

# Husbandry Guidelines for northern birch mouse

## *Sicista betulina*

Compiled by Galina Vakhrusheva & Olga Ilchenko in December, 2012  
*Moscow zoo*

### 1. Northern birch mouse in the wild. Natural history

#### 1.1 Taxonomy

RODENTIA; SMINTHIDAE Brandt, 1855, Genus *Sicista* Gray, 1827

*S. betulina* Pallas, 1779 (5)

English name – northern birch mouse

German name – Buschmaus

Russian name – лесная мышовка

#### 1.2 Physical description

Small mammals, adult animals weigh usually about 6-13 g, head and body length about 57-70 (up to 75 (6)) mm; semiprehensile tail of about 85-102 mm (2,4), according to other data – up to 112,5 mm (6). This species has a defined black stripe at the middle of the back (like *S. subtilis*). Males and females are of the same size and color (2, 6).



Photo by A. Volkov (right) and A. Garakin



Footprints of *Sicista betulina* in the loose sand, to the right – traces of front (atop) and back paws (from Gudkov, 2007).

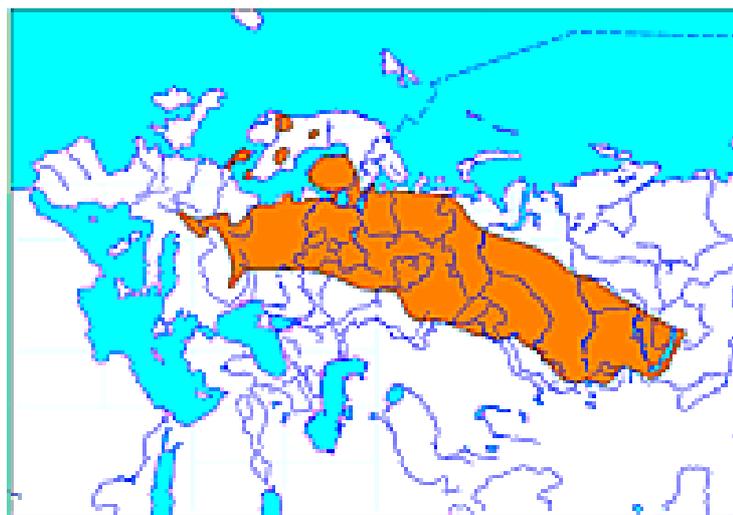
### 1.3 Range and habitat

Forests and forest-steppe regions of Europe and Asia (1). Inhabits different ecotopes with dense herbage; prefers forest borders, glades, meadows and deciduous forests with great number of shelters (old stumps, fallen trees, rich grass) (2, 4). Excessive soil moistening is not desirable (7). At Altai region can be met in mountains up to 2200-2700 m above sea level (2). In many regions within the area birch mice avoid lichen pine forests and high (oligotrophic) moors (11).

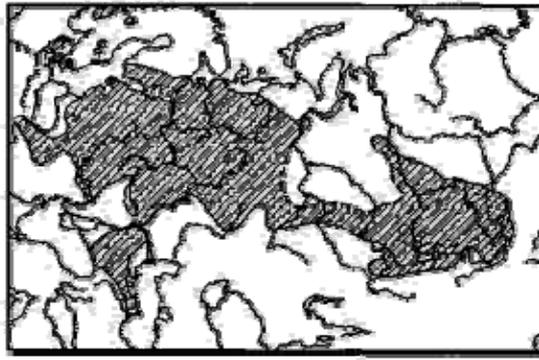
Pitfalls are more preferable for catching in comparison with usual traps (2).

During one season northern birch mice can change several stations depending on weather and food resources (1, 12).

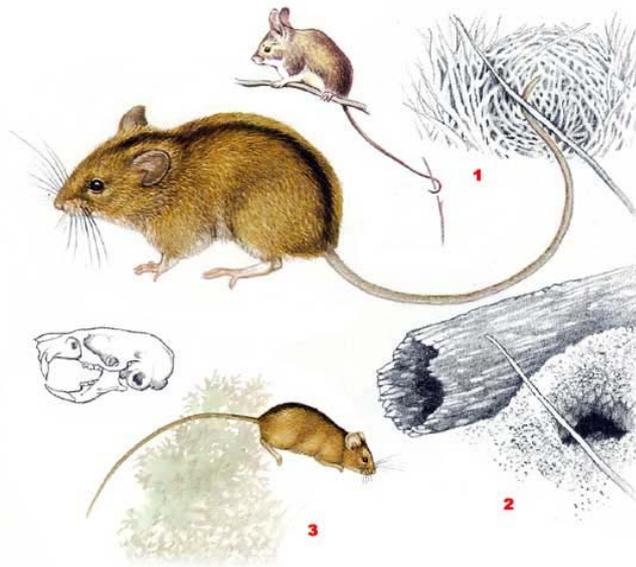
They shelter under logs, in rotten stumps, excavate shallow burrows or use burrows abandoned by other animals, sometimes they use woodpeckers' tree hollows. Ground nests are rare (2). The most distinctive nests birch mice make inside old rotten fogies where they can gnaw long (up to several meters) burrows with the sole barely visible entrance. Females organize two chambers: the upper one is a nest made of dry leaves and moss; the lower one usually contains chitin remains of insects and excrements (14).



