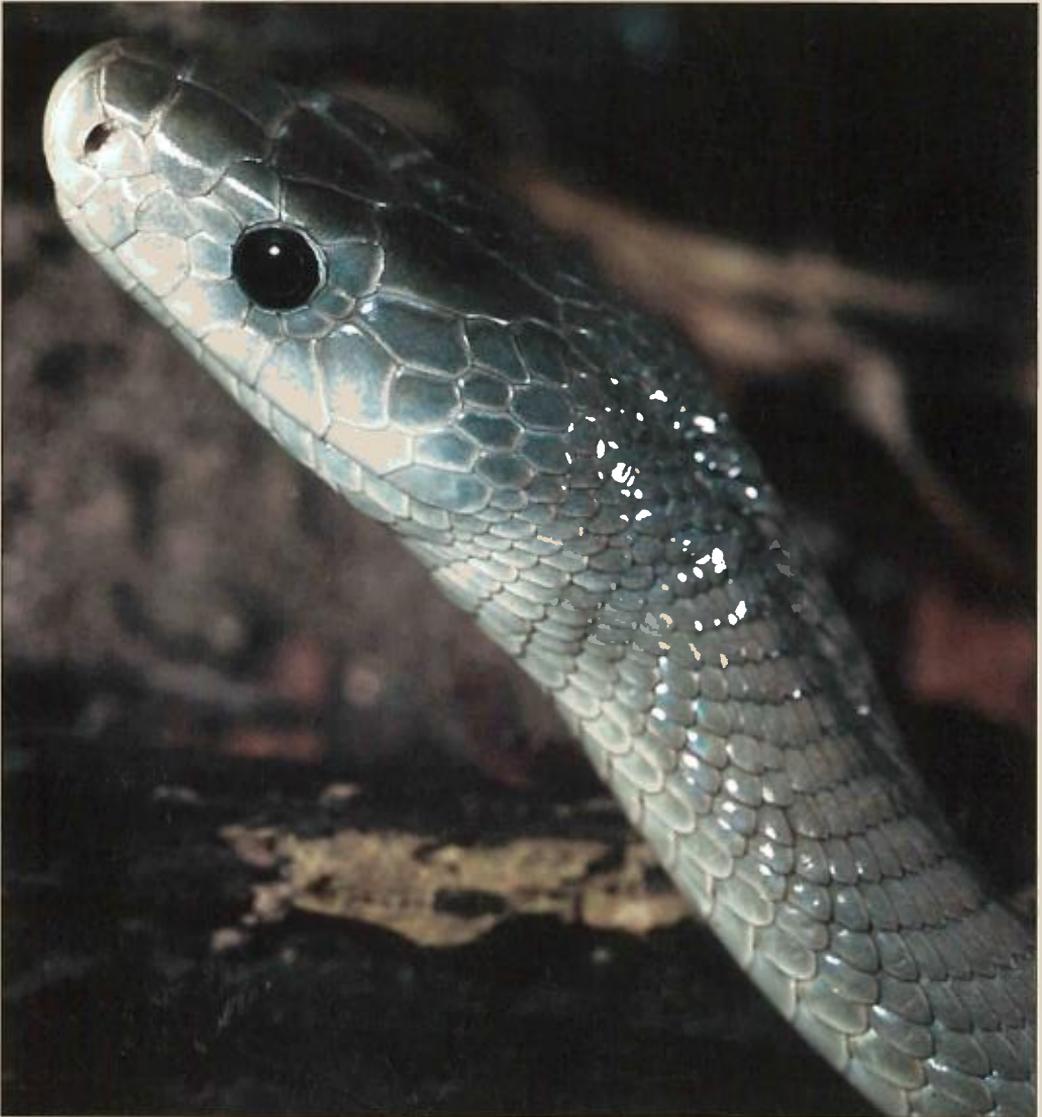


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A study of the Black Mamba (*Dendroaspis polylepsis*) in KwaZulu-Natal, South Africa, with particular reference to long-term-refugia

TONY PHELPS

Reptile Research and Imagery, 2 Grosvenor Road, Swanage, Dorset, BH19 2DD, UK.

THE Black Mamba, *Dendroaspis polylepsis*, is probably the most infamous snake on the African continent. The snake's reputation has been borne as a mixture of fact and fiction, but mostly fiction. It is true that the Black Mamba is a potentially highly dangerous animal and an untreated bite would almost certainly be fatal, but most accounts of its aggressive nature, such as unprovoked attacks, are much exaggerated and can be discounted.

Research on Black Mambas, and other high profile venomous snakes, usually has a clinical bias, particularly in a country such as South Africa where snakebite is a very real problem. Although it may seem a tenuous connection snakebite statistics may offer clues as to the true nature of the Black Mamba. During the 1960s attempts were made to assess the incidence and epidemiology of snakebite in the Durban area (Chapman, 1967). Over a seven-year period more than a thousand cases were admitted, and although many of the species responsible were not identified, only seven were Black Mamba bites, all of which were fatal. Similar studies do show that the Black Mamba is the cause of a number of accidents; however, other species figure much more highly. In the Durban area these are: Night Adder (*Causus rhombeatus*), Bibron's Stiletto Snake (*Atractaspis bibroni*), Mocambique Spitting Cobra (*Naja mossambica*), and the Puff Adder (*Bitis arietans*). A more recent and detailed study in northern KwaZulu-Natal based on 164 cases over a sixteen-month period revealed that most bites were caused by the Mocambique Spitting Cobra and Stiletto Snake (Coetzer & Tilbury, 1982).

