

Short note

A Wall lizard on a Danube Island - Podarcis muralis (Reptilia) in Moldova Veche Island, Iron Gates Natural Park, Romania

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Abstract. *Podarcis muralis* was identified on Moldova Veche Island (Romania), although naturally the island lacks the species' appropriate habitats. *P. muralis* occurs in artificial habitats represented by stony piers. Probably, some individuals were brought by chance to the island together with the stones used for the pier. *P. muralis* is limited to this artificial habitat, without any possibility of further distribution.

Key words: artificial habitats, human impact, introduction, lizards.

The wall lizard, *Podarcis muralis* (Laurenti, 1768), is distributed from northern Spain to Turkey Anatolia; Romania is a part of its north-eastern distribution limit (e.g. Sillero et al., 2014). In Romania it occurs especially in the southern and central part of the Carpathian Mountains, and in Dobruja (e.g. Fuhn & Vancea, 1961; Cogălniceanu et al., 2013). It is a xerothermophilous species, widespread in rocky areas (Fuhn & Vancea, 1961). *P. muralis* was recently mentioned in Romania in anthropogenically disturbed habitats (Covaciu-Marcov et al., 2006, 2009a; Gherghel et al., 2009; Strugariu et al., 2008; Sas-Kovács & Sas-Kovács, 2014). It was frequently reported in south-western Romania, in the Danube Gorge area, where it is well represented (Covaciu-Marcov et al., 2005, 2009b; Cogălniceanu et al., 2013). Although those records refer to the Danube's banks and surrounding slopes (Covaciu-Marcov et al., 2005,

2009b), the species was also recorded on one of the islands from the Danube Gorge, namely Ada Kaleh (Fuhn, 1975). After the construction of the Iron Gates I Dam Lake, the population disappeared as the island was flooded (Fuhn, 1975). This paper mentions the wall lizard on another island from the Danube Gorge, namely Moldova Veche Island, providing some possible explanations for its colonization.

Moldova Veche Island is situated in the Iron Gates Natural Park - IGNU. Before the dam lake the island was much larger (Ujvári, 1972). Nowadays, only some higher regions survived, covered by wetlands and some grassland. The island was a step away from becoming a tailings deposit, when the copper mine from Moldova Nouă was still functioning (Radomir & Simion, 2016; Burlacu et al., 2017). For this purpose, the island's landscape was modified by the introduction of stones, used for propping a peri-

island pier and for a bridge construction (abandoned in a useless condition), which linked the island to the left Danube bank (Radomir & Simion, 2016). The stony piers, of some meters width, surround the island.

P. muralis was observed on the island by different occasions in the last years. In the autumn of 2019, during a day field study, we observed tens of individuals on the stony piers in the island's western part (Fig. 1). From what we know, *P. muralis* was not previously recorded on the island (see Fuhn & Vancea, 1961). The species probably did not inhabit naturally the island, due to the anterior landscape, which did not fit its requirements, even if it was recorded in the surroundings (Covaciu-Marcov et al., 2005, 2009b; Tomović et al., 2014). The island landscaping with large quantity of stones has created new habitats, which were occupied by the wall lizard. Presently, the wall lizard population from the island inhabits only these stony piers. The invasive potential of this species is well known (e.g. Ulrich et al., 2012), reported from Romania (Covaciu-Marcov et al., 2006; Gherghel et al., 2009; Sas-Kovács & Sas-Kovács, 2014; Strugariu et al., 2008), Europe (e.g. Heym et al., 2013; Schulte et al., 2008; Wirga & Majtyka, 2013) or other continents (e.g. Deichsel & Gist, 2001; Deichsel & Schweiger, 2004; Hedeén & Hedeén, 1999). Thus, if the wall lizard could colonize areas on other continents, why couldn't it be established on an island from its native distribution range, with optimal climate conditions? Moreover, it was introduced in similar habitats from seaport areas situated outside its distribution range (Santos et al., 2019). The only unenlightened fact in this case is the way the species arrived at this island.

The distribution ways of the wall lizard in the new habitats over the Danube could be multiple. Most likely *P. muralis* was brought with the loads of stone used for pier propping, coming from the quarry near Moldova Nouă (information from the IGNU staff). This possibility becomes more plausible because *P. muralis* was recorded in Moldova Nouă locality (Fuhn & Vancea, 1961; Covaciu-Marcov et al., 2005) and it inhabits stone quarries (e.g. Fuhn &

Vancea, 1961; Wirga & Majtyka, 2013). Similar situations were described even in areas outside its distribution range (Iftime, 2005; Sas-Kovács & Sas-Kovács, 2014). River embankments with stones are used in other regions too (Kühnis & Schmocker, 2008). The presence of *P. muralis* on Ada Kaleh Island was also considered a consequence of unintentional introduction by humans (Fuhn, 1970). On the other hand, *P. muralis* is a good climber (Avery et al., 1993; Brown et al., 1995; Žagar et al., 2017), fact suggested by its preference for steep slopes. There is a possibility that the lizard climbed the concrete pillars of the bridge and crossed to the island. This option has low chances due to the copper tailings deposit situated near the bridge pillars from the left bank of the river. Another way of distribution could be the intentional introducing by people, fact also mentioned by some authors (Deichsel & Gist, 2001; Deichsel & Schweiger, 2004; Schulte et al., 2008). In this context even its introduction by chance through boat transport must be considered.



