

Ecology of the Daurian Hedgehog (*Hemiechinus dauuricus*) in Ikh Nart Nature Reserve, Mongolia: Preliminary Findings

James D. Murdoch¹, Batdorj Sodnompil², Suuri Buyandelger³, David Kenny⁴ and Richard P. Reading⁴

¹ Wildlife Conservation Research Unit, University of Oxford, Tubney House, Abingdon Road, Tubney, Abingdon, OX13 5QL, United Kingdom

² Mongolian State Education University, Department of Biology, Ulaanbaatar, Mongolia

³ National University of Mongolia, Department of Zoology, Ulaanbaatar, Mongolia

⁴ Denver Zoological Foundation, Conservation Biology Department, 2300 Steele Street, Denver, Colorado 80205 USA

ABSTRACT

The Daurian hedgehog ranges across northern Mongolia, southern Siberia, and northern China. However, few details of the species' behavior, ecology, or distribution are known. We conducted a pilot study of the ranging behavior and diet of Daurian hedgehogs in Ikh Nart Nature Reserve, Mongolia. We captured and radio-tagged eight hedgehogs (six males/two females) between June and September 2006. We tracked their movements until hibernation to estimate home range sizes and daytime nest characteristics. We also analyzed scats ($N = 38$) to gain a preliminary understanding of the food habits of the species. During the study, we collected 237 hedgehog locations, including 91 night, 141 day, and five hibernation sites. Hedgehogs were followed a mean of 53.43 ± 4.35 SE days from capture before entering hibernation. Mean home range size for seven hedgehogs was 422.72 ± 94.07 SE ha. Daytime nest sites had one, rarely two entrances, and usually occurred in rocky outcrops or at the base of shrubs. The most frequently occurring prey groups in scats included beetles (47%), cockroaches (28%), and grasshoppers (20%). Scats also included bird (3%), reptile (1%), and rodent (1%) remains. Daurian hedgehogs in Ikh Nart were generally larger in size, occupied larger home ranges, and ate similar foods compared to Daurian hedgehogs in other regions. The presence of Daurian hedgehogs in Ikh Nart also represents a range extension for the species.

Key words: Daurian hedgehog, diet, ecology, *Hemiechinus dauuricus*, home range, Ikh Nart

Introduction

Two species of hedgehog inhabit Mongolia: Daurian (*Hemiechinus dauuricus*) and long-eared (*H. auritus*) (Mallon, 1985). The long-eared hedgehog has been well-studied in other parts of Asia, but details of the fundamental behavior and ecology of the Daurian hedgehog remains largely unknown. To our knowledge, there have been no previous ecological studies of Daurian hedgehogs in the wild.

Long-eared hedgehogs, which share a close taxonomic relationship with Daurians, generally range over relatively small areas. Studies in Israel, for example, indicated that long-eared hedgehogs occupied home ranges from 0.17 to 9.97 ha, with males using larger ranges than females (Schoenfeld & Yom-Tov, 1985; Harrison & Bates, 1991). Long-eared and other hedgehog

species also rely mainly on insects for food, but reportedly consume a variety of foods including other invertebrates like spiders, worms, and mollusks; small vertebrates, such as birds and lizards; and occasionally plant material (Krishna, 1956; Ognev, 1962; Schoenfeld & Yom-Tov, 1985; Corbet, 1988; Dickman, 1988; Reeve, 1994; Jones *et al.*, 2006; Morris, 2006).

We inadvertently captured Daurian hedgehogs while trapping small carnivores for a different study in 2006. This provided us with an opportunity to explore the ecology of this mostly unstudied species. We conducted a pilot study of Daurian hedgehog ranging behavior and diet during the summer of 2006 to spring 2007 and report our results here. We hope to expand our work to include a comparative study of sympatric long-eared and Daurian hedgehogs in 2008.