The fact that the Black Mamba is not uncommon, even in urban areas of KwaZulu-Natal, strongly suggests that it is undeserving of

such a bad reputation. Just how common Black Mambas can be was first made apparent during my time as Curator of the Fitzsimons Snake Park, Durban, in the early 1980s. The duties of the snake park staff included dealing with so-called problem snakes. Many of these call-outs involved harmless species but quite a large number included venomous species such as Puff Adder, Night Adder, Boomslang (*Dispholidus typus*), Green Mamba (*Dendroaspis angusticeps*), and Mocambique Spitting Cobra. In addition, about two or three calls each week were positive Black Mamba calls, and many were found in some unlikely places. Black Mambas were caught in the Durban Botanical Gardens and in the roof space of a house where one had been feeding on bats. Many were taken from overgrown gardens, and one was even rescued from a ladies toilet at a caravan park. One aspect that was quite consistent when attending Black Mamba calls was that the residents often stated that the snake had been there for some time, perhaps months or even longer. It was also the case that some people were not too concerned about having the snake on the property until the land needed improving or development was imminent. Others were shocked to find that they had been sharing their space with such a notorious species.

Examining the sites where Black Mambas were caught was quite revealing. Often the refuge, a hole, or a series of holes, and perhaps the stems at the base of a bush, would be highly polished, clearly showing that a snake had been there for some time. Such refugia sometimes also contained shed skin of varying ages. On closer examination some sites even had evidence of egg fragments, revealing further proof of a long-term occupation. Although it is widely accepted, and often stated,

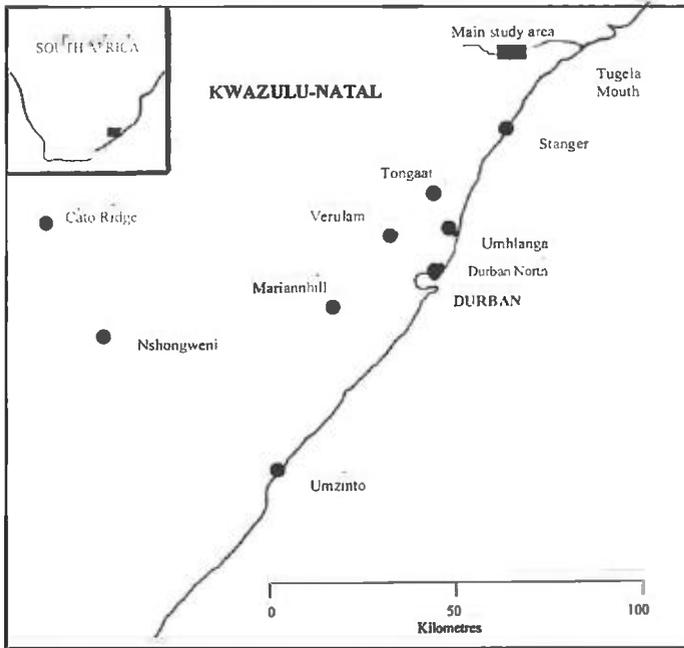


Figure 1. Durban, showing location of study areas.

that the Black Mamba, and some other large elapids, appear to operate from a permanent refuge, (Pitman, 1974; Broadley, 1983), such statements appear to be a result of personal observation and anecdotes. However, such information that existed in popular treatise was enough to initiate a study of this aspect of behaviour. In addition, the study proved positive in recording other aspects of Black Mamba behaviour.

STUDY AREAS AND METHOD

Using a mixture of advice from colleagues, and as a result of my own experiences, nine study areas were established, all situated within a fifty kilometre radius from Durban centre. Although some of these areas were fairly remote, they all had one major disadvantage in that they all suffered from human disturbance in varying degrees. For this reason, another, and more remote, site was established as the main study area and was situated along the northern bank of the Tugela River some five km inland and 80 km north of Durban. This site was discovered while

undertaking a general reptile survey along a two kilometre transect on this part of the Tugela River. This location is notable in that it represents the southernmost distribution for a number of reptile species, the most notable of these being the Nile Crocodile (*Crocodylus niloticus*). Other potential species to be found included the Snouted Night Adder (*Causus defilipii*), and possibly the Forest Cobra (*Naja melanoleuca*) and Egyptian Cobra (*Naja haje annulifera*). A checklist of the amphibian and reptile species recorded for this site is shown in Appendix I.

The habitat of the main study area consisted of dense riverine *Acacia* thicket with low rocky outcrops and occasional boulder-strewn open areas containing sparse grasses and thorn cushion.

Although the acacia thicket was dense and virtually impenetrable, it only grew to a height of two metres or less. From the thicket the bank rose steeply to a low cliff face with hanging vegetation typified by aloes and euphorbias and various vines and climbing plants. A common factor for all the study locations was that all the actual refuges were situated in or very close to dense thicket or scrub. A short summary of the habitat types for the secondary study areas is given in Appendix II together with recorded sympatric snake species.