Fig. 1. *Podarcis muralis* individual from Moldova Veche Island.

Beyond these uncertainties, *P. muralis* is a protected species (O.U.G. 57/2007). Nowadays there is sustainable population on the island, which can only be protected. The negative effects of this colonization are hard to estimate, but the anthropic changes on the island are much more serious than any consequence of the lizard's presence. Besides *P. muralis* we observed reptile species as *Lacerta viridis*, *Natrix natrix* and *N. tessellata*. In other areas of Romania even railroads are a distribution way

of *P. muralis*, but its potential impact is considered limited (see in: Gherghel & Tedrow, 2019). This is similar with the case of this island, where most habitats are not favorable for this species. Thus, *P. muralis* is currently situated, and in the future will remain, captive on the artificial stony pier habitats, which permitted its establishment on the island.

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References

- Avery, R., Corti, C., & Basker, A. (1993). "Scan" behaviour in *Podarcis muralis*: the use of vantage points by an actively foraging lizard. *Amphibia-Reptilia*, 14(3), 247-259. doi:10.1163/156853893X00444.
- Brown, R.M, Taylor, D.H., & Gist, D.H. (1995). Effect of Caudal Autotomy on Locomotor Performance of Wall Lizards (*Podarcis muralis*). *Journal of Herpetology*, 29(1), 98-105. doi:10.2307/1565091.
- Burlacu, I.F., Deak, G., Raischi, M.C., Daescu, A., Zamfir, S., Uritescu, B., Cristinoiu, C., & Olteanu, M.V. (2017). Greening Solutions Applicable in the Tailing Ponds Tăusani and Bosneag from Moldova Nouă. *IOP Conference Series: Materials Science and Engineering*, 209, 012097. doi:10.1088/1757-899X/209/1/012097.
- Cogălniceanu, D., Rozyłowicz, L., Székely, P., Samoilă, C., Stănescu, F., Tudor, M., Székely, D., & Iosif, R. (2013). Diversity and distribution of reptiles in Romania. *ZooKeys*, 341: 49-76. doi:10.3897/zookeys.341.5502.
- Covaciu-Marcov, S.-D., Sas, I., Cicort-Lucaciu, A.-Ș., Peter, I., & Bogdan, H. (2005). Notes upon the herpetofauna of the county of Caraș-Severin, Romania. *Revue Roumaine de Biologie, serie de Biologie Animale*, 49(1-2), 47-56.
- Covaciu-Marcov S.-D., Bogdan, H.V., & Ferentî, S. (2006). Notes regarding the presence of some *Podarcis muralis* (Laurenti 1768) populations on the railroads of western Romania. *North-Western Journal of Zoology*, 2(2), 126-130.
- Covaciu-Marcov, S.-D., Cicort-Lucaciu, A.-Ș., Dobre, F., Ferentî, S., Birceanu, M., Mihuț, R., & Strugariu, A. (2009a). The herpetofauna of the Jiului Gorge National Park, Romania. *North-Western Journal of Zoology*, 5(Supplement 1), S1-S78.
- Covaciu-Marcov, S.-D., Cicort-Lucaciu, A.-Ș., Gaceu, O., Sas, I., Ferentî, S., & Bogdan, H.V. (2009b). The herpetofauna of the south-western part of Mehedinți County, România. *North-Western Journal of Zoology*, 5(1), 142-164.
- Deichsel, G., & Gist, D.H. (2001). On the Origin of the Common Wall Lizards *Podarcis muralis* (Reptilia: Lacertidae) in Cincinnati, Ohio. *Herpetological Review*, 32, 230-232.
- Deichsel, G., & Schweiger, S. (2004). *Podarcis muralis* (Common Wall Lizard). Canada: British Columbia. *Herpetological Review*, 35, 289-290.
- Fuhn, I.E. (1970). Amfibieni și Reptile din zona viitorului lac de baraj de la Porțile de Fier. *Studii și Cercetări de Biologie, Seria Zoologie*, 22(4), 321-331. (In Romanian).
- Fuhn, I.E. (1975). Amphibia și Reptilia. In: M. Ionescu (Ed.). *Grupul de cercetări complexe "Porțile de Fier", Seria Monografică Fauna*. (pp. 301-303). Bucharest, Romania: Editura Academiei Republicii Socialiste România. (In Romanian).
- Fuhn, I., & Vancea, Ș. (1961). *Fauna R.P.R., Vol. XIV, Fascicola II, Reptilia*. Bucharest, Romania: Editura Academiei R.P.R. (In Romanian).
- Gherghel, I., & Tedrow, R. (2019). Manmade structures are used by an invasive species to colonize new territory across a fragmented landscape. *Acta Oecologica*, 101, 103479. doi:10.1016/j.actao.2019.103479.
- Gherghel, I., Strugariu, A., Sahlean, T.C., & Zamfirescu, O. (2009). Anthropogenic impact or anthropogenic accommodation? Distribution range expansion of the common wall lizard (*Podarcis muralis*) by means of artificial habitats in the north-eastern limits of its distribution range. *Acta Herpetologica*, 4(2), 183-189. doi:10.13128/Acta_Herpetol-3421.

