

A unique case of albinism in *Rana temporaria parvipalmata* in Cantabria

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RESUMEN: Se describe un caso excepcional de albinismo en *Rana temporaria parvipalmata* para la comunidad autónoma de Cantabria. En primer lugar, se realiza una introducción al albinismo en anfibios. Los ojos del ejemplar –con el patrón de coloración típico– hacen que nos hallemos ante un caso único y nunca antes descrito para la especie a nivel global. Se compara con los casos de otros anuros con características similares descritos en Australia y Japón.

In this paper, a rare –and probably unique– case of albinism in an adult specimen of *Rana temporaria parvipalmata* is reported. It was discovered in the very center of the autonomous community of Cantabria. On December 12th 2014, an albino specimen of *R. temporaria parvipalmata* was found in the vicinity of Quintana de Toranzo, a small village within the municipality of Corvera de Toranzo, at an altitude of 510 masl and in a typical Atlantic countryside environment (43°14'6.59"N / 03°58'43.60"W). The frog was found underwater, lying still and semi-hidden at the bottom of an old water trough (Figure 1). The water body also contained some spawns of *R. temporaria parvipalmata* and numerous wintering larvae of *Alytes obstetricans obstetricans*. The discovery occurred in the heart of the breeding season for *R. temporaria parvipalmata* at low and medium altitudes in the Atlantic slope of the Cantabrian Range (Álvarez, 2013; Á. Ruiz-Elizalde, personal observation). The specimen was captured, thoroughly examined, sexed and aged as an adult male in heat, given the remarkable robustness of its forelimbs and the presence of nuptial calluses on the inner

fingers of the hands. It was observed that its skin had a striking and uniform orange hue. Its eyes had the usual pattern and coloration for the species (Álvarez, 2013). However, in its left eye, the pupil presented some type of malformation (Figure 2b), since it appeared abnormally dilated in its upper part. After examination, several pictures of the specimen were taken (Figure 2) in order to put on photographic record the atypical orange coloration it presented. Finally, the anuran was duly released into the same water body where it was found.

Pigmentary anomalies are the disorders produced in the typical coloration of species. They are the consequence of various genetic mutations, which can affect the different pigments of the external tegument. These pigments, under the incidence of white light, reflect a particular color in external tissues and they are contained in a certain type of skin cells called chromatophores (Guiberteau *et al.*, 2012), which are responsible for skin and eyes coloration on amphibians and other ectothermic animals, such as reptiles, fish, crustaceans, cephalopods, etc. Up to six different types of chromato-



Figure 1: Atlantic countryside environment and old water trough where the adult albino specimen of *Rana temporaria* was found.

Figura 1: Entorno (o ambiente) de campiña atlántica y viejo abrevadero en el que fue localizado el individuo albino de *Rana temporaria*.

phores can be found in amphibians (Lunghi *et al.*, 2017), depending on the colors reflected by the pigments they contain: melanophores (black and brown), xanthophores (yellow), cyanophores (blue), erythrophores (red), iridophores (iridescent glitters), and leucophores (white).

Albinism, while still rare, is one of the most commonly recorded pigmentary anomalies in nature. It is characterized by the total absence (hypopigmentation) of melanin: a pigment contained in the melanophores and responsible for reflecting the dark tones (brown and black) on skin and eyes. *A priori*, every living being whose external tissues contain melanin is susceptible to al-

binism. Albinos are characterized by having reddish pupils and the pale coloration of their skin, which often looks pinkish because it reveals, through it, the color of blood as it passes through blood vessels (Rivera *et al.*, 2001). Occasionally, albino specimens may present other shades, such as yellowish or orange, due to xanthophores and erythrophores or iridescent golden glitters due to iridophores (Guiberteau *et al.*, 2012).

So far, various cases of albinism have been described –both in the Iberian Peninsula and in the rest of Europe– for several of the amphibian species present in Cantabria, such as *Chioglossa lusitanica* (Brame & Freytag, 1963), *Salamandra salamandra* (Arribas & Rivera, 1992;



Figure 2: Adult albino male of *Rana temporaria* with a striking uniform orange coloration on its skin and eyes with the usual coloration for the species. The pupil of the left eye appears abnormally dilated in its upper part (right).

Figura 2: Macho albino adulto de *Rana temporaria* con una llamativa coloración anaranjada de la piel y ojos con coloración normal para la especie. La pupila del ojo izquierdo parece anormalmente dilatada en la parte superior (derecha).