The actual refuge at the main study area consisted of a hole beneath two small boulders on the edge of a clearing, about two metres from thick cover (see page 11). The hole measured approximately fifty centimetres in width, by about thirty centimetres deep at its widest point. How far the hole extended beneath the ground was unknown. Black Mambas are shy and nervous, and usually very alert, and are difficult to approach to within thirty metres or so. However, observations at other sites, particularly around Durban, showed that the snakes that existed at long term refugia were fairly tolerant with regard to people habitually walking past. At one site, the refuge was just a few metres away from a well used track.

To establish fidelity of mambas at each respective refuge it was necessary to identify individuals. Scale clipping was not an option as past experience has shown that close disturbance, such as handling, can cause the snake to vacate the refuge (Phelps, 1981). Black Mambas obviously lack individual natural distinguishing features, such as body pattern, and it was initially thought that this may have presented a problem. The problem in fact solved itself when after a period of close observation, using both binoculars and telescope, it became obvious that nearly all the mambas identified bore the evidence of past trauma in the form of scarring, bits of the tail missing, and in one case an eye missing. Scarring was typified by patches of black where scales had been lost and the skin had healed. Some scars were quite large, others were more subtle, but size, shape, and location of scarring was carefully recorded and proved positive for identifying individual Black Mambas. The female Black Mamba at the main Tugela River study site was easy to identify as approximately ten centimetres of the tail was missing.

At the main study site a hide was set up on a low rock outcrop some thirty metres distance from the mamba refuge. The hide consisted of a two-metre wide canvas front extending to a roof some two metres in length and tied at the back to overhanging branches. Three apertures with flaps were made in the front of the hide and a screen of scrim was added for extra concealment. A telescope mounted on a tripod was set up for close detailed examination and binoculars used for general observation. The main study area was visited for a total of eighty-five days from 1982 to 1984 (Table 1). This included three sessions each consisting of five days continuous observation. During these extended periods of observation it was necessary to operate from a nearby base camp. As this was essentially a covert study it was desirable to be in place a little before dawn and depart just after dusk. This schedule was adhered to for both daily and extended periods of observation. All of the secondary study sites were

Site Name	No. snakes	No. of days visited	% days at refuge
Tugela River	1	85	90.58 (female)
Durban north	1	46	84.78 (female)
Umhlanga	1	52	92.30 (male)
Verulam	3	48	75.0 (females) 61.66 (male)
Tongaat	1	47	80.85 (female)
Mariannhill	2	54	92.59 (female) 77.77 (male)
Umzinto	1	41	80.48 (female)
Stanger	1	47	74.46 (female)
Cato Ridge	1	45	88.88 (male)
Nshongweni	2	62	91.93 (female) 80.64 (male)

Table 1. Black Mamba sites showing percentage of days at refugia. At the Tulega River site, snakes were visible for the period September 1982 to November 1984.

visited at least twice a month and wherever possible the dawn till dusk timetable was employed. It will be appreciated that in some instances, for personal safety reasons, it was not possible to visit a minority of areas at certain times.

RESULTS

Social Structure — A total of fifteen individual Black Mambas were identified at twelve sites. Sexing individuals by sight alone was difficult but assumptions were made on shape of tail, (particularly during the breeding season), observations of courtship and mating, and positive proof of egg-laying. Accepting a small margin of error, of the fifteen Black Mambas identified, five were males and ten were females. All were adults estimated to be in excess of two metres, some notably much more.

During the study period no immature Black Mambas were observed. One probable reason for this is that Black Mambas can reach a length of almost two metres in the first year of growth (Broadley, 1983). It is also likely that shortly after hatching young mambas are more arboreal and remain secretive in thick bush. Quite early on



Black Mamba refuge, Mariannahill, KwaZulu-Natal, South Africa. Photograph by author.

during the study it became clear that Black Mambas do not occur in aggregations of any note throughout any given suitable habitat. The occurrence of more than one mamba at a refuge was unusual, and recorded for just for two sites. One refuge at Verulam consisted of a male and two females, while another at Tongaat had two females. These groups were observed to stay together during, and beyond the breeding season, although individuals were occasionally seen to be absent for several days or more. The fact that the Black Mamba is not uncommon would suggest that some individual refugia would be situated in reasonably close proximity to each other. However, due to the limitations of the study, mainly the requirement for minimal disturbance, this was not assessed in any detail. However, more than one refuge was identified at two sites: two refuges were separated by 250 m at Mariannahill, and by 500 m at Nshongweni.

Although aggregations of Black Mambas were unusual, at four of the study sites, including the main Tugela site, the Mocambique Spitting Cobra was seen to share the refuge. This cobra is the most common elapid of the general area, as it is over much of central and southeastern parts of South Africa. During the study period the

Mocambique Spitting Cobra was recorded in the general area at all but two of the sites.

At two sites, Umhlanga, and Umzinto, the Black Mambas existed in close proximity to the Green Mamba. The Green Mamba is highly arboreal and the two species were never observed to interact. Further up the coast, at the St. Lucia Estuary, Black and Green Mambas have been observed to occupy different areas; that is they are thought to be locally allopatric (T. Pooley, pers. comm.).

