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The Green Mamba

This short story tells how a zoo keeper from the University of Ibadan Zoological Garden in Nigeria, West Africa, was bitten by a green mamba snake, not in the Zoo but when he was out and about one day. He was treated in hospital with antivenom but this was soon followed by a second big shock.... I have given false names to the three main characters. The events described here took place in the early 1970s.

by Bob Golding



Top: head of green mamba (*Dendroaspis jamesoni*).



Bottom: mamba skull showing two fangs.

As Director of the Zoological Garden at the University of Ibadan in Nigeria, West Africa, I began my working day at around 8.15 most mornings. I drove my car the short distance from my home to the Zoo, both located on the large University campus. The matters that needed my attention varied from one day to another. On arrival I first walked around at least some sections of the Zoo and talked to the staff as they went about their early morning checks on the animals and began their daily cleaning and feeding duties. In this way I became informed quickly of any births, deaths, sickness, staff problems, and so on. I also had a preliminary discussion with my secretary, when she updated me on any matters that would need attention that day.

My office was located just inside the Zoo, near the visitors' entrance, and was accessed by a flight of steps that was located, at the bottom, between a large, wire mesh cage containing a tree hyrax and an open enclosure for hinged tortoises. A solitary female tree hyrax was already there when I arrived and lived for several years after that; unfortunately, we never managed to find any companions for her. I went up and down those steps many times most days and often glanced into her quiet, secret little world, partly hidden by the plants that grew over the cage.

In my office, fixed to one wall, was a large, glazed vivarium. Its interior was furnished with a few slender branches that we renewed regularly from trees nearby. Visitors to my office either knew or assumed that the vivarium contained a live animal of some sort, so they usually took a good look inside it as they entered the room. Often they could only make out the branches. Then they realised that, unmoving and intertwined with the branches, was a slim, green snake about 1.5 metres long. The snake's form and body language matched the natural rhythms of



Newly hatched hinged tortoise (*Kinixys homeana*) with egg of sibling also about to hatch.

the branches with such magical symmetry that often the snake just seemed to disappear - then reappear again.

This snake was a young Jameson's green mamba (*Dendroaspis jamesoni*). I shall tell you a little more about it because it was a mamba of this species that later brought about the near tragedy that is the focus of this story.

Four species of mamba are recognised. While there is some overlap of the home ranges of the four species, their combined ranges include much of the African continent south of the Sahara. Mambas are venomous and their bite can be fatal to humans. Mamba bites occur regularly among farm workers and others working on the land and in the African countryside. Having said that it would, in my opinion, be unusual for a mamba to attack a human being without first perceiving a threat or being attacked in some way. Certainly, all the wild Jameson's green mambas I encountered in Nigeria made every effort to move away quickly from any threat or human disturbance near them.

Green mambas are attractive snakes to look at, with green or yellow-green scales, some with black edges. I enjoyed having one living right behind me in my office. One reason for keeping it there was to introduce zoo staff to some of the cautions and concerns



Eggs of Jameson's green mamba (*Dendroaspis jamesoni*). These eggs have soft, parchment-like shells and are laid by the female in a moist, hidden location on or in the ground. When the young snakes are ready to hatch they slit the eggshell open using a temporary egg tooth at the front of the upper jaw.

involved with the public display of venomous snakes; I was thinking ahead to the development of a new reptile house. The mamba in my office had been brought to the Zoo by a farmer who had captured it on his land without harming it; it was then very young and very small. It would have hatched a few weeks previously from an egg similar to those in the photo on this page, laid in some damp, hidden place by its mother. The eggs in the photo above are just over 5cm long.

close proximity of humans, for example the moving objects it could see regularly through the glass sides of its vivarium and the vibrations transmitted through the ground - and possibly through the air - from nearby human activities. The snake gave every indication that it was living contentedly in an environment that suited it.

