Levente Barti

UNUSUAL OCCURRENCE OF THE BICOLOURED WHITE-TOOTHED SHREW (*CROCIDURA LEUCODON,* SORICOMORPHA: SORICIDAE) IN A MATURE BEECH FOREST IN THE CIOMAD-PUTUROSU MOUNTAINS (EASTERN CARPATHIANS, CENTRAL ROMANIA)

Keywords. *Crocidura leucodon*, mature beech forest, Eastern Carpathians, Ciomad-Puturosu Mts.

In past 3 years two short notes[1] were published about the unusual occurences of the bicoloured white-toothed shrew, *Crocidura leucodon* in central European closed canopy beech forests.

Because the altitudinal expansion of the species seems to be a recent and data deficient phenomenon in the whole Carpathians, I decided to present the details of another similar observation.

In 17th of November 2010 a subadult female of *Crocidura leucodon* was found dead in an unusual habitat near Bálványos locality (geographical coordinates N 46°07.299' E 025°57.059') at the altitude of 1075 m a. s. l., close to te peak of the Puturosu (Büdös) Mountain (Ciomad-Puturosu Mts., Eastern Carpathians, central Romania). The place of capture is situated on the northern slope of the mountain in a short and narrow manmade valley, a result of the former mining activity in the late middle age. Around this valley all the area is covered with a mature beech forest *(Lusulo-Fagetum* and *Asperulo-Fagetum)*, the age of the canopy is between 40–120 years. The aerial distance between the finding point and the closest ecotone was more than 200 m (a former clearing with 3–4 m high, dense young stand). The distance to the main road and the closest open habitat with several buildings (a clearing at 900 m a. s. l.) is approximately 575 m. The closest settlement, Bálványos (750 m a. s. l.) is about 1050 m far from this point. The distance to the continuous unforested area is around 5 km.

This area is very rich in postvolcanic phenomena like the carbon-dioxide emanations and the solphatares. Because the carbon-dioxide is heavier than the air, it forms deadly traps in the bottom of the pits. These places are gathering very efficiently the terrestrial fauna, therefore mostly of them are used in the local monitoring.

During 13 years (since 1997 until 2010) 863 individuals of small mammals (216 insectivores and 647 rodents) belonging to 16 species were collected from more than 20 natural traps (pits, small mineral water pools and caves) which are located at altitudes between 867 and 1118 m a. s. l.

95.4% of the insectivores were shrews belonging to the following other species: *Sorex araneus* (61.7%), *Sorex minutus* (34.0%), *Sorex alpinus* (2.4%), *Neomys fodiens* (1.5%). Maybe it's a noteworthy detail that one individual of *S. alpinus* was found in the same pit with the *C. leucodon*, and the others were collected as well in the close vicinity (the distances to all those locations are from 50 to 150 m).

The *C. leucodon*'s body was not well preserved, just few biometrical data were recorded using the corpse: the length of the body was 76.6 mm, the length of the tail 31.4 mm. Cranial measurements were also taken with a manual caliper, graduated to 0.1 mm. The Peman's[2] measurement metodology for the Neomys genera was adapted, the following measurements were recorded: CBL – condylobasal length 19.3 mm, CIL – condyloincisive length 20.3 mm, CB – cranial breadth 8.7 mm, IB – interorbital breadth 4.3 mm, PL – palatal length 8.5 mm, PGW – post-glenoidal width 6.6 mm, LMxT – length of maxillary tooth row 7.3 mm, LMxI – length of maxillary tooth row with incisive 8.7 mm, LMA – angular length of mandibula 10.7 mm, LMbT – length of mandibular tooth row 5.9 mm, LMbI – length of mandibular tooth row with incisive 8.2 mm, UUR – length of the unicuspid tooth row 2.0 mm, PML – length of the molariform tooth row 5.1 mm, LR – rostral length 7.9 mm, ZW – zygomatic width 6.6 mm, LM – length of mandible 10.4 mm, LMC – coronoid length of mandible 9.0 mm and HC – height of coronoid process 4.0 mm.

[1] LEŠO, Peter et alii 2008; KRYSTUFEK, Boris 2009.

[2] PEMAN, E. 1983.

