New record of Southern birch mouse, *Sicista subtilis trizona* in Hungary

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A b s t r a c t . The Southern birch mouse, *Sicista subtilis* (Pallas, 1773), is one of the rarest and least known small mammal species in Europe. At present, the occurrence of its subspecies, the *S. subtilis trizona* (Frivaldszky, 1865), is confined to Hungary. The last living individual of this rare subspecies was caught in 1926. Prior to 2006, individuals were detected only from owl-pellets, but at fewer and fewer localities. After an 80 year hiatus in the records, the first living specimen was trapped on 21st June, 2006 in the Borsodi Mezőség (NE Hungary), at a location well known from previous skeletal records. In the same year, another 42 specimens were trapped. Recapture occurred only three times. The last three specimens were captured on 22nd September in 2006. So far *S. subtilis trizona* has occurred mainly in weed vegetation *Carduetum acanthoidis* and in its edge. These patches mostly border on abandoned plough-land vegetation (*Convolvulo–Agropyretum repentis*) dominated by annual grasses. The majority of the habitat had been ploughed a short time earlier (approx. 10–15 years), and barns and other farm-buildings occupying smaller part of it.

Key words: mammals, rodent, endangered species, pitfall traps

Introduction

The Southern birch mouse, *Sicista subtilis* (Pallas, 1773), is a rare and near-threatened small mammal species in Europe. Admittedly, the only occurrence of its subspecies, the *S. subtilis trizona* (Frivaldszky, 1865) – differing from other subspecies of *S. subtilis* in phallic morphology (M é h e l y 1913) – is only known from the Carpathian Basin. The author of *S. subtilis trizona* was changed recently from P e t é n y i (1882) to F r i v a l d s z k y (1865) because the scientific binomen *Mus trizonus* was first introduced by F r i v a l d s z k y in 1865 as a junior synonym of *Sminthus vagus* (F r i v a l d s z k y 1865). The manuscript notes of Petényi were published in 1882 (C h y z e r 1882), which included a detailed description of *Mus trizonus*. On the basis of clear evidences, the two nominal taxa were based on the same syntypic material of five individuals. According to the International Code of Zoological Nomenclature (ICZN 1999) the author of the scientific name *Mus trizonus* is F r i v a l d s z k y (for a detailed nomenclature see B á l i n t & G u b á n y i 2006).

As of this date, *S. subtilis trizona* is regarded as extinct in Austria (P u c e k 1999). The last published data from its known Serbian locality (Deliblat) dates from the 1980s (H a m et al. 1983, P e t r o v 1992), and - in spite of expedient research - the species has not been detected ever since (M. P a u n o v i c , pers. comm.). Occurrences of individuals were recorded in Slovakia near the Hungarian border based on materials from owl-pellets 20–30 years ago (D e m e t e r & O b u c h 2004). According to G. D e m e t e r (pers. comm.) who found these skeletal materials, this species probably does not occur in this region at the present.

Prior to 2006, the last live specimen of *S. subtilis* in Hungary was caught in 1926 (V á s á r h e l y i 1929). Between 1926 and 2006, skeletal materials of specimens were recovered only from owl-pellets, but from fewer and fewer localities (S c h m i d t 1962, 1971, C s e r k é s z 2004). In addition to a natural eastward area-regression that begun in the Holocene, destruction and contamination of the undisturbed lowland habitats are responsible for the declining population trends of this species. As in the case of several other species, the Central-European *Sicista*-populations collapsed in the 1960s, due to the dynamically intensifying agriculture. Today, the distribution range of the *trizona* subspecies has shrunken into only one location, nearing extinction. The species conservation project for Hungarian populations began in 2004 (C s e r k é s z 2004) and its first results are presented in this paper.

Material and Methods

The live trapping began in 2000 at various locations in the Borsodi Mezőség Landscape Protection Area (47°48'N–20°50'E) where the species occurrence were suspected based on materials from owl-pellets. In historical times, the area was regularly flooded by the river Tisza, which turned the land into a marshy region for several months. River regulation in the 19th and 20th centuries and building extensive soil drainage system did not yield the expected results; only a small part of the area became suitable for productive agricultural cultivation, and the rest of the land underwent salinization. Some lower-lying areas, however, have remained wet (oxbow lakes, marshes near the Tisza, land-parcels in areas situated at lower levels where fresh hayfields dry out quickly). Areas with salty soil, and alkali pastures alternate with agricultural fields and small patches of remnant steppe. The region's climate is similar to that of the Hortobágy. The annual average temperature is 10 °C; the annual average precipitation is 550 millimetres. The main factor in the evolvement of these meadows and forest steppes are the particular climatic pattern; the winters of the region are markedly cold, the summers are hot, and the whole year is generally dry.

