

A new distribution record of *Salamandra salamandra* (Amphibia) in the Getic Subcarpathians, Romania

Original Article

Abstract:

Salamandra salamandra, a species considered in Romania to be related to the Carpathian arch, was identified in a new locality south of the Southern Carpathians, in the Oltenia region. The new distribution record indicates that the species is present in more locations in the region, despite its previous few and recent records. In October 2024, we identified two adults at an altitude of about 400 m in a hilly region covered with beech forests. In April 2025, we identified larvae in a puddle situated near an abandoned railway that served an abandoned coal mine. The aquatic habitat created alongside the railway offered favorable conditions for larval development. In recent years, with dry, warm conditions, this aquatic habitat, alongside the region's beech forest, contributed to the survival of the fire salamander population.

Key words:

fire salamander, forests, beech, aquatic habitat, coal mine, railway.

Apstrakt:

Novi nalaz rasprostranjenja vrste *Salamandra salamandra* (Amphibia) u Getičkim subkarpatima, Rumunija

Salamandra salamandra, vrsta koja se u Rumuniji smatra vezanom za karpatski luk, identifikovana je na novoj lokalitetu južno od Južnih Karpata, u regionu Oltenije. Novi nalaz rasprostranjenja ukazuje na to da je vrsta prisutna na većem broju lokaliteta u regionu, uprkos ranijim malobrojnim i skorijim nalazima. U oktobru 2024. godine identifikovali smo dve odrasle jedinke na nadmorskoj visini od oko 400 m u brdovitom području prekrivenom bukovim šumama. U aprilu 2025. godine identifikovali smo larve u bari koja se nalazi u blizini napuštene željezničke pruge koja je služila napuštenom rudniku uglja. Vodeno stanište formirano duž pruge pružilo je povoljne uslove za razvoj larvi. Poslednjih godina, uz suve i tople uslove, ovo vodeno stanište, zajedno sa bukovom šumom regiona, doprinelo je opstanku populacije daždevnjaka.

Ključne reči:

daždevnjak, šume, bukva, vodeno stanište, rudnik uglja, železnica.

Introduction

Salamandra salamandra is traditionally considered in Romania associated with areas at altitudes above 200 m (Fuhn, 1960), as it is distributed in the Carpathian arch and neighboring areas (Fuhn, 1960; Cogălniceanu et al., 2000, 2013). Also, the species' distribution range is associated with forested areas (e.g., Fuhn, 1960; Cogălniceanu et al., 2000; Balogová et al., 2012; Kovar et al., 2024). The fact is also true for the most part of its distribution range, as *S. salamandra* is considered in other regions tied with higher, mountain areas, with cold and wet climate (e.g., Balogová et al., 2012; Manenti et al., 2013; Kovar et al., 2024), although in the northern part of its distribution range, it was recorded in lowlands (Litvinchuk, 1996). In Romania, it reaches almost 2000 m altitude (Cogălniceanu et al., 2013),

while at the lowest altitudes it descends to only 78 m (Covaciu-Marcov et al., 2017a), but in other, more southern, areas of the Balkan Peninsula, it descends to even lower altitudes (Jablonski et al., 2013). Nevertheless, in recent years, *S. salamandra* has also been reported in Romania, in regions outside the Carpathian Mountains, such as the Getic Piedmont (Covaciu-Marcov et al., 2012; Pop, 2024) and the Moldavian Plateau (Strugariu et al., 2008). In southwestern Romania (Oltenia region), the species' distribution overlaps the southern border of the Southern Carpathians (Cogălniceanu et al., 2013). Nevertheless, there is information prior to that review (Cogălniceanu et al., 2013) regarding seven distribution records of *S. salamandra* in the Getic Piedmont (Covaciu-Marcov et al., 2012), one of which was recently reconfirmed (Pop, 2024). South

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of the Southern Carpathians, although there are some flat, deforested depressions, they are surrounded by the Getic Piedmont, which is mostly above 200 m in altitude and largely forested (Mândruț, 2006). In this context, our contribution adds a new distribution record of *S. salamandra* south of the Southern Romanian Carpathians.

Materials and Methods

In the first instance, adult fire salamanders were accidentally encountered at the end of October 2024 while we were in the region for other studies. Subsequently, we revisited the region in April 2025. Adult fire salamanders were directly observed in the field during visual transects in the region in the first part of the day, following a rainy night. In April 2025, we visually inspected various aquatic habitats to look for fire salamander larvae. The studied region is situated in the north-eastern part of Gorj county, in the area of Cărbunești Hill (Tufescu, 1986),

between the Getic Subcarpathians and the Getic Piedmont (Mândruț, 2006).

