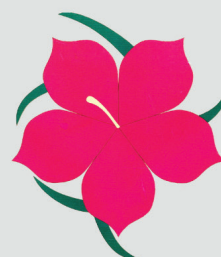


JOURNAL FOR SCIENCE AND
POPULAR SCIENCE



JU Prirodnjački muzej
Crne Gore **Natural History**
Museum of Montenegro



NATURA

MONTENEGRINA

ISSN 1800-7155 On line edition

15/2026



PODGORICA



THE REPTILE COLLECTION OF THE NATURAL HISTORY MUSEUM OF MONTENEGRO: TAXONOMIC COMPOSITION AND COVERAGE OF THE NATIONAL HERPETOFAUNA

Lidija LEKOVIĆ

Public Institution Natural History Museum of Montenegro, Trg Vojvode Bećir-bega Osmanagića 16, Podgorica 81000.
Corresponding author: lidja.lekovic@pmcg.co.me

SYNOPSIS

Key words:

collection specimens,
reptile species,
Natural History Museum
of Montenegro.

The Reptile Collection of the Natural History Museum of Montenegro represents an important scientific and documentary resource for the study of the national herpetofauna. It comprises 548 inventory units (specimens) and six study specimens, representing 32 native species and two non-native species. In addition, the collection includes three specimens of native species collected outside the territory of Montenegro. In terms of the native fauna of Montenegro, the collection includes 32 species. The collection includes four turtle species (four families), 13 lizard species (three families), and 15 snake species (five families). Compared with the 38 reptile species recorded in Montenegro, the collection covers 32 species (84.2%), with complete representation of snakes and partial coverage of turtles and lizards. Of the seven endemic species recorded in Montenegro, six lizard species and one snake species are included in the collection.

SINOPSIS

Ključne riječi:

muzejski primjerci,
vrste gmizavaca,
Prirodnjački muzej Crne
Gore.

Zbirka gmizavaca Prirodnjačkog muzeja Crne Gore predstavlja važan naučni i dokumentacioni resurs za proučavanje nacionalne herpetofaune. Obuhvata 548 inventarnih jedinica (primjeraka) i šest primjeraka studijskog materijala, koji predstavljaju 32 autohtone i dvije alohtone vrste. Pored toga, zbirka obuhvata tri primjerka autohtonih vrsta koji su sakupljeni van teritorije Crne Gore. U pogledu autohtone faune gmizavaca, u zbirci su zastupljene 32 vrste. Zastupljene su četiri vrste kornjača (četiri familije), 13 vrsta guštera (tri familije) i 15 vrsta zmija (pet familija). U poređenju sa 38 vrsta gmizavaca registrovanih u Crnoj Gori, zbirka pokriva 32 vrste (84,2%), pri čemu su zmije u potpunosti zastupljene, a kornjače i gušteri djelimično. Od sedam endemskih vrsta registrovanih u Crnoj Gori, u zbirci je zastupljeno šest vrsta guštera i jedna vrsta zmija.

INTRODUCTION

The first Natural History Collection in Montenegro was established in 1961 within the Republic Institute for Nature Protection by a governmental decree. The collection included several hundred preserved animal specimens, with birds from the Skadar Lake region being the most numerous, as well as fish, mammals, and a smaller number of reptiles. It also contained a valuable herbarium representing the flora of Balkan countries.

The collection was open to the public through a permanent exhibition in the building of the Republic

Institute for Nature Protection in Podgorica. It was additionally presented at Hunting and Fishing Fairs and through scientific publications, particularly in the Journal Bulletin of the Republic Institute for Nature Protection. As the collection specimens were primarily intended for exhibition purposes, limited attention was given to systematic documentation and detailed specimen data. As a result, documentation was often incomplete, and many specimens were not fully processed or scientifically identified.

The building housing the collection was severely damaged during the 1979 earthquake. Although the specimens did not suffer major direct damage at

that time, subsequent relocations to facilities with inadequate microclimatic conditions caused gradual deterioration of the collection. In 1985, the collection was returned to the renovated building of the Institute and placed in a new exhibition space, where it remained until the establishment of the Natural History Museum of Montenegro in 1995. After the Museum was founded, the former exhibition rooms were repurposed as offices, and the natural history material was transferred to a small storage room of approximately 50 m² with inadequate conditions for long-term preservation. The collections continue to be maintained in this storage room. In 2017–2018, the museum storage room was renovated and equipped in accordance with professional conservation standards, and a microclimate control system was finally installed.

