M1, 2 m1, 1 m2, mandible fragment, 8 incisors	1 M2
Arvicola terrestris Linnaeus (water vole)	1 M3	—	1 m2
Microtus (Stenocranius) gregalis Pallas (narrow-skulled vole)	—	—	1 m1
Microtus (Microtus) obscurus Eversmann ("obscurus vole")	2 m1, 1 M1	1 m1	2 m1
Microtus sp. (vole)	2 M1, 1 M2, 5 incisors	1 M2, 3 M1, 10M1, 1 m1 fragment, 2 mandible fragments, 27 incisors	m1 fragments, M1, 2 m2, 20 incisors, 2 mandible fragments
Total number of species	6	5	5

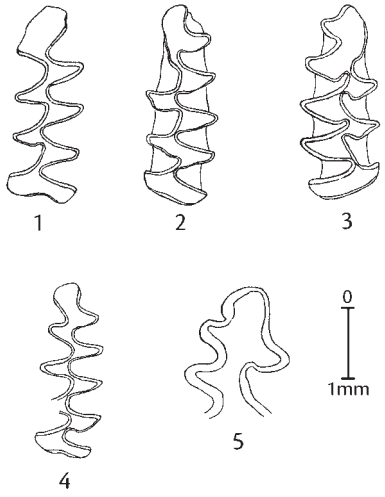

Figure 3-9—Buran-Kaya III Level 6-5,1: *1*–m1 *Eolagurus luteus*; *2*–m1 *Microtus gregalis*; *3*–m1 *Microtus oeconomus*; *4*–m1 *Lagurus lagurus*; *5*–m1 (fragment) *Ellobius talpinus*.

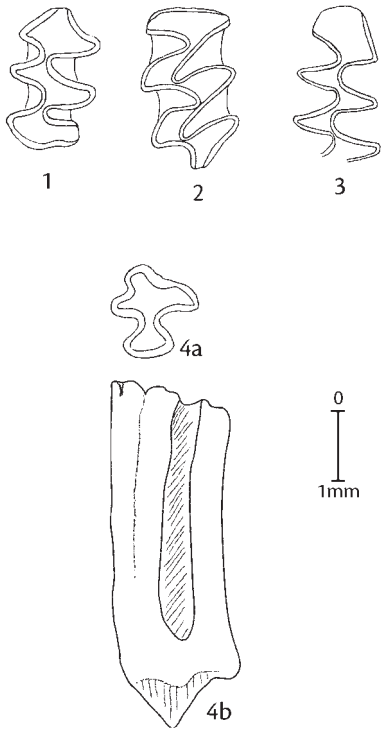

Figure 3-10—Buran-Kaya III Level 6-4, 1: *1*–m3 *Arvicola terrestris*; *2*–M1 *Microtus* sp.; *3*–m1 *Eolagurus luteus*; *4a* and *4b*–M3 *Ellobius talpinus*.

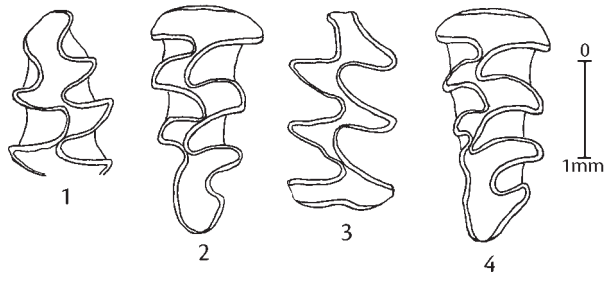

Figure 3-11—Buran-Kaya III Level 6-4, 1: *1*–m1 (fragment) *Microtus obscurus*; 2, *4*–M3 *Microtus* sp.; 3–m2 *Eolagurus luteus*.

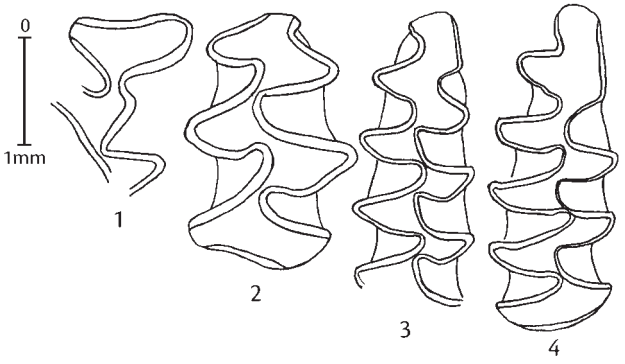

Figure 3-12—Buran-Kaya III Level 6-3, 1: *1*–M1 (fragment) *Eolagurus luteus*; 2–m2 *Arvicola terrestris*; 3–m1 *Microtus obscurus*; *4*–m1 *Microtus gregalis*.

gregalis also are absent in this level. It seems that this level could be also attributed to an interstadial.

