RODENT FAUNA (MAMMALIA, RODENTIA) FROM TINCA AREA (BIHOR COUNTY, ROMANIA)

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Abstract. The paper presents the results of the researches performed between 2000-2020 regarding the rodent species from the Tinca area (Bihor county, Romania) and some of their ecological and ethological aspects. 26 species were identified, belonging to 9 families and 20 genera.

Keywords: rodent species, Tinca area.

Rezumat. Speciile de rozătoare (Mammalia, Rodentia) din zona Tinca (județul Bihor, România). Lucrarea prezintă rezultatele cercetărilor efectuate de autori în perioada 2000-2020 privind speciile de rozătoare din zona Tinca (județul Bihor, România) și unele aspecte ecologice și etologice ale acestora. Au fost identificate 26 specii, aparținând la 9 familii și 20 genuri.

Cuvinte cheie: specii de rozătoare, zona Tinca.

INTRODUCTION

The Tinca area is located in the south-western part of the Bihor county, at the contact of the Miersig plain and the Holod depression. The average altitude is 115 m, the climate is temperate-continental and the vegetation belongs to the oak layer. The hydrographic system is represented by the Crișul Negru river. The Tinca village includes the Tinca, Râpa, Belfir, Gurbediu and Girișu Negru villages (Fig.1). Recent papers and books regarding the rodent species in the area were published by authors (ILIE, 2014; 2014a; ILIE & MARINESCU, 2014; ILIE, 2016; 2016a; ILIE & MARINESCU, 2017; ILIE, 2017a; 2017b; 2017c; ILIE, 2018; 2019). The aim of this paper is to provide new information about the rodent species and some of their ecological and ethological aspects from this part of Romania.

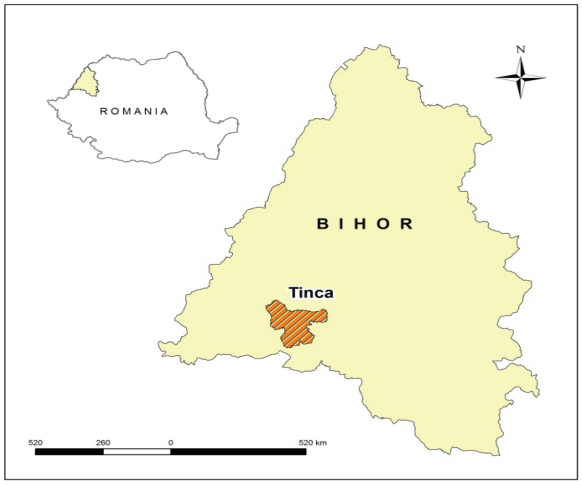

Figure 1. The location of Tinca area (original).

MATERIAL AND METHOD

Research regarding the presence of the rodent species, their ecology and ethology began sporadically in 2000, then investigations were systematically performed starting 2009 till 2020 in different locations from the Tinca village. Rodent species from forests and agricultural crops were captured using traps, others were identified by direct observation, by the pellets of owl species or traces of their presence in nature (such as rosettes). Different guides were used for the identification of the rodent species and their traces in nature, (BANG et al., 1985; MACDONALD & BARRET, 1995; POPESCU & MURARIU, 2001). The conservation status of rodent species was published in different books (BOTNARIUC & TATOLE, 2005; GOGA, 2012) or internet sources (IUCN REDLIST).

RESULTS AND DISCUSSIONS

In the analysed period, the following species were identified in the Tinca area:

SCIURIDAE FAMILY

Sciurus vulgaris (Linnaeus, 1758) Examined material: many specimens in the Tinca, Belfir, Râpa forests during 2000-2019 (Fig. 2).

Figure 2. Nest of Sci*urus vulgaris* (photo Ilie A. L.)

The extreme drought (three and half months) of 2012 resulted in the complete drying of many trees in the region, so the food was insufficient. In this case, the squirrels began to leave the forests, penetrating into human households. Example: one specimen, September 26, 2012, in the yard of Ilie A. L. (ILIE, 2016). In general, the fur of the species is reddish, but there are varieties with blackish fur: one specimen, Tinca forest, August 29, 2013; one specimen, Tinca forest, November 3, 2013 (ILIE, 2016); rarely totally albinotic: one specimen, Tinca forest, July 15, 2013; one specimen, Râpa forest, November 1, 2015; one specimen, Râpa forest, March 7, 2016 (ILIE, 2016). Relatively common species in the Romanian forests (POPESCU & MURARIU, 2001; GOGA, 2012). Conservation status: least concern.

