
ZOO
Zagreb
DINARSKI VOLUHAR
Balkan Snow Vole

Dinarski voluhar jedini je preživjeli predstavnik svojeg roda, nepromijenjenih karakteristika još od vremena davno izumrlih predaka. Taj tajanstveni mali sisavac nastanjuje ograničeno područje dinarskog krša i kao takav iznimno je vrijedan predstavnik hrvatske prirodne baštine.

Zbog česte nedostupnosti i skrovitosti staništa koje naseljava, proučavanje dinarskog voluhara u prirodi vrlo je teško. Veliki je to izazov za mnogobrojne istraživače koji žele razotkriti njegovu dobro čuvanu tajnu preživljavanja.

The Balkan Snow Vole is the sole representative of its genus and its characteristics are the same as they were in the times of its long extinct ancestors. This mysterious small mammal inhabits the limited area of Dinaric karst and as such is an extremely valuable representative of the Croatian natural heritage.

Because of the often unavailability and concealment of its habitat, the study of the Balkan Snow Vole in nature is very difficult. It is a great challenge for numerous researchers who want to uncover its well-kept secret of survival.

SISTEMATIKA
SYSTEMATICS

Dinaromys bogdanovi
DINARSKI VOLUHAR / BALKAN SNOW VOLE

Dinarski voluhar (*Dinaromys bogdanovi*) mali je sisavac iz reda glodavaca (Rodentia) u srodstvu s voluharicama. Otkriven je 1922. i tada je opisan kao pripadnik roda Chionomys (snježne voluharice). Unutar roda Dinaromys konačno je svrstan tek 1955. i danas je njegov jedini živući predstavnik. Na području dinarsko-alpskog prostora taj je rod nastao i evoluirao tijekom posljednja četiri milijuna godina. Za razliku od većine široko rasprostranjenih voluharica, dinarski voluhar je endem i relikt specifičan za krško područje Dinarida.

The Balkan Snow Vole (Dinaromys bogdanovi) is a small mammal from the Rodentia order, related to voles. It was discovered in 1922 when it was first described as a member of the Chionomys (snow voles) genus. It wasn't classified under the Dinaromys genus until 1955 and is the only living representative of that genus today. That genus has originated and evolved during the last four million years. Unlike most of the widespread voles, the Balkan Snow Vole is endemic species and a relict specific for the karst area of the Dinarides.

ENDEMI
ENDEMIC SPECIES

Biljne i životinjske vrste koje se pojavljuju na ograničenom geografskom području (arealu) i ne nalazimo ih nigdje drugdje.

Plant and animal species that exist only in limited geographical regions (areals) and cannot be found anywhere else.

RELIKE
RELICS

Biljne i životinjske vrste koje su se razvile u prošlosti i kao takve, u svojem izvornom obliku, opstale su do današnjih dana. U prošlosti su bile široko rasprostranjene, ali uslijed velikih promjena staništa i klime ostale su izolirane na ograničenim područjima.

Plant and animal species from the past which survived in their original form until today. They were widespread in the past but stayed isolated in restricted areas due to great changes in habitats and climate.

NALAZIŠTA

Do sada je u Hrvatskoj vrsta potvrđena na sljedećim područjima: **Biokovo** (Vošac 1400 m.n.v, Stara sniježnica 1420 m.n.v., Sošići 750 m.n.v.), **Dinara** (Troglav 1420 m.n.v.), **Mala Kapela** (Bijeli vrh 920 m.n.v.), **Mosor** (iznad Dugopolja), **Otpor** (Vidilica-Malačka 580 m.n.v.), **Ploče** (sjeverna obala Baćinskih jezera 20 m.n.v.), **Pelješac** (Sv. Ilija 900 m.n.v.), **Sniježnica** (Glogova jama 950 m.n.v.), **Velebit** (Barbovača 950 m.n.v., Gornja klada 350 m.n.v., Prezid 820 m.n.v., Bačić kuk 900 m.n.v., Anića kuk 270 m.n.v., Alan-Mrkvište 1200 m.n.v., Lukovo Šugarje, Vasanova korita 950 m.n.v., Križ 695 m.n.v.).