Five species have been identified from cultural Level 6-3. European hare, yellow steppe lemming, water vole, narrow-skulled vole, and "obscurus" vole all inhabited the site environs during the deposition of Level 6-3 (Table 3-2; Figure 3-12). The presence of *Microtus gregalis* remains (Figure 3-12: *4*), may reflect cooler temperatures.

Thus, during the deposition of Levels 6-5, 6-4, and 6-3 some climatic changes took place near the end of this interval and indicate some cooling. Overall, however, open dry landscapes existed near the site during this entire interval.

Small Mammals from Levels 6-2 and 6-1

The small assemblage from Level 6-2 consists of three species of small mammals: *Lepus europaeus*, *Eolagurus luteus,* and *Microtus* (*Stenocranius*) *gregalis* (Table 3-3).

The first lower molar of *Microtus gregalis* has the simple "*gregalis*" morphotype of the anteroconid complex. This species indicates open landscapes near the site and some cooling, similar to the environment seen during the deposition of Levels 6-4 and 6-3.

Cultural Level 6-1 includes several sub-levels (Table 3-3), which have been analyzed as a single unit. Eleven species of small mammals were identified from Level 6-1. Ten species belong to Rodentia, and one to Lagomorpha (Table 3-3; Figures 3-13–3-21). The small mammal assemblage from Level 6-1 is one of the richest in Buran-Kaya III. As a comparison, today in the mountainous part of Crimea, fourteen species of rodents (including *Rattus* and *Ondatra,* which appear only in the Holocene) and six species of insectivores exist (Gromov and Erbaeva 1995; Panteleev et al. 1990; Flint et al. 1970).

Fauna of Level 6-1 includes the remains of little suslik (ground squirrel) *Spermophilus pygmaeus*, the thick-tailed jerboa *Stylodipus telum*, the great jerboa *Allactaga major* (Figure 3-19: *3*), the little earth hare (lesser five-toed jerboa) *Pygeretmus (Alactagulus) pumilio*, the northern mole-vole *Ellobius talpinus* (Figures 3-15: *10;* 3-18: *2*; 3-19: *1*; 3-21: *1–3*), the steppe lemming *Lagurus lagurus* (Figures 3-13: *1–2, 4–6*; 3-18: *1*; 3-20), the yellow steppe lemming *Eolagurus luteus* (Figure 3-13: *3, 7*), the water vole *Arvicola terrestris* (Figure 3-13: *8*), the root vole *Microtus* (*Pallasiinus*) *oeconomus* (Figure 3-14: *1–2*), the narrow-skulled vole *Microtus* (*Stenocranius*) *gregalis* (Figures 3-14: *4,* 3-16: *1*), and the "obscurus" vole *Microtus* (*Microtus*) *obscurus*. (Figures 3-14: *3*; 3-15: *2*; 3-16: *2–4*). The remains of European hare were also present in the level. Most of the spe-

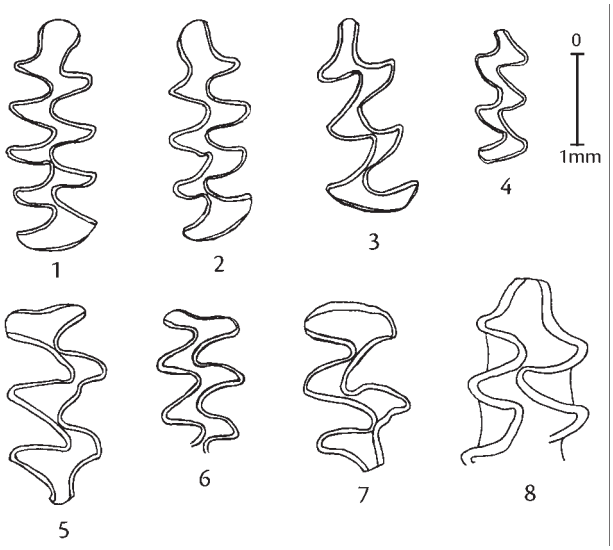

Figure 3-13—Buran-Kaya III Level 6-1, 4: *1*, 2–m1 *Lagurus lagurus*; 3–m3 *Eolagurus luteus*; *4*–m3 *Lagurus lagurus*; 5–M1 *Eolagurus luteus*; 6–M3 *Lagurus lagurus*; *7*–M2 *Eolagurus luteus*; 8–m2 *Arvicola terrestris*.

