

Medicinal uses and trade of Madras Hedgehogs *Paraechinus nudiventris* in Tamil Nadu, India

Recently, Nijman and Bergin (2015) presented a global overview of the trade in hedgehogs for medicinal purposes or meat. They noted that there were reports of 13 of the 16 species being traded, but lamented the paucity of quantitative data on the trade and ethnozoology of hedgehogs. One of the three species for which no information was obtained was the Madras Hedgehog *Paraechinus nudiventris*, a species endemic to the southern part of India (the others were Somali Hedgehog *Aterix sclateri*, endemic to parts of Somalia, and Brandt's Hedgehog *Paraechinus hypomelas*, a largely montane species from the Middle East and parts of the Arabian Peninsula). Besides the Madras Hedgehog, India is home to two other species of hedgehog: Indian Hedgehog *P. micropus* and Indian Long-eared Hedgehog *Hemiechinus collaris*. Both species occur sympatrically in south-eastern Pakistan and north-western India, with the Indian Long-eared Hedgehog additionally occurring in Pakistan's Khyber Pakhtunkhwa (North West Frontier) Province and the Indian State of Uttar Pradesh (Molur, 2008; Chakraborty *et al.*, 2008a). In India, both species of hedgehog are hunted locally for subsistence food and for medicinal purposes (Molur *et al.*, 2005; Padmanabhan, 2007; Mahawar and Jaroli, 2008) but these, or other threats, are not enough for either species to be considered globally threatened (Molur, 2008; Chakraborty *et al.*, 2008a).

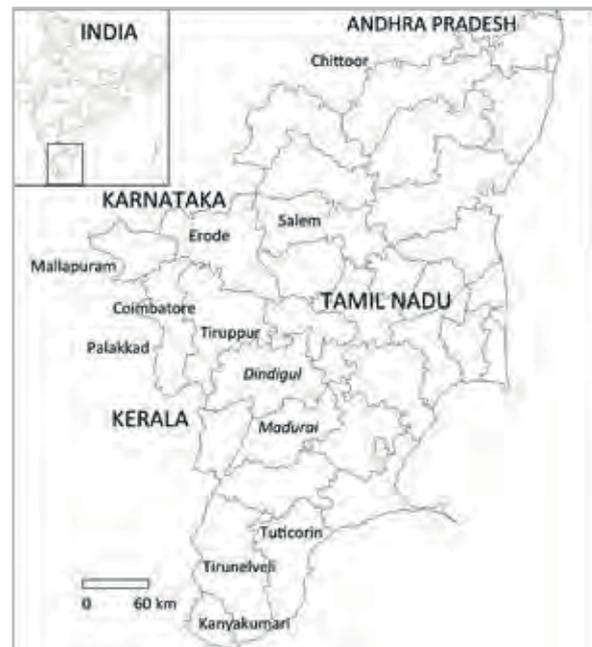
The Madras Hedgehog has a much more restricted distribution than the other two hedgehog species occurring in India, and is endemic to the country. It is known from just five locations—two in northern Tamil Nadu (Salem district) and one from adjoining southern Andhra Pradesh (Chittoor district), and two isolated populations in Cudappah district in Andhra Pradesh and in Palakkad district in Kerala (Molur *et al.*, 2005). Chakraborty *et al.* (2008b), as part of their IUCN Red List assessment, map three disjunct areas: two in Kerala and one in the border areas of southernmost Andhra Pradesh and northernmost Tamil Nadu. Molur *et al.* (2005) noted that habitat loss due to collection of fuelwood, logging, agriculture and urbanization are major threats, but Chakraborty *et al.* (2008b) listed the species as Least Concern in view of its abundance within its restricted distribution, its presumed large population, and because its habitat is unlikely to be declining fast enough to qualify for listing in a more threatened category. In light of its restricted range—in fact the smallest geographic range of any species of hedgehog—and paucity of data, more information on the species's distribution and threats is urgently needed (cf. Molur *et al.* 2005). Although the Madras Hedgehog is only one of about 35 species of mammal that is endemic to mainland India, and one with a very restricted distribution, it is not included on the list of species that are protected under the Indian *Wildlife Protection Act, 1972*. Most rodents and shrews are listed as vermin on this Act (and may indeed be hunted), and it is easy for the general



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public to treat hedgehogs and shrews and rodents alike, thus unwittingly putting more pressure on hedgehogs.

Here the authors present an overview of the ethnozoology of Madras Hedgehogs in parts of Tamil Nadu, as well as report on the trade in the species, to improve our understanding of the conservation status of this Indian endemic. They furthermore present new information on the distribution of the species.



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Fig. 1. Districts in the State of Tamil Nadu, India, where the presence of Madras Hedgehogs has been confirmed, including additional sites identified during this study.

