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First Records of Mediterranean Horseshoe Bat *Rhinolophus euryale* Blasius, 1853 (Mammalia: Chiroptera) in Romanian Dobrudja, Black Sea Region

Levente Barti*[1] *& Attila D. Sándor*[2,3,4]

[1]Myotis Bat Conservation Group, Miercurea Ciuc, Romania
[2]Department of Parasitology and Parasitic Diseases, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania
[3]Department of Parasitology and Zoology, University of Veterinary Medicine, Budapest, Hungary
[4]ELKH-ÁTE Climate Change: New Blood-sucking Parasites and Vector-borne Pathogens Research Group, Hungary

Abstract: Two Mediterranean horseshoe bats *Rhinolophus euryale* were observed in Romanian Dobrudja on the 12 January 2016. This observation is the first record in Romania of the species away from its Carpathian Range. The two specimens were found hibernating in an abandoned mine shaft in the Pădurea și Valea Canaraua Fetii, Iortmac Natural Reserve, near Băneasa, Constanța County, SE Romania. The only published record of the species in this region is from Bulgaria (Malkata Badzhaliya Cave in the valley of the Taban Dry River), about 24 km southwest of the Pădurea Canaraua Fetii Natural Reserve. The karst area of the southern part of the Dobrudjan Plateau, which is characterised by dry valleys (former riverbeds) and scattered thermophilous deciduous forests, may represent the sole suitable habitat for the northernmost population of the Mediterranean horseshoe bats near the western shores of the Black Sea.

Key words: Chiroptera, diversity, Pădurea Canaraua Fetii Natural Reserve, protected species

Introduction

Several noteworthy updates regarding the Romanian distribution of the medium-sized horseshoe bats were published over the last decade. *Rhinolophus mehelyi* Matschie, 1901 was caught in the Romanian Banat region (Csősz et al. 2015) while *Rhinolophus blasii* Peters, 1866 was recorded in the northern part of the Romanian Western Carpathians (Jére et al. 2017); both records represent the northernmost limits of the ranges of these two species in Europe. Another article was dedicated to the revision of the Mediterranean horseshoe bat records in the Carpathian region (Uhrin et al. 2012), offering the most comprehensive knowledge about the species distribution in the western part of Romania. The recent studies revealed further surprising facts regarding the distribution of the medium-sized horseshoe bats.

The Mediterranean horseshoe bat *Rhinolophus euryale* Blasius, 1853 is a typical bat of the thermo-Mediterranean zone of Europe. The species is distributed from north-western Africa through most of southern Europe to the Middle East and the Caucasus (Dietz et al. 2009). The southern and eastern limits of its distribution range are in the Levant and Iran (Uhrin et al. 2012); recently, it has been recorded in Iraq (Al-Sheikhly et al. 2015). The Romanian range of the species covers mostly the warm slopes of the Romanian Western Carpathians and the western group of the Southern Carpathians (55 localities).