cies indicate that arid open landscapes were widely distributed near the site. *Stylodipus telum* (Figure 3-18: *3a, b*) and *Pygeretmus* (*Alactagulus*) *pumilio* (Figures 3-17; 3-19: *2a, b*) are also representative of very arid semi-desert and desert landscapes. *Stylodipus telum* today inhabits sand desert and desert-steppes of different types. It also lives on modern and old river dunes, and in clay deserts. The main food of this mammal is seeds. *Pygeretmus pumilio* now inhabits deserts. Its favorite biotopes are salt-marshes and *takyrs*. Bulbs are the main food of this animal in springtime, later it is the green part of grasses, and during the autumn, it feeds on seeds. The modern range of *Pygeretmus pumilio* includes the southern Russian Plain (parts of Don and Volga drainage basins). This mammal also inhabits Kazakhstan and Middle Asia (Gromov and Erbaeva 1995).

The small mammal assemblage from Level 6-1 indicates very arid environmental conditions near the site, seemingly a semi-desert. Most of the identified mammals prefer to inhabit semi-deserts, deserts of different types, and arid steppes. Only the water vole *Arvicola terrestris* and the root vole *Microtus oeconomus* live on the banks of rivers and other water reservoirs. These species, however, have an intrazonal range. Their presence in Level 6-1 indicates that a stream was nearby.

TABLE 3-3
Small mammal remains from Buran-Kaya III Levels 6-2 and 6-1

	Level 6-2, 1	*Level 6-1, 2*	*Level 6-1, 4*	*Level 6-1, 5*	*Level 6-1, 6*
Lagomorpha					
Lepus europaeus Pallas (European hare)	6 molars, 8 incisors	6 molars, 7 incisors	—	—	—
Rodentia					
Spermophilus pygmaeus Pallas (little suslik)	—	3 molars	2 molars, 4 incisors	1 molar	3 molars, 2 incisors
Stylodipus telum Lichtenstein (thick-tailed jerboa)	—	—	1 m1	—	1 M1
Allactaga major Kerr (great jerboa)	—	—	1 m3	—	—
Pygeretmus (Alactagulus) pumilio Kerr (little earth hare)	—	—	1 m1, 1 m3	—	—
Ellobius talpinus Pallas (northern mole-vole)	—	1 m1, 2 m1, 1 m2	2 M2, 5 incisors	1 m2, 1 incisors	1 M1, 1 incisor
Lagurus lagurus Pallas (steppe lemming)	—	3 m1, 1 m2, 1 m3, 1 M1, 4 incisors	3 m1, 2 m1, 1 m3, 1 M1, 1 M3, 8 incisors	—	1 m1, 2 incisors
Eolagurus luteus Eversmann (yellow steppe lemming)	1 M1, 2 incisors	—	1 m2	—	—
Arvicola terrestris Linnaeus (water vole)	—	—	1 M1, 1 m2, 2 incisors	—	—
Microtus (Pallasiinus) oeconomus Pallas (root vole)	—	—	2 m1	—	—
Microtus (Stenocranius) gregalis Pallas (narrow-skulled vole)	1 m1	—	1 m1	1 m1	—
Microtus (Microtus) obscurus Eversmann ("obscurus vole")	—	—	—	3 m1	—
Microtus sp. (vole)	5 incisors	7 M1, 2 M2, 6M3, 5m2, 1 m3, 25 incisors	—	1 M1, 1 M2, 1 m2, 1 m3, 10 incisors	1 m2, 3 mandible fragments, 5 incisors
Total number of species	3	4	10	4	4

