

On the presence of the Danube crested newt, *Triturus dobrogicus*, at Durankulak Lake, Bulgaria

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Abstract. The Danube crested newt, *Triturus dobrogicus*, was known to be distributed in the Pannonian Basin, along the lower Danube and from the Danube Delta to the Dnepr Delta. Based on the discovery of three specimens in the collection of the "Grigore Antipa" National Museum of Natural History, Bucharest, Romania, we report a new record of *Triturus dobrogicus* from Lake Durankulak. This location in the north-east of Bulgaria, the Black Sea littoral region, is far outside the previously known range, and therefore establishes a new south-eastern limit for the distribution of this species. The possibility of introgressive hybridization with *Triturus karelinii* is discussed.

Keywords: *Triturus dobrogicus*, new limit of distribution, Bulgaria, Durankulak.

The Danube crested newt, *Triturus dobrogicus* (Kiritzescu, 1903), with its two subspecies, is spread from Austria and the Pannonian Basin (*Triturus dobrogicus macrosomus*), and, after a gap in the Iron Gates area, along the Danube to its Delta and mouth at the Black Sea, as well as along some of its tributaries (Tisa, Siret, Prut) and the seaside lagoons to the Dnepr Delta (*Triturus dobrogicus dobrogicus*) (Fig.1) (Arntzen et al. 1997, Cogălniceanu et al. 2000, Litvinchuk & Borkin 2000, Litvinchuk 2005, Strugariu & Gherghel 2008). In Bulgaria, *Triturus dobrogicus* is known from the low Danubian plain in the northern part of the country (Buresh & Zonkov 1941, Beshkov & Beron 1964, Arntzen et al. 1997, Petrov 2007), living in or around lakes, ponds, or slow water courses with abundant reed beds, up to an altitude of 200 m a.s.l. (Fuhn 1960, Cogălniceanu et al. 2000,

Iftime 2005, Petrov 2007), but has never been found in or around the Black Sea lagoons or littoral lakes.

The Danube crested newt is a strictly protected species under the Bern Convention and the EU Habitats Directive Annex II and is listed as Near Threatened globally by the IUCN (2008).

In 2007, while studying the newts in the collection of the "Grigore Antipa" National Museum of Natural History in Bucharest, Romania, we found three specimens of crested newts, one male and two females (inventoried as MGAB 500664, with the note that this museum number covers three specimens), collected at Durankulak by Mihai Băcescu. The original label did not bear a collection date; it is likely that they were collected in the 1930s-1940s. The material is conserved in formaline and we have no reasons to surmise any mislabelling. The

collection contains specimens of *Pelobates syriacus* and *P. fuscus*, taken from the same site. The occurrence of these two species of spadefoot toad in the area is confirmed in the literature (Dzukic et al. 2008).

Lake Durnakulak has a surface of ca. 450 ha and is fed by two rivers, displaying a salinity gradient. The lake hosts more than 80 species which are strictly protected at European level, as well as in Bulgaria and the neighbouring Romania (Kotchev et al. 1983, Ivanov 2000). Lake Durankulak is a RAMSAR and Natura 2000 site, as well as a Natural Monument of Bulgaria (Anonymous 2005). We therefore assume that the ecological conditions for crested newts have remained unaltered and we anticipate that they are still there.

For the identification of the museum material, we calculated the so-called 'Wolterstorff index' (length of anterior member X 100/ distance between insertion of fore-

limb and hindlimb), the number of rib-bearing vertebra (counted on radiographic images of the newts), as well as specific chromatic features (abdominal and gular coloration, noting the comparative extent of black and light colour).

The Wolterstorff index (WI) is 0.385 for the female in Fig. 2a, 0.469 for the female in Fig. 2b and 0.485% for the male (Fig. 2c). The number of rib-bearing vertebra (RBV) is 16 for both females and 15 for the male.

The chromatic features taken into account show a clear predomination of dark pigmentation, a tendency for the dark ventral spots to unite longitudinally, totally black gular coloration in one female (Fig. 2a) and almost totally black gular coloration in the second female (Fig. 2b) and the male (Fig. 2c).

