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Bats in the Lviv Natural History Museum: description and comparative analysis of the collection

Introduction

Bats is the most endangered group of animals included in all editions of Red Data Book for Ukraine and Europe as a whole. State of their population is very bad throughout the world because of an intensive anthropic changes of the environment, and this group of mammals is an indicator of the modern state and historical changes of the fauna and of nature as a whole. Recent bat fauna of Ukraine includes about 25 species of 9 genera [1]. Now more than 50 % of species are considered rare and endangered ones and are included in the Red Data Book of Ukraine [6]. Perspectives of the further changes of bat fauna are negative, and the estimations of the bat species number in "Red Book 2000" give at least 67 % of total taxonomic abundance of Ukrainian bat fauna [9].

As result, all new investigations of bats must be carried out only using the distant observations or using the earlier collected samples. Zoological collections are the main sources of morphological materials as well as new data about species records. Peak of their growth was in 50–60th, and during two last decades collections obtained only occasional materials [11]. Further updating of the collections will take place occasionally, without special capturing of animals for the collections. Thus, the role of museums will increase in future, and zoological collections will become the main funds for further systematic and morphological investigations of bats.

The aim of this investigation is description of bat lots of the oldest zoological collection, namely the Lviv Natural History Museum of National Academy of Sciences of Ukraine (LNHM), analysis of taxonomic abundance of this collection, description of the most interesting lots, and comparison of this collection with the other ones, namely the National Ukrainian Natural History Museum of the National Academy of Sciences of Ukraine (UNHM) and Zoological museum of Kyiv National University (ZMKU).

General outline of collection

Collection of bats in LNHM includes 296 specimens, all of them are deposited as labelled dry skins with prepared skulls. This collection is placed in the Box N 477, some materials are placed in exposition. All the specimens are registered in the main Theriological catalogue, where each card corresponds to the few specimens of one series, up to 12 records on one card. Each card has its own current number, and each specimen has the same number with its own sub-number like "1027/2". Last revision of this collection was made in 1968 by Dr. G. Senek and Dr. M. Rudyshyn.

Most of the specimens were collected after the end of the World War II during 1940 to 1960th by zoologists of the Lviv Natural History Museum, the Lviv State University and the Forestry Institute. The majority of samples were collected in the East-Carpathian region, i. e. in the Transcarpathians and in the Northern Carpathians, some materials were collected in the Podolian Upland and the Crimea. There are some exotic specimens obtained from other collections.

Thus, the main part of the collection is represented by regional samples from the western part of Ukraine. The portion of the Lviv bat collection among all Ukrainian museums is 20,5 % (293 specimens of 1432 known ones).

Table 1. Abundance of bat genera in the collection of LNHM (materials from Ukraine)

Genus	Number of samples	Species
Myotis (s. str.)	59 specimens of 2 species	*myotis*, *blythi*
Barbastella	56 specimens of 1 species	*barbastellus*
Rhinolophus	50 specimens of 2 species	*ferrumequinum*, *hipposideros*
Eptesicus	38 specimens of 1 species	*serotinus*
Plecotus	32 specimens of 1 species	*auritus*
Nyctalus	31 specimens of 2 species	*noctula*, *lasiopterus*
Myotis (other)	21 specimens of 3 species	*daubentoni*, *mystacinus*, *bechsteini*
Pipistrellus	05 specimens of 1 species	*pipistrellus*
Miniopterus	02 specimens of 1 species	*schreibersi*

Species composition of collection

Bat collection of LNHM includes 296 specimens of 16 species, most of them coming from Ukraine. Only three specimens are from other countries, namely the only *Desmodus* specimen from America, one specimen of *Nyctalus noctula* from Poland, and one *Myotis dasycneme* from the Seliger lake. Another 293 specimens are from Ukraine, and they represent 14 species of 8 genera of 2 families. According to their abundance in collection, we have the following row, where *Myotis* (s. str.), *Barbastella* and *Rhinolophus* have leading positions, and *Pipistrellus* as well as *Miniopterus* are most rare in the collection (Table 1).

In the studied collection, *Myotis blythi* are deposited as "*M. oxygnathus"*, *Nyctalus lasiopterus* as "*N. siculus"*, *Eptesicus serotinus* as "*Vespertilio serotinus*" (*Vespertilio* is absent in LNHM). Samples of *Plecotus auritus* and *Myotis mystacinus* need re-identification, taking into account presence of *P. austriacus* in the fauna of Ukraine, and supposed presence of *M. brandti*. However, these materials are not available now.