The following three main habitat patches were distinguished in the studied area: weed vegetation (*Carduetum acanthoidis*), abandoned plough-land (*Convolvulo–Agropyretum repentis*) and saline pasture, the steppe (*Artemisio santonicae–Festucetum pseudovinae*).

We set box-type live-traps, later pitfall live-traps following a transect. Plastic box-traps (20 x 8 x 10 cm) were baited with seeds and carrot, pitfalls were left unbaited. The pitfall-trap consisted of a polyvinylchloride (PVC) pipe (20 cm long and 10 cm wide) sunk to a depth where the rim was even with the ground level. Small holes were bored at the bottom of the cylinders to allow rainwater to drain.

Considering that we had no useful information on the habitat preference of *S. subtilis,* we attempted to trap individuals in different vegetations. After catching the first specimens, we set three pitfall- and one 7x7 grid with box-traps in the thistle weed-vegetation (*Carduetum acanthoidis*) and in its surrounding, near the town of Mezőcsát (Fig. 1.). Building the grids of pitfall traps, we buried 5x6, 4x8 and 3x6 traps with 10-metre trap spacing between them. We did not use drift fences because we tried to have as little impact on the area as possible. We checked all traps three times a day and marked each captured individual with toe-tattooing. We trapped every month between April and November and each trapping session lasted five nights.

Results and Discussion

In an average year the relative frequency of *S. subtilis* skeletal materials in barn owl (*Tyto alba*) pellets collected on the protected area of the Borsodi Mezőség is only 1–2%. (The

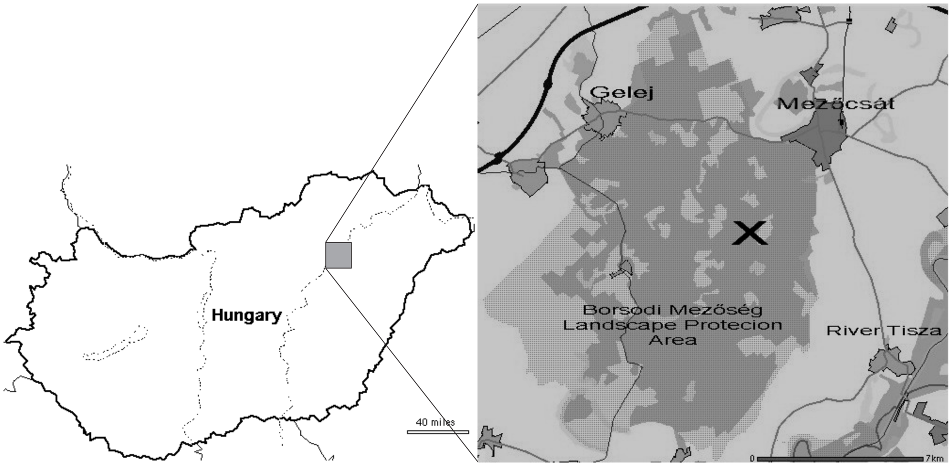

Fig. 1. Location (**x**) where Southern birch mice (*S. subtilis trizona*) were trapped in the Borsodi Mezőség Landscape Protection Area. Lightly shaded lines refer to protected area and darkly shaded lines show the grassland-zone.

relative frequencies were calculated from the number of individuals of *S. subtilis* in the sample x 100 / total number of the mammalian prey in the sample.) In 1998, however, there was an increase in density, when the relative frequency of the species in pellets was more than 10% (Cserkész 2007). Based on these data, we were optimistic about our chances of live-trapping individuals, but in the first five years we did not capture any *S. subtilis* because we attempted to trap in habitats where the mouse does not occur. We captured the first specimen, an adult male, on the 21st of June, 2006 using a box-trap. In the same year, we caught another 2 specimens (0.3% of total mammal captures) with the same type of trap, and an additional 40 individuals (8.6% of the total mammal captures) with pitfall traps. We observed, that while the box-traps were baited with sunflower seeds and carrot, but none of the animals took it as food. Recapture or previously marked animals occurred only three times. We captured the last three individuals on the 22nd September, 2006 and on the 14th September, 2007. We caught specimens in all of the four quadrants (one quadrant with box-traps and three with pitfalls). Despite the relatively warm whether, we caught no additional specimens of *S. subtilis* in October and November. According to Bolshakov et al. (1977) and Rokitansky (1952), *S. subtilis* stays underground if the temperature is lower than 10–12 °C. The mouse collects reserve which is consumed in the summer (Vásárhelyi 1929), probably on cold days. According to the same author, the underground nest is left only for food gathering and for the rest of the time its exit remains blocked. In 2007, we caught the first *S. subtilis* of the season on the 12th April, in the early morning at a temperature of 3.6 °C. The ratio of males/females, which were doubtless sexed (75% of total captured mice), was 1.75:1. It had already been noted by Ausländer & Hellwing (1957) that males were captured more often than females (2:1). Ham et al. (1983) caught only males in Serbia.