The habitat preference of the species and the similar findings from the Carpathians and the surroundings

The bicoloured white-toothed shrew, *Crocidura leucodon* (Hermann, 1870) is distributed in the central and southern parts of Europe as well as in the Palaearctic part of Asia, from 5° W to 55° E and from 35° to 53° N. The species is absent from southern France, the Iberian Peninsula, and the islands of the Mediterranean Sea except for Lesbos.[3]

Habitat preferences for this species vary in different parts of its geographic range. In France, it is found in damp areas with dense vegetation, whereas in central Europe and Italy it prefers open agricultural landscapes. At the northern edge of its range it is associated with gardens and houses in suburban and urban areas, and in the Balkans and Asia Minor it can be found in moist habitats in the mountains including screes, stony areas, riverbanks and stone walls. In Russia the species occurs in moist habitats within steppe and semi-desert areas.[4]

Bicolored white-toothed shrews are associated with dry, upland habitats such as grasslands, woodlands, and roadside brush. These animals tunnel through leaf litter as well as under brush and rock piles. These shrews are usually found below 1000 m in elevation except in the Alps, where they may be found as high as 1600 m.[5]

High altitudinal records are not exceptional along the southern border of its distribution. It was found at 2100 m a. s. l. in Macedonia, up to 1950 m in Anatolia, 2000 m in Lebanon, 2100 m in Georgia, and 2150 m in Iran.[6]

Closer to the study area, in south-western Slovenia on the Mt. Snežnik *C. leucodon* was recorded on higher altitudes in a termophilous beech forest at 1120 m a. s. l. *(Seslerio-Fagetum)*, and in a mountain pine *(Pinus mugo)* stand at 1650 m a. s. l., but it was absent in continental beech forests at 1250 m a. s. l. *(Abieti-Fagetum)* and at 1520 m a. s. l. *(Fagetum subalpinum)*.[7]

In central Europe, the species occurs in lowland and hilly areas, prefers mainly warm and dry sites of steppe and forest-steppe character, and avoids continuous forest complexes.[8]

However in the last decades the species tends to appear in other habitats as well, exploring higher altitudes as usually. Mošanský[9] described its sporadic occurrence in eastern Slovakia at higher altitudes (up to 1100 m) in a close vicinity of mountain cottages, where it could be brought with foodstuffs delivery.[10]

In 2007 a subadult individual of *C. leucodon* was captured in central Slovakia in an extensive fir-beech forest at the altitude of 850 m a. s. l., near the locality Mláčik, Kremnické Vrchy Mts., geomorphologically belonging to the West Carpathians.[11]

In Romania, as I know, the species was rarely found on higher altitudes, and probably never found before in a closed canopy beech forest. Regarding the vertical distribution range of the species, the literature are presenting records mainly from the lowlands and hilly areas of the country (below 600 m a. s. l.).

Maybe the first record of the species from the mountain area was mentioned by Benedek[12], unfortunately without the specification of the sampling place and the elevation. During 5 years Benedek researched the fauna of the Retezat Mountains at the altitudes between 900 and 2100 m a.s.l. and she captured only one individual of *C. leucodon* in 2004.

In the same year, on 18th of September I found the first individual of *C. leucodon* at 810 m. a. s. l. in the Ciomad-Puturosu Mountains. This specimen was lying dead in the grass without any visible injuries, close to the main road and the bushy border of a mature beech forest. The ecotone area along the main road might have been a way of acces for the species to this area. I found often the species along the roads at lower altitudes in the vicinity of different type of forests. But this individual might have been too an abandoned prey, transported throughout the forest and left behind.

On 20th of April 2011 another dead individual was found in Trascău Mountains (Romanian Western Carpathians) at 959 m a. s. l. in a grassland below the Piatra Cetii peak. Nor in this case cannot be excluded the possibility of predation, this individual might have been captured at lower altitude.[13]

Same year, same month another individual was trapped deep in a mature beech forest near Braniştea (Făgăraşului Mountains, Southern Carpathians) at 470 m a. s. l. The distance between the trapping point and the ecotone area was more than 550 m.[14]

The presence of the species in the mature beech forests from lower altitudes could be much frequent,

