

HARES AND RABBITS (LEPORIDAE) IN COLLECTION OF THE ŠARIŠ MUSEUM, BARDEJOV (SLOVAKIA)

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Hares and rabbits (Leporidae) in collection of the Šariš Museum, Bardejov (Slovakia). — A. Csanády. — The Natural History Department of the Šariš Museum, Bardejov, Slovakia, was established in 1956 by PhMr. Tibor Weisz. The mammal collection consists of more than 5 000 specimens of 67 mammal species of the Slovakian fauna. The museum mostly represents the fauna of north-eastern Slovakia, i.e. the transition area between the Eastern and Western Carpathians and adjacent to the northernmost part of the Pannonian Basin. In the paper, data are presented on hare and rabbit specimens deposited in the collection of the Šariš Museum in Bardejov (SMB), Slovakia. In total, data were evaluated on 27 specimens of the brown hare (*Lepus europaeus*) from twelve sites of Slovakia (n = 19), one site of Czech Silesia (n = 1), and from unknown localities (n = 7). Individuals were acquired in 1958–1971, but mainly in 1965–1966 (n = 19, 70.4 %). Among them, one specimen had signs of „albinism“ and was collected from Zlaté village. The collection also includes a skull of a brown hare with anomalous dentition. Similarly, two skulls of the mountain hare (*Lepus timidus*) obtained from the Danish preparator N. H. Gustaffson were evaluated. Three rabbit specimens were also found in the collection, including two skulls of the wild rabbit (*Oryctolagus cuniculus*) and a skin-mount and skull of a domestic rabbit (*Oryctolagus cuniculus* forma *domestica*). The collection contains 20 adult specimens (15 males and 5 females) with body size values recorded in the protocol cards. Mammalogical collections in the Šariš Museum in Bardejov represent an outstanding scientific time capsule. All stored specimens in this particular and other similar collections, including those in local museums, will largely be needed and used as datasets by ecologists and conservationists in the future. It is necessary to preserve the collections, to computerise and digitise their inventories and the wealth of information they represent. At present, most of these data are not accessible electronically or online. Therefore, such collections, including that in Bardejov, must be sustained for a long term, which will require increased funding for their physical and scientific preservation.

Key words: hares, rabbits, faunal data, Slovakia, natural history collections.

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Introduction

The Natural History Department of the Šariš Museum in Bardejov, Slovakia (hereafter the SMB) was established in 1956 by PhMr. Tibor Weisz. The typical feature of T. Weisz's way of work was his focus toward collecting significant, long-term series of the same species from a single geographical area (Hromada *et al.* 2015). In total, between 1956–1983, he collected and deposited in the SMB's collection approximately 400 000 specimens of the fauna (invertebrates and vertebrates) and flora (Hromada 2015). He focused primarily on north-eastern Slovakia, particularly nearby to Bardejov city and the adjacent territory, i.e. the transition area between the Eastern and Western Carpathians adjacent to the northernmost part of the Pannonian Basin. Therefore, this area is of great interest from a zoogeographical point of view (Hromada *et al.* 2015).

In case of mammal collection, he collected material which provide more than 5 thousand specimens and useful source of data not only for zoological, but also ecological, morphological, biodiversity and conservation research (Hromada *et al.* 2015). It is very important, because museums with collections and data they represent provide entrance into the history and inform about the present (Cavarzere *et al.* 2017; Arbelaez-Cortes *et al.* 2017; Lacey *et al.* 2017; Hope *et al.* 2018; Dowler 2019). Moreover, they can help to predict the future of natural habitats and human-altered environments and then predict changes in biodiversity (Kress, 2014; Minter *et al.* 2014; Rocha *et al.* 2014; Krell & Wheeler 2014; Holmes *et al.* 2016). Kemp *et al.* (2015) showed that three-quarters

of newly named mammalian species are already part of natural history collections. Sometimes, they had been unrecognised for a century or longer, or misidentified and unlabelled. On the other hand, older specimens often lack the data needed to answer modern questions (Page *et al.* 2015; Hromada *et al.* 2015; Monfils *et al.* 2017; Drew *et al.* 2017).

The collection documents also allow to obtain information on the frequency and periods of reproduction, social behaviour of animals, migration, the food chain or the impact of parasites and external factors on body shape and size. They can also serve for research into population biology, evolutionary biology and systematics (Garnett & Les Christidis 2017).

Therefore, the main aim of this paper was to study hares and rabbits deposited in the SMB collection.