AREAS

The species has so far been confirmed in the following areas in Croatia: **Biokovo** (Vošac 1400 m a.s.l., Stara Sniježnica 1420 m a.s.l., Sošići 750 m a.s.l.), **Dinara** (Troglav 1420 m a.s.l.) **Mala Kapela** (Bijeli vrh 920 m a.s.l.) **Mosor** (above Dugopolje), **Otpor** (Vidilica-Malačka 580 m a.s.l.), **Ploče** (northern coast of Baćina lakes 20 m a.s.l.), **Pelješac** (Sv. Ilija 900 m a.s.l.), **Sniježnica** (Glogova jama pit 950 m a.s.l.), **Velebit** (Barbovača 950 m a.s.l., Gornja klada 350 m a.s.l., Prezid 820 m a.s.l., Bačić kuk 900 m a.s.l., Anića kuk 270 m a.s.l., Alan-Mrkvište 1200 m a.s.l., Lukovo Šugarje, Vasanova korita 950 m a.s.l., Križ 695 m a.s.l.)

RASPROSTRANJENOST
DISTRIBUTION

Dinarski voluhar je u Hrvatskoj rasprostranjen na području od Sjevernog Velebita, Male Kapele, Dinare, Biokova, sve do Sniježnice u Konavlima. Nalazimo ga i u Hercegovini, južnim dijelovima Bosne, u Crnoj Gori i Kosovu, a na istoku Sjeverne Makedonije nalazimo izolirane populacije. Postoje pretpostavke da područje rasprostranjenosti obuhvaća i Albaniju te sjever Grčke.

Obzirom na specifičan izbor staništa, područje naseljenosti dinarskog voluhara procijenjeno je na oko 5 200 km2. Također, prema paleontološkim nalazima uočava se da je i u prošlosti rasprostranjenost ove vrste bila mala te ograničena na područja sjevernog Jadrana i zapadnog Balkana.

In Croatia, the Balkan Snow Vole inhabits the area from Northern Velebit, Mala Kapela, Dinara, Biokovo up to Sniježnica mountain in Konavle. It can also be found in Herzegovina, southern areas of Bosnia, in Montenegro and Kosovo, and isolated populations can be found at the eastern part of North Macedonia. There is a presumption that the area of distribution also covers Albania and Northern Greece.

Given the specific choice of habitat, the area of population of Balkan Snow Vole is estimated at around 5 200 km2. Furthermore, according to the paleontological findings, it has been noticed that the distribution area of this species was small in the past as well and restricted to the areas of Northern Adriatic and the Western Balkans.

VANJSKI IZGLED I KARAKTERISTIKE
OUTER APPEARANCE AND CHARACTERISTICS

Glatki i vitki rep pokriven je sitnim dlačicama i može dostići više od polovice duljine tijela (8 – 10 cm duljine). Its soft and slim tail is covered in tiny hairs and can reach more than half of the length of body (8-10 cm in length).

Mužjaci i ženke ne razlikuju se prema vanjskom izgledu (ne postoji spolni dimorfizam), a oba spola su podjednake težine. Males and females do not differ in terms of external appearance (there is no sexual dimorphism), and both sexes are of equal weight.

Tijelo ovog malenog glodavca je zdepasto, s okruglom njuškom, pokriveno gustim i mekanim krznom, s leđne strane smeđe ili plavo-sivkaste boje, dok je trbušni dio krzna bjelkast. The body of this small rodent is stubby, it has a round snout and is covered in dense and soft fur, brown or bluish-grey from the upper side, whereas the stomach area is whitish.

Za snalaženje u prostoru koristi se širokom lepezom osjetilnih dlaka (vibrissae), dugih do 6 cm. Dinarski voluhar ima velike uši, blago prekrivene dlakama. It uses a wide spectrum of tactile hair (vibrissae) for orientation in space, of up to 6 cm in length. The Balkan Snow Vole has large ears, lightly covered in hair.

Dlanovi i stopala su bijeli, nemaju dlake, osim na području u blizini peta. Palac ima mali spljošteni nokat, dok ostali prsti imaju kratke oštre kandže, podjednake duljine na prednjim i stražnjim nogama. Its paws and feet are white, without hairs, except in the area near heels. Their thumbs have a small flat nail, while the rest of the fingers have short sharp claws, of equal length on front and back feet.

Jedini je voluhar na području Europe koji ima kutnjake s korijenjem. Korijen je razvijen u odraslih jedinki, čija se starost može procijeniti ovisno o njegovoj duljini. It is the only vole in Europe with molars with roots. The root is developed in mature individuals whose age can be estimated depending on its length.

