

## SHORT COMMUNICATIONS

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DOI: 10.30906/1026-2296-2019-26-5-305-308

### FILLING THE GAPS: UPDATED DISTRIBUTION OF THE CASPIAN WHIP SNAKE (*Dolichophis caspius*, REPTILIA: COLUBRIDAE) IN ROMANIA

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*Submitted February 28, 2017*

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The Caspian whip snake (*Dolichophis caspius*) occurs at its north-western distribution range limit in Romania, where it is only present in the southern part of the country, but the overall range pattern is problematic and poorly understood. Here we compiled an updated distribution for the species in Romania, adding 29 new distribution records spread across 25 new UTM grids, information collected during 2011 – 2015. We add new locations to the historic region of Moldova and fill gaps in the south-central part of the country, and perhaps more surprisingly in the intensively surveyed area of Dobrogea. We present a tentative distribution range for the Caspian whip snake in Romania, but future surveys are still required in order to understand if the remaining distribution gaps are real or if they result from sampling bias.

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**Keywords:** *Dolichophis caspius*; distribution range; Romania; occurrence; new records.

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The Caspian whip snake, *Dolichophis caspius* (Gmelin, 1789), is one of the largest European snake species, growing up to 2 m in length (Fuhn and Vancea 1961; Ščerbak and Böhme 1993) and with a distribution range that covers two continents (Europe and Asia) from East-

ern Europe and the Balkan Peninsula to the Caucasus Mountains, southern Russia and Kazakhstan in the east (Fuhn and Vancea, 1961; Ščerbak and Böhme, 1993; Ananjeva et al., 2006; Sahlean et al., 2014). In Romania, the Caspian whip snake is located towards its north-western distribution limit and is considered a Mediterranean addition to the country's herpetofauna, occupying primarily open steppe grasslands and forest steppe habitats (Fuhn and Vancea, 1961; Ščerbak and Böhme, 1993; Sahlean et al., 2014) from the southern part of the country (Fuhn and Vancea, 1961). The Caspian whip snake is featured in red lists of numerous countries across its range (Kazakhstan, Republic of Moldova, Ukraine) (Ananjeva et al., 2006), while in Romania the species is listed as vulnerable (VU) (Iftime, 2005). *D. caspius* is also covered by both European (Bern Convention, Habitats Directive) and Romanian legislation (Law 13/1993, Government Ordinance 57/2007 annotated and modified by Law 49/2011).

Until recently the distribution of *D. caspius* in Romania was poorly understood, with populations recorded in the south-western part of the country (the historical