Materials and Methods

Study area. We conducted the study in Ikh Nart Nature Reserve (hereafter Ikh Nart), located in northwestern Dornogobi Aimag, Mongolia (N 45.723°, E 108.645°). Ikh Nart was established in 1996 to protect 66,619 ha of rocky outcrops and its wildlife on the northern edge of the Gobi (Myagmarsuren, 2000; Reading *et al.*, 2006). The region is a high upland (~1,200 m) covered by semi-arid steppe vegetation. Permanent cold-water springs are available in some of the several, shallow valleys draining the reserve. Climate is strongly continental and arid, characterized by cold winters (to -40 °C), dry, windy springs (to 25 mps), and relatively wet, hot summers (to 40 °C). Precipitation is low and seasonal, with most precipitation falling in the summer (Reading *et al.*, 2006). The flora and fauna are representative of the semi-arid regions of Central Asia, with a mix of desert and grassland steppe species (Reading *et al.*, 2006). Vegetation is sparse and dominated by xerophytic and hyperxerophytic semi-shrubs, shrubs, forbs, and turfy grasses, including *Achnatherum splendens*, *Allium* spp., *Amygdalus pedunculata*, *Artemisia* spp., *Caragana pygmaea*, *Reaumuria soongorica*, *Salsola* spp., and *Stipa* spp. Different plant communities can be found around oases and streams, on rocky outcrops, and other localized areas.

Capture, radio-tagging, and home range estimation. To estimate home range size and evaluate the general ranging characteristics of the species, we captured, radio-tagged, and tracked hedgehogs. We captured hedgehogs in three ways. First, we captured hedgehogs opportunistically when we encountered them in their daytime resting sites (occasionally beneath rocky ledges, between boulders, or at the base of bushes or trees). Second, we captured them through nighttime searches with spotlights. Third, and most commonly, we captured them inadvertently in padded leg-hold traps (Victor Softcatch 1 & 1.5, Woodstream Corporation, Lititz, Pennsylvania, USA) set to capture small carnivores as part of another, on-going study in the reserve. We baited these traps with commercial hunting lures and modified them by increasing jaw offset to minimize the potential for injury. Traps were set in the evening and checked in the early morning from June to September.

We outfitted captured hedgehogs with 3 g

VHF radio transmitters (custom built, Advanced Telemetry Systems, Isanti, Minnesota, USA) by clipping their quills down to about 5 mm from the skin and encasing the quills and transmitters in a dental methacrylate composite (Protemp™ 3 Garant™, 3M ESPE Dental Products, St. Paul, Minnesota, USA), typically used in dentistry for temporary crowns and bridges (Kenny *et al.*, in prep.). We attached ear tags (Conservation Tag # 1005-1, National Band and Tag, Newport, Kentucky, USA) on most animals, weighed them, and collected the following body measurements: total body length, girth at mid-body, length of foreleg, length of hind leg, length of forefoot, length of hind foot, ear length from inside ear, ear length from outside ear, tail length, girth of neck, and anogenital distance. We did not collect all measurements on all animals. We also collected external parasites (*e.g.*, fleas and ticks) on each animal. We used ketamine (80 mg/kg body weight) to anesthetize some animals to facilitate transmitter application and measurements, although for other animals we were able to do both without the use of anesthesia. We generally held captured animals for 1 night and provided them with water and insects and domestic animal meat ad lib prior to release the subsequent evening.

We tracked radio-tagged hedgehogs using handheld antennas (three-element) and marked animal locations with a GPS (Global Positioning System) unit. We tracked animals at night and to nests or other hiding locations during the day. For night locations, we aimed to collect three to five locations per week on each animal. During daytime telemetry, we collected data on the type of hiding location (nest, base of bush or tree, or between or among rocks) and, for animals in nests, on nest substrate and burrow opening size, three to five times per week. We tracked hedgehogs until they entered hibernation (usually in October). We incorporated our telemetry data into a geographic information system (ArcGIS 9.1, ESRI, Redlands, California, USA) and used Animal Movement (Hooge & Eichenlaub, 1997) and Hawth's Tools extensions (Beyer, 2004) to examine hedgehog movements and calculate home ranges. We calculated home ranges as 100% minimum convex polygons (MCP) (Mohr, 1947).