*Corresponding author: attila.sandor@usamvcluj.ro

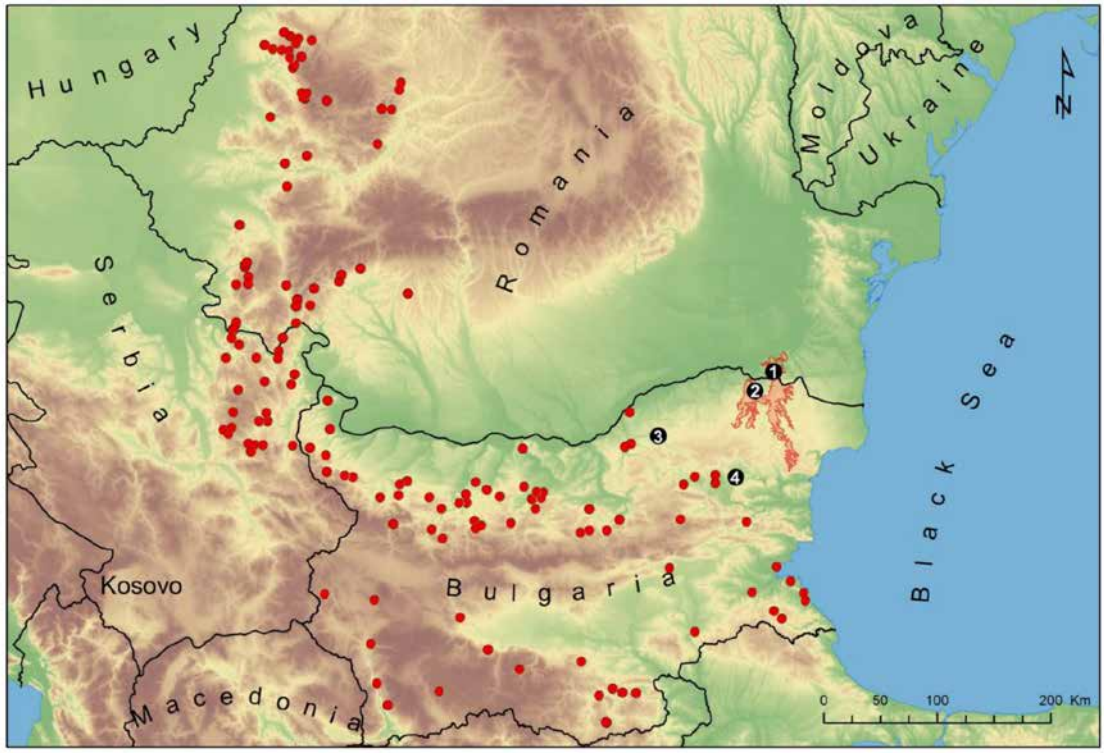

Fig. 1. The location of the new record of the Mediterranean horseshoe bat *Rhinolophus euryale* Blasius, 1853 (1 – Canaraua Fetii), with known records from Romania, Serbia and Bulgaria. Red points on the map are based on Uhrin et al. (2012) and Benda et al. (2003). The closest known occurrences from Bulgaria are also presented: 2 – Malkata Badzhaliya Cave; 3 – Hilyadite Ochichki Cave; 4 – Bozhkova Dupka Cave. By the red-shaded dots, areas the protected Natura 2000 sites Harsovska Reka BG0000106 and Suha Reka BG0000107 (on Bulgarian side) and Pădurea și Valea Canaraua Fetii – Iortmac Natural Reserve ROSCI0172 (Romanian side).

The species has never been recorded at lowland landscapes and its most-reported sites are found between 200 and 600 m a.s.l. (Uhrin et al. 2012).

In Bulgaria, Mediterranean horseshoe bats occur on the whole territory (104 localities listed by Benda et al. 2003). It prefers karst regions of the Danubian Plain and the northern foothills of the Balkan Mts. Preliminary altitudinal data show a preference for sites within the altitude belt of 300–500 m a. s. l. in Bulgaria. The species generally does not reach the Danube River and only a handful of records are known at lower altitudes (Benda et al. 2003).

In this article, we present the first record of the Mediterranean horseshoe bat in Romanian Dobrudja (Pădurea și Valea Canaraua Fetii – Iortmac Nature Reserve, Băneasa), providing data on both summer and winter presence, 17 years after a specimen was mist-netted on the other side of the Romanian-Bulgarian border.

Materials and Methods

This karst area of the southern part of the Dobrudjan Plateau is unique with its dry valleys (former river beds), scattered thermophilous deciduous forests, scrub and xeric grasslands, providing habitat for more than 800 plant species and several rare animal species, including rarities from the Ponto-Caspian and Mediterranean bioregions (Arcuș & Lupașcu 2004, Giurgiu et al. 2012). The Romanian Canaraua Fetii valley is the lower section of the Bulgarian Sukha Reka valley. The bat fauna of the whole valley includes 18 species and, therefore, it might be considered rich. Besides the Mediterranean horseshoe bat, other horseshoe bat species (*R. mehelyi, R. ferrumequinum* and *R. hipposideros*) and a number of vespertilionid species (*Myotis myotis, M. blythii, M. daubentonii, M. davidii, M. capaccinii, M. emarginatus, Eptesicus serotinus, Vespertilio murinus, Pipistrellus pipistrellus, P. nathusii, P. pygmaeus, Hypsugo savii, Plecotus austriacus, Barbastella barbastellus* and *Miniopterus schreibersii*) are present in the area (Dumitrescu et al. 1963, Rădulețţ & Stănescu 1996, SDF of Suha Reka SCI, Sándor et al. 2021, Péter et al. 2022). Bats were captured with harp traps and mist nests placed close to the entrance of known roosts and locations where commuting individuals had been ob-

