



An Amelanistic Red Cornsnake (*Pantherophis guttatus*) as a Possible Identity for an Unusual Road-killed Snake Discovered in Sydney, Australia

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Photographs by the authors.

The exotic pet trade has been identified as the primary introduction pathway for several populations of invasive vertebrates (García Díaz et al. 2017; Lockwood et al. 2019), including a number of commonly traded exotic reptiles (Mo 2019a; Perella and Behm 2020). Australia is an island continent with jurisdictions prohibiting the importation and private keeping of non-native reptiles. However, a recent study of the most frequently intercepted exotic vertebrates in Australia, either as pre-border stowaways or post-border captive and at-large interceptions, found three reptiles amongst the top five (Toomes et al. 2019). The Red Cornsnake (*Pantherophis guttatus*), Red-eared Slider (*Trachemys scripta elegans*), and Boa Constrictor (*Boa constrictor*) were just ahead of the Rose-ringed Parakeet (*Psittacula krameri*) and Asian Black-spined Toad (*Duttaphrynus melanostictus*) in the number of intercep-



Fig. 2. The dorsal surface of the dead Red Cornsnake (*Pantherophis guttatus*) lacking black edges around the reddish to orange blotches (left) compared to a live conspecific showing the typical black edges (right).

tions. This study (Toomes et al. 2019) also noted that these vertebrates were generally species featured heavily in the international pet trade (Alacs and Georges 2008; García Díaz et al. 2017). To date, the Red-eared Slider is the only one of these species that has confirmed established populations in Australia (Robey et al. 2011; Mo 2019b); however, the other species are all considered to be serious establishment risks (Henderson et al. 2011; Vall-llosera et al. 2017).

On 29 April 2013, a dead snake was photographed on a suburban road in the Georges River local government area in southeastern Sydney (Fig. 1). Based on the dorsal part of the head being crushed, the snake had either been struck by a motor vehicle or killed by someone striking its head with an implement. Regardless, the snake was an unexpected find with the immediate area comprised entirely of residential development and a distance of more than 1.5 km to the nearest bushland. This suggests the snake was an escaped or abandoned pet (Mo and Oliver 2020).

At the time, the snake was thought to be a Brown Treesnake (*Boiga irregularis*) based on similarly patterned snakes known to occur in the Sydney region (Shea 2010;



Fig. 1. A dead Red Cornsnake (*Pantherophis guttatus*) on a road in Sydney, Australia.

Griffiths 2012). However, our retrospective examination of photographs found the dorsal pattern did not resemble that of any snake native to Australia (see Cogger 2018 and Wilson and Swan 2020), but rather strongly resembled that of a Red Cornsnake (Bechtel and Bechtel 1989), a colubrid native to southeastern North America. Notably, the ventral pattern lacked checkered black markings, which are characteristic for most cornsnakes. Likewise, the dorsal surface lacked the black edges around the reddish to orange blotches typical in most cornsnakes (Fig. 2). However, the dorsal and ventral patterns did resemble that of Red Cornsnakes exhibiting amelanism, such as one shown in Saenko et al. (2015). This color variant lacks black pigment and has been observed in naturally-occurring populations in Tennessee, North Carolina, and Florida (Bechtel and Bechtel 1989).

We retrospectively estimated the snake to be approximately 90 cm in length based on a comparison of the corpse with a person's shoes in one of the photographs (Fig. 3). This estimated body length is within the size range of the species (Ullate-Agote et al. 2014). Unfortunately, the damaged head prevented further confirmation of species identity.

Our find was not unusual based on the numerous reports in the Sydney region of apparently free-living Red Cornsnakes lodged with FeralScan (Invasive Animals Limited 2021), a citizen-science reporting platform (Fig. 4). Additional locations where Red Cornsnakes have been captured in the Sydney region were reported by McFadden et al. (2017), who collated records from two wildlife rescue organizations and Taronga Zoo staff. This quantity of reports suggests that the illegal keeping of Red Cornsnakes in the Sydney region is prolific, increasing the risk of populations becoming established (Henderson et al. 2011) — although none have been reported to date (McFadden et al. 2017).

