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Abstract

We present accounts for 40 species of mammals collected from 15 localities in the Mongolian People's Republic. Accounts include taxonomic, morphometric, reproductive and ecological information, as well as trap effort and success. In addition, we include a brief history of mammalogical work within Mongolia, a taxonomically updated species list for the country, and a list of institutions with holdings of Mongolian mammals.

INTRODUCTION

The Mongolian People's Republic is a country of great ecological and geographic diversity covering more than 1.5 million km^2. The combination of mountain, steppe and desert habitat, elevational variability, and extreme ranges in temperature supports a unique faunal community. Currently, more than 130 species of mammals are recognized from Mongolia. Despite this fact, Mongolia is grossly underrepresented in the mammalian literature of the western world when compared to other regions of Asia. Research in all areas of mammalian biology in Mongolia is needed to better understand the Eurasian fauna.

Although some early 20th-century publications on the mammals of Mongolia were published in English (Allen 1938; Hollister 1913), most mammalogical work published up to the 1990s had a limited distribution within Mongolia or was published in Russian with often limited availability in the West. In the subsequent 70 years, the fauna of Mongolian mammals received at least five comprehensive treatments (Avirmed et al. 1989; Bannikov 1954; Dulamsuren 1970; Sokolov and Orlov 1980; Stubbe and Chotolchu 1968), and additionally was considered in regional and continent-wide publications (for example, Corbet 1978; Ognev 1966). Mallon (1985) compiled a checklist with accompanying range maps for 119 species of mammals, which represents the only inclusive treatment of this fauna available in English. Most recently, Reading et al. (1994) included 134 species of mammals in a *Dictionary of the Vertebrate Species of Mongolia*, however, no specimens examined or citations are included. Rogovin and Shenbrot (1995) analyzed the community ecology of desert-dwelling species of rodents in the Gobi desert, which was included later in global comparative analyses (for example, Kelt et al. 1996).

Since the early 1990s Mongolia has solicited collaboration from western nations. To further this type of collaboration, a joint project between the National University of Mongolia (Ulaan Baatar) and the Museum of Southwestern Biology of the University of New Mexico (MSB, Albuquerque, NM, USA) brought together personnel from both organizations in a field expedition to Mongolia in the summer of 1999 under the auspices of the International Long-Term Ecological Research (ILTER) program of the National Science Foundation. As part of this collaboration, we established a perma-

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nent, long-term, small-mammal monitoring site in Gorkhi–Terelj National Park. Also during this time we sampled mammals at various localities elsewhere in the country. A second collection also was made by one of us (JLD) during a subsequent ILTER meeting at Lake Hovsgol in July 2001. Our collections and specimens obtained in 1997 by Steve O. MacDonald (University of Alaska Museum) in the Bulgan Aymag form the basis for this report. With the objective of stimulating new interest in the mammalian fauna of Mongolia, we report on 40 species of mammals collected during our expeditions, and provide comments on their taxonomy, ecology, distribution, morphometrics, and reproductive status. Additionally, we summarize past work and include a taxonomically updated checklist of the mammals of Mongolia (Appendix).

MATERIAL AND METHODS

Our initial fieldwork was conducted from June 19–August 2, 1999, at 13 localities. An additional locality was added during a separate trip to Lake Hovsgol by one of us (JLD) from 3-8 July 2001. S.O. MacDonald trapped at a single locality in July and November 1997. Trapping localities for all specimens are plotted in Fig. 1. The MacDonald specimens, an unarchived collection, were donated to the MSB by the National University of Mongolia.

Specimens were collected primarily with Sherman® and Tomahawk® live traps (a total of 4,227 trap nights). Bait usually consisted of a combination of millet and vanilla, or vegetable oil-soaked bread; at some localities sardines or marmot fat was added to the mixture. Mixed oats and peanut butter were used during the Hovsgol trapping. Fossorial rodents were captured with Victor® and Macabee® gopher traps, and shrews were collected using pitfall traps and drift fences. MacDonald's specimens were taken using snap traps. Multiple specimens from several taxa were collected with the use of a slingshot, a 22-caliber rifle or a 12-gauge shotgun. Bats were mist-netted with various sized nets that generally were open for 5–6 hours starting just before dusk. At one locality (Ulziyt Uul) several bat specimens were collected with a 12-gauge shotgun. Most specimens were prepared as standard museum skins with skeletons or alternatively preserved in 96% ethanol. Ancillary material (heart, liver, kidney, spleen, lungs, blood, and cell suspensions for karyological work) were obtained fresh and preserved immediately in liquid nitrogen. Hovsgol voucher and tissue specimens initially were preserved in vodka (ca. 45% ethanol) before transfer to 96% ethanol. Subsequently, all ancillary material was placed in storage at –80°C in the Division of Genomic Resources, Museum of Southwestern Biology, The University of New Mexico. Ecto- and endoparasites are archived

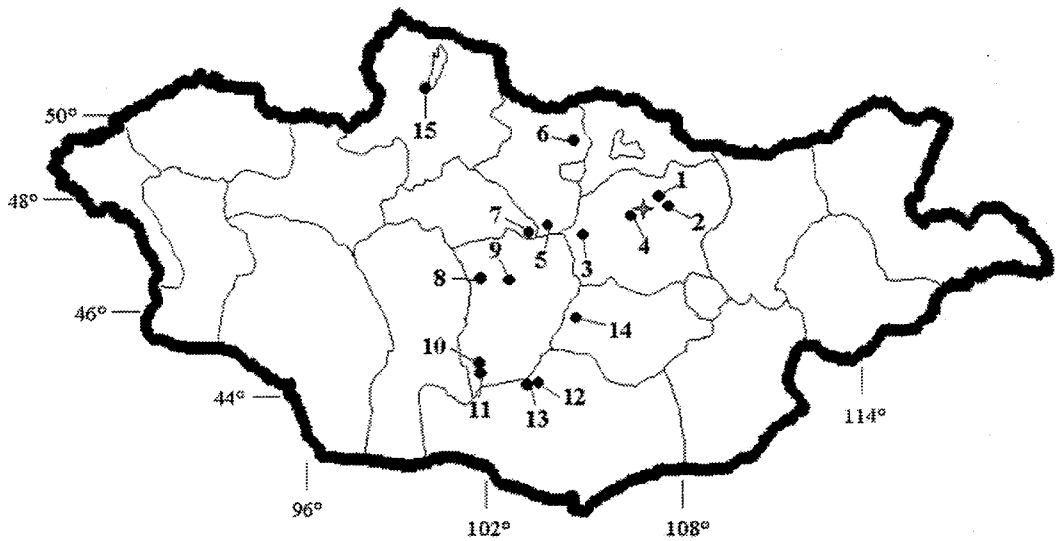

Fig. 1. Collecting localities in Mongolia. Locality names and descriptions are listed in the gazetteer.

at the Harold W. Manter Laboratory of Parasitology (HWML), University of Nebraska State Museum, University of Nebraska–Lincoln. Mammal voucher specimens are deposited and cataloged in the MSB Division of Mammals. All voucher, ancillary and parasitological material was prepared and stored as outlined in Yates et al. (1996), Yates (1996) and Gardner (1996.) Ecological and natural history data were recorded in physiognomy and trap data sheets as well as in personal journals, all of which are archived in the MSB. Recorded information included dominant plant species, plant height, percent cover (three categories: groundcover, understory and overstory) for the general locality, microhabitat information for each capture site, weather data, and any other noteworthy observations. Data and records for the parasites are archived and stored in the HWML. Our designation of habitat types follows that of Mallon (1985), who provides a description of the topography and vegetative zones of Mongolia. A more detailed account, including faunal associations of the different regions, can be found in Bannikov (1954).

Standard external measurements were taken with a ruler (in mm) in the field. Cranial measurements were taken using a digital caliper (to 0.01 mm) from cleaned skulls. Tables 1–21, found in their respective species accounts, list the mean, range and sample size for these measurements for adults by gender. For *Alticola semicanus, Meriones unguiculatus, M. meridianus* and *Phodopus roborovskii*, there were two size classes evident within the adults, likely representing young of the year and older adults. These were pooled in the measurement tables. The measurements taken were:

TOTL total length—length of head, body, and tail.

TAIL tail length—length of tail not including terminal hair.

RHF right hind foot—length of foot from ankle to tip of nail or claw.

EAR ear—length from notch to tip of ear not including hair on pinnae.

CIL condyloincisive length—distance from anterior surface of incisors to posterior edges of occipital condyles.

ZB zygomatic breadth—greatest distance across left and right zygomatic arches.

IOB least interorbital breadth—smallest distance between inner margins of orbits, in some taxa corresponding to postorbital breadth.

PTL palatilar length—distance from posterior margins of incisive alveoli to posterior margin of palate.

MTR length of maxillary toothrow—length from anterior margin of alveoli of anterior most cheek tooth to posterior margin of alveolus of last molar.

Four additional measurements were taken for bats:

FA forearm length.

TR tragus length from notch.

BCW braincase width—width of cranium at level of squamosal root of zygomatic arch.

GMB greatest breadth across molars—distance between labial margins of paired molars.

For shrews the following measurements were substituted for maxillary toothrow:

U^1–U^5 length of unicuspid toothrow—length from anterior margin of alveoli of anterior most unicuspid to posterior margin of alveolus of last unicuspid.

P^4–M^3 length of molariform toothrow—length from anterior margin of alveoli of anterior most premolar to posterior margin of alveolus of last molar.

We used Mallon (1985) and Reading et al. (1994) with updated taxonomies to reflect current conventions (e.g., Formozov 1999; Hoffmann 1996; Stubbe et al. 1998; Wilson and Reeder 1993) to compile a checklist of Mongolian mammalian species (Appendix).

GAZETTEER OF LOCALITIES AND SYNTOPIC ASSEMBLAGES

Localities are geo-referenced using latitude and longitude and are subdivided into their respective Aymag (province). General habitat information is provided and collecting effort and syntopic assemblages follow each locality description. Localities are plotted in Fig. 1.

Töv Aymag

1. **Gorkhi–Terelj National Park**, 47°53′N, 107°23′E, 1470 m, 1800 m, 2000 m.

This site is located in the Khentey mountain range, west of the Tüül River. It is a mesic locality with high elevational and habitat variability (Fig. 2). The valleys (ca. 1400 m) are composed of heavily grazed short-grass steppe and large rock outcroppings. The transition zone between valley and mountain-top (1470–2000 m) is a combination of alpine meadows, talus slopes, large boulders, and small mixed forest patches (*Betula* sp., *Larix sibirica, Populus tremula*) (Fig. 3), 5–10 m in height. Steppe, meadow and forest herbaceous vegetation ranges from 0.15 to 0.5 m high and cover approaches 100%. The mountain top ridges (ca. 2000 m) are quite narrow (50–70 m wide) and are covered by a mixed forest of *Pinus sibirica, Betula sp., Larix sibirica* and *Populus tremula*, and intermittent alpine meadows and talus fields (Fig. 4).

Trapping Effort: total trap nights = 1175, total captures = 45, trap success = 3.8%.

Additional Specimens: 2 *Ochotona hyperborea* by sling shot, 1 *Tamias sibiricus* with a rifle, 1 *Sorex caecutiens* in a pitfall, 1 *Plecotus auritus* in one net-night, 1 salvaged *Meles meles* skull.

Syntopic Assemblage: 2 *Sorex caecutiens*, 1 *Plecotus auritus*, 1 *Spermophilus undulatus*, 1 *Tamias sibiricus*, 1 *Meles meles*, 12 *Cricetulus barabensis*, 23 *Clethrionomys rufocanus*, 8 *Clethrionomys rutilus*, 16 *Apodemus peninsulae*, 7 *Ochotona hyperborea*.

2. **Gorkhi–Terelj National Park, Tüül River**, 47°49′N, 107°20′E, 1383 m.

The Tüül River valley in this area is surrounded by small hills and valleys with heavily grazed steppe vegetation (ca. 0.2 m in height, 60–100% cover) and intermittent rock outcroppings. The riparian zone is characterized by rich friable soils, thick grass, and patchy forest of *Populus tremula* and *Salix* sp. about 10 m in height.

Fig. 2. Gorkhi–Terelj National Park. Locality 1 in gazetteer. Forest steppe site: a mosaic of grassland, mixed forest, rocky protrusions and talus slopes.

Fig. 3. Gorkhi–Terelj National Park. Mixed forest.

Fig. 4. Gorkhi–Terelj National Park. Talus slopes and pine forest found at 1800 m and 2000 m elevations.

Trapping Effort: total trap nights = 160, total captures = 9, trap success = 5.6%; 30 gopher traps for approximately 20 hrs.

Additional Specimens: 2 *Myospalax aspalax* in gopher traps, 8 bats in 6 net-nights, 1 *Spermophilus undulatus* by hand.

Syntopic Assemblage: 7 *Plecotus auritus*, 1 *Vespertilio murinus*, 6 *Spermophilus undulatus*, 2 *Cricetulus barabensis*, 2 *Mus musculus*, 2 *Myospalax aspalax*.

3. 7 km W, 4 km N of **Erdenesant**, 47°19′06″ N, 104°23′58″E, 1284 m.

This locality is situated in short-grass steppe vegetation (1–10 cm in height, ranging between 40–70% coverage); a *Stipa* sp. and one *Artemisia* sp. make up more than 95% of the cover in this area. Large rock outcroppings (30–100 m in height) protrude from the rolling steppe terrain and there is no overstory save a few shrubs and trees in the outcroppings.

Trapping Effort: total trap nights = 440, total captures = 8, trap success = 1.8%.

Syntopic Assemblage: 1 *Cricetulus longicaudatus*, 1 *Phodopus campbelli*, 6 *Meriones unguiculatus*.

4. Ca. 20 km SW of **Ulaan Baatar**, 47°49′06″N, 106°36′53″E, 1253 m.

This is a small riparian area (ca. 200 x 10 m) surrounded by heavily grazed and disturbed steppe. A small, slow-flowing stream, approximately 2 m across, paralleled a rocky cliff (ca. 50 m high). Vegetation consisted of three dominant species: *Stipa* sp., *Artemisia* sp. and scattered *Populus tremula*.

Trapping Effort: total trap nights = 80, total captures = 2, trap success = 2.5%. One net-night, no captures.

Syntopic Assemblage: 2 *Cricetulus longicaudatus*.

Bulgan Aymag

5. **Elsen Tasarkhai**, 47°19′51″N, 103°41′21″E.

This sand dune field is located in the southern Tüül River valley. The soil is dry, sandy and light colored, with little organic matter. Sparse vegetation at this site included small trees (cf. *Salix*) that were very patchy in distribution, *Stipa* sp. and *Artemisia* sp. (<0.05 m high).

Trapping Effort: 30 gopher traps for two hours.

Syntopic Assemblage: 2 *Myospalax aspalax*.

6. **Hangal Soum**, 49°20′N, 104°25′E.

