

Re-evaluation of a little-known *Neurergus crocatus* population from Başaran (Şırnak, Türkiye): insights on morphology and oviposition

(Caudata, Salamandridae)

İhsan Ekin

Ekin, İ. 2025. Re-evaluation of a little-known *Neurergus crocatus* population from Başaran (Şırnak, Türkiye): insights on morphology and oviposition (Caudata, Salamandridae). Spixiana 48(1): 117–121.

A population of *Neurergus crocatus* Cope, 1862 from Başaran village (Şırnak, Türkiye), originally reported in 2009 and not studied further since, was re-evaluated during fieldwork conducted in May 2025, providing the first data on oviposition and detailed morphology from this locality. Morphometric analysis revealed pronounced sexual size dimorphism, with females (mean total length: 156.8 mm) being larger than males (140.7 mm). Sexual dichromatism and cloacal dimorphism were consistent with previous descriptions of the species. Oviposition was documented, with eggs deposited in adhesive gelatinous capsules beneath submerged substrates. Despite its Vulnerable status on the IUCN Red List, *N. crocatus* remains poorly studied.

İhsan Ekin, Department of Energy Systems Engineering, Faculty of Engineering, Şırnak University, Şırnak, Türkiye; e-mail: ekinihsan@gmail.com

Introduction

The genus *Neurergus* Cope, 1862 includes five species with small distribution ranges endemic to the Zagros Mountains of western Iran, northern Iraq, and southeastern Türkiye, within the Irano-Anatolian biodiversity hotspot (Raoof et al. 2016, Myers et al. 2000, Niknaddaf et al. 2023). These are *Neurergus kaiseri*, *N. derjugini*, *N. strauchii*, *N. barani*, and *N. crocatus* (yellow-spotted or Lake Urmia newt). *N. crocatus* is listed as Vulnerable on the IUCN Red List under the criterion B2ab(iii), due to ongoing habitat loss and fragmented distribution (Elnaz & Kaya 2013). This study revisits a population of *N. crocatus* from Başaran village (Şırnak, Türkiye), originally discovered and reported in 2009 but not studied further until now, providing updated morphological measurements, evidence of sexual dimorphism, and oviposition data. These findings confirm already known ecological and reproductive characteristics of *N. crocatus* and provide updated data from a geographically isolated, previously un-

derstudied population in Başaran, Şırnak, south of the nearest known population near Ayvalık village, strengthening the basis for targeted conservation efforts. These findings help filling current knowledge gaps and support conservation efforts in a geopolitically restricted region.

Results

Fieldwork was conducted between 16–20 May 2025 in a freshwater stream in Başaran village (Şırnak, Türkiye) at 1202 m a.s.l. (37°28'39"N, 43°08'18"E). During the investigation the water temperature was 13°C. A total of 17 adult *Neurergus crocatus* individuals (9 females, 8 males) were hand-collected during daytime surveys. Standard morphometric data were obtained using a digital caliper (Insize 1103–150, ±0.02 mm; Insize, Brazil LTDA), and body and egg mass was measured with an analytical balance (Radwag AS 220/C/2; Radwag, Poland). External morphology and egg characteristics were docu-