NAČIN ŽIVOTA I PONAŠANJE
HABITS AND BEHAVIOUR

Aktivan je tijekom cijele godine, najčešće u sumrak i tijekom noći. Vrlo je spretan i brz, po kamenjaru se kreće kombinacijom skokova i penjanja, poput kombinacije kretanja kod vjeverice i divokoze.

Kemijski signali posebno su važni u komunikaciji ove vrste. U vrijeme razmnožavanja označavaju teritorije izlučevinama iz lojnih žlijezda.

Kod glodavaca glasanje je važan dio ponašanja, a to je uočeno i kod dinarskog voluhara.

It is active throughout the entire year, most often at dusk and at night. It is very agile and fast, it moves across rocky grounds with a combination of jumps and climbs, like a combination of movements of squirrels and mountain goats.

Chemical signals are of great importance in communication of this species. At the time of reproduction, they mark the territories by secretions from sebaceous glands.

Vocalization is an important part of the behaviour of rodents, which has been noticed in the Balkan Snow Vole as well.

ISTRAŽIVANJEM ULTRAZVUČNOG GLASANJA OVOG ENDEMIČNOG GLODAVCA U PROSTORU ZOO VRTA, DOBIVENI SU PRVI PODACI O VOKALIZACIJI I MOGUĆOJ VAŽNOSTI GLASANJA KOD OVE VRSTE.

BY RESEARCHING THE ULTRASONIC VOCALIZATION OF THIS ENDEMIC RODENT IN THE ZOO, THE VERY FIRST DATA ON VOCALIZATION AND THE POSSIBLE IMPORTANCE OF VOCALIZATION IN THESE SPECIES WAS OBTAINED.

PREHRANA
DIET

U PREHRANI KORISTI I NEKE BILJKE KOJE DRUGI IZBJEGAVAJU, POPUT KOPRIVE TE MLJEČIKE (*EUPHORBIA*) I ZVONČIĆA (*CAMPANULA*) KOJE IZLUČUJU SOK NEUGODNOG OKUSA.

THEIR DIET ALSO INCLUDES SOME PLANTS THAT OTHERS AVOID, SUCH AS NETTLE AND SPURGE (EUPHORBIA) AND BELLFLOWER (CAMPANULA) WHICH SECRETE SAPS OF UNPLEASANT TASTE.

Dinarski voluhar je biljojed i hrani se raznim vrstama zeljastih biljaka i trava koje može pronaći na planinskim livadama te dodatno brsti lišće niskog grmlja. Također, skladišti hranu u svojim gnijezdima ili skrovištima, kako bi osiguralo zalihe za razdoblja kad nastupe nepovoljni uvjeti. Prehrana se obično mijenja tijekom sezona, ovisno o vrstama dostupnog bilja.

The Balkan Snow Vole is herbivore and feeds on various types of herbaceous plants and grass it can find on mountain meadows and browses shrub leaves. They also store food in their nests or hideouts, in order to ensure food for periods when unfavourable conditions occur. Diet usually changes during the season, depending on the types of available herbs.

RAZMNOŽAVANJE
REPRODUCTION

Životni vijek: oko 4 godine.
Broj mladunaca: u prosjeku 2 – 3 u leglu.

Spolnu zrelost dostižu tek u drugoj godini života te u prosjeku imaju do dva legla godišnje. Razmnožavaju se tijekom cijele godine, najčešće u ožujku i krajem listopada. Gnijezda grade pod blokovima stijena, u škrapama, manjim špiljama te jamama ledenicama. Ženke nose mlade otprilike 30 dana. Na razmnožavanje uvelike utječu vremenski uvjeti, ukoliko su nepovoljni (suhe sezone) može doći do njegovog odgađanja.

Life span: about 4 years
Number of pups: on average 2-3 in litter

They reach sexual maturity only during their second year of life and have up to two litters a year on average. They reproduce throughout the entire year, most often in March and late October. They build nests under rock blocks, in limestone pavements, smaller caves and ice pits. Females carry the pups for around 30 days. Reproduction is greatly affected by weather conditions, if they are adverse (dry seasons) it can be delayed.

Photo: idontlikepeas.co.uk

GRABEŽLJIVCI
PREDATORS

Plijen je brojnim malim grabežljivcima poput lasice (*Mustela nivalis*) i kune bjelice (*Martes foina*), a često i za poskoka (*Vipera ammodytes*) te šumsku sovu (*Strix aluco*).

Balkan Snow Vole is prey for small predators such as weasel (Mustela nivalis) and beech marten (Martes foina), and often for horned viper (Vipera ammodytes) and tawny owl (Strix aluco).