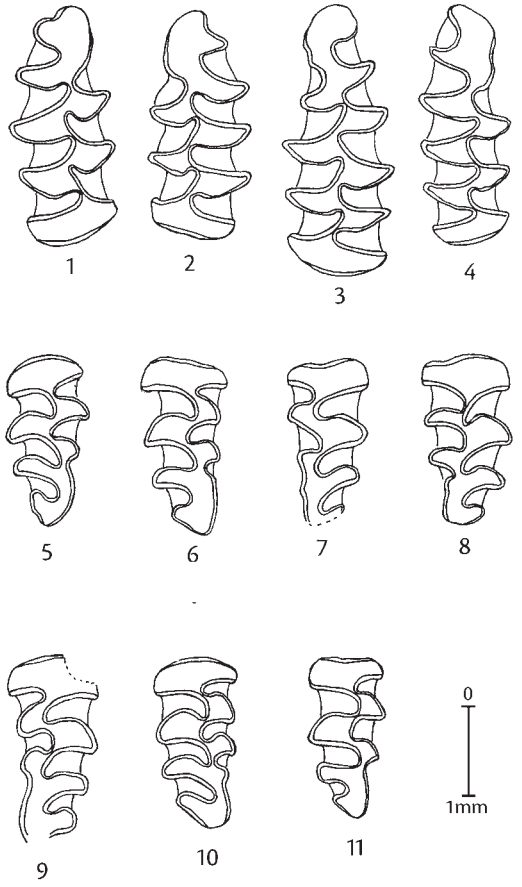

Figure 3-14—Buran-Kaya III Level 6-1, 4: 1, 2–m1 *Microtus oeconomus*; 3–m1 *Microtus obscurus*; 4–m1 *Microtus gregalis*; 5-11–M3 *Microtus* sp.

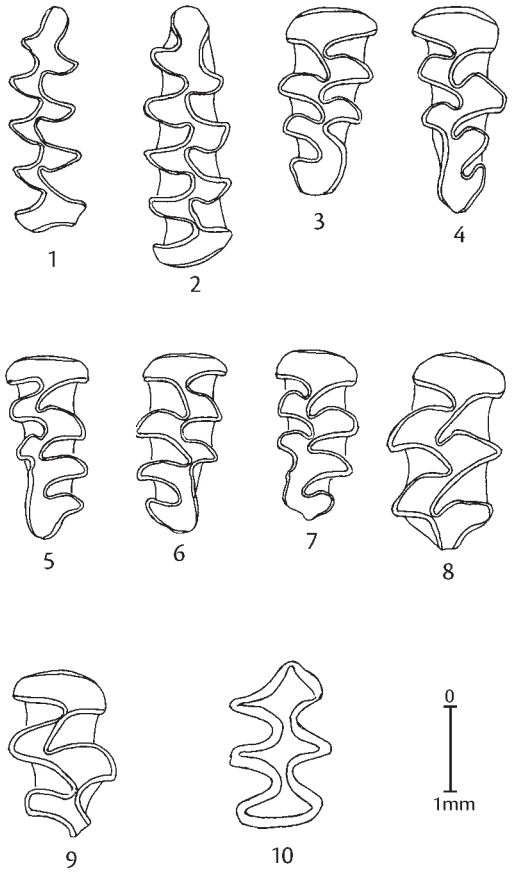

Figure 3-15—Buran-Kaya III Level 6-1, 2: *1*–m1 *Lagurus lagurus*; *2*–m1 *Microtus obscurus*; *3–7*–M3 *Microtus* sp., *8*–M1 *Microtus* sp., *9*–M2 *Microtus* sp., *10*–m2 *Ellobius talpinus*.

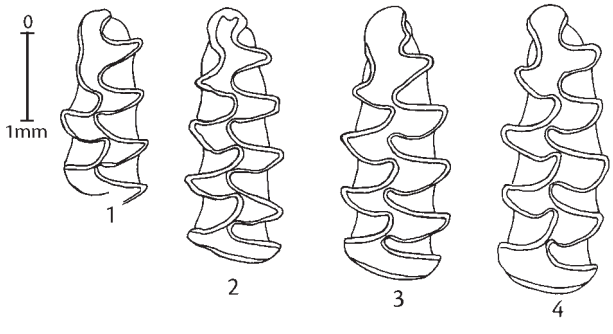

Figure 3-16—Buran-Kaya III Level 6-1, 5: *1*–m1 *Microtus gregalis*; *2–4*–m1 *Microtus obscurus* (3 is a juvenile).

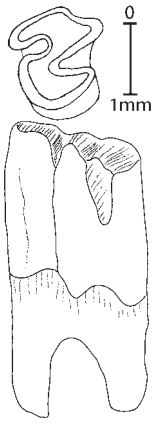

Figure 3-17—Buran-Kaya III Level 6-1, 4: *Pygeretmus pumilio* m3.

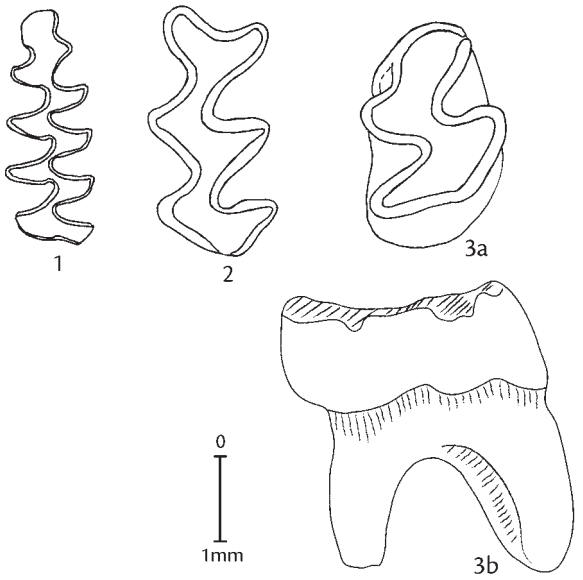

Figure 3-18—Buran-Kaya III Level 6-1: *1*–m1 *Lagurus lagurus*; *2*–M1 *Ellobius talpinus*; *3a* and *3b*–M1 *Stylodipus telum*.