Two indices were estimated for each species in collection, namely the index "A" as its share among all known specimens in all collections studied, and the index "B" as the share of the same species in the collection of LNHM (Table 2). The shares of all species are shown in the Figure. The largest part of the collection is represented by *Barbastella*, and this sample is the largest among all known ones (69 % of all bat specimens in Ukrainian museums). The samples of *R. hipposideros* (n=33 of 88 known specimens, 37,5 %), *M. bechsteini* (n=3 of 5, 60 %), and *Plecotus auritus* (n=32 of 69, 46,4 %) are presented by more than one third of all known collected specimens.

Rare and endangered species in collection

Among 25 known bat species of Ukrainian fauna, there are 12 bat species that have an official protected status (among 41 "red" mammals). This Red List includes both *Rhinolophus* species (*ferrumequinum* and *hipposideros*), *Miniopterus schreibersi*, four of eight *Myotis* species (*bechsteini*, *nattereri*, *dasycneme*, *emarginatus*), *Barbastella barbastellus*, two of three *Nyctalus* (*leisleri* and *lasiopterus*) and the same number of *Pipistrellus* species (*kuhli* and *savii*).

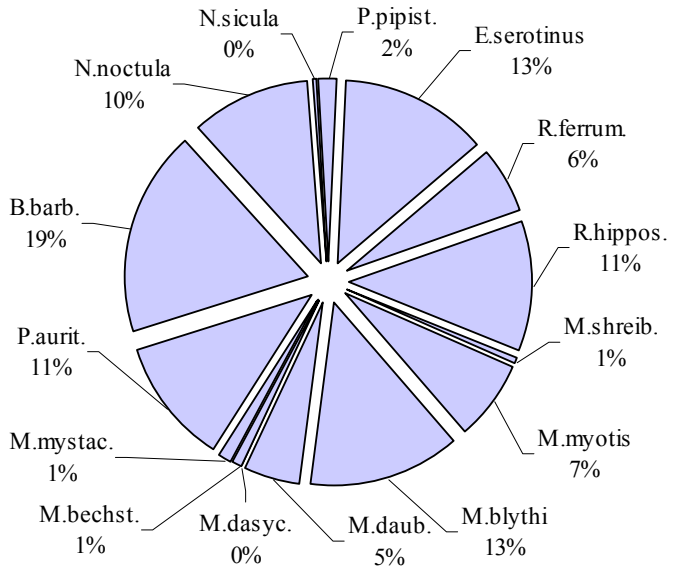

Fig. 1. Portion of each bat species in the zoological collection of LNHM.

In the collection of LNHM, there are six "red" species: *Rhinolophus ferrumequinum* (n=17), *R. hipposideros* (33), *M. schreibersi* (2), *M. bechsteini* (3), *B. barbastellus* (56), and *N. lasiopterus* (1). That is 112 specimens, and their share in the collection is 38,2 % of all collected bat specimens.

Most interesting findings

The most interesting materials are concerning the species *M. schreibersi*, *M. bechsteini, N. lasiopterus* and *R. hipposideros*.

Miniopterus schreibersi. One of two specimens of *Miniopterus schreibersi* is from the Karadagh Mts. (1947, leg. O. Korniev), and it is one of the latest findings of this species in Crimea (see also: Beskaravajny, 1988). This specimen was trapped in summer time (august) in seaside grotto "Myshyna shchilyna".

Myotis bechsteini. Three specimens of the Bechstein's bat (*Myotis bechsteini*) come from the Medovi caves in Lviv vicinity (1950, leg. K. Tatarynov) and from the cave Stradch near Ivano-Frankove of the Lviv oblast (1950, leg. Lysenko; see: Tatarinov, 1951); now species is absent there [5]. These findings are the first and only findings of the species in Ukraine northward the Carpathians (for review see: [4]).

Nyctalus lasiopterus. The only collected specimen of *Nyctalus lasiopterus* is from Kyiv (Korchevate, 1948, leg. M. Shcherbak), and it is one of 6 known collection specimens from Ukraine, as well as one of the latest findings of this species in Ukraine (see: [2]).

Rhinolophus hipposideros. The next interesting sample is includes 31 specimens of *Rhinolophus hipposideros*, that were captured in the Podolian Upland, in the Borshchiv dstr. of the Ternopil oblast (Bilche-Zolote, 1951/1952, leg. Lysenko and M. Antonenko). These findings are the most north-eastern ones of this species in Europe and, probably, represented an isolated part of species range (for details see: [8, 10]).