Photo: Wikimedia Commons / DominikTurk

Photo: Branko Jalžić

DINARSKI KRŠ
DINARIC KARST

Dinarski je krš jedinstveno i specifično područje brojnih površinskih i podzemnih krških reljefnih oblika, od sitnih škrapa po površini stijena do velikih krških polja te prostranih krških zaravni, jama i špilja. Poznat je u svjetskim razmjerima, jer predstavlja klasični tip krša (lat. locus tipicus). Krš je tip reljefa koji se razvija na tlu sastavljenom od topivih karbonatnih stijena, najčešće vapnenca ($CaCO_3$ – kalcijev karbonat) ili dolomita ($CaMg(CO_3)_2$ – kalcij-magnezijev karbonat).

Glavnu ulogu u oblikovanju krškoga reljefa ima voda, koja svojim kemijskim otapanjem (korozijom) i mehaničkim radom (erozijom) oblikuje krške fenomene: ponikve (vrtače), škrape, kamenice, zaravni i humce, uvale i polja na površini te špilje i jame u podzemlju. Krški je reljef značajno prisutan u Hrvatskoj, prekriva gotovo 50% površine, a dinarski krš je po mnogobrojnim karakteristikama jedinstven u svijetu.

Unutar prirodnih vrijednosti dinarskog krša veliki značaj ima živi svijet. Faunu Dinarida odlikuje velik broj endemičnih i jedinstvenih podzemnih vrsta, a od toga gotovo 80% vrsta pripada fauni Hrvatske. Iako je prepoznata kao vruća točka biološke razlolikosti, podzemna fauna Hrvatske još je uvijek nedovoljno istražena te često ugrožena brojnim ljudskim aktivnostima koje na nju štetno djeluju i ostavljaju neizbrisiv trag.

Dinaric karst is a unique and specific area of numerous surface and underground karst relief forms, from tiny limestone pavements on the surface of the rock to the great karst fields and spacious karst plateaus, pits and caves. It is known worldwide because it represents a classic karst type (locus tipicus). Karst is a type of relief which is formed on soil composed of soluble carbonate rocks, most commonly limestone ($CaCO_3$ – calcium carbonate) or dolomite ($CaMg(CO_3)_2$ – calcium magnesium dicarbonate).

Water has the main role in the formation of the karst relief, as it forms the following karst phenomena by its chemical dissolution (corrosion) and mechanical work (erosion): sinkholes, limestone pavements, plateaus and hills, coves and fields on the surface and caves and pits underground. Karst relief is significantly present in Croatia, it covers almost 50% of the surface, and the Dinaric karst is unique in the world by its characteristics.

Wildlife is of great importance in terms of natural values of the Dinaric karst. The fauna of the Dinarides is characterised by many endemic and unique underground species, of which nearly 80% belong to the fauna of Croatia. Even though it is recognised as the hot spot of biological diversity, the underground fauna of Croatia is still insufficiently explored and often endangered by numerous human activities that are detrimental to it and leave an indelible mark.

UGROŽENOST I ZAŠTITA
ENDANGERMENT AND PROTECTION

Razlozi vjerojatne ugroženosti ove vrste nisu do kraja poznati. Na staništa dinarskog voluhara ljudi rijetko odlaze, međutim svejedno je ugrožen neizravnim ljudskim djelovanjem. Izgradnje cesta, naselja i poljoprivrednih površina prekida vezu između skupina ovih životinja, koje onda ostanu izolirane na svom staništu, i postupno, kako nemaju kontakt s drugima, lagano nestaju. Dinarskom voluharu slična vrsta, europska snježna voluharica (*Chionomys nivalis*), koja preferira život visoko u planinama, možda potiskuje dinarskog voluhara s njegovih omiljenih visokoplaninskih staništa.

Zbog slabog poznavanja biologije ove vrste, kao i nepoznatih uzroka smanjenja populacije, još uvijek ima relativno nizak stupanj ugroženosti. Prema IUCN-ovoj* Crvenoj listi ugroženih vrsta spada u kategoriju osjetljive vrste (VU – vulnerable) s naglaskom na rapidno smanjenje populacije. U Crvenoj knjizi sisavaca Hrvatske ima status nedovoljno poznate vrste (za ovu vrstu ne postoji dovoljno informacija (DD – data defficient).

Prema Pravilniku o strogo zaštićenim vrstama (NN 73/2016) ova vrsta je proglašena strogo zaštićenom vrstom.