The variability of patterning in Red Cornsnakes compounded by selectively bred color mutations (Bechtel and



Fig. 3. A photograph of the dead Red Cornsnake (*Pantherophis guttatus*) showing a person's shoes, which allowed us to estimate the size of the snake.

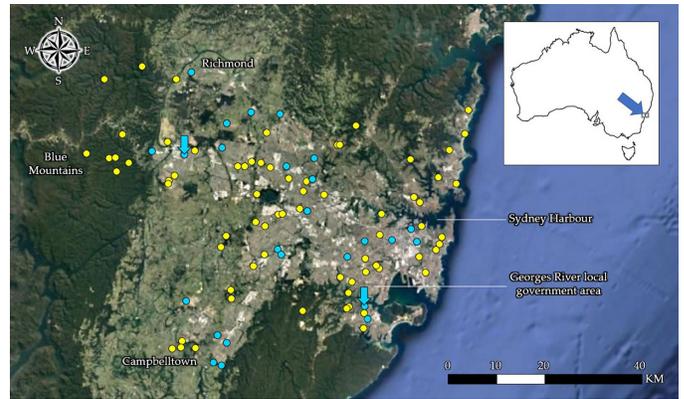


Fig. 4. Records of Red Cornsnakes (*Pantherophis guttatus*) reported and/or captured in the Sydney region by citizen scientists, wildlife rescuers, professional snake handlers, and environment agency officers. Blue records are from the FeralScan database (Invasive Animals Limited 2021), with arrows indicating reports of animals that were not removed; yellow records are from McFadden et al. (2017).

Bechtel 1989; Griswold 2001) makes it difficult for members of the public to recognize snakes they encounter as an exotic species. This challenge potentially reduces the probability of free-living or escaped Red Cornsnakes being reported to authorities. On the other hand, many landholders seek to have snakes removed from their properties and adjacent areas (Shine and Koenig 2001), which may result in Red Cornsnakes being reported to people with species identification expertise such as wildlife rescuers, professional snake handlers, and environmental agency officers (McFadden et al. 2017; Wolfe et al. 2020).

Literature Cited

- Alacs, E. and A. Georges. 2008. Wildlife across our borders: a review of the illegal trade in Australia. *Australian Journal of Forensic Sciences* 40: 147–160. <https://doi.org/10.1080/00450610802491382>.
- Bechtel, H.B. and E. Bechtel. 1989. Color mutations in the Corn Snake (*Elaphe guttata guttata*): review and additional breeding data. *Journal of Heredity* 80: 272–276. <https://doi.org/10.1093/oxfordjournals.jhered.a110853>.
- Cogger, H.G. 2018. *Reptiles and Amphibians of Australia*. Seventh edition. CSIRO Publishing, Clayton South, Victoria, Australia.
- García Díaz, P., J.V. Ross, A.P. Woolnough, and P. Cassey. 2017. The illegal wildlife trade is a likely source of alien species. *Conservation Letters* 10: 690–698. <https://doi.org/10.1111/conl.12301>.
- Griffiths, K. 2012. *Frogs and Reptiles of the Sydney Region*. Second edition. Reed New Holland, Sydney, Australia.
- Griswold, W.G. 2001. Captive care and breeding of the Corn Snake, *Elaphe guttata*. *Journal of Herpetological Medicine and Surgery* 11: 35–40. <https://doi.org/10.5818/1529-9651.11.4.35>.
- Henderson, W., M. Bomford, and P. Cassey. 2011. Managing the risk of exotic vertebrate incursions in Australia. *Wildlife Research* 38: 501–508. <https://doi.org/10.1071/WR11089>.
- Invasive Animals Limited. 2021. Report Australia's most unwanted animals. Department of Agriculture, Water and the Environment, Canberra, Australia. <<https://www.feralscan.org.au/newpests/default.aspx>>.
- Lockwood, J.L., D.J. Welbourne, C.M. Romagosa, P. Cassey, N.E. Mandrak, A. Strecker, B. Leung, O.C. Stringham, B. Udell, D.J. Episcopio-Sturgeon, M.F. Tlusty, J. Sinclair, M.R. Springborn, E.F. Pienaar, A.L. Rhyne, and R. Keller. 2019. When pets become pests: the role of the exotic pet trade in producing invasive vertebrate animals. *Frontiers in Ecology and the Environment* 17: 323–330. <https://doi.org/10.1002/fee.2059>.