This is the locality from which S.O. MacDonald collected his specimens. This area lies within the Orkhon–Selenge river basin and consists of variable habitat types, including mountain steppe and riparian zones. The forest zones are comprised of *Larix sibirica* and *Betula* sp. with an understory of dwarf shrubs, while the open steppe areas are heavily overgrazed. Specific microhabitat information is unavailable.

Trapping Effort: unknown.

Syntopic Assemblage: 1 *Sorex isodon*, 1 *Sorex minutissimus*, 1 *Tamias sibiricus*, 11 *Clethrionomys rufocanus*, 3 *Microtus mongolicus*, 3 *Microtus oeconomus*, 8 *Apodemus peninsulae*, 2 *Ochotona dauurica*.

Arkhangay Aymag

7. 27 Km east of **Kharkhorin**, 47°15′39″N, 103°10′18″E, 1420 m.

This typical mid-elevation site consisted of short-grass steppe (*Stipa, Artemisia*) vegetation and rolling hills with occasional rock outcroppings.

Trapping Effort: 10 Shermans for one hour, total captures = 1, trap success = 10%.

Additional Specimens: 1 shot with a rifle.

Syntopic Assemblage: 2 *Lasiopodomys brandtii*.

Övörkhangay Aymag

8. **Ulaan Tsutgalan**, 46°47′13″N, 101°57′47″E, 1850 m.

Located in the Khangay Mountains, these large stretches of mountain steppe vegetation (0.05–0.30 m in height) are interspersed with rock outcroppings (Fig. 5). In turn, these lower areas were surrounded on all sides by mountains forested with *Pinus sibirica*. The Orkhon River canyon (ca. 200 m wide by 50 m deep) divides the valley. The canyon walls are steep, sharply cut rock. A mixed forest (*Pinus–Populus–Larix*) occurs along the riverbank within the canyon (Fig. 6).

Trapping Effort: total trap nights = 1275, total captures = 43, trap success = 3.4%.

Fig. 5. Ulaan Tsutgalan. Locality 8 in gazetteer. Mountain steppe.

Fig. 6. Ulaan Tsutgalan. Orkhon River canyon.

Additional specimens: 4 net nights, 48 bat captures: 6 *Spermophilus undulatus*, 2 *Ochotona dauurica*, and 1 *O. alpina* shot with a rifle.

Syntopic Assemblage: 2 *Eptesicus gobiensis*, 7 *Myotis brandti*, 11 *Myotis daubentoni*, 3 *Plecotus auritus*, 25 *Vespertilio murinus*, 28 *Spermophilus undulatus*, 1 *Allactaga sibirica*, 28 *Alticola semicanus*, 9 *Clethrionomys rufocanus*, 2 *Cricetulus barabensis*, 3 *Ochotona alpina*, 4 *O. dauurica*.

9. **Khetsuugiin Övör**, 46°35′56″N, 102°43′07″E, 2000 m.

This short-grass steppe site (Fig. 7) is very similar to the 27 km east of Kharkhorin locality.

Trapping Effort: total trap nights = 292, total captures = 4, trap success = 1.4%.

Additional Specimens: 1 *Marmota sibirica* and 1 *Ochotona dauurica* shot with a rifle.

Syntopic Assemblage: 1 *Marmota sibirica*, 3 *Alticola semicanus*, 2 *Ochotona dauurica*.

10. **Ulziyt Uul**, 44°41′09″N, 102°00′57″E, 1640 m, and

11. **Arts Bogd**, 44°39′32″N, 101°58′19″E.

These Gobi steppe localities are located just north of the Arts Bogd Mountains. The topography is a combination of large open valleys, jutting rocky hills, shallow sandy arroyos, and mountains. This is a transitional area between the more mesic steppe and the true Gobi desert. The vegetative groundcover (*Allium, Artemisia* and *Stipa*) is sparse (10–35% cover) and low (0.01–0.15 m in height), and the soil has little organic matter. The open areas are covered in desert pavement (Fig. 8).

Trapping Effort: total trap nights = 827, total captures = 26, trap success = 3.1%.

Additional Specimens: 4 net nights, 4 captures; 2 *Spermophilus alashanicus*, 1 *Ochotona pallasi*, 1 *Lepus tolai* shot with a rifle, 4 *Eptesicus gobiensis* shot with a shotgun; 1 *Allactaga sibirica*, 1 *Hemiechinus auritus* by hand; 30 gopher traps, 1 *Ellobius tancrei*.

Syntopic Assemblage: 6 *Hemiechinus auritus*, 8 *Eptesicus gobiensis*, 2 *Spermophilus alashanicus*, 1 *Allactaga sibirica*, 1 *Ellobius tancrei*, 17 *Phodopus roborovskii*, 5 *Meriones meridianus*, 10 *Meriones unguiculatus*, 2 *Ochotona pallasi*, 1 *Lepus tolai*.

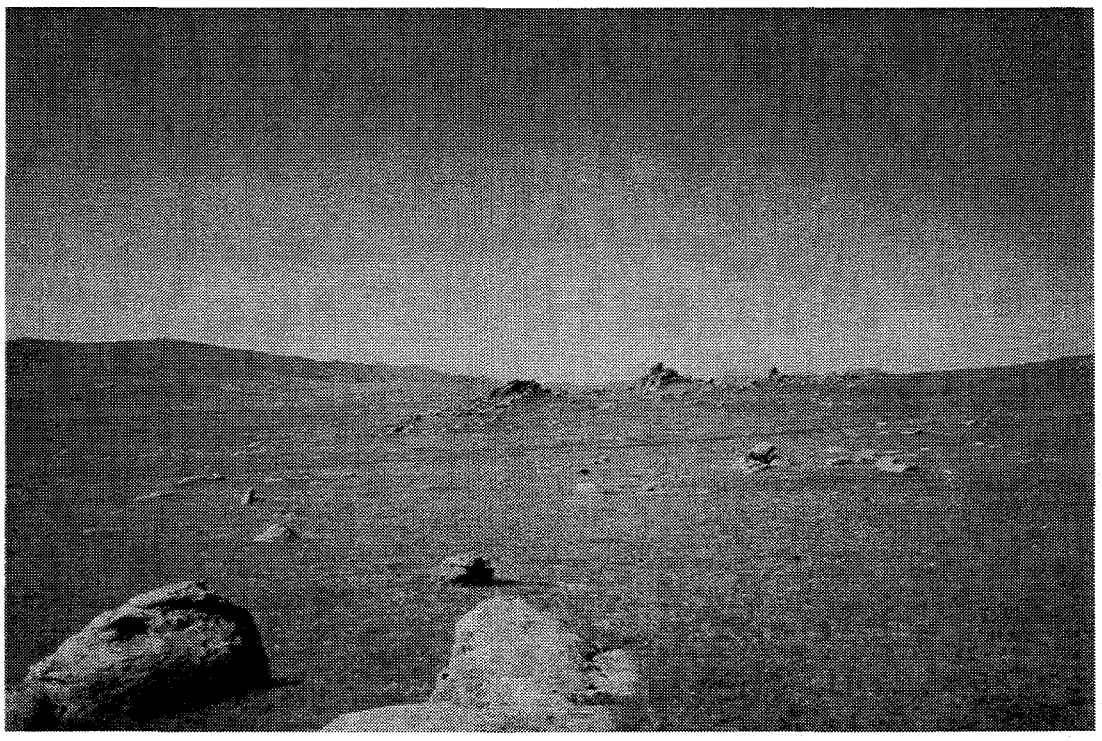

Fig. 7. Khetsuugiin Övör. Locality 9 in gazetteer. Short-grass steppe habitat.

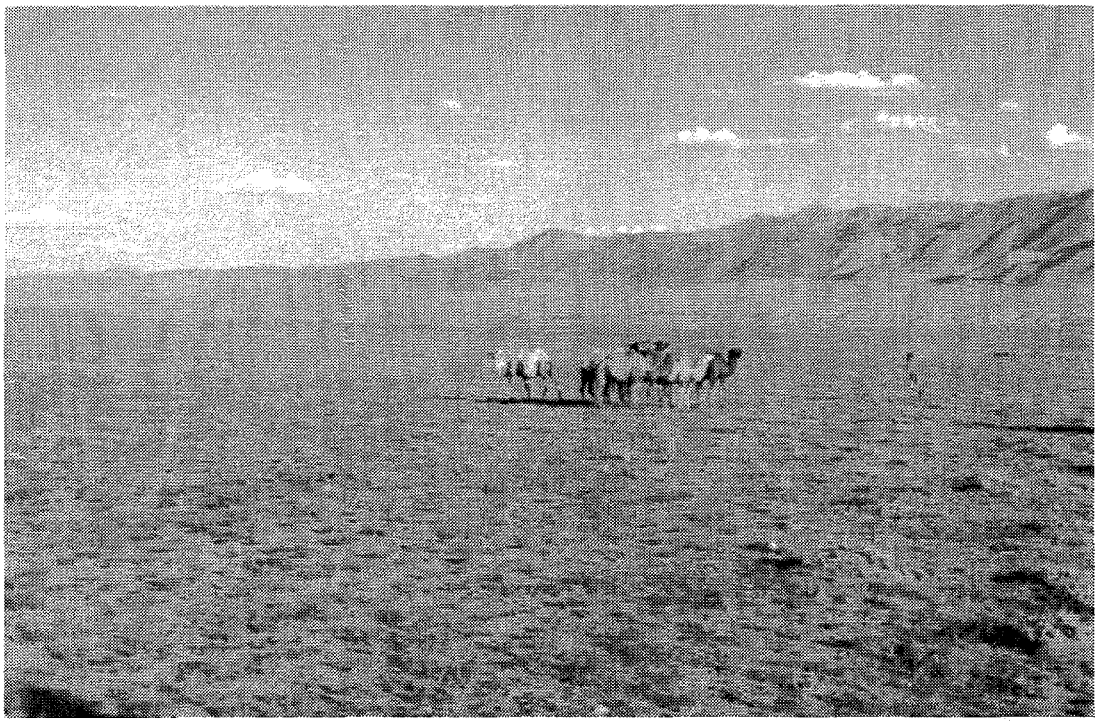

Fig. 8. Ulziyt Uul. Locality 10 in the gazetteer. Gobi steppe habitat with Arts Bogd in the background.

Ömnögovi Aymag

12. **Ulaan Nuur**, 44°32′06″N, 103°28′25″E.

This seasonally dry lake bed is surrounded by Gobi steppe vegetation. The soil is very soft and sandy and the main vegetation is a large woody shrub, *Nitraria sibirica*, that produces edible red berries. These shrubs greatly influence the topology of the area by holding soil and creating large mounds up to a meter in height and several meters in diameter (Fig. 9). These mounds create the only relief in the area and are used by *Dipus sagitta* for burrow sites.

Trapping Effort: 5 captures by hand.

Syntopic Assemblage: 1 *Phodopus roborovskii*, 4 *Dipus sagitta*.

13. 17.5 km W of **Ulaan Nuur**, approx. 44°30′N, 103°21′E.

This site consists of desert pavement with less than 5% vegetative cover (Fig. 10), and no geographic relief.

Salvaged from Roadside: 1 *Gazella subgutturosa*.

Dundgovi Aymag

14. **Erdenelai Soum**, 45°55′17″N, 104°53′44″E, 1380 m.

This sparse (20–30% cover), overgrazed, semi-desert steppe locality had little geographic relief aside from a few low rolling hills.

Salvaged from Roadside: 1 *Lasiopodomys brandtii*.

Hovsgol Aymag

15. **Hovsgol National Park**, 1 km N of **Hangard Tourist Camp**, 50°30′32″N, 100°09′19″E, 1758 m, 1668 m.

Located in the Hovsgol mountain range, this national park encompasses Lake Hovsgol and the surrounding area (838,000 ha.). The elevation ranges from 1645 m at the lake to just more than 3100 m in the surrounding mountain range. The mountain/lake ecotone consists of more than 96 river drainages. The area is a mosaic of larch forest (30–40 m), alpine meadow (0.3–1.2 m), and short-grass steppe (0–0.5 m) vegetation. The forest (50% canopy cover) is a mixture of young and old trees. A thick layer of larch litter and many downed trees cover the forest floor, vegetative ground cover is 90%, and a shrub under-

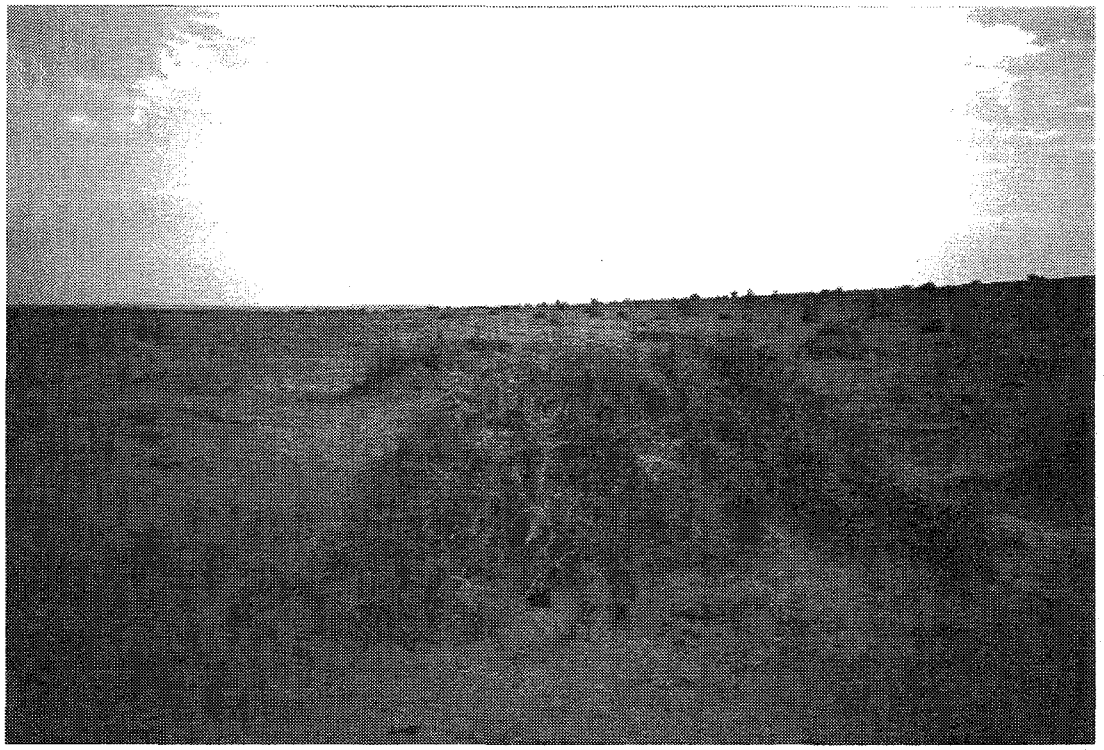

Fig. 9. Ulaan Nuur. Locality 12 in the gazetteer. Dry lake bed with *Nitraria sibirica* mounds.

story makes up 10%. This extremely mesic area becomes nearly submerged as runoff flows to the lake during heavy rains. The soil is rich with organic matter.