Two districts where Madras Hedgehogs have been confiscated (Madurai and Dindigul) are italicized. In addition the districts where the species has been recorded in the neighbouring States of Kerala and Andhra Pradesh are indicated. Note there is an additional record from Cudappah district, north of Chittoor district (see text for details). **Top:** A boy holding the skin of a Madras Hedgehog. Chennimalai village, Erode District, Tamil Nadu, January 2015.

METHODS

The first author conducted field surveys in the districts of Coimbatore, Thoothukudi, Ramanathapuram, Tiruppur, Tirunelveli, Tuticorin, Erode and Kanyakumari in Tamil Nadu from October 2012 to July 2015 to record the presence of Madras Hedgehogs (including road kills). Selection of these areas was initially based on reports received from older people in Tirunelveli who reported the presence of hedgehogs in their gardens at night; none of the four districts are included in the distribution maps of Madras Hedgehog presented in Molur *et al.* (2005) or Chakraborty *et al.* (2008b) but Erode borders Salem and Coimbatore borders Palakkad, two of the districts from where Molur *et al.* (2005) reported the presence of the species.

Road kill surveys were conducted on motorbike along the ~38 km long Radhapuram–Nagercoil Road, as well as other smaller roads in the region, once every three months (i.e. 11 times for a total of >400 km). Direct surveys on foot using spotlights were conducted during 47 nights (from 23:00–03:00 hrs) in Ooralvaaimozhi (Kanyakumari), Gangaikondan and Paruthipaadu (Tirunelveli), Panaikulam (Ramanathapuram) and Palaniappapuram (Thoothukudi). In addition, sites were checked for hedgehogs where villagers or informants reported their recent presence.

To assess the trade in the species, the authors recorded the number of dried skins they observed in villages, and followed up on reports from villagers or others of trade in hedgehogs or their derivatives. In 68 villages in Tirunelveli, a total of 712 people were asked about their knowledge of the species, and to recount any particulars pertaining to the use of Madras Hedgehogs. On average two villages were visited each month over the 34-month survey period. The interviews were structured, using a questionnaire in Tamil. Given the historic use of hedgehogs for medicinal purposes, there was a bias towards selecting older people and traditional healers or others that dispense traditional medicine.

RESULTS

Occurrence and reported usage of Madras Hedgehogs.

The authors obtained 13 direct sightings of Madras Hedgehogs in Coimbatore (one hedgehog seen), Tiruppur (one), Tirunelveli (eight), Tuticorin (one), Erode (one) and Kanyakumari (one). Additionally, two road kills were observed in Kothapalayam, Tiruppur and Papanasam, Tirunelveli. Hedgehogs were recorded from thorny, bushy deserts as well as introduced mesquite *Prosopis juliflora* dominated shrub lands, and in cultivated areas and the edges of fields and along hedgerows. In the coastal parts of Tuticorin and Kanyakumari it was recorded in the red sandy dunes locally known as *theri*.

Madras Hedgehogs are well known to the local people as they are widely perceived as having medicinal value as a cure for, or offering relief, against coughs, tuberculosis, and asthma. In Tirunelveli, 232 out of 712 informants from 38 out of 68 villages indicated the use of hedgehog skin as a medicine. While the authors do not have information on the ages of all the 712 informants, 27 of

those that indicated their use of hedgehog medicine were under 25 years of age, 81 were between 26 and 50 years of age, and 124 were over 50. Fifty-four respondents said that they used hedgehog skins for relief against whooping cough, 60 as relief for asthma, and 91 for childcare medicine; 27 reported its use to treat tuberculosis. Many of the respondents indicated dual usage of the dried skin, e.g. asthma and childcare medicine. The spines are burned in a fire, crushed and powdered; mixed with honey it is taken as a cure for whooping cough, and mixed with plant extract it is used to relieve stomach pains. The rendered fat of Madras Hedgehogs (hedgehog oil or *muleli kaba sarvaanga thailam*) is used to cure earache and coughs. A total of 217 respondents had eaten the flesh or skin of hedgehogs, apparently because of its flavour and because of its perceived medicinal properties (for conditions outlined above). Finally, dried skins of Madras Hedgehogs are hung on the walls of houses to prevent evil spirits from entering.

Trade in Madras Hedgehogs. Madras Hedgehogs are caught either opportunistically or with the help of hunting dogs. They are largely nocturnal and sleep in underground burrows, making them largely cryptic to humans. The authors are aware of at least 25 local hunting groups in Tirunelveli and Kanyakumari that mostly go out at night with spotlights to catch animals, Indian Hare *Lepus nigricollis*, in particular. If Madras Hedgehogs are encountered (near streetlights or in the dry season near the wetter agricultural fields), these are brought back to the village, with the flesh used for local consumption and the skins traded locally. The nomadic Nari Kuruvaars people are known collectors of hedgehogs and sell live and dried hedgehogs; likewise local wood collectors sometimes offer the species for sale. The authors found nine skins (seven singles, one pair) in the houses of people that prepare hedgehog-based medicine (two in Tuticorin, three in Erode, three in Tirunelveli). In India's southernmost city of Nagercoil, in Kanyakumari, a well-known Ayurveda medical shop was selling hedgehog oil. In the past, hedgehog skins were commonly sold in the weekly markets in Nagercoil and Dindugal Districts (Bharathidasan and Kumaran Sathasivam, pers. comm. to Brawin Kumar), but it is unclear if this practice still takes place.

