| SPIXIANA | 43 | 1 | 175–176 | München, Oktober 2020 | ISSN 0341–8391 |
|---|---|---|---|---|---|

**Scientific note**

# Axanthism in *Salamandra salamandra* (Linnaeus, 1758)

**(Amphibia, Salamandridae)**

**Nahla Lucchini & Cristian Pizzigalli**

Axanthism represents a rarely observed chromatic aberration in amphibians. The discovery of amphibian individuals with abnormal pigmentation provides interesting insights on intraspecific phenotypic variability as well as on variation among populations inhabiting different habitats. Here we report on the first well documented case of axanthism in *Salamandra salamandra*.

Coloration in amphibians, as well as in other vertebrates, is linked to the presence of chromatophores that mostly contain coloured pigments. Six types of chromatophores, with the respective colorations, are known in amphibians skin: xanthophores (yellow), erythrophores (red), iridophores (reflective/iridescent), leucophores (white), melanophores (black/brown), and cyanophores (blue) (Bagnara et al. 1978, Duellman & Trueb 1994, Rivera et al. 2001, Rudh & Qvarnström 2013). Skin of axanthic animals lacks xanthophores, erythrophores, and iridophores, which normally produce yellow, red and iridescent pigmentation or crystals, respectively (Rudh & Qvarnström 2013, Jablonski et al. 2014). As a result, a subject could present blue, light grey or dark coloration (and dark eyes), depending on which pigment its skin is lacking (Martínez-Silvestre & Montori 2016). Colour aberrations of albinism, melanism and leucism are commonly reported in amphibians while axanthism is rarely observed (Dubois 1979, Bechtel 1995, Rivera et al. 2001, Jablonski et al. 2014). Cases of axanthism in amphibians have been described already from the Iberian Peninsula for *Lissotriton helveticus* (Razoumovsky, 1789), *Alytes obstetricans* (Laurenti, 1768), *Epidalea calamita* (Laurenti, 1768), *Hyla molleri* Bedriaga, 1890, *H. meridionalis* Boettger, 1874 and *Pelophylax perezi* (Beebee & Griffiths 2000, Rivera et al. 2001, Jablonski et al. 2014, Martínez-Silvestre & Montori 2016). The fire salamander, *Salamandra salamandra* (Linnaeus, 1758), shows a high intraspecific phenotypic variation that, together with the general black background coloration, has resulted in a number of subspecies traditionally described based on the extension and pattern of yellow, red and/or grey spots (see *S. s. gigliolii* and *S. s. gallaica*; Eiselt & Lanza 1956, Seoane 1884).

Here we report a case of a male *Salamandra salamandra gallaica* showing an unusual coloration for the species (Fig. 1). The animal has been found during visual encounter surveys on the night of 15th October 2018 (9:03 pm) in an eucalyptus forest in the surroundings of Mindelo; air temperature and humidity recorded were

**Fig. 1.** Adult male of fire salamander (*Salamandra salamandra gallaica*) displaying an axanthic coloration.

Nahla Lucchini, Department of Biological, Geological and Environmental Sciences, University of Bologna, Bologna, Italy; e-mail: lucchini.nahla@gmail.com

Cristian Pizzigalli (corresponding author; the authors contribute equally), CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto, Portugal; e-mail: pizzigalli.cristian@gmail.com

about 18 °C and 80 %. The specimen presented a black background coloration with grey and pinkish patches, most likely due to a partial or total lack of carotenoids and pterines. From the available bibliography, this seems to be the first reported case of axanthism in *Salamandra salamandra gallaica* and the second one in *Salamandra salamandra* (see Rivera et al. 1993), although the latter does not provide a well explicative picture.

The axanthic individual was the only one observed among 190 other individuals of *S. s. gallaica* with normal phenotype. The individual has been released after photographed.

**Acknowledgements.** We are grateful to Guillermo Velo-Antón and Miguel Angel Carretero for the helpful comments and suggestions and for reviewing an earlier version of this manuscript.

## References

Bagnara, T., Frost, S. K. & Matsumoto, J. 1978. On the development of pigment patterns in amphibians. American Zoologist 18: 301–312.

Bechtel, H. B. 1995. Reptile and amphibian variants. Colors, patterns and scales. 224 pp., Malabar, Florida (Krieger Publishing Company).

Beebee, T. J. C. & Griffiths, R. A. 2000. Amphibians and reptiles. A natural history of the British herpetofauna. The New Naturalist Library, London (Harper Collins).

Dubois, A. 1979. Anomalies and mutations in natural populations of the *Rana esculenta* complex (Amphibia, Anura). Mitteilung aus dem Zoologischen Museum Berlin 55: 59–87.

Duellman, W. E. & Trueb, L. 1994. Biology of amphibians. 670 pp., Baltimore, MD (Johns Hopkins University Press).

Eiselt, J. & Lanza, B. 1956. *Salamandra salamandra gigliolii* subspec. nov. aus Italien. Abhandlungen und Berichte für Naturkunde und Vorgeschichte (Magdeburg) 10: 3–11.

Jablonski, D., Alena, A., Vlček, P. & Jandzik, D. 2014. Axanthism in amphibians: a review and the first record in the widespread toad of the *Bufotes viridis* complex (Anura: Bufonidae). Belgian Journal of Zoology 144: 93–101.

Martínez-Silvestre, A. & Montori, A. 2016. Axantismo en *Pelophylax perezi*: nuevas citas en Catalunya. Boletín de la Asociación Herpetológica Española 27: 61–63.

Rivera, J., Vilagrosa, A. & Arribas, O. 1993. El albinismo y otros fenómenos aberrantes en los anfibios ibéricos. Aquamar 53: 16–19.

Rivera, X., Arribas, O. & Martí, F. 2001. Revisión de anomalias pigmentarias en los anfibios de la Península Ibérica y de Europa. Butlletí de la Societat Catalana d'Herpetologia 15: 59–75.

Rudh, A. & Qvarnström, A. 2013. Adaptive colouration in amphibians. Seminars in Cell & Developmental Biology 21: 553–561.

Seoane, V. L. 1884. Identidad de *Lacerta schreiberi* (Bedriaga) y *Lacerta viridis* var. *gadovii* (Boulenger): e investigaciones herpetologicas de Galicia. 19 pp., La Coruña.