Results

Salamandra salamandra was identified near Burlani village (Gorj county) (Fig. 1), at an elevation of about 400 m. On 13 October 2024, we observed two large-sized *S. salamandra* adults (approximately 15 cm) on a rainy autumn day following a rainy night. One adult (Fig. 2) was observed in an area with bulrushes at 10 m from the forest edge (45.047326 N, 23.698620 E), and the other near an abandoned railway tunnel, also near the forest edge (45.048110 N, 23.698563 E). The fire salamanders were identified at the top of a hill, mostly covered by beech-dominated forests. Nevertheless, there are also areas with different *Quercus* species, but also black locust and poplar plantations in the regions affected by the open-pit coal mine and near the disused railway. At the end of April 2025, we observed fire salamander

larvae in both a small stream and, in greater numbers, in an artificial puddle near the railway (45.048465 N, 23.696552 E). This aquatic habitat probably served to collect springs and torrents that would otherwise affect the railway, as it is situated near concrete support walls along the railway (Fig. 3). The stream passes under the railway, and although it has some sections with concrete banks, it is in direct contact with the neighboring forest.

Discussion

According to previous data (Covaciu-Marcov et al., 2012; Pop, 2024), this is the eighth distribution record of *S. salamandra* in the Oltenia region of southwestern Romania, outside the Carpathian Mountains. The new locality is situated at about 20 km in a straight line from the southern limit of the Southern Carpathians, previously considered the limit of the species distribution in the region (Cogălniceanu et al., 2013) (Fig. 1), and at about the same distance

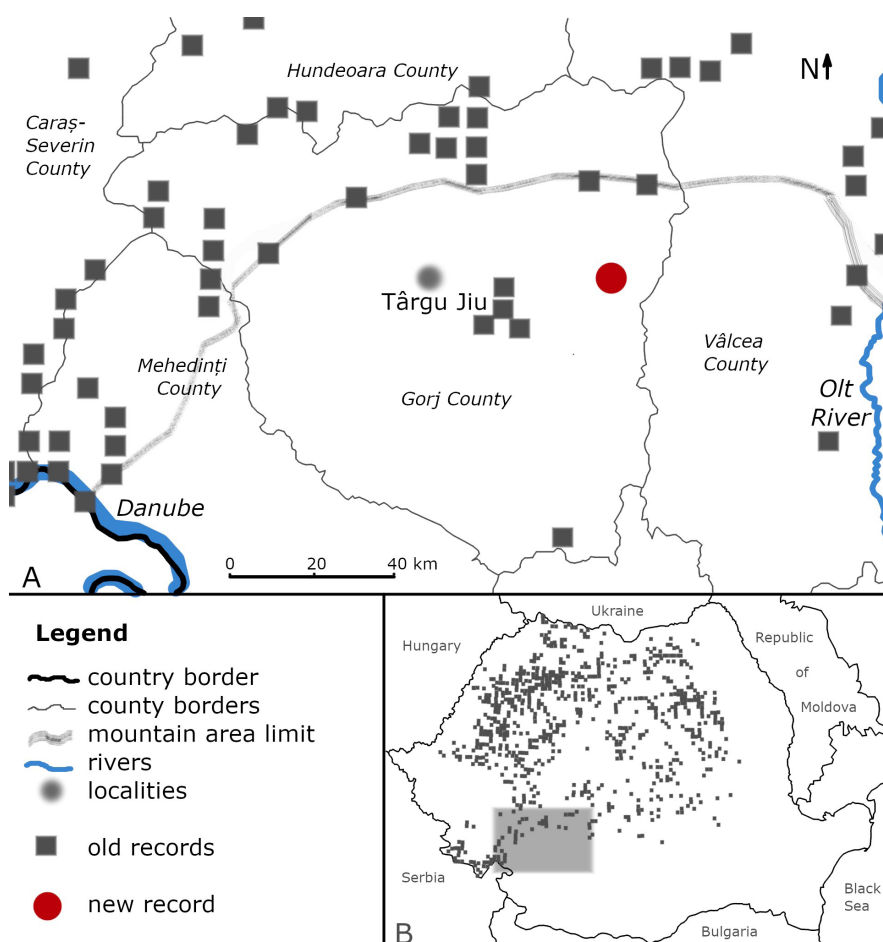


Fig. 1. A. The new distribution record of *S. salamandra* at Burlani, Gorj County (red circle); old records (grey squares) in the Carpathian arch (Cogălniceanu et al., 2013), and outside the Carpathian arch (Covaciu-Marcov et al. 2012; Pop 2024) in the studied region. **B.** General distribution of *S. salamandra* in Romania after Cogălniceanu et al. 2013.