<http://www.sevin.ru/vertebrates/index.html?Mammals/112.html>



(from Medical Teriology, 1979)



Different shelters of northern birch mice (<http://www.ecosystema.ru/08nature/mamm/109.htm>)

#### 1.4 Diet

Diet consists of different seeds (clover, timothy grass, winter cress, fir tree, pine, linden,...), insects (grasshoppers, wasps, bumblebees, ant pupae, day and night moths, spiders,...), berries (raspberries, blueberries, hips,...), dandelions and so on (1).

According to some studies, at the Altai region habitats, 66,7% of diet in May consisted of insects and other invertebrates; in June-July share of vegetable food in their diet increased and in August it averaged 85,9%. Structure of ration depended mostly of accessibility of different food sources (3).

It is reported that in Karelia diverse diet could indicate unstable forage reserve as well as high species trophic flexibility (8).

#### 1.5 Social structure and behavior

Behavior is poorly studied. Most likely northern birch mice in the wild are solitary (1). Territories of males and females may overlap but their size is not known exactly (2). These

animals are generally active in the twilight and at night. Period of activity may depend on latitude and season (2, 3). From the second half of autumn could be met in the daytime (4). Hibernation lasts 6-8 months and used to start when air temperature decreases to 6-10°C. Birch mice hibernate in underground burrows and it seems that burrows 40 cm deep are mostly favorable and secure. Some nests with hibernating animals were found just on the ground under thick layer of forest litter. During sleeping animals can loose their weight dramatically. In spring stable warming leads to break of hibernation. First active animals were noted at the Altai Mountains at the beginning of April, at other parts of area they are usually met from the middle of April (1, 6).

Heat regulation of birch mice is imperfect; that's why they are sensitive to temperature fluctuations and at cold spring or autumn nights can become torpid. In some regions of Russia they are called "sensitive to cold mice" (1).

## **1.6 Reproduction**

The reproductive season starts after hibernation (1, 8), usually from mid-April to mid-May, but every year its beginning depends on many factors (time of snow melting, sex and age of animal). At this period northern birch mice are very active, sometimes during all the day time with short breaks for rest, males may chirp gently looking for a female (1).

Males have well developed testicles till June-July and very rare in August (6). Gestation lasts about 30 days (4). Litters consist of 2-6 young (1), according to other information – of 2-11 (2,, 13).

In Karelia (the northern limit of the species distribution in Russia) reproductive characteristics differ from those in central and southern parts of area: the reproductive season starts about 1 month later, maximum of pregnant females is noted in July, fertility of females is lower as well as embryo mortality, mass moving of young animals is observed in August (7, 13). The same situation was noted in Pechora-Ilych State Reserve. There reproductive success depended greatly on air temperature in June: prolonged cold springs always caused considerable decrease in the species number (11).

Each adult female produces only one litter per year as period of activity is too short and hibernation period is very long. Sexual maturity is attained after first winter hibernation; young birch mice start breeding not in spring but in the middle of summer (1, 2, 4, 6, 7, 8).

According to data received from Ju. Kovalskaya (unpublished data) she had once caught a pregnant female in Moscow region in September. That female gave birth to 6 young in October but did not raise them. Probably it is the latest known time of the species breeding.

Ontogenesis was studied only in captive conditions when some wild pregnant females gave birth after being caught (1).

Altricial newborn had no pigmentation, their body length was about 30 mm (1). Their development was very slow: first fur appeared on the dorsum only after 6 days (1), according to other data - after 10 days (6). Aged 15 days young birch mice could crawl out of the nest for short period. By day 20 they started eating small seeds but had their eyes open only at the age of 25-28 days. Lactation lasted 35-37 days. 45-day-old animals weighed only 5 g. At that period they became independent of their mother, left their nest and settled in new places (1, 6).

## **1.7 Life span**

Most birch mice live 2 years (1) but it was found out that in some regions of Karelia 2,7-4,0% of all caught animals were 3 and more years old (7,8).