Spermophilus citellus (Linnaeus, 1766) Examined material: one specimen and many galleries on a land, Tinca, July 7, 2007; one specimen, Râpa, September 7, 2015 (ILIE, 2016). These data are in line with the literature (POPESCU & MURARIU, 2001) which states that the populations of this species from Crișana area are small, but at the same time their number may be due to anthropogenic causes (intensive agriculture, pesticides, etc). Relatively common species in the plain, steppe and hilly areas from all Romania (POPESCU & MURARIU, 2001; BENEDEK & DRUGĂ, 2005; BENEDEK, 2007; GOGA, 2012). Conservation status: vulnerable species.

MIOXIDAE FAMILY

Mioxus glis (Linnaeus,1766) Examined material: one specimen, in a willow pit near Crișul Negru river, November 3, 2008, between Tinca and Râpa villages; one specimen, Râpa forest, November 15, 2015. Ilie A.L. observes numerous sores on the apple tree bark, having a diameter between 10-12 cm, Tinca, December 15, 2014 (ILIE, 2014) (Fig. 3) and a nest on the edge of the Tinca forest in a hawthorn (*Crataegus* sp.) at a height of 2.30 meters above the ground, November 1, 2015 (ILIE, 2016). Relatively rare species in the Romanian forests and orchards. Distribution in Romania: Muntenia, Transylvania, Moldavia (PARASCHIV et al., 2001; POPESCU & MURARIU, 2001; GOGA, 2012). Conservation status: vulnerable species.

Figure 3. Sores of *Mioxus glis* (photo Ilie A. L.).

Muscardinius avellanarius (Linnaeus, 1758) Examined material: one nest, near Crișul Negru river, Râpa, in a walnut bush, May 20, 2015 (ILIE, 2016); one specimen that wintered in a bee hive, Tinca, December, 2017. Its wintering location is surprising!; one specimen, Tinca forest, June 10, 2017 (ILIE, unpublished data); one nest inside the nest of *Pica pica* Linnaeus, 1758, at the foundation of this nest. This foundation has a 16 cm thickness, being formed by little branches mixed with ground. Galleries of this rodent were observed inside this foundation. These galleries were lined with little branches, straw, flakes. This is for the first time when this rodent built its nest inside the foundation of a nest of birds and does not change the nest outside, as indicated in literature (POPESCU & MURARIU, 2001). The nest of the bird had been left 2-3 years before, therefore the rodent used this nest, Tinca, December 16, 2016 (ILIE, 2017a). Relatively common species in the Romanian deciduous forests. Distribution in Romania: Banat, Crișana,

Muntenia, Transylvania, Moldavia (POPESCU & MURARIU, 2001; DUMA, 2007; GOGA, 2012). Conservation status: vulnerable species.

Elyomis quercinus (Linnaeus, 1766) Examined material: one specimen, Tinca forest, July 23, 2017 (ILIE, unpublished date). Very rare species in the Romanian deciduous forests. Distribution in Romania: Transylvania, Oltenia (POPESCU & MURARIU, 2001). Conservation status: vulnerable species.

Dryomys nitedula (Pallas, 1779) Examined material: one specimen, Râpa forest, July 3, 2008 (ILIE, 2016). Relatively common species in the Romanian deciduous forests. Distribution in Romania: Dobruja, Moldavia, Muntenia, Transylvania, Banat, Crișana (POPESCU & MURARIU, 2001; GOGA, 2012). Conservation status: vulnerable species.

SPALACIDAE FAMILY

Nannospalax leucodon (Nordmann, 1840) Examined material: many molehills and a corpse in the vicinity of a land cultivated with lucerne, Râpa, July 9, 2005; one specimen, Tinca, July 12, 2009, during the night (ILIE, 2016). Relatively rare species on Romanian cultivated or open lands. Distribution in Romania: Moldavia, Muntenia, Dobruja, Transylvania (POPESCU & MURARIU, 2001; GOGA, 2012). Conservation status: least concern.

Spalax microphtalmus (Guldebstaedt, 1770**)** Examined material: one specimen and many molehills, the edge of Tinca forest, February 15, 2017 (ILIE, 2017a). Relatively common species in the lands, the edges of forests. Distribution in Romania: Oltenia, Muntenia, Moldavia, Transylvania (POPESCU & MURARIU, 2001; PARASCHIV& ARDEI, 2011). Conservation status: near-threatened.