The price for hedgehogs or their parts depends partially on a buyer's negotiating skills and at which point in the trade chain it is purchased. The Nari Kuruvaar collectors quoted prices for live hedgehogs of INR250–500 (USD3.79–7.59) each, whereas in the markets they are offered typically for INR200–500 (USD3.04–7.59). Dried skins can be purchased for INR150–180 (USD2.28–2.73), and hedgehog oil for INR50 (USD0.75) a bottle.

According to informants, increasingly Madras Hedgehogs are kept as pets, especially in the districts of Tirunelveli, Erode and Kanyakumari; all are presumed to be wild-caught individuals. The authors are aware of three seizures of Madras Hedgehogs in recent years: a single live animal in Madurai on two occasions in September 2014 and Dindugal in August 2015, respectively, and a skin in Erode in December 2014.



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DISCUSSION

The authors report on the use of Madras Hedgehogs by the people of Tamil Nadu, showing that while the number of hedgehogs and the amounts of derivatives in trade are perhaps small, the knowledge of their use and the number of people who indicate that they have consumed hedgehogs or use hedgehog-derived medicine is considerable. While a greater number of informants over the age of 50 were targeted during the survey, more of whom stated their use of hedgehog-derived medicines than the younger informants interviewed, and given that the latter group are perhaps more likely to use non-traditional medicine, it is not possible from this study to assess whether there is a shift away from the use of hedgehog-derived medicine in the younger generation.



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◀ A village man showing the dried skin of a Madras Hedgehog to Brawin Kumar (left), Radhapuram, Tirunelveli District, Tamil Nadu, August 2013.

The authors concur with Molur *et al.* (2005) that habitat loss due to logging (for timber, firewood or charcoal production), expanding agriculture and urbanization are major threats to the survival of Madras Hedgehogs. Large-scale industrial projects, such as the establishment of wind farms, convert once suitable hedgehog habitat into areas where the species can no longer persist. For instance, Tamil Nadu's wind power capacity is now ~35% of India's total, and with a rule of thumb of ~10 ha needed for the production of one megawatt of wind energy, some 1000 km² has been set aside for wind farms in the last two decades. Similarly, the road network density in Tamil Nadu is ~1.5 km per 1 km² (or 200 000 km of roads in Tamil Nadu's 130 000 km²) which inevitably has a negative impact on hedgehog numbers.

The presence of Madras Hedgehogs in Coimbatore, Tiruppur, Tirunelveli, Tuticorin, Erode and Kanyakumari was confirmed during the course of this survey, whereas the seizures of hedgehogs in Madurai and Dindigul may suggest the species occurs in these districts as well (Fig. 1). In addition, Padmanabhan (2007) reported their presence in Mallapuram district in Kerala (in addition to Palakkad district, where Molur *et al.* (2005) already reported their presence). While Marimuthu and Asokan (2014) confirmed the presence of Madras Hedgehogs from Coimbatore, Chakraborty *et al.* (2004) doubted the validity of the record from Cudappah district as it was based on a report by a single local source and no hedgehog was actually observed during four years of fieldwork (Srinivasulu and Nagulu, 2002). Accepting the Cudappah record, the species is now known from at least 10, and possibly 12 districts, in three States (two in Kerala, two in Andhra Pradesh and six in Tamil Nadu). The widespread, albeit localized, distribution in these districts suggests that the species is present over a considerably larger geographic area than suggested by, for instance, Molur *et al.* (2005) and Chakraborty *et al.* (2008b). Still, even acknowledging this larger range and the species's possible presence in districts neighbouring those from where their presence has been established, the Madras Hedgehog has the smallest geographic range of any hedgehog species. It is clear that trade, albeit localized and rarely commercially, occurs throughout this landscape. Prices are low, but given the little effort undertaken to locate hedgehogs (which are collected opportunistically while targeting other species or while conducting other activities), the monetary gains that can be made may be sufficient to keep collectors going. The authors recommend that a reassessment is made of the Madras Hedgehog's conservation status, taking into account the perceived rarity of the species and the impact of trade, in addition to its restricted range, and that appropriate measures are taken to better protect and manage the remaining populations.

◀ Brawin Kumar examining the dried skin of a Madras Hedgehog in a home, Maruthuval Malai village, Kanyakumari District, Tamil Nadu, May 2014.

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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