Since then the mamba had grown and appeared to have become entirely accustomed to the disturbances associated with the

It appeared to be alert but unstressed. It ate a dead mouse every few days and generally kept an eye on things in my office when I wasn't around. It always looked spectacularly healthy. I am sure that if snakes could smile, that mamba would have had a permanent grin on its face.



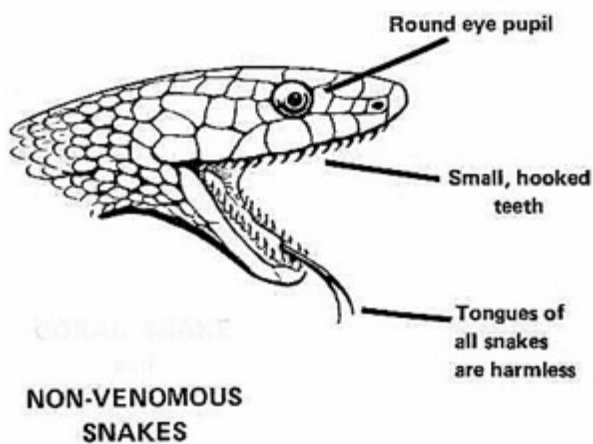
Jameson's green mamba (*Dendroaspis jamesoni*). It was a green mamba that bit Peter Aruba, a zoo keeper at the University of Ibadan Zoo. Mambas are fast moving, agile snakes both on the ground and in the branches of a shrub or tree. Mamba venom is potent, attacks the victim's central nervous system and can kill a human.

My daily working routine usually included a break from around 1.30pm when I drove from the Zoo to the Senior Staff Club for a beer and an exchange of news and views with friends and colleagues from the many different departments and areas of activity of the University of Ibadan. In the general scheme of things, the Senior Staff Club was extremely important for many of us as it was the main social centre where expatriate staff from a number of countries, as well as the many Nigerian staff, could gather, drink cold beer, talk, play tennis, swim, play liar dice and form friendships, many of which have lasted until today. For several years I was elected Social Secretary of the Club and was the first to bring a live band from Lagos for a memorable Saturday night event with amazing music and non-stop dancing. I believe that many of us enjoyed and benefited from the international mix of people who congregated in that Club and that in many cases, certainly mine, our experiences in Nigeria changed us and changed our lives permanently.

From the Staff Club I drove home each working day for a late lunch, had a short siesta (remember, this was tropical West Africa), then returned to the Zoo for the remainder of my working day.

At the Zoo I usually left routine matters such as the day to day control of zoo staff and the allotment and management of tasks to the head keeper, Simeon Ukoli, who kept me fully informed of all important animal and staff matters. Thus I learned one day that zoo keeper Peter Aruba had asked head keeper Ukoli if he could take two days' casual leave the following week in order to attend to some family matter in Lagos. Simeon agreed to this and made alternative arrangements for Peter's work at the Zoo to be done on those two days.

Lagos is on the coast, just over 100 miles south of Ibadan by road, although it is no longer Nigeria's capital city. A one-way road journey between the two cities usually took between two and three hours, occasionally more, depending on the weather, time of day and the level of traffic. A few days later, on the agreed day, Peter went to the motor park in teeming central Ibadan to negotiate the cost of a ride to Lagos. He soon agreed a price with the driver of one of the many taxis and passenger-carrying vehicles and climbed aboard. These vehicles were privately owned and hurtled all day between Ibadan and Lagos and back again. They offered a passenger service to and from virtually all parts of Nigeria to the many less well off Nigerians. The largest of these vehicles were known as mammy wagons but there were also other passenger vehicles of different size and capacity. Mammy wagons had slogans painted across the front, above the driver's cab - 'Sea Never Dry' and 'No Condition is Permanent' spring to mind. These vehicles often literally overflowed with passengers and it was common to see mammy wagons speeding along the road with surplus passengers apparently glued to the outside, arms and legs outspread, clinging on like human limpets.