The reasons for likely endangerment of this species are not fully known. People rarely go to the habitats of Balkan Snow Vole, but they are nevertheless jeopardised by indirect human action. Construction of roads, settlements and agricultural land interrupts the link between the groups of these animals, which then remain isolated in their habitat, and gradually, as they have no contact with others, slowly disappear. A Balkan Snow Vole-like species, the European Snow Vole (Chionomys nivalis), which prefers the life high in the mountains, might be pushing the Balkan Snow Vole off its favourite high mountain habitats.

Due to poor knowledge of biology of this species, as well as the unknown causes of the decline of its population, it still has a relatively low level of endangerment. According to the IUCN* Red List of Threatened Species it is under the category of vulnerable species (VU-vulnerable) with an emphasis on rapid decrease in population.

In the Red Book of Mammals of Croatia, it has the status of little-known species (there is not enough data for this species – DD – data deficient).

*IUCN (eng. International Union for Conservation of Nature) – Međunarodna unija za zaštitu prirode.
*IUCN – International Union for Conservation of Nature

PROJEKT:
ISTRAŽIVANJE BIOLOGIJE VRSTE DINARSKI VOLUHAR (DINAROMYS BOGDANOVI)

Godina početka projekta: 2011.
Status: Aktivan
Vrsta: Dinarski voluhar
(*Dinaromys bogdanovi*, Martino 1922.)

PROJECT:
RESEARCH ON THE BIOLOGY OF THE BALKAN SNOW VOLE (DINAROMYS BOGDANOVI) SPECIES

Year of the start of the project: 2011
Status: Active
Type: Balkan Snow Vole
(Dinaromys bogdanovi, Martino 1922.)

S obzirom da se radi o rijetkom endemskom sisavcu kojemu je status nedovoljno poznat, doprinos ovih istraživanja zaštiti, upravljanju te poznavanju ugroženosti vrste bit će od velikog značaja.

Kako bi osigurali što bolju zaštitu i očuvanje ove vrste te biološke raznolikosti hrvatskoga krša, u sklopu projekta provode se i brojni edukativni programi na lokalnoj i općoj razini, s ciljem podizanja svijesti javnosti.

Udruga Biom :

- Poučna ploča “Dinarski voluhar”, špilja Vranjača, Mosor.
- Ciklus predavanja o dinarskom voluharu i krškom području, održanima u obrazovnim institucijama, planinarskom društvu te za širu javnost u Domu kulture na području Splitske županije.

Given that this is a rare endemic mammal whose status is not well known, the contribution of these research to the protection, management and knowledge of the endangerment of the species will be of great importance.

In order to ensure the best protection and preservation of this species and the biodiversity of the Croatian karst, numerous educational programmes on the local and general level are held within the project, with the aim of raising public awareness.

Association Biom:

- Educational sign “Balkan Snow Vole”, Vranjača Cave, Mosor
- Cycle of lectures on the Balkan Snow Vole and the karst area, held in educational institutions, mountaineering society and for general public in the Cultural centre at the area of Split County

PARTNERI / PARTNERS:

Udruga Biom – 2011. pokrenula je projekt „Istraživanje biologije vrste dinarski voluhar (*Dinaromys bogdanovi*)“, s ciljem proučavanja biologije i ekologije ove vrste kako bi se upotpunili podatci, ustanovilo stanje ugroženosti te na temelju dobivenih saznanja podigla razina njihove zaštite.

Prirodoslovno-matematički fakultet Sveučilišta u Zagrebu – Biološki odsjek, Zavod za animalnu fiziologiju – Na projektu, u svojstvu volontera, sudjeluju i studenti Biološkog odsjeka Prirodoslovno-matematičkog fakulteta Sveučilišta u Zagrebu.

Veterinarski fakultet Zagreb – Osigurava stručnu veterinarsku skrb za jedinke koje se nalaze u Zoološkom vrtu. Obavlja dijagnostičke i preventivne postupke te liječenje životinja. Također, zajedno s partnerima projekta provodi znanstvena istraživanja od zajedničkog interesa.

Šumarski fakultet Sveučilišta u Zagrebu – Provedba istraživanja određivanja brzine probave u dinarskog voluhara.

Zoološki vrt grada Zagreba – Sudjelovanjem u navedenom projektu Zoo Zagreb aktivno se uključio u programe zaštite u Hrvatskoj. U prostorima Zoo vrta drži se reproduktivno aktivna populacija ove vrste, što daje jedinstvenu priliku za proučavanje i doprinos istraživanjima.