General behaviour — The Black Mamba is said to be the fastest snake in the world; discounting the more exaggerated stories, a maximum speed of around fifteen kilometres per hour is probably about right. But without doubt the most publicised aspect of the Black Mamba's behaviour is its supposed truculent nature and a so-called readiness to attack. This aggressive behaviour is said to be most apparent during the breeding season (Pienaar, 1978; Broadley, 1983), but others have stated that there is little hard evidence to support this (Spawls et al., 2002). However, the Black Mamba is a nervous excitable snake and meaningful defensive behaviour usually occurs in circumstances when the snake is either surprised or molested.

Observing Black Mambas from a place of concealment was a revelation. Although for most of the time individuals appeared to be alert, generally they were calm and were never seen to be aggressive. The daily cycle observed during the Spring (October) began with emergence at around 07:00 hrs. This time was seen to be constant throughout all the study sites, and for a seven day period during mid October all individuals showed a mean of 07:12 hrs ($n = 12$). Although the mamba's attachment to the refuge was seen to be constant throughout the year, lying-out, retreat, and movement, was variable and largely influenced by weather conditions. Pronounced sedentary behaviour was also observed when the



Refuge and egg-laying site of Black Mamba, *Dendroaspis polylepis* (hole between boulders in foreground). Tugela River, Kwazulu-Natal, South Africa. All photographs by author.



Female *D. polylepis*. Inquisitive hood-spreading. Tugela River, Kwazulu-Natal, South Africa.



Male and immature Boomslangs, *Dispholidus typus*. Tugela River, Kwazulu-Natal, South Africa.



Mocambique Spitting Cobra, *Naja mossambica*. Tugela Rive site.



D. polylepis from Tulega River site (post-partum female; note especially thin body).

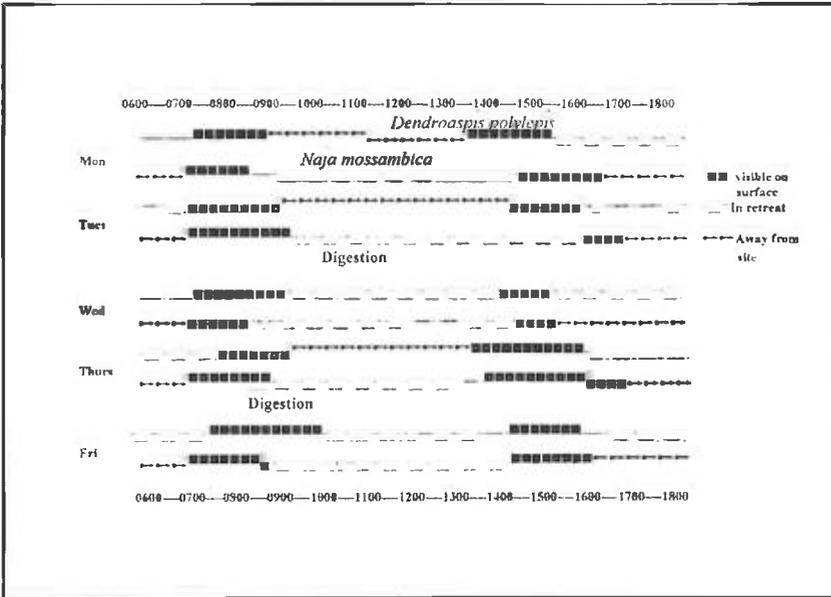


Figure 2. Diurnal activity of *Dendroaspis polylepis* and *Naja mossambica* observed over a five-day period at the Tugela River site, October 1983.

snake was in pre-moult condition and during parts of the winter period when a lower feeding regime was apparent. The daily cycle for two five-day periods in January and August is shown in Figs. 3 & 4.

Unlike snake refugia in temperate regions, hardly any of the Black Mamba sites were fully exposed to the early morning sun. The subtropical climate was typically humid and during the spring months night temperatures rarely dropped below twenty degrees Celsius. During the early part of emergence some individuals were seen to lie with just the forepart of the body out of the refuge. Others would emerge fully but stay immediately next to the refuge entrance. When fully emerged at ground level virtually all of the Black Mambas were observed to adopt a lying-out posture which can be described as an elongated ellipse with the head resting at the centre, and on top of the coils. During overcast weather, there were often extended periods of lying-out and this very often involved individuals climbing into low bush and stretching out in a loose posture.

At the sites that contained more than one individual at a refuge Black Mambas were seen to

be extremely tolerant of each other, and during the early part of emergence would often lie entwined together. However, the interaction between the Black Mamba and the Mocambique Spitting Cobra, particularly at the main study site, was most notable. The spitting cobra at the main study area was a female of about a metre in length. Despite the size difference the two snakes would lie side by side most days, and on a number of occasions

were seen to enter the refuge together. The Black Mamba is a diurnal snake and the Mocambique Spitting Cobra is largely nocturnal, and the fact that the lying-out times for both species were seen to noticeably overlap may appear unusual. However, at the main study site, the spitting cobra was observed to be at or near the refuge usually some time before the mamba and often looked well fed after a night of foraging. After a period of lying-out, alongside the female Black Mamba, the spitting cobra would retire into the hole around 09:00 hrs, and emerge again during the afternoon for another period of lying-out. The diurnal activity for the two snakes over a five-day period is shown in Fig. 2. The spitting cobra shared the mamba refuge continuously for eleven months and then disappeared, but reappeared two months later and stayed until the end of the study. The Black Mamba's tolerance toward other snake species was also made evident when an immature Rock Python, *Python natalensis*, took up residence in a mamba refuge at Nshongweni. The python stayed for just a week but during that time the resident Black Mamba showed no concern or react in any way other than to raise its head when the python moved close by.