Fig. 2. *Salamandra salamandra* individual at Burlani, Gorj County, Romania.

from the previous records in the Getic Piedmont (Jupânești and Scoarța) (Covaciu-Marcov et al., 2012; Pop, 2024). Thus, the new distribution record indicates a broader distribution of *S. salamandra* in the region, as it is roughly situated between the previous records from the Getic Piedmont and those from the mountains.

Both adult fire salamanders displayed typical behavior for the species, moving slowly and likely searching for food, as the species feeds after rainy periods (e.g., Ferenți et al., 2010; Balogová et al., 2015; Maier et al., 2022). The aquatic habitat near the railway is permanent, as it retains water even in August, providing favorable conditions for larval development. Probably, the stream dries out in the drier years, and the last years were very hot and dry in the entire Eastern Europe (see in: Ionita et al., 2025), but the artificial aquatic habitat, presently re-naturalized as the human activities ceased in the region, offered water along the entire warm season. Because the railway passed through a hilly, difficult terrain, it required numerous engineering works, including four tunnels (Bellu, 2010). The railway was built in the 80s for coal transport (Bellu, 2010) and has been abandoned for more than 10 years. This fact highlights a positive aspect of abandoned man-made structures: the humid habitats near railways (both abandoned and in use) are also useful for amphibians, as previously reported (e.g., Leanders, 2001; Covaciu-Marcov et al., 2009a, 2017b, 2023), while abandoned railways could offer habitat for other groups too (e.g., Graitson, 2006; Pop et al., 2021; Dylewski & Tobolka, 2022; Lazăr & Mușet, 2025).

The altitude of about 400 m recorded at Burlani is in the range of the species distribution, which is present in Romania above 200 m (Fuhn, 1960), although recently it was registered at lower altitudes (e.g., Covaciu-Marcov et al., 2009b; Bogdan et al., 2014), even below 100 m (Covaciu-Marcov et al., 2017a). Thus, in this case, not the altitude is

remarkable, but the fact that the location lies outside its established distribution range in the country (Cogălniceanu et al., 2013). The identification of *S. salamandra* at Burlani indicates that it is not only present but also well represented south of the Southern Carpathians, in the Getic Subcarpathians, and in the Getic Piedmont. Also, the population is sustainable, as we encountered both adults and larvae. Although the new record is located in an area where the species' presence was previously unknown (Cogălniceanu et al., 2013), the region contains large forests, which provide favorable habitats (Fuhn, 1960). All these indicate a continuous distribution of *S. salamandra* at least in the area of Cărbunesti Hill, as the populations from the Getic Piedmont are probably connected with the ones from the Southern Carpathians, where the species is well represented (e.g., Covaciu-Marcov et al., 2009a, 2020; Iftime & Iftime, 2014). Consequently, future studies should focus mainly on the southern parts of Getic Piedmont, where it is unclear how far the species descends.

Old-growth forests have recently been shown to serve as refugia for salamanders over time, protecting them from climatic and ecological changes (Delle Monache et al., 2025). This was probably also



Fig. 3. Habitat with *S. salamandra* larvae at the base of the railway's concrete support walls.

true for populations in the Getic Piedmont, where many forested areas are still present nowadays, thereby facilitating the survival of this forest-related species (e.g., Fuhn, 1960; Cogălniceanu et al., 2000; Balogová et al., 2012; Kovar et al., 2024). This possibility is also supported by the observation that, at the local level, the adult's dimensions are an indicator of the quality of the habitat (Sinsch, 2024). Thus, the individuals from Burlani were large, indicating that the population has access to good-quality habitats. Nevertheless, in more southern areas, such as Bulgaria, even larger individuals were recorded, because at the southern limit of the species' distribution range, the active period lasts longer as the climate is warmer (Pulev et al., 2016). This fact is also possible at Burlani, because in the region the mean January temperature is higher than in the Southern Carpathians (Mândruț, 2006), in areas populated by the species (Cogălniceanu et al., 2013).