Diet composition.—We collected fresh hedgehog scat (<1 day old) at daytime resting locations and from captured animals to gain a preliminary understanding of diet. We estimated scat age

based on observations of the decomposition of scats collected from captured animals. We placed scats in paper bags, air dried them, then placed them in nylon sieves (36 mesh/cm²) and washed them in an automatic clothes washer to remove detritus and unidentifiable material. We identified prey items in scats by comparing remains with a reference collection at the Mongolian Academy of Sciences. We identified insect remains to species level whenever possible. Other remains were grouped into broader categories, including birds, reptiles, and rodents. We calculated the percent occurrence of each prey item (*i.e.*, the number of scats containing a particular prey item/total number of scats).

We examined all variables for normality and compared mean measurements of male and female hedgehogs using separate variance t-tests. We present all data as \pm SE unless otherwise indicated.

Results

We captured 11 Daurian hedgehogs on 15 occasions from June 2006 to May 2007. Our identification of Daurian hedgehogs in Ikh Nart represents a range extension for the species (Allen, 1938; Ognev, 1962; Dulamtsere, 1970; Mallon, 1985; Corbet, 1988; Zhang *et al.*, 1997) (Fig. 1). Ecto-parasites found on captured hedgehogs included a single species of flea, the human flea (*Pulex irritans*), and a single species of tick, *Dermacentor nuttalli*.

Daurian hedgehogs at Ikh Nart measured an average of 252.40 ± 8.63 mm long, with a

mean girth of 345.10 ± 6.97 mm (Table 1). They possessed longer forelegs (mean = 76.67 ± 3.33 mm) than hind legs (mean = 51.67 ± 1.67 mm), but their hind feet were longer than their forefeet (43.78 ± 0.64 mm and 31.00 ± 3.00 mm, respectively). Mean shoulder height for two animals was 135.00 ± 15.00 mm. Daurian hedgehog ears measured an average of 22.82 ± 1.46 mm on the inside and 18.43 ± 4.45 mm on the outside. Tails were a mean of 29.22 ± 1.72 mm long. Neck circumference was a mean of 19.75 ± 0.25 mm for two hedgehogs. We measured the anogenital distance on two females (mean = 8.50 ± 1.50 mm). Mean hedgehog mass was $1,078.00 \pm 42.96$ g. Although males tended to be slightly larger than females, the differences were mostly small and not significant ($P > 0.05$) for measurements with adequate sample sizes for testing. The only exception was tail length that was significantly longer in females (mean = 33.75 ± 2.32 mm) than males (mean = 25.60 ± 2.34 mm; *t*-test: $t_{6,9} = 2.47$, $P = 0.04$).

We radio-tagged eight (six males and two females) of the Daurian hedgehogs we captured from June to September 2006. We recorded 237 telemetry locations on the tagged hedgehogs, of which 91 were night locations, 141 were day nest (or den) sites, and five were over-wintering hibernacula. Day nest sites had one, rarely two openings, with a mean of 1.10 ± 0.03 entrances per site. Day nest entrances measured an average of 15.25 ± 0.45 cm by 35.20 ± 1.30 cm. Hibernacula were similar, with mean entrance measurements of 17.17 ± 1.30 cm by 19.50 ± 2.51 cm. We excavated one hibernaculum located in a sandy substrate in May 2007 that extended 2.40 cm laterally and 159

Table 1. Body measurements of Daurian hedgehogs from Ikh Nart Nature Reserve, Dornogobi Aimag, Mongolia. All measurements are in mm, except for weight, which is in kg.