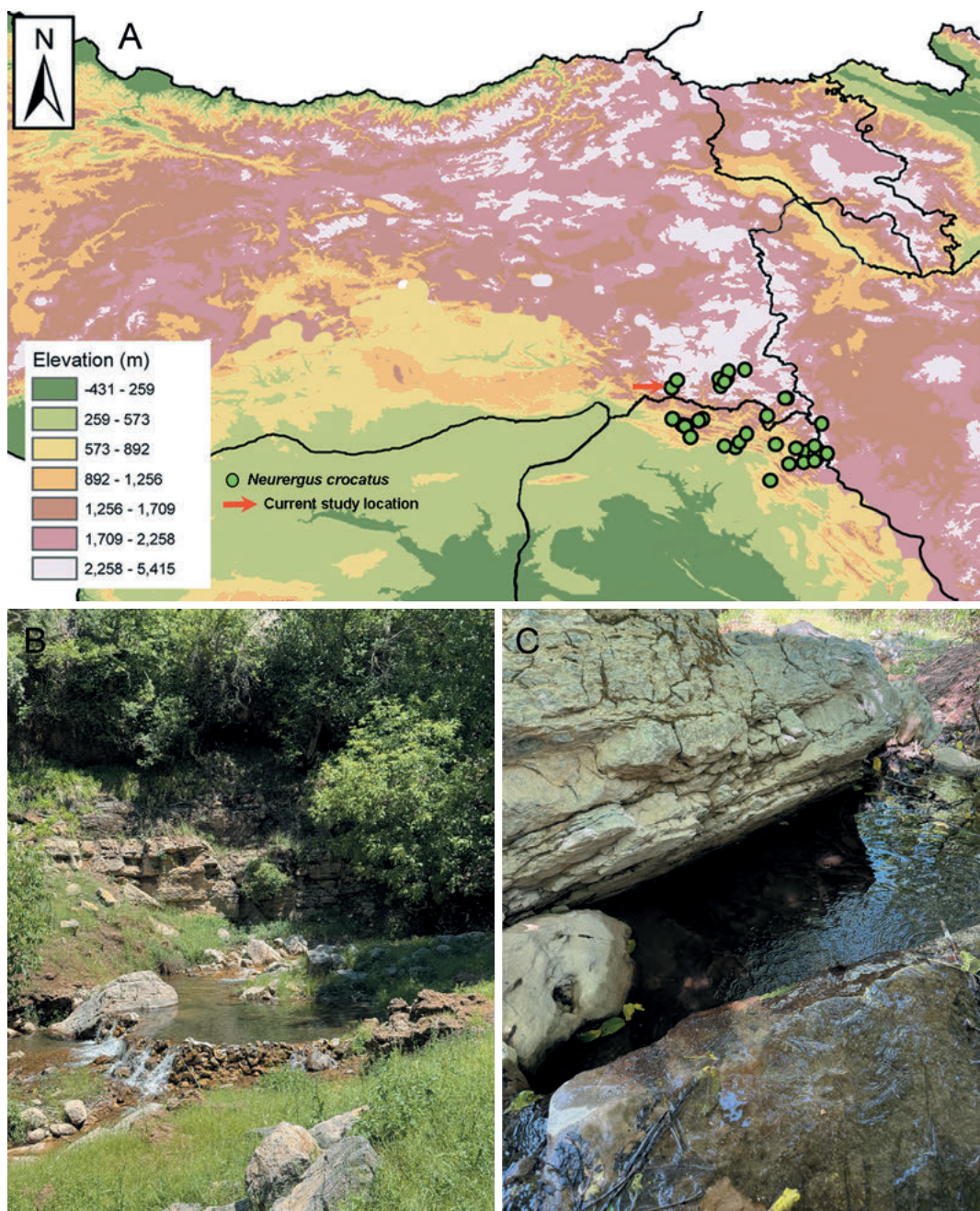
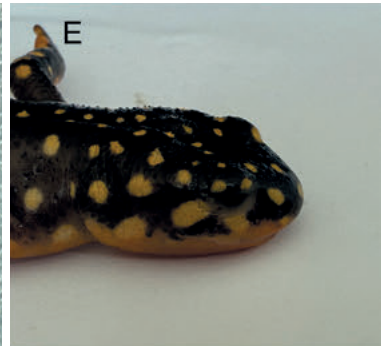
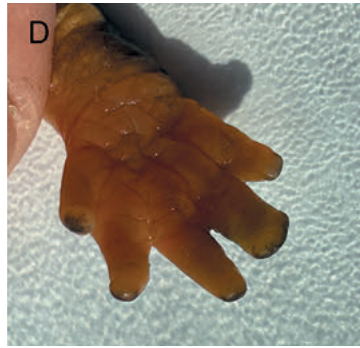
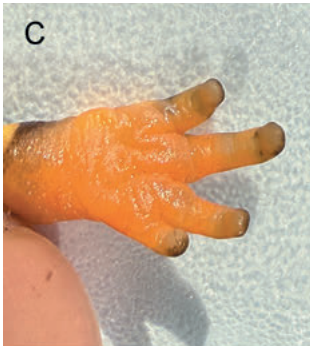
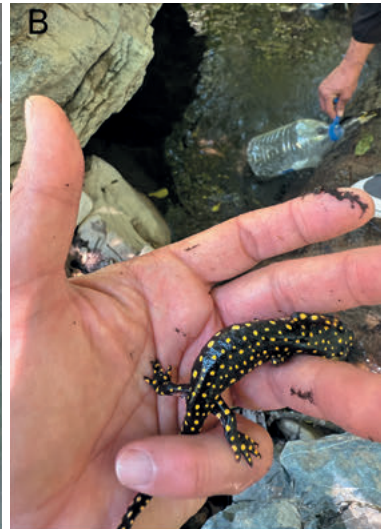