Teeth as in a typical, non-venomous snake – solid, sharp, backward-pointing for holding often still-struggling prey while it is hooked back to the throat by alternate action of each side of the lower jaw.

The following day Peter, having sorted out his family matter in Lagos, was due to return to Ibadan. As it happened I had a long meeting to attend, away from the Zoo, and was not there for most of that morning. I finished my meeting at around 1.00pm and drove to the Senior Staff Club for my usual early afternoon break without returning to my office. An hour later, as I was preparing to leave the Staff Club to drive home, I suddenly saw one of the zoo keepers, Johnson Udowu, walk into the Club through the main entrance. He seemed agitated and pushed his way through the people talking in the entrance area and strode quickly into the Club premises, looking all around him as he did so.

I was slightly surprised to see Johnson there because, within the University, and indeed many other organisations in Nigeria, there was a fairly clear social demarcation between the so called senior staff and the junior staff and normally the only junior staff inside the Senior Staff Club were those that worked there. Not that many of us actually approved of, or directly contributed to, this separation, but that was the way it was, and the arrangement was as widely accepted by Nigerian staff as others. The other reason I was surprised was because of Johnson's unusually agitated demeanour. He looked around, a worried frown on his face, apparently looking for someone or something. I assumed, rightly as it turned out, that he was probably looking for me so I stood up and called his name. He hurried over and, without further ado, told me he had some bad news.

Johnson's co-worker, zoo keeper Peter Aruba, had been bitten by a green mamba earlier that morning on his way back from Lagos! Peter was now back in Ibadan and had been admitted to the University College Hospital, three or four miles away from the Zoo. Johnson was just coming from the Hospital where he had spoken with Peter.

I remember I was so surprised and shocked I could hardly speak. Johnson continued. Peter had told him that several miles out of Lagos on the drive back to Ibadan his vehicle was forced to slow right down by some sort of commotion near the side of the road. People were yelling and rushing around. Peter soon learned from one of the bystanders that a large snake had appeared earlier from somewhere and 'attacked' a local woman whose fate was unclear. The locals had chased and trapped the snake in a large bush or shrub nearby. They now wanted to kill it but were not sure how to go about this without being bitten by what they assumed was a snake that could kill.

Peter had then asked the driver of his passenger vehicle to wait for just a few minutes and explained to everybody there that he was from the University of Ibadan Zoo. He offered to try to catch the offending snake and take it away with him back to Ibadan and the Zoo.

Peter was told to go ahead - the locals had probably heaved a big sigh of relief after listening to what he had to say. Peter didn't waste time. He walked up to the large bush and, armed with a couple of sticks someone had given him, apparently pushed the outer leaves and twigs aside and peered into the interior. He spotted the snake among the branches, scared it into action with his longer stick and, as it moved through the branches near him, reached into the bush with the much shorter stick to hook the snake rapidly sideways out of the bush and onto the ground. From there he hoped he would be able to pin the snake down and grab it behind the head. Alas, it was not to be. As Peter reached into the bush with the short stick the mamba bit him on the hand!

