The Atherton Tablelands is a 700–900-m high plateau in North Queensland, Australia. Prior to European settlement, the region was covered largely by upland rainforest interspersed with areas of more open sclerophyll forest. Large-scale clearing for agriculture began in the early part of the 20th century and continued for a number of decades. Logging was in decline by the time most of the remaining rainforest was incorporated into the Wet Tropics World Heritage Area in the late 1980s.

# Giants in the Rainforest: A Radiotelemetry Study of the Amethystine Python in North Queensland, Australia

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Photographs by the senior author except where indicated.

## Chasing Big Snakes

The ping from the receiver indicated the Amethystine Python (*Morelia kinghorni*) was very close; judging by the volume it was less than two meters in front of me. Once again, I am amazed at how these large snakes manage to "melt" into the forest floor. After some frustration and muttered curses, like a switch coming on in my head, I see him. Stretched out in the leaf litter is the large muscular predator right where I had been looking for the last minute or so. At 3.5 m, this male is larger than average, which is slightly less than 3 m in length (A.B. Freeman, unpubl. data; Fearn et al. 2005). We have been following him for over two years now and he has become like an old friend. He watches me cautiously as I quietly withdraw a short distance to start data collection. Five minutes later, he decides

Amethystine Pythons (*Morelia kinghorni*), such as this large male, appear to "melt" into the forest floor.

ELLEN REID

Catching a large python is often a collaborative effort. Here the authors chase a telemetered snake.

that I am no threat and turns to continue on his way. After two and a half years and many hours spent studying these magnificent animals in the wild, the sight of this large reptile moving over the forest floor still gives me a buzz of excitement.

We started the radiotracking project in April 2004. For the preceding two years, we had been collecting roadkill data and incidental records for this species on the Atherton Tablelands in North Queensland. We came to the conclusion early that radiotracking individuals would be necessary to really understand more about the ecology of this species in the wild. In particular, we had become interested in how this large predator uses a landscape that is highly modified by land clearance and agricultural development.

**Where and How Do You Study Big Snakes?**

The Atherton Tablelands is a mid-elevation plateau (700–900 m), situated southwest of the city of Cairns in North Queensland, Australia. Prior to European settlement, the region was covered largely by upland rainforest interspersed with areas of more open sclerophyll forest (Winter et al. 1987). Large-scale clearing for agriculture began in the early part of the 20th century and continued for a number of decades (Winter et al. 1987). Logging was in decline by the time most of the remaining rainforest was incorporated into the Wet Tropics World Heritage Area in the late 1980s. Today, the area is a mosaic of pasture, crops, and small towns. Interspersed among these are rainforest fragments ranging in size from a few trees to 600 ha, many dissected by major and minor roads. Small areas of secondary growth are common, particularly along riparian corridors. Large areas of continuous forest are confined to the slopes of hills that surround the Tablelands. Our study area is situated on the eastern edge of the Tablelands, centered on the School for Field Studies Centre for Rainforest Studies. In the immediate vicinity are all of the main habitat types known to occur in the Atherton Tablelands, everything from cattle pastures to World Heritage rainforests that have never been cleared.

The Amethystine or Scrub Python is the largest snake in Australia. It is also arguably the largest terrestrial carnivore in Australia. Surprisingly, very little is known about its ecology in the wild. Most accounts of this species have been observations of specific events (Fearn and Sambono 2000; Turner 2001;

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Fearn 2002), valuable in themselves but far from the detail needed to get a complete picture of this species' ecology. Scientific studies have been few and far between (Martin 1995; Fearn et al. 2005).

The radio transmitters are surgically inserted into the body cavity of the snake near the vent. Because of the body shape of snakes, this is the only practical way one can "attach" a transmitter to them. After about 9–11 months, pythons are recaptured and the transmitter is removed or replaced before the batteries expire. Over a period of 27 months, we have radiotracked six individual pythons for varying lengths of time. The snakes are located on average twice a week. When located, detailed notes are made of the habitat in which they were found, their exact locality is recorded using a handheld GPS, and air and ground temperatures and a range of behavioral variables are recorded. If at all possible, we try to visually locate the snakes, but many times, particularly when they are in the canopy and emergent layers of the forest, they are impossible to see.


