

Presumptive unilateral anophthalmia recorded in *Coronella austriaca* Laurenti, 1768

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Different kinds of morphological anomalies were recorded in snakes, most of them in captive-bred individuals (Mulder, 1995). According to this author, the main cause of anomalies seemed to be wrong incubation temperature conditions during embryo development. However, little is known about variety of anomalies from snakes born in the wild probably due to their high mortality rate during early life (Mulder, 1995). Smooth snake, *Coronella austriaca* Laurenti, 1768, is a small, viviparous, nonvenomous colubrid snake occurring in the most of Europe and some parts of Asia (Arnold and Ovenden, 2002). It lives in heathlands, hedgerows, wood-edges, open woods and bushy and rocky slopes (Arnold and Ovenden, 2002). Except several types of colour anomalies (see Lauš and Burić, 2012), no other anomalies or deformities have been recorded so far in this species.

On 30 May 2014, we found one juvenile specimen of *C. austriaca* (total length 180 mm, one year old) in Šúr Nature Reserve near Bratislava in south-western Slovakia (48.22845°N, 17.20679°E, WGS 84, 134 m a. s. l.). The animal was found at 8:10 a.m. (local time) under an old wooden board on the edge of the deciduous forest. The snake was in bad condition, slow and moved uncoordinatedly. The animal was missing its right eye, while the left eye was normally developed (Fig. 1A, B). The abnormality appeared to be congenital with normally pigmented skin covering the orbit. There was no evidence of eye injury (Fig. 1A). Several other

specimens of *C. austriaca* and other snake species (*Natrix natrix*, *N. tessellata*, *Zamenis longissimus*) have been previously found on the same locality, but all were without ocular anomaly or other deformities (pers. observation). According to our best knowledge, this is the first report of presumptive unilateral anophthalmia observed in *C. austriaca* in nature.

As for reptiles, several kinds of ocular abnormalities are known: microphthalmia, cystic globe, cyclopia/synophthalmia, coloboma or aphakia (Sabater and Pérez, 2013), but their etiology is difficult to explain (Da Silva et al., 2015). Anophthalmia, either unilateral or bilateral, is defined as the congenital total absence of ocular tissue and results from a failure of the primary optic vesicle to develop or from a complete regression of the optic vesicle (Millichamp, Jacobson and Wolf, 1983; Grahn and Peiffer, 2007). The position of affected eye may differ from individual to individual (Da Silva et al., 2015).

Several cases of presumptive anophthalmia have been reported in different snake species (e.g. *Epicrates cenchria*, *Pituophis melanoleucus*, *Python bivittatus*, *P. regius*, *Vipera ammodytes*, *Z. longissimus*; see Heimes, 1994; Sabater and Pérez, 2013; Da Silva et al. 2015). Similarly, congenital malformations such as short upper jaw, dicephalism, cleft palate, eye defects are relatively common in snakes, especially in captive-bred individuals (Bellairs, 1981; Wallach, 2007). These deformities have been attributed to infections, exposure to chemicals, UV radiations, mutations or developmental errors (e.g. Khan and Law, 2005; Bell, Spotila and Congdon, 2006). Genetic factors also play an important role in abnormalities observed in reptiles (Velo-Antón, Becker and Cordero-Rivera, 2011). However we cannot know, genetics or environmental factors could both be plausible causes behind observed anophthalmia in *C. austriaca* found.