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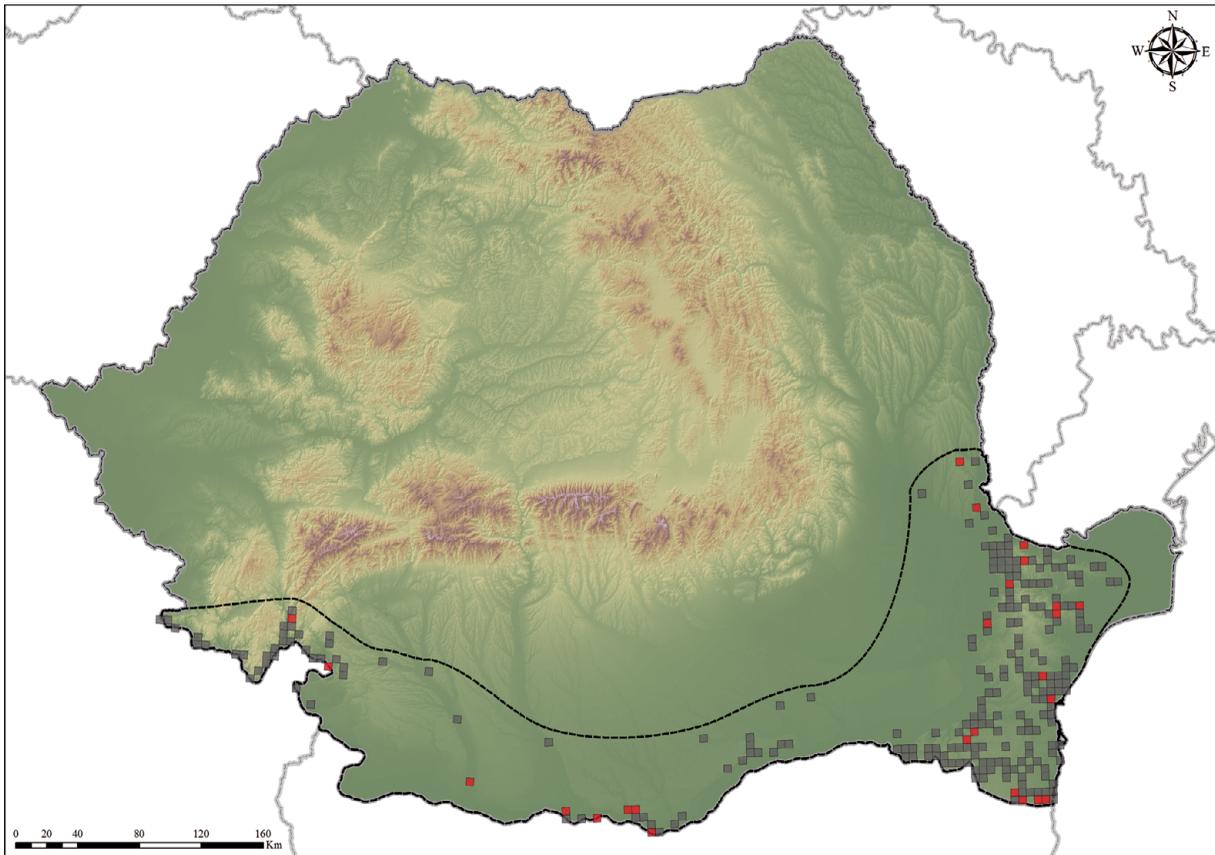
**TABLE 1.** Details for the New Caspian Whip Snake Occurrences Presented in the Current Paper

ID	County	Geographical Coordinates	Habitat	Observations
DC01	Caraș-Severin	44.8612° N 22.3982° E	Rocky outcrops with shrub vegetation	1 adult & exuvia
DC02	Mehedinți	44.5784° N 22.7497° E	—	1 individual DOR
DC03	Dolj	43.9359° N 23.9196° E	Steppe vegetation	1 adult
DC04	Olt	43.7376° N 24.6806° E	Loess walls with steppe vegetation	1 juvenile
DC05	Teleorman	43.7248° N 24.9137° E	Ruderal vegetation and shrubs	1 adult
DC06	Teleorman	43.7679° N 25.1899° E	Steppe grasslands with shrubs	1 adult
DC07	Teleorman	43.7646° N 25.2101° E	Steppe grasslands with shrubs	1 adult
DC08	Teleorman	43.6540° N 25.3403° E	Ruderal vegetation at the edge of a loess wall	1 adult
DC09	Galați	45.6001° N 28.0222° E	Paved road surrounded by agricultural fields	1 adult DOR
DC10	Galați	45.4805° N 28.0421° E	Shrubs on the edge of the railroad embankment; aprox. 100 m from loess walls	1 adult
DC11	Tulcea	45.2741° N 28.4515° E	Steppe vegetation with shrubs and rocky outcrops at the edge of an agricultural field	1 adult
DC12	Tulcea	45.1854° N 28.4617° E	Shrubs and ruderal vegetation	1 adult
DC13	Tulcea	45.0440° N 28.3260° E	—	2 individuals DOR
DC14	Tulcea	44.9101° N 28.7073° E	Steppe grasslands with shrubs	1 adult
DC15	Tulcea	44.8757° N 28.6903° E	—	1 individual DOR
DC16	Tulcea	44.8448° N 28.6989° E	—	1 individual DOR
DC17	Tulcea	44.8832° N 28.8381° E	Steppe grasslands with shrubs	1 adult
DC18	Constanța	44.4816° N 28.5404° E	Steppe grassland with rocky outcrops	exuvia
DC19	Constanța	44.4744° N 28.5150° E	Steppe grasslands with shrubs and rocky outcrops	1 sub-adult
DC20	Constanța	44.3750° N 28.5786° E	Lake embankment with ruderal vegetation	1 adult
DC21	Constanța	44.1680° N 27.9624° E	Steppe grasslands with shrubs and rocky outcrops	1 adult
DC22	Constanța	44.1799° N 27.9460° E	Steppe grasslands with shrubs	1 adult
DC23	Constanța	44.1427° N 27.8953° E	Rocky outcrops with shrub vegetation	1 adult
DC24	Constanța	43.8190° N 28.2714° E	—	1 individual DOR
DC25	Constanța	43.7720° N 28.3573° E	Rocky outcrops with shrub vegetation	1 adult
DC26	Constanța	43.7899° N 28.4723° E	Ruderal vegetation	1 adult
DC27	Constanța	43.7925° N 28.4830° E	Rocky outcrops with shrub vegetation	1 adult & 1 juvenile
DC28	Constanța	43.7853° N 28.4856° E	Steppe grasslands with shrubs and rocky outcrops	1 adult
DC29	Constanța	43.7850° N 28.4947° E	Steppe grassland with rocky outcrops	1 adult