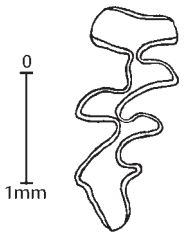

Figure 3-20—Buran-Kaya III Level 6-1, 4: M3 *Lagurus lagurus*.

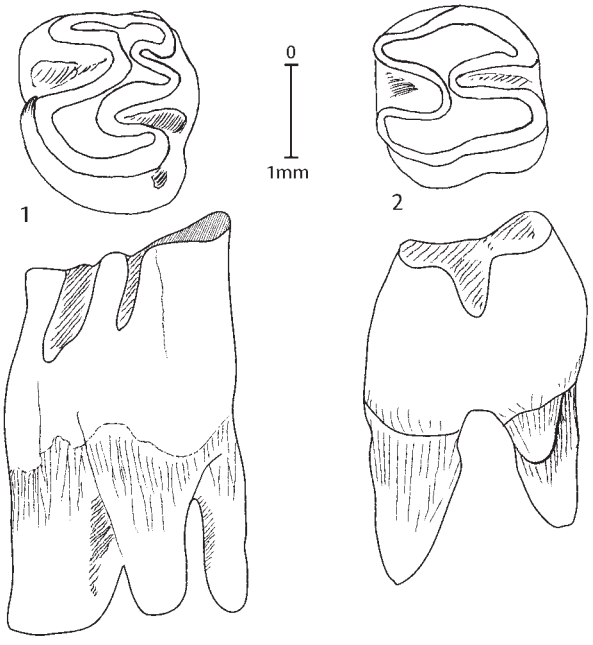

Figure 3-22—Buran-Kaya III Layer 5: *1*–m2 *Stylodipus telum*; *2*–M2 *Stylodipus telum*.

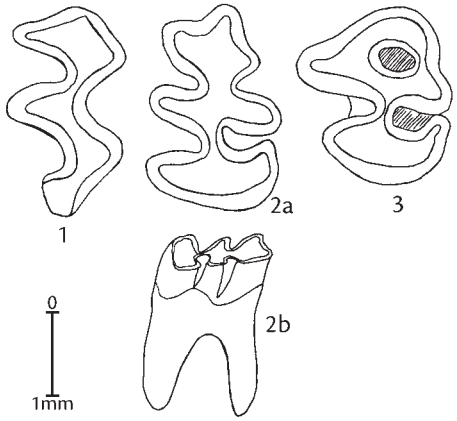

Figure 3-19—Buran-Kaya III Level 6-1, 4: *1*–M2 *Ellobius talpinus*; *2a* and *2b*–m1 *Pygeretmus pumilio*; *3*–m3 *Allactaga major*.

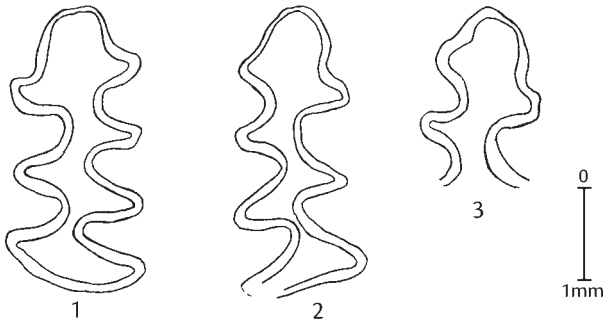

Figure 3-21—Buran-Kaya III Level 6-1, 2: m1 *Ellobius talpinus*.

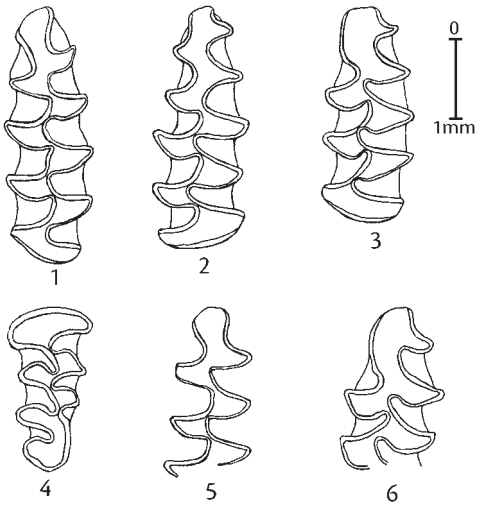

Figure 3-23—Buran-Kaya III Layer 5: *1*, *2*–m1 *Microtus obscurus*; *3*–m1 *Microtus oeconomus*; *4*–M3 *Microtus* sp., *5*–m1 *Lagurus lagurus*; *6*–m1 *Microtus oeconomus*.