The duration of lying-out periods in the spring at the refuge, consisted of around an hour and a

half in the morning with a similar period around mid afternoon, although at times the afternoon sessions were sometimes shorter. During the morning lying-out period at the main study site, the female Black Mamba would change position two or three times, including climbing into low bush if there was total cloud cover. Lying-out periods usually ended with the snake moving slowly off into the surrounding thicket, but on occasions the female would move around the site following the edge of cover moving down toward the river. At such times the mamba would often pause and raise the forepart of the body and spread a hood as if surveying the way ahead. This behaviour was also observed with regard to the spitting cobra but the snake only sometimes spread a hood.

Although the main study site was devoid of human activity the mamba was seen to be always alert to other possible threats. On one occasion, about an hour after emergence, the mamba suddenly raised its head and then rapidly entered the refuge hole. Some thirty seconds later a group of Banded Mongoose, *Mungos mungo*, appeared thirty metres away from the mamba, foraging along the edge of the river. It was almost forty minutes before the mamba emerged again from the refuge. On other occasions the proximity of other creatures drew little response. This was most apparent regarding a small troop of Vervet Monkeys, *Cercopithecus pygerythrus*. The monkeys were very much aware of the mamba's presence and its exact location, and would usually

scold and bark from a tree some twenty metres away. These efforts solicited no response from the mamba, and the monkeys would give up and move off after a few minutes. On the occasions when the mamba climbed into low bush it would often be mobbed by birds, usually Bulbuls (*Andropadus* sp.), Weavers (*Ploceus* sp.), and Barbets (*Lybius* sp.). Even though these birds attacked boldly, almost touching the snake at times, it drew little response from the mamba, other than on one occasion when the mamba was seen to draw the head back and gape briefly. Birds proved to be useful allies as their alarm calls often signalled the mamba's return to the refuge during the afternoon some minutes before it actually appeared.

The female Black Mamba at the main study site did not always make daily excursions away from the refuge. Two reasons for remaining at the refuge were to allow the digestion of large meals and egg-laying. Another sedentary period was observed during the days when the snake was in the pre-moult condition. Normally, the colour of this mamba was ash grey with a dull white ventral surface. A few days before moulting the body colour changed very noticeably to a dark leaden grey, and in fact appeared as a completely different snake. During the period when the eyes became opaque the mamba became nervous and spent much of the time in, or at, the entrance of the refuge hole. When the eyes cleared, the snake moved away and moulted away from the refuge. Over a two-year period this mamba was observed to moult seven times.

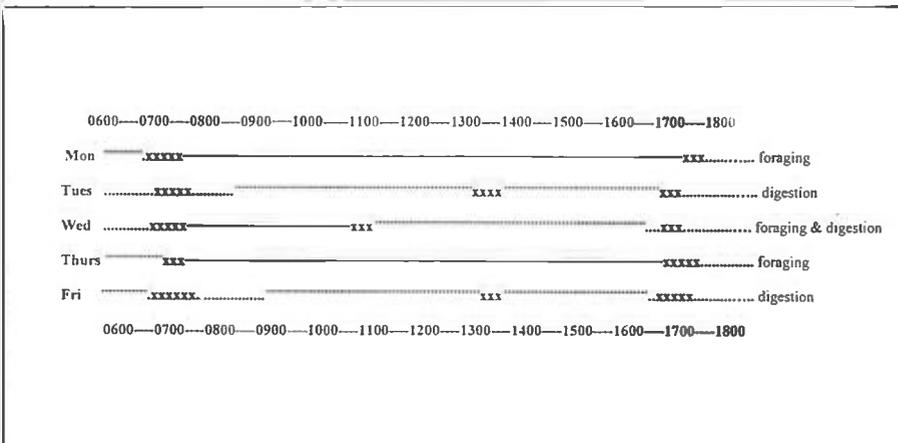


Figure 3. Activity of *D. polylepis* at the Tugela River site showing a high feeding regime over a five-day period during January 1984.

XXXXX visible on surface
 ***** in retreat
 — away from site

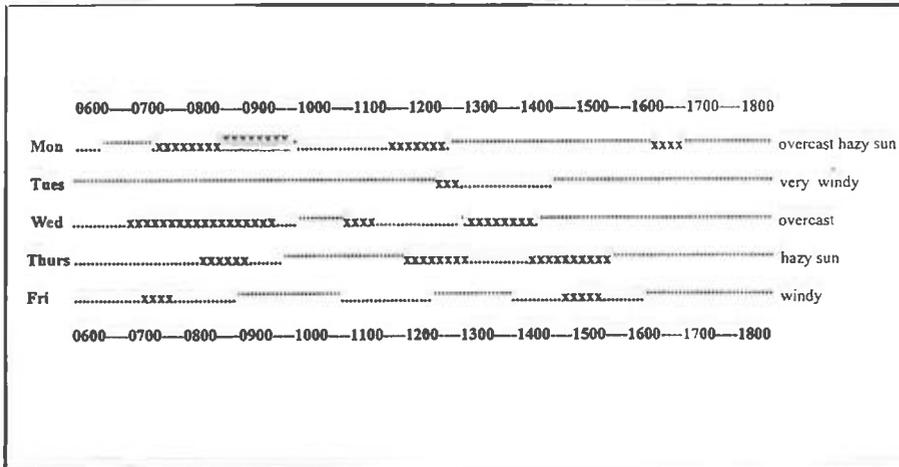


Figure 4. Activity of *D. polylepis* at the Tugela River site over a five-day period during August 1984, showing erratic lying-out periods and sedentary behaviour. The snake was in pre-moult condition