For all three specimens, the WI is within the known range of variation for *Triturus dobrogicus* (see Arntzen 2003: Abb. 2) and

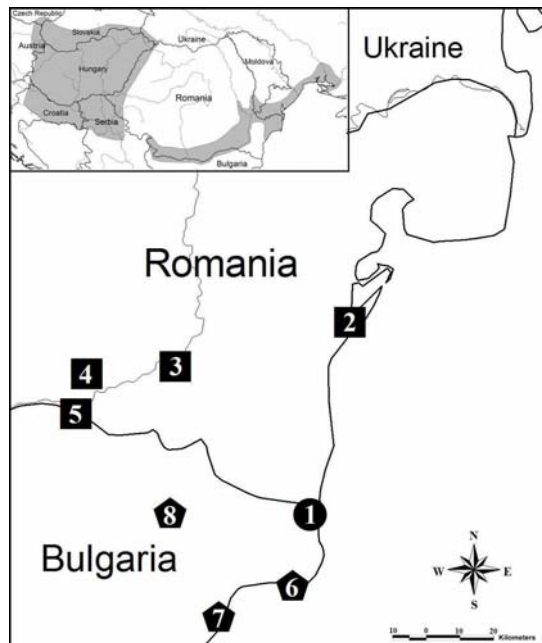


Figure 1. General distribution of *Triturus dobrogicus* and location of the closest reports of *Triturus karelinii* (pentagons) and *Triturus dobrogicus* (squares) of Durankulak Lake (circle)

- (1) - Durankulak Lake,
- (2) - Histria,
- (3) - Vlahii,
- (4) - Călărași,
- (5) - Ostrov,
- (6) - Bolata,
- (7) - Zlatni Pyasatsi,
- (8) - Dobrich.

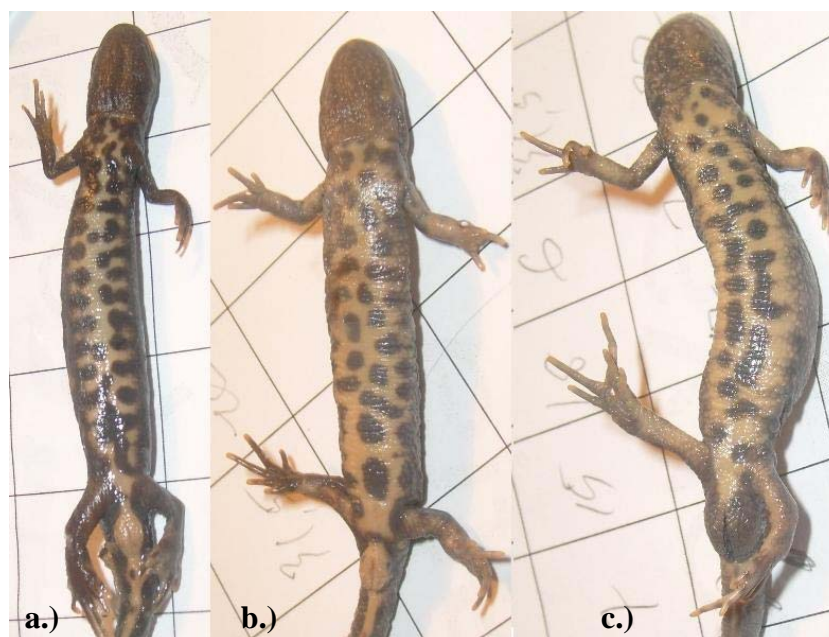


Figure 2. Ventral characteristics of studied newts from Durankulak

within or extremely close to the diagnostic values for *Triturus dobrogicus* (lower than 0.54 for males, lower than 0.462 for females – cf. Arntzen, 2003: Tab. 1) but outside the known range of variation for *T. karelinii*, excepting introgressives (see Arntzen, 2003: Abb. 2) and far below the diagnostic values for *T. karelinii* (higher than 0.671 in males, higher than 0.592 in females – cf. Arntzen 2003: Tab. 1). As regarding the RBV number, for all three specimens it falls within the range of variation of *T. dobrogicus* (being often 14-18, but over 15 in more than 90% of specimens and 16 in ca. 40% of specimens); for the male it has a value which is at the upper limit of the range of variation of *T. karelinii* and for the two females it is clearly outside it (in *T. karelinii* the RBV number is generally 13-14, rarely 15 and never 16) (Arntzen & Wallis 1999,

Arntzen 2003 – see Abb. 4). The RBV values in our sample are closer to what is seen in *T. d. dobrogicus*, which has most often 16 RBVs, as opposed to *T. d. macrosomus* in which the RBV number is more often 17, and 16 only in populations that show introgression with *T. cristatus* (Litvinchuk & Borkin 2000).