Small Mammals from Layer 5

The youngest small mammal assemblage analyzed from Buran-Kaya III was from Layer 5 (Table 3-4). This layer has a rather rich fauna, with ten species of rodents and lagomorphs identified: little suslik (ground squirrel) *Spermophilus pygmaeus*, thick-tailed jerboa *Stylodipus telum* (Figure 3-22: *1a, b; 2a, b*), northern mole-vole *Ellobius talpinus* (Figure 3-25: *1–3*), steppe lemming *Lagurus lagurus* (Figure 3-23: *5*), yellow steppe lemming *Eolagurus luteus* (Figure 3-24: *4*), water vole *Arvicola terrestris* (Figure 3-24: *1–3*), narrow-skulled vole *Microtus* (*Stenocranius*) *gregalis* (Figure 3-23: *1*), root vole *Microtus* (*Pallasiinus*) *oeconomus* (Figure 3-23: *3*, *6*), "obscurus" vole *Microtus obscurus* (Figures 3-23: *2*; 3-25: *4*), and European hare *Lepus europaeus*. This faunal assemblage looks similar ecologically to that from Level 6-1, but the number of the identified remains is lower.

Table 3-4
Small mammal remains from Buran-Kaya III Layer 5

Lagomorpha	
Lepus europaeus Pallas (European hare)	1
Rodentia	
Spermophilus pygmaeus Pallas (little suslik)	9 molars
Stylodipus telum Lichtenstein (thick-tailed jerboa)	1 M2, 1 m2
Ellobius talpinus Pallas (northern mole-vole)	2 M1, 1 M2, 2 m1, 2 m2
Lagurus lagurus Pallas (steppe lemming)	1 M1, 3 m1, 6 m2, 4 m3
Eolagurus luteus Eversmann (yellow steppe lemming)	1 M1, 1 M2, 1 m1
Arvicola terrestris Linnaeus (water vole)	1 m1, 2 m2
Microtus (Stenocranius) gregalis Pallas (narrow-skulled vole)	2 m1
Microtus (Pallasiinus) oeconomus Pallas (root vole)	3 m1
Microtus (Microtus) obscurus Eversmann (*M. arvalis* group) (obscurus vole)	2 m1
Microtus sp. (vole)	15 M1, 6 M2, 6 M3, 7 m2, 4 m3, 15 incisors
Total number of species	10

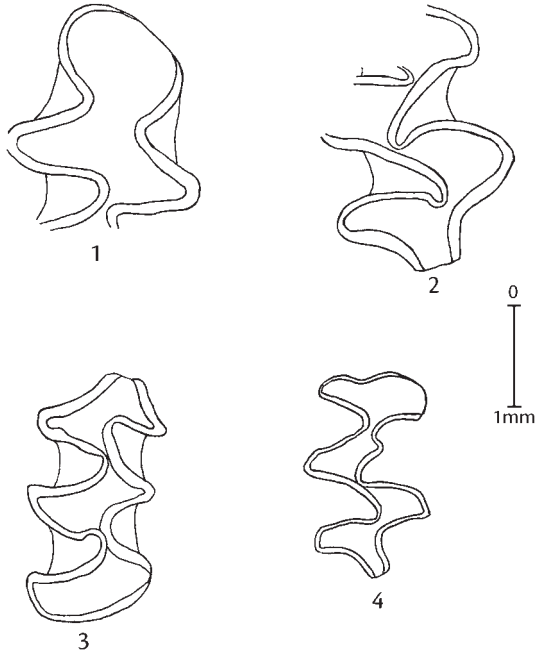

Figure 3-24—Buran-Kaya III Layer 5: *1*–m1 *Arvicola terrestris* (fragment); *2*–M2 *Arvicola terrestris*; *3*–m3 *Arvicola terrestris*; *4*–M2 *Eolagurus luteus*.