Foraging and Feeding — Although only one Black Mamba was actually observed ingesting prey, evidence of recent feeding was usually very obvious by a large bulge at mid body, which also showed that prey of some substantial size was taken. The one occasion when feeding was observed involved the female at Mariannahill. The mamba was seen some one hundred metres from the refuge and was identified by a long scar along the dorsals at mid body. The snake was half way up a small cliff face and had killed a young Rock Dassie, *Procavia capensis*, and was flicking the tongue over the body. The mamba was about two and a half metres in length and from the time that the snake engulfed the head of the prey until it was completely ingested engaged a duration of thirty-five minutes. The snake then retired into thick cover. Rock Dassies are said to be a favoured item of prey (Pienaar, 1978; Spawls & Branch, 1995). This is further confirmed by the fact that at least one tribal name for the Black Mamba in southern Africa, *muRovambira*, translates as 'dassie catcher' (Jacobsen, 1985). Rock Dassies were only present at three of the study sites, namely, Mariannahill, Nshongweni, and Cato Ridge. However, Black Mambas are known to take a wide range of warm-blooded prey and observations at the other study sites showed that there was no shortage of suitable food sources.

Evidence of Black Mambas feeding on bats was revealed during a rescue operation when a large

female was taken from a roof space in a house at Westville near Durban. The snake regurgitated a freshly consumed bat, which was identified as the Free-tailed Bat, *Tadarida pumila*. The roof space also contained a number of other bat species including, the Cape Serotine, *Eptesicus capensis*, and an unidentified species of horseshoe bat, *Rhinolophus* sp. A moulted skin of a Black Mamba was also found in the roof space, which indicated that this could have been a permanent refuge. In fact, another Black Mamba was taken from the same roof space some three months later. On several occasions Black Mambas were seen in and around sugar cane plantations and one was identified as the male from the refuge at Verulam. The sugar plantations were also known to attract other snakes, including large Rock Pythons. The plantations contained large numbers of Cane Rats, *Thryonomys swinderianus*, although adults can reach a weight of five kilograms and Black Mambas would have only taken young animals. Potential prey at the main study site included Tree Squirrel (*Paraxerus cepapi*), Molerat (*Cryptomys hottentotus*), and Peter's Epauletted Fruit Bat (*Epomorphus crypturus*). The Cane Rat was also present in low numbers.

During the five-day observation periods at the main study site the female was seen to have taken very large items of prey. This was apparent when the mamba returned to the refuge around mid-afternoon with a hugely distended body. The snake

was obviously at a disadvantage at such times and moved clumsily, and stayed very close to the refuge hole. It has been stated that the Black Mamba can digest such large meals in as little as ten to twelve hours (Broadley, 1983), but the mamba at the main study site would stay at the refuge during the day after feeding. By the afternoon of that same day the snake was observed to have completely digested the meal making a total digestion period of closer to 24 hours.

When foraging, the mamba at the main study site was away for an average of four to five hours. Although there was no way of knowing how far the snake travelled the consistent and regular timetable indicated that movements were quite local. Observations show that, apart from moulting and breeding periods, the female mamba at the main study site fed two to three times each week and favoured large items of prey. Evidence that large items of prey were taken regularly was also recorded at Nshongweni, Mariannahill, Cato Ridge, and Verulam. Due to the notable paucity of immature mambas throughout the study areas it was not possible to investigate any ontogenetic shift in diet, although hatchling Black Mambas reared at the Durban Snake Park readily accepted skinks and other small lizards (pers. obs.). It is generally accepted that adult Black Mambas feed exclusively on warm-blooded prey (Branch et al., 1995). The Black Mamba has a wide spectrum of prey, and although this could not be confirmed during the study it is said to be willing to take relatively small items (Branch et al., 1995). The Black Mamba would appear to be an opportunist and this is made very apparent by the record of a two metre Black Mamba feeding on flying termite alates (Branch, 1991).

Breeding — Mating activity at the actual refuge was observed at only one of the study sites, Verulam, one of the refuges that contained more than one mamba. The resident male was seen to mate with one of the females on an overcast day during early October 1983, and then vacate the refuge but to return two weeks later. During late October through to the second week of November,



Sugar cane monoculture. Feeding ground for *D. polylepis*. KwaZulu-Natal, South Africa. Photograph by author.

there were periods of up to five days when no mambas were seen at any of the refugia. The female at the main study site was absent from the refuge for two periods, each of two days, during early November. The absence from the refuge at this time involved both males and females and was obviously a part of the mating routine, and probably more specifically, mate-seeking.