At the time the collection was assigned its first curator in June 2000, the museum had no inventory records of preserved reptile specimens inherited from the Institute's collection. Some specimens contained data on the date and locality of collection, as well as the collector, while others lacked any associated information. The curator recorded eight well-preserved reptile specimens from the Institute's collection and 15 specimens donated to the museum from its establishment until 2000.

This study aims to provide a comprehensive overview of the reptile collection of the Natural History Museum of Montenegro. Specifically, it focuses on documenting the historical development of the collection, analyzing its taxonomic composition and specimen diversity, assessing how well it represents the national reptile fauna, and evaluating its conservation and scientific significance.



Figure 1: Fluid-preserved specimens stored in glass jars or cylinders with 75% ethanol.

MATERIALS AND METHODS

The reptile collection of the Natural History Museum of Montenegro comprises specimens preserved primarily in 75% ethanol. Some of the fluid-preserved specimens were previously stored in a freezer or in 4% formalin and were later transferred to 75% ethanol. In total, the collection includes 401 fluid-preserved specimens stored in glass jars or cylinders with 75% ethanol (Figure 1), 117 specimens of lizard skeletons preserved in glycerin and 36 specimens prepared as dermoplastic or skeleton models (Figure 2).

In museum documentation, specimens are recorded as inventory units, each of which may consist of a single or multiple specimens or eggs of the same species. In some cases, multiple specimens of the same species collected at the same locality and on the same date are registered under a single inventory number as an inventory unit. Females with associated clutches, or multiple eggs from a single clutch, are also typically treated as a single inventory unit. Therefore, the total number of inventory units does not necessarily correspond to the total number of individual specimens.

Most species were identified based on relevant herpetological literature. The identification of *Dinarolacerta montenegrina* Ljubisavljević, Arribas, Džukić & Carranza, 2007 was based on published diagnostic characteristics and the geographic origin of the samples (Ljubisavljević et al., 2007).

Conservation statuses are provided according to the IUCN (International Union for Conservation of Nature) Red List of Threatened Species at the regional level (Europe) (IUCN, 2024), the Bern Convention on the Conservation of European Wildlife and Natural Habitats (Council of Europe, 1979), the Habitats Directive (Council of the European Communities, 1992), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (UNEP-WCMC, 2017), the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (UNEP/CMS, 2017), Riješenje o stavljanju pod zaštitu pojedinih biljnih i životinjskih vrsta. Službeni list RCG 76/06, Podgorica: 836 (Republički Zavod za zaštitu prirode Crne Gore), and the Red List of Amphibians and Reptiles of Montenegro (Jelić et al., 2023).

Results

The foundation of the reptile collection was formed by its oldest items, eight well-preserved reptile specimens



Figure 2: Specimens prepared as dermoplastic or skeleton models.

inherited from the natural history collection of the Republic Institute for Nature Protection. Of these, five specimens lacked accompanying data: two dermoplastic specimens of the Hermann's tortoise and the European pond turtle, one fluid-preserved specimen of the Balkan whip snake, and two fluid-preserved specimens of the Leopard snake. The remaining three specimens contained data on locality and date of collection. The oldest specimen in the collection is a fluid-preserved individual of the Common wall lizard *Podarcis muralis* (Laurenti, 1768) from 1969, collected on the left bank of the Lim River near Skakavac (most likely a village in the municipality of Berane) (Figure 3). This is followed by a fluid-preserved specimen of the grass snake *Natrix natrix* (Linnaeus, 1758) from Nikšić, dating from 1983, and a fluid-preserved specimen of the Sand lizard *Lacerta agilis* Linnaeus, 1758 from 1986, collected at Ponikvica, Studeno (Mt. Prekornica).

In the period from the establishment of the Museum until the appointment of the curator responsible for the collection, a total of 15 specimens were donated: three in 1996, one in 1997, four in 1999, and four in

2000, while the year of donation for three specimens could not be determined.

Of the total 15 donated specimens, seven had been stored frozen, including three without any accompanying data, except that they were known to originate from the territory of Montenegro. Despite the lack of any accompanying data, these specimens were incorporated into the collection as the first fluid-preserved specimens prepared by the curator during their traineeship. A total of six fluid-preserved specimens dating from the period 1996–2000 were donated to the Museum in 2022 by the Environmental Protection Agency of Montenegro.