Variable	Overall			Males			Females		
	Mean	\pm SE	(N)	Mean	\pm SE	(N)	Mean	\pm SE	(N)
Body Length	252.40	± 8.63	(10)	257.43	± 9.61	(7)	240.67	± 19.33	(3)
Girth	345.10	± 6.97	(10)	347.86	± 9.87	(7)	338.67	± 4.10	(3)
Foreleg	76.67	± 3.33	(3)	75.00	± 5.00	(2)	80.00		(1)
Hind Leg	51.67	± 1.67	(3)	52.50	± 2.50	(2)	50.00		(1)
Hind Foot	43.78	± 0.64	(9)	44.20	± 0.20	(5)	43.25	± 1.49	(4)
Forefoot	31.00	± 3.00	(2)				31.00	± 3.00	(2)
Ear (inside)	22.82	± 1.46	(11)	23.29	± 1.84	(7)	22.00	± 2.74	(4)
Ear (outside)	18.43	± 1.72	(7)	18.60	± 2.29	(5)	18.00	± 3.00	(2)
Tail	29.22	± 2.11	(9)	25.60	± 2.34	(5)	33.75	± 2.32	(4)
Height	135.00	± 15.00	(2)	150.00		(1)	120.00		(1)
Neck	19.75	± 0.25	(2)	20.00		(1)	19.50		(1)
Anogenital	8.50	± 1.50	(2)				8.50	± 1.50	(2)
Weight	1.08	± 0.04	(13)	1.11	± 0.05	(9)	1.01	± 0.07	(4)

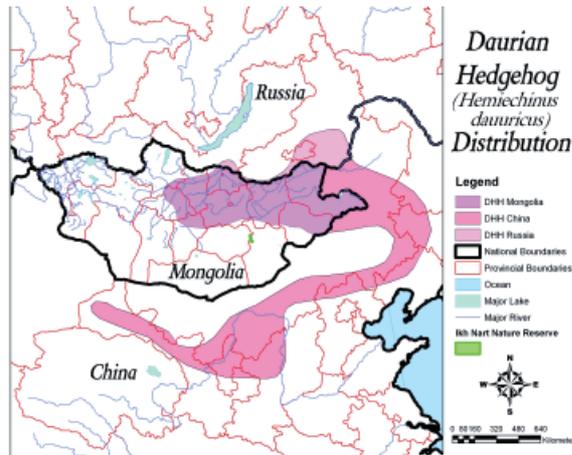


Figure 1. Reported range of the Daurian hedgehog in relation to the location of Ikh Nart Nature Reserve, Mongolia. Range adapted from Dulamtseren, 1970; Mallon, 1985; Corbet, 1988; and Zhang *et al.*, 1997.

cm vertically to the den chamber. The burrow opening measured 12 x 11 cm and was plugged 29 cm from the entrance.

We collected ≥ 25 telemetry locations in 2006 on seven (five males and two females) of the eight Daurian hedgehogs, permitting us to conduct additional analyses (Table 2). For those seven animals, we gathered an average of 32.71 ± 2.08 locations over 53.43 ± 4.35 days. Mean MCP home range was 422.72 ± 94.07 ha (Table 2). Males (mean = 462.46 ± 125.62 ha) covered larger home ranges than females (mean = 323.38 ± 119.21 ha). Although this difference was not significant (t -test: $t_{3,4} = 0.80$, $P = 0.47$), our sample sizes were too small to allow a rigorous test. The hedgehogs did not appear to be territorial, with substantial overlap in home ranges among individuals (Figure 2). Daurian hedgehogs were found primarily in areas with rocky outcrops (Figure 2), dominated by shrubs, onion grasses (*Allium* spp.), and turf grasses. Surprisingly, these small creatures (~1

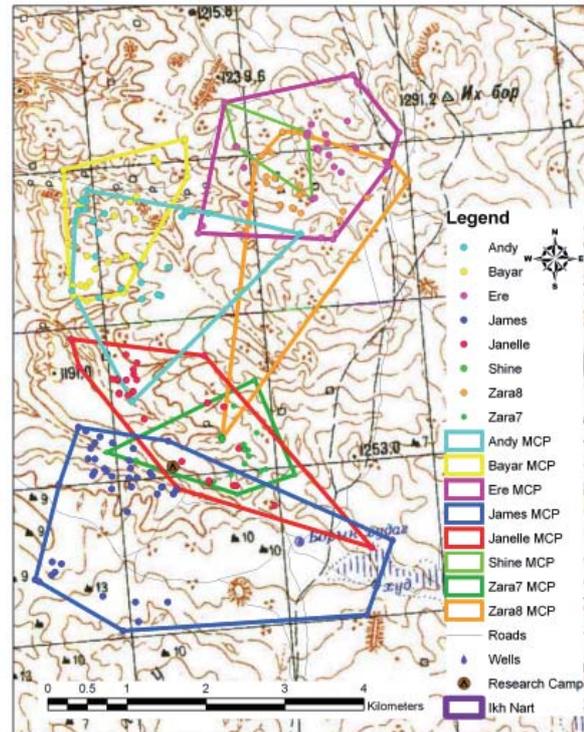


Figure 2. Daurian hedgehog locations and 100% minimum convex polygon home ranges in Ikh Nart Nature Reserve, Mongolia, Summer 2006.

kg) moved large distances during nighttime hours – sometimes over 2 kms.