- Hedeon, S.E., & Hedeon, D. (1999). Railway-Aided Dispersal of an Introduced *Podarcis muralis* Population. *Herpetological Review*, 30(1), 57.
- Heym, A., Deichsel, G., Hochkirch, A., Veitii, M., & Schulte, U. (2013). Do introduced wall lizards (*Podarcis muralis*) cause niche shifts in a native sand lizard (*Lacerta agilis*) population? A case study from south-western Germany. *Salamandra*, 49(2), 97-104.
- Iftime, A. (2005). Herpetological observations in the Danube floodplain sector in the Giurgiu County (Romania). *Travaux du Muséum National d'Histoire Naturelle «Grigore Antipa»*, 48, 339-348.
- Kühnis J.B., & Schmocker, H. (2008). Zur Situation der Mauereidechse (*Podarcis muralis*) im Fürstentum Liechtenstein und im schweizerischen Alpenrheintal. *Zeitschrift für Feldherpetologie*, 15, 43-48.
- O.U.G. nr. 57/2007. (2007). Ordonanța de Urgență 57/2007 privind regimul ariilor naturale protejate, conservarea habitatelor naturale, a florei și faunei sălbatice. *Monitorul oficial I*, 442/2007. (Romanian law, I in Romanian).
- Radomir, A., & Simion, H. (2016). Remarkable Bridges on the National Road DN 57 along the Danube from Orșova to Moldova Nouă. *Procedia Engineering*, 156, 372-379. doi:10.1016/j.proeng.2016.08.310.
- Santos, J.L., Žagar, A., Drašler, K., Rato, C., Ayres, C., Harris, D.J., Carretero, M.A., & Salvi, D. (2019). Phylogeographic evidence for multiple long-distance introductions of the common wall lizard associated with human trade and transport. *Amphibia-Reptilia*, 40, 121-127. doi:10.1163/15685381-20181040.
- Sas-Kovács, I., & Sas-Kovács, É.-H. (2014). A non-invasive colonist yet: The presence of *Podarcis muralis* in the lowland course of Crișul Repede River (north-western Romania). *North-Western Journal of Zoology*, 10(1), 141-145.
- Schulte, U., Thiesmeier, B., Mayer, W., & Schweiger, S. (2008). Allochthone Vorkommen der Mauereidechse (*Podarcis muralis*) in Deutschland. *Zeitschrift für Feldherpetologie*, 15, 139-156.
- Sillero, N., Campos, J., Bonardi, A., Corti, C., Creemers, R., Crochet, P.-A., Crnobrnja Isailovic, J., Denoël, M., Ficetola, G.F., Gonçalves, J., Kuzmin, S., Lymberakis, P., de Pous, P., Rodríguez, A., Sindaco, R., Speybroeck, J., Toxopeus, B., Vieites, D.R., & Vences, M. (2014). Updated distribution and biogeography of amphibians and reptiles of Europe. *Amphibia-Reptilia*, 35, 1-31. doi:10.1163/15685381-00002935.
- Strugariu, A., Gherghel, I., & Zamfirescu, Ș.R. (2008). Conquering new ground: On the presence of *Podarcis muralis* (Reptilia: Lacertidae) in Bucharest, the capital city of Romania. *Herpetologica Romanica*, 2, 47-50.
- Tomovič, L., Ajtič, R., Ljubisavljevič, K., Urošević, A., Jovič, D., Krizmanič, I., Labus, N., Đorđević, S., Kalezič, M.L., Vukov, T., & Džukič, G. (2014). Reptiles in Serbia – distribution and diversity patterns. *Bulletin of the Natural History Museum*, 7, 129-158. doi:10.5937/bnhmb1407129T.
- Ujvári, I. (1972). *Geografia apelor României*. Bucharest, Romania: Editura Științifică. (In Romanian).
- Ulrich, S., Hochkirch, A., Löttersm, S., Rödder, D., Schweiger, S., Weimann, T., & Veith, M. (2012). Cryptic niche conservatism among evolutionary lineages of an invasive lizard. *Global Ecology and Biogeography*, 21, 198-211. doi:10.1111/j.1466-8238.2011.00665.x.
- Wirga, M., & Majtyka, T. (2013). Records of the Common Wall Lizard *Podarcis muralis* (Laurenti, 1768) (Squamata: Lacertidae) from Poland. *Herpetology Notes*, 6: 421-423.
- Žagar, A., Carretero, M.A., Vrezec, A., Drašler, K., & Kaliontzopoulou, A. (2017). Towards a functional understanding of species coexistence: ecomorphological variation in relation to whole-organism performance in two sympatric lizards. *Functional Ecology*, 31(9), 1780-1791. doi:10.1111/1365-2435.12878.

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