## **1.8 Threats and status in the wild**

Number of *S. betulina* in the wild depends on region and methods of its detection and varies significantly from year to year (1, 2, 8). It depends considerably of hibernation conditions, such as thickness of snow cover and depth of frozen soil (10).

## **2. Keeping in captivity. Enclosure**

### **2.1 Indoor enclosure (size, structure, substrate, temperature, ventilation, watering, lighting)**

Cages of vertical type are good for keeping *Sicista betulina*. In vivarium of Moscow zoo 3 females and 1 male lived in cages of different size at a natural lighting and room temperature. We put turf, sawdust and dry leaves as a litter and used to place a lot of thin branches into the cage for climbing and a wooden nest-box as a shelter. Animals were provided with hay, dry leaves and moss as a nest material.

### **2.2 Outdoor enclosure**

There is one description of keeping of northern birch mice outdoors during winter (see chapter 6 of this review).

## **3. Social structure**

### **3.1 Social structure within the species**

In literature northern birch mice were described as very peaceful animals: several individuals could live in one cage without agonistic interactions, with one dominant animal (usually it was an old female). Its dominance was manifested by taking away food from other mice and slight bites. Pregnant females are reported to live with males in one nest peacefully but before parturition females forced males out of the nest (1).

Moscow zoo – only solitary keeping (4 animals).

Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences, biological research station – kept solitary, in pairs and in groups (totally 60 animals). In pairs and in groups animals periodically demonstrated aggression. Without hibernation birch mice lived only for several months and died because of metabolic disorder (Ju. Kovalskaya, personal communication).

### **3.2 Introduction**

Without preliminary acquaintance (1).

### **3.3 Mixed species exhibit**

## **4. Enrichment**

## **4.1 Exhibit design**

Moscow zoo – thick layer of litter to dig and to hide; a lot of branches to climb, special material to make nests (dry leaves, moss, etc.)

## **4.2 Feeding**

Moscow zoo – live insects and seeds diffused in the litter.

## **4.3 Other**

# **5. Nutrition**

## **5.1 Feeding schedule and food presentation**

Moscow zoo - feeding every other day.

## **5.2 Diet**

In captivity northern birch mice prefer to eat insects; they need water to drink permanently, like to drink milk. Without water and succulent feed they can die in 24 hours (1).

Moscow zoo - We fed our birch mice with seed mix for small granivorous birds and with insects, primarily young crickets and locusts, sometimes with mealworms. We also added cottage cheese, hard-boiled eggs and small pieces of fruits to their ration. Water for drinking was always available. At the end of summer we used to add seeds of sunflower to stimulate birch mice to gain weight before hibernation.

Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences, biological research station – diet consisted of seeds, berries, earth worms, walnuts (M. Rutovskaya, personal communication). Other specialist of this Institute fed northern birch mice with meal worms, i.e. very monotonously (I. Popov, personal communication).

There are records of feeding northern birch mice with insects (horseflies, butterflies, caterpillars) and earthworms (9).

## **5.3 Hand rearing**

# **6. Hibernation**

Hibernation of northern birch mice is described only in one book (1) when 16 animals were placed together in one large box with very thick layer of earth and litter. That box was dug into the ground. Animals made ball-shaped nests for hibernation on the surface of ground under the litter (rarely) and in burrows at the depth of 50-70 cm. All animals hibernated separately from each other with the only exception of four birch mice which hibernated together in one nest.

Moscow zoo - we used to start hibernation of our birch mice when they were weighing about 16-17 gr. We put them into a small plastic capacity with a nest-box and kept under 6-7°C in a special room. We decreased amount of daily food but supplied animals with water. In such conditions 2 of our *Sicista betulina* succeeded to sleep for 3,5 months and we stopped their

hibernation when their weight was about 9-10 gr. During hibernation period animals could wake up periodically and eat (one birch mouse preferred to eat orange segments, leaving only peels). In October, 2011 we decided to hibernate a female of *S. betulina* in an outdoor enclosure. We prepared a large capacity, filled it with sawdust and placed a wooden nest-box with double walls deep into the sawdust. Unfortunately that animal died during hibernation. We found it out at the end of March when we decided to check the situation. It was freezing hard that winter and we related that failure to weather conditions.

## **7. Breeding in captivity**

### **7.1 Sexual maturation**

### **7.2 Breeding seasons**

### **7.3 Mating and gestation period**

### **7.4 Litter size**

### **7.5 Ontogenesis**

St. Petersburg state university, zoological department - Pregnant females after being caught could give birth in captivity but most of them failed to rear their young. Nevertheless one or two litters were raised successfully and gave an opportunity to study the development of young (see chapter 1.6 of this review).

### **7.6 Lactation and weaning period**

## **8. Transportation**

## **9. Veterinary care**

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