CRICETIDAE FAMILY

Cricetus cricetus (Linnaeus, 1758) Examined material: many galleries and a dead specimen, near the personal yard of Ilie A.L., Tinca, July 17, 2005 (ILIE, 2016); one pellet of *Strix aluco* Linnaeus, 1758 that contained bones and skull of a juvenile specimen, Tinca, February 3, 2019 (ILIE, 2019). Relatively common species in open lands or cereal crops. Distribution in Romania: Oltenia, Muntenia, Banat, Transylvania, Moldavia (POPESCU & MURARIU, 2001; BENEDEK, 2007; GOGA, 2012). Conservation status: vulnerable species.

ARVICOLIDAE FAMILY

Arvicola terrestris (Linnaeus, 1758) Examined material: one specimen, near Crișul Negru river, Tinca spa, July 23, 2006; one specimen, Gurbediu valley, May 1, 2015 (ILIE, 2016); many pellets of *Asio otus* Linnaeus, 1758 that contained fragments of skull, bones, hairs, Tinca, December 2016 (ILIE, 2017b) (Fig. 4). Common species in Romania near waters (PARASCHIV, 2011; LAZĂR et al., 2012). Conservation status: species for which no risks are identifiable.

Figure 4. Pellets of *Asio otus* (photo Ilie A. L.).

Clethrionomys glareolus (Schreber, 1780) Examined material: one specimen, Râpa forest, August 2, 2017 (ILIE, unpublished date). Relatively common species in the Romanian deciduous forests. Distribution in Romania: missing in Dobruja (POPESCU & MURARIU, 2001; GOGA, 2012). Conservation status: species for which no risks are identifiable.

Microtus agrestis (Linnaeus, 1761) Examined material: five specimens, Râpa, December 21, 2016 (ILIE, 2017c) (Fig. 5). Species mentioned in the lands, the edge of forests, forests lights in the hilly and mountainous areas from Romania. Distribution in Romania: Crișana, Transylvania, Moldavia, Muntenia, Oltenia (POPESCU & MURARIU, 2001). Conservation status: species for which no risks are identifiable.

Figure 5. Gallery of *Microtus agrestis* (photo Ilie A. L.).

Microtus arvalis **(**Pallas, 1779) Examined material: many galleries in the personal yard of Ilie A. L., Tinca, during 2008 -2016; one specimen, Tinca, December 30, 2015 (ILIE, 2016). Common species in Romanian open and cultivated lands (ILIE & MARINESCU, 2014), rarely in forests (POPESCU & MURARIU, 2001; BENEDEK, 2007; GOGA, 2012) (Fig. 6). Conservation status: species for which no risks are identifiable.

Figure 6. Gallery of *Microtus arvalis* (photo Ilie A. L.).

Pitymys subterraneus (De Selys - Longschamps, 1836) Examined material: one specimen, Tinca, June 27, 2017; one specimen, Gurbediu, August 20, 2017 (ILIE, unpublished data). Relatively common species in open and cultivated lands from all Romania (POPESCU & MURARIU, 2001). Conservation status: species for which no risks are identifiable.

Ondatra zibethicus (Linnaeus, 1766) Examined material: many traces in mud, Tinca, Crișul Negru river, October 30, 2016 (ILIE, 2016a); one specimen, near the Crișul Negru river, Tinca spa, August 12, 2017 (ILIE, unpublished data). Species mentioned in all Romania near waters (POPESCU & MURARIU, 2001; BENEDEK & DRUGĂ, 2005; GOGA, 2012), but rare in the Tinca area. Conservation status: there are no current identifiable risks to the species.

DIPODIDAE FAMILY

Sicista subtilis (Pallas, 1773) Examined material: one male dead specimen, Tinca, August 21, 2019 (ILIE, 2019). A typical steppe species, present on meadows, forest meadows, lucerne fields. Distribution in Romania: Maramureș, Transylvania, Muntenia, Moldavia, Dobruja (POPESCU & MURARIU, 2001). Conservation status: lower risk, near-threatened.

