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1 HUMAN PREDATION BY A SNAKE

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3 **Biting off more than you can chew: attempted**
4 **predation on a human by a giant snake (*Simalia***
5 ***amethystina*)**

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35 the predation attempt.

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41 **Abstract**

42 On 10 March 2014 a radio-tracked Australian scrub python (*Simalia amethystina*)
43 made a predatory attack on a 64 kg sleeping woman. The snake was unsuccessful, but
44 data from our radio-tracking program suggest that predation attempts on oversized
45 prey are not uncommon – even if they threaten the survival of the predator. We
46 explore hypotheses about why snakes attempt to consume such large meals.

47

48 *Key words: Cape York; constrictor; feeding ecology; Morelia kinghorni; oversized;*
49 *scrub python*

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51 **Main text**

52 At 0228 h on 10 March 2014, one of us (Lee-Ann) was awoken abruptly when
53 her right leg was seized by a large (3.60 m) Australian scrub python (*Simalia*
54 *amethystina*) that had crawled in through an open door. The python seized her on the
55 thigh, and immediately began to throw coils around her body. Lee Ann was able to
56 free herself from those coils, subdue the snake, and trap it in the kitchen.

57 The unprovoked nature of the attack, and the snake's use of constriction, attest
58 to the fact that this was an attempt at predation. If the snake involved was a more
59 heavy-bodied species, the attack on Lee-Ann would be surprising (snakes rarely eat
60 people) but not inexplicable. A reticulated python (*Malayopython reticulatus*) or
61 green anaconda (*Eunectes murinus*) of 5 m body length might weigh > 35 kg, and
62 hence be able to overpower and ingest a small to medium-sized person (Rivas 1998;
63 Headland & Greene 2011). But at 64 kg, Lee-Ann weighed more than 13 times as
64 much as the 4.6 kg scrub python that seized her. No snake can consume such a large
65 prey item (Arnold 1993; King 2002; Wiseman *et al.* 2019).

66

67 Lee-Ann's experience is not unique. Brown tree snakes (*Boiga irregularis*;
68 Pacific Islands), Mozambique spitting cobras (*Naja mossambica*; southern Africa)
69 and common kraits (*Bungurus caeruleus*; India) frequently attack and envenomate
70 sleeping people, especially newborn babies (Fritts *et al.* 1990; Broadley & Blaylock
71 2013; Suraweera *et al.* 2020). Again, the snakes involved (which weigh < 3 kg) would
72 be unable to ingest even the smallest human being (Fritts *et al.* 1994). Why, then, do
73 these snakes sometimes try to kill and consume prey items that are far beyond their
74 capacity to ingest? Below, we provide additional information about the predation
75 attempt (above) that may help to clarify its nature.

76 Remarkably, the snake that seized Lee-Ann was fitted with a VHF radio-
77 transmitter at the time. Our radio-tracking study was carried out in the Lockerbie
78 Scrub, a large area of rainforest and woodland at the tip of Cape York Peninsula,
79 Australia. Temperatures remain high (30°C +) year round with a mean annual rainfall
80 of 1744 mm (range = 1268 to 3184 mm), primarily falling during the summer
81 monsoon (December to April; see Natusch *et al.* 2016 for additional details). The
82 snake (an adult male) had been fitted with a transmitter on 4 February 2014, five
83 weeks before the attack. Over that period it had moved 100 m from woodland to the
84 vicinity of the house occupied by Lee-Ann and her family; this displacement distance
85 is well within the range we have recorded for conspecifics in this area (N = 27 snakes
86 radio-tracked; D. Natusch unpubl. data). The house is isolated, and is surrounded by
87 rainforest and woodland (the closest other dwelling is > 15 km away). Scrub pythons
88 are common in this area, and are not considered a threat to people.

89 On the day preceding the attack, one of us (D. Natusch) tracked the specimen
90 involved and located it beneath a shipping container near Lee-Ann's home. It is not

91 unusual for pythons to frequent areas close to human habitation; radio-tracking of
92 other python species on the edge of suburbia have shown that these large snakes
93 spend much of their time around houses rather than in bushland, presumably
94 reflecting resource subsidies (notably, more mammalian prey in these disturbed sites:
95 Slip & Shine 1988; Shine & Fitzgerald 1996; Fearn *et al.* 2001). However, the large
96 size of this individual suggested that it might pose a threat to the two small children
97 (aged 1.5 and 3 years) living in the house. It was impossible to remove the animal
98 because it was inaccessible, so we suggested that windows and doors to the children's
99 room should be closed at night as a precaution. This was done. However, Lee-Ann
100 (the only adult at home) kept her own door ajar to allow airflow to increase comfort in
101 the tropical heat. The attempted predation event occurred that night, while she was
102 sleeping. The snake was released ~200 m away the next day. On 30 January 2015, the
103 same snake that attacked Lee-Ann returned to the house and overpowered and
104 rendered unconscious a ~25 kg dog (545% of the snake's body weight), which
105 required resuscitation (Table 1). The snake was then relocated further away from the
106 residence, to prevent recurrence of such attacks.