Fig. 1. A. Distribution of *Neurergus crocatus* in southeastern Türkiye, western Iran, and northern Iraq; red arrow marks the Başaran village population studied (map modified from Niknaddaf et al. 2023). B–C. Habitat at Başaran locality.

Fig. 2. A. *Neurergus crocatus* in natural habitat. B. A specimen held for scale. C. Forelimb with four digits. D. Hindlimb with five digits. E. Head close-up. F. Female during oviposition (ventral view). G. Eggs in gelatinous capsules.



mented photographically using a Jiusion Wi-Fi USB Digital Microscope (50× – 1000×, Jiusion Technology Ltd., China) and an iPhone 16 Pro under macro and natural light conditions.

The examined *N. crocatus* individuals exhibited the species' characteristic coloration and morphology. The dorsal surface was black with irregular yellow spotting extending across the tail and limbs (Fig. 2A–B), while the ventral surface appeared bright orange in females and slightly paler in males (Fig. 2F). Limbs were robust, with four digits on the forelimbs and five on the hind limbs (Fig. 2C–D), consistent with genus-specific traits. Sexual dimorphism was evident in morphometric traits; detailed measurements, including egg characteristics, are summarized in Table 1. Oviposition was observed, with eggs deposited in clusters attached to submerged substrates along the stream margins (Fig. 2F). Each egg was enclosed in a transparent gelatinous capsule exhibiting pigmentation ranging from pale green to light brown (Fig. 2G). The gelatinous matrix was adhesive and cohesive, maintaining the structural integrity of the egg masses.

Discussion

Neurergus crocatus is distributed in southeastern Türkiye, western Iran, and northern Iraq, but biological data and precise distribution records remain limited due to geopolitical challenges and difficult

terrain (Özdemir et al. 2009, Niknaddaf et al. 2023). In Türkiye, the species has been reliably documented only in mid- and high-altitude freshwater habitats of Şırnak and Hakkâri provinces (Özdemir et al. 2009, Schneider & Schneider 2010, Uğurtaş et al. 2015). The Başaran population inhabits a spring-fed stream with rocky substrates, dense riparian vegetation, and shaded pools, consistent with known breeding habitats of the species (Steinfartz 1995). Field observations revealed seasonal grazing activities and temporary animal shelters nearby. Three dead newts showed injuries probably consistent with trampling by livestock.

Morphological traits and oviposition behaviour align with previous descriptions from Iraq and Iran (Al-Sheikhly et al. 2013, Niknaddaf et al. 2023). Sexual dichromatism was evident, with males exhibiting distinct white spots on the tail and females showing scattered yellowish spots on the body, while sex was determined based on cloacal morphology during the breeding season (Schneider & Schneider 2010, Üzümlü et al. 2011).

Acknowledgements

I sincerely thank the residents of Başaran village – Mehmet Gökçe, Sezgin Gökçe, and Şaban Ali Gökçe – for their valuable assistance during the fieldwork, particularly for their help in accessing the collection locality and collecting specimens.