MURIDAE FAMILY

Rattus rattus (Linnaeus, 1758) Examined material: one dead juvenile specimen, Tinca, June 11, 2012 (ILIE, 2016); bones, fragments of skull, hairs in the pellets of *Asio otus* Linnaeus, 1758 (ILIE & MARINESCU, 2017), Tinca, during 2013-2016; one specimen, Râpa, August 22, 2017 (ILIE, 2017c). Relatively rare species in the Tinca area. Species present both in natural ecosystems and especially in anthropic ones. Distribution in Romania: Transylvania, Muntenia, Banat, Moldavia (POPESCU & MURARIU, 2001). Conservation status: there are no current identifiable risks to the species.

Rattus norvegicus (Linnaeus, 1758) Examined material: frequent species in all the Tinca area. Ilie A. L. reports a case of cannibalism in a rat trap where a rat (*Rattus norvegicus* L.) and a mouse (*Mus musculus* L.) were present. The rat devoured the mouse. In general, there are no cases of cannibalism among rodent species in nature. In confined species, however, the stress of captivity, the absence of food and the habit of constantly biting something to prevent the growth of incisors determine such phenomena (ILIE, 2016). Distribution in Romania: frequent species in all the country, in anthropic and natural ecosystems (Fig. 7). Conservation status: there are no current identifiable risks to the species.

Figure 7. Gallery of *Rattus norvegicus* L. (photo Ilie A. L.).

Mus musculus (Linnaeus, 1758) Examined material: different nests in Tinca, 2017 -2019 – Fig. 9,10; one specimen and many sores on corn cobs, climbing to them, December 3, 2014 (ILIE, 2014); one pellet of *Athene noctua* Scopoli, 1769 that contained fragments of a skull, bones, hairs, Tinca, November 6, 2016 (ILIE, 2016a); many pellets of *Asio otus* Linnaeus, 1758 and *Athene noctua* Scopoli, 1769 that contained fragments of skull, bones, hairs, Tinca, December 2016 and 2013 -2016 (ILIE & MARINESCU, 2017; ILIE, 2017b); frequent species in all the Tinca area. Cases of induced cannibalism - in a stable, two mice fell down in a tall bucket and they do not could go out from there. After two days, the big mouse devoured the little mouse, with its viscera being noticed. Cannibalism between rodents in nature is not mentioned in scientific literature and is due not to the absence of food but to the limited space (probable claustrophobia) that determined a stress or to the permanent growth of teeth that determined an irritation of the gums, aggressiveness and a beginning of cannibalism, Tinca, December, 2014 (ILIE, 2014); two mice were caught on a cardboard containing rodent catch glue. The first specimen was already dead. The second specimen was still alive, but it was very close to the first. Not being able to run away, being hungry and having a permanent tendency to chew on something to prevent the growth of incisors, he devoured half of the body of the first mouse. Finally, the second mouse died, never reaching the first mouse to eat it completely, Tinca, December 1-2, 2018 (ILIE, unpublished date). Distribution in Romania: frequent species in all the country, in anthropic ecosystems and in open lands (PARASCHIV, 2010; PARASCHIV & ARDEI, 2011; ILIE & MARINESCU, 2014) (Figs. 8, 9, 10, 11). Conservation status: there are no current identifiable risks to the species.

Figure 8. *Mus musculus* (photo Ilie A. L.).

Figure 9. Corn gnawed by *Mus musculus* (photo Ilie A. L.).

Mus spicilegus (Nordmann, 1840) Examined material: some winter nests on cultivated lands, Belfir, December, 2012 and Râpa, November, 2011 (Fig. 12). Relatively common species in open lands, cultivated or not (ILIE & MARINESCU, 2014). Distribution in Romania: in the entire country (POPESCU & MURARIU, 2001; PARASCHIV et al., 2007, 2008). Conservation status: lower risk, near-threatened.

Figure 10. Nest of *Mus musculus* (photo by Ilie A. L.).

Figure 11. Nest of Mus musculus (photo by Ilie A. L.).

Figure 12. Nest of *Mus spicilegus* (photo by Ilie A. L.).

