The fauna of the Tăuşoare Cave, Romania

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Abstract. Tăuşoare cave is located in Rodnei mountains, Romania, being the deepest cave in the country. It has 413.5 m depth and 20 km galleries lenght. The cave fauna is represented by aerobic bacteria, invertebrates from Phylum Arthropoda, the most important being the endemic diplopod *Romanosoma birtei*, five bat species and beech marten, who only visits the cave during winter in search for food. The human impact on the fauna is rather small due to the severe protection regime of the cave.
Key Words: endemic, diplopod, bat, maternity, impact.

Introduction. A cave is a hollow place in the ground, formed by natural processes of weathering and might extend quite deep underground. Smaller openings on the ground like rock shelters, sea caves, and grottos are also designated as caves (Nag 2017). Peculiarities of underground habitat make it an extreme environment. The main characteristic of underground environment is the lack of sunlight. Climatic values, like temperature and relative humidity, are generally almost stable (Stoch 2001). Food sources are limited and localized. The lack of sunlight inhibits photosynthetic processes, so food comes only from epigean environment (through percolating water, gravity, or passive transport by animals) (Culver & Pipan 2009; White & Culver 2012). Despite all these harsh environmental conditions, there are still many animals in various groups inhabiting the caves, mostly arthropods and other invertebrates; however, there is a number of vertebrates (such as cave fishes and cave salamanders), although they are less common (Nag 2017).

Cave dwelling animals show different levels of adaptations to underground environment. According to Sket (2008), animals living in terrestrial subterranean habitats can be classified into 3 categories, based on their ecology:

- troglobionts (or troglobites): species strongly bound to subterranean habitats;
- troglophiles: species living both in subterranean and in epigean habitats;
- trogloxenes: species only occurring sporadically in a hypogean habitat and unable to establish a subterranean population.

The Tăuşoare cave is a unique cave, located in Rodnei Mountains, Romania (Viehmann & Şerban 1963; Mureşianu et al 2011; Ciortescu 2015; Gavriloaie et al 2016). The cave entrance is situated at an altitude of 964 m after the latest information (http://pesteratausoare.ro/istoric/index.html). In terms of altitude it has has a drop of 413.5 m (Mureşianu et al 2011), which places it as the deepest cave in Romania (Bâca 2015; Ciortescu 2015). The cave has 20 kilometers of galleries, thus being the greatest length of the galleries in the Eastern Carpathians (Mureşianu et al 2011; Drăguşin 2013; Ciortescu 2015) being the third in Romanian carst from this point of view, after Vântului

Cave from Apuseni Mountains and Topolniţa Cave from Mehedinţi Plateau (Viehmann 2004; Sara 2013).

In this paper we briefly describe the main animal groups inhabiting or visiting this cave. From the microbiologic point of view, the cave is very scarce, only few aerobic bacteria being found so far (Manolache et al 1991; Theodorescu 2011). So, we will only discuss about the invertebrates and vertebrates related with the cave.

Invertebrates. The following species have been found in Tăuşoare cave: *Ischyropsalis manicata*, *Micrargus herbigradus*, *Porrhomma microphthalmum*, *Taranucnus bihari* (Arachnida), *Megacyclops viridis* (Crustacea), *Litocampa humilis*, *Trechus latus, Duvailus (Duvaliopsis) pilosellus, Quedius mesomelinus* (Insecta), *Romanosoma birtei* (Diplopoda), *Deuteraphorura silvaria, Plutomurus unidentatus, Desoria violacea, Protaphorura armata* (Collembola) (http://natura2000.eea.europa.eu; Niţu et al 2008; Theodorescu 2011; Mureşianu et al 2011). Undetermind species from other groups have been also observed: gastropods, few insect as trichopterans and dipterans, and also few other arachnid species (Niţu et al 2008). Without any doubt, the most remarkable species is *R. birtei*, which is endemic here (http://natura2000.eea.europa.eu; Niţu et al 2008; Theodorescu 2011; Mureşianu et al 2011) (Figure 1).

Figure 1. *Romanosoma birtei* (Diplopoda) in Tăuşoare cave (http://www.bistriteanul.ro/rondul-de-dimineata-este-unic-in-lume-este-la-fel-de-important-precum-opera-lui-brancusi-si-traieste-doar-in-bistritanasaud-video-1484203440843.html)

Vertebrates. The cave provides shelter for 5 bat species (*Myotis blythii, Myotis emarginatus, Myotis myotis, Rhinolophus ferrumequinum* and *Rynolophus hipposideros*), which hibernate here during the cold season in big colonies of thousands of individuals (http://natura2000.eea.europa.eu; http://complexulmuzealbn.ro/sectii/pestera-tausoare; Chiş 2010; Mureşianu et al 2011; Sasarman 2016) (Figure 2). According to the cave custodian, the bats in *Myosotis* genus do not mix with individuals in *Rhinolophus* genus. It is easy to distinct betwenn these groups, because *Rhinolophus* sp. cover their bodies with their own wings, while *Myosotis* sp. do not (Sasarman 2016) (Figure 3).

Until recently it was believed that the above mentioned bat species use the cave only for hibernation, during the cold season. But two years ago, a small colony of 15 females with 15 offsprings of species *R. ferrumequinum* has been discovered in a distant closed gallery of the cave, at a distance of 1,150 m after the entrance. This is a very rare event, the last one of this kind dating back to 200 years (Bradea 2017a; Sabau 2017).

During the winter, a small mammal, the beech marten (*Martes foina*), visits the cave in search for food. Dozens of its tracks and feces (Figure 4) were discovered throughout the entire cave, one conclusion being drawned: it feeds with the hibernating bats (Sasarman 2016), but it is not established in the cave (Bradea 2017b).

Figure 2. Bat colonies hibernating in Tăuşoare cave (Sasarman 2016).

Figure 3. *Rhinolophus hipposideros* hibernating in Tăuşoare cave (Sasarman 2016).

Figure 4. Feces of *Martes foina* in Tăuşoare cave (containing bat bones) (Bradea 2017b).

Conclusions. The fauna is poor considering the impressive dimensions of the cave. The cave fauna includes troglobionts (mainly most of the invertebrates, especially the endemic diplopod *R. birtei*), troglophiles (the five bat species) and also trogloxenes (the beech marten). One of the most remarkable recent events is the discovery of the maternal colony of *R. ferrumequinum*.

We think the cave fauna is rather protected by natural hazards and human impacts. The only natural hazards which could occur are floods and cave ceiling and walls collapses. So far, they did not bring harm to the cave fauna. The human impact is rather small, due to the protection regime of the cave.

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