Trapping Effort: total trap nights = 40, total captures = 10, trap success = 25%.

Additional Specimens: 1 *Lepus timidus* skull was salvaged from forest floor.

Syntopic Assemblage: 8 *Alticola semicanus*, 1 *Clethrionomys rufocanus*, 1 *Clethrionomys rutilus* and 1 *Lepus timidus*.

SPECIES ACCOUNTS

A total of 340 specimens are included in this report. In the accounts provided herein, we give the following information: a list of specimens examined with MSB catalog numbers, sex, geographic ranges, detailed reproductive condition, details of capture, morphometrics, and microhabitat information for all animals collected. Natural history and microhabitat information were taken from data sheets and personal journal entries recorded in the field, thus our own observations form an essential part of each account; however, in some cases, we compare and contrast our data with those published previously (for example, Sokolov and Orlov 1980). Global distributions for each of the species were derived from Hutterer (1993), Koopman (1993), Wozencraft (1993), Grubb (1993), Hoffmann et al. (1993), Holden (1993), Musser and Carleton (1993), and Hoffmann (1993), while within-country ranges were obtained primarily from Sokolov and Orlov (1980). Common name for each species follows Wilson and Cole (2000).

ORDER INSECTIVORA
Family Erinaceidae
Hemiechinus auritus (Gmelin, 1770)
Long-Eared Hedgehog

Ulziyt Uul ([6] MSB 94032 F, 94033 F, 94034 M, 94035 M, 94036 F, 94037 F)

Four females and two males were caught in Tomahawk® traps, baited with a mix of marmot fat, millet, vanilla and sardines. One female was lactating, and a male and female were juveniles. At Ulziyt Uul, all animals were collected within a radius of ca. 500 m from camp over a period

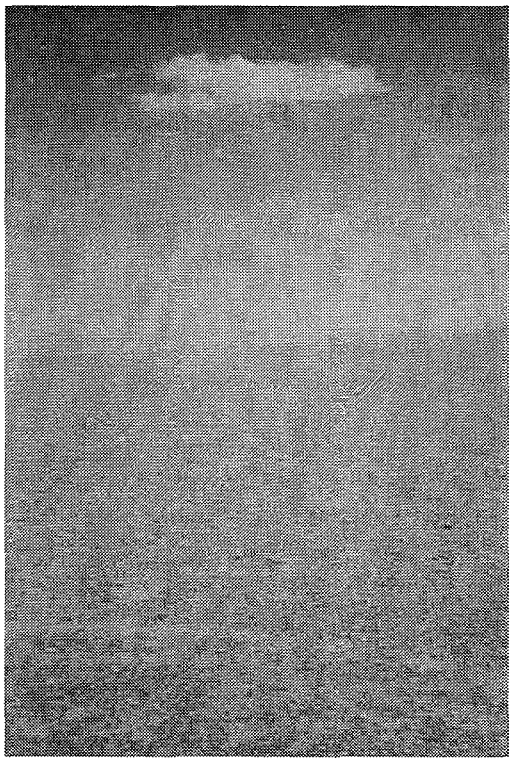

Fig. 10. Seventeen and a half km W of Ulaan Nuur. Locality 13 in the gazetteer. Desert pavement habitat.

Fig. 11. *Lasiopodomys brandtii* burrow with run.

of three nights. Trap success for hedgehogs over the three nights amounted to 8.6%. One young hedgehog was captured by hand at 0530 hrs, just before dawn, as it foraged around campsite.

Hedgehogs were all caught in an open basin surrounded by rocky hillsides and intersected by several dry arroyos. Ground cover was characterized by desert pavement, and where vegetation was present it was of the "Gobi steppe" type, which includes sparse clumps of *Allium*, *Artemisia* and *Stipa*.

The long-eared hedgehogs that we captured were shy, but not alarmed at our handling. Occasionally, when annoyed at our handling, they would make a huffing sound and attempt to poke with their spines. Allen (1938) noted that a young hedgehog captured by R.C. Andrews near Tsagaan Nuur (ca. 60 km from our locality) was kept in camp, where it was tamed after two days, allowing itself to be handled freely. See Table 1 for morphological measurements.

Hemiechinus auritus is found across northern Eurasia from eastern Ukraine to Mongolia, and in the southern part of its range from Libya to western Pakistan. In Mongolia, it is found across the steppe and semi-desert areas of the south.

Table 1. Measurements for *Hemiechinus auritus*.

	Female (n = 3)	Male (n = 1)
Mass	466.7 (430–520) 3	695
Total	251.7 (240–260) 3	248
Tail	30.3 (30–31) 3	21
RHF	40.7 (40–42) 3	42
Ear	47.3 (44–50) 3	35
CIL	50.23 (48.79–51.24) 3	50.51
ZB	28.74 (27.96–29.63) 3	31.22
IOB	12.03 (11.8–12.5) 3	12.80
PTL	26.11 (25.73–26.44) 3	27.22
MTR	18.27 (17.70–18.70) 3	18.70

Family Soricidae
Sorex caecutiens (Laxmann, 1788)
Laxmann's Shrew

Gorkhi–Terelj ([2] MSB 94038 F, 94039 M)

Two adult shrews were collected in different habitats and elevations at this locality in the Khentey Mountains. The first was captured in a Y-shaped pitfall array composed of seven buckets spaced five meters apart. This array was set along a rocky creek bottom in a thin patch of larch forest near an open meadow at 1470 m for a total of four nights. The second was captured in a Sherman® trap at 2000 m along a heavily wooded ridge-top with a dense vegetative understory (60% cover) and ground cover (90% cover). Traps were baited with a mix of millet and vanilla. Out of 1332 trap nights on this ridge, this was the only shrew capture. See Table 2 for morphological measurements.

Laxmann's shrew ranges from eastern Europe across to eastern Siberia, and extends south to Ukraine, northern Kazakhstan across to the Altai Mountains into Mongolia, northeast China, to Korea and Sakhalin Island. In Mongolia, they are restricted to the steppe and forest–steppe regions of the Khangay and Khentey mountains.

Sorex minutissimus (Zimmermann, 1780)
Miniscule Shrew

Hangal Soum (MSB 94040 F)

This pregnant female was carrying six embryos with a crown–rump length (CRL), taken after fixation, of 5 mm. See Table 2 for morphological measurements.

The miniscule shrew ranges across the Taiga zone of Eurasia from Scandinavia to Siberia; the islands of Sakhalin and Hokkaido; south to Mongolia, China, and South Korea. In Mongolia, it is known from the Khentey Mountains, around Lake Hovsgol, and across the forested north of the country.

Sorex isodon (Turov, 1924)
Equal-Toothed Shrew

Hangal Soum (MSB 94041 M)

The equal-toothed shrew ranges from Norway and Finland through Siberia to the Pacific; Kamchatka; Sakhalin, Kurile; probably China and Korea. In Mongolia, its range is unclear. We based our identification on comparison with specimens at the U.S. National Museum from elsewhere in the range of this species. Sokolov (1980) mentions this species as most likely being present in the country, and Shvetsov (1984) shows collection localities for *S. isodon* in the Khentey Mountains. It is listed in Reading et al. (1994), however distributions are not included. See Table 2 for morphological measurements.

ORDER CHIROPTERA
Family Vespertilionidae
Eptesicus gobiensis (Bobrinskii, 1926)
Gobi Bat

Ulaan Tsutgalan ([2] MSB 94042 F, 94043 M)

Table 2. Measurements for *Sorex*.

	S. caecutiens		*S. minutissimus*	*S. isodon*
	Female (n = 1)	Male (n = 1)	Female (n = 1)	Male (n = 1)
Mass	4	3		
Total	100	101	75	97
Tail	34	37	25	30
RHF	11	11	9	12
Ear	7		5	8
CIL	18.76	18.37	13.59	17.47
IOB	3.44	3.37	2.58	3.27
PTL	7.06	7.07	5.13	6.73
U^1–U^4	2.48	2.42	1.62	2.05
M^1–M^4	4.05	4.03	3.22	4.21

Ulziyt Uul ([8] MSB 94044 M, 94045 F, 94046 F, 94047 M, 94048 M, 94049 F, 94050 F, 94051 U)

A male and female were taken from the Orkhon River valley between 2110 and 2200 hrs from two 20-m nets placed along and over an inlet of calm water near a vertical rock face filled with crevices and holes. Although there was no canopy over the water where the nets were set, intact canopy (15–20 m in height) was within a radius of 20 m. Four other bat species (*Myotis daubentoni, M. brandti, Plecotus auritus* and *Vespertilio murinus*) also were caught during this time period.

Eight individuals (four females, three males, and one unknown gender) were taken from the Ulziyt Uul site under a clear sky, three-quarters moon, and windless conditions. Four were shot with a shotgun, the other four were netted between 2200 and 0200 hrs. Bats were seen flying starting about 2130 hrs. All specimens were collected at the base of a small hill containing many rocks and crevices. The surrounding area is typical, open Gobi steppe habitat. See Table 3 for morphological measurements.

We follow Strelkov (1986) in recognizing *gobiensis* as distinct from *E. nilssoni*. Strelkov (1986) found differences in bacula as well as in cranial morphology between the two taxa. Although Koopman (1993) included *gobiensis* with *E. nilssoni*, several authors recognize it as a valid species (e.g., Rossolimo 1995b).

The Gobi bat is found from Tajikistan and the Altai Mountains east through Mongolia and northwest China. In Mongolia, it is found from the southern edge of the Khangay south into the Gobi Altai, the southeast part of the Mongolian Altai, and southeastern parts of the country.

Myotis brandti (Eversmann, 1845)
Brandt's Bat

Ulaan Tsutgalan ([7] MSB 94052 M, 94053 M, 94054 F, 94055 F, 94056 M, 94057 M, 94058 M)

Five males and two females were collected at the Ulaan Tsutgalan site. See the account of *E. gobiensis* for description of habitat and netting conditions. See Table 4 for morphological measurements.

Table 3. Measurements for *Eptesicus gobiensis*.

	Female (n = 4)	Male (n = 1)
Mass	11.5 (10–120) 4	10
Total	113.25 (112–115) 4	106
Tail	44 (43–46) 4	39
RHF	10 (9–11) 4	9
Ear	14.8 (14–16) 4	15
Forearm	41.25 (40–42) 4	39
Tragus	6.25 (5–7) 4	7
CIL	16.04 (15.83–16.18) 3	15.82
ZB	10.37 (10.10–10.64) 3	10.39
IOB	4.24 (4.04–4.47) 3	4.06
PTL	7.63 (7.50–7.77) 3	7.55
MTR	4.87 (4.82–4.91) 3	4.61
BCW	8.03 (7.80–8.27) 3	8.20
GMB	6.61 (6.40–6.72) 3	6.79

Brandt's bat is found from Britain to Kazakhstan, Eastern Siberia, Mongolia, south to Spain, Greece, Korea and Japan. In Mongolia, it is found in the forest steppes of the Khangay and Khentey mountains, as well as in the steppes of the eastern part of the country.

Myotis daubentoni (Kuhl, 1817)
Daubenton's Bat

Ulaan Tsutgalan ([11] MSB 94059 M, 94060 M, 94061 F, 94062 F, 94063 M, 94064 F, 94065 M, 94066 F, 94067 F, 94068 F, 94069 M)

Five males and six females were collected at the Ulaan Tsutgalan site. See *E. gobiensis* for description of site and netting conditions. See Table 4 for morphological measurements.

Daubenton's bat is found in Europe east to Kamchatka, Japan, Korea, Manchuria, East and South China, Britain, Ireland, Scandinavia and India. In Mongolia, it is known from Lake Hovsgol, and the Khentey, Khangay and western Altai mountains.

Plecotus auritus (Linnaeus, 1758)
Brown Big-Eared Bat

Gorkhi–Terelj (MSB 94073 F)
Tüül River ([7] MSB 94074 F, 94075 M, 94076 F, 94077 F, 94078 M, 94079 F, 94080 F)

Table 4. Measurements for *Myotis*.

	M. brandti		*M. daubentoni*	
	Female (n = 2)	Male (n = 5)	Female (n = 6)	Male (n = 5)
Mass	6.5 (6–7) 2	4.9 (4–5.5) 5	7.4 (6.5–8.5) 6	6.5 (5–7.5) 5
Total	88 (87–89) 2	87.4 (84–91) 5	93.7 (90–100) 6	91.2 (86–93) 5
Tail	37.5 (36–39) 2	37.4 (34–39) 5	38 (36–40) 6	37.8 (36–42) 5
RHF	7 (6–8) 2	9.2 (8–10) 5	11.7 (11–12) 6	10.8 (9–12) 5
Ear	14.5 (14–15) 2	13.6 (12–15) 5	14.5 (14–15) 6	14.4 (14–15) 5
CIL	13.57 1	13.46 1	13.80 (13.38–14.22) 2	13.71 (13.51–13.9) 2
ZB	8.79 1	8.57 1	9.00 (8.82–9.18) 2	8.82 1
IOB	3.65 1	3.67 1	3.93 (3.85–4.01) 2	3.84 (3.83–3.85) 2
PTL	7.03 1	6.96 1	6.63 (6.54–6.71) 2	6.67 (6.62–6.71) 2
MTR	4.44 1	4.35 1	4.45 (4.34–4.55) 2	4.27 (4.13–4.41) 2
BCW	7.18 1	6.99 1	7.58 (7.49–7.66) 2	7.49 (7.36–7.62) 2
GMB	5.63 1	5.65 1	5.76 (5.65–5.87) 2	5.65 (5.63–5.66) 2

Ulaan Tsutgalan ([3] MSB 94070 M, 94071 M, 94072 M)

Six females (two lactating) and two males (testes [t] = 3 x 1.5) were collected from riparian habitats in the Gorkhi–Terelj–Tüül river area. These areas were surrounded by small hills and valleys covered in heavily grazed steppe vegetation (ca. 0.2 m in height) with intermittent rock outcroppings. The waterways were lined with a patchy forest of *Populus tremula* and *Salix* sp. of ca. 10 m in height. With the exception of one *Vespertilio murinus*, only *P. auritus* was collected at these sites. During the two collection periods, weather ranged from cold (3.3°C), overcast and rainy to clear, calm and warm (22.2°C). Only a single capture was made during inclement weather and one-quarter moon, whereas seven animals were caught under good weather conditions and a full moon.

Habitat and capture conditions for the three males collected at Ulaan Tsutgalan are described in the *E. gobiensis* account. See Table 5 for morphological measurements.

The brown big-eared bat is distributed from Norway, Ireland and Spain to Sakhalin Island, Japan, North China and Nepal. Within Mongolia, it is found in the steppe and forest steppe regions of the north.

Table 5. Measurements for *Plecotus auritus*.