During late October and early November an effort was made to observe Black Mambas away from the refuges. This part of study did not involve the main study area so as to maintain the discipline of minimal disturbance for this important site. In fact, searches away from the refuge were restricted to just two sites, Stanger and Nshongweni. Male rivalry was observed at Stanger involving two unknown males in the late afternoon of 4th November 1983. These males were in combat in full view on the edge of the sugar cane plantation and only approximately one hundred metres from the female refuge. Although not actually observed mating, the male and female from two of the respective refuges at Nshongweni were seen lying together in neutral territory during early November 1984.

Clear evidence of mating was obvious by the condition of females just prior to egg-laying in the summer. During December the female at the main study area was seen to be obviously gravid and in a premoult condition. The mamba had remained at the refuge for at least five days. One morning in

late January 1984 it was noted that fragments of moulted skin were scattered in and around the refuge hole. Later that day the female mamba emerged from the hole looking very thin and with fragments of old skin still adhering to parts of the body. The snake had obviously had a bad moult, but had definitely deposited eggs in the refuge hole. The female basked for about thirty minutes and then moved slowly down to the river and then returned some ten minutes later and retired down the refuge hole.

The opportunity of examining a gravid female was presented when a female close to the Umhlanga refuge killed a dog and a request was made for its removal. The female was duly caught and taken into captivity. Two weeks later this female laid twelve eggs. This mamba was notably large and details for this snake are given in Appendix III.

DISCUSSION

The study clearly shows that the individual Black Mambas have a definite and pronounced attachment to a permanent home base or refuge. The study sites were selected at random and although females outnumbered males by two to one overall with regard to individual sites it is most probable that long-term refugia are not biased toward either male or female. Twelve of the mambas were still in residence, including the female at the main study site, at the end of the study period. It is likely that unless disturbed Black Mambas may well remain at a particular refuge permanently. Correspondence with other herpetologists supports the statements in popular literature regarding a permanent refuge. In addition, a number of unofficial records were obtained including that of a Black Mamba in Kenya occupying the same refuge for seven years, (James Ashe, pers. comm.).

During the two-year period no Black Mamba exhibited any notable aggressive behaviour. The species is best described as alert, agile, and sociable toward their own kind and other snake species. During the breeding period some individual mambas became quite excitable, but such behaviour could not be described as aggressive.

The Black Mamba is not uncommon in KwaZulu-Natal and it is perhaps surprising that such a large snake could remain undiscovered in areas very close to human habitation for long periods of time. This aspect was most apparent at three of the study sites and probably says something about the true nature of the Black Mamba due to the lack of conflict between humans and snake.

We still know very little about the lives and habits of African snakes and there is a need for more ecological research, particularly with regard to the clinically important species contained in such genera as *Dendroaspis*, *Naja*, *Bitis*, *Echis*, and *Atractaspis*. Such knowledge can only serve as a better understanding of these so-called dangerous snakes and perhaps we may even learn how to minimise the age-old conflict between humans and snakes.

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Appendix I

Checklist of amphibians and reptiles recorded over a one kilometre transect at the Tugela River study area, Kwazulu-Natal.

AMPHIBIA

Bufonidae

- Guttural Toad, *Bufo gutturalis*
 Raucous Toad, *Bufo rangeri*
 Red Toad, *Schismaderma carens*

Arthroleptidae

- Bush Squeaker, *Arthroleptis wahlbergi*

Hyperoliidae

- Painted Reed Frog, *Hyperolius marmoratus*
 Yellow-striped Reed Frog, *Hyperolius semidiscus*
 Greater Leaf-folding Frog, *Afraxalus fornasinii*
 Bubbling Kassina, *Kassina senegalensis*
 Forest Tree Frog, *Leptopelis natalensis*

Ranidae

- Common Caco, *Cacosternum boettgeri*
 Snoring Puddle Frog, *Phrynobatrachus natalensis*
 Common River Frog, *Rana angolensis*

REPTILIA

Pythonidae

- Rock Python, *Python natalensis*

Colubridae

- Brown Water Snake, *Lycodonomorphus rufulus*
 Olive Grass Snake, *Psammophis phillipsii*
 Green Water Snake, *Philothamnus hoplogaster*
 Spotted Bush Snake, *Philothamnus semivariatus*
 Natal Green Snake, *Philothamnus natalensis*
 Red-lipped Snake, *Crotophopeltis hotamboeia*
 Boomslang, *Dispholidus typus*
 Twig Snake, *Thelotornis capensis*
 Brown Egg-eater, *Dasyplectis inornata*
 Common Slug-eater, *Duberria lutrix*
 Variegated Slug-eater, *Duberria variegata* (new record for area)
 Bibrons Stiletto Snake, *Atractaspis bibroni*

Elapidae

- Mocambique Spitting Cobra, *Naja mossambica*
 Black Mamba, *Dendroaspis polylepis*

Viperidae

- Rhombic Night Adder, *Causus rhombeatus*
 Snouted Night Adder, *Causus defilippii*

Scincidae

- Striped Skink, *Mabuya striata*

Gerrhosauridae

- Yellow-throated Plated Lizard, *Gerrhosaurus flavigularis*

Varanidae

- Nile Monitor Lizard, *Varanus niloticus*

Agamidae

- Rock Agama, *Agama atra*

Chamaeleonidae

- Flapneck Chameleon, *Chamaeleo dilepis*

Gekkonidae

- Tropical House Gecko, *Hemidactylus mabouia*

Crocodylidae

- *Nile Crocodile, *Crocodylus niloticus*

Pelomedusidae

- Side-necked Turtle, *Pelomedusa subrufa*

Total no. amphibians - 12; Total no. reptiles - 25

*Most southerly distribution

Appendix II

Localities of individual Black Mamba refugia in the Durban area, South Africa, observed over a two year period (1982-1984).