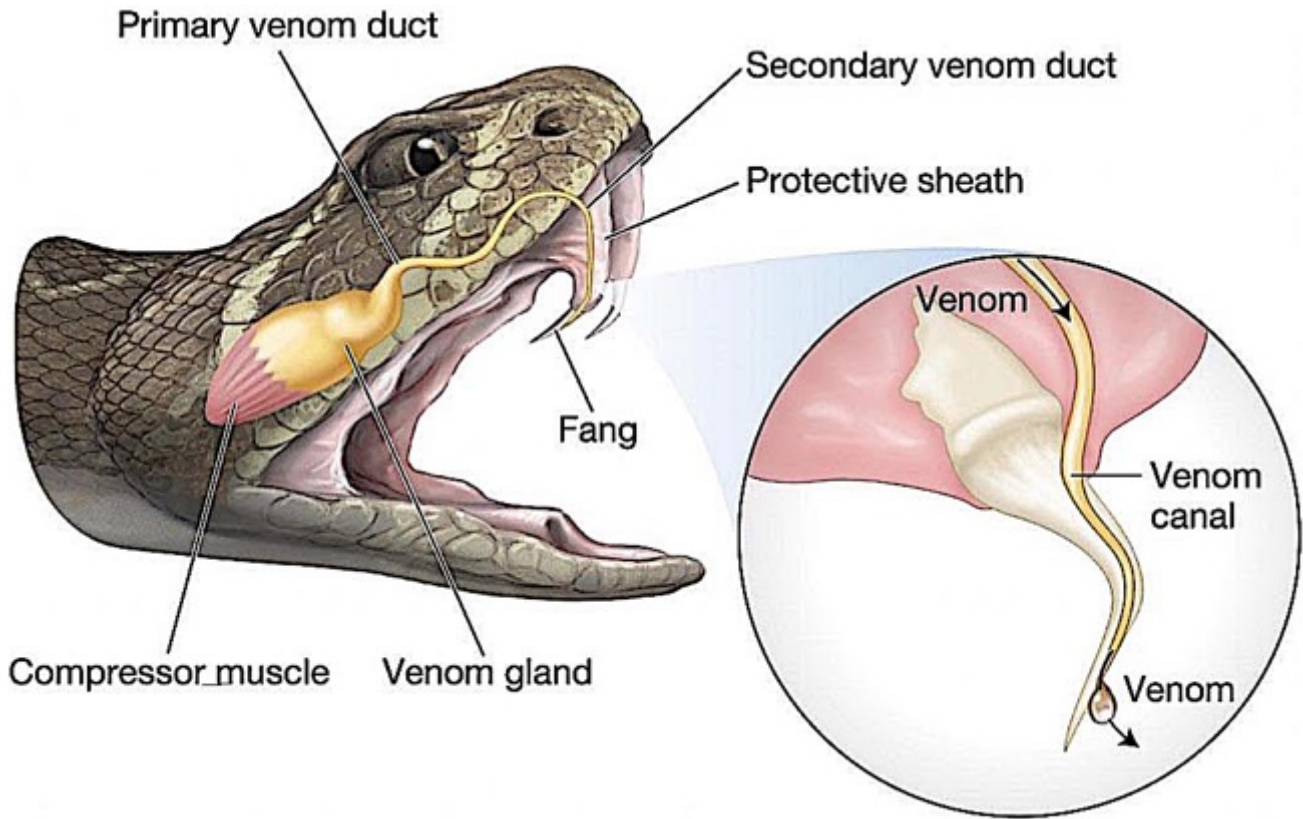


Fangs of a back-fanged snake; they are located at the back of the upper jaw on each side, often in small groups of two or three at different stages of development as seen here. The venom is conducted to the wound in the victim's soft tissues by the open groove along the fang.

It was only during those last few minutes that Peter had recognised the snake as a green mamba. As he was wearing no protective clothing, not even padded gloves, and was generally quite unprepared for dealing with a mamba, he should really have walked away. But... he wanted to help.

As a brief aside, the reader may find the following information helpful. When I say that Peter was bitten by a green mamba I wonder what that conveys. I know that some people don't really understand what a snake bite is, what it involves or what happens to a prey animal - or for that matter to a human being - when bitten by a venomous snake.

Snakes vary enormously in size and form and are found in many different habitats throughout the warm and temperate regions of the world. Some live in deserts, some in



Showing some of the features and principles involved in a venomous snake bite. The fangs shown here are typical of a viper's fangs in that they are long, hinged and fold back along the roof of the mouth when the mouth is closed. Note the venom gland and the compressor muscle overlying it which, when contracted, forces the venom along the duct, through the hollow fang and into the victim's tissues.

the sea where they swim as well as many fish, some are found in trees and can actually glide down to lower branches or to the ground, some are large constrictors measuring up to ten metres long, some have a body smaller in diameter than a human finger and hide away just below the surface of the soil.