	Female (n = 5)	Male (n = 6)
Mass	9 (8–10) 5	7.6 (7–8) 6
Total	100 (96–103) 5	102.2 (91–107) 6
Tail	44.8 (41–49) 5	45.5 (39–49) 6
RHF	11 (9–12) 5	11.7 (10–13) 6
Ear	36.8 (34–38) 5	36.8 (35–39) 6
Forearm	40.6 (38–43) 5	41.5 (41–42) 6
Tragus	17.5 (16–19) 4	17.08 (16–18) 6
CIL	15.92 (15.85–16.0) 3	15.86 1
ZB	9.09 (9.09–9.09) 2	8.91 1
IOB	3.51 (3.42–3.58) 3	3.41 1
PTL	7.82 (7.66–7.94) 3	7.98 1
MTR	4.61 (4.57–4.68) 3	4.75 1
BCW	8.88 (8.69–9.04) 3	8.88 1
GMB	6.51 (6.28–6.67) 3	6.37 1

Vespertilio murinus (Linnaeus, 1758) Parti-Colored Bat

Tüül River (MSB 94106 M)

Ulaan Tsutgalan ([25] MSB 94081 M, 94082 M, 94083 M, 94084 M, 94085 M, 94086 M, 94087 M, 94088 F, 94089 M, 94090 M, 94091 M, 94092 M, 94093 M, 94094 F, 94095 M, 94096 M, 94097 M, 94098 F, 94099 F, 94100 M, 94101 M, 94102 M, 94103 F, 94104 M, 94105 M)

One male was taken with seven *Plecotus auritus* along the Tüül River during a full moon

under clear conditions. See *Plecotus auritus* account for description of habitat and netting conditions.

At Ulaan Tsutgalan, this species made up the largest portion (25/48 total captures) of the five collected species. See *E. gobiensis* account for habitat description and capture conditions. See Table 6 for morphological measurements.

The parti-colored bat is found from Norway and Britain to the Ussuri region of Russia, China and Afghanistan. In Mongolia, the only previous collection locality (Sokolov and Orlov 1980) is in the western Altai. Our specimens represent the first collection of this species in the Khentey and Khangay mountain ranges and indicate a much wider distribution in the country than previously reported.

Table 6. Measurements for *Vespertilio murinus*.

	Female (n = 5)	Male (n = 20)
Mass	10.5 (10–11.5) 5	9.8 (8–14) 20
Total	108.6 (104–114) 5	104 (99–112) 20
Tail	40.8 (38–44) 5	40.5 (35–47) 20
RHF	10 (9–12) 5	10.3 (8–12) 20
Ear	15.2 (13–16) 5	14.7 (14–17) 20
Forearm	40.7 (40–42) 5	40.5 (38–49) 20
Tragus	6.2 (5–7) 5	6.17 (5–7) 18
CIL	15.35 (14.94–15.75) 2	14.96 (14.36–15.39) 8
ZB	10.10 1	9.53 (9.34–9.79) 8
IOB	3.94 (3.83–4.04) 2	4.10 (3.97–4.25) 8
PTL	7.24 (7.03–7.44) 2	7.05 (6.5–7.41) 8
MTR	4.47 (4.33–4.6) 2	4.30 (4.11–4.51) 8
BCW	7.78 (7.56–7.99) 2	7.67 (7.37–8.30) 8
GMB	6.40 (6.24–6.56) 2	6.23 (5.71–6.45) 8

ORDER CARNIVORA
Family Canidae
Vulpes vulpes (Linnaeus, 1758)
Red Fox

Ulziyt Uul (MSB 94107 M)

A single pelt from an adult animal was donated by a local herder. The animal had been collected in the area during the summer of 1998. The common red fox is Holarctic in distribution, and is found throughout Mongolia.

Family Mustelidae
Meles meles (Linnaeus, 1758)
Eurasian Badger

Gorkhi–Terelj (MSB 94108 U)

Our single specimen is a skull (measurements: CIL 118.08, ZB 76.95, IOB 22.72, PTL 54.53, MTR 29.98) recovered from a talus slope at 1800 m. The slope supports a substantial pika population (see the account of *Ochotona hyperborea*).

The Eurasian badger is found throughout most of Eurasia except for southeast Siberia and the desert regions of central and south central Asia. It is also found on the islands of Ireland, Britain, Crete, Rhodes and Japan. In Mongolia, it has been recorded from the forest steppe and steppe zones and the Mongolian Altai.

ORDER ARTIODACTYLA
Family Bovidae
Gazella subgutturosa (Güldenstaedt, 1780)
Goitered Gazelle

17.5 km W **Ulaan Nuur** (MSB 94109 M)

Our specimen, a partial skull and horns, was found on the roadside. On a number of occasions we observed live animals, usually in pairs, running (ca. 60 km/h) along the roadsides.

The goitered gazelle is found in the deserts and semi-deserts from the Middle East through central Asia and into China. In Mongolia, they are found in the desert and desert steppe regions of the south including the areas surrounding the Gobi and Mongolian Altai.

The subspecies *G. s. marica* is listed as endangered under the U.S. Endangered Species Act (US [ESA] 1999). This subspecies occurs in Jordan and the Arabian peninsula. None of the Mongolian forms of this species have been listed by either CITES (CITES 2000) or the U.S.

ORDER RODENTIA
Family Sciuridae
Marmota sibirica (Radde, 1862)
Tarbagan Marmot

Khetsuugiin Övör (MSB 94110 M)

One adult male specimen (measurements: 691–142–81–27, 5.2 kg, CIL 93.42, ZB 95.5, IOB

3.37, PTL 15.93, MTR 6.99) of this wide-ranging species was shot at this locality, which was characterized by rolling hills of short-grass steppe and rocky outcroppings. We saw numerous marmots at most localities we visited, from the high meadows in Gorkhi–Terelj National Park to the Gobi steppe of Ömnögobi. The marmots we observed were extremely wary of humans; we were never able to approach closer than 200 m before they would flee into their burrows. Since marmots are sought as a food source, hunting has reduced their numbers greatly across the country.

The tarbagan marmot ranges through the Altai Mountains, southwestern Siberia, southeastern Kazakhstan, Kirgizistan, and Xinjiang, China. In Mongolia, *M. sibirica* is found in the mountains and steppes of the northern half of the country.

Spermophilus alashanicus (Buchner, 1888) Alashan Ground Squirrel

Arts Bogd ([2] MSB 94111 M, 94112 M)

An adult and a subadult of the Alashan ground squirrel were shot with a rifle in the foothills of Arts Bogd. The area is typical Gobi steppe vegetation. During the Central Asiatic Expeditions, R.C. Andrews collected 20 individuals in the low foothills of Arts Bogd (Allen 1940). See Table 7 for morphological measurements.

This squirrel has a rather restricted range compared to the majority of Mongolian mammals. It is found in the Ala Shan and Nan Shan mountains of northwestern China, and the Gobi Altai of Mongolia.

Spermophilus undulatus (Pallas, 1778) Long-Tailed Ground Squirrel

Gorkhi–Terelj (MSB 94141 M)
Tüül River ([6] MSB 94142 F, 94143 M, 94144 F, 94145 M, 94146 F, U)
Ulaan Tsutgalan ([28] MSB 94113 M, 94114 F, 94115 M, 94116 F, 94117 F, 94118 M, 94119 M, 94120 M, 84121 M, 94122 M, 94123 F, 94124 F, 94125 M, 94126 M, 94127 M, 94128 F, 94129 M, 94130 M, 94131 M, 94132 M, 94133 F, 94134 F, 94135 M, 94136 M, 94137 M, 94138 F, 94139 U, 94140 F).

Thirteen non-pregnant females and 20 adult males were captured in Sherman® traps. One female was lactating and one had enlarged nipples, but was not lactating. Testes size ranged from 6 x 4 mm to 10 x 5 mm. At Ulaan Tsutgalan, most animals preferred areas in and around rocky outcroppings as opposed to open steppe. In preferred habitat, the density of captured long-tailed ground squirrels was 18 animals/ha. However, we also saw many more animals moving around in that area that were not collected. In contrast, the density estimated from capture data in the open steppe amounted to 2.4 animals/ha. Thus, in preferred habitat this ground squirrel is quite abundant. Allen (1940) mentions that R.C. Andrews reported this species as patchy in oc-

Table 7. Measurements for *Spermophilus*.

	S. undulatus		*S. alashanicus*
	Female (n = 12)	Male (n = 20)	Male (n = 2)
Mass	250 (185–332) 12	236.4 (142–327) 20	233 (164–302) 2
Total	326.8 (301–362) 12	315.3 (280–346) 20	268.5 (241–296) 2
Tail	105.8 (93–120) 12	108.5 (101–122) 20	72.5 (58–87) 2
RHF	46.7 (43–51) 12	47.1 (45–51) 20	40.5 (38–43) 2
Ear	11.8 (9–14) 12	11.4 (8–14) 20	7 (6–8) 2
CIL	42.39 (40.69–44.27) 10	42.4 (40.03–44.55) 13	42.88 1
ZB	28.78 (27.38–30.8) 10	28.8 (25.65–30.17) 13	28.45 1
IOB	9.57 (9.24–9.94) 10	9.52 (8.41–10.50) 13	8.35 1
PTL	24.08 (22.26–26.31) 10	24.54 (23.3–26.65) 13	24.15 1
MTR	10.93 (10.50–11.70) 10	10.73 (10.10–11.60) 13	9.98 1

currence, but very abundant in some areas. He collected 58 at one locality 45 miles northeast of Ulaan Baatar; while near Sain Noin Khan, in the southern Khangay, they were seen "in hundreds all over the plains." See Table 7 for morphological measurements.

The long-tailed ground squirrel ranges across southern Siberia, Transbaikal, Mongolia, eastern Kazakhstan and the provinces of Heilungjiang and Xinjiang in China. In Mongolia, it is found in the steppes of the Khentey and Khangay mountains, Lake Hovsgol and the Mongolian Altai.

Tamias sibiricus (Laxmann, 1769)
Siberian Chipmunk

Gorkhi–Terelj (MSB 94148 F)
Hangal Soum (MSB 94149 M)

One adult, non-pregnant female was shot with a rifle in a mixed forest (*Larix–Populus–Betula*) at approximately 1500 m in Gorkhi–Terelj. Only one other chipmunk was sighted during five days at this locality. One adult male was among the McDonald collection from Hangal Soum. See Table 8 for morphological measurements.

The Siberian chipmunk occurs across northern Europe into Siberia and south into Kazakhstan, Mongolia and China. In Mongolia, it is found in the taiga and mountain forests of the Khentey, Khangay and Mongolian Altai.

Table 8. Measurements for *Tamias sibiricus*.

	Female (n = 1)	Male (n = 1)
Mass	94	85
Total	264	229
Tail	111	75
RHF	32	36
Ear	19	16
CIL	36.01	
ZB	21.8	
IOB	10.3	
PTL	17.91	
MTR	6.5	

Family Dipodidae
Allactaga sibirica (Forster, 1778)
Mongolian Five-Toed Jerboa

Ulziyt Uul (MSB 94151 F)
Ulaan Tsutgalan (MSB 94150 M)

One young, non-gravid female was shot at dusk in the open Gobi steppe approximately 150 m west of camp at Ulziyt Uul. No other individuals were observed although several hours were spent searching the area.

An adult male (t = 12 x 5) was captured in a Sherman trap® in the mountain steppe (ca. 1850 m) at Ulaan Tsutgalan. This animal was the only one of this species captured in more than 1,000 trap nights in the same habitat at this location. See Table 9 for morphological measurements.

The Mongolian five-toed jerboa ranges widely from Kazakhstan and the Caspian Sea east to Transbaikalia, south to Turkmenistan, into Mongolia, Inner Mongolia and northwest and north central China. In Mongolia, this species is found in the forest–steppe, steppe, and semi-deserts throughout the country.

Table 9. Measurements for *Allactaga sibirica*.

	Male (n = 1)	Female (n = 1)
Mass	124	64
Total	327	330
Tail	204	200
RHF	76	72
Ear	40	41
CIL	37.39	32.76
ZB	25.21	
IOB	12.82	10.30
PTL	22.43	
MTR	7.75	7.49

Dipus sagitta (Pallas, 1773)
Northern Three-Toed Jerboa

Ulaan Nuur ([4] MSB 94152 F, 94153 F, 94154 M, 94155 F)

All specimens were hand-caught between 0000–0200 hrs after they were seen in the headlights of the truck. One of the females was lactating and another one had enlarged nipples (not

lactating), whereas the only male caught was scrotal. Ulaan Nuur is a seasonally dry lake bed. The animals were all caught on the periphery of the lake bed where the vegetative cover was sparser (desert pavement). On the southwestern edge of Ulaan Nuur, we encountered numerous burrows at the base of sand mounds, which supported large shrubs (*Nitraria sibirica*) (Fig. 9). These burrows were open and their entries had a very peculiar geometry as they were flat on the bottom and arched on top. Our Mongolian collaborators identified them as burrows of this species. See Table 10 for morphological measurements.

The northern three-toed jerboa extends from the northwest coast of the Caspian Sea south into northern Iran and east through Turkmenistan, Uzbekistan and Kazakhstan to the southern part of Tuva and on into Mongolia, Inner Mongolia, and parts of northwest China. In Mongolia, they are found throughout the desert and semi-desert regions of the south.

Table 10. Measurements for *Dipus sagitta*.

	Female (n = 3)	Male (n = 1)
Mass	78 (71–91) 3	72
Total	272.3 (264–278) 3	276
Tail	150 (132–163) 3	164
RHF	64 (63–65) 3	62
Ear	21.3 (20–24) 3	20
CIL	32.12 (29.7–30.8) 2	29.80
ZB	21.78 (21.71–21.84) 2	22.60
IOB	9.88 (9.46–10.30) 2	9.50
PTL	16.42 (16.3–16.53) 2	15.90
MTR	5.71 (5.6–5.81) 2	5.85

Family Muridae
Alticola semicanus (Allen, 1924)
Mongolian Silver Vole

Ulaan Tsutgalan ([28] MSB 94156 F, 94157 F, 94158 M, 94159 M, 94160 M, 94161 F, 94162 F, 94163 F, 94164 F, 94165 M, 94166 M, 94167 F, 94168 M, 94169 F, 94170 M, 94171 M, 94172 M, 94173 M, 94174 F, 94175 F, 94176 F, 94177 F, 94178 M, 94179 M, 94180 M, 94181 F, 94182 F, 94183 F)

Khetsuugiin Övör ([3] MSB 94184 F, 94185 F, 94186 M)

Lake Hovsgol National Park ([8] MSB 98505 M, 98506 F, 98507 F, 98508 F, 98509 M, 98510 F, 98511 M, 98512 M)

A total of 26 animals were captured in and around the rock outcroppings of the steppe surrounding the canyon at Ulaan Tsutgalan, and two were caught along the rocky canyon rim of the Orkhon River. The rim was covered by mixed forest, whereas the rock outcroppings in the steppe had no overstory. No animals were caught in the open steppe, although the same trapping effort was used in both open steppe and outcroppings. The specimens caught at Khetsuugiin Övör also were trapped around rocks in the steppe. At Ulaan Tsutgalan, we saw and collected numerous animals of this species in the daytime.