[3] CORBET, Gordon – OVENDEN, Denys 1980; MITCHELL-JONES, Anthony J. et alii 1999.
[4] SHENBROT, Georgy et alii 2008.
[5] CORBET, Gordon – OVENDEN, Denys 1980; GRZIMEK, Bernhard 1990; NOWAK, Ronald 1999; RAESE, Joshua – YAHNKE, Chris 2004.
[6] KRYŠTUFEK, Boris 2009.
[7] KRYŠTUFEK, Boris 2009.
[8] Slovakian autors cited in LEŠO, Peter et alii 2008.
[9] MOŠANSKÝ, Aristid 1980.
[10] Cited in LEŠO, Peter et alii 2008.
[11] LEŠO, Peter et alii 2008.
[12] BENEDEK, Ana Maria 2006.
[13] HEGYELI Zsolt in verbis.
[14] MĂRGINEAN, Georgiana in verbis.

as we supposed, unfortunately this ecological aspect is data deficient as well.

The occurrence of *C. leucodon* in the mature beech forest habitat may be a result of increasing fragmentation of the extensive forest complex.[15] This hipothesys in the case of Mt. Puciosu area seems to be also supported by the expansion of other mammal species like *Micromys minutus* and *Arvicola terrestris* (1109 m a.s.l. maximum elevation recorded for both species in the close vicinity), which can occur mainly in the open and semi-open habitats at lower altitudes.

Murariu mentioned the occurence of the species in disturbed forest-habitats as well, mainly in the clearings with dense raspberry scrub layer.[16]

Barti, Levente – Sepsiszentgyörgy, Domb u. 11B/16., RO-520060; bartilev@yahoo.com

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[15] LEŠO, Peter et alii 2008.

[16] MURARIU, Dumitru 2000.

A mezei cickány (*Crocidura leucodon,* Soricomorpha: Soricidae) előfordulása egy öreg bükkösben a Büdös-hegyen (Csomád–Büdös-hegycsoport, Keleti-Kárpátok)

(Kivonat)

A mezei cickány közép-európai állományai javarészt a sík- és dombvidék nyitottabb élőhelyeiről, a mezőgazdasági területekről és azok közeléből ismertek, a hegyvidéki zárt erdőségek eleddig nem tartoztak a kedvelt élőhelyeik közé. Az utóbbi évtizedben azonban a fajnak több szokatlan megjelenése is volt a Kárpátokban, mind a Felvidéken, mind Erdélyben, az utóbbiak körülményeit e cikkben tárgyalom. A legkirívóbb eset, mely egyben a faj hazai előfordulásának magasságrekordját is jelenti, egy szabadult nőstény egyed begyűjtése egy 1075 m tengerszint feketti magasságban található gázveremből, 2010. november 17-én. Az elmúlt 13 év során először került elő a faj ebből a környezetből. Megjegyzendő, hogy a két gyakoribb Sorex faj mellett ugyanabból a gödörből és a környező helyekről több *S. alpinus* egyedet is gyűjtöttem az elmúlt évek során.

Apariția chițcanului de câmp (*Crocidura leucodon,* Soricomorpha: Soricidae) într-un făget bătrân din Muntele Puturosu (Masivul Ciomatu-Puturosu, Carpații Orientali)

(Rezumat)

Populațiile central-europene ale chițcanului de câmp se găsesc mai degrabă în zonele deschise ale câmpiilor şi dealurilor, pe terenurile agricole şi împrejurimile acestora, pădurile montane închise nefiind printre habitatul lor preferat. În ultimele decenii însă specia a avut mai multe apariții neobişnuite în Carpați, atât în Slovacia, cât şi în Transilvania. Acest studiu tratează cele din Transilvania. Cel mai evident caz care în acelaşi timp reprezintă şi un record de înălțime din punct de vedere al habitatului, este colectarea unui subadult dintr-o grotă gazoasă aflată la o altitudine de 1075 m, la data de 17 noiembrie 2010. E prima oară în ultimii 13 ani când s-a colectat din acest mediu geografic un exemplar din această specie. Trebuie menționat că pe lângă cele două specii mai frecvente de Sorex, am colectat în ultimii ani din aceeaşi grotă şi împrejurimile acesteia mai multe exemplare *S. Alpinus.*