In one of the females (Fig. 2b) and the male (Fig. 2c) we can note a larger quantity of light pigment, as well as a more robust body shape; and the male has 15 rib-bearing vertebra, a number rarely found in *Triturus dobrogicus* which generally has more (16, 17 and rarely 18) – see Litvinchuk & Borkin 2000, whereas *Triturus karelinii* can have 15, but seldom (Arntzen & Wallis 1989, Arntzen 2003). These features recall to some extent the related species *Triturus karelinii* which is widespread in Bulgaria, even close to the site of Durankulak, e.g. at Bolata (Anony-

mous 1997), this last being only 30 km south of Durankulak, suggesting some interpecific gene flow from *Triturus karelinii* into *Triturus dobrogicus*, following a past hybridization event. This introgression hypothesis would be in accord with the observation of Wallis & Arntzen (1989) who found in Serbia specimens which corresponded morphologically with *Triturus karelinii*, but had mitochondrial DNA markers typical for *Triturus dobrogicus* (but note that this appears to represent an example of introgression in the reverse direction to the case we report).

Triturus dobrogicus has not been reported before in the littoral lakes and lagoons from Bulgaria. Known populations of *T. dobrogicus* the nearest to Lake Durankulak are found at Histria (110 km to North), Călărași and Vlahii (120 km to West) in Romania (Covaciu-Marcov et al. 2006, Iftime & Iftime 2007), and near Silistra (120 km to West) in Bulgaria (Buresch & Zonkov 1941, cited by Arntzen et al. 1997). We conclude that Lake Durankulak represents the south-eastern range limit of *Triturus dobrogicus*. To the east and to the south its range is limited by the Black Sea and by the range of the related species, *Triturus karelinii* (Trayanov & Filipova 2005, Anonymous 1997), respectively.

The importance of this record of *Triturus dobrogicus* at Durankulak is all the greater as the continental (i.e. excepting the Danube floodplain and Delta) Dobrudja in Romania, adjacent to our site, has no records of crested newts to this date (see Cogălniceanu et al. 2000, Iftime 2005, Covaciu-Marcov et al. 2006). It also highlights the need for further investigation to establish whether *Triturus dobrogicus* is still present at Lake Durankulak and whether there are crested newt populations (*T. dobrogicus* or *T. kare-*

linii) in the Romanian Dobrudja, overlooked by previous studies.

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References

- Anonymous (1997): Kaliakra Reserve. Management Plan. Bulgarian-Swiss Biodiversity Conservation Programme.
- Anonymous (2005): International species review, ferruginous duck *Aythya nyroca*. Convention on the Conservation of Migratory Species of Wild Animals.
- Arntzen, J.W., Bugter, R.J.F., Cogălniceanu, D., Wallis, G.P. (1997): The distribution and conservation status of the Danube crested newt, *Triturus dobrogicus*. *Amphibia-Reptilia* 18: 133-142.
- Arntzen, J.W., Wallis, G.P. (1994): The 'Wolterstorff Index' and its value to the taxonomy of the Crested Newt superspecies. *Abhandlungen und Berichte des Museums für Naturkunde und Vorgeschichte* 17: 57-66.
- Arntzen, J.W., Wallis, G.P. (1999): Geographic variation and taxonomy of crested newts (*Triturus cristatus* superspecies): morphological and mitochondrial DNA data. *Contributions to Zoology* 68: 181-203.
- Arntzen, J. W. (2003): *Triturus cristatus* Superspezies - Kammolch Artenkreis (*Triturus cristatus* (Laurenti, 1768) - Nördlicher Kammolch, *Triturus carnifex* (Laurenti, 1768) - Italienischer Kammolch, *Triturus dobrogicus* (Kiritzescu, 1903) - Donau-Kammolch, *Triturus karelinii* (Strauch, 1870) - Südlicher Kammolch). In: Grossenbacher, K. & Thiesmeier, B. (eds.), *Handbuch der Reptilien und Amphibien Europas* 4 (IIA): 421-514.
- Arntzen, J.W., Espregueira-Themudo, G., Wielstra, B. (2007): The phylogeny of crested newts (*Triturus cristatus* superspecies): nuclear and mitochondrial genetic characters suggest a hard polytomy, in line with the paleogeography of the centre of origin. *Contributions to Zoology* 76 (4): 261-278.