Two scrotal (t = 12 x 8, 11 x 7) males, two non-scrotal (t = 5 x 2, 4 x 2) males, one reproductive female (11 scars), and three non-reproductive females were collected from in and around a large rock outcrop (ca. 50 x 15 x 7 m) that protruded out of an alpine meadow ca. 100 m above Lake Hovsgol. The mountainside was at a ca. 60° slope. Grasses, forbs, wildflowers and shrubs made up about 85% of the non-rock area; rich, rocky soil made up the remainder of the ground cover. This was the only rock outcrop visible in the area, and appeared to have been occupied by rodents for a very long time—the majority of the crevices and overhangs were coated with heavy layers of feces and urine. One animal was seen during the day (ca. 1800 hrs) scurrying up a vertical rock face. See Table 11 for morphological measurements.

The Mongolian silver vole ranges from the Tuva region of Russia through north central Mongolia. Within Mongolia, this species ranges from the Altai in the northwest through the Khangay in central Mongolia and into the steppes of the east (Rossolimo et al. 1988).

Table 11. Measurements for *Alticola semicanus*.

	Female (n = 19)	Male (n = 18)
Mass	30.2 (18–59) 19	30.8 (18–54) 18
Total	138.0 (119–166) 19	137.0(118–165) 18
Tail	29.1 (22–39) 19	30.4 (24–36) 18
RHF	22.7 (20–26) 19	22.5 (21–24) 18
Ear	19.0 (12–23) 19	20.2 (18–23) 18
CIL	28.09 (26.86–28.86) 4	27.02 (25.16–29.21) 9
ZB	15.55 (14.8–16.24) 4	15 (14.17–16.82) 9
IOB	4.15 (3.96–4.31) 4	4.1 (3.85–4.30) 9
PTL	13.32 (12.69–13.89) 4	13.01 (12.15–14.05) 9
MTR	6.3 (6.06–6.62) 4	5.98 (5.69–6.24) 9

Clethrionomys rufocanus (Sundevall, 1846) Gray Red-Backed Vole

Gorkhi–Terelj ([23] MSB 94196 F, 94197 M, 94198 M, 94199 M, 94200 F, 94201 F, 94202 F, 94203 M, 94204 F, 94205 F, 94206 M, 94207 M, 94208 M, 94209 F, 94210 F, 94211 F, 94212 F, 94213 F, 94214 F, 94215 M, 94216 M, 94217 M, 94218 M)
Ulaan Tsutgalan ([9] MSB 94187 M, 94188 M, 94189 F, 94190 M, 94191 M, 94192 M, 94193 M, 94194 M, 94195 F)
Hangal Soum ([11] MSB 94219 F, 94220 M, 94221 M, 94222 M, 94223 M, 94224 M, 94225 F, 94226 F, 94227 U, 94228 M, 94229 M)
Lake Hovsgol National Park (MSB 98513 F)

Ten males (seven scrotal, t = 9 x 6 to 12 x 8) and 13 females (2 pregnant: 6 embs. crown–rump length [CRL] = 7; 8 embs. CRL = 6) were taken at the Gorkhi–Terelj locality. Although most individuals were trapped in the mixed forest (*Larix–Populus–Betula*), they were found in all of the varying habitat types at this locality (mixed forest, talus slopes, short steppe, and alpine meadows).

At Ulaan Tsutgalan, seven males (t = 9 x 6 to 11 x 6) and one non-pregnant female were taken from within the Orkhon River canyon. This area was a mixed forest with heavy vegetative cover bordered by steep rocky cliffs on one side and the Orkhon River on the other. No animals were collected in the steppe habitat above the rim. The MacDonald collection contained seven males, three females and one of unknown gender. Specimens from November showed a distinct increase in pelage thickness and hair length on the body and tail when compared with specimens collected in July.

At Hovsgol, one pregnant, adult female (10 embs. 3l, 7r, CRL = 7) was captured at the base of a large, fallen larch tree. The forest (50% canopy cover) was a mixture of young and old trees. A thick layer of larch litter and many downed trees covered the forest floor, vegetative ground cover was 90% and a shrub understory made up 10%. The soil was very friable with rich organic matter. Many rodent holes were present under the litter and downed trees. This was an extremely mesic area, which becomes nearly submerged as runoff flows towards Lake Hovsgol during heavy rains. These specimens were collected in sympatry with *Clethrionomys rutilus* at this site. See Table 12 for morphological measurements.

The gray red-backed vole is found throughout northern Eurasia from Scandinavia through Siberia to Kamchatka, extending south to the southern Urals, the Altai Mountains, Transbaikalia, and into Mongolia. In Mongolia, it has a similar range to *C. rutilus*, mainly in the northern mountain regions.

Clethrionomys rutilus (Pallas, 1779) Northern Red-Backed Vole

Gorkhi–Terelj ([8] MSB 94229 M, 94230 F, 94231 M, 94232 M, 94233 M, 94234 M, 94235 M, 94236 F)
Lake Hovsgol National Park (MSB 98514 F)

Four scrotal (t = 9 x 7 to 12 x 7) males, one non-scrotal male, and two females (one with scars, 2l, 2r) were collected from this locality. Seven of the eight were collected at 1470 m and one was taken at 2000 m, all within mixed forest in sympatry with *C. rufocanus*. Both species of *Clethrionomys* were collected within five meters of each other and even at the same trap station on different nights, but maintaining a fairly strict density ratio of 1:3, with *C. rufocanus* always being more abundant. The herbaceous layer was ca. 0.15 m in height. The majority of the captures were near or under boulders within the forest.

At Hovsgol, one pregnant, adult female (9 embs. 6l, 3r, CRL = 7) was captured at the base of a large, fallen larch tree within 20 m of the

Clethrionomys rufocanus from this site described in the above account. See Table 12 for morphological measurements.

The northern red-backed vole has an Holarctic distribution from northern Scandinavia eastward to the Chukotski Peninsula and south to northern Kazakhstan, Mongolia, Transbaikal, northeast China, and Korea, including populations on Sakhalin, Hokkaido, and St. Lawrence islands. In the New World, it ranges from Alaska east to the Hudson Bay and south to northern British Columbia, and northeastern Manitoba. In Mongolia, they are found in the northern mountain regions of the Khentey, Khangay and Mongolian Altai, as well as Lake Hovsgol.

Ellobius tancrei (Blasius, 1884) Zaisan Mole Vole

Ulziyt Uul (MSB 94238 M)

One non-reproductive (t = 5 x 3) adult male (measurements: 130–12–24–3, 53 g, CIL 32.62, ZB 20.91, IOB 5.58, PTL 18.18, MTR 9.6) was caught with a Victor® gopher trap on the north slope of a hill near camp. This animal and the mounds we observed were found on the extremely rocky hillsides, most often on the northern and western slopes; no mounds were observed on the more friable soils of the valley bottoms. Most burrows and burrow entrances were small (ca. 0.03 m in diameter) and were extremely hard to follow. The soil was so hard and rocky that simply opening burrows was very difficult. This is in contrast to other reports on the soil and burrow characteristics of this species. According to Schauer (1987), who referred to them as *E. talpinus*, burrows are found in meadows with higher organic content.

The Zaisan mole vole ranges from northeastern Turkmenistan and Uzbekistan east through Kazakhstan to eastern China and Mongolia. In Mongolia, it is found throughout the desert and semi-desert zones of the country.

Lasiopodomys brandtii (Radde, 1861) Brandt's Vole

27 km east of **Kharkhorin** ([2] MSB 94239 M, 94240 M)

Erdenelai Soum (MSB 94241 M)

We collected (one shot with a rifle, one trapped in a Sherman®) two male *Lasiopodomys* between 1400 and 1500 hrs from a colony occupying an area in excess of 100 m across. The colony was an interconnected maze of trails and burrow entrances (Fig. 11). Many animals were seen and heard "chirping" during the short period of time that we observed this colony. We were able to approach to within 10 m before they would retreat into their burrows.

In Erdenelai we salvaged one juvenile male specimen from the roadside. In our travels through the steppe from Ulaan Baatar west through Arvaykheer, we observed many large colonies. Active colonies also were located by

Table 12. Measurements for *Clethrionomys*.

	C. rufocanus		*C. rutilus*	
	Female (n = 9)	Male (n = 22)	Female (n = 1)	Male (n = 5)
Mass	22 (18–32) 9	25.2 (16–39) 22	20	19.2 (14–24) 5
Total	133.3 (122–159) 9	133 (121–161) 22	144	131.2 (121–140) 5
Tail	31.8 (25–39) 9	30 (24–38) 22	34	31.4 (26–35) 5
RHF	18.2 (17–19) 9	19.3 (18–21) 22	18	18.2 (16–19) 5
Ear	15.7 (14–19) 9	16.5 (13–20) 22	17	17 (15–19) 5
CIL	24.65 (22.8 – 25.85) 5	25.35 (23.21–27.76) 8	23.41	22.72 (21.55–24.13) 4
ZB	13.54 (12.38–14.20) 6	14.06 (12.61–14.92) 8	12.22	12.28 (11.68–13.05) 4
IOB	3.64 (3.43–3.85) 6	3.64 (3.28–3.87) 8	3.63	3.85 (3.70–3.93) 4
PTL	11.32 (10.62–12.22) 6	11.77 (11.19–12.99) 8	10.35	10.31 (9.67–11.06) 4
MTR	6.03 (5.75–6.22) 6	6.10 (5.80–6.33) 8	4.68	5.02 (4.67–5.73) 4

observing raptors circling colonies in search of prey.

Southwest of Ulaan Baatar, we found similar numbers of colonies, but the majority appeared to be abandoned. We surveyed and trapped extensively at the few colonies that showed signs of activity, but no animals were seen or captured. These areas, compared to those in the west, were experiencing drier than normal conditions, were more densely inhabited by humans, and were more heavily grazed by domesticated animals. See Table 13 for morphological measurements.

Brandt's vole is found in Transbaikalia, Mongolia, eastern Inner Mongolia, and northwest China. In Mongolia, it ranges throughout the steppe regions.

Table 13. Measurements for *Lasiopodomys brandtii*.

	Male (n = 2)
Mass	46 (42–52) 2
Total	143.5 (142–145) 2
Tail	26 (24–28) 2
RHF	23 (23) 2
Ear	12.5 (12–13) 2
CIL	29.5 1
ZB	17.68 1
IOB	3.37 1
PTL	15.93 1
MTR	6.99 1

Microtus mongolicus (Radde 1861) Mongolian Vole

Hangal Soum ([3] MSB 94245 M, 94246 M, 94247 F)

MacDonald collected three adults along with *M. oeconomus* in Hangal Soum. Although specific microhabitat information is not available for these specimens, *M. mongolicus* is known to frequent forest, forest steppe and riparian areas. See Table 14 for morphological measurements.

The Mongolian vole is distributed across Transbaikalia, Mongolia and NE China. In Mongolia, it is found in the Khentey, parts of the Khangay and around Lake Hovsgol.

Microtus oeconomus (Pallas 1776) Tundra Vole

Hangal Soum ([3] MSB 94242 F, 94243 M, 94244 M)

Three adults were collected along with *M. mongolicus* by MacDonald. Specific microhabitat information is not available for these specimens, although *M. oeconomus* is mostly found in shrubby riparian areas in forest and forest steppe. See Table 14 for morphological measurements.

The tundra vole ranges throughout the tundra and taiga of the Holarctic. In Mongolia, it is found around Lake Hovsgol, in the Khentey, the Khangay, and the northern Mongolian Altai.

Table 14. Measurements for *Microtus*.

	M. mongolicus		*M. oeconomus*	
	Female (n = 1)	Male (n = 2)	Female (n = 1)	Male (n = 2)
Mass	25	27 (24–30) 2	30	
Total	133	143.5 (143–144) 2	144	
Tail	39	37 (35–39) 2	35	
RHF	22	22 (22) 2	19	
Ear	13	14 (14) 2	14	
CIL		28.57 1	27.9	25.82 1
ZB		15.46 1	15.29	15.49 1
IOB		4.10 1	3.57	3.99 1
PTL		15.63 1	14.5	12.16 1
MTR		7.14 1	6.50	6.31 1

Cricetelus barabensis (Pallas, 1773) Striped Dwarf Hamster

Gorkhi–Terelj ([12] MSB 94250 M, 94251 M, 94252 F, 94253 F, 94254 F, 94255 M, 94256 M, 94257 M, 94258 M, 94259 M, 94260 M, 94261 F)
Ulaan Tsutgalan ([2] MSB 94248 F, 94249 M)
Tüül River ([2] MSB 94262 M, 94263 F)

In Gorkhi–Terelj, we captured eight males, most of which were non-reproductive (testes averaging 3 x 4 mm); one scrotal individual had testes that measured 17 x 10 mm. Of four females captured, one was pregnant (10 embs. CRL = 7 mm), and three were non-reproductive. Sokolov and Orlov (1980) stated that *C. barabensis* litter size averages 6–8 young. The majority of our captures were taken at the base of boulders at or near burrow entrances in the larch–birch forest. Burrows were ca. 0.04 m in diameter. Two were captured on open areas on the 50° slope of the mountain—one on almost bare mine tailings, the other in the steppe at the base of a boulder.

In the riparian zone of the Tüül River, one male and one female were captured in a small, rocky ravine within a small strip of *Populus tremula* and tall grass. This area is a popular weekend campsite outside of Ulaan Baatar and hence is fairly disturbed.

In Ulaan Tsutgalan, only two *Cricetulus* were captured. One, a scrotal male (t = 18 x 9 mm), was caught in the large, open meadow; the other, a non-reproductive female, was caught along the rocky edge of the river canyon. See Table 15 for morphological measurements.

Currently, there is disagreement as to the taxonomic status of *C. barabensis* in this region (Musser and Carleton 1993; Rossolimo 1995a). Based on chromosomal differences, some authors (Pavlinov and Rossolimo 1987) recognize a second species *C. pseudogriseus* (2n = 24) throughout the center of Mongolia, with *C. barabensis* (2n = 20) restricted to the north. We could not verify the chromosome number on the animals included in this account, however we follow Wilson and Reeder (1993) and refer to these specimens as *C. barabensis* although they were collected within the range attributed to *C. pseudogriseus*.

The striped dwarf hamster ranges from southern Siberia south through Mongolia and Inner Mongolia into northern China and Korea. In Mongolia, they are found throughout the forest steppe, steppe and semi-desert areas from the border with Transbaikal south to the Gobi Altai.

