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REFERENCES

- Chakraborty, S., Sirinivasalu, C., Sirinivasalu, B., Pradhan, M.S. and Nameer, P.O. (2004). Checklist of insectivores (Mammalia: Insectivora) of South Asia. *Zoos' Print* 19:1361–1371.
- Chakraborty, S., Bhattacharyya, T. and Molur, S. (2008a). *Paraechinus micropus*. *The IUCN Red List of Threatened Species*. Version 2015.2. www.iucnredlist.org. Viewed on 21 August 2015.
- Chakraborty, S., Srinivasulu, C. and Molur, S. (2008b). *Paraechinus nudiventris*. *The IUCN Red List of Threatened Species*. Version 2015.2. www.iucnredlist.org. Viewed on 21 August 2015.
- Mahawar, M.M. and Jaroli, D.P. (2008). Traditional zootherapeutic studies in India: a review. *Journal of Ethnobiology and Ethnomedicine* 4, article 17.

- Marimuthu, R. and Asokan, K. (2014). Bare-bellied or Madras hedgehog, *Paraechinus nudiventris* (Horsfield, 1851) in Coimbatore, Tamil Nadu. *Zoo's Print* 29:33–34.
- Molur, S. (2008). *Hemiechinus collaris*. *IUCN Red List of Threatened Species*. Version 2015.2. www.iucnredlist.org. Viewed on 21 August 2015.
- Molur, S., Srinivasulu, C., Srinivasulu, B., Walker, S., Nameer P.O. and Ravikumar, L. (2005). Status of Non-volant Small Mammals: Conservation Assessment and Management Plan Workshop Report. Zoo Outreach Organization, Coimbatore.
- Nijman, V. and Bergin, D. (2015). Trade in hedgehogs (Mammalia: Erinaceidae) in Morocco, with an overview of their trade for medicinal purposes throughout Africa and Eurasia. *Journal of Threatened Taxa* 7:7131–7137.
- Padmanabhan, P. (2007). Ethno zoological studies on the tribals of Palakkad and Malappuram districts of Kerala, South India, KFRI Research Report No.292. Kerala Forest Research Institute, Peechi.
- Srinivasulu, C., and Nagulu, V. (2002). Mammalian and avian diversity of the Nallamala Hills, Andhra Pradesh. *Zoos' Print* 17:675–684.

Brawin Kumar, Zoo Outreach Organization,
Wildlife Information and Liaison Development Society,
Coimbatore, India
E-mail: brawinkumarwildlife@gmail.com
Vincent Nijman, Oxford Wildlife Trade Research Group,
Oxford, UK. E-mail: vnijman@brookes.ac.uk

Bogus captive-breeding of the South African Sungazer Lizard *Smaug giganteus*

Reptile species that have restricted distributions, high levels of protection and low reproductive rates are rarities in the pet trade, and command premium prices (Auliya, 2003). The protected status of such species encourages dealers to trade captive-bred individuals, but also provides an opportunity for unscrupulous traders to launder wild-caught reptiles as “captive bred” (Lyons and Natusch, 2011; Nijman, 2014). This is particularly concerning when exporting and importing countries do not verify claims about the captive source, effectively leaving the trade in wild-caught individuals unregulated.

The Sungazer Lizard *Smaug* (previously *Cordylus giganteus*) is endemic to South Africa, and has a restricted range, narrow environmental niche and a life history characterized by slow reproduction. Sungazers only reach sexual maturity after five years, and females produce one to three offspring only once every two or three years (Van Wyk, 1991). The species was listed as Vulnerable in a national assessment due to habitat loss and poaching (Mouton, 2014), and is consequently a nationally protected species, with collection of wild individuals strictly prohibited. Internationally, the species is listed in Appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).

Although there is no substantiated evidence of captive reproduction, Sungazers are frequently offered for sale

on social media groups, trade websites, and reptile fairs, fetching prices of between USD1000 and USD4000, occasionally as much as USD6000. A single case of captive breeding was reported by Langerwerf (2001), but all other literature on Sungazers in captivity lacks reports of breeding incidences (e.g., Hild, 1988; Fogel, 2000; Gilchrist, 2015). Despite this, virtually all international trade is in individuals reported as produced in captivity (Table 1). With the exception of 12 Sungazers reportedly produced elsewhere, all purportedly captive-produced Sungazers (521 individuals) were exported from South Africa (UNEP-WCMC, 2016). Moreover, South Africa reported the majority of these individuals as captive-bred, i.e. offspring from parents that had also been born in captivity. Importing countries reported only slightly lower quantities, totalling 459 individuals produced in captivity (Table 1). The only wild-caught *S. giganteus* were 50 individuals exported by Mozambique, which is not a range country for the species. Most lizards were imported by Japan (157 individuals), Germany (145 individuals) and the USA (125 individuals).