Fangs of a viper. The drop of liquid hanging from the nearest fang is venom that has oozed from the aperture at its tip.

There are around 3,600 species of snake worldwide of which around 770 are venomous. Thus most species are non-venomous and have relatively simple teeth that typically are long, sharp, solid and point backward. Their function is to hold the prey animal, often still alive and struggling, securely in the mouth as the snake hooks it further back toward its throat prior to swallowing it. The snake moves each side of its lower jaw alternately forward and backward. As it moves one side backward, the teeth on that side hook the prey backward. A snake such as the non-venomous grass snake, found in the UK, has only these simple, solid teeth, the sort of teeth you would indeed expect to find in a snake that feeds on live frogs, toads or fish and is not a constrictor.

A venomous snake has modified teeth called fangs which are essentially long, sharp, hollow or grooved teeth that have evolved to inject venom into prey animals and thus immobilise or kill them before they are swallowed. A mamba's fangs remain fixed in position at the front of the mouth (see photo below). Each one resembles a hypodermic needle in that it is hollow and has an oblique or elongated opening just behind the sharp tip. At the base it is connected by a duct or tube to a venom gland. When the mamba bites its victim the venom is forced along the duct to the fang by the contraction of a muscle overlying the venom gland; the fang simultaneously delivers the venom into the victim's soft tissues from the tiny opening near its tip. Most venomous snakes also have simple, solid teeth that - just as in the non-venomous species - enable the snake to hold and manipulate its food.



This fang was removed from a dead Gaboon viper in Nigeria. A wire has been threaded through it to show the route of the venom when the viper bites. The fang is hinged at its base (on the left in this image). An amazing design in miniature from the natural world....

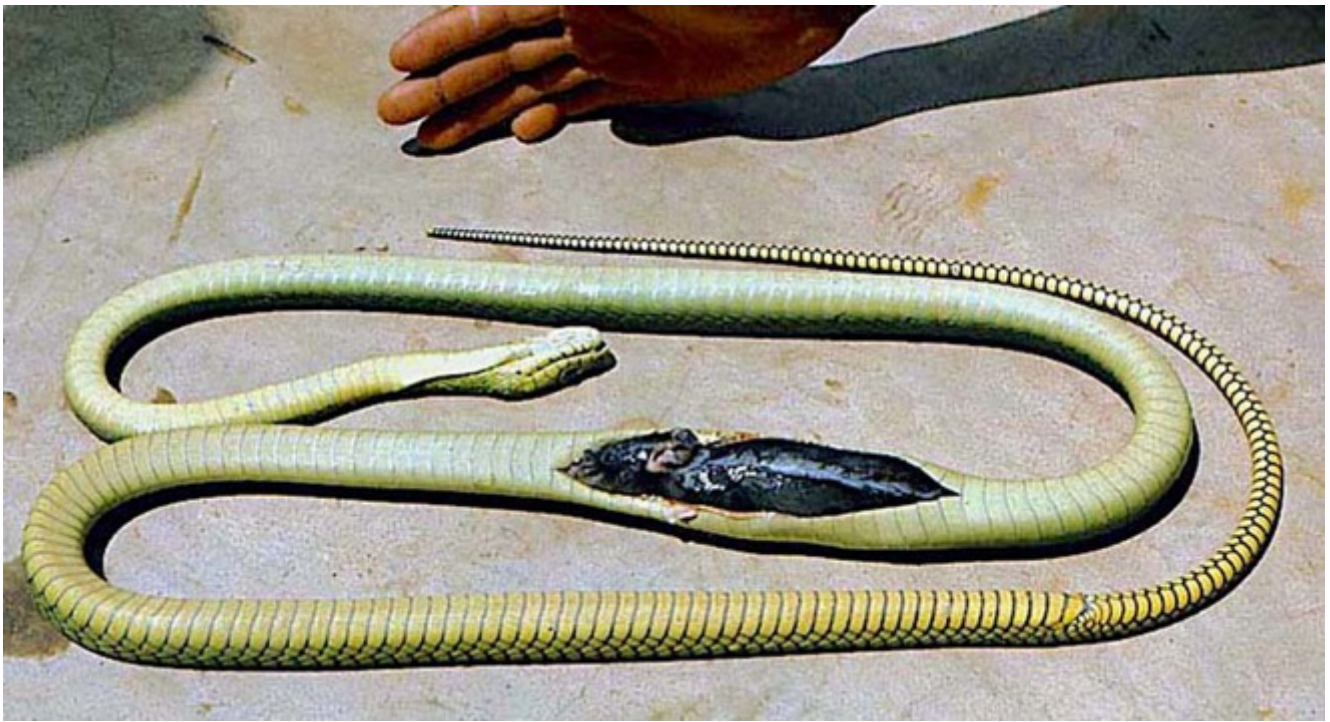
The fangs of vipers such as the Gaboon viper and the smaller viper found in the UK are also hollow but they are more curved and proportionately longer than the mamba's. They are hinged at the base and when the viper closes its mouth they fold back and lie along the roof of the mouth. As the viper strikes, the mouth opens wide and the fangs hinge forward and downward into an erect position. As the snake makes contact with its prey, the fangs pierce the body and inject the venom. Often, but not always, the snake then



