NATURAL HISTORY NOTE

Idiopathic Ocular Heterochromia in the California Newt, *Taricha torosa*

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Malformations and other enigmatic physical anomalies have been reported for numerous species of amphibian worldwide (Meteyer 2000, Henle et al. 2017, de Souza et al. 2021). A recent report by de Souza et al. (2021) concluded that various physical anomalies from 111 anuran species reviewed in their work were likely derived from parasites, predatory attacks, environmental degradation, unknown congenital origins, or a combination of these factors. Similar to de Souza (2021), Blaustein and Johnson (2003) reported malformations in 60 species, which were attributed to a complex array of potentially interacting mechanisms. Work in Brazil by Gonçalves et al. (2019) found a high level of mutagenicity in larval anurans that were primarily attributed to agricultural activities (e.g., various pollutants, habitat modification and degradation). Work by Johnson et al. (2001), in the western United States, reported physical malformations in both anurans and urodeles with origins in infection of the trematode *Ribeiroia*. The causes of malformations and physical anomalies in amphibians remain a current and critical area of study.

We found that anatomical malformations or physical anomalies in urodeles are relatively rare or go underreported (Alvarez et al., in press). Herein we report on ocular heterochromia in the salamandrid salamander, the California Newt (*Taricha torosa*), in the northern San Francisco Bay Area of California.

We conducted amphibian surveys at Bonnie's Pond on the Mitsui Ranch, Sonoma County, California (38.3300° N, -122.5819° W) in February 2022, during which numerous California Newts, Rough-skinned Newts (*T. granulosa*) and Pacific Treefrogs (*Hyliola regilla*) were collected and quantified. While assessing general condition and sex of each animal, we noted that a single adult California Newt had a typical eye (right side), marked by a yellow-gold iris, and an atypical eye (left side) marked by a completely black eye (Figure 1).

We concluded, through discussion, that despite our collective, extensive experience with this subspecies that we could not recall a similar anomaly for this species during previous work in the field. The senior author (JAA) noted a recent observation of a similar condition in the plethodontid salamander *Ensatina eschscholtzii* approximately 5 miles to the northeast during the previous fall (Alvarez et al., in press).

The potential cause of some physical anomalies is unclear (de Souza et al. 2021). Researchers have reported heterochromia in the Common Toad (*Bufo bufo*) and in the Bahía's Broad-snout Casque-headed Treefrog (*Aparashenodon arapapa*; Lourenço-de-Moraes et al. 2013, Henle et al. 2017). An image of a Red-eyed Treefrog (*Agalychnis callidryas*) with ocular heterochromia was found through an online source but this observation and condition could not be verified by the authors. We found only a single account or report of heterochromia, either sectoral or complete, in a urodele (see Alvarez et al., in press). This report of ocular heterochromia is the first for a salamandrid and is regionally significant in that the similar-appearing and declining sympatric species—the Red-bellied Newt (*T. rivularis*), whose dark eyes (black iris) are a diagnostic feature—may be confused with California Newt. Field biologists should use care when examining specimens of the genus *Taricha*, taking time

Fig. 1. An adult California Newt (*Taricha torosa*) found showing ocular heterochromia in the left eye, indicated by an entirely black iris, as opposed to the iris of the right eye with yellow-gold in the upper 1/3, which is diagnostic for this species. Photo by L. Solano.

Field biologists should use care when examining specimens of the genus *Taricha*, taking time to examine the entire animal before concluding species identification in this area of northern California, where three species of *Taricha* may be sympatric.

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Literature Cited

Alvarez, J.A., T. Dryer, R. Anderson, B. Ahmed, S. Bylin, A. Casby, J. Daley, M. Falicki, M. Fee, A. Freeman, J. Gaudio, J. Graves, C. Hamilton, K. Herrera, I. Jackson, and M. Zimmerman. In Press. A case of idiopathic ocular heterochromia in *Ensatina eschscholtzii xanthoptica* Gray, 1850, in northern California. Herpetology Notes.

Blaustein, A.R., and P.T.J. Johnson. 2003. The complexity of deformed amphibians. Frontiers in Ecology and the Environment 1:87-94.

de Souza, F.C., A.L.F. da Silva, C.S. Dos Anjos, T. Freisleben, M.D.O.L. Estevinho, and M. Menin. 2020. New records of morphological anomalies in anurans, with a review for Brazil. Herpetology Notes 14:31-41.

Gonçalves, M.W., C.B.M. e Campos, F.R. Godoy, P.G. Gambale, H.F. Nunes, F. Nomura, R.P. Bastos, A.D. da Cruz, and D.D.M. Silva. 2019. Assessing genotoxicity and mutagenicity of three common amphibian species inhabiting agroecosystem environment. Archives of environmental contamination and toxicology 77:409-420.

Henle, K., A. Dubois, and V. Vershinin. 2017. A review of anomalies in natural populations of amphibians and their potential causes. Mertensiella 25:57-164.

Lourenço-de-Moraes, R., A.S. Lantyer-Silva, L.F. Toledo, and M. Solé, M. 2013. Tadpole, oophagy, advertisement call, and geographic distribution of *Aparasphenodon arapapa Pimenta*, Napoli and Haddad 2009 (Anura, Hylidae). Journal of Herpetology 47:575-579.

Meteyer, C.U. 2000. Field guide to malformations of frogs and toads: with radiographic interpretations (No. 2000-0005). US Geological Survey Biological Services Report: 1-16.

NATURAL HISTORY NOTE

Gila Woodpecker and Spadefoot

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At 0620 (MST), on 2 May 1994 in Tucson, Arizona, a male Gila Woodpecker (*Melanerpes uropygialis*) was observed vigorously pecking on an object on the ground. Upon inspection through binoculars, the object was determined to be a spadefoot toad that was still alive and moving. The woodpecker continued hammering very hard on what appeared to be the head of the spadefoot and within five minutes all evidence of life in the spadefoot had disappeared. The woodpecker continued pecking and appeared to be attempting to remove small blood-stained pieces from the carcass. At this point, the writer intervened to determine exact prey identification, and the woodpecker departed. The prey was a 60 mm long female Couch's Spadefoot (*Scaphiopus couchii*). The bird failed to return during the next 30 minutes, and when reinspected the spadefoot was observed still breathing though not moving its limbs.

The area had received less than 0.5 mm of rain several days earlier and the ground was dry. The origin of the spadefoot (neighbors irrigated yard?) and why it was on the surface are unknown. The observation indicates that Gila Woodpeckers might be minor predators of spadefoots. And, further, that these woodpeckers might be potential predators of horned lizards (*Phrynosoma* spp.), equivalent-sized prey that are present in the woodpecker's environment, or small lizards and amphibians.

Couch's Spadefoot (*Scaphiopus couchii*), photo by Young Cage.

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