region of Banat), south of Bucharest and in the south-east — continental Dobrogea and southern Moldova (Fuhn and Vancea, 1961). In more recent years, new studies have bridged the existent gaps in our knowledge with occurrence records from Oltenia (Lazăr et al., 2005; Covaciu-Marcov and David, 2010; Sahlean et al., 2010; Ferenți et al., 2011) and the Danube floodplain (Iftime and Iftime, 2007). In spite of the recent efforts, our knowledge regarding this species' distribution is still questionable, with lots of occurrence gaps that need to be filled by further surveys, even in parts of the range where the species is considered common and prevalent, such as Dobrogea (Fuhn and Vancea, 1961; Covaciu-Marcov et al., 2006). The current paper tries to bring us a step closer to this goal by adding “pieces to the puzzle board”: bringing new occurrence records from areas where *D. caspius* has not been recorded previously.

Occurrence data were collected between 2011 and 2015, generally from March to October, either by tar-

geted species searches or during general herpetological surveys. We utilized a combination of visual transect surveys and random searches, as well as investigations in favorable habitats. Some of the individuals were identified as victims of road traffic (dead on road — DOR). The complete list of occurrences was compared to the data available in the literature (Cogălniceanu et al., 2013; Covaciu-Marcov and David, 2010). Data from Cogălniceanu et al. (2013) and Covaciu-Marcov and David (2010) were georeferenced using ArcGIS 10.2.1 (ESRI 2013), the Romanian maps available (5 km UTM grids, borders, localities, spatial imagery) and the national projection system (Stereo 70). Georeferencing error did not exceed 1 km in both cases; occurrence data extracted from Covaciu-Marcov and David (2010) was further compiled to UTM grids in ArcGIS. The data is displayed using 5 km UTM grids and the expected distribution range was created in ArcGIS by joining the outermost limits of the



**Fig. 1.** Updated distribution of the Caspian whip snake in Romania: grey squares, published distribution records; red squares, new distribution records as of this paper; dashed black line, expected distribution range of *D. caspius* in Romania.

UTM grids where the species was found, adding a buffer of 5 km and then applying a polygon smoothing.

Our dataset comprises 29 new occurrence records (Table 1) distributed over 25 UTM grids (Fig. 1). The previous database, based on information extracted from Cogălniceanu et al. (2013) and Covaciu-Marcov and David (2010) featured 182 5 km UTM grids, so we have an almost 14% increase in distribution space for the species in Romania. The AOO (Area of Occupancy) for the Caspian whip snake has increased from 4555 km<sup>2</sup> to roughly 5181 km<sup>2</sup> and the expected distribution range covers 49,831 km<sup>2</sup>.