We collected and analyzed 38 hedgehog scats. Daurian hedgehog diet consisted primarily of insects, although we found remains of birds, reptiles, and rodents in some scats (Table 3). We identified 18 insect species from eight families representing the orders Coleoptera (beetles), Orthoptera (crickets), and Blattodea (cockroaches) (Table 3). We found beetles (Coleoptera) in all scats. Tenebrionid beetles, particularly *Blaps femoralis*, represented the most commonly consumed insects, being found in 89.5% of scats collected. Hedgehogs, however, consumed a wide variety of other beetles from at least four other

Table 2. Daurian hedgehog telemetry data in Ikh Nart Nature Reserve, Mongolia, Summer 2006. MCP = 100% Minimum Convex Polygon home range.

Name	MCP Area (ha)	# Locations	Days in Study
Andy (♂)	263.34	32	48
Bayar (♂)	207.76	36	59
Ere (♂)	450.75	34	63
James (♂)	921.73	42	64
Zara8 (♂)	468.71	28	32
Shine (♂)	76.24	4	4
Janelle (♀)	442.59	32	48
Zara7 (♀)	204.17	25	60
Mean (25 locations)	422.72	32.71	53.43
Standard Error (25 locations)	94.07	2.08	4.35

Table 3. Percent occurrence of prey species consumed by Daurian hedgehogs based on an analysis of 38 scats collected from June 2006 to September 2006 in Ikh Nart Nature Reserve, Mongolia.

<i>Prey</i>	<i>Percent Occurrence</i>
Insects	100.0
Coleoptera	100.0
Tenebrionidae	89.5
Carabidae	15.8
Scarabaeidae	13.2
Curculionidae	10.5
Buprestidae	2.6
Unknown	44.7
Blattodea	60.5
Corydiidae	60.5
Orthoptera	42.1
Bradyporidae	39.5
Acrididae	5.3
Birds	5.3
Reptiles	2.6
Rodents	2.6

families, as well as crickets and wild cockroaches. The most commonly consumed insects included *Blaps femoralis* (78.9%; Coleoptera, Tenebrionidae), *Eupolyphaga sinensis* (60.5%; Blattodea, Corydiidae), and *Omocestus viridulus* (39.5%; Orthoptera, Acrididae) (Table 3). Beetle remains from unknown species occurred in 44.7% of scats. The occurrence of bird, reptile, and rodent remains was rare.

Discussion

The range of the Daurian hedgehog reportedly extends in an arc across the northeastern part of Mongolia and adjacent areas of southern Siberia into Inner Mongolia, China and then south along the eastern and southern edges of the Gobi Desert in China (Allen, 1938; Ognev, 1962; Dulamtseren, 1970; Corbet, 1988; Reeve, 1994; Zhang *et al.*, 1997) (Figure 1). The species' range encompasses most of the Mongolian provinces of Bulgan, Selenge, Tov, Khentii, Dornod, and Sukhbaatar, as well as parts of Arkhangai, and Ovorkhangai. The range includes adjacent portions of Russia in southernmost Buryatia and the Daurian steppes of Chita. In China, Daurian hedgehogs are reported from the Daurian steppes of Inner Mongolia, and then east to include the eastern and southern portions of Inner Mongolia, southwestern Heilongjiang, western Jilin and Liaoning, northern Hebei, Shanxi, Ningxia, and Gansu (along the north slopes of the Qilian Mountains). Our findings extend the species' range

into northern Dornogobi Province, and probably Govisumber Province as well (Figure 1).