107 The most puzzling aspect of this attack was not the fact that a large python
108 would attempt to consume a person; such attempts at predation (sometimes
109 successful) have been reported occasionally for the two largest snake species
110 worldwide (anacondas and reticulated pythons; see above and Rivas 1998; Headland
111 & Greene 2011). Pythons typically consume a wide taxonomic diversity of
112 mammalian prey, including primates (Shine *et al.* 1998). We are aware of at least five
113 verified attacks and/or deaths of people from reticulated pythons in Indonesia alone
114 since 2017 (Table 2). Although far more slender-bodied than either of the two taxa
115 mentioned above, scrub pythons are Australia's longest snake species (to 6 m: Fearn

116 & Sambono 2000) and often attack and kill domestic pets. At least two predatory
117 attacks on children have been documented since 2018
118 ([https://www.abc.net.au/news/2018-10-20/queensland-family-saves-toddler-from-](https://www.abc.net.au/news/2018-10-20/queensland-family-saves-toddler-from-pythons-jaws/10400156)
119 [pythons-jaws/10400156](https://www.abc.net.au/news/2018-10-20/queensland-family-saves-toddler-from-pythons-jaws/10400156); [https://www.news.com.au/lifestyle/real-life/news-life/father-](https://www.news.com.au/lifestyle/real-life/news-life/father-saves-four-year-old-son-from-enormous-scrub-python-in-airlie-beach/news-story/f518b2e6d91eb79b8fe9232dcba5fc53)
120 [saves-four-year-old-son-from-enormous-scrub-python-in-airlie-beach/news-](https://www.news.com.au/lifestyle/real-life/news-life/father-saves-four-year-old-son-from-enormous-scrub-python-in-airlie-beach/news-story/f518b2e6d91eb79b8fe9232dcba5fc53)
121 [story/f518b2e6d91eb79b8fe9232dcba5fc53](https://www.news.com.au/lifestyle/real-life/news-life/father-saves-four-year-old-son-from-enormous-scrub-python-in-airlie-beach/news-story/f518b2e6d91eb79b8fe9232dcba5fc53)). Children are within the prey size range
122 for large scrub pythons (which can weigh up to 35 kg: Fearn & Sambono 2000); our
123 research has recorded nine cases (out of 32 recorded predation events or attempts) in
124 which prey equaled or exceeded the snake's own body mass. In three of those cases,
125 the prey consumed was so large that the predator died after ingesting it (Table 1; Fig.
126 1). Southern African pythons (*Python natalensis*) have also been observed attempting
127 to consume prey items that were clearly too large (Fig. 2). This phenomenon may be
128 more widespread in snakes than previously thought, with the magnitude of the
129 difference between predator and prey likely greatest in the large constrictors (Boidae,
130 Pythonidae).

131 The puzzle, then, is why snakes sometimes attack prey items that are clearly
132 far too large to ingest; or even if ingestible, are so large that they threaten survival of
133 the predator (Table 1; Fig. 1). We consider several possible explanations. First, it may
134 be a case of mistaken identity. In some cases, the snake may only see part of the
135 whole prey item. Once the snake strikes the prey, its natural feeding response ensues
136 even if the prey item is too large to consume. The immobility of a sleeping person
137 removes visual cues as to whether or not the object in question (e.g., a hand or a leg)
138 is part of a larger body *versus* being a smaller (edible-size) separate object. Linked to
139 this, a hungry snake may mistake human odour (e.g., sweat) for the scent of a prey
140 species. Alternatively, the snake may misinterpret the situation as being one with

141 multiple individuals of the prey taxon, such as a mother and dependent young, or a
142 nest full of juvenile mammals. Prolonged proximity of mothers and their dependent
143 offspring in mammals means that an actively-foraging snake often may encounter
144 multiple individuals (each of them small enough to be ingestible) in physical contact;
145 and hence, that seizing an appropriately-small object may be a successful tactic. Even
146 after the snake realizes that it has seized a small part of a much larger animal, it may
147 retain its grip because releasing the hold may allow the potential prey item to
148 retaliate; and if the prey is killed, the snake may take the risk of attempting to ingest
149 it. Finally, optimal foraging theory suggests that the benefit of a large meal may
150 outweigh the risk of a snake misjudging the size of a prey item (Arnold 1993),
151 favouring strenuous attempts to ingest prey even if that ultimately proves to be
152 physically impossible.

153 In summary, the explanation for why snakes sometimes attempt to prey on
154 prey items too large to ingest remains obscure. Nonetheless, the threat posed by large
155 constrictors and the medical relevance of envenomation of sleeping people
156 (especially, in Asia and Africa) warrants further investigation into this phenomenon.
157 Experimental trials could usefully explore feeding responses of snakes to objects too
158 large to swallow (models, or non-human prey), and to cues provided by those items
159 (e.g., scent: Chiszar et al. 1993). Such studies on apparently non-adaptive prey choice
160 criteria in snakes may help to unravel the drivers of this behavior and help to mitigate
161 the risks associated with this puzzling form of conflict between snakes and people.

162

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220 **Figure and table captions**

221

222 Table 1. Summary of extreme predation records by scrub pythons (*Simalia*

223 *amethystina*) in tropical Australia. SVL = snout-vent length.

224

225 Table 2. Summary of recent predation attempts on people by reticulated pythons in

226 Indonesia. Local people estimated snake length. The outcome for the attack victim is

227 also shown. Data compiled by Daniel Natusch – photo or video evidence is available.



228

229 Fig. 1. Scrub pythons (*Simalia amethystina*) regularly ambushed and consumed agile
230 wallabies (*Macropus agilis*; above) and a 4 m male scrub python (7385 g) found dead
231 in situ with a 7410 g red-legged pademelon (*Thylogale stigmatica coxenii*) in its gut
232 (below).



233

234 Fig. 2. A 25 kg blue wildebeest (*Connochaetes taurinus*) killed by a 3.9 m Southern
235 African python (*Python natalensis*) weighing 31.4 kg. The python tried to ingest the
236 wildebeest for two hours before giving up. The python was unable to pass the head,
237 let alone the antelope's front legs and shoulders. Photo and data supplied by G.

238 Alexander.

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