Cricetulus longicaudatus (Milne–Edwards, 1867) Long-Tailed Dwarf Hamster

7 km W, 4 km N of **Erdenesant** (MSB 94264 M)
Ca. 20 km SW of **Ulaan Baatar** ([2] MSB 94265 M, 94266 F)

One non-scrotal male (t = 6 x 4) was collected from within a large rock outcropping in the steppe near Erdenesant. One scrotal male (t = 16 x 12) and one non-reproductive female were taken from along a rocky ridge above a stagnant

Table 15. Measurements for *Cricetulus*.

	C. barabensis		*C. longicaudatus*	
	Female (n = 4)	Male (n = 7)	Female (n = 1)	Male (n = 2)
Mass	20 (16–23) 4	19.1 (15–27) 7	12.5	24 (15–33) 2
Total	122.5 (112–138) 4	122.1 (112–135) 7	124	140 (133–147) 2
Tail	29.8 (26–34) 4	28 (25–30) 7	33	34.5 (31–38) 2
RHF	16.5 (16–18) 4	17.4 (15–18) 7	18	17.5 (17–18) 2
Ear	17.8 (16–20) 4	18.1 (17–19) 7	19	20 (20) 2
CIL	23.92 1	23.13 (22.19–24.48) 6		25 1
ZB	12.62 1	12.70 (12.01–13.57) 6		14.06 1
IOB	3.74 1	3.85 (3.68–3.94) 6		4.18 1
PTL	11.05 1	10.28 (9.70–10.88) 6		10.74 1
MTR	3.81 1	3.75 (3.55–3.92) 6		4.01 1

stream at the second locality. See Table 15 for morphological measurements.

The long-tailed dwarf hamster is found in Russia and Kazakhstan in the Tuva and Altai regions, Mongolia and south through northwest China and into northern Tibet. In Mongolia, it is found in the mountain steppes and semi-desert grasslands of the Khangay, and the Mongolian and Gobi Altai.

Phodopus campbelli (Thomas, 1905) Campbell's Hamster

7 km W, 4 km N of **Erdenesant** (MSB 94267 M)

One scrotal male (t = 19 x 11 mm) was collected in the open steppe near Erdenesant. See Table 16 for morphological measurements.

The dwarf hamster ranges across Transbaikal and Mongolia through Inner Mongolia and the northwest regions of China. It is found across the steppe and desert grassland regions of Mongolia.

Phodopus roborovskii (Satunin, 1903) Desert Hamster

Ulziyt Uul ([16] MSB 94269 M, 94270 F, 94271 F, 94272 F, 94273 M, 94274 M, 94275 F, 94276 M, 94277 M, 94278 M, 94279 M, 94280 M, 94281 F, 94282 F, 94283 M, 94284 F)

Ulaan Nuur (MSB 94268 M)

All specimens from Ulziyt Uul were collected in open Gobi steppe. Nine males were collected with testes measurements ranging from 6 x 4 to 18 x 8 mm, along with two pregnant (9 embs. CRL = 6 mm; 6 embs. CRL = 12 mm) and five non-reproductive females. One scrotal male, whose testes measured 14 x 10 mm, was captured on the desert pavement at Ulaan Nuur. See Table 16 for morphological measurements.

The desert hamster ranges across Tuva and eastern Kazakhstan into Mongolia and northwestern China. In Mongolia, these hamsters are found in the desert grasslands of the northern Gobi, extending south into the desert zones.

Meriones meridianus (Pallas, 1773) Mid-day Jird

Ulziyt Uul ([2] MSB 94288 F, 94289 M)
Arts Bogd ([3] MSB 94285 F, 94286 M, 94287 F)

Three non-pregnant females, one non-reproductive female and one scrotal male (t = 14 x 11) were collected from open Gobi steppe at these sites. This species was collected in sympatry with *M. unguiculatus*, which outnumbered *M. meridianus* 3:1 in our survey. See Table 17 for morphological measurements.

The mid-day jird ranges from the lower Don River in Russia and north of the Caucuses to Mongolia and northwest China, south to east Iran and north Afghanistan. In Mongolia, it is found throughout the desert and semi-desert regions of the south, northward to the southern edge of the Khangay.

Meriones unguiculatus (Milne-Edwards, 1867) Mongolian Jird

Table 16. Measurements for *Phodopus*.

	P. roborovskii		*P. campbelli*
	Female (n = 4)	Male (n = 7)	Male (n = 1)
Mass	15.3 (12–20) 4	16.9 (14–22) 7	17
Total	91.3 (85–100) 4	91 (88–97) 7	91
Tail	11.5 (8–15) 4	8.9 (6–13) 7	4
RHF	12.5 (12–13) 4	12.7 (12–14) 7	13
Ear	15 (15) 4	15.1 (11–16) 7	11
CIL	19.62 1	20.41 (19.31–22.17) 5	20.17
ZB	12.08 1	12.35 (12.01–12.75) 5	11.90
IOB	4.01 1	3.88 (3.76–3.97) 5	4.11
PTL	9.06 1	9.50 (8.68–10.70) 5	9.34
MTR	3.26 1	3.32 (3.22–3.47) 5	3.52

7 km W, 4 km N of **Erdenesant** ([6] MSB 94290 F, 94291 M, 94292 F, 94293 F, 94294 F, 94295 M)
Ulziyt Uul ([7] MSB 94299 F, 94300 F, 94301 F, 94302 M, 94303 F, 94304 F, 94305 U)
Arts Bogd ([3] MSB 94296 M, 94297 M, 94298 F)

In Erdenesant, four non-pregnant females were collected along with two scrotal males (t = 11 x 9, 18 x 9) in the open steppe of this area. In Ulziyt Uul and Arts Bogd, five non-pregnant and one pregnant female (6 embs. CRL = 7 mm) were collected along with three adult males, one scrotal (t = 14 x 9), in open Gobi steppe. Although captured in sympatry with *M. meridianus* in Ulziyt Uul and Arts Bogd, they were the only gerbil species found at Erdenesant. See Table 17 for morphological measurements.

The Mongolian jird is distributed across Transbaikal, Mongolia and China from north Gansu through Inner Mongolia to Heilongjiang. In Mongolia, it is distributed across the entire desert and semi-desert region of the southern half of the country.

Apodemus peninsulae (Thomas, 1907) Korean Field Mouse

Gorkhi–Terelj ([16] MSB 94307 M, 94308 F, 94309 F, 94310 F, 94311 M, 94312 M, 94313 F, 94314 M, 94315 M, 94316 F, 94317 F, 94318 F, 94319 M, 94320 M, 94321 M, 94322 M)
Ulaan Tsutgalan (MSB 94306 M)
Hangal Soum ([8] MSB 94323 M, 94324 M, 94325 M, 94326 M, 94327 M, 94328 M, 94329 M, 94330 M)

All specimens collected from Gorkhi–Terelj were captured in association with rocky habitats. Four were captured in the talus slopes at 1800 m, while the remainder were captured under boulders or in rocky ravines within the larch–birch forest at 1470 m. Fifty percent of the specimens collected from Gorkhi–Terelj were subadult or juvenile. Of the adult animals, two females were pregnant (8 embs. CRL = 14 mm; 8 embs. CRL = 24 mm) and one was post-reproductive (6 scars), and two males were scrotal (t = 9 x 7, 9 x 4). Testes measurements on the subadult males ranged from 3 x 5 mm to 6 x 3 mm. At Ulaan Tsutgalan, a single adult male specimen was captured within the rocky Orkhon River canyon under a mixed forest canopy.

MacDonald collected only males. Two individuals that were collected in November showed distinct pelage differences from those collected in July. Body hair was thicker and longer and tails were much more haired and bicolored in appearance. See Table 18 for morphological measurements.

The Korean field mouse is found in southeastern Siberia from the Altai Mountains to the Ussuri region, south into Mongolia, through southwest and northeast China, Korea, as well as on Sakhalin and Hokkaido. In Mongolia, it ranges across the forest and forest–steppe regions of the north, including the Mongolian Altai, Khentey and Khangay.

Table 17. Measurements for *Meriones*.

	M. meridianus		*M. unguiculatus*	
	Female (n = 2)	Male (n = 2)	Female (n = 10)	Male (n = 3)
Mass	34.5 (34–35) 2	46.5 (38–55) 2	40.6 (28–62) 10	54.7 (36–64) 3
Total	201 (200–202) 2	248.5 (232–265) 2	208.6 (199–240) 10	217.3 (187–235) 3
Tail	96 (96) 2	104.5 (100–109) 2	96.6 (90–115) 10	100 (88–107) 3
RHF	31.5 (31–32) 2	31.5 (31–32) 2	30.5 (28–31) 10	30.3 (29–31) 3
Ear	15 (15) 2	16 (15–17) 2	14.7 (13–16) 10	14.7 (13–16) 3
CIL	27.98 (27.85–28.10) 2	29.53 (28.18–30.87) 2	27.97 (25.84–28.67) 8	29.14 (27.83–30.0) 3
ZB	16.47 (16.39–16.55) 2	17.56 (17.10–18.02) 2	17.35 (15.47–18.61) 7	18.06 (17.19–18.54) 3
IOB	5.62 (5.53–5.71) 2	5.89 (5.81–5.97) 2	5.62 (5.26–6.03) 8	6.00 (5.92–6.04) 3
PTL	13.32 (13.3–13.34) 2	14.19 (13.73–14.65) 2	13.55 (12.37–14.7) 8	14.12 (13.42–14.50) 3
MTR	4.58 (4.57–4.59) 2	4.78 (4.7–4.86) 2	4.62 (4.10–4.88) 8	4.84 (4.52–5.22) 3

Table 18. Measurements for *Apodemus peninsulae*.

	Female (n = 4)	Male (n = 13)
Mass	40.8 (30–49) 4	20.6 (17–28) 13
Total	212 (208–217) 4	180.7 (163–203) 13
Tail	99.5 (94–105) 4	83.8 (75–95) 13
RHF	24 (23–25) 4	24.4 (23–26) 13
Ear	17.8 (17–19) 4	16 (14–17) 13
CIL	25.2 (25.09–25.35) 4	23.55 (22.68–24.85) 4
ZB	13.68 (13.47–13.96) 3	12.79 (12.32–13.56) 3
IOB	4.42 (4.16–4.71) 4	4.26 (4.11–4.40) 4
PTL	12.44 (12.15–12.62) 4	11.68 (11.32–12.32) 4
MTR	4.29 (4.14–4.52) 4	4.12 (4.04–4.17) 4

Mus musculus (Linnaeus, 1758)
House Mouse

Tüül River ([2] MSB 94331 M, 94332 F)

Two non-reproductive adults were captured in mixed *Populus–Salix* forest along the banks of the Tüül River. This area is fairly heavily used as a common weekend camping area for people from Ulaan Baatar. See Table 19 for morphological measurements.

The ubiquitous house mouse is found worldwide in association with human activity. They have been recorded from throughout Mongolia as well.

Table 19. Measurements for *Mus musculus*.

	Female (n = 1)	Male (n = 1)
Mass	18	13
Total	161	146
Tail	67	59
RHF	19	19
Ear	14	12

Myospalax aspalax (Pallas, 1776)
False Tsokor

Tüül River [2] (MSB 94335 F, 94336 F)
Elsen Tasarkhai ([2] MSB 94333 F, 94334 F)

All individuals were collected using gopher traps. An adult and sub-adult were collected at each locality. The Tüül River specimens were collected in the meadows along the riparian zone; vegetative cover was thick and lush (100% cover, ca. 20 cm high). The soil here was rich, dark and had a high clay content. This is in contrast to the other locality, which was a more xeric and sparsely vegetated site. Vegetation at Elsen Tasarkhai was composed of a thin cover of *Stipa* and *Artemisia* <5 cm in height and about 40% coverage. Soil was dry, sandy and light colored with little organic matter. Mounds at Elsen Tasarkhai (Figure 12) were ca. 20 cm high, ca. 50 cm diameter, in straight lines about 1.5 m apart. Tunnels were located directly below the mounds and were ca. 8 cm in diameter. Mounds along the Tüül River were smaller, closer together, and did not follow straight lines. Schauer (1987) reported mounds being 14.6 cm in height and at intervals of 80 cm; the mean length of six burrows was 215 m, with a mean number of spoil heaps of 254, resulting in an average of 2.5 metric tons of soil excavated per burrow system.

The tsokors at these sites appeared to be very active in inspecting and maintaining their burrow systems. Due to the large tunnel diameter and volume of earth being moved, continuous monitoring was necessary as traps were frequently sprung or pushed out within minutes of being set. The traps were not ideal for capturing tsokors and our resulting trap success was poor in relation to our success with North and South American fossorial rodents. See Table 20 for morphological measurements.

According to Musser and Carleton (1993), the false tsokor only occurs in the Amur Basin of Russia and Inner Mongolia. Bannikov (1954), Shvetsov et al. (1984) and Sokolov and Orlov (1980), as well as Rossolimo (1995a), include this species in the fauna of Central Mongolia, including the Khentey and eastern Khangay ranges.

Table 20. Measurements for *Myospalax aspalax*.

	Female (n = 2)
Mass	304.5 (295–314) 2
Total	249.5 (245–254) 2
Tail	47.5 (42–53) 2
RHF	37 (37) 2
Ear	5 (4–6) 2
CIL	42.65 (42.03–43.26) 2
ZB	28.87 (28.53–29.21) 2
IOB	7.54 (7.16–7.92) 2
PTL	23.59 (23.4–23.77) 2
MTR	9.35 (9.07–9.63) 2

ORDER LAGOMORPHA
Family Ochotonidae
Ochotona alpina (Pallas, 1773)

Ulaan Tsutgalan ([3] MSB 94337 M, 94338 F, 94339 F)

One adult male and an adult and sub-adult female were taken from rocky outcroppings in the steppe of Ulaan Tsutgalan. *O. dauurica* also was taken at this site. See Table 21 for morphological measurements.

This species is distributed throughout the Sayan and Altai mountains, the upper Amur drainage (NW Kazakhstan, southern Russia, and NW Mongolia), and the N Kansu–Ninsia border in China. Within Mongolia, it is found in the Khangay, Khentey, and Altai mountain ranges.

Ochotona dauurica (Pallas, 1776)
Daurian Pika

Ulaan Tsutgalan ([4] MSB 94340 M, 94341 F, 94342 F, 94343 F)

Khetsuugiin Övör ([2] MSB 94346 F, 94347 F)

Hangal Soum ([2] MSB 94344 F, 94345 F)

One male (t = 6 x 3) and three juvenile females (no embryos or scars) were collected in sympatry with *O. alpina* in and around the rocky outcroppings of the Ulaan Tsutgalan area. MacDonald collected two adult females from Hangal Soum. One adult and one sub-adult female were taken from rocky outcroppings in steppe habitat at Khetsuugiin Övör.