Fig. 2. A hibernating Mediterranean horseshoe bat *Rhinolophus euryale* Blasius, 1853 (right) and Greater horseshoe bat *Rhinolophus ferrumequinum* Schreber, 1774 (left) hanging from the ceiling of the Canaraua Fetii mine shaft on 12 January 2016 (Photo L. Barti).

Table 1. Records of the Mediterranean horseshoe bat *Rhinolophus euryale* Blasius, 1853 in Dobrudja, Black Sea Region, Romania. Legend: ad – adult; M – male.

No	Age	Sex	Forearm (mm)	Weight (g)	Date	Observations
1, 2	ad	-	-	-	12.01.2016	Mineshaft I, two individuals observed
3	ad	M	47.05	11.9	31.08.2016	Mineshaft I
4	ad	M	48.19	11.3	27.05.2019	Mineshaft I, caught together with No. 5
5	ad	M	49.07	11.2	27.05.2019	Mineshaft I, caught together with No. 4
6	ad	M	48.27	10.6	28.05.2019	Mineshaft II

served. Captured individuals were identified using morphological characteristics (Dietz et al. 2009). Their age and sex were noted and fore-arm length and weight were measured. All bats were released at the place of capture. Known hibernation sites were surveyed in late January for evaluating the number of hibernating bats.

Results

Mediterranean horseshoe bats were observed in Romanian Dobrudja for the first time on 12 January 2016, when two individuals were located hibernating in the Pădurea și Valea Canaraua Fetii, Iortmac Natural Reserve (site code: ROSCI0172, ROSPA0008, IV/2.363), near the locality of Băneasa, Constanța County (Fig. 1). These bats were observed together with six other bat species (*R. mehelyi*, *R. ferrumequinum*, *R. hipposideros*, *M. blythii, M. daubentoni* and *M. schreibersii*) in a 300-m-long abandoned mine (N44.07° E27.64°, 21 m a.s.l.). The two Mediterranean horseshoe bats were found in different parts of the mine. The first individual was located close to the entrance, in a small incompact group of *R. ferrumequinum* (Fig. 2). The second individual was found in the terminal part of the shaft, in a close vicinity of a colony of *R. mehelyi*. No measurements were taken from these individuals to reduce disturbance. However, the essential identification characters were observed (Dietz et al. 2009):

(1) The lower saddle process on the nasal leaf was broad and square-shaped when viewed from the front, while its lower margin was rounded.

(2) The lancet was narrowing gradually to its tip, while the tip was broadly rounded.

(3) The upper saddle process was horn-shaped,

Fig. 3. Mediterranean horseshoe bat *Rhinolophus euryale* Blasius, 1853 captured at the entrance of the Canaraua Fetii mine shaft on 31st August 2016 (Photo L. Barti).

pointed in laterally and curving frontally (much narrower than in the case of *R. mehelyi,* see. Fig. 2).

Moreover, the belly was brown-greyish, not whitish like in *R. mehelyi,* with an indistinct boundary between the back and underside. The presence of several individuals of *R. mehelyi* in the close quarters offered a good chance for comparisons (Fig. 4).

The first record was followed by several further records. Using a harp-trap, we captured on 31 August 2016 another individual at the same place, which was an adult male (Fig. 3, 4). Seven other species (*R. mehelyi*, *R. ferrumequinum*, *M. myotis*, *M. blythii*, *M. daubentonii*, *E. serotinus* and *M. schreibersii*) were caught during that same campaign at the entrance of the mine shaft. The most numerous was *M. schreibersii,* which had a large summer/swarming colony inside the shelter. In 2019, three different individuals were recorded, two from the same site, while another at a distance of 0.9 km to the north (Table 1).