Benavides *et al.*, 2000), *Triturus marmoratus* (Budó, 1998), *Ichthyosaura alpestris* (Blu & Guesdon, 1993), *Lissotriton helveticus* (Freytag, 1956), *Alytes obstetricans* (Rivera *et al.*, 1991), *Bufo spinosus* (Rostand, 1955), *Epidalea calamita* (Beebe, 1983; Díaz-Paniagua *et al.*, 2005), *Hyla molleri* (Gosá & Arribas, 2017), *Rana iberica* (Alarcos *et al.*, 2006), *Pelophylax perezi* (Aguilar *et al.*, 2011; Jiménez-Cazalla, 2011), etc. In *R. temporaria*, cases of albinism in spawns, larvae, juveniles and adults are known (Mendel, 1990; Rivera *et al.*, 2001; Defranoux, 2012; Paterson, 2018).

It is not usual for a specimen such as the one in question to reach adulthood and reproductive status in the wild, since such a pigmentary anomaly implies, *a priori*, a greater vulnerability to its potential predators due to the lack of adequate crypsis, apart from other serious problems such as visual impairment or lack of vigor (Arribas, 1986). Initially, due to its striking orange coloration, it was hypothesised that the specimen could suffer from another pigmentary anomaly known as erythrism, which is characterized by a hyperpigmenta-

tion or supplementary pigmentation of the erythrophores (red), but retaining the usual pattern of coloration of the species (Rivera *et al.*, 2001). The hypothesis of erythrism was immediately discarded since the specimen did not show any of the typical pattern of coloration of *R. temporaria* on its skin (dark facial mask, dark transverse bars on the hind limbs, dark inverted “V” spots on the back, etc.). It was concluded that the frog presented a total absence of melanin (contained in the melanophores), but it did have other pigments that conferred that conspicuous orange coloration (contained in xanthophores or erythrophores). All this fitted perfectly with albinism and discarded leucism, the latter being characterized by the total absence of all skin pigments and by having dark or blue eyes (Rivera *et al.*, 2001). Nevertheless, the eyes of this specimen, apparently with the typical coloration for the species, make us face a case of rare, atypical, and probably unique albinism among those registered so far in *R. temporaria*. Although the presence of

golden glitters (iridophores) in the irises of the anuran fits perfectly with albinism, its dark pupils do not, since these should be reddish or orange in a typical case of albinism (see typical adult albinos of *R. temporaria* in Mendel, 1990 and Natural England, 2007). In principle, cases of albinism such as this one for *R. temporaria* are not known in the rest of its worldwide range or, at least, have not been found in the existing scientific literature. Nevertheless, similar cases of albinism have been documented in other species of Anura, some of them out of our biogeographic realm. For instance, in Kely & Maldonado (2013), an adult albino male of *Litoria raniformis* (Growling Grass Frog) found in Melbourne (Australia) is described, although it is erroneously listed as leucistic. It possessed certain characteristics very similar to that of our albino specimen of *R. temporaria parvipalmata*, with uniform orange coloration and nor-

mal eyes. Likewise, in Miura (2018), cases of albino specimens of *Pelophylax nigromaculatus* (Black-spotted Pond Frog) with normal-colored eyes are disclosed. In the latter, the author proposes that the melanin of eggs, skin, and eyes could be synthesized through three different pathways in some species of Japanese anurans. If this theory was globally confirmed, our atypical case of albinism in *R. temporaria parvipalmata* and, at the same time, those of the oriental frogs mentioned above could be explained.

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A report of complete albinism in an adult *Pleurodeles waltl* in the wild

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RESUMEN: El albinismo es una de las anomalías pigmentarias más documentadas en los anfibios, aunque en poblaciones naturales se da con poca frecuencia, posiblemente porque los animales con fenotipos albinos presentarían tasas de supervivencia menores que aquellos con fenotipo normal. En esta nota describimos una observación de una hembra adulta albina de gallipato (*Pleurodeles waltl*) en una charca temporal en la Comunidad de Madrid y aportamos documentación gráfica de este caso de albinismo completo.

The abundance and disposition of chromatophores in the amphibian epidermis generate a broad range of coloration patterns that can vary at the individual, population, and species level. Depending on the pigments involved and the composition of granules, chromatophores typically found in the amphibian skin are classified as melanophores (black), xanthophores (yellow), erythrophores

(red), cyanophores (blue), leucophores (white), and iridophores (iridescent reflections) (Duellman & Trueb, 1994; Rivera *et al.*, 2001). Different anomalies in amphibian pigmentation have been described, of which albinism is one of the most studied, characterized by a lack of melanin in the skin caused by alterations in the melanophore synthesis pathway. This anomaly can affect the whole body or, more