Jameson's green mamba (*Dendroaspis jamesoni*) showing the two fangs. Unlike a viper's fangs the mamba's fangs are not hinged. They are fixed in the position seen here and are located right at the front of the mouth for easy and rapid injection of venom.

opens its mouth and withdraws from its prey – all in the blink of an eye. The simplest form of snake fang has an open groove along its length that conducts the venom. Species with such fangs are referred to as back-fanged snakes because the grooved fangs are in most cases at the back of the upper jaw (see photograph page 5).

I refer now to the photograph of a Gaboon viper's fang (above); this is from an adult viper that was brought to the Zoo for sale. However, It had been badly injured when some people tried to kill it and was of little interest. The vendor decided to leave the snake with us anyway but



This green mamba (*Dendroaspis jamesoni*) was brought to the Zoo already dead. It had been killed on the University campus by young men who saw it in a tree and managed to knock it down with long sticks; they then killed it. The rodent in its stomach is a black rat, an imported vermin species that now seems common in Nigeria. Green mambas kill large numbers of rodents.

it died the next day. I removed the fangs for future reference. Three separate fangs of different lengths were grouped together on each side of its mouth, but in each group there was one fang that was longer than the others; almost certainly it was this fang that delivered the venom into the prey animal. One only has to look at these fangs to understand what little jewels of natural engineering they are. I am sure that whoever designed the hypodermic needle must first have studied a viper's fang!

Snake venom may be divided into two general types, haemotoxins and neurotoxins. Haemotoxins break down the blood cells, circulatory system and muscle tissue; neurotoxins attack the central nervous system and can cause breathing difficulties and heart failure in a human. There are, however, many variations of both types of toxin as well as combinations of the two. Species vary considerably from being only mildly venomous to species such as mambas and vipers that can kill large mammals. Snake venoms presumably evolved as part of a specialised mechanism for securing food. However, some species also use their venomous bite defensively and respond accordingly to danger or threats. Venom effectiveness is often related to the size or speed of the prey animal and how far it can travel after being bitten; the snake must be able to find it fairly quickly by following its scent. Many non-venomous species prey on animals such as frogs or fish or other smaller animals that can simply be seized in the teeth and swallowed alive without the snake being harmed. However, pythons and boas and indeed many other non-venomous species kill their prey by constriction before swallowing it.

We can now return to the moment when Peter was bitten by a green mamba on the Lagos Road. Peter's zoo keeper colleague, Johnson, was with me in the University Staff Club and was telling me what had happened to Peter.

