

PREDATION ON SUN BEARS BY RETICULATED PYTHON IN EAST KALIMANTAN, INDONESIAN BORNEO

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ABSTRACT. – The Malayan sun bear is the largest member of the order Carnivora on the island of Borneo. Few records exist of predation on this species beside humans, whereas accurate recordings of natural predation events can teach us about the ecology of the prey species. Here I report on an attempted and a successful predation of Malayan sun bears by a reticulated python, both in a lowland dipterocarp forest in East Kalimantan. The successful predation was accomplished by a ~7 m reticulated python. The python preyed and swallowed an adult female sun bear, possibly weakened at the time due to a fruiting failure and nursing of a cub. Both predation events occurred at night, with the python probably surprising the bears during their sleep.

KEY WORDS. – *Helarctos malayanus*, Indonesia, Kalimantan, predation, python, *Python reticulatus*, sun bear.

INTRODUCTION

Throughout the world bears are at the top of the food chain with few natural predators, apart from man and congeners, which are capable of killing and eating an adult individual (e.g. Garshelis, 2004). The Malayan sun bear is the smallest bear species, with the Bornean subspecies (*Helarctos malayanus euryspilus*) weighing between 20-40 kg for females and 30-60 kg for males in the wild (Fredriksson unpubl. data; F. Nomura pers. comm.; Wong et al., 2004). The distribution range of the sun bear covers most of tropical mainland Southeast Asia's forests as well as the islands of Sumatra and Borneo (Servheen, 1999). Sun bears are primarily diurnal (Wong et al., 2004; Fredriksson, in prep.), though reportedly more nocturnal in forests with much human traffic (Griffiths & van Schaik, 1993). Usually sun bears are encountered solitary and the most common social grouping is a female with cub(s), though infrequently 3 bears have been sighted together (Fredriksson, unpubl. data.). Sun bears are mainly terrestrial though expert tree climbers, with a diet that primarily comprises of insects and fruits (Wong et al., 2002; Fredriksson, in prep.).

The main predator of sun bears throughout its range is by far man (Meijaard, 1999; Fredriksson, 2005). Tigers and other large felines are also potential predators (e.g. Kawanishi & Sunquist, 2004). Here I report on a predation of a wild female sun bear, radio-collared at the time for an ecological study, by a reticulated python, and another unsuccessful predation attempt, in East Kalimantan, Indonesian Borneo.

The reticulated python (*Python reticulatus*, Pythonidae), is thought to be the world's largest or second largest snake (Shine et al., 1999), or at least the world's longest snake (Murphy & Henderson, 1997). They inhabit tropical rainforests of Southeast Asia from Myanmar (Burma) to most of the islands of the Philippines and Indonesia (Auliya & Abel, 2000a; Auliya, 2003a). The longest recorded length of a python comes from the island of Sulawesi, Indonesia, where a reticulated python measuring 10.05 m was caught (Raven, 1946; Murphy & Henderson, 1997). Females can attain much larger body sizes than males when mature (Shine et al., 1998), but sexual dimorphism varies between areas (Shine et al., 1999). Large (>6 m) pythons are rarely encountered and during Shine et al's (1999) study of reptile slaughterhouses few were recorded. Very large specimens may be relatively scarce as well in other natural python populations (Bhupathy, 1990). Huge pythons can attain a body mass of up to 150 kg (Pope, 1975).

The reticulated python has a broad head and a huge gape enabling it to swallow large prey. Long curved teeth ensure that once the snake has caught its prey, it rarely loses grip. The snake is a powerful constrictor and when adult it can overpower and kill animals as large as pigs, deer, and dogs (Auliya, 2003a, 2003b). Prey are killed by asphyxiation, looping its body around the victim, squeezing until it stops breathing. The reticulated python is a nocturnal hunter that heavily relies on ambush tactics to catch prey. The thick and heavy body is usually firmly anchored when the python strikes. Due to their good camouflage prey may come close

without detecting them. Pythons have sensory organs (infrared-sensitive labial pits) in order to locate prey accurately, even in total darkness. Pythons allegedly often wait in ambush at a spot where wildlife frequently passes by (Slip & Shine, 1988), although it might be possible that prey are traced during inactivity (Auliya, 2003a). Despite their massive size, a reticulated python is surprisingly hard to spot due to its excellent camouflage and partly because it is less active during the day and remains extremely silent. Prey size increases with larger body size (Shine et al., 1998, 1999; Auliya, 2003a), with small pythons mainly feeding on rats but shifting to larger mammals at 3–4 m body length, depending on prey availability (Shine et al., 1998; Auliya, 2003a). Prey recorded for pythons in Indonesia range from small mammals like rats (Muridae) and shrews (Soricidae), to larger animals like civets (Viverridae), pangolins (Manidae), porcupines (Hystricidae), binturong (*Arctictis binturong*), primates, wild pigs (Suidae), as well as domesticated prey like chickens, dogs, cats in agricultural/urban areas (Shine et al., 1998; Auliya & Abel, 2000b). It is one of the few snakes in the world known to eat humans occasionally. Kopstein (1927) reports on a 14-year old boy eaten by a 5.17 m reticulated python, and Schmidt (1998 in Auliya, 2003a) reports of a 32 year-old man eaten by a 7 m python.