References

- Bellu, R.** (2010). *Romania, mica monografie a tunelelor de cale ferata (1856–2009)*. Tipografia Filareat S.A. [in Romanian].
- Balogová, M., Uhrin, M., Kaňuk, J., & Kaľavský, J.** (2012). *Salamandra salamandra* in Slovakia: Distribution and habitat. *Folia Veterinaria*, 56(4), 3–6.
- Balogová, M., Miková, E., Orendáš, P., & Uhrin, M.** (2015). Trophic spectrum of adult *Salamandra salamandra* in the Carpathians, with the first note on food intake during winter. *Herpetology Notes*, 8, 371–377.
- Bogdan, H. V., Sas-Kovács, I., & Covaciu-Marcov, S.-D.** (2014). Herpetofaunistic diversity in Lipova Hills, western Romania: Actual and past causes. *Bihorean Biologist*, 8(1), 48–52.
- Cogălniceanu, D., Aioanei, F., & Bogdan, M.** (2000). *Amfibienii din România: Determinator*. Ars Docendi. [in Romanian].
- Cogălniceanu, D., Székely, P., Samoilă, C., Iosif, R., Tudor, M., Plăiașu, R., Stănescu, F., & Rozyłowicz, L.** (2013). Diversity and distribution of amphibians in Romania. *ZooKeys*, 296, 35–57. <https://doi.org/10.3897/zookeys.296.4872>
- Covaciu-Marcov, S.-D., Cicort-Lucaciu, A.-Ș., Dobre, F., Ferenți, S., Birceanu, M., Mihuț, R., & Strugariu, A.** (2009a). The herpetofauna of the Jiului Gorge National Park, Romania. *North-Western Journal of Zoology*, 5(Suppl. 1), S01–S78.
- Covaciu-Marcov, S.-D., Cicort-Lucaciu, A.-Ș., Gaceu, O., Sas, I., Ferenți, S., & Bogdan, H. V.** (2009b). The herpetofauna of the south-western part of Mehedinți County, Romania. *North-Western Journal of Zoology*, 5(1), 142–164.
- Covaciu-Marcov, S.-D., Cicort-Lucaciu, A.-Ș., Sucea, F.-N., & Sas, I.** (2012). *Salamandra salamandra* (Linnaeus, 1758) in the Getic Piedmont, Romania: Geographic distribution, status and conservation. *Carpathian Journal of Earth and Environmental Sciences*, 7(1), 55–58.
- Covaciu-Marcov, S.-D., Ferenți, S., Urák, I., Sas-Kovács, E.-H., Cicort-Lucaciu, A.-Ș., & Sas-Kovács, I.** (2017a). After the last train passes: Data on the fauna from abandoned railway tunnels in Romania. *Annales Zoologici Fennici*, 54, 335–346. <https://doi.org/10.5735/086.054.0505>
- Covaciu-Marcov, S.-D., Sas-Kovacs, I., & Cicort-Lucaciu, A.-Ș.** (2017b). Lower than the lowest! Relict *Salamandra salamandra* population in Stârmina Hill, south-western Romania. *Russian Journal of Herpetology*, 24(1), 81–83. <https://doi.org/10.30906/1026-2296-2017-24-1-81-83>
- Covaciu-Marcov, S.-D., Popovici, P.-V., Cicort-Lucaciu, A.-Ș., Sas-Kovacs, I., Cupșa, D., & Ferenți, S.** (2020). Herpetofauna diversity in the middle of the Southern Carpathians: Data from a recent survey (2016–2018) in Cozia National Park (Romania). *Eco.Mont*, 12(2), 11–21. <https://doi.org/10.1553/eco.mont-12-2s11>
- Covaciu-Marcov, S.-D., Pop, D.-M., Sucea, F.-N., Ile, G.-A., Cicort-Lucaciu, A.-Ș., & Ferenți, S.** (2023). Good news from newts: Distribution, population size and dynamics of two protected newt species in the Jiu Gorge National Park, Romania. *Studia Universitatis Babeș-Bolyai Biologia*, 68(2), 219–234.
- Delle Monache, D., Chiocchio, A., Martino, G., Bisconti, R., Siclari, A., & Canestrelli, D.** (2025). Drivers of population structure and connectivity in a mountain biodiversity hotspot: Current patterns and future trends in fire salamander populations. *Global Ecology and Conservation*, 62, e03696. <https://doi.org/10.1016/j.gecco.2025.e03696>
- Dylewski, Ł., & Tobolka, M.** (2022). Unused railway lines as a contributor to bird abundance, species richness and diversity in intensively managed farmland. *Agriculture, Ecosystems & Environment*, 326, 107820.
- Ferenți, S., David, A., & Nagy, D.** (2010). Feeding-behaviour responses to anthropogenic factors on *Salamandra salamandra* (Amphibia, Caudata). *Bihorean Biologist*, 4(2), 139–143.
- Fuhn, I. E.** (1960). *Fauna R.P.R., Vol. XIV*

Fascicula I: Amphibia. Editura Academiei R.P.R. [in Romanian].