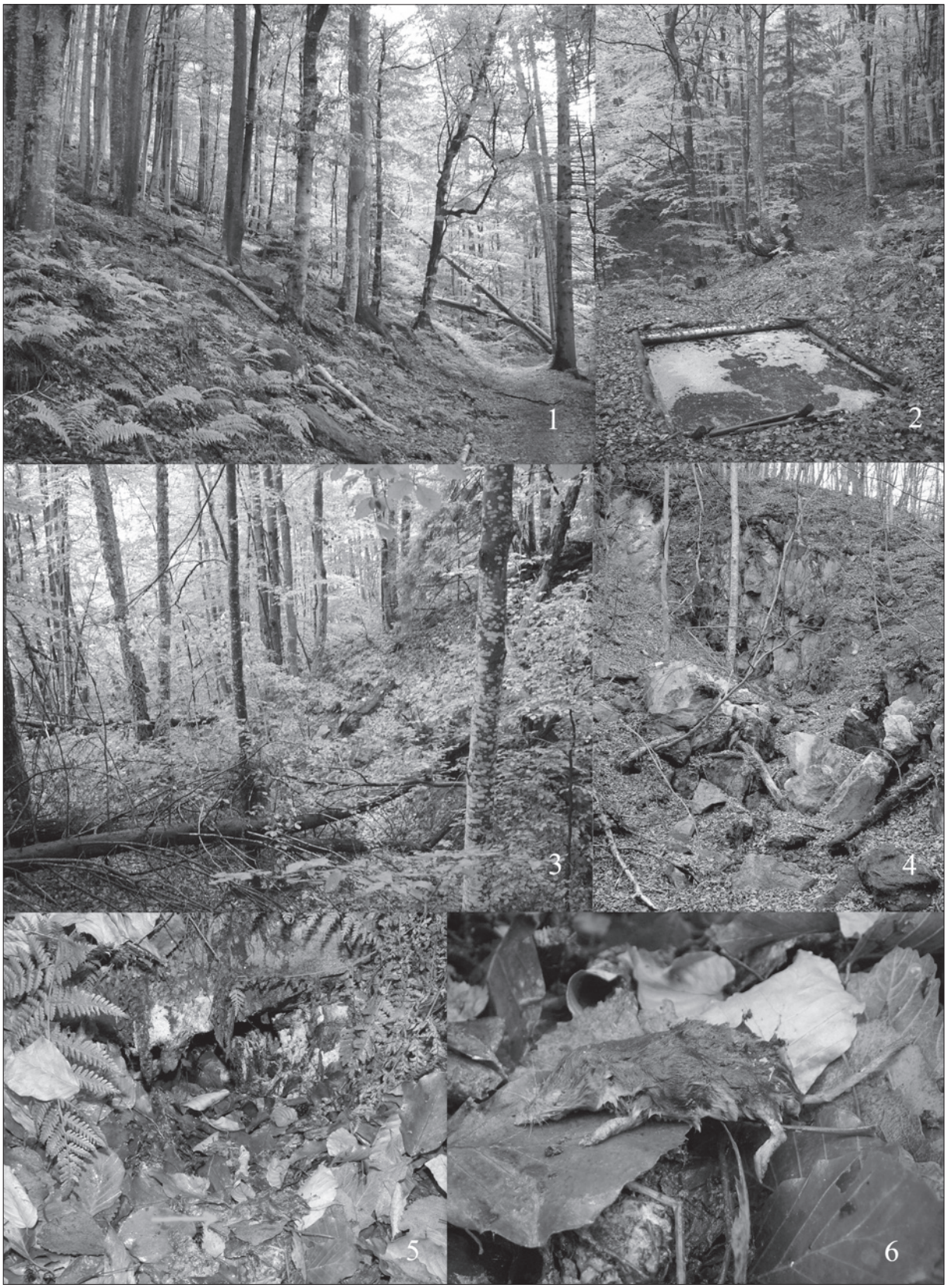

Figure 1. 1–2: typical old beech forest habitats of the Mt. Puturosu, in the neighbourhood of the *C. leucodon record's* location; **3–4:** the small valley below and above the natural gas trap, where the *C. leucodon* was found; **5–6:** the "in situ" position of the dead *C. leucodon* individual (photo: Levente Barti)