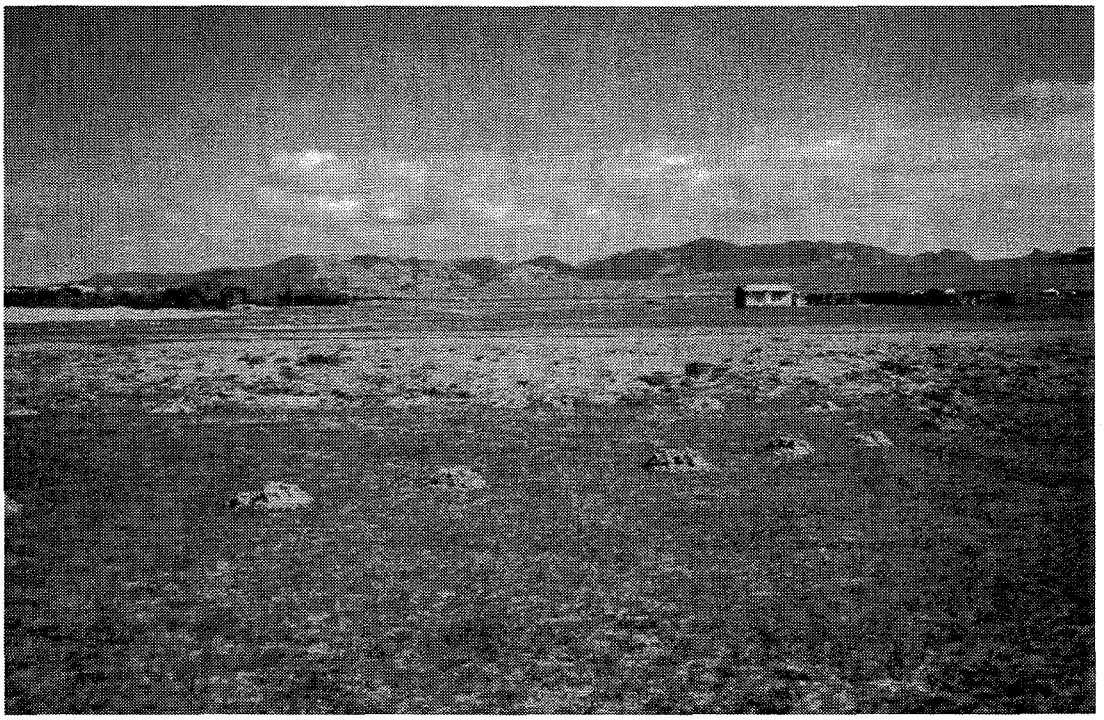

Fig. 12. *Myospalax aspalax* mounds at Elsen Tasarkhai.

Table 21. Measurements for *Ochotona*.

	O. alpina		*O. hyperborea*		*O. dauurica*	*O. pallasi*
	Female (n = 2)	Male (n = 1)	Female (n = 2)	Male (n = 2)	Female (n = 1)	Female (n = 2)
Mass	105 (88–122) 2	202	99.5 (97–102) 2	83.5 (70–97) 2	104	103.5 (102–105) 2
Total	171.5 (171–172) 2	200	165 (160–170) 2	145 (145) 2	182	159.5 (159–160) 2
Tail	0 (0) 2	0	0 (0) 2	0 (0) 2	0	0 (0) 2
RHF	29.5 (29–30) 2	32	27.5 (27–28) 2	27 (27) 2	32	31.5 (31–32) 2
Ear	23 (23) 2	23	19.5 (19–20) 2	19.5 (19–20) 2	21	23 (22–24) 2
CIL	36.30 1	44.98	36.57 (35.84–37.3) 2	34.46 (33.95–34.96) 2		34.6 (34.25–34.94) 2
ZB	20.54 1	23.00	19.15 (18.90–19.4) 2	19.09 (18.74–19.44) 2		23.6 (21.11–26.09) 2
IOB	5.20 1	4.80	4.58 (4.50–4.65) 2	4.99 (4.81–5.17) 2		4.67 (4.66–4.67) 2
PTL	14.04 1	16.80	13.19 (13.07–13.31) 2	12.69 (12.1–13.27) 2		13.33 (13.28–13.37) 2
MTR	7.44 1	8.68	7.39 (7.30–7.47) 2	7.13 (6.94–7.32) 2		7.49 (7.45–7.52) 2

Allen (1938) reported that they avoid rocky highlands and are found in grassy valleys, but our Ulaan Tsutgalan collection provides evidence for this species also occupying rocky steppe. *O. dauurica* make use of a variety of burrow types. Schauer (1987) reported that their burrows range from simple to complex and that they also use *Myospalax* burrows; we did not observe use of burrows of *Myospalax* at the two localities we collected tsokors. See Table 21 for morphological measurements.

This species is found in the steppes from the Altai, Tuva and Transbaikal through northern China and Mongolia, south to Qinhai province in China. In Mongolia, it is distributed through the mountain forest, steppes and in the desert steppes of the Mongolian and Gobi Altai.

Ochotona hyperborea (Pallas, 1811)
Northern Pika

Gorkhi–Terelj ([7] MSB 94348 M, 94349 F, 94350 F, 94351 F, 94352 F, 94353 M, 94354 F)

Two adult males (t = 4 x 3, 4 x 2), one adult female (5 embs. 2r, 3l), and one juvenile female were captured in the talus slopes of Gorkhi–Terelj at 1800 m. Northern pikas appeared to be abundant within the talus slopes at this elevation. Animals were seen frequently on the rocks during the daytime, and many burrows and hay piles were found, however they were never observed foraging in the surrounding meadows. Three additional females—two juvenile and one adult (4 embs. 3r, 1l)—were captured in meadows on the ridge-top at 2000 m, 50 to 70 m from the nearest talus slopes. No pikas, however, were observed in the high-elevation talus. All adult pikas we encountered were in a stage of molt. See Table 21 for morphological measurements.

The northern pika is distributed through the Ural, Putorana and Sayan mountains; east of the Lena River to Chukotka, Koryatsk and Kamchatka; upper Yenesei, Transbaikal and Amur; northcentral Mongolia, northeastern China, northern Korea, Hokkaido and Sakhalin. It is found across northern Mongolia, in the Khentey and Khangay mountains, and over to Hovsgol.

Ochotona pallasi (Gray, 1867)
Pallas' Pika

Arts Bogd ([2] MSB 94355 F, 94356 F)

Two adult females were shot in the open desert steppe. No burrows were encountered in the open; however, a burrow was found among the boulders on the slope of a rocky mountainside. Allen (1938) also reported them living in rocky hillsides. See Table 21 for morphological measurements.

Pallas' pika has a discontinuous distribution in arid regions (mountains and high steppe) in Kazakhstan, Altai mountains, Tuva and Mongolia to Xinjiang and Inner Mongolia. In Mongolia, it is restricted to the southern Khangay, and the Mongolian and Gobi Altai.

Family Leporidae

Lepus timidus (Linnaeus, 1758)
Mountain Hare

Lake Hovsgol National Park (MSB 98515 U)

At Hovsgol, the cranium and mandible of an adult specimen of unknown gender were salvaged from the forest floor. The larch forest (50% canopy cover) is a mixture of young and old trees. A thick layer of larch litter and many downed trees cover the forest floor, vegetative ground cover is 90%, and a shrub understory makes up 10%. The soil is very pliable and rich with organic matter. It is an extremely mesic area that becomes nearly submerged as runoff flows towards Lake Hovsgol during heavy rains.

The mountain hare ranges from north and east of the Caspian Sea, south to eastern Iran; east to Afghanistan and Kazakhstan, as well as into southern Siberia, Mongolia and China. In Mongolia, it is found in the northern forests of the Khentey, Khangay, Altai and Khingan mountains, as well as around Lake Hovsgol.

Lepus tolai (Pallas, 1778)
Tolai Hare

Ulziyt Uul (MSB 94357 F)

One pregnant female (measurements: 900–120–130–95, 2.25 kg, CIL 77.840, ZB 41.04, IOB 20.08, PTL 34.56, MTR 15.2) was shot with a rifle in the open Gobi steppe of this locality. She was carrying four embryos (MSB 94358, 94359, 94360, 94361) that were large enough (CRL= 56 mm, 6.5 g each) to obtain individual tissues from. Individuals of this species rarely were seen. Allen (1938) reported only three specimens from Arts Bogd and the general vicinity of our collecting locality, and he commented that they appeared to be rare elsewhere in the country.

The Tolai hare ranges widely throughout Eurasia; in Mongolia, it has been reported from most of the country, including the mountains, steppes and deserts.

CONCLUSIONS

The habitats contained within the political boundaries of Mongolia are typical of those occurring throughout central Asia. These are somewhat similar to habitats in the northern center of continental North America. During our field expedition we collected and identified 40 species of mammals (including the specimens provided by S.O. MacDonald). The checklist provided in the Appendix contains 136 species; however, we are not certain that current assessments of mammalian diversity in Mongolia are truly representative of the actual diversity.

An estimation is possible by comparing it with that of equal areas at similar latitudes on a continent with a more extensive inventory history. Thus, we calculated the number of mammal species present in roughly similar areas (size and latitude) in North America and compared these results to the estimated diversity of mammals of Mongolia. These areas ranged in area from 1.0 million km^2 to 1.6 million km^2. These landmasses, with the exception of the extremely dry deserts of southern Mongolia, shared similar types of habitats: boreal forest, short-grass steppes, and alpine regions. The number of species of mammals for the North American area (Table 22) was calculated from Hall (1981), Jones and Birney (1988) and Jones et al. (1985). Overall, the diversity of species of mammals in Mongolia was equal to or greater than that in equivalent areas within North America.

Despite the high estimated diversity of mammals in Mongolia relative to similar areas of the North American continent, we consider these estimates to be lower than reality. There are several species whose taxonomic status is under debate, and some of these ultimately could lead to a modest increase in the number of species in

Table 22. Mammalian diversity in Mongolia and equivalent areas of the U.S.

	Mongolia	NC† States	NC & Dakotas	Northern States‡
Area (million km²)	1.5	1	1.4	1.9
Rodents	65	39	47	65
Bats	14	13	18	22
Insectivores	13	13	15	14
Carnivores	23	22	22	24
Ungulates	14	7	8	9
Lagomorphs	7	4	6	8
Other Orders	0	1	1	2
Total Species	136	99	117	144

† NC States: Minnesota, Iowa, Wisconsin, Illinois, Michigan, Indiana and Ohio.

‡ Northern States: Minnesota, Iowa, Wisconsin, Nebraska, N & S Dakota, Wyoming, Idaho and Montana.

the Mongolian fauna. Among them are *Cricetulus pseudogriseus* and *Eptesicus gobiensis*, dealt with in the accounts above. Sokolov and Orlov (1992) proposed the elevation of *Ursus gobiensis* at a symposium, although most authors agree on the synonymy of *gobiensis* with *Ursus arctos* (Masuda et al. 1998; Rossolimo 1995b; Wozencraft 1993). Although *Equus przewalskii* is synonymized with *E. caballus* by Bennet and Hoffmann (1999) and Grubb (1993), it is reported as a valid species by other authors (Groves 1994; Rossolimo 1995b; Ryder 1994). *Sorex araneus* and *S. minutus* both occur in regions adjacent to Mongolia (Hoffmann 1985, 1987); thus, their occurrence in Mongolia merits further investigation. *S. araneus* has been reported from the country (Reading et al. 1994; Sokolov and Orlov 1985), but many of the formerly recognized subspecies of *S. araneus*, which occur in that region, have been synonymized with *S. roboratus* or *S. tundrensis* (Hoffmann 1985). Sokolov and Orlov (1985) stated that *S. minutus* might occur in Mongolia. While Reading et al. (1994) included it in their species list, there exists some question as to its presence in the country (Hoffmann, pers. comm.)

Based on unconfirmed reports as well as their distribution in adjacent regions, Mallon (1985) reported 24 species that possibly could occur in Mongolia. Of these, eight have since been collected within Mongolia. Many of these species occur in sections of the Altai Mountain range abutting Mongolia, or have distributions that encircle the country, indicating to us that they probably occur there, but have not yet been collected within its borders. Thus, the diversity of Mongolian mammals may in fact be higher than is currently recognized. Regardless, the apparent equity in species number already recorded in comparison with more explored areas in the U.S. is intriguing and dispels our prior notions of an area that was mammalogically vastly unknown. Still, there is the possibility of additional species to be found, especially once molecular and other genetic techniques are more widely used to investigate this fauna.

Mallon (1985) provided distributional maps with his checklist. The majority of our collection was from within the distributions outlined in his work. However, specimens from at least five species (*S. isodon, S. minutissimus, V. murinus, P. auritus* and *C. longicaudatus*) were collected from outside his reported ranges. Due to a relative lack of specimens and the tendency for collections to be made only in areas easily accessible (e.g., near urban areas or along roads), these maps should be viewed as preliminary in nature.

The foundation for research in Mongolia was laid in the early 20th century by researchers such as Hollister, Andrews and Allen, who first traversed the land by horse and camel. Later, armed with the new technology of the age (automobiles and movie cameras), they were able to ex-

pand the information on mammals from this region. Since that early period, great strides have been made by researchers from Mongolia, Russia and Germany. As a result of these decades-long collaborations came scores of publications and at least three books specifically addressing the mammalian fauna of Mongolia.

Although the baseline data of mammalian diversity may be well established, there are a host of topics (species distributions, geographic variation, reproductive biology, genetics, karyology, parasitology, long-term population demography, etc.) that remain very poorly understood for the Mongolian mammal fauna. To address these shortcomings, further field studies will need to be undertaken, and utilization of the resources accumulated by past researchers is essential. The majority of voucher specimens already collected from Mongolia are housed in collections such as the Zoological Museum of the Russian Academy of Sciences, St. Petersburg; the Zoological Museum of Moscow State University, Moscow; and the Siberian Zoological Museum, Novosibirsk. Although not as extensively represented in western collections, some specimens are present in collections of North America and Europe. The American Museum of Natural History, New York, houses most of the specimens from the Central Asiatic Expeditions. The Field Museum of Natural History in Chicago contains more than 330 specimens, mostly consisting of small mammals. Harvard University's Museum of Comparative Zoology has approximately 225 specimens, primarily from the Central Asiatic Expeditions. The Hungarian Natural History Museum in Budapest contains more than 300 specimens, primarily *Lasiopodomys* and other small mammals. While this is by no means an exhaustive list, these are important resources that future work should make use of and build upon.

A modern interpretation of the diversity of the mammals of Mongolia necessitates focused approaches of field-work combined with full-scale laboratory studies. In this way, the biology of the mammals in their habitat can be understood. The establishment of long-term ecological monitoring stations is one of the best ways to begin to understand the interplay of environmental conditions and the mammals themselves. For example, studies of mammals and their parasites on the Sevilleta Long-Term Ecological Research Site in New Mexico show the importance of sampling mammals and their parasite faunas over time (i.e., Decker *et al.* 2001). The continued collaboration of Mongolian biologists/mammalogists on the nascent ILTER sites in Mongolia with other ILTER research groups will enable intercontinental comparisons of mammal diversity, abundance and other important parameters. Minimum data sets taken at all LTER sites compared with density and diversity estimates of the mammals, combined with other data such as prevalence and diversity of parasites in and on the mammals under study (Decker et al. 2001), will enable broad comparative studies.

