Leucistic neoteny in *Pleurodeles waltl*. First observation recorded in Spain

Àlex Torres-Riera1, Diego Martínez-Martínez2,3 & Aïda Tarragó3

1 Asociación Bio+. Avenida de America, 64, 7º B. 28028 Madrid. Spain. C.e.: alex@bio-mas.org

Fecha de aceptación: 8 de octubre de 2016.
Key words: neoteny, leucism, albinism, ribbed newt, Iberian ribbed newt.

RESUMEN: La presente nota da a conocer el primer caso documentado en la península ibérica de un ejemplar neoténico leucístico de *Pleurodeles waltl*. La descripción del ejemplar se acompaña de una breve revisión de las anomalías pigmentarias en esta especie y del concepto de las mismas.

In general, the coloration of animal species plays an important role in avoiding predators, obtaining food, sexual selection, inter- and intraspecies communication and, in the case of ectotherms, also in thermoregulation (Alaminos & López, 2011; Hinckley et al., 2015). Meanwhile, variations or anomalies in the pattern and the color of the species have been widely studied and the timely appearance of colorations and atypical patterns of some of them have been documented (García-Roa et al., 2015). Sometimes the misuse of certain scientific terms is implanted in society, leading to their use with no rigor. This is the case of albi-
Albinism, which has been stripped off its meaning and its use, has been generalized every time a living being presents a white coloration.

According to García-Morales et al. (2010), we should differentiate between albinism, dilution, squizocroism and leucism. Albinism is a rare genetically determined abnormality in wild animals, defined as the absence of melanin produced by a defect in its synthesis by the melanophores in the skin and hair (Diego-Rasilla & Luengo, 2007; Romero & Real, 2007; García-Morales et al., 2010; Alaminos & López, 2011; Jiménez-Cazalla, 2011; Modesti et al., 2011; Ayllón, 2013). In this case, the iris of the eye does not contain pigment, showing a red coloration due to the blood capillaries (Romero & Real, 2007; Galán, 2010; Jiménez-Cazalla, 2011; Modesti et al., 2011; Ayllón, 2013). Dilution occurs when the color tone is reduced (García-Morales et al., 2010). The squizocroism happens when a pigment is not expressed without affecting another (García-Morales et al., 2010). Finally, leucism is a deficiency of a particular pigment (melanin) or all pigments and differs from albinism that generally possess white or clear yellow skin, hair and scales, but with darkly pigmented eyes and nails (García-Morales et al., 2010; Modesti et al., 2011). In this sense, the leucistic animals do not appear to be more vulnerable to exposure to sunlight and have no vision problems as in albinos (Alaminos & López, 2011; Modesti et al., 2011).

Given these definitions, this paper provides the first record of an individual neotenic leucistic of Iberian ribbed newt (Pleurodeles waltl, Michahelles 1830) in the Iberian Peninsula. The specimen was found in the Comes pond (10x10: 31N CF02), 283 masl, Ø = 17.5 m and 1.30 m average depth (Figure 1), in the municipality of El Perelló, Baix Ebre (Tarragona). The discovery was made on 11th February 2016, during the work of management and conservation of that species made by technicians of the Generalitat de Catalunya.

The individual had light-coloured yellow pigmentation in the cutaneous tissue which made it very visible in relation to their congeners (Figure 2, 3 and 4). The yellowing is because these individuals have normal xanthophores and iridophores (Galán, 2010; Jiménez-Cazalla, 2011; Modesti et al., 2011). You can see the external gills with red colouration due to the visualization of blood capillaries (Figure 2 and 3). The iris was golden and the pupil was brown (Figure 4), showing some pigmentation in the retina. This individual lacked design dorsal black spots, except tail, which showed some of them, mainly in the caudal region (Figure 2). The usual coloration of the upper parts of the Iberian ribbed newt have irregular dark spots on olive, brown or gray background and allows them to camouflage in both terrestrial and aquatic habitats (Rivera et al., 2011; Salvador & Martínez-Solano, 2014). In this regard, coloration and absence of spots make these animals more vulnerable to their predators and more visible by their prey. The specimens that have the
mentioned phenotypic abnormalities are easily detectable by their predators and their survival rate is usually rare (Martínez-Silvestre et al., 2009; Galán, 2010; Busack & Donaire, 2014). However, being a crepuscular / nocturnal species and being in a pond with muddy water could have helped their survival.