Map of the Atherton Tablelands in North Queensland, Australia.

Today, the Atherton Tablelands of North Queensland, Australia is a mosaic of pasture, crops, and small towns. Interspersed among these are rainforest fragments ranging in size from a few trees to 600 ha, many dissected by major and minor roads. Small areas of secondary growth are common, particularly along riparian corridors. Large areas of continuous forest are confined to the slopes of hills that surround the Tablelands.

**Some Preliminary Results**

The tracking so far indicates that Amethystine Pythons on the Atherton Tablelands are strongly but not exclusively forest dwellers. The majority of sightings of radiotracked snakes (around 75%) have been in forest habitats, either rainforest or rainforest regrowth, with around 20% of sightings of animals in clearings or along the forest edge. The remaining sightings are in sclerophyll forest. One of the most interesting findings to emerge from the study is knowledge of the snakes' behavior during the cool misty winters of the Tablelands. Radiotracking has shown that during the coldest part of the year, Amethystine Pythons spend most of their time in large epiphytic basket ferns (*Drynaria* sp.) in the canopy and emergent layers of the forest. Similar behavior was documented on the Atherton Tablelands in the late 19th century by the explorer Carl Lumholtz, who described how in winter his Aboriginal guides would climb high into ferns to catch pythons for food. Although he referred to those snakes as *Morelia variegata* (Lumholtz 1889), judging by their size, they could only be Amethystine Pythons. Studies in Neotropical rainforests have shown that temperatures are significantly higher in the canopy and above it than below it (Madigosky 2004). These very large epiphytes (most are larger than 1 m in width) in the canopy and in emergent trees therefore serve as ideal basking platforms.

Far from being a big, slow sluggard of a snake, the Amethystine Python can move far and relatively quickly when necessary. In many ways, these pythons, with their gracile bodies, long tails, and slender necks, are built more like an arboreal colubrid or treeboa than a large python.

One of the males has a home range of over 200 ha, whereas another male moved over 800 m in a 24-hr period. They seem to apply both "sit-and-wait" and "active-foraging" strategies for prey capture. During the warmer months, we have come across

Although most frequently encountered lying motionless on the forest floor or in the canopy, one male Amethystine Python (*Morelia kinghorni*) had a home range of over 200 ha, and another male moved over 800 m in a 24-hr period.

AMANDA FREEMAN

Radiotracked snakes were located on average twice a week. Detailed notes document the habitat in which they were found. Here the senior author is radiotracking the snake visible on the ground.

Rainforest canopy from below. During the coldest part of the year, Amethystine Pythons (*Morelia kinghorni*) spend most of their time in large epiphytic basket ferns (*Drynaria* sp.) in the canopy and emergent layers of the forest.

individual snakes displaying what can only be called active "exploratory" behavior in the middle of the day. In one case, a large male was observed moving systematically over the forest floor, his tongue constantly flicking, pushing his head into holes and then withdrawing it. Active foraging by Amethystine Pythons, while seldom observed, is fairly well known because of the number of pythons that are trapped in chicken coops after eating their fill and then being unable to squeeze back out through the wire mesh. More commonly, these pythons have been found in a sit-and-wait foraging stance, often next to obvious mammalian trails through dense grass or undergrowth.

While we have never observed an animal "in the act" of swallowing prey, we have obtained some information on diet in the study area from droppings, regurgitated samples, and the contents of one dissected stomach. So far, the Amethystine Pythons have shown a preference for Bandicoots (*Isoodon macrourus* and *Parameles nasuta*) and Red-legged Pademelons (*Thylogale stigmatica*). The former are small marsupial omnivores similar in appearance to a large rat; the latter is a medium-sized forest macropod. Other food items that we have recorded from pythons in the study area and elsewhere include Spectacled Flying Foxes (*Pteropus conspicillatus*), rats (*Rattus* sp.), cats (*Felis catus*), and birds. The most unusual item we have found is reptilian eggs that were in the droppings of one of the radiotracked females. How these came to be in the snake we have no idea, and we have yet to identify the species to which the eggs belong.