The Daurian hedgehogs we measured tended to be longer, with longer tails and hind feet, but shorter ears than Daurian hedgehogs measured by previous researchers (Table 4). We believe this may be partly due to taxonomic confusion among earlier studies. Some earlier researchers considered *H. dauuricus* simply a distinct subspecies of *H. auritus* (Allen, 1938). Since long-eared hedgehogs tend to be smaller than Daurian hedgehogs, with longer ears and shorter tails and hind feet (Table 4), pooling these two species together may have compromised earlier morphometric reports.

Reeve (1994) reports that hedgehogs use three types of nests: day nest, breeding nests, and hibernacula. Species of the *Hemiechinus* genus typically use single burrows for their unlined day nests, often using burrows from other species (Schoenfeld & Yom-Tov, 1985; Reeve, 1994). Similar to Daurian hedgehogs, Ognev (1962) reported that long-eared hedgehogs prefer soft soil, sand, and rock fissures for day nest sites. In Israel, Schoenfeld and Yom-Tov (1985) found that 70% ($N = 26$) of long-eared hedgehog nests consisted of burrows, 27% ($N = 10$) occurred in depressions under rocks, and 4% ($N = 1$) was simply in a pile of vegetation at the base of a tree. At 10 to 17 cm in diameter, they found smaller burrow entrances than we did, but again, long-eared hedgehogs tend to be smaller than Daurian hedgehogs (Table 4). In Rajasthan, India, Krishna

Table 4. Comparison of body measurements of *Hemiechinus* species from different studies. See literature cited for complete citation of references.

Species	Location	Mean \pm SD or Range Measurements (mm)				Reference
		Body Length	Ear	Tail	Hind Foot	
<i>H. auritus</i>	Middle East	187.9 \pm 20.2	36.6 \pm 3.5	24.2 \pm 6.8	30.9 \pm 2.1	[1]
<i>H. auritus</i>	Russia	153 – 190	29 – 40	31 – 39		[2]
<i>H. auritus</i>	Israel	172 \pm 23	35 \pm 4	21 \pm 3	33 \pm 3	[3]
<i>H. dauuricus</i>	Mongolia	244	34	28		[4]
<i>H. dauuricus</i>	Mongolia	210 – 266	33	25 – 31	41 – 43	[5]
<i>H. dauuricus</i>	Mongolia	195 – 200	25 – 29	14 – 15		[6]
<i>H. dauuricus</i>	Mongolia	252.4 \pm 27.3	22.8 \pm 4.9	29.2 \pm 6.3	43.8 \pm 1.9	[7]

[1] Harrison and Bates, 1991; [2] Ognev, 1962; [3] Schoenfeld and Yom-Tov, 1985; [4] Pallas (no date) in Allen, 1938; [5] Lönnberg (no date) in Allen, 1938; [6] Kashchenko (no date) in Ognev, 1962; [7] This study.

and Prakash (1955) reported single entrances to day nest burrows measuring only 6.5 to 10 cm in diameter for collared (*H. collaris*) and Indian (*Paraechinus micropus*) hedgehogs.

Home ranges in our study far exceed those reported for other species (by one to two orders of magnitude), but similar to other studies, males used larger home ranges than females at Ikh Nart. Harrison and Bates (1991) reported mean home range sizes of 2.8 ha and 4.9 ha for female and male long-eared hedgehogs, respectively in Israel. Also in Israel, Schoenfeld and Yom-Tov (1985) found similar home ranges sizes for long-eared hedgehogs: 5.0 \pm 0.8 SD ha for males, 2.9 \pm 1.4 SD ha for non-lactating females, and 2.2 \pm 1.5 SD ha for all females. Home ranges for eastern European hedgehogs (*Erinaceus concolor*) varied from 0.5 to 11.2 ha for males and 0.8 to 3.5 ha for females in Russia and Israel (Schoenfeld & Yom-Tov, 1985; Reeve, 1994). Finally, European hedgehogs (*E. europeaus*) used mean home ranges of 6.4 to 96.0 ha for males and 6.9 to 29.1 ha for females in various European countries (Morris, 1988; Reeve, 1994; Doncaster *et al.*, 2001; Riber, 2006). Larger home range sizes in these studies were usually associated with study areas further from urban and suburban development (Riber, 2006). As with our research, previous studies found no evidence of territoriality among any species of hedgehog (Schoenfeld & Yom-Tov, 1985; Morris, 1988; Reeve, 1994; Riber, 2006).