Material and Methods

In this paper, presented and evaluated are data of 27 specimens of the brown hare (*Lepus europaeus*) from twelve sites of Slovakia ($n = 19$), one site of Czech Silesia ($n = 1$), and from unknown localities ($n = 7$, Fig. 1). All specimens (skin-mounts, study skins, and skulls) were divided by location and year of collection (Table 1, Figs 2, 3, 4). Similarly, information is given about two specimens of the mountain hare (*Lepus timidus*) obtained from the Danish preparator N. H. Gustaffson, most likely from Denmark (Figs 5, 6). Three rabbit specimens were also found in the SMB collection. They belong to the wild rabbit (*Oryctolagus cuniculus*) represented by two skulls and a skin-mount and by one skull of the domestic rabbit (*Oryctolagus cuniculus* forma *domestica*).

Based on catalogue protocols with body size data, most of the specimens belong to adult animals (Hell 1972; Semizorová & Švarc 1987; Hell & Slamečka 1999).

Results and Discussion

The importance of the SMB mammal collection in studies of animal biodiversity and morphometry was showed in previous studies (e.g. Čanády 2013, 2015; Čanády Čomor 2015; Čanády & Onderková 2016; Čanády *et al.* 2015a-b; Čanády *et al.* 2019a-b). In this paper, I focused on hares and rabbits (order Lagomorpha, family Leporidae) deposited in the collection. The family Leporidae, which includes hares and rabbits, represents one of the two extant families in the order Lagomorpha. It contains 11 genera and 63 species (Schai-Braun & Hackländer 2016), of which species of two genera (*Oryctolagus* and *Lepus*) are represented in the Slovakian fauna (Krištofík *et al.* 2012a-b).

The first one, the European rabbit (*Oryctolagus cuniculus* Linnaeus, 1758) occurs in Slovakia discontinuously and sporadically, mainly in lowlands and uplands, especially in western Slovakia (Krištofík *et al.* 2012a). The second one, the European hare (*Lepus europaeus* Pallas, 1778) is a well known species common in entire area (Hell 1972; Krištofík *et al.* 2012b) being the most abundant in lowlands and uplands in the warm lowland areas of Podunajská nížina and Východoslovenská nížina (Krištofík *et al.* 2012b). The aforementioned authors stated that both species are represented in Slovakia by nominative subspecies (*O. c. cuniculus* and *L. e. europaeus*). Similarly, the specimens of both species were deposited in the SMB collection.

Moreover, the SMB collection also contains specimens of the mountain hare (*Lepus timidus* Linnaeus, 1758), an arctic/subarctic species that mainly inhabits the tundra and taiga and has a fragmented distribution range in Europe (Schai-Braun & Hackländer 2016).

Summarisation of samples deposited in SMB collection confirmed the presence of twenty-seven brown hare specimens (Table 1) collected in various places (Fig. 1) and times (Fig. 2) mainly in north-eastern Slovakia (vicinities of Bardejov city) and Czech Silesia. The specimens were collected in 1958–1971, but mainly in 1965–1966 ($n = 19$, 70.4 %). It should be noted that these record locality data were also included into the summarisation of “Mammals of Slovakia: distribution, bionomy, and protection“ as unpublished data (see Krištofík *et al.* 2012a-b). The SMB collection contains 20 adult specimens (15 males and 5 females) with body size values recorded in the protocol cards.

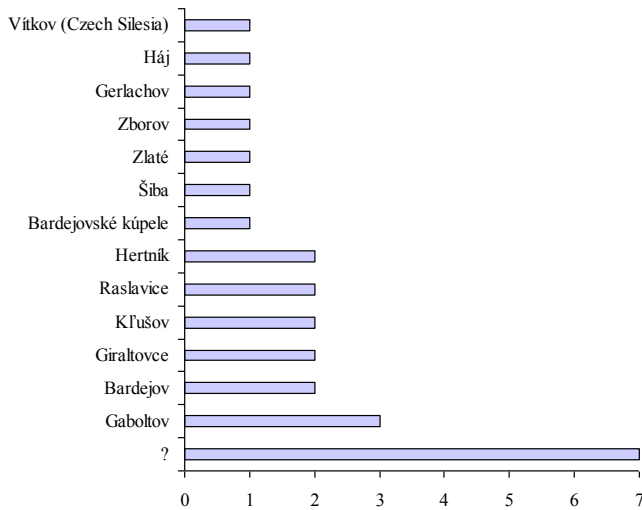


Fig. 1. The number of brown hare (*Lepus europaeus*) specimen deposited in the SMB collection according to record localities.

Рис. 1. Кількість зразків зайця сірого (*Lepus europaeus*) у колекції Музею Шаріша в Бардейові за місцями збору.

