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Tail bifurcation in two species of *Desmognathus* salamander (Caudata: Plethodontidae) in south-eastern Kentucky, USA

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For centuries, amphibian malformations have been documented globally and in veritable detail (Vallisneri, 1706; Bourne, 1884; Ouellet, 2000; Haas et al., 2018), particularly in anurans (Lannoo, 2008). Although, rarely have malformations been documented in caudates (for a review of the literature, see Henle et al., 2012), primarily manifesting as post-larval tail malformations (i.e. bifurcation and duplication). Furthermore, among the caudate families in which malformations have been reported, the Plethodontidae - the largest caudate family - has been apparently underrepresented, with only three of the > 470 species documented to exhibit malformations (Henle et al., 2012; Hartzell, 2017). Previously, tail bifurcation within the genus *Desmognathus* (Caudata: Plethodontidae) has only been reported in *D. fuscus* (Rafinesque, 1820) (Hartzell, 2017). We report here tail bifurcation in natural populations of *D. ochrophaeus* Cope 1859 and *D. monticola* Dunn 1916. To our knowledge, these observations represent the first reports of tail bifurcation in either species.

On 7 June 2017, a post-larval *D. ochrophaeus* exhibiting tail bifurcation (Fig. 1a) was observed in a headwater stream that originates and flows through an old-growth forest. The bifurcation occurred at approximately ¼ length of the tail from the cloaca. On 19 May 2018, an additional post-larval tail bifurcation was observed in *D. monticola* (Fig. 1b). This bifurcation appeared similar to the malformation previously observed in *D. ochrophaeus*, occurring at approximately ¼ to ⅓ length of the tail from the cloaca. Both salamanders were hand-captured in the riparian area of a small, forested headwater stream (37.078398° N, -82.994013° W, WGS 84, 355 m elev.) at Lilley Cornett Woods Appalachian Ecological Research Station (Letcher Co., Kentucky, U.S.A.).

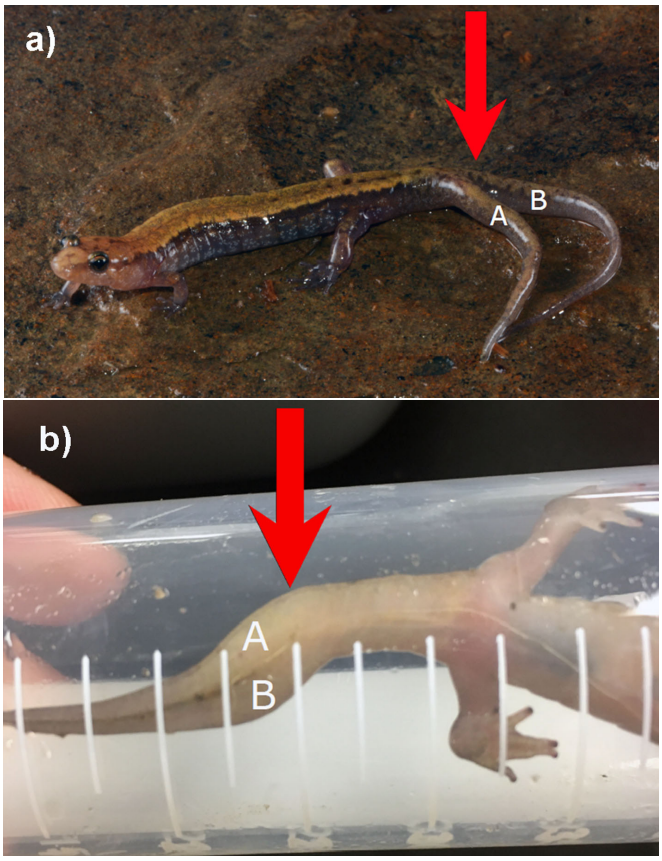

Figure 1. Tail bifurcation in two species of salamander captured in a headwater stream at Lilley Cornett Woods Appalachian Ecological Research Station in Letcher County, Kentucky, U.S.A. **a)** Dorsal view of the tail of an adult *D. ochrophaeus*, and **b)** ventral view of the tail of an adult *D. monticola* to show tail bifurcation. Red arrows indicate the point of bifurcation. Beyond point of bifurcation, individual tail segments are labelled 'A' and 'B'.

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REFERENCES

Bourne, A.G. (1884). On certain abnormalities in the common frog (*Rana temporaria*). *Quarterly Journal of Microscopical Science* 2: 83–88.

Haas, S.E., Reeves, M.K., Pinkney, A.E. & Johnson, P.T.J. (2018). Continental-extent patterns in amphibian malformations linked to parasites, chemical contaminants, and their

interactions. *Global Change Biology* 24: e275–e288.
Hartzell, S.M. (2017). Tail bifurcation in a Northern dusky salamander, *Desmognathus fuscus* (Caudata: Plethodontidae). *Herpetology Notes* 10: 181–182.
Henle, K., Mester, B., Lengyel, S. & Puky, M. (2012). A review of a rare type of anomaly in amphibians, tail duplication and bifurcation, with description of three new cases in European species (*Triturus dobrogicus*, *Triturus carnifex*, and *Hyla arborea*). *Journal of Herpetology* 46: 451–455.
Lannoo, M. (2008). *Malformed Frogs: the Collapse of Aquatic Ecosystems*. University of California Press, West Sussex, U.K.
Ouellet, M. (2000). Amphibian deformities: Current state of knowledge. In *Ecotoxicology of Amphibians and Reptiles*, pp. 617–646. Sparling, D., Linder, G. & Bishop, C. (Eds.). Pesacola, FL: SETAC Press.
Vallisneri, V.L. (1706). Galleria di Minerva Overo Notizie Universali di Quanto e Stato Scritto da Letterati di Europa. Volume 3. Venice.

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