Table 1. Morphometric measurements of *Neurergus crocatus* and egg characteristics. Values are presented as mean ± standard deviation (SD) for males (n=8), females (n=9), and eggs (n=20).

Characteristics	Female	Male	Egg
Total body length (mm)	156.8±2.6	140.7±2.3	
Body length (snout–vent) (mm)	74.6±1.2	65.6±1.8	
Tail length (mm)	81.5±1.6	73.4±2.6	
Head length (mm)	18.4±0.9	16.9±0.2	
Head width (mm)	15.5±0.3	13.1±0.2	
Forelimb length (mm)	25.2±0.7	23.8±0.4	
Hindlimb length (mm)	27.3±0.9	25.4±0.3	
Interlimb distance (mm)	39.7±0.3	33.8±0.7	
Inter-nostril distance (mm)	4.6±0.1	4.2±0.1	
Inter-orbital distance (mm)	8.3±0.3	7.9±0.1	
Eye width (mm)	5.4±0.2	5.0±0.1	
Total body weight (g)	17.2±2.1	15.4±2.0	
Egg diameter (mm)			2.4±0.2
Egg weight (g)			0.011±0.001
Gelatinous egg capsule weight (g)			0.22±0.03

References

- Al-Sheikhly, O. F., Nader, I. A., Rastegar-Pouyani, N. & Browne, R. K. 2013. New localities of the Kurdistan newt *Neurergus microspilotus* and Lake Urmia newt *Neurergus crocatus* (Caudata: Salamandridae) in Iraq. *Amphibian & Reptile Conservation* 6(4): 42–49.
- Elnaz, N. M. & Kaya, U. 2013. Rediscovery of the Lake Urmia newt, *Neurergus crocatus* Cope, 1862 (Caudata: Salamandridae) in northwestern Iran after 150 years. *Amphibian & Reptile Conservation* 6(4): 36–41.
- Myers, N., Mittermeier, R. A., Mittermeier, C. G., da Fonseca, G. A. B. & Kent, J. 2000. Biodiversity hot-spots for conservation priorities. *Nature* 403(6772): 853–858.
- Niknaddaf, Z., Hemami, M. R., Pourmanafi, S. & Ahmadi, M. 2023. An integrative climate and land cover change detection unveils extensive range contraction in mountain newts. *Global Ecology and Conservation* 48: e02739.
- Özdemir, N., Üzümlü, N., Avci, A. & Olgun, K. 2009. Phylogeny of *Neurergus crocatus* and *Neurergus strauchii* in Turkey based on morphological and molecular data. *Herpetologica* 65(3): 280–291.
- Raoof, E. Y., Kheder, N. K. & Saeed, A. Y. 2016. Spatial-temporal variation in algal community in freshwater springs inhabited by aquatic salamander *Neurergus crocatus*. *Jordan Journal of Biological Sciences* 9(1): 53–61.
- Schneider, C. & Schneider, W. 2010. Fieldnotes on the ecology and distribution of *Neurergus crocatus* Cope, 1862 and *Neurergus strauchii strauchii* (Steindachner, 1887) in Turkey. *Herpetozoa* 23(1/2): 59–69.
- Steinfartz, S. 1995. Zur Fortpflanzungsbiologie von *Neurergus crocatus* und *Neurergus strauchii barani*. *Salamandra* 31(1): 15–32.
- Uğurtaş, İ. H., Sevinç, M., Akkaya, A. & Ilgaz, Ç. 2015. A new locality record of *Neurergus crocatus* Cope, 1862 (Amphibia: Salamandridae) in Eastern Anatolia, Turkey. *Russian Journal of Herpetology* 22(2): Article 2.
- Üzümlü, N., Avci, A., Özdemir, N., Ilgaz, Ç. & Olgun, K. 2011. Body size and age structure of a breeding population portion of the Urmia salamander, *Neurergus crocatus* Cope, 1862 (Caudata: Salamandridae). *Italian Journal of Zoology* 78(2): 209–214.