STUDY SITE

The reported case of sun bear predation took place in the Sungai Wain Protection Forest, near Balikpapan, East Kalimantan, Indonesian Borneo (1° 05' S and 116° 49' E). The reserve covers a watercatchment area of circa 10,000 ha. The topography of the reserve consists of gentle to sometimes steep hills, and is intersected by many small rivers. The area varies in altitude from 30 to 150 metres a.s.l. The most common tree families above 10 cm dbh (diameter at breast height) are Euphorbiaceae, Dipterocarpaceae, Sapotaceae and Myrtaceae. Poaching is rare and primarily restricted to the borders of the reserve (Fredriksson & de Kam, 1999). The reserve contains relatively large populations of potential prey species for pythons. Bearded pigs (*Sus barbatus*), barking deer (*Muntiacus spp.*), and mouse deer (*Tragulus spp.*) are common (pers. obs.), as well as a primarily ground-dwelling pig-tailed macaques (*Macaca nemestrina*), civets, pangolins (*Manis javanica*) and other ground dwelling mammals like porcupines are also present.

PREDATION ATTEMPT

On June 21, 1999, a probable python attack occurred on a 3-year-old, 31-kg female sun bear. This bear had been confiscated as a cub and subsequently taken to the forest where I had raised her for several months before releasing her in the study area with a radiocollar, 1.5 years prior to the predation event. The bear's activity was being monitored continuously that day, and it had been sleeping for several hours when, at 0130, 4 loud barks were heard, suggesting that it was involved in an agonistic encounter. Afterwards, the bear was heard growling for 30 min up in a tree.

The next morning the bear was observed in a tree nest, with blood drops covering nearby undergrowth. At 1800 it climbed down and could be examined more closely (having been raised in captivity, the bear could be touched). The left side of the bear's face was swollen with a row of small superficial scabs found on the skin. On both back feet 2 claws each were torn out, causing the blood that was encountered on the undergrowth below the nest. Otherwise no obvious physical wounds could be found, nor were any signs of other animals (e.g. feline, pig) encountered at the place of attack. From the nature of the wounds and by eliminating all potential predators a python appeared the most likely attacker. The subsequent successful predation event occurred only 100 m from the site of this predation attempt.

PREDATION EVENT

A wild adult female sun bear weighing 23 kg, with a small cub (1–2 months old), was trapped on July 6, 1999. This bear was in a poor physical condition (probably >10 kg underweight), due to a prolonged fruit shortage at the time compounded with nutritional stress from nursing a small cub. The bear's canines were worn down to stumps and her age was estimated to be >10 years. She was fitted with an activity and mortality-sensing radiocollar (ATS, Isanti, Minnesota, U.S.A.).

The bear was monitored on a daily basis, with locations obtained by triangulation, in the morning, midday and afternoon. A 24-hour activity monitoring was conducted once a week by listening and recording the pulse rate of the bear's radio transmitter every 10 minutes.

On the afternoon of July 30, the bear was located and found to be active. The next morning she was located 550m from the previous location, but her radio signal indicated that she had not moved for ≥ 4 hours, which was indicative of either mortality or a dropped radiocollar. I tracked the collar to a swamp, and ultimately found that the signal was being emitted from the stomach of a large python, which was curled under a thicket. After being poked with a stick, it fled into a nearby stream, producing, as it twisted, the sound of breaking bones (Fig. 1). The bulge of the bear was ~2 m from the python's head. No traces of a struggle were found near the site where the python was encountered nor any signs of the sun bear's cub.

The python remained resting in the stream until August 3, when it moved into a large hollow log (*Shorea laevis*), 120 m from the site where it was initially encountered. The log had an outer diameter of 153 cm and was hollow for approximately 8 m. The python was back about 5 m from the entrance. A few metres from the log entrance a large skin shedding of a python was found.

The radiocollar remained functioning and hence the python's movements could be monitored on a regular basis. The signal of the collar remained fully inactive for 26 days, while the python remained inside the log. On August 30 the python

left the tree hollow and entered the swamp again. As the radiocollar contains batteries in a metal casing it was decided to monitor closely whether the python would regurgitate remains of the bear, including the radiocollar. On September 8, I decided to catch the python and hold it in captivity to facilitate collection of regurgitated remains. Ten villagers were recruited and the python was caught manually and put in a steel-barred cage. That same night the python escaped by dislodging the bars of the cage through squeezing. The next day the python was caught again (Fig. 2), now encountered in a small underground stream. This time it was placed inside a barrel trap, designed for catching the sun bears.