The Reptile Collection comprises 548 inventory units and six specimens of study material that were entered into the museum accession book but not formally inventoried due to their poor condition at the time of collection. The Collection includes representatives of 32 native reptile species, covering multiple developmental stages (adults, subadults, juveniles, and egg clutches), as well as two non-native species: one donated crocodilian specimen without associated data and a clutch (two eggs) of the African

PMCG Evidencije Muzejski predmeti Knjige

Muzejski predmeti > *Podarcis muralis* (Laurenti, 1768)

95/95

Identifikacija

Zbirka: 600 POD GMI: Gmizavci

Broj knjige ulaza: 11-1 Kolektorski broj: L9

Inventarski broj: 784 Raniji inventarski broj:

Redni broj u zbirci: 9

Vrsta predmeta: Mokri preparat

Opis vrste predmeta: Mokri preparat

Klasifikaciona oznaka: *Podarcis muralis* (Laurenti, 1768)

Naziv predmeta: zidni gušter

Lokalni naziv predmeta: zidni gušter

Broj komada: 1

Vrijednost (EUR):

Procjenu izradio:

UDK (UDC):

Muzejska kategorizacija:

Opis predmeta:

Analiza predmeta:

Nastanak

Lokaliitet: Lijeva obala Lima, kod Skakavca Zemlja: Crna Gora

Lat Long koordinate: UTM koordinate:

Kolektor / Autor: Datum sakupljanja: 26.03.1969.

Kokolektor / Koaautor 1: Kokolektor / Koaautor 2:

Kokolektor / Koaautor 3: Kokolektor / Koaautor 4:



Figure 3: The oldest specimen in the collection: a fluid-preserved specimen of the Common wall lizard.

Table 1: Overview of native species present in the NHMM Reptile collection, with the number of inventory units, endemism, and conservation status. Colour coding is used to distinguish conservation status: threatened categories (NT, VU, EN) are highlighted in red, whereas Least Concern (LC) is indicated in black.

Species (native)	Number of inventory units	Endemism	Conservation status	
			National protection	Threat status (international/national)
Chelonia				
<i>Emys orbicularis</i>	14	-	+	NT / VU
<i>Mauremys rivulata</i>	1	-	+	LC / EN
<i>Testudo hermanni</i>	5	-	+	VU / NT
<i>Caretta caretta</i>	1	-	+	VU / VU
Sauria				
<i>Hemidactylus turcicus</i>	11	-	-	LC / LC
<i>Algyroides nigropunctatus</i>	102	+	+	LC / LC
<i>Dalmatolacerta oxycephala</i>	23	+	+	LC / LC
<i>Dinarolacerta montenegrina</i>	5	+	-	NT / EN
<i>Dinarolacerta mosorensis</i>	144	+	+	NT / VU
<i>Lacerta agilis</i>	8	-	+	LC / LC
<i>Lacerta trilineata</i>	13	+	+	LC / LC
<i>Lacerta viridis</i> complex	16	-	+	LC / LC
<i>Podarcis melisellensis</i>	19	+	+	LC / LC
<i>Podarcis muralis</i>	78	-	+	LC / LC
<i>Zootoca vivipara</i>	1	-	+	LC / LC
<i>Anguis fragilis</i> complex	8	-	+	LC / LC
<i>Pseudopus apodus</i>	5	-	+	LC / LC
Serpentes				
<i>Xerotyphlops vermicularis</i>	1	-	-	LC / DD
<i>Hierophis gemonensis</i>	4	+	+	LC / LC
<i>Dolichophis caspius</i>	7	-	-	LC / LC
<i>Platycephus najadum</i>	2	-	+	LC / LC
<i>Elaphe quatuorlineata</i>	10	-	+	LC / NT
<i>Zamenis longissimus</i>	5	-	+	LC / LC
<i>Zamenis situla</i>	5	-	+	LC / NT
<i>Coronella austriaca</i>	3	-	+	LC / LC
<i>Telescopus fallax</i>	3	-	-	LC / LC
<i>Natrix natrix</i>	23	-	+	LC / LC
<i>Natrix tessellata</i>	11	-	+	LC / LC
<i>Malpolon insignitus</i>	4	-	+	LC / LC
<i>Vipera berus</i>	2	-	-	LC / LC
<i>Vipera ursinii</i>	1	-	-	VU / VU
<i>Vipera ammodytes</i>	11	-	-	LC / LC

Spur-thighed tortoise *Centrochelys sulcata* (Miller, 1779), laid during its temporary housing in the museum. The eggs did not develop due to inadequate incubation conditions and were subsequently retained in the collection. In addition, the collection includes three specimens of native species collected outside Montenegro: two specimens of *Natrix tessellata* (Laurenti, 1768) from North Macedonia and one specimen of *Hemidactylus turcicus* (Linnaeus, 1758) from Croatia.

The curator of the collection has assembled 449 specimens, while 89 specimens were donated by known contributors and 16 specimens lack information on their donors.