Spadefooted toad (*Pelobates fuscus*) was the most frequent vertebrate in pitfalls. In addition to *S. subtilis,* three other small mammals were frequently captured: *Microtus arvalis, Apodemus agrarius* and *Sorex araneus*. The summary of trapping result are presented in Table 1 in addition to owl-pellets data, but these results are not examined in this paper.

88.2% of *S. subtilis* individuals were caught in thistle vegetation *Carduetum acanthoidis* and in its edge. These vegetation patches are frequently on the fringe of abandoned plough-lands covered by characteristic vegetation (*Convolvulo–Agropyretum repentis*) dominated

Table 1. Comparison of relative abundance (%) of small mammals captured with traps and found in owl-pellets (after C s e r k é s z 2007). Only trapped mammal species are listed. Abbreviations: SMI = *Sorex minutus*, SAR = *S. araneus*, CSU = *Crocidura suaveolens*, CLE = *C. leucodon*, NAN = *Neomys anomalus*, SSU = *Sicista subtilis*, AUR = *Apodemus uralensis*, AFL = *A. flavicollis*, ASY = *A. sylvaticus*, MMI = *Micromys minutus*, MSP = *Mus spicilegus*, MAR = *Microtus arvalis*, AAG = *Apodemus agrarius*.

	SMI	SAR	CSU	CLE	NAN	SSU	AUR	AFL	ASY	MMI	MSP	MAR	AAG
pit-trap	11.6	31.2	0.1	3.4	2.5	8.6	1.8	0	0	1.6	0.2	38.3	0.7
box-trap	0	11.6	0.1	0.9	0.3	0.3	7.3	1.5	0.3	1.4	0	37.4	39
owl-pellets	6.9	13.9	4.3	9.3	0.9	1.4		4.8*		3.2	6.3	44.5	2.7

*= wood mice (*Sylvaemus*) all together

by annual grasses. We also caught a few individuals in these adjacent areas. The habitat of *S. subtilis* adjoins solonetz steppe (*Artemisio santonicae–Festucetum pseudovinae*), too. Most parts of the habitat had been ploughed a short time (10–15 years) earlier, with barns and other farm-buildings standing in the vicinity.

In Austria the species was found in "woody steppe biotope", sandy grassland where characteristic plant species are *Bromus tectorum* and *Festuca vaginata*, and in "*Astragalo–Stipetum*" pannon type steppes (B a u e r 1960). In Deliblat (Serbia), besides the steppe-zone, it was found in orchards, and between houses of a former vineyard (P e t r o v 1992) where the soil was yellow sand. None of these papers mention the adhering of *S. subtilis* to the thistle weed vegetation. Only M é h e l y (1913) noted it on thistle: "its underground nest is lined with silky tuft of thistle" and P o p o v (1960) caught *S. subtilis* in the Volga–Kama region in thistles. F l i n t (1960) regards it as the most euryecious rodent of Kazakhstan.

During our trapping, several colour variants have turned up. The youngs were more colourful, with more yellow in the pelage, especially on the lateral parts. The number of visible stripes running along the back was also variable. One black stripe bordered by two

Table 2. Descriptive statistics of the 43 trapped specimens of *S. subtilis* from the Borsodi Mezőség.

	Minimum	Maximum	Mean	SD
Mass (g)	3.5	14.5	7.7	1.99
Length of body (mm)	49.0	66.0	61.2	5.53
Length of tail (mm)	56.0	76.0	71.2	4.83
Length of foot (mm)	13.0	16.0	14.8	0.88

Fig. 2. Juvenile (left) and adult (right) *S. subtilis trizona*. Photos by the authors.

light stripes ran on the back of the adults. In juveniles, these light stripes or patches were bordered by one darker stripe on the edge of the back and side (Fig. 2). Basic biometric data are given in Table 2.

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