The diet of hedgehogs in Ikh Nart is consistent with previous accounts of the species that indicate grasshoppers and beetles are commonly consumed (Allen, 1938; Corbet, 1988). Similarly, Dulamtseren (1970) states that Daurian hedgehogs eat primarily insects and small mammals, and sometimes visit gers, dwelling of local herders to eat the meat of domestic animals. Studies of other

Hemiechinus species similarly found that insects comprised the bulk of hedgehog diets, which also included some small vertebrates, especially lizards (Krishna, 1955; Ognev, 1962; Schoenfeld & Yom-Tov, 1985; Harrison & Bates, 1991; Reeve 1994).

Further studies that examine fine-scale habitat use and diet relative the prey availability would provide greater insight into the ecology of the species. Daurian hedgehogs also live sympatrically with long-eared hedgehogs in the Ikh Nart reserve. We plan to conduct further research to examine niche separation between these two species.

Acknowledgments

The Denver Zoological Foundation, Earthwatch Institute, Trust for Mutual Understanding, University of Oxford, the Mongolian Academy of Sciences, and ESRI provided funding for the project. We thank S. Amgalanbaatar, A. DeNicola, N. Narantuya, Dr. Janchiv, B. Lhagvasuren, T. Munkhzul, G. Otgonbayar, Purevsuren, T. Selenge, E. Togoldor, Tomortogoo, and N. Enkhuvshin, as well as students from Colorado College and volunteers from Earthwatch for their assistance with the project.

References

- Allen, G.M. 1938. *The Mammals of China and Mongolia*. New American Museum of Natural History, New York, USA.
- Beyer, H.L. 2004. *Hawth's Analysis Tools for ArcGIS*. <http://www.spatial ecology.com/htools>.
- Corbet, G.B. 1988. The family Erinaceidae: A synthesis of its taxonomy, phylogeny, ecology, and zoogeography. *Mammal Review*, 18: 117-172.

- Dickman, C.R. 1988. Age-related dietary change in the European hedgehog, *Erinaceus europaeus*. *Journal of Zoology (London)*, 215: 1-14.
- Doncaster, C.P., Rondinini, C & Johnson, P.C.D. 2001. Field test for environmental correlates of dispersal in hedgehogs, *Erinaceus europaeus*. *Journal of Animal Ecology*, 70: 33-46.
- Dulamtsuren, S. 1970. *A Key to the Mammals of the Mongolian People's Republic*. Mongolian State Publishing House, Ulaanbaatar, Mongolia (In Mongolian).
- Harrison, D.L. & Bates, P.J.J. 1991. *The Mammals of Arabia, 2nd Edition*. Harrison Zoological Museum, Sevenoaks, United Kingdom.
- Hooge, P.N. & Eichenlaub, B. 1997. *Animal Movement Extension to ArcView. Ver. 2.0*. Alaska Science Center – Biological Science Office, U.S. Geological Survey, Anchorage, Alaska.
- Jones, C., Moss, K. & Sanders, M. 2005. Diet of hedgehogs (*Erinaceus europaeus*) in the upper Waitaki Basin, New Zealand: Implications for conservation. *New Zealand Journal of Ecology*, 29: 29-35.
- Krishna, D. 1956. Hedgehogs of the desert of Rajasthan, Park 2. Food and feeding habits. *Journal of the Bombay Natural History Society* 53:362-366.
- Krishna, D. & Prakesh, I. 1955. Hedgehogs of the desert of Rajasthan, Park 1. Fossorial habits and distribution. *Journal of the Bombay Natural History Society*, 53: 38-43.
- Mallon, D. 1985. The mammals of the Mongolian People's Republic. *Mammal Review*, 15: 71-102.
- Morris, P.A. 1988. A study of home range and movements in the hedgehog (*Erinaceus europaeus*). *Journal of Zoology (London)*, 214: 433-449.
- Morris, P. 2006. *The New Hedgehog Book*. Whittet Books, Suffolk, United Kingdom.
- Mohr, C.O. 1947. Table of equivalent populations of North American small mammals. *American Midland Naturalist*, 37: 223-249.
- Myagmarsuren, D. 2000. *Special Protected Areas of Mongolia*. Mongolian Environmental Protection Agency and the German Technical Advisory Cooperation (GTZ), Ulaanbaatar, Mongolia.
- Ognev, S.I. 1962. *Mammals of Eastern Europe and Northern Asia*. Israel Program for Scientific Translations, Jerusalem, Israel.
- Reading, R.P., Kenny, D. Wingard, G. Mandakh, B. & Steinhauer-Burkart, B. 2006. *Ikh Nart Nature Reserve*. Nature-Guide No. 4, Mongolia. ECO Nature Edition Steinhauer-Burkart OHG, Oberaula, Germany.
- Reeve, N. 1994. *Hedgehogs*. T & AD Poyser, LTD, London, United Kingdom.
- Riber, A.B. 2006. Habitat use and behavior of European hedgehog *Erinaceus europaeus* in a Danish rural area. *Acta Theriologica*, 51: 363-371.
- Schoenfeld, M. & Yom-Tov, Y. 1985. The biology of two species of hedgehogs, *Erinaceus europaeus concolor* and *Hemiechinus auritus aegyptius*, in Israel. *Mammalia*, 49: 339-355.
- Zhang Y., Jin, S., Quan, G., Li, S., Ye, Z., Wang, F. & Zhang M. 1997. *Distribution of Mammalian Species of China*. China Forestry Publishing House, Beijing, P.R. China.