Regarding the native reptile fauna, the collection comprises four turtle species representing four families, 13 lizard species from three families, and 15 snake species representing five families (Table 1).

DISCUSSION WITH CONCLUSIONS

A total of 38 reptile species have been confirmed for the territory of Montenegro. The national reptile fauna comprises seven turtle species from five families, 16 lizard species from five families, and 15 snake species from five families (Leković & Ljubisavljević, in press). Of these, seven species are endemics, including six lizard species and one snake species. Overall, the collection contains 32 of the 38 reptile

species recorded for Montenegro, corresponding to a coverage of 84.2%. Six species are not represented in the collection, all belonging to the group of lizards (three species) and turtles (three species). All snake species recorded for Montenegro are represented in the collection, resulting in 100% coverage for this group. The results highlight the scientific value of the collection and identify taxonomic gaps for future enrichment.

Missing species in the reptile collection:

Three species of turtles: *Trachemys scripta* (Thunberg, 1758), an introduced species first recorded in 2022 (Ljubisavljević, 2022). So far, it has been documented in the coastal region and the eastern subregion of the mountain-basin region of Montenegro (Ljubisavljević, 2022; Iković et al., 2023). It is considered invasive, and its import has been banned in the European Union since 1997 (Bringsøe, 2006; van Dijk et al., 2011); *Chelonia mydas* (Linnaeus, 1758), occasionally occurs in the coastal region of Montenegro, in the Adriatic Sea. The only records so far are from Kotor: Orahovac and Bigova (Gvozdenović et al., 2016); *Dermochelys coriacea* (Vandelli, 1761), occasionally occurs in the Adriatic Sea along the Montenegrin coast. Recorded in Ulcinj (Gvozdenović et al., 2016) and Budva (Kosić, 1896, 1899; Gvozdenović et al., 2016). Three species of lizards: *Tarentola mauritanica* (Linnaeus, 1758), two records exist from the coastal region of Montenegro: Ulcinj (Bruno, 1988) and Bar (Čadenović et al., 2022). The autochthonous origin of populations in the eastern Mediterranean, and consequently in our coastal area, remains questionable; *Podarcis siculus* (Rafinesque, 1810), occurs in the Mediterranean subregion of the coastal region of Montenegro. So far, an isolated population has been confirmed in Kotor and its surroundings, as well as on Mamula Island in

the Bay of Kotor (Džukić et al., 2017). It has been introduced in several Mediterranean countries of Europe, including Montenegro; *Ablepharus kitaibelii* Bibron & Bory de Saint-Vincent, 1833, only one confirmed record of this Short-legged lizard exists in Montenegro, near Berane between the villages of Mašte and Babino (Vergilov et al., 2016).

The absence of several reptile species from the collection of the Natural History Museum of Montenegro can be explained by their ecological and biogeographical characteristics. Introduced species (*Trachemys scripta*, *Tarentola mauritanica*) have only recently been recorded in Montenegro and were not included in earlier collecting efforts. *Podarcis siculus* is also an introduced species, with a limited distribution restricted to isolated populations in Kotor and Mamula Island. Sporadically occurring marine turtles (*Chelonia mydas*, *Dermochelys coriacea*) are rare visitors to the Adriatic coast of Montenegro, usually recorded as isolated individuals. Their unpredictable occurrence makes systematic collection difficult. Finally, *Ablepharus kitaibelii* is an extremely rare species in Montenegro, with only a single confirmed record, and organized field surveys of its potential habitats in the country have not yet been conducted, which naturally limits its representation in museum collection.

Despite these absences, the collection remains a cornerstone for documenting the reptile diversity of Montenegro. It represents a valuable scientific resource and an important component of the country's natural heritage. Future research and collection development may further expand its scope by incorporating newly recorded, introduced, sporadic, or rare species, thereby enhancing its taxonomic completeness and long-term scientific relevance.

REFERENCES:

- BRINGSØE, H. 2006: NOBANIS – Invasive Alien Species Fact Sheet – *Trachemys scripta*. In: Online Database of the North European and Baltic Network on Invasive Alien Species – NOBANIS, www.nobanis.org.
- BRUNO, S. 1988: The herpetofauna from the islands of Cres, Krk and Ada. - Bulletin d'écologie, 19: 265–281.
- COUNCIL OF EUROPE 1979: Convention on the conservation of European wildlife and natural habitats. CETS 104. Bern, Switzerland.
- COUNCIL OF EUROPEAN COMMUNITIES 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wildlife and flora Habitats Directive - 92/43/EEC.
- ČAĐENOVIĆ, N., RADONJIĆ, T., VUKADINOVIĆ, S. & STAMENKOVIĆ, S. 2022: The Moorish gecko, *Tarentola mauritanica* (Linnaeus, 1758) (Reptilia, Squamata, Phyllodactylidae) a new species for the herpetofauna of Montenegro. In: Živić, M & Petković, B. (eds.), The Book of Abstracts. Third Congress of Biologists of Serbia, p. 189. Serbian Biological Society, Belgrade.
- DŽUKIĆ, G., TOMOVIĆ, LJ., ANĐELKOVIĆ, M., UROŠEVIĆ, A., NIKOLIĆ, S. & KALEZIĆ, M. L. 2017: The herpetological collection of the Institute for biological research "Siniša Stanković", University of Belgrade. - Bulletin of the Natural History Museum, 10: 57–104.
- GVOZDENOVIĆ, S., ĐUROVIĆ, M. & IKOVIĆ, V. 2016: Distribution records of sea turtles in the Montenegrin waters. - Studia Marina, 29 (1): 31–46.

- IKOVIĆ, V., POPOVIĆ, J. & GVOZDENOVIC-NIKOLIĆ, S. 2023: Overview of the Pond Slider *Trachemys scripta* (Thunberg in Schoepff, 1792) (Testudines: Emydidae) records in Montenegro. - *Natura Sloveniae*, 25 (2): 61–68.
- IUCN 2024: The IUCN Red List of Threatened Species. Version 2024-1. <<http://www.iucnredlist.org>>.
- JELIĆ, D., IKOVIĆ, V., ČAĐENOVIC, N., GVOZDENOVIC-NIKOLIĆ, S., VUJOVIĆ, A., LJUBISAVLJEVIĆ, K., TOMOVIĆ, LJ., POLOVIĆ, L., MIĆANOVIĆ, A., KRAJNOVIĆ, M. & BLAŽEVIĆ, M. 2023: Crvena lista vodozemaca i gmizavaca Crne Gore (Red list of Amphibians and Reptiles of Montenegro). Agencija za zaštitu životne sredine Crne Gore, Podgorica, 43 pp.
- KOSIĆ, B. 1896: *Sphargis coriacea* Gray u Jadranskome moru. - *Glasnik Hrvatskog Naravoslovnoga Društva*, 8: 117–144.
- KOSIĆ, B. 1899: *Sphargis coriacea* Gray u Jadranskome moru. Dodatak. - *Glasnik Hrvatskog Naravoslovnoga Društva*, 10: 15–24.
- LEKOVIĆ, L. & LJUBISAVLJEVIĆ, K. (in press): Katalog faune gmizavaca (Reptilia) Crne Gore/ Catalogue of The Reptiles (Reptilia) of Montenegro, Catalogues, The Section of Natural Sciences, Montenegrin Academy of Sciences and Arts, Podgorica.
- LJUBISAVLJEVIĆ, K., ARRIBAS, O., DŽUKIĆ, G. & CARRANZA, S. 2007: Genetic and morphological differentiation of Mosor Rock Lizards, *Dinarolacerta mosorensis* (Kolombatović, 1886), with the description of a new species from the Prokletije Mountain Massif (Montenegro) (Squamata: Lacertidae). - *Zootaxa*, 1613: 1–22.
- LJUBISAVLJEVIĆ, K. 2022: First record of the Yellow-bellied Slider, *Trachemys scripta scripta* (Testudines: Emydidae) in Montenegro. - *Herpetology Notes*, 15: 493–497.
- REPUBLIČKI ZAVOD ZA ZAŠTITU PRIRODE CRNE GORE, 2006: Riješenje o stavljanju pod zaštitu pojedinih biljnih i životinjskih vrsta. - Službeni list RCG 76/06, Podgorica: 836, Republički Zavod za zaštitu prirode Crne Gore, 2006.
- UNEP-WCMC 2017: UNEP-WCMC Species Database: CITES Listed Species on the World Wide Web. <https://cites.org/eng/disc/species.php>.
- UNEP/CMS 2017: Convention on Migratory Species Homepage. Available online: <http://www.cms.int/species>.
- VAN DIJK, P. P., HARDING, J. & HAMMERSON, G. A. 2011: *Trachemys scripta* (errata version published in 2016). The IUCN Red List of Threatened Species 2011: e.T22028A97429935.
- VERGILOV, V., HRISTOV, G., LUKANOV, S., LAMBEVSKA, A. & TZANKOV, N. 2016: First record of *Ablepharus kitaibelii* (Bibron & Bory de Saint-Vincent, 1833) in Montenegro. *Biharean Biologist*, 10: 65–66.

RECEIVED: 20. Aprile 2026.