In this capture session, a total of 88 individuals, 31 adults (10 females, 21 males) were collected and 57 neotenous, this being the only specimen showing an abnormal coloration. In turn, it had captured several individuals of *Pelophylax perezi* (approximately 20 adult individuals) and two larvae of *Pelobates cultripes* in the same pond.

Within the Amphibia class, although rare, there are several citations of cases of albinism or leucism both in Urodela and in Anura (see for example collections of Rivera et al., 2001; Romero & Real, 2007; Galán, 2010; Jiménez-Cazalla, 2011; or Modesti et al., 2011). In these reviews pigmentary defects in any stage of development, even albin eggs (Ayllón, 2013), are reported.

However, in these records there are not any explicit descriptions of any neotenic individual with abnormalities in coloration. Consequently, this would be the first note reported on a neotenic leucistic amphibian as long as we know. In the case of the Iberian ribbed newt, these anomalies are reported infrequently, suggesting that individuals who survive are rare or that the condition itself is rare (Busack & Donaire, 2014). There are three registers of full albinism in larvae of *P. waltl*, four partial albino adults and leucistic larva and other not well defined cases in their pigmentary anomalies (see collection Busack & Donaire, 2014, or Salvador & Martínez-Solano, 2014).
Moreover, this individual can be neoteny - paedomorphosis in which sexual maturity is reached maintaining larval characters (Fuentes et al., 2011), as it presents a big size and developed limbs of adult character and preserves the reduced external gills and a soft epidermis as characters of larval stage (Figure 3). However, we can not have absolute security that the individual is neotenic as we would have to check their sexual maturity watching its genitalia, surely killing him. In certain cases, neoteny can be considered as an evolutionary advantage determined by recessive genes and influenced by environmental conditions (Fuentes et al., 2011). It would be advisable to study these populations, as they represent the northernmost limit of the northeastern end of the distribution of the species (Fontanet et al., 1982; Llorente et al., 1995; Orriols, 2009; Rivera et al., 2011; Salvador & Martínez-Solano, 2014), and these are in sharp decline (Guinart-Patiño et al., 2012).

Given that morphological variability and coloration of the populations of this species have not been studied in detail (Salvador & Martínez-Solano, 2014) and that the frequency of observation of these abnormalities is increasing, it would be justified an additional investigation recording future anomalies in more precise notes to allow a more detailed study (Busack & Donaire, 2014).

Acknowledgements: We thank I. Abella-Gutiérrez from Asociación Bio+ and J. Nchaso Sota for providing us some interesting suggestions on the translation, and A. Sánchez-Vialas from CSIC-MNCN and Asociación Bio+ for his valuable information to help us to improve our note. Our gratitude also extends to the constructive comments of A. Egea-Serrano.

References


The Mediterranean Painted Frog (*Discoglossus pictus*) is a species native of North Africa and lives in Eastern Morocco, Algeria and Tunis and in the islands of Sicily, Malta and Gozo (Lanza et al., 1986; Pabijan et al., 2012). It was introduced in Banyuls de la Marenda, Southern France, at the beginning of the 20th century (Wintrebert, 1908) and since then, it has expanded north and southwards, with similar rates of spread (Montori et al., 2007; Llorente et al., 2016). It is still expanding (SIARE, 2016), being the southern limit of the continuous expansion found nowadays near St. Celoni (Barcelona Province, NE Spain).

In its invasive range, *D. pictus* usually reproduces in temporary or ephemeral ponds commonly shared with native species with similar preferences, like *Bufo calamita* or *Pelodytes punctatus* (Montori et al., 2007; Llorente et al., 2016). Concretely, Richter-Boix et al. (2013) estimated a niche overlap in breeding areas between *Discoglossus pictus* and *Bufo calamita* of 0.99 over 1, meaning that it is very common to see them as larval competitors in the same ponds. When they share ponds, previous studies suggest a displacement of *B. calamita* to non-preferred food resources and greater competitive abilities of *D. pictus* (San Sebastián et al., 2015a).

On 9th March 2016, approximately at 19:00 h, during a nocturnal survey to check the southern expansion front of *D. pictus*, we found in a pond near La Batllòria (UTM: 31T 4619000m N, 463802m E), a group...