Similarly, new technology and techniques of our age can expand greatly our knowledge. New molecular techniques can help to clarify centuries old taxonomic questions. Global positioning systems can provide exact locality information, eliminating the ambiguous locality designations associated with multiple same-name localities and transliteration problems between Mongolian, Russian and English. Long-term ecological studies, satellite imagery and global information systems (GIS) can address the relationships between mammals, climate and habitat. At this time, there are still many questions concerning the biology of many of the mammals that we included in this summary; however, we hope that by publishing this work, other researchers will be stimulated to continue and expand these studies. Finally, Mongolia represents an important link in the rodent radiation between the Old and New World. A more complete knowledge of its fauna may enhance our overall understanding of rodent diversification in the Holarctic Region.

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APPENDIX

List of currently recognized species of mammals found in Mongolia with the source for their inclusion. Asterisks denote a species whose nomenclature has been updated from that listed in the source publication.

ORDER INSECTIVORA

Family Erinaceidae

1.	*Hemiechinus auritus* (Gmelin, 1770)	Sokolov and Orlov (1980)*
2.	*Mesechinus dauuricus* (Sundevall, 1842)	Sokolov and Orlov (1980)*

Family Soricidae

3.	*Crocidura suavelens* (Pallas, 1811)	Sokolov and Orlov (1980)
4.	*Crocidura leucodon* (Hermann, 1780)	Reading (1994)
5.	*Neomys fodiens* (Pennant, 1771)	Sokolov and Orlov (1980)
6.	*Sorex caecutiens* (Laxmann, 1788)	Sokolov and Orlov (1980)
7.	*Sorex daphaenodon* (Thomas, 1907)	Sokolov and Orlov (1980)
8.	*Sorex isodon* (Turov, 1924)	Shvetsov et al. (1984)
9.	*Sorex minutissimus* (Zimmerman, 1780)	Sokolov and Orlov (1980)
10.	*Sorex minutus* (Linnaeus, 1766)	Reading (1994)
11.	*Sorex roboratus* (Hollister, 1913)	Sokolov and Orlov (1980)*
12.	*Sorex tundrensis* (Merriam, 1900)	Sokolov and Orlov (1980)

Family Talpidae

13.	*Talpa altaica* (Nikolsky, 1883)	Sokolov and Orlov (1980)

ORDER CHIROPTERA

Family Vespertilionidae

14.	*Eptesicus bottae* (Peters, 1869)	Koopman (1993)
15.	*Eptesicus gobiensis* (Bobrinskii, 1926)	Sokolov and Orlov (1980)*
16.	*Eptesicus nilssoni* (Keyserling and Blasius, 1839)	Sokolov and Orlov (1980)*
17.	*Myotis brandti* (Eversmann, 1845)	Sokolov and Orlov (1980)
18.	*Myotis daubentoni* (Kuhl, 1817)	Sokolov and Orlov (1980)
19.	*Myotis ikonnikovi* (Ognev, 1912)	Koopman (1993)
20.	*Myotis mystacinus* (Kuhl, 1817)	Sokolov and Orlov (1980)
21.	*Nyctalus noctula* (Schreber, 1774)	Reading (1994)
22	*Pipistrellus savii* (Bonaparte, 1837)	Sokolov and Orlov (1980)*
23.	*Plecotus auritus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
24.	*Plecotus austriacus* (Fischer, 1829)	Sokolov and Orlov (1980)
25.	*Vespertilio murinus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
26.	*Vespertilio superans* (Thomas, 1899)	Sokolov and Orlov (1980)
27.	*Murina leucogaster* (Milne–Edwards, 1872)	Koopman (1993)

ORDER CARNIVORA

Family Canidae

28.	*Canis lupus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
29.	*Cuon alpinus* (Pallas, 1811)	Sokolov and Orlov (1980)
30.	*Nyctereutes procyonoides* (Gray, 1834)	Sokolov and Orlov (1980)
31.	*Vulpes corsac* (Linnaeus,1768)	Sokolov and Orlov (1980)
32.	*Vulpes vulpes* (Linnaeus, 1758)	Sokolov and Orlov (1980)

Family Felidae

33.	*Felis sylvestris* (Schreber, 1775)	Reading (1994)
34.	*Lynx lynx* (Linnaeus, 1758)	Sokolov and Orlov (1980)*
35.	*Otocolobus manul* (Linnaeus,1776)	Sokolov and Orlov (1980)*
36.	*Uncia uncia* (Schreber, 1775)	Sokolov and Orlov (1980)

Family Mustelidae

37.	*Arctonyx collaris* (Cuvier, 1825)	Stubbe et al. (1998)
38.	*Lutra lutra* (Linnaeus, 1758)	Sokolov and Orlov (1980)
39.	*Meles meles* (Linnaeus, 1758)	Sokolov and Orlov (1980)
40.	*Gulo gulo* (Linnaeus, 1758)	Sokolov and Orlov (1980)
41.	*Martes foina* (Erxleben, 1777)	Sokolov and Orlov (1980)
42.	*Martes zibellina* (Linnaeus, 1758)	Sokolov and Orlov (1980)
43.	*Mustela altaica* (Pallas, 1811)	Sokolov and Orlov (1980)
44.	*Mustela erminea* (Linnaeus, 1758)	Sokolov and Orlov (1980)
45.	*Mustela eversmannii* (Lesson, 1827)	Sokolov and Orlov (1980)
46.	*Mustela nivalis* (Linnaeus, 1766)	Sokolov and Orlov (1980)
47.	*Mustela sibirica* (Pallas, 1773)	Sokolov and Orlov (1980)
48.	*Mustela vison* (Schreber, 1777)	Reading (1994)
49.	*Vormela peregusna* (Güldenstädt, 1770)	Sokolov and Orlov (1980)

Family Ursidae

50.	*Ursus arctos* (Linnaeus, 1758)	Sokolov and Orlov (1980)

ORDER PERISSODACTYLA

Family Equidae

51.	*Equus caballus przewalskii* (Poljakov, 1881)	Sokolov and Orlov (1980)*
52.	*Equus hemionus* (Pallas, 1775)	Sokolov and Orlov (1980)

ORDER ARTIODACTYLA

Family Suidae

53.	*Sus scrofa* (Linnaeus, 1758)	Sokolov and Orlov (1980)

	Family Camelidae	
54.	*Camelus bactrianus* (Linnaeus, 1758)	Sokolov and Orlov (1980)*
	Family Moschidae	
55.	*Moschus moschiferus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
	Family Cervidae	
56.	*Cervus elaphus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
57.	*Alces alces* (Linnaeus, 1758)	Sokolov and Orlov (1980)
58.	*Capreolus pygargus* (Pallas, 1771)	Sokolov and Orlov (1980)
59.	*Rangifer tarandus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
	Family Bovidae	
60.	*Gazella subgutturosa* (Güldenstädt, 1780)	Sokolov and Orlov (1980)
61.	*Procapra gutturosa* (Pallas, 1777)	Sokolov and Orlov (1980)
62.	*Saiga tatarica* (Linnaeus, 1766)	Sokolov and Orlov (1980)
63.	*Capra sibirica* (Pallas, 1776)	Sokolov and Orlov (1980)
64.	*Ovis ammon* (Linnaeus, 1758)	Sokolov and Orlov (1980)
	ORDER RODENTIA	
	Family Sciuridae	
65.	*Marmota baibacina* (Kastschenko, 1889)	Sokolov and Orlov (1980)
66.	*Marmota sibirica* (Radde, 1862)	Sokolov and Orlov (1980)
67.	*Sciurus vulgaris* (Linnaeus, 1758)	Sokolov and Orlov (1980)
68.	*Spermophilus alashanicus* (Büchner, 1888)	Sokolov and Orlov (1980)*
69.	*Spermophilus dauricus* (Brandt, 1843)	Sokolov and Orlov (1980)*
70.	*Spermophilus erythrogenys* (Brandt, 1841)	Sokolov and Orlov (1980)*
71.	*Spermophilus undulatus* (Pallas, 1778)	Sokolov and Orlov (1980)*
72.	*Tamias sibiricus* (Laxmann,1769)	Sokolov and Orlov (1980)
73.	*Pteromys volans* (Linnaeus, 1758)	Sokolov and Orlov (1980)
	Family Castoridae	
74.	*Castor fiber* (Linnaeus, 1758)	Sokolov and Orlov (1980)
	Family Dipodidae	
75.	*Allactaga balikunica* (Hsia and Fang, 1964)	Mallon (1985)*
76.	*Allactaga bullata* (Allen, 1925)	Sokolov and Orlov (1980)
77.	*Allactaga elater* (Lichtenstein, 1828)	Sokolov and Orlov (1980)
78.	*Allactaga sibirica* (Forster, 1778)	Sokolov and Orlov (1980)
79.	*Pygeretemus pumilio* (Kerr, 1792)	Sokolov and Orlov (1980)*
80.	*Cardiocranius paradoxus* (Satunin, 1903)	Sokolov and Orlov (1980)
81.	*Salpingotus crassicauda* (Vinogradov, 1924)	Sokolov and Orlov (1980)
82.	*Salpingotus kozlovi* (Vinogradov, 1922)	Sokolov and Orlov (1980)
83.	*Dipus sagitta* (Pallas, 1773)	Sokolov and Orlov (1980)

84.	*Stylodipus andrewsi* (Allen, 1925)	Sokolov and Orlov (1980)
85.	*Stylodipus sungorus* (Sokolov and Shenbrot, 1987)	Sokolov and Orlov (1980)*
86.	*Euchoreutes naso* (Sclater, 1891)	Sokolov and Orlov (1980)
87.	*Sicista subtilis* (Pallas, 1773)	Reading (1994)
	Family Muridae	
88.	*Alticola barakshin* (Bannikov, 1947)	Rossolimo et al. (1994)
89.	*Alticola macrotis* (Radde, 1862)	Sokolov and Orlov (1980)
90.	*Alticola semicanus* (Allen, 1925)	Rossolimo et al. (1994)
91.	*Alticola strelzowi* (Kastchenko, 1899)	Sokolov and Orlov (1980)
92.	*Alticola tuvinicus* (Ognev, 1950)	Rossolimo et al. (1994)
93.	*Arvicola terrestris* (Linnaeus, 1758)	Sokolov and Orlov (1980)
94.	*Clethrionomys rufocanus* (Sundevall, 1846)	Sokolov and Orlov (1980)
95.	*Clethrionomys rutilus* (Pallas, 1779)	Sokolov and Orlov (1980)
96.	*Ellobius tancrei* (Blasius, 1884)	Sokolov and Orlov (1980)*
97.	*Eolagurus luteus* (Eversmann, 1840)	Sokolov and Orlov (1980)
98.	*Eolagurus przewalskii* (Büchner, 1889)	Sokolov and Orlov (1980)
99.	*Lagurus lagurus* (Pallas, 1773)	Sokolov and Orlov (1980)
100.	*Lasiopodomys brandtii* (Radde, 1861)	Sokolov and Orlov (1980)
101.	*Lasiopodomys mandarinus* (Milne–Edwards, 1871)	Sokolov and Orlov (1980)
102.	*Microtus fortis* (Büchner, 1889)	Sokolov and Orlov (1980)
103.	*Microtus gregalis* (Pallas, 1779)	Sokolov and Orlov (1980)
104.	*Microtus limnophilus* (Büchner, 1889)	Sokolov and Orlov (1980)
105.	*Microtus maximowiczii* (Schrenk, 1859)	Sokolov and Orlov (1980)
106.	*Microtus mongolicus* (Radde, 1861)	Sokolov and Orlov (1980)
107.	*Microtus obscurus* (Eversmann, 1841)	Musser and Carleton (1993)
108.	*Microtus oeconomus* (Pallas, 1776)	Sokolov and Orlov (1980)
109.	*Myopus schisticolor* (Lilljeborg,1844)	Sokolov and Orlov (1980)
110.	*Ondatra zibethicus* (Linnaeus, 1766)	Sokolov and Orlov (1980)
111.	*Allocricetulus curtatus* (Allen, 1925)	Sokolov and Orlov (1980)
112.	*Cricetulus barabensis* (Pallas, 1773)	Sokolov and Orlov (1980)
113.	*Cricetulus longicaudatus* (Milne–Edwards, 1867)	Sokolov and Orlov (1980)
114.	*Cricetulus migratorius* (Pallas, 1773)	Sokolov and Orlov (1980)
115.	*Cricetulus sokolovi* (Orlov and Malygin, 1988)	Musser and Carleton (1993)
116.	*Phodopus campbelli* (Thomas, 1905)	Sokolov and Orlov (1980)*
117.	*Phodopus roborovskii* (Satunin, 1903)	Sokolov and Orlov (1980)
118.	*Meriones meridianus* (Pallas, 1773)	Sokolov and Orlov (1980)
119.	*Meriones tamarascinus* (Pallas, 1773)	Sokolov and Orlov (1980)
120.	*Meriones unguiculatus* (Milne–Edwards, 1867)	Sokolov and Orlov (1980)
121.	*Rhombomys opimus* (Lichtenstein, 1823)	Sokolov and Orlov (1980)
122.	*Apodemus agrarius* (Pallas, 1771)	Sokolov and Orlov (1980)
123.	*Apodemus peninsulae* (Thomas, 1907)	Sokolov and Orlov (1980)
124.	*Micromys minutus* (Pallas, 1771)	Sokolov and Orlov (1980)

125.	*Mus musculus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
126.	*Rattus norvegicus* (Berkenhout, 1769)	Sokolov and Orlov (1980)
127.	*Myospalax aspalax* (Pallas, 1776)	Sokolov and Orlov (1980)
128.	*Myospalax psilurus* (Milne–Edwards, 1874)	Sokolov and Orlov (1980)
	Family Myoxidae	
129.	*Dryomys nitedula* (Pallas, 1778)	Sokolov and Orlov (1980)
	ORDER LAGOMORPHA	
	Family Ochotonidae	
130.	*Ochotona alpina* (Pallas, 1773)	Sokolov and Orlov (1980)
131.	*Ochotona dauurica* (Pallas, 1776)	Sokolov and Orlov (1980)
132.	*Ochotona hoffmanni* (Formozov et al., 1996)	Formozov and Baklushinskaya (1999)
133.	*Ochotona hyperborea* (Pallas, 1811)	Sokolov and Orlov (1980)
134.	*Ochotona pallasi* (Gray, 1867)	Sokolov and Orlov (1980)
	Family Leporidae	
135.	*Lepus timidus* (Linnaeus, 1758)	Sokolov and Orlov (1980)
136.	*Lepus tolai* (Pallas, 1778)	Sokolov and Orlov (1980)

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