- Beshkov, V., Beron, P. (1964): Catalogue et bibliographie des Amphibiens et des Reptiles en Bulgarie. Sofia, ABS.
- Buresh, I., Zonkov, J. (1941): Untersuchungen über die Verbreitung der Reptilien und Amphibien in Bulgarien und auf der Balkanhalbinsel. 111. Teil: Schwanzlurche (Amphibia, Caudata). Mitteilungen aus den Königl. Naturwissenschaftlichen Instituten in Sofia-Bulgarien 14: 171-237. [in Bulgarian].
- Cogălniceanu D., Aioanei F., Bogdan M. (2000): Amphibians from Romania. Determination keys. Editura Ars Docendi, Bucharest. [in Romanian].
- Covaciu-Marcov, S.D., Ghira, I., Cicort-Lucaciu, A.S., Sas, I., Strugariu, A., Bogdan, H.V. (2006): Contributions to knowledge regarding the geographical distribution of the herpetofauna of Dobrudja, Romania. North-Western Journal of Zoology 2 (2): 88-125.
- Dzukic, G., Beskov, V., Sidorovska, V., Cogălniceanu, D., Kalezic, M. (2008): Contemporary chorology of the spadefoot toads (*Pelobates* spp.) in the Balkan Peninsula. Zeitschrift für Feldherpetologie 15: 61-78.
- Fuhn, I. (1960): The fauna of the People's Republic of Romania. Vol. XIV, Fascicola I, Amphibia. Editura Academiei R.P.R., Bucharest. [in Romanian].
- Iftime, A. (2005): Amphibians. pp.197-214. In: Botnariuc, N. & Tatole, V. (eds.) The Romanian Red Data Book of Vertebrates. Editura Academiei Române, Bucharest. [in Romanian].
- Iftime, A., Iftime, O., (2007): Some records of the herpetofauna of the Danube floodplains in the Balta Ialomitei area (Romania). Travaux du Museum National d'Histoire Naturelle „Grigore Antipa” 50: 273-281.
- Ivanov, B. (1994): Shabla Complex - Durankulak Lake. In: Michev, T. (ed). National plan for priority conservation actions for wetlands in Bulgaria. Bulvest 2000 Publishing House, Sofia. [in Bulgarian].
- IUCN (2008): 2008 IUCN Red List of Threatened Species. <www.iucnredlist.org>. accessed at 20 February 2009.
- Kalezic, M. L., Dzukic, G., Stamenkovic, A.M., Crnobrnja J. (1990): Morphometrics of the crested newt (*Triturus cristatus* complex) from Yugoslavia: Relevance for taxonomy. Arhiv bioloških nauka, Beograd 42: 17-37.
- Kotchev, H., Kovatchev, S., Uzunov, J. (1983): The biological characteristics of Lake Durankulak and some problems of its protection. Proceedings III National Conference of Botany, Sofia, Bulgaria.
- Litvinchuk, S.N. (2005): A record of the Danube newt, *Triturus dobrogicus*, from the Dnepr river delta (Ukraine). Russian Journal of Herpetology 12 (1): 69-72.
- Litvinchuk, S.N., Borkin, L.J. (2000): Intraspecific taxonomy and nomenclature of the Danube crested newt, *Triturus dobrogicus*. Amphibia-Reptilia 21: 419-430.
- Strugariu, Al., Gherghel, I. (2008): A preliminary report on the composition and distribution of the herpetofauna from the Lower Prut River Basin (Romania) North-Western Journal of Zoology 4 (Suppl. 1): S49-S69.
- Trayanov, R., Filipova, D. (2005): Fauna of "Zlatni Pyasatsi" Natural Park (amphibians, reptiles and mammals). NUG & PP "Zlatni Pyasatsi", Varna. [In Bulgarian].
- Wallis, G.P., Amtzen, J.W. (1989): Mitochondrial DNA variation in the Crested Newt superspecies: limited cytoplasmic gene flow among species. Evolution 43: 88-104.

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