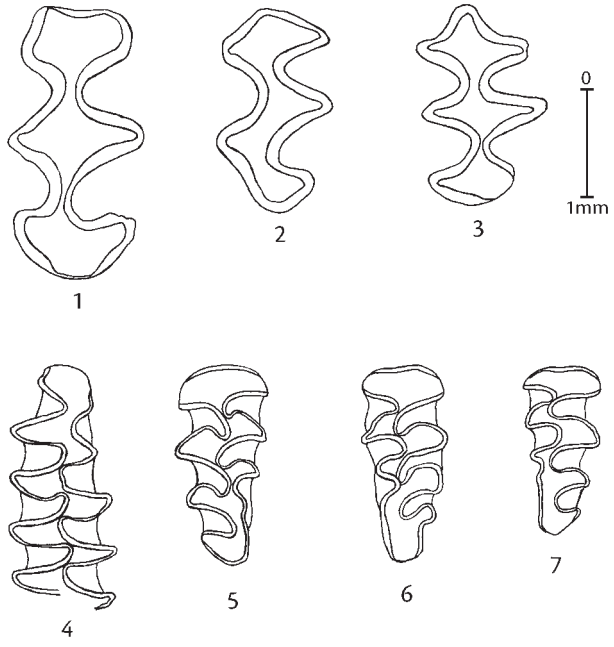

Figure 3-25—Buran-Kaya III Layer 5: *1*–M1 *Ellobius talpinus*; *2*–M2 *Ellobius talpinus*; *3*–m2 *Ellobius talpinus*; *4*–m1 *Microtus obscurus*; *5–7*–M3 *Microtus* sp.

Conclusions

The analysis of the Buran-Kaya III small mammal fauna permits the reconstruction of the principal environmental features during the human occupations at the site. The specific taphonomy of mammalian concentrations in the cultural layers deposited in the rockshelter could have left traces on the compositions of the small mammal species. This composition depends strongly on the hunting strategies of predator birds, which are the principal sources of small mammal bone accumulation in the site and concentrated in the form of pellets. However, the rather wide hunting area of these predator birds and the rich materials obtained from Buran-Kaya III permits a complete picture of the small mammal assemblages that existed during the human occupation.

Small mammal fauna from the analyzed levels includes fourteen species, which is comparable to the modern small mammal diversity. The majority of these species are Rodentia. Only one species of Insectivora and one species of Lagomorpha were found (Tables 3-1–3-4, Figures 3-26 and 3-27).

The species composition of the small mammals and their ecological proclivities reflect the principal ecological conditions surrounding the site and, at the same time, some environmental changes which took place during the human occupations of Buran-Kaya III (Figure 3-27). The majority of species belongs to the group of animals that inhabit open arid landscapes. Most of the small mammals found in Buran-Kaya III indicate the prevalence of arid steppe landscapes near the site. The typical cold-tolerant species are absent in the analyzed levels of the site. Forest and periaquatic animal remains are very rare as well.

During the earlier stage of human occupation (Level C and Layer B), the environmental conditions appear to have been a little more moderate than during the deposition of the overlying cultural layers. Some areas with bushes or trees existed near the site. Desert species were absent at this time. This interval with more moderate conditions may possibly be correlated with the Bryansk Interstadial.

Later, during the deposition of Levels 6-5 to 6-2, signs of forest-bush vegetation, and animals connected with such vegetation, practically disappeared. During this time, semi-desert and meadow-steppe small mammals inhabited the site surroundings. One periaquatic species, the water vole *Arvicola terrestris*, indicates the proximity of a stream near the site.

Finally, conditions became even drier during the deposition of Levels 6-1 and Layer 5. Besides a large group of semi-desert and dry steppe mammals, desert species also appeared near the site during this time.