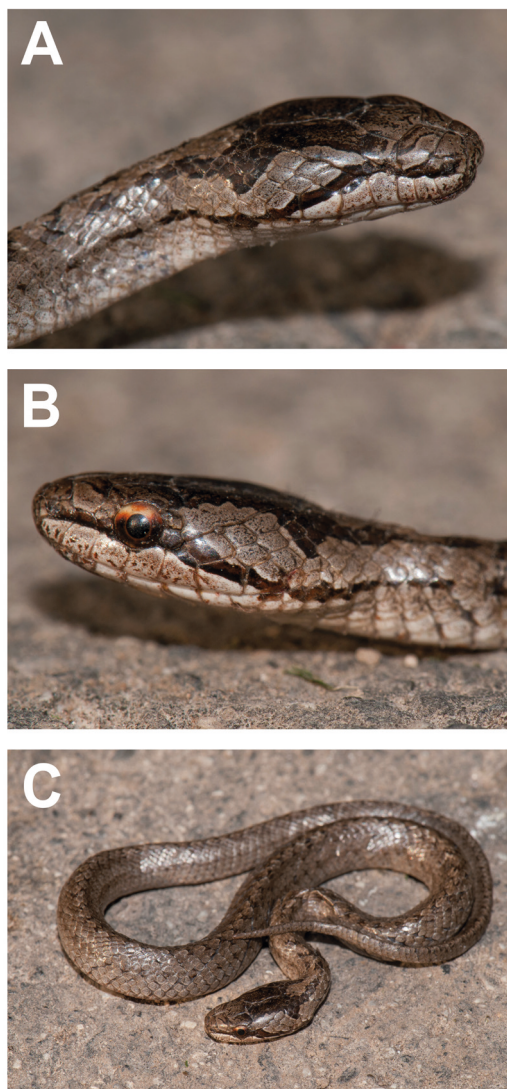


Figure 1. Individual of *Coronella austriaca* with recorded malformation. A – Right side of the head with unilateral anophthalmia; B – left side of the head without malformations; C – overall view on the individual.

References

- Arnold, N., Ovenden, D. (2002): A field guide to the reptiles and amphibians of Britain and Europe, 2nd Edition. London, UK, HarperCollins Publishers.
- Bell, B., Spotila, J.R., Congdon, J. (2006): High incidence of deformity in aquatic turtles in the John Heinz National Wildlife Refuge. *Environmental Pollution* **142**: 457-465.

- Bellairs, A.d'A. (1981): Congenital and developmental diseases. In: *Diseases of the Reptilia*. Cooper, J., Jackson, O.F., Eds., London, UK, Academic press.
- Da Silva, M-A.O., Bertelsen, M.F., Wang, T., Pedersen, M. Lauridsen, H., Heegaard, S. (2015): Unilateral microphthalmia or anophthalmia in eight pythons (*Pythonidae*). *Veterinary Ophthalmology* **18**: 23-29
- Grahn, B.H., Peiffer, R.L. (2007). Fundamentals of veterinary ophthalmic pathology. In: *Veterinary ophthalmology*, p. 355-437. Gelatt, K.N., Ed., Ames, Iowa, USA, Blackwell Publishing.
- Heimes, P. 1994. Morphologische Anomalien bei Äskulapnattern (*Elaphe longissima*) im Rheingau-Taunus. *Salamandra* **30**: 268-271.
- Khan, Z.M., Law, F.C.P. 2005. Adverse effects of pesticides and related chemicals on enzyme and hormone systems of fish, amphibians and reptiles: a review. *Proceedings of the Pakistan Academy of Sciences* **42**: 315-323.
- Lauš, B., Burić, I. (2012): Colour abnormalities in *Coronella austriaca* (Laurenti, 1768) in Croatia. *Hyla* **2**: 43-44.
- Millichamp, N.J., Jacobson, E.R., Wolf, E.D. (1983): Diseases of the eye and ocular adnexae in reptiles. *Journal of the American Veterinary Medical Association* **183**: 1205-1212.
- Mulder, J. (1995): Congenital anomalies in morphology and colour in captive-bred vipers (Reptilia, Serpentes, Viperidae). *Deinsea* **2**: 41-50.
- Sabater, M., Pérez, M. (2013): Congenital ocular and adnexal disorders in reptiles. *Veterinary Ophthalmology* **16**: 47-55.
- Velo-Antón, G., Becker, C.G., Cordero-Rivera, A. (2011). Turtle carapace anomalies: The roles of genetic diversity and environment. *PloS One* **6**: e18714.
- Wallach, V. (2007): Axial bifurcation and duplication in snakes. Part I. A synopsis of authentic and anecdotal cases. *Bulletin of the Maryland Herpetological Society* **43**: 57-95.

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