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Research Note

Predation on a cryptic rainforest rodent (*Pogonomys* sp.) by a carpet python (*Morelia spilota*)

Jennifer M. Fill[A,B,G], *Alastair B. Freeman*[A,C], *Georgeanna Story*[D,E] *and Timothy J. Curran*[A,F]

[A]The School for Field Studies, PO Box 141, Yungaburra, Qld 4884, Australia.
[B]Department of Biological Sciences, 706 Coker Life Sciences, University of South Carolina, Columbia, SC 29208, USA.
[C]Threatened Species Unit, Environment and Heritage Protection, PO Box 975, Atherton, Qld 4883, Australia.
[D]Scats About, PO Box 45, Majors Creek, NSW 2622, Australia.
[E]The Fenner School of Environment and Society, Australian National University, Canberra, ACT 0200, Australia.
[F]Department of Ecology, PO Box 84, Lincoln University, Canterbury 7647, New Zealand.
[G]Corresponding author. Email: fill@email.sc.edu

Abstract. The tree mouse (*Pogonomys* sp.) is a cryptic species from north-east Queensland. We report the first known predation of this species by a reptile, the carpet python (*Morelia spilota*), based on the identification of hair retrieved from a road-killed python. We describe characteristics of the hair sample and comment on implications that diverse foraging strategies in a reptilian predator may have for prey behaviour and vulnerability.

Additional Keywords: Atherton Tablelands, hair identification, tropical rainforest, Wet Tropics.

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Introduction

The tree mouse, or prehensile-tailed rat (*Pogonomys* sp.), is a cryptic rainforest species endemic to north-east Queensland. It is found at Iron Range National Park on the Cape York Peninsula and in the Wet Tropics bioregion between Cooktown and Townsville (Winter *et al*. 2008). Initially described as *P. mollipilosus*, the Australian *Pogonomys* is likely a species distinct from its congeners from New Guinea, but is yet to be described (Musser and Carleton 2005; Winter *et al*. 2008). First recorded in 1974 from the Atherton Tablelands, *Pogonomys* sp. is currently considered common throughout its range in the Wet Tropics (Calaby and Lee 1989; Winter *et al*. 2008). This is principally due to the predominance of specimens obtained opportunistically (e.g. in owl pellets) (Winter *et al*. 2008). However, little is known about its biology, due to the difficulty of trapping live specimens (Calaby and Lee 1989; Rader and Krockenberger 2006; Breed and Ford 2007). This is most likely because it forages nocturnally and almost exclusively in the rainforest canopy (generally 12–33 m high) and is only occasionally found in the understorey (Rader and Krockenberger 2006; Winter *et al*. 2008).

Here we report the first recorded predation of *Pogonomys* sp. by a carpet python (*Morelia spilota*) in north-east Queensland, identified from a hair sample as part of a wider study of python diet (Fill *et al*. 2012). Specimens of *Pogonomys* sp. have previously been obtained as prey of domestic cats (*Felis catus*), lesser sooty owls (*Tyto multipunctata*), and southern boobooks (*Ninox novaeseelandiae*) (Winter *et al*. 2008). However, our record represents the first instance of predation on this species by a reptile in Australia.

Methods and results

An adult male carpet python was found dead (presumably hit by a vehicle) on 21 November 2006 at the School for Field Studies, Centre for Rainforest Studies, property near Yungaburra, Queensland (17°12′29.9″S, 145°40′57″E). It had been crossing a dirt road traversing upland (~700 m above sea level) remnant rainforest that has been selectively logged in the past. There were two main rainforest types, differentiated by the substrate on which they occur: simple notophyll vine forest (Type 8 *sensu* Tracey 1982) occurs on granite or rhyolite, while complex mesophyll vine forest (Type 1b) occurs on basalt parent material. Within 1 km of the python record there was regrowth rainforest of both types, usually dominated by *Acacia celsa*, as well as introduced pastures on land cleared of its original rainforest. Carpet pythons are known to occupy all of these habitats on the Atherton Tablelands (Freeman and Bruce 2007; A. B. Freeman, unpub. data).

The python weighed 1.68 kg; snout–vent length was 172.3 cm and total length was 201.3 cm (Fill *et al*. 2012). A hair sample was extracted from the python stomach contents and stored in 70% ethanol solution, before being rinsed in water and oven-dried for 12–24 h at 65°C (Fill *et al*. 2012). It was then identified using the software Hair ID 1.0 program for Australian mammals

(Triggs and Brunner 2002) and sent to Barbara Triggs for confirmation. Here we document some of the diagnostic features of this hair sample and expand on the information presented by Triggs and Brunner (2002) for this species.