Graitson, E. (2006). Répartition et écologie des reptiles sur le réseau ferroviaire en Wallonie. *Bulletin de la Société Herpétologique de France*, 120, 15–32.

Iftime, A., & Iftime, O. (2014). Note on the amphibians and reptiles of the “Nordul Gorjului de Est” site of community interest and adjacent areas (Southern Carpathians, Romania). *North-Western Journal of Zoology*, 10(Suppl. 1), S44–S50.

Ionita, M., Vaideanu, P., Nichita, D., & Nagavciuc, V. (2025). Breaking records under clear skies: The impact of sunshine duration and atmospheric dynamics on the 2024 Eastern European extreme summer temperatures. *npj Natural Hazards*, 2, 82. <https://doi.org/10.1038/s44304-025-00137-9>

Jablonski, D., Balej, P., Jůna, F., & Homolka, M. (2013). Low altitudinal distribution of *Salamandra salamandra* from the Balkan Peninsula. *Herpetology Notes*, 6, 563–566.

Kovar, R., Brabec, M., Moravec, P., & Husak, T. (2024). Fire salamander, *Salamandra salamandra*, niche selection in Central European conditions. *Salamandra*, 60(2), 129–146.

Leanders, A. J. W. (2001). Het belang van spoorwegen voor de herpetofauna. *Natuurhistorisch Maandblad*, 90, 81–88.

Lazăr, A.-M., & Mușet, A.-F. (2025). Waiting for the trains that never came: Establishing a new *Podarcis muralis* (Laurenti, 1768) railway population in Romania. *Studia Universitatis Babeș-Bolyai Biologia*, 70(2), 15–25.

Litvinchuk, S. N. (1996). On records of *Salamandra salamandra* in the south-eastern part of the Baltic region. *Russian Journal of Herpetology*, 3(2), 196–198. <https://doi.org/10.30906/1026-2296-1996-3-2-196-198>

Maier, A.-R.-M., Ferenti, S., Dumbravă, A.-R., & Cadar, A.-M. (2022). A late autumn feeding: Diet of *Salamandra salamandra* (Linnaeus, 1758) (Amphibia: Salamandridae) in October and November in the Iron Gates Natural Park, Romania. *Acta Zoologica Bulgarica*, 74(2), 195–201.

Manenti, R., De Bernardi, F., & Ficetola, G. F. (2013). Pastures vs forests: Do traditional pastoral activities negatively affect biodiversity? The case of amphibian communities. *North-Western Journal of Zoology*, 9(2), 284–292.

Mândruț, O. (2006). *Mic atlas de geografie a României*. Editura Corint. [in Romanian].

Pop, D.-R. (2024). A new record of *Salamandra salamandra* (Amphibia) in the Getic Piedmont, south-western Romania. *South-Western Journal of Horticulture, Biology and Environment*, 15(1), 68–73.

Pop, D.-R., Ferenti, S., Maier, A.-R.-M., Cadar, A.-M., Covaciu-Marcov, S.-D., & Cupșa, D. (2021). A journey on the railway to nowhere: Terrestrial isopod assemblages on an abandoned railway in western Romania. *Spixiana*, 44(2), 135–143.

Pulev, A., Manolev, G., & Sakalarijeva, L. (2016). Two records of large specimens of fire salamander *Salamandra salamandra* (Linnaeus, 1758) (Amphibia: Caudata) in Bulgaria. *ZooNotes*, 85, 1–4.

Sinsch, U. (2024). Environmental drivers of local demography and size plasticity in fire salamanders (*Salamandra salamandra*). *Animals*, 14, 2869. <https://doi.org/10.3390/ani14192869>

Strugariu, A., Zamfirescu, Ș. R., Nicoară, A., Gherghel, I., Sas, I., Pușcașu, C. M., & Bugeac, T. (2008). Preliminary data regarding the distribution and status of the herpetofauna in Iași County (Romania). *North-Western Journal of Zoology*, 4(Suppl. 1), S1–S23.

Tufescu, V. (1986). *Harta R.S. România*. Editura Didactică și Pedagogică. [in Romanian].