Discussion

Previous studies on the bat fauna of Romanian Dobrudja (Dumitrescu et al. 1963, Červený 1982, Grimmberger 1993, Răduleţ & Stănescu 1996, Hermanns et al 2002, Răduleţ 2005, Nagy et al.

Fig. 4. Mediterranean horseshoe bat *Rhinolophus euryale* Blasius, 1853 (right) and Mehely's horseshoe bat *Rhinolophus mehelyi* Matschie, 1901 (left) captured at the entrance of the Canaraua Fetii mine shaft on 31th August 2016 (Photo L. Barti).

2005, Nagy & Postawa 2010, Pocora & Pocora 2011) did not report the Mediterranean horseshoe bat from that region. The only previous record of the species from Dobrudja was from Bulgaria – one adult male mistnetted on the 16 April 1999 at Malkata Badzhaliya Cave in the valley of the Taban Dry River (Harsovska Reka Natura 2000 site, code BG0000106), close to the settlement of Voynovo, Silistra District (Benda et al. 2003). This site is at about 24 km from the Pădurea Canaraua Fetii Nature Reserve (Fig. 1). Further information regarding the presence of the species is mentioned in the documentations of the Bulgarian Nature Protection legislation. There are two neighbouring Natura2000 sites (Harsovska Reka BG0000106 and Suha Reka BG0000107), which list the species. The estimated population numbers for both sites are of 51–100 individuals. Unfortunately, no details of observations or citations are included. This information suggests the presence of at least two colonies in the area, which might be the northernmost population of the species in the karst regions at the Bulgarian side of the Danube River Plain. Previously known Romanian populations of the Mediterranean horseshoe bat are connected directly to the south European parts of the species range on the Balkans and in Dalmatia, through the Carpathian Mountains (Uhrin et al. 2012). The distance between the Pădurea Canaraua Fetii Natural Reserve and the closest Romanian record's site (Berlești, Gorj County, a former house-dwelling colony of the medium-sized horseshoe bats, Barbu & Bazilescu 1977) is about 329 km through lowlands with intensive agriculture – a landscape that probably excludes the possibility of any direct connection. A survey of the anthropogenic roosts of the medium-sized horseshoe bats in the Romanian part of the Danubian Lowland (Olt, Teleorman, Giurgiu and Călărași Countys) performed in 2008 failed to locate any Mediterranean horseshoe bat (Jére C. & Dragu A., pers. comm.).

The individuals of the Mediterranean horseshoe bat from the Pădurea Canaraua Fetii Nature Reserve probably belong to the northernmost Bulgarian population. This group might have connections with the eastern part of the core population on the Balkans, even if the published records are very scarce in the eastern Danube Lowland area. The distance to the closest locality (Malkata Badzhaliya Cave, 27 km SW) or the other two areas from Bulgaria (Fig. 1), i.e. Hilyadite Ochichki Cave near Madara, Shumen District (77 km S) and Bozhkova Dupka Cave near Krivnya, Razgrad District (93 km SW) as well as to the important colonies of Orlova Chuka Cave (Pepelina, Ruse) and Zorovica Cave (Cherven, Ruse) may allow a continuous exchange between these populations, even for such species with reduced mobility (Benda et al. 2003, Dietz et al. 2009).

There are no data regarding historical presence of the Mediterranean horseshoe bat in the region, likely because of lack of research in the past. Before the 1990's, no records were known from the whole Dobrudja Plateau (Benda et al. 2003). Being a cave-dwelling species, which forages in warm wooded areas, it likely persisted there since the last Ice Age. The area pertained extensive forest cover until recently, with massive reduction of the forested surfaces starting only 200 years ago, and in 50 years about 2/3 of the ancient forest disappeared (Arcuș & Lupașcu 2004). Although locally, the limestone cliffs from the dry valleys have been and still are home for birds of prey, including owls. Recent surveys failed to detect the species in the owls' diet (Sándor 2022) or in ossuaries formed from pellets in the numerous surveyed caves and crevices (Barti & Sándor, unpublished). Material collection and minutiose analyses of bat remains are needed to clarify if the species has been present in the Pădurea Canaraua Fetii Nature Reserve for long time, or his recent emergence is due to a range expansion caused by changes in climate or habitat distribution.

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