Association Biom – launched a project in 2011 entitled „Research on the biology of the species Balkan Snow Vole (Dinaromys bogdanovi), with the aim of studying the biology and ecology of this species in order to complete data, establish the level of endangerment and raise the awareness for their protection on the basis of resulting findings.

The Faculty of Science, University of Zagreb – Department of Biology, Division of Animal Physiology – the students of the Department of Biology of the Faculty of Science, University of Zagreb participated in the project as volunteers

The Faculty of Veterinary Medicine Zagreb – Provides professional veterinary care for individuals in the Zoo. Carries out diagnostic and preventive procedures and the treatment of animals. Together with project partners carries out scientific research of common interest.

Faculty of Forestry, University of Zagreb - Study related to the determination of the Balkan Snow Vole’s speed of digestion

The Zagreb Zoo – By participating in the abovementioned project, the Zagreb Zoo actively participated in the protection programmes in Croatia. A reproductive active population of this species is kept at the Zoo, which gives a unique opportunity to study them and contribute to research.

DINARSKI VOLUHAR U ZAGREBAČKOM ZOO VRTU

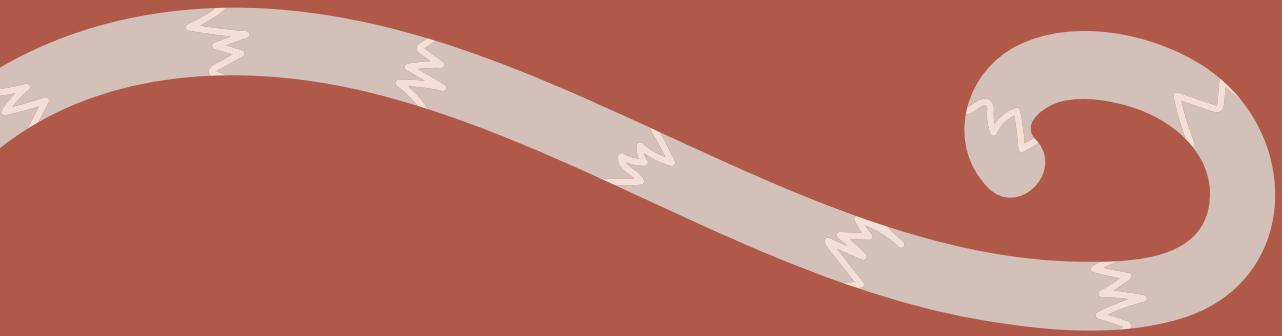
BALKAN SNOW VOLE IN THE ZAGREB ZOO

Osim stroge povezanosti s dubokim škrapama i procijepima na vapnencu Dinarida, vrlo se malo zna o biologiji ove vrste. Zna se da je relativno rijetka u prirodi te da se sporo razmnožava, a ako se uzme u obzir nedostupnost staništa koja naseljava i skrovitost ove životinje, proučavanje dinarskog voluhara u prirodnom okruženju nije jednostavno. Zbog toga je brojne karakteristike vezane uz biologiju vrste, poput reproduktivnog ciklusa, ponašanja ili fizioloških prilagodbi lakše i učinkovitije proučavati u zatočeništvu nego u prirodi.

Držanjem jedinki dinarskog voluhara u prostorima Zoološkog vrta dane su mogućnosti za provođenje specifičnih bioloških istraživanja. Proučavaju se socijalna ponašanja, glasanje jedinki, dnevne i sezonske razlike u aktivnostima, korištenje prostora te kognitivne karakteristike. Također se istražuju morfologija i fiziologija probavnog sustava, prehrambene navike, brzina probave te mikrobiologija probavnog sustava.

Apart from the close connection to the deep limestone pavements and faults of Dinaric limestone, not much is known of the biology of this species. It is known that it is relatively rare in nature and that i reproduces slowly and considering the unavailability of its habitat and the hiddenness of this animal, studying the Balkan Snow Vole in natural environment is not easy. For this reason, many features related to the biology of this species, such as reproductive cycle, behaviour or physiological adaptations are easier and more effective to study in captivity than in nature.

By keeping the Balkan Snow Vole individuals in the Zoo, we have created opportunities for carrying out specific biological research. Their social behaviour, vocalization, daily and seasonal differences in activities, use of space and cognitive characteristics are all studied. Morphology and physiology of the digestive system, eating habits, digestion rate and microbiology of the digestive system are studied as well.



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