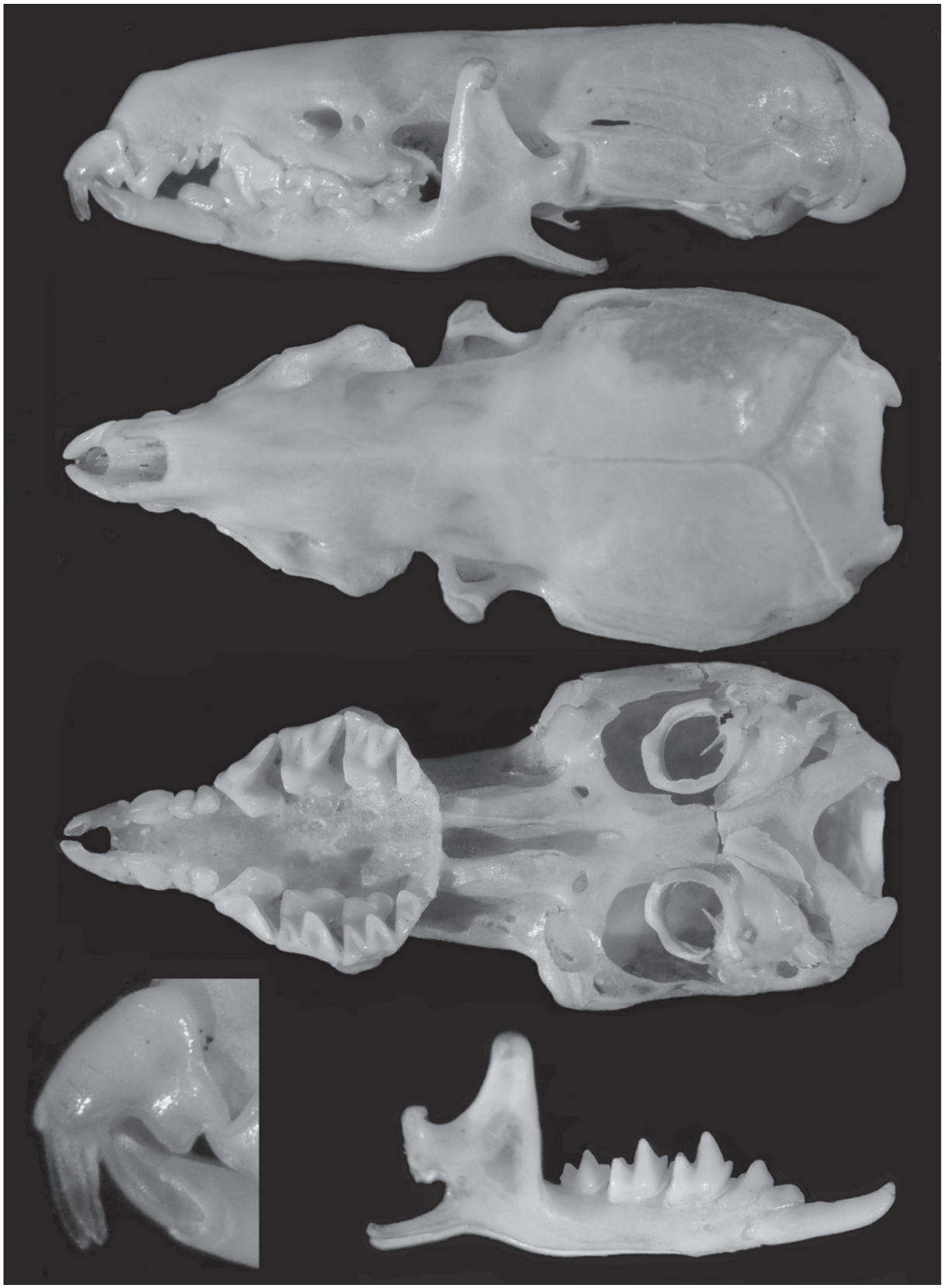

Figure 2.
The skull of the *Crocidura leucodon* individual from the Mt. Puturosu.
The peak of the incisors were partially dissolved by the high concentration of H_2CO_3 (photo: Levente Barti)