Apodemus agrarius (Pallas, 1771**)** Examined material: one specimen, Tinca, July 15, 2003; one excrement, at the edge of the Tinca forest, L=2.3 mm, l= 1.2 -1.3 mm, August 29, 2015; one pellet of *Athene noctua* Scopoli, 1769 that contained fragments of a skull, bones, hairs, Tinca, November 6, 2016 (ILIE, 2016; 2016a); bones, fragments of skull, hairs in the pellets of *Asio otus* Linnaeus, 1758, Tinca, during 2016-2017 (ILIE & MARINESCU, 2017); two specimens, Tinca, August 12 and 28, 2018 (ILIE, 2018); one dead female specimen, Tinca, July 27 ,2019. Body length = 18.6cm; tail length = 7.3cm. The literature (POPESCU & MURARIU, 2001) indicated the length of the head and trunk = 11.4cm. It is probably the only specimen identified in Romania with such large dimensions. Common species in the open and cultivated lands (ILIE & MARINESCU, 2014), at the edge of forests. Distribution in Romania: all over the country (POPESCU & MURARIU, 2001; BENEDEK & DRUGĂ, 2005; BENEDEK, 2007; PARASCHIV, 2011). Conservation status: a species for which no risks are identifiable.

Apodemus flavicollis (Melchior, 1834) Examined material: one specimen captured with a trap, Râpa forest, June 20, 2007; bones, hairs, fragments of skull in the pellets of *Asio otus* Linnaeus, 1758, Tinca, 2016 -2017 (ILIE & MARINESCU, 2017); one dead specimen, Tinca forest, October 5, 2018. Common, forestry species. Distribution in Romania: in all the country, in the oak and beech forests. Conservation status: species for which no risks are identifiable.

Apodemus sylvaticus (Linnaeus, 1758) Examined material: three specimens captured by trap, Tinca forest, July 19, 2007; many pellets of *Asio otus* Linnaeus,1758 and *Athene noctua* Scopoli, 1769 that contained fragments of skull, bones, hairs, Tinca, December 2016 (ILIE & MARINESCU, 2017; ILIE, 2017b). Relatively common species in the forests and open lands (cultivated or not). Distribution in Romania: in all the country (POPESCU & MURARIU, 2001). Conservation status: there are no current identifiable risks to the species.

Micromys minutus (Pallas, 1771) Examined material: one pellet of *Asio otus* Linnaeus, 1758 that contained fragments of a skull, bones, hairs, Tinca, November, 2016 (ILIE, 2017b); a nest in a young hawthorn (*Crataegus* sp.) at a height of 50 cm above the ground, Tinca, near the Crișul Repede river, April 15, 2018 (ILIE, 2018); one pellet of *Athene noctua* Scopoli, 1769 that contained bones and skull (fragments), Tinca, February 7, 2019 (ILIE, 2019). Distribution in Romania: all over the country, in humid places or cultivated lands. Conservation status: lower risk, near-threatened; CRVR = vulnerable species.

MYOCASTORIDAE FAMILY

Myocastor coypus (Mollina, 1782) Examined material: two specimens, probably escaped from a farm, Belfir, Crișul Negru river, May 20, 2015 (ILIE, 2014; ILIE, 2016). Distribution in Romania: mammal from South America, raised for meat and fur, semiaquatic, exists only in captivity in Romania (POPESCU & MURARIU, 2001). Conservation status: there are no current identifiable risks to the species.

CASTORIDAE FAMILY

Castor fiber (Linnaeus, 1758) Examined material: many sores on poplar tree, Râpa, 2016 (Fig. 13); specimens observed in the Crișul Negru river (Tinca, Râpa, Gurbediu, Girișu Negru) during 2015 - 2016 (ILIE, 2016); one specimen, Tinca, Crișul Negru river, January 4, 2018 (ILIE, 2018). Semiaquatic species recently introduced in the Criș catchment area by the Forestry Research and Development Institute, being observed for the first time in Tinca in 2015. Distribution in Romania: Crișana, Muntenia, Transylvania, Dobruja (Danube Delta). Conservation status: there are no current identifiable risks to the species.

Figure 13. Poplar tree gnawed by *Castor biber* (photo by Ilie A. L.).

CONCLUSIONS

During the analysed period, the work signals a large number of rodent species (26 species belonging to 9 families and 20 genera) in the Tinca area. According to the Red list of vertebrates from Romania (BOTNARIUC & TATOLE, 2005) and IUCN REDLIST, 6 vulnerable species were recorded, of which 4 with lower risk, near-threatened species and 14 species for which no risks are identifiable. Cases of induced cannibalism were seen in at *Mus musculus* L. Also, the work brings new data on the presence of beavers (*Castor fiber* L.) in the Western Plain where, in addition to the scheduled colonization, there are also natural penetrations from Hungary, a phenomenon reported along the Tisa and Someș rivers. There is a small number of European ground squirrel reported specimens, probably due to anthropogenic causes (example: intensive agriculture, pesticides, etc.).

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