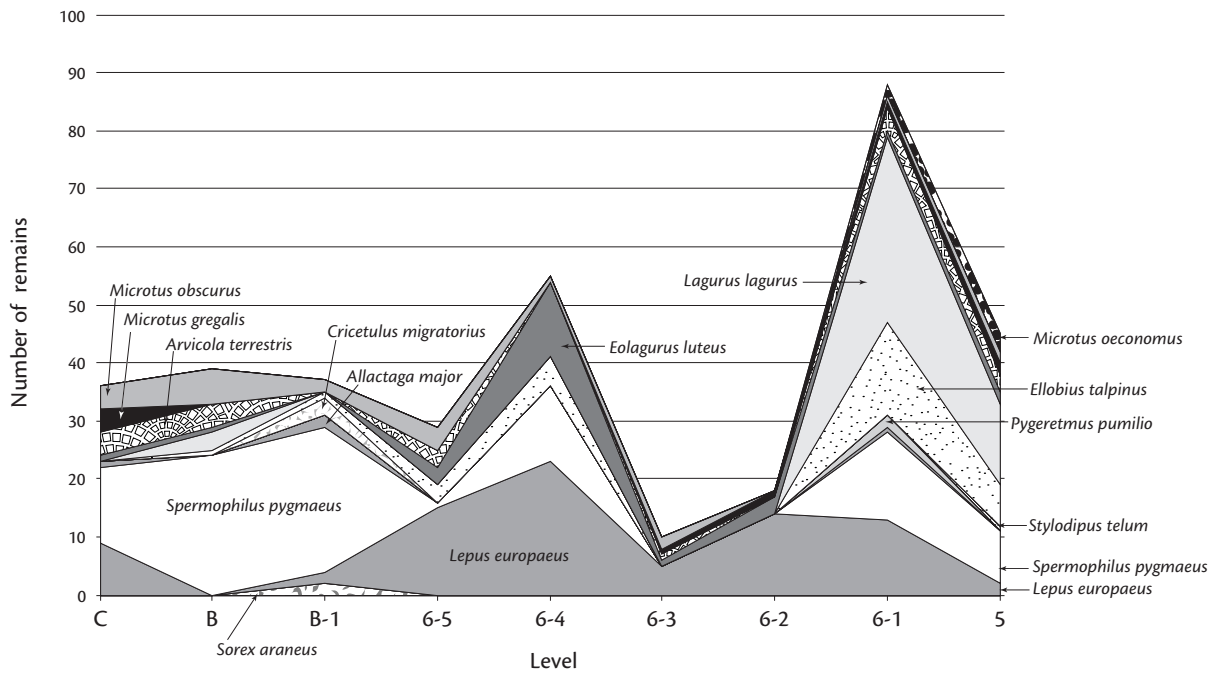

Figure 3-26—Species composition of small mammals in the analyzed levels of Buran-Kaya III.

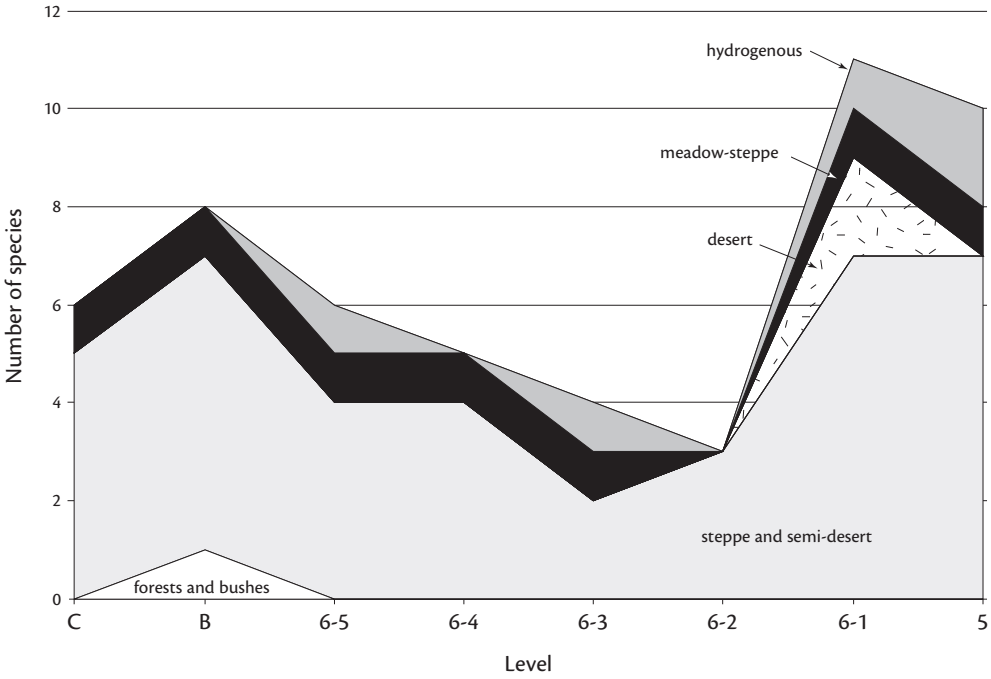

Figure 3-27—Ecological groups of small mammals in the analyzed levels of Buran-Kaya III.

This indicates a climatic aridification that may be correlated with the transition to the last Valdai glacial maximum.

Thus, the rich small mammal fauna discovered in Buran-Kaya III provides information about the surrounding environments during the human occupations. These results permit the reconstruction of the principal features of the ecosystems near the site over several thousands years. It is possible to say that these fauna do not indicate the severe cold conditions of a glacial period. This is the result of the southerly location of Crimean sites (including Buran-Kaya III) and also because Buran-Kaya III corresponds to the second part of OIS 3, which mostly had interstadial climatic conditions.