The hairs in our sample demonstrated many of the basic characteristics that are indicative of *Pogonomys* species. The hairs were fine and slightly wavy, displayed a narrow aeriform lattice and in cross-section contained a combination of circular and eye-shaped hairs (Fig. 1). The size and cross-sectional characteristics differentiate the hair of *Pogonomys* sp. from that of other rodents present in the region. Hairs of other rodents are at least 15 µm wider, they display a wide aeriform lattice and in cross-section are oblong, reniform or concavo-convex. However, while still distinguishable as hair of a *Pogonomys* sp., the diagnostic features of this sample did vary from previous descriptions. Triggs and Brunner (2002) reported hair lengths up to 12 mm and maximum widths of 25 µm, whereas hairs of this sample were slightly longer (up to 17 mm) and wider (up to 35 µm). Our sample also contained many hairs with a deep orange colour, rather than predominantly white, and a far greater proportion of eye-shaped hairs than previously reported (Triggs and Brunner 2002). The observed variations are most likely a factor of the samples examined and the infrequency with which *Pogonomys* sp. is encountered. The additional information gained from this sample should contribute to our understanding of the diagnostic characteristics for *Pogonomys* sp. hair identification.

Discussion

There are few data that describe interactions between snakes and arboreal mammals in Australia, and natural history data for both tropical arboreal mammals and reptiles are badly needed (Kays and Allison 2001). The relationship between predators and their prey is an important factor shaping species' ecology (e.g. prey foraging behaviour: Kotler *et al*. 1993; prey selection: Fitzgerald *et al*. 2004). This predation event allows us to speculate on the predator–prey interactions of these two species. *Pogonomys* sp. lives in colonial burrows underground, emerging around evening to feed in the canopy (Winter *et al*. 2008). When disturbed, it runs to the ground but immediately returns to the trees. We do not know whether the python consumed its prey at ground level or in the canopy. In semiarid regions and suburban areas, *M. spilota* has been observed to feed both underground and in elevated structures such as trees and roof cavities (Shine and Fitzgerald 1996; Fearn *et al*. 2001; Corey 2007). This suggests an equal likelihood of arboreal or ground-level predation. However, little is known about its feeding ecology in the rainforest (Fill *et al*. 2012). Fitzgerald *et al*. (2004) recorded Stephen's banded snake (*Hoplocephalus stephensii*) feeding upon arboreal mammals such as the pygmy feathertail glider (*Acrobates pygmaeus*), the fawn-footed melomys (*Melomys cervinipes*) and the eastern pygmy-possum (*Cercartetus nanus*). Although this snake is arboreal, it also consumed ground-dwelling mammals such as bush rats (*Rattus fuscipes*) (Fitzgerald *et al*. 2004). The range of predator foraging strategies in these two reptiles may result in a diverse range of prey behaviour.

The record described here represents only one of 49 records of mammalian prey items of tropical pythons from our wider study in the Wet Tropics (21 *Morelia kinghorni*, 28 *M. spilota*: Fill *et al*. 2012), suggesting either that *Pogonomys* sp. is uncommon in this area (an unlikely scenario given other reports of *Pogonomys* abundance by Rader and Krockenberger (2006) and Winter *et al*. (2008)) or, more plausibly, that *Pogonomys* sp. is not commonly taken by pythons. *Pogonomys* sp. was the second smallest prey item taken by pythons in the Wet Tropics (Fill *et al*. 2012). The small size of this mammal would be expected to render it easier prey than larger species (Fitzgerald *et al*. 2004), but the low frequency of *Pogonomys* sp.in python diet hints at behavioural traits that help avoid predation.

Our study underscores the utility of indirect survey methods, such as hair identification in predator scats or stomach contents, particularly in confirming the presence of species that are difficult to detect via other survey methods (Valente 1981; Paltridge 1998). Our notes on the identification of the hair of *Pogonomys* sp. may prove useful to others and enable further study on this cryptic rainforest species.

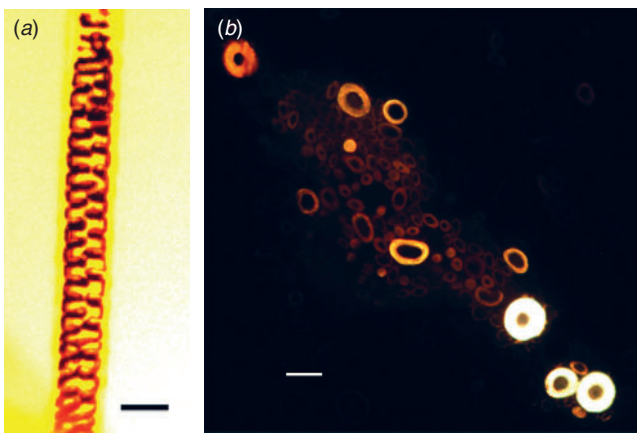

Fig. 1. Whole-mount view of primary guard hair in shield region showing narrow aeriform lattice (*a*), and cross-section view, showing circular and eye-shaped hairs (*b*), of *Pogonomys* sp. Scale bar: 30 µm.

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