

A case of xanthochromism in the common frog (*Rana temporaria*)

STEVEN J. R. ALLAIN* & MARK J. GOODMAN

Cambridgeshire and Peterborough Amphibian and Reptile Group

*Corresponding author Email: steveallain@live.co.uk

Xanthochromism is a condition that is characterised by the lack of skin pigments except brown, orange and yellow (xanthophores, Mitchell, 1994). Xanthochromism, a form of amelanism, has been reported in all vertebrate classes with the most notable examples in wild animals include those in birds (Isted, 1985) and in fish (Schwartz, 1978). Chromatophores are responsible for producing the skin colour primarily in ectothermic animals; these specialised cells can be grouped based on the colour they reflect under white light. There are other groups of chromatophores which help to produce various colouration including erythrophores, leucophores and melanophores (Bagnara et al., 1968). The causes for xanthochromism and other abnormalities are rare and may be caused by environmental conditions as well as mutations (Jablonski et al., 2014).

During a routine survey at a man-made inlet in Chesterton, Cambridge, UK (TL 4647 5957) on 06 March 2014, we came across a xanthochromatic male common frog (*Rana temporaria*). At first, the frog (Fig. 1) returned a red eye shine from torchlight, so we believed the individual to be an albino. On closer inspection, the frog indeed had red eyes but he was yellow in colour. Over the course of a few evenings over April and May that year, the same individual was spotted twice more. On the first occasion the frog was in amplexus with a female. On the second occasion, we were able to capture the individual for closer inspection. The male's nuptial pads were noticeably lighter in colour than usual with a brown hue. The same individual was seen again at the site in April 2015 but was not seen during 2016.

Albinism and melanism have previously been reported in *R. temporaria* (Smallcombe 1949; Alho et al., 2010), however xanthochromism has yet to be reported. The opposite pigmentation abnormality to xanthochromism is axanthism, which is a domination of cyanophores giving the individuals that suffer from it an overall blue colour. This pigmentation abnormality is more common in frogs found in the USA compared to Europe (Berns & Uhler, 1966). Axanthism is yet to be reported in *R. temporaria* but it has been reported in the closely related *Pelophylax esculentus* and *P. lessonae* (Jablonski et al., 2014).

Williams (1959) describes a male common frog from Sanderstead, Surrey much like the one which we observed, although Williams refers to it as an albino. We believe that Williams (1959) misidentified the skin condition his frog



Figure 1. The xanthochromatic male common frog (*R. temporaria*) on our first encounter

was suffering from as it is most likely his frog was actually xanthochromic and not a true albino. This is due to the yellow hue and the brown nuptial pads the frog is described as having – which is an almost identical description of the male discovered on our surveys. Unfortunately the level of detail given in the original report is limited, but through our own experience we believe that Williams (1959) is the first record of a wild xanthochromic *R. temporaria* in the UK.

REFERENCES

- Alho, J. S., Herczeg, G., Söderman, F., Laurila, A., Jönsson, K. I., & Merilä, J. (2010). Increasing melanism along a latitudinal gradient in a widespread amphibian: local adaptation, ontogenic or environmental plasticity? *BMC Evolutionary Biology* 10: 317.
- Bagnara, J. T., Taylor, J. D., & Hadley, M. E. (1968). The dermal chromatophore unit. *The Journal of Cell Biology* 38: 67-79.
- Berns, M. W. & Uhler, L. D. (1966). Blue frogs of the genus *Rana*. *Herpetologica* 22: 181-183.
- Isted, D. (1985). A xanthochroistic male Purple Finch. *Bulletin of the Oklahoma Ornithological Society* 18: 31.

- Jablonski, D., Alena, A., Vlcek, P., & Jandzik, D. (2014). Axanthism in amphibians: A review and the first record in the widespread toad of the *Bufo viridis* complex (Anura: Bufonidae). *Belgian Journal of Zoology* 144: 93-101.
- Mitchell, J. C. (1994). An unusually colored northern water snake (*Nerodia sipedon sipedon*) from Giles County, Virginia. *Banisteria* 4: 32-33.
- Modesti, A., Aguzzi, S., & Manenti, R. (2011). A case of complete albinism in *Lissotriton vulgaris meridionalis*. *Herpetology Notes* 4: 395-396.
- Schwartz, F. J. (1978). Xanthochromism in *Epinephelus drummondhayi* (Pisces: Serranidae) caught off North Carolina. *Northeast Gulf Science* 2: 62-64.
- Smallcombe, W. A. (1949). Albinism in *Rana temporaria*. *Journal of Genetics* 49: 286-290.
- Williams, G. E. (1959). An albino specimen of the common frog. *Nature* 183: 1408.

Accepted: 28 February 2017