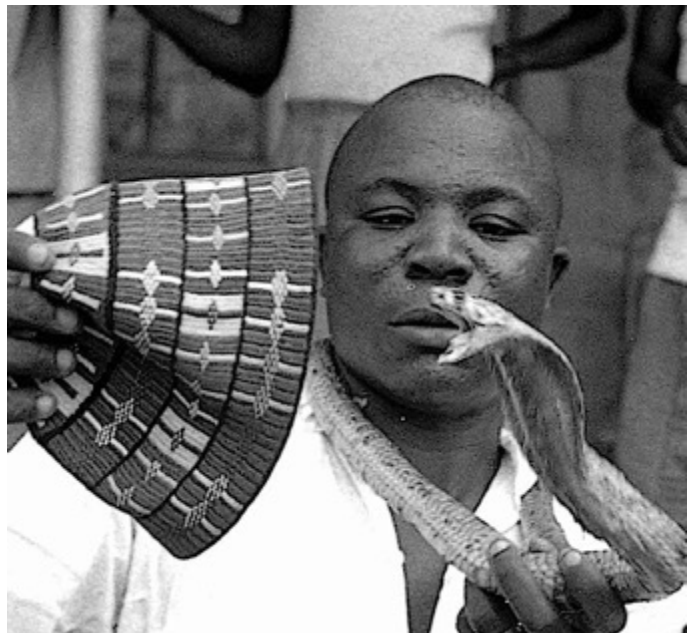
As one would expect, immediately following the mamba's bite Peter was deeply shocked and anxious about what would now happen to him. Apparently he was already experiencing some pain at the site of the bite although he could still talk and stand normally. The driver of Peter's taxi vehicle and some of his fellow passengers took over. None of them knew much about snake bite, but they assumed the mamba's bite would kill Peter and they rushed to help him. They all agreed that the best place to take Peter was to the highly regarded University College Hospital (UCH) in Ibadan although they were still many miles away. On arrival there a little more than an hour later, Peter was admitted immediately. He asked the hospital staff to please get a message to the Zoo to inform them of what had happened. In my absence from the Zoo that day, Johnson was despatched immediately to the hospital and was allowed to visit Peter in his ward. Johnson was told by a nurse that the hospital had a stock of snake bite antivenom and that Peter had already been injected with this. However, Johnson reported that Peter looked and sounded very unwell; in particular he was having difficulty with his breathing.

As Johnson related all this to me in the Senior Staff Club I was hugely relieved to hear that the hospital had treated Peter with antivenom. This medication is produced by injecting a horse or a sheep with small but increasing quantities of venom from selected species of venomous snake. The host animal then reacts by producing antibodies in its blood; some of this blood is later removed and refined to form the antivenom which is injected into a bitten person to neutralize the effects of the venom.

Before I heard all this from Johnson, I had no idea whether or not the hospital stocked snake antivenom. However, I hadn't been too concerned because I had my own supply in the Zoo in case of an accident there. When necessary, I brought a supply back with me from the UK when I returned from my annual leave in the summer.

After Johnson had described these earlier events I felt a little more relaxed about Peter's situation, even though I hadn't yet seen him. At least Peter was in the right place, with modern medical expertise available to treat him. I felt able to finish quickly what I had been doing at the Staff Club and then prepared to drive to the hospital so that I could see Peter for myself. I asked Johnson to come with me and quickly drove the three miles or so to the University College Hospital. On arrival we were taken to Peter's bedside where a curtain had been drawn around his bed.

I was immediately concerned at Peter's condition. He lay in bed looking ill and frightened. He said the site of the bite was somewhat painful but not unbearably so. However, my main cause for concern was that he couldn't breathe very well and was tending to gasp for breath; and he told me these symptoms were becoming worse. A mamba's bite affects the victim's nervous



A Hausa man from northern Nigeria with Egyptian cobra (*Naja naja*). He appeared to take quite unnecessary risks when handling this snake. However, when he allowed me to inspect the snake I discovered that its fangs had been pushed crudely out of place and removed.

system and I could only assume that the snake venom was doing its job and that it would soon be more obviously effective. It was then around three hours since Peter had been bitten. He confirmed he was quite certain that the snake that had bitten him was a green mamba and was able to give me a little more information about what had happened. However, I was soon advised by a nurse to leave him in peace to continue his treatment and recovery.

