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ARTIFICIAL HABITATS SERVING AS SHELTERS FOR AMPHIBIANS IN RICH BIODIVERSITY AREAS: A CASE IN THE JIU GORGE NATIONAL PARK, ROMANIA

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ABSTRACT. *In the settling ponds of a nonfunctional stone quarry in the Jiu Gorge National Park, in the year 2018, some individuals of two protected newt species (Lissotriton vulgaris and Triturus cristatus) were observed. This report is important because in this protected area newts are rare due to the mountain relief, which is unfavorable to their aquatic habitats. Even if in the park there are many areas with low human impact, which shelter a rich biodiversity, artificial habitats may still have value for the preservation of some protected species. They can serve as substitutes for natural habitats not only in areas where the natural ones were destroyed by human activities, but also in regions where natural habitats are rare because of natural causes. The presence of these two newt species with conservative importance imposes the protection of this artificial habitat.*

KEY WORDS: *aquatic habitats, newts, human impact, natural areas, colonization.*

The Jiu Gorge National Park in south-western Romania is a protected area with a diverse herpetofauna, including numerous protected- and zoogeographically important species (Covaciu-Marcov et al. 2009). Nevertheless, amphibians and especially newts are poorly represented, compared with reptiles, because of the mountain relief, with very steep slopes, which is not favorable to their aquatic habitats (Covaciu-Marcov et al. 2009). Thus, in the protected area only one habitat shelters large *Lissotriton vulgaris* and *Triturus cristatus* populations (Covaciu-Marcov et al. 2009, Dobre et al. 2009), both protected species in Romania (O.U.G. 57

/ 2007). One of these, *T. cristatus,* was mentioned as being in decline in Europe (e.g. Beebee 1997, Kuzmin 2001, Denoël 2012). Recent data indicate the disappearance of some populations from the south-western limit of the species` distribution range (Grillas et al. 2018). The disappearance of some populations was also observed in other newt species (Scillitani et al. 2004, Botto & Seglie 2010). Although in Romania *T. cristatus* is well represented, the western part of the Southern Carpathians is the region with the fewest records (Cogălniceanu et al. 2013). In this context, this note presents a new distribution point of two newt species in an artificial habitat from the Jiu Gorge National Park.

In March 2018 we identified two newt species, *L. vulgaris* and *T. cristatus*, in a habitat from Jiu Gorge National Park, where they were not mentioned before (Covaciu-Marcov et al. 2009). This is the sixth record of *L. vulgaris* and the fifth record of *T. cristatus* in the protected area. The newts were encountered in the technological area of the Meri stone quarry, at some tens of meters from the Jiu River. Presently the quarry is not functional. The newt's habitat is represented by the settling ponds of the quarry (Figure 1), which, after the activity has stopped, are no longer affected by suspensions. At the time of the study upon the park's herpetofauna (Covaciu-Marcov et al. 2009) the quarry was still functional. Thus, the water in the settling ponds was polluted with suspensions, having white color, so no newts were observed. The settling ponds comprise two basins with vertical concreted edges, with approximately 9 m length and 6 m width each. The water depth reaches approximately 50 cm, the bottom being covered with an approximately 80 cm thick layer of mud and deposits from the quarry. After the quarry activity has stopped in 2010, the settling ponds were gradually invaded by vegetation, especially on the banks where alders and bulrush are growing. The water surface is mostly without vegetation. Although the settling ponds have concreted edges, they are in some places deteriorated, thus the newts can enter and get out from the water. Approximately 30 *L. vulgaris* and about 10 *T. cristatus* individuals were observed in April. Also, in other habitats *L. vulgaris* was better represented than *T. cristatus* (e.g. Dobre et al. 2009, Cicort-Lucaciu et al. 2011). Beside the two newt species, in the ponds were present dozens of *Bombina variegata*, and some *Hyla arborea*, *Rana dalmatina*, *Pelophylax ridibundus* and *Bufotes viridis* individuals. The newts, both adults and larvae, were observed in July. The settling ponds are surrounded by alders and then dense beech and hornbeam forests.

Figure 1. The abandoned settling pond from Meri quarry, Jiu Gorge National Park.

Newts were frequently mentioned in different artificial habitats (e.g. Ferracin et al. 1980, Šizling & Zavadil 2001, Scillitani et al. 2004, Kolář et al. 2017, Wirga & Majtyka 2015, Covaciu-Marcov et al. 2017). In regions where natural aquatic habitats are affected, the artificial ones are considered a solution for amphibians (e.g Martínez-Abraín & Galán 2018, Le Viol et al. 2012). Unlike this, the Jiu Gorge National Park is not a region with high human disturbance, but a protected region with a rich biodiversity (e.g. Petrescu et al. 2004, Covaciu-Marcov et al. 2009, Telcean et al. 2017, Tomescu et al. 2011). Nevertheless, from natural causes newts are rare in the protected area (Covaciu-Marcov et al. 2009), thus any new record is important. The presence of amphibians in the settling ponds indicates that artificial habitats could have importance even in natural areas where the aquatic habitats are rare because of natural causes.

Ten years have passed from the previous study and eight from the cessation of the quarry activity, and this time was enough for the establishment of newt populations. The closest locality to the settling pond, where the presence of the two newt species is known, is at Meri railroad station, situated at approximately 500 m. Recent scientific literature mentions that, in crested newts, beside individuals with site fidelity, there

are also some which migrate between habitats (Denoël et al. 2017). Newts can move certain distances from their aquatic habitats (e.g. Arntzen & Teunis 1993, Kupfer & Kneitz 2000, Schabetsberger et al. 2004, Schmidt et al. 2006, Kovar et al. 2009); in the case of crested newts this distance can be over 1 km (e.g. Haubrock & Altrichter 2016, Mori et al. 2017). Thus, the distance between Meri railroad station and the settling ponds from the quarry could be made by newts. However, between the two habitats there is a high traffic road and the Jiu River with a bridge to the stone quarry. Taking into account these obstacles, the newts from the settling pond probably did not come from the railway station habitat, but they are the few individuals who have survived at this bank of the river before the cessation of the quarry activity. There is a stream near the settling pond, with numerous temporary puddles in its meadow area, where some individuals could probably survive. These newts have colonized the settling pond, of which proper conditions, with deeper and permanent water, have permitted population growth in time. Newts` fast colonization of new habitats was observed in other cases too (Arntzen & Teunis 1993). Moreover, some human translocated *T. cristatus* individuals in only six years have shown population growth in the new habitat (Gustafson et al. 2016).

Even if this is an artificial habitat situated near a disturbed area like the quarry, the settling pond from Meri has come to be conservatively valuable, sheltering protected amphibian species. Because of the presence of a species with high conservative importance, like *T. cristatus* (O.U.G. 57/2007), the settling ponds must be protected by any anthropogenic impact. In the case of the activity resumption of the quarry, these settling ponds should not be used anymore but preserved; instead new settling ponds should be built. Moreover, monitoring of this population for size establishment should be performed in the next period, as well as in the case of the other newt populations in the Jiu Gorge National Park, which were investigated 10 years ago (Covaciu-Marcov et al. 2009, Dobre et al. 2009).

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