After holding the python for a month, it only passed remains of bones. Thus, on October 29 I retrieved the collar surgically. The snake was sedated with zolazepam–tiletamine (Telazol® 3.75 mg/kg for an estimated weight of 80 kg). Full sedation took several hours due to initial low dosage of drugs (recommended dosage 20mg/kg, Kreeger et al., 2002). Once fully anaesthetized the python was palpated to find the radiocollar and an incision was made in the skin and large intestine and the radiocollar removed.

The python measured 6.95 m and weighed 59 kg, after having not eaten for nearly 3 months. Sex was not determined. The snake was held in captivity and monitored for another 3 weeks, twice being fed a chicken, and then released on November 20.

DISCUSSION

This is the first detailed record of predation of bears by a python, and could only have been recorded due to the fact that the bear was radiocollared. By its very nature, predation is a once in a life time experience, hence difficult to observe. Although anecdotal, accurate recordings of predation events can teach us about the ecology of the prey species. The only other published case of a radio-collared mammal being eaten by a python was reported by Martin (1995), involving an amethystine python (*Morelia amethystina*) that preyed on a



Fig 1. Reticulated python (~7 m) lying in a small stream after having swallowed an adult female sun bear; the bulge on the left hand side in the python contains the sun bear.

Bennett's tree-kangaroo (*Dendrogaleus bennettianus*) in North Queensland, Australia.

Few published records exist of bear predation by other animals. Kurt & Jayasurya (1968) report of a sloth bear (*Melursus ursinus*) eaten by a leopard (*Panthera pardus*). Sloth bears, due to their less arboreal and more aggressive nature, might be less inclined than sun bears to climb a tree when threatened by a leopard; however, leopards are also expert tree climbers (Laurie & Seidensticker, 1977). A number of records exist of bears being predated upon by conspecifics (*Ursus arctos*, S. Brunberg. pers.comm.), or congeners (Garshelis, 2004). In terms of animal predation on sun bears, few published records exist. Kawanishi & Sunquist (2004) report on 3 tiger (*Panthera tigris*) scats containing sun bear remains from peninsular Malaysia. Other predators on mainland Southeast Asia and Sumatra could potentially be the common leopard, and the clouded leopard (*Neofelis nebulosa*), which occur sympatrically with sun bears. The moon bear (*Ursus thibethanus*), also occurring sympatrically throughout parts of the sun bears range, being substantially larger than the sun bear, could potentially pose a risk to sun bears.

A sun bear, with its long claws and powerful jaws with large canines, would be a formidable prey for a python. In the cases reported here, it appeared that the sun bears were probably caught by surprise while they were sleeping. It is possible that a python had come across the sleeping bear, which usually spend the night resting on a log or on the forest floor. Although it has been described that pythons attack from ambush, it is possible that the python followed a scent trail (M. Auliya, pers. comm.), came across the bear, bit it in the face (indicated by the scars from the predation attempt) while trying to constrict it. Moreover, in the successful predation event, the python was >3 times the mass of the bear. Animals much larger than bears, such as >60-kg wild pigs have been swallowed by pythons (Shine et al., 1998; Auliya, 2003b).

Although little is known about what body size a python would need to attain in order to successfully overpower a sun bear,



Fig 2. Reticulated python being pulled out of an underground stream 1.5 month after it swallowed a radio-collared adult female Malay sun bear (photo courtesy M. van Nieuwstadt).

it seems likely that it will need to be a fairly large specimen. The python that predated on the sun bear during this study was large (~7 m), and densities of such large pythons are probably low, even more so as large pythons are becoming extremely rare due to unsustainable harvesting (Shine et al., 1999). Of >1000 python stomach contents examined in Sumatra, none contained remains of a sun bear (Shine et al. 1998), although predation of a sun bear by a python in the interior of Borneo was reported by a local Dayak (Domalian 1991 in Auliya & Abel, 2000b).

It remains unclear whether the incidents reported here were truly rare events. During the course of my study, only 6 sun bears were radiocollared, 3 wild caught and 3 partially reared in captivity. One of the captive-reared bears was killed by a person, and one of the wild-caught bears apparently starved after a prolonged fruiting failure, subsequent to the 1997-1998 ENSO event. The fruiting failure possibly contributed to the death of the bear that was captured by the python, due to her weakened physical condition. Perhaps these predation events are not uncommon during such periods of food scarcity, which on Borneo occur at irregular intervals.

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