I still felt uneasy though. Peter didn't look well at all. I had never before observed anyone who had been bitten by a venomous snake and was aware that individual conditions and circumstances can vary the victim's response to a bite. There were questions I wanted to ask but at that time there were no doctors present for me to talk to. The nurse in charge had earlier confirmed to me that a doctor had injected Peter with a dose of snake antivenom very soon after his admission but that it could be some time before Peter began to improve. There was nothing more I could do.

I bade Peter farewell and said I would come to see him next morning. I went over to a senior nurse, who was sitting behind a large table, and thanked her. I was about to walk off when a small carton sitting there on the table caught my eye. I recognised the same logo and packaging as on my stock of antivenom at the Zoo. I remarked on this and the nurse confirmed it was



Gaboon viper (*Bitis gabonica*). Venomous.

indeed the antivenom they had used to treat Peter. Being curious, and with the nurse's permission, I picked up the carton and took out the printed sheet inside to look at the list of venomous snake species covered by this particular antivenom. Several species were included there, some of them indigenous to that part of West Africa, but were identified by their scientific names only. Common or English names were not used. So I looked down the short list for *Dendroaspis jamesoni* but couldn't see it. I couldn't see any other species of mamba either. That's strange, I thought, and checked again. No, it was definitely not there. Not there!! The implications of this omission suddenly hit me. Could Peter have been given the wrong antivenom? Was he dying?

For the second time that day, my heart missed several beats. Could this be possible? Johnson was still with me. I almost shouted at the senior nurse and we had a brief and noisy exchange. However, she sent a colleague to fetch a doctor.

I waited no longer, however. Leaving Johnson there, I ran outside to the car park, leaped into my car and sped back to the University campus and the Zoo. I knew exactly where the Zoo's stock of antivenom was kept, grabbed a carton and drove back to the hospital at speed. When I arrived back at Peter's ward about forty five minutes later a doctor was by his bed; he was cautiously receptive to what I had to say. After a short discussion, he

accepted that he and other hospital staff simply had no reliable way of knowing the identity of snakes. Without further ado, however, and right there before me, Peter was treated with the correct antivenom I had brought from the Zoo. After we had all calmed down, I again said good bye to Peter and the hospital staff and left to go home.



**Egyptian cobra (Naja naja) from northern Nigeria.
Venomous.**

I am delighted to say that Peter showed an improvement soon after this which continued over the next few days. His recovery was essentially uneventful and he soon returned to his keeper's job at the Zoo. The entire drama of his snake bite, however, including that quite unfortunate and unnecessary second scare, lived with some of us for some time. At least the episode had a positive effect in that it impressed on the Zoo's animal staff, especially the reptile keepers, the need for careful and thoughtful preparation before attempting to handle any venomous or any unidentified snake. A general feeling persisted for some time that Peter had had a very close shave indeed! I hoped, too, that the administrative and medical staff at

University College Hospital were able to review their approach to snake bite treatment and make changes that ensured the appropriate antivenoms were stocked and used correctly.

That's really the end of this story about Peter and the mamba. However, I should mention briefly that, at the Zoo, we went on to modify an existing building and construct a very successful reptile house exhibiting various snakes, lizards, crocodiles and tortoises to the (Nigerian) public. I have written about it elsewhere. This project was a totally new concept that was of immediate interest generally. One of my lasting memories is of a party of young school children in the Zoo clamouring to hold a snake and then one of them - a girl - standing very still, a smile on her face, a small python around her shoulders and one of her school friends reaching out carefully to touch it.

Bob Golding.

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