A recent discovery related with the occurrence of beech marten (*Martes foina*) in Tăuşoare Cave, Romania

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Abstract. Beech marten (*Martes foina*) inhabits a large range of habitats, including urban areas, throughout a large part of Europe and central Asia. There is a lack of information about the species preference for karst habitats, at least for Romania. Within this study we discuss about the first case of cave nesting for this species, in Tăuşoare Cave, Romania.
Key Words: breeding, cave, den, marten.

Introduction. Beech marten (*Martes foina*) lives throughout a large part of Europe and central Asia. The boundaries of its range are Denmark to the north, then Spain to the west, Italy to the south (including the islands of Crete, Rhodes, and Corfu), and Mongolia and the Himalayas to the east (Grizimek 1990; Virgos & Garcia 2002; Wild Natures 2003; Carter 2004; GCT-SECEM 2004; Murariu & Munteanu 2005).

Beech martens prefer open landscapes, being less dependent on forested habitats than pine marten (*Martes martes*). The pine marten lives primarily in forest environments (coniferous, deciduous or mixed forests) (Larivière & Jennings 2009). Beech marten is frequently found living near human habitation, where they may den in buildings. Natural den sites include abandoned burrows, hollow trees, and rocky crevices (Pop & Homei 1973; Pîrvu et al 1985; Georgescu 1989; Nowak 1999; Murariu & Munteanu 2005; Eisenreich et al 2016). The pine martens avoid urban areas and arable lands (Larivière & Jennings 2009). In contrast, the stone marten is among the few mustelids that take advantage of urban areas and increased availability of food resources in those areas (Wereszczuk & Zalewski 2015).

There were few recent sightings of this species in some cities in Romania. Thus, it was observed in Bucharest city in Balta Albă neighborhood, on May, 2014 (I. Stoian, personal communication), in Cugir city on January, 2018 (www.cugirinfo.ro), in Oradea city on March, 2019 (www.libertatea.ro; www.digi24.ro), in Focsani city on September, 2019 (www.ziaruldevrancea.ro).

In the present paper we discuss about the presence of beech marten in Tăuşoare Cave, based on discoveries which were made during a recent research inside the cave.

Beech marten - a recent cave inhabitant. Concerning its relationship with caves, there is very scarce information. According to Eisenreich et al (2016), beech marten can enter some caves for short periods of time to rest during the day. In Romania there were no information regarding the beech marten sheltering in caves until recently, when it was indirectly observed (Gavriloaie et al 2017a, b) in Tăuşoare Cave, which is one of the most remarkable and scientifically important caves in Romania (Viehmann & Şerban 1963; Viehmann et al 1964; Viehmann 1973; Silvestru 1990; Cocean 1995; Chiş 2010a,

b; Mureşianu et al 2011; Ciortescu 2015; Gavriloaie et al 2016). Starting with 2014, its tracks and feces were discovered in the cave during the winter, where it used to shelter temporarily, also preying on the hibernating bats (Sasarman 2016; Gavriloaie et al 2017a). According to the cave's custodian, the marten feces are present throughout the entire cave, even in the furthest locations from the entrance. Since there is a complete darkness in the cave, the beeach marten marks the places where it roams with some pheromones secreted by an anal gland; this way it remembers the paths it crosses along the cave.

Aspects concerning the beech marten reproduction. Beech martens are typically solitary animals, except during the mating season, which is in midsummer (Lode 1991). Even the copulation occurs in midsummer, the implantation only occurs early in the following spring (Murariu & Munteanu 2005). Total pregnancy time is 230 to 275 days, but the true gestation (the development time of the embryo from time of implantation) only lasts for one month within the total pregnancy time (Murariu & Munteanu 2005).

Females give birth to 1 to 4 blind, hairless young, which are nursed and protected in the den by the female only. Weaning of the young occurs in mid May, just before mating season is about to begin (Carter 2004; Murariu & Munteanu 2005).

A significant change in the nesting behaviour of beech marten. In the Romanian scientific literature we were not able to find any data regarding the beech marten nesting in caves.

In mid fall of 2018, a team from the National Television - Cluj branch, joined a speleologists team in an exploration in Tăuşoare Cave. Later that year, on November 4, a 23 minutes movie (named "Natură şi aventură: incursiune în peştera Izvorul Tăuşoarelor" [in Romanian] or "Nature and adventure: insight in Izvorul Tăuşoarelor cave") which documented the above mentioned exploration was broadcasted on National Television channel 2 and on National Television channel - Cluj branch. Then, on November 18, the documentary has been uploaded on the Youtube channel as well, making it worldwide available. The television team was guided by the cave's custodian during the exploration. The other team installed few specific equipments on certain locations within the cave.

At 450 meters distance from the cave entrance, the television team found a nest arranged near some wood remnants (the wood was obviously brought by the human explorers in the previous expeditions), containing two dead marten offspring. They already had a full developed dentition. Based on their size and on the fact that marten offspring feed on female's milk in their first 6 weeks of life (Murariu & Munteanu 2005), their age can be estimated to at least 7-8 weeks. Their body shape was heavily damaged and a significant amount of mold was present on the fur, so, it can be assumed they died approximately 5-6 months ago. Most probably the female died somewhere outside the cave when preying for food, consequently the offspring dying by starvation.

It is remarkable that, since the first discovery of its sporadically and temporarily presence in the cave in 2014 until the first nest discovered in 2018, such a behavioural shift occurred in a relatively short period of time. From a trogloxene species, it shifted to a more troglophile one (Sket 2008). We can expect to discover other similar situations both in the same cave or other caves in mountainous areas, especially in the ones with a severe protection regime. In the near future, this could be a significant new research field for scientists, especially biologists.

Conclusions. The beech marten (*Martes foina*) lives in a many habitat types throughout the Europe and Central Asia. Few years ago, the presence of this species in a karst habitat was documented for the first time in our country, specifically in Tăuşoare Cave from Rodnei Mountains. After four years from the first observation of its presence in this cave, a nest deep inside the cave has been discovered. Two dead offspring were noticed in the nest, most probably because of starvation, the female supposedly being killed outside the cave when roaming for food. This is a major behavioural shift for this species and the years to come will hopefully bring new insights in this remarkable domain.

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