The study adds two new locations for the Caspian whip snake in the historic region of Moldova, where the species has only recently been confirmed as still present (Strugariu and Gherghel, 2007), but also fills gaps in our knowledge regarding the distribution of *D. caspius* in the southern part of the country, a region only recently investigated more thoroughly (Lazăr et al., 2005; Iftime and Iftime, 2007; Covaciu-Marcov and David, 2010; Sahlean et al., 2010; Ferenti et al., 2011) and, perhaps more sur-

prisingly, adds a sizeable number of records to the distribution of the species in Dobrogea, a region known as a “herpetological hotspot” (Strugariu et al., 2008; Cogălniceanu et al., 2013) (Fig. 1).

The distribution and the number of new occurrence records gathered in a relatively short time span raises a big question mark regarding our understanding of this species’ range in Romania. It is clear that even in well studied areas such as Dobrogea we do not yet know the full extent of the species’ distribution. The new map (Fig. 1) tentatively adds an expected distribution range for the Caspian whip snake but it remains unclear where the northern limit should be set, especially considering the new records in Moldova as well as the climatic and habitat conditions in some areas where the species has not been reported (e.g., Vrancea, Vaslui, Brăila, Buzău, Dâmbovița) (Sahlean et al., 2014). The south-western part of the Caspian whip snake’s range in Romania features a large gap, between Drobeta-Turnu Severin and Craiova, and there is also a large gap in the central part between Craiova and Bucharest (Fig. 1). Is the species’

range continuous in those regions or is it distributed only along the Danube? As of yet, we do not know, as we are unsure whether the species has a continuous range in Dobrogea or the gaps we see are caused by intensive human activity (e.g., agriculture, urban development). For instance, a recent study that updated the distribution of the spur-thighed tortoise in Romania (Dobrogea) suggested that previous distribution gaps for the species in agricultural environments were probably a result of sampling bias (Moraru et al., 2016) and even more rare and elusive species have been identified in close proximity to agricultural fields (e.g., Strugariu et al., 2008, Sahlean et al., 2016).

Although located at its northern range limit, the Caspian whip snake is considered a common sight in Dobrogea (Covaciu-Marcov et al., 2006; Strugariu et al., 2008). Nevertheless, the species was assessed as vulnerable (Iftime, 2005) due to its distribution limit in Romania and the fact that the species' habitats are prime candidates for agricultural activities. Therefore, we believe it is of utmost importance to clarify both the species' northern range limits in Romania and the large gaps visible in its current distribution range, otherwise it is not inconceivable that populations may disappear before we even acknowledge their existence. We further suggest that future studies on this species should focus on population dynamics in natural vs. anthropic environments (especially agro-ecosystems), in order to better understand if the records made in the more affected areas represent viable populations, and how various agricultural practices might affect them.

**Acknowledgments.** We thank the members of the Moldavia Herpetological Group who assisted the authors during field-work. This study was partially supported by the project No. RO1567-IBB04/2016 from the Institute of Biology, Romanian Academy (to VDG), and by the "Alexandru Ioan Cuza" University of Iași, through the project 06/3.12.2015, code: GI-2015-03, Grant Competition for Young Researchers of UAIC (to AS).