- McFadden, M.S., P. Topham, and P.S. Harlow. 2017. A ticking time bomb: Is the illegal pet trade a pathway for the establishment of Corn Snake (*Elaphe guttata*) populations in Australia? *Australian Zoologist* 38: 499–504. <https://doi.org/10.7882/AZ.2017.006>.
- Mo, M. 2019a. Using citizen-science reports to document range expansion of the introduced Chinese Water Dragon (*Physignathus cocincinus*) in Hong Kong. *Reptiles & Amphibians* 26: 128–131. <https://doi.org/10.17161/randa.v26i2.14383>.
- Mo, M. 2019b. Red-eared Sliders *Trachemys scripta elegans* in southern Sydney, including new incursions. *Australian Zoologist* 40: 314–325. <https://doi.org/10.7882/AZ.2018.022>.
- Mo, M. and R. Oliver. 2020. Current approaches to rehoming unwanted, escaped and seized native animal pets in New South Wales and recent trends. *Australian Zoologist* 40: 548–564. <https://doi.org/10.7882/AZ.2019.002>.
- Perella, C.D. and J.E. Behm. 2020. Understanding the spread and impact of exotic geckos in the greater Caribbean region. *Biodiversity and Conservation* 29: 1109–1134. <https://doi.org/10.1007/s10531-020-01939-1>.
- Robey, J., S. Burgin, D. Hitchen, and G. Ross. 2011. Status of an urban feral Red-Eared Slider (*Trachemys scripta elegans*) population in Sydney a decade on. *Australian Zoologist* 35: 822–825. <https://doi.org/10.7882/AZ.2011.033>.
- Saenko, S., S. Lamichhaney, A. Barrio, N. Rafati, L. Andersson, and M.C. Milinkovitch. 2015. Amelanism in the Corn Snake is associated with the insertion of an LTR-retrotransposon in the OCA2 gene. *Scientific Reports* 5: 17118. <https://doi.org/10.1038/srep17118>.
- Shea, G.M. 2010. The suburban terrestrial reptile fauna of Sydney – winners and losers. pp. 154–197. In: D. Lunney, P. Hutchings and D. Hochuli (eds.), *The Natural History of Sydney*. Royal Zoological Society of New South Wales, Mosman, NSW, Australia. <https://doi.org/10.7882/FS.2010.015>.
- Shine, R. and J. Koenig. 2001. Snakes in the garden: an analysis of reptiles “rescued” by community-based wildlife carers. *Biological Conservation* 102: 271–283. [https://doi.org/10.1016/S0006-3207\(01\)00102-1](https://doi.org/10.1016/S0006-3207(01)00102-1).
- Toomes, A., P. García Díaz, T.A. Wittmann, J. Virtue, and P. Cassey. 2019. New aliens in Australia: 18 years of vertebrate interceptions. *Wildlife Research* 47: 55–67. <https://doi.org/10.1071/WR18185>.
- Ullate-Agote, A., M.C. Milinkovitch, and A.C. Tzika. 2014. The genome sequence of the Corn Snake (*Pantherophis guttatus*), a valuable resource for EvoDevo studies in squamates. *International Journal of Developmental Biology* 58: 881–888. <https://doi.org/10.1387/ijdb.150060at>.
- Vall-llosera, M., A.P. Woolnough, D. Anderson, and P. Cassey. 2017. Improved surveillance for early detection of a potential invasive species: the alien Rose-ringed Parakeet *Psittacula krameri* in Australia. *Biological Invasions* 19: 1273–1284. <https://doi.org/10.1007/s10530-016-1332-x>.
- Wilson, S. and G. Swan. 2020. *A Complete Guide to Reptiles of Australia*. Sixth edition. Reed New Holland, Sydney, Australia.
- Wolfe, A.K., P.A. Fleming, and P.W. Bateman. 2020. What snake is that? Common Australian snake species are frequently misidentified or unidentified. *Human Dimensions of Wildlife* 25: 517–530. <https://doi.org/10.1080/10871209.2020.1769778>.