	No. of sites	No. snakes /sex	Habitat	Recorded sympatric spp.
Durban North	1	1F	Thick bush at end of residential garden.	<i>Naja mossambica</i> <i>Dispholidus typus</i> <i>Lamprophis fuliginosus</i> <i>Crotrophpeltis hotamboeia</i>
Umhlanga	1	1M	Coastal bush and cliffs	<i>Dendroaspis angusticeps</i> <i>Philothamnus semivariiegatus</i> <i>Philothamnus natalensis</i> <i>Dasyveltis inornata</i> <i>Crotrophpeltis hotamboeia</i>
Verulam	1	1M + 2F	Isolated <i>Acacia</i> scrub surrounded by monoculture (sugar cane).	<i>Python natalensis</i> <i>Philothamnus semivariiegatus</i> <i>Thelotornis capensis</i>
Tongaat	1	2F	Riverine bush and low cliffs surrounded by monoculture (sugar cane).	<i>Python natalensis</i> <i>Naja mossambica</i> <i>Philothamnus natalensis</i> <i>Philothamnus hoplogaster</i> <i>Philothamnus semivariiegatus</i> <i>Lycodonomorphus rufulus</i>
Mariannahill	2	1M + 1F	Well-vegetated cliff face along old pipeline, sites 250 m apart.	<i>Python natalensis</i> <i>Naja mossambica</i> <i>Bitis arietans</i> <i>Causus rhombeatus</i> <i>Dispholidus typus</i> <i>Thelotornis capensis</i> <i>Philothamnus hoplogaster</i> <i>Philothamnus semivariiegatus</i> <i>Lycodonomorphus rufulus</i> <i>Lamprophis fuliginosus</i> <i>Apparallactus capensis</i> <i>Mehelya capensis</i>
Umzinto	1	1F	Coastal bush adjacent to large camp site.	<i>Dendroaspis angusticeps</i> <i>Naja mossambica</i> <i>Philothamnus semivariiegatus</i> <i>Crotrophpeltis hotamboeia</i> <i>Lamprophis fuliginosus</i>
Stanger	1	1F	Coastal bush close to residential area and sugar cane plantation	<i>Philothamnus hoplogaster</i> <i>Lamprophis fuliginosus</i> <i>Crotrophpeltis hotamboeia</i>
Cato Ridge	1	1M	Rock outcrops with acacia thicket and small stream.	<i>Bitis arietans</i> <i>Naja mossambica</i>

				<i>Elapsoidea sundevallii</i> <i>Thelotornis capensis</i> <i>Atractaspis bibroni</i> <i>Philothamnus hoplogaster</i> <i>Philothamnus semivariiegatus</i> <i>Crotrophopeltis hotamboeia</i>
Nshongweni	2	1M + 1F	Acacia thorn scrub with steep cliffs and rock outcrops. Sites 500 m apart	<i>Bitis arietans</i> <i>Naja mossambica</i> <i>Causus rhombeatus</i> <i>Dispholidus typus</i> <i>Psammodromus rhombeatus</i> <i>Thelotornis capensis</i> <i>Philothamnus semivariiegatus</i> <i>Philothamnus natalensis</i> <i>Mehelya capensis</i> <i>Lamprophis fuliginosus</i> <i>Lamprophis guttatus</i> <i>Apparallactus capensis</i> <i>Atractaspis bibroni</i> <i>Macrelaps microlepidotus</i> <i>Crotrophopeltis hotamboeia</i> <i>Homoroselaps lacteus</i> <i>Python natalensis</i>

Appendix III

A note on maximum size for the Black Mamba, *Dendroaspis polylepis*, with reference to a large female taken at Umhlanga, KwaZulu-Natal, November 1983.

Accounts of Black Mambas reaching lengths in excess of five metres or more are well known. Some measurements have been taken from stretched skins; others are probably more likely the result of stretched imaginations. A stretched skin can add perhaps twenty percent to that of the actual live snake. One Black Mamba skin on display at a private game park in the Northern Transvaal measured 3990 mm. The living snake would have been more like 3220 mm, but still a very large snake. During the 1950s a Black Mamba said to measure 4.3 metres was shot by a man called Bennet in Natal. The account appeared in *African Wildlife* and the snake was referred to as the 'King of the Mambas'. Any mamba over 3 metres is a big snake; another Black Mamba caught in the Kerio Valley, Kenya, measured 3250 mm (Stephen Spawls, pers.comm.). The largest

specimen in the Natural History Museum of Zimbabwe is a 2990 mm female, although these largest specimens appear to be represented by heads only (Don Broadley, pers. comm.).

It has often been said amongst herpetologists who work in Africa that KwaZulu-Natal appears to have the largest Black Mambas. That is unofficial, but below are the measurements of the gravid female taken at Umhlanga. Surprisingly, this snake was living very close to a residential area and had been there for some time.

Total length — 3800 mm
 Snout-vent — 3015 mm
 Mid-body girth — 295 mm