## REFERENCES

- Ananjeva N. B., Orlov N. L., Khalikov R. G., Darevsky I. S., Ryabov S. A., and Barabanov A. V. (2006), *The Reptiles of Northern Eurasia: Taxonomic Diversity, Distribution, Conservation Status*, Pensoft Publishers, Bulgaria.
- Cogălniceanu D., Rozyłowicz L., Székely P., Samoilă C., Stănescu F., Tudor M., Székely D., and Iosif R. (2013), "Diversity and distribution of reptiles in Romania," *ZooKeys*, **341**, 49 – 76.
- Covaciu-Marcov S. D. and David A. (2010), "*Dolichophis caspius* (Serpentes: Colubridae) in Romania: New distribution records from the northern limit of its range," *Turk. J. Zool.*, **34**, 119 – 121.
- Covaciu-Marcov S. D., Ghira I., Cicort-Lucaciu A. Ș., Sas I., Strugariu A., and Bogdan H. V. (2006), "Contributions to knowledge regarding the geographical distribution of the herpetofauna of Dobruđja, Romania," *N.-W. J. Zool.*, **2**, 88 – 125.
- Environmental Systems Research Institute (ESRI) (2013), ArcGIS Release 10.2.1, Redlands, CA.
- Ferenți S., Cupșa D., and Telcean I. C. (2011), "*Dolichophis caspius* (Gmelin, 1789) is indeed continuously distributed in Southern Romania: Zoological and conservation implications of identifying new populations," *Carpath. J. Earth Environm. Sci.*, **6**, 273 – 276.
- Fuhn I. E. and Vancea Ș. (1961), *Reptilia (Testoase, Sopîrle, Serpi), Fauna R. P. R. Vol. XIV, fasc. 2*, Editura Academiei, Romania [in Romanian].
- Iftime A. (2005), "Reptiles," in: Botnariuc N. and Tatole V. (eds.), *The Red Book of Vertebrates in Romania*, Curtea Veche, Bucharest, pp. 173 – 196 [in Romanian].
- Iftime A. and Iftime O. (2007), "Some records of the herpetofauna of the Danube floodplain in the Balta Ialomiței area (Romania)," *Trav. Mus. Natl. d'Hist. Nat. "Grigore Antipa"*, **50**, 273 – 281.
- Lazăr V., Covaciu-Marcov S. D., Sas I., Pusta C., and Kovacs E. H. (2005), "The herpetofauna in the district of Dolj (Romania)," *Anal. Științ. Univ. 'Al. I. Cuza' Iași. Ser. Biol. Anim.*, **51**, 169 – 178.
- Moraru V. E., Buhaciu E., Măntoiu D. Ș., Gavril V. D., Popescu-Mirceni R., and Strugariu A. (2016), "The spur-thighed tortoise (*Testudo graeca iberica*) in Romania: new locality records suggest a more optimistic situation," *N.-W. J. Zool.*, **12**(2), 396 – 400.
- Sahlean T. C., Gherghel I., Papeș M., Strugariu A., and Zamfirescu Ș. R. (2014), "Refining climate change projections for organisms with low dispersal abilities: a case study of the Caspian whip snake," *PLoS ONE*, **9**, e91994.
- Sahlean T. C., Meșter L. E., and Crăciun N. (2010), "First distribution record for the large whip snake (*Dolichophis caspius* Gmelin, 1789) in the county of Teleorman (Islaz, Romania)," *Bihorean Biol.*, **4**, 181 – 183.
- Sahlean T. C., Strugariu A., Dincă P. C., Chișamera G., Stanciu C. R., Zamfirescu Ș. R., Gherghel I., and Moraru V. (2016), "Morphological characteristics of the elusive blotched snake (*Elaphe sauromates*) at its northwestern range limit (Romania)," *Turk. J. Zool.*, **40**, 136 – 140.
- Ščerbak N. N. and Böhme W. (1993), "*Coluber caspius* — Kaspische Pfeilnatter oder Springnatter," in: Böhme W. (ed.), *Handbuch der Reptilien und Amphibien Europas. Band 3/I. Schlangen (Serpentes). I*, Aula-Verlag, Wiesbaden, Germany, pp. 83 – 96.
- Strugariu A. and Gherghel I. (2007), "New record on the occurrence of *Dolichophis caspius* (Reptilia: Colubridae) in Romanian Moldavia," *N.-W. J. Zool.*, **3**, 57 – 61.
- Strugariu A., Sos T., Gherghel I., Ghira I., Sahlean T. C., Pușcaș u C. M., and Hușuleac-Volosciuc M. V. (2008), "Distribution and current status of the herpetofauna from the northern Măcin Mountains area (Tulcea County, Romania)," *Anal. Științ. Univ. 'Al. I. Cuza' Iași. Ser. Biol. Anim.*, **54**, 191 – 206.