While the occasional birth of a Sungazer in captivity is not in doubt, there is a clear and alarming discrepancy in the number of substantiated breeding records of captive Sungazers, and the number being traded annually. As has been reported for several other species (Lyons and Natusch, 2011; Nijman, 2014), it is highly likely that the

Year	Importer reported			Main importer	Exporter reported			Main exporter
	W	F	C		W	F	C	
2004	0	20	0	Japan	0	23	0	South Africa
2005	0	0	0	-	0	6	0	South Africa
2006	0	0	11	Japan	0	20	13	South Africa
2007	0	26	36	Indonesia	0	26	38	South Africa
2008	0	55	40	Germany	0	43	54	South Africa
2009	0	0	50	Japan	50	0	53	Mozambique
2010	0	2	16	USA	0	0	4	South Africa
2011	0	3	59	Germany	0	3	44	South Africa
2012	0	0	33	Germany	0	0	40	South Africa
2013	0	0	36	USA	0	0	122	South Africa
2014	0	0	72	USA	0	0	44	South Africa
Total	0	106	353		50	121	412	

Table 1. Commercial trade (purpose T) of live Sungazers, excluding re-exports, reported by importing and exporting countries for 2004–2014. Source codes W, F and C represent wild, captive-born and captive-bred, respectively; confiscated individuals were excluded. Source: UNEP-WCMC, 2016.

majority of Sungazers in the pet trade are laundered wild-caught animals. The authors strongly recommend that the export and import countries identified in this paper demand incontrovertible evidence of captive breeding before issuing permits, and that prospective buyers temper their desires against the realities of supporting the poaching of a threatened species.

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REFERENCES

- Auliya, M. (2003). Hot trade in cool creatures: a review of the live reptile trade in the European Union in the 1990s with a focus on Germany. TRAFFIC Europe, Brussels, Belgium.
- Fogel, G. (2000). Observations on the giant Sungazer Lizard, *Cordylus giganteus*, in captivity. *Bulletin of the Chicago Herpetological Society*, 35:277–280.
- Gilchrist, F. (2015). Studbook Breeding Programme *Smaug giganteus* (Sungazer Lizard): annual report 2014. Viewed on 2 February 2016. <http://studbooks.eu/images/pdf/2015/annual%20report%202014%20-%20smaug%20giganteus%202014.pdf>.
- Hild, D.W. (1988). Husbandry techniques for the ouvolk, *Cordylus giganteus*. Pp.87–97. In: Rosenberg, M.J. (Ed.). *Proceedings. 11th International Herpetological Symposium on Captive Propagation and Husbandry*. Thurmont, MD: Zoological Consortium, Inc.
- Langerwerf, B. (2001). Keeping and breeding the Sungazer (*Cordylus giganteus* Smith 1844). *Reptiles*, 9:58–65.
- Lyons, J.A. and Natusch, D.J. (2011). Wildlife laundering through breeding farms: illegal harvest, population declines and a means of regulating the trade of Green Pythons (*Morelia viridis*) from Indonesia. *Biological Conservation*, 144:3073–3081.

- Mouton, P. le F. (2014). *Smaug giganteus* (A. Smith, 1844). Giant Dragon Lizard; Giant Girdled Lizard; Sungazer; Ouvia. P.209. In: Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. and De Villiers, M. *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Suricata*, 1.
- Nijman, V. (2014). Bogus captive breeding of Oriental Rat Snakes. *Oryx*, 48:483–484.
- UNEP-WCMC (2016). CITES Trade Database. <http://trade.cites.org/>. Viewed on 1 February 2016.
- Van Wyk, J.H. (1991). Biennial reproduction in the female viviparous lizard, *Cordylus giganteus*. *Amphibia-Reptilia*, 12:329–342.

Victor J.T. Loehr (corresponding author),
Homopus Research Foundation
E-mail: loehr@homopus.org
Shivan Parusnath, University of the Witwatersrand/
National Zoological Gardens of South Africa
E-mail: shivan.parusnath@gmail.com
Fraser Gilchrist, European Studbook Foundation
E-mail: info@saveoursungazers.com

An adult Sungazer *Smaug giganteus*, Free State Province, South Africa.



SHIVAN PARUSNATH