Хураангуй

Дагуурын зараумард Монгол, өмнөд Сибир, умард Хятадын нутгийг хамарсан тархацтай бөгөөд энэ зүйлийн зан төрх, экологи, тархацын тухай нарийвчилсан мэдээ баримт хомс байдаг. Их нартын байгалийн нөөц газар дахь дагуурын зарааны байршил, идэш тэжээлийн судалгааны үр дүнг энэ өгүүлэлд тусгалаа. Бид 2006 оны 6-р сараас 9-р сарын хооронд нийт найман (зургаан эр, хоёр эм) зарааг барьж радио дохио дамжуулагч зүүгээд, тэдний байршил нутгийн хэмжээ, өдрийн цагаар байрладаг үүрний шинж чанарыг үнэлэх зорилгоор шилжилт хөдөлгөөнийг нь бүртгэв. Мөн уг зүйлийн идэш тэжээлийг судлахаар ялгадас (N=38) цуглуулсан. Судалгааны явцад зарааны нийт 237 байршлын цэг (шөнийн 91, өдрийн 141, ичиж байх үеийн 5 цэг) тэмдэглэгдсэн. Бодгалиудыг барьсан өдрөөс ичээнд орох хүртэл дунджаар 53.43 ± 4.35 SE өдрийн турш байршлын мэдээлэл цуглуулсан. Долоон бодгалийн дундаж байршил нутаг 422.72 ± 94.07 SE га байсан. Өдрийн цагаар байрладаг үүр нь нэг, цөөн тохиолдолд 2 орцтой бөгөөд хад чулуутай газар, эсвэл бут сөөгний ёроолд тохиолдож байв. Ялгадсанд элбэг тохиолдож буй идэш тэжээлийн бүлэгт цох (47%), жоом (28%), шулуун далавчтан (20%) орж байна. Ялгадсанд мөн шувуу (3%), мөлхөгчид (1%), мэргэгчид (1%) тохиолдож байлаа. Их нарт

дахь дагуурын зараа бусад нутагт тохиолдох дагуурын зараатай харьцуулахад биеийн хэмжээ, байршил нутгийн хэмжээ зэргээр харьцангуй том боловч идэш тэжээлийн хувьд

ижил төсөөтэй байна. Их нартад дагуурын зараа тохиолдож байгаа нь тухайн зүйлийн тархац нутгийн хэмжээг нэмэгдүүлж байгаа мэдээ болно.

Received: 16 June 2007
Accepted: 23 November 2007