BRUCE TOMSON

Amethystine Pythons (*Morelia kinghorni*), such as this female, can move far and relatively quickly when necessary. In many ways, these pythons, with their gracile bodies, long tails, and slender necks, are built more like an arboreal colubrid or treeboa than a large python.

Sadly, we have collected almost no data on reproductive behavior. No observations have been made of fighting behavior in males or of mating, and none of the three tracked females has attempted to brood a clutch.


AMANDA FREEMAN

Amethystine Pythons (*Morelia kinghorni*), such as this female, use both "sit-and-wait" (seen here) and "active-foraging" strategies for prey capture.


AMANDA FREEMAN

Bandicoots, small marsupial omnivores similar in appearance to a large rat, are favored prey for Amethystine Pythons (*Morelia kinghorni*).

**Other Reptiles in the Study Area**

In addition to the Amethystine Python, another boid present in the area is the smaller and more common Carpet Python (*M. spilota*). Two subspecies of this species are thought to occur on the Atherton Tablelands: the specialist rainforest-inhabiting "Jungle Carpet" and the more widespread "Coastal Carpet" (Barker and Barker 1994). However, from roadkill and incidental data that we have collected, no consistent pattern of habitat use differentiates the two supposed subspecies (Freeman and Bruce 2007). Consequently, we believe that the presence of two subspecies on the Atherton Tablelands is unlikely.

Other snakes that have been observed in the study area include Brown Treesnakes (*Boiga irregularis*), Common Treesnakes (*Dendralaphis calligastra*), Yellow-faced Whipsnakes (*Demansia psammophis*), Small-eyed Snakes (*Cryptophis nigrescens*), Eastern Brown Snakes (*Pseudonaja textilis*), and the impressive Red-bellied Black Snake (*Pseudechis porphyriacus*). However, perhaps the most spectacular and unlikely sighting in the area was of a Coastal Taipan (*Oxyuranus scutellatus*). This species is generally thought to be a snake of dry open areas. One of us (ABF) came across a 1.8-m animal on an old logging track in thick rainforest. This highly venomous species tends to have a bad reputation among the general public, but, in this case, the snake sat quietly for 30 seconds or so while it was photographed before moving off into the forest.

Lizards in the study area include a number of Wet Tropics endemics. The Chameleon Gecko (*Carphodactylus laevis*) and spectacular Northern Leaf-tailed Gecko (*Salturus cornatus*) are regularly observed at night during the warmer months, while the more secretive Boyd's Forest Dragon (*Hypsilurus boydi*) is less frequently seen. The skink fauna numbers eight species, ranging from the diminutive *Saproscincus tetradactylus* with a SVL of 33 mm to the impressive Pink-tongued Lizard (*Cyclodomorphus gerrardii*) with head-body lengths to 200 mm.

Other more widely distributed species that occur in the area include Eastern Water Dragons (*Physignathus lesueurii lesueurii*) and the imposing Lace Monitor (*Varanus varius*). This large varanid can reach lengths of 2 m elsewhere in Australia, and we have observed individuals over 1.5 m in our study area.

**Where to from Here?**

The radiotracking is about to finish, the last two snakes will be caught soon and their transmitters removed before they are released back into the wild. While the radiotracking will finish, we will continue to collect feeding observations for this species. Also, some circumstantial evidence suggests that Amethystine Pythons may suppress the densities of browsing folivores such as opossums and tree kangaroos in some rainforest fragments. Perhaps that will be our next research project.

Coastal Taipans (*Oxyuranus scutellatus*) are generally thought to be snakes of dry open areas. This highly venomous species tends to have a bad reputation among the general public, but, in this case, the snake sat quietly for 30 seconds or so while it was photographed before moving off into the forest.

Adult Lace Monitors (*Varanus varius*) are seen regularly in the study area. These large varanids can reach lengths of 2 m.

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Wet Tropics endemic Northern Leaf-tailed Geckos (*Salturus cornatus*) are regularly observed at night during the warmer months.

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