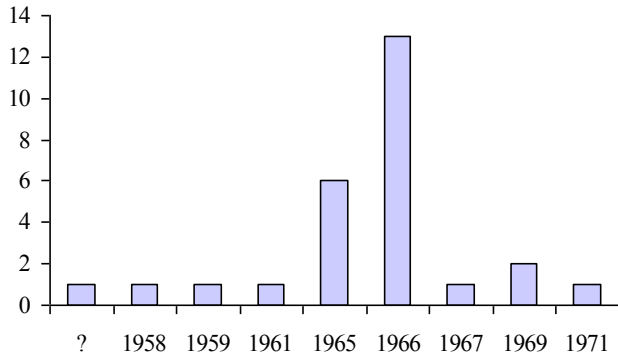


Fig. 2. The brown hare (*Lepus europaeus*) deposited in the SMB collection according to years of records.

Рис. 2. Кількість зразків зайця сірого (*Lepus europaeus*) у колекції Музею Шаріша в Бардейові за роками збору.

Table 1 The brown hare (*Lepus europaeus*) samples deposited in the SMB collection

Таблиця 1. Вибірки зайця сірого (*Lepus europaeus*) у колекції Музею Шаріша в Бардейові

Samples	Number	%
Total sample size	27	100
Sample of males	16	59.3
Sample of females	5	18.5
The number of specimens with known record locality	20	74.1
The number of specimens with missing record locality	7	25.9
The number of specimens with missing date of record	7	25.9
The number of soecimens with missing sex information	6	22.2
Sample of skins	24	88.9
Samples of skulls	26	96.3

The furs (Fig. 3) showed a colouration typical for the brown hare in Slovakia (e.g. Hell 1972; Hell & Slamečka 1999; Krištofik *et al.* 2012b) except for one specimen (see Fig. 4). This anomalously coloured individual had signs of „albinism“ and was obtained from Zlaté village. However, we can not confirm that it was a completely albino individual because information about the eye colour was not found. Likewise, the colour of the fur suggests only partial albinism.

Colouration anomalies in brown hares were rarely found in Slovakia. Several authors have noted albinism (Horváth 1961; Mocko 1977), flavism (Soviš 1962, 1978), partial albinism and

melanism (Hell 1972). Similarly, one specimen of the mountain hare (*L. timidus*) in typical winter fur is also present in the SMB collection. This specimen is displayed as a skin-mount in the public exhibition (Fig. 5) and its skull stored in the museum deposit (Fig. 6).



Fig. 3. Study skins of the brown hare (*Lepus europaeus*) deposited in the SMB collection.

Рис. 3. Тушки зайця сірого (*Lepus europaeus*) у колекції Музею Шаріша в Бардейові.



Fig. 4. A mounted male of the brown hare deposited in the SMB collection with anomalously coloured fur (in protocol cards with No. 550/59 stated as “albino”).

Рис. 4. Опудало самця зайця сірого з колекції Музею Шаріша з аномальним забарвленням хутра (під № 550/59 в облікових картках з позначкою «альбінос»).



Fig. 5. A mounted specimen of the mountain hare (*Lepus timidus*) deposited in the SMB collection (in protocol cards with No. 40/71).

Рис. 5. Опудало зайця білого (*Lepus timidus*) з колекції Музею Шаріша (під № 40/71 в облікових картках).



Fig. 6. Skull of the mountain hare (*Lepus timidus*) deposited in the SMB collection (in protocol cards with no. 40/71).

Рис. 6. Череп зайця білого (*Lepus timidus*) з колекції Музею Шаріша (під № 40/71 в облікових картках).



Fig. 7. Skull of the brown hare (*Lepus europaeus*) deposited in the SMB collection with anomalous dentition.

Рис. 7. Череп зайця сірого (*Lepus europaeus*) з колекції Музею Шаріша з аномальними зубами.

One specimen of the European rabbit (*O. cuniculus*) is also displayed in the public exhibition as a skin-mount (in protocol cards with no. 32/65) having a fur colouration typical for the species. However, the exact record locality of this specimen is ambiguous. This is related to a record in a protocol indicating a locality from north-eastern Slovakia (i.e. Komárov), but on the skull stored in the collection, Opava (i.e. Czech Silesia) was indicated. I assume that the correct locality was Komárov and this contradiction occurred because the taxidermist (Mr. Borůvka) was from Opava.

It should also be noted that the collection also includes a skull of the brown hare with anomalous dentition (Fig. 7). The skull is deposited without protocol number and was collected in Zborov village in 1961.

Conclusions

Results presented in this study confirm the knowledge about the occurrence of the studied species as well as highlight the importance of the SMB collection. Specimens and associated data are essential for making informed decisions about management and conservation now and in the future. Mammalogical collections of the Šariš Museum in Bardejov represent an outstanding scientific time capsule. All stored specimens in this and other similar collections, including those from local museums, will largely be needed and used as datasets by ecologists and conservationists in the future. It is necessary to preserve the collections, to computerise and digitise their inventories and the wealth of information they represent. At present, most of these data are not accessible electronically or online. Therefore, collections, including those in Bardejov, must be sustained for a long term, which will require increased funding for their physical and scientific preservation.

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