Table 2. Number of known bat specimens from Ukraine based on the results of investigations of all the central zoological museums, and protection status of the species

Taxa in Ukrainian fauna		Number in collection				Portion		Protection status **		
		LNHM	ZMKU	UMNH	Sum	of LNHM	in LNHM	RDBU	RDBU	ZagTk
Genus	Species	spec.	spec.	spec.	spec.	A %	B %	1980	1994	1996
Rhinolophus	*hipposideros*	33	3	52	88	37,5	11,3	+	2	3
	ferrumequinum	17	17	154	188	9,0	5,8	+	2	2
Miniopterus	*schreibersi*	2	36	59	97	2,1	0,7	+	2	1
Myotis	*blythi*	39	75	95	209	18,7	13,3		-	4
	myotis	20	11	48	79	25,3	6,8		-	
	bechsteini	3	1	1	5	60,0	1,0	+	3	3
	nattereri	0	0	1	1	0,0	0,0	+	3	2
	*mystacinus**	3	0	20	23	13,0	1,0		-	4
	emarginatus	0	3	12	15	0,0	0,0	+	3	3
	dasycneme	0	0	1	1	0,0	0,0	+	3	2
	daubentoni	14	4	27	45	31,1	4,8		-	
Plecotus	*auritus* (s. l.)	32	7	30	69	46,4	10,9		-	
	austriacus	0	0	4	4	0,0	0,0		-	3
Barbastella	*barbastellus*	56	8	17	81	69,1	19,1	+	3	
Pipistrellus	*pipistrellus*	5	16	46	67	7,5	1,7		-	4
	nathusii	0	1	43	44	0,0	0,0		-	3
	kuhli	0	0	3	3	0,0	0,0	+	3	3
	savii	0	1	1	2	0,0	0,0	+	3	3
Nyctalus	*leisleri*	0	1	17	18	0,0	0,0	+	3	2
	noctula	30	79	117	226	13,3	10,2		-	
	lasiopterus	1	1	4	6	16,7	0,3	+	3	1
Eptesicus	*serotinus*	38	32	59	129	29,5	13,0		-	
	nilssoni	0	0	4	4	0,0	0,0		-	3
Vespertilio	*murinus*	0	2	25	27	0,0	0,0		-	
Total		293	298	840	1431	20,5	99,9	13	12	17

* the only specimen *Myotis "ikonnikovi"* (exposition of UMNH) probably is identical to *M. mystacinus*.
** RDBU — Red Data Book of Ukraine [6], ZagTk — proposed status after Zagorodnyuk & Tkach [11].

Conclusion

Collection of bats in the Lviv Natural History Museum is one of the biggest in Ukraine, and represents the great part of total taxonomic abundance of Ukrainian bat fauna as well as large portion of the rare and endangered species. This collection contains more than one third of the rare species, among them there are *Barbastella barbastellus*, *Rhinolophus hipposideros, Myotis bechsteini* and *Plecotus auritus*. Some of the interesting data were published earlier [7, 8], or presented in the recent publications [4, 10, this article]. This collection gives a large faunistic materials as well as good materials (skins with skulls) for the further morphological and systematic investigations.

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И. В. Загороднюк. Летучие мыши в Государственном Природоведческом Музее НАН Украины (Львов): описание и сравнительный анализ коллекции. — Коллекция рукокрылых в ГПМ НАН Украины – одна из самых больших в Украине (296 экземпляров, более, чем 20 % всех известных сборов). Эта коллекция представляет большую часть общего таксономического богатства рукокрылых фауны Украины (15 видов), и в ней велика доля редких и исчезающих видов. Фонды ГПМ содержат более трети всех коллекционных экземпляров четырех редких видов — *Barbastella barbastellus* (56 sp., 69 % всех собранных экземпляров в Украинских музеях), *Rhinolophus hipposideros* (n = 33 sp., 38 %), *Myotis bechsteini* (3 sp., 60 %), *Plecotus auritus* (32 sp., 46 %). Наиболее интересные материалы – фаунистические данные относительно *R. hipposideros* (находки в Подолии), *M. schreibersi* (одна из самых последних находок в Крыму), *M. bechsteini* (Прикарпатье), *Nyctalus lasiopterus* (один из 6 известных коллекционных экземпляров, из Киева).

I. V. Zagorodniuk. Bats in the Lviv Natural History Museum: description and comparative analysis of the collection. — Collection of bats in the Lviv Natural History Museum is one of the biggest in Ukraine (296 specimens, more than 20 % of all known collected bats). This collection represent the great part of total taxonomic abundance of the Ukrainian bat fauna (15 species), and the portion of rare and endangered species ("Red Data Book") is very large. Collection contains more than the third of the all collected specimens of the four rare species – *Barbastella barbastellus* (56 sp., 69 % of the all collected specimens in Ukrainian museums), *Rhinolophus hipposideros* (n=33 sp., 38 %), *Myotis bechsteini* (3 sp., 60 %), *Plecotus auritus* (32 sp., 46 %). Most interesting materials are the faunistic data on *R. hipposideros* (findings in Podolia), *M. schreibersi* (one of the latest finds in the Crimea), *M. bechsteini* (northward of the Carpathians), *Nyctalus lasiopterus* (one of only 6 known collected specimens, from Kyiv).

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