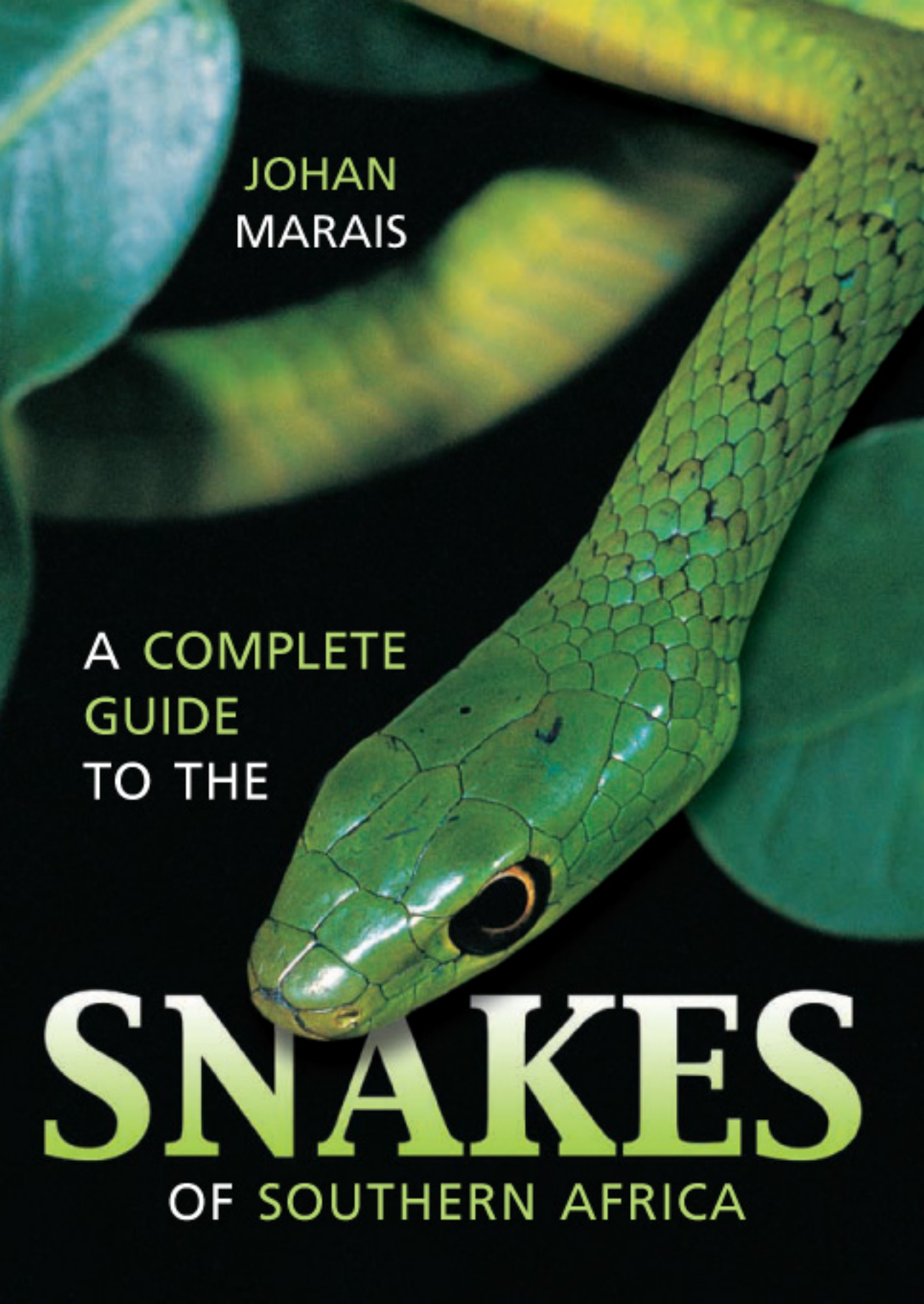
JOHAN
MARAIS
A COMPLETE
GUIDE
TO THE
SNAKES
OF SOUTHERN AFRICA

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A Complete Guide to the

SNAKES

of Southern Africa

DEDICATION

To Molleen and Melissa

A Complete Guide to the

SNAKES

of Southern Africa

Johan Marais

ACKNOWLEDGEMENTS

FIRST EDITION

I am indebted to several amateur and professional herpetologists who have given me advice and information over the years. A great deal of information was obtained from various newsletters and journals of the Herpetological Association of Africa – my thanks to the contributors.

Several people assisted during photographic sessions. My thanks to Brandon Borgelt, Timothy Simpkins, Crawford Coulsen, Dave Morgan, Mike Glynn, John Neeves and especially Theuns Eloff for their help. The late Gody Kunzi, Wulf Haacke, Malcolm Paterson, the late John Lougher, John Vorster, Frans Meyer, Kierie Botha, Gavin Carpenter, Donald Strydom, Barry and Karen Stander and Keith Walters made specimens available to photograph while some of the snakes were photographed at the Transvaal Snake Park and Durban Snake Park. My thanks are also due to Rod Patterson and Fritz Muller.

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Angelo Lamibiris kindly supplied the line drawing of *Naja nigricollis nigricincta*, *Naja n. woodi*, and illustrations for the chapter on classification and relationships.

Dr O Bourquin supplied the species account, distribution map and line drawings of *Montaspis gilvomaculata*.

My thanks to the directors of Jonathan Ball and Ad Donker Publishers and Dr Donald Broadley for permission to use line drawings from *FitzSimons' Snakes of Southern Africa*.

The distribution maps were drawn by my wife Molleen with help from Theuns Eloff.

Dr Mark Verseput, Dr Ev Cock and Dr Chris Foggin commented on the drug chart in the reptile husbandry section.

Special thanks are due to Lynn Raw, Angelo Lambiris and Mike Bates who had the laborious task of reading through the manuscript and suggesting improvements. Despite their rather hectic schedules, they managed to find the time to help and I value their contributions. I trust that the end product does justice to their efforts. Lynn Raw also wrote the chapter on classification and relationships. Dr L Schrire, head of the serum and vaccine department of the South African Institute for Medical Research, read and commented on the chapter dealing with snakebite and first-aid treatment.

My sincere thanks to Gordon Setaro for all the good times that we have spent in the veld and for his willingness to share his wealth of information with me. His knowledge and understanding of the reptiles and amphibians of southern Africa is unequalled. I would also like to thank my very good friend, Prof. Gerrie Smith, for all his enthusiasm and encouragement.

My working relationship with my publisher has always been a very pleasant one and I thank Rita van Dyke (formerly of Southern Books) and Louise Grantham for their efforts, patience and assistance.

A final word of thanks goes to my wife Molleen, daughter Melissa and my father. This book is the result of many weekend photographic sessions and hours in my study – times that my family had to do without me or actively avoid me. Without their encouragement, support and understanding this book would not have been possible.

JOHAN MARAIS
1992

SECOND EDITION

It has been more than a decade since the first edition of *A Complete Guide to the Snakes of Southern Africa* appeared and much has happened on the snake front in that time.

I have been very busy building up my business and must thank my colleagues and business associates for their support. Many friends, far too many to list, have given me advice, encouragement and support over the years. My thanks to Donald Strydom, Randy Babb, Paul Moler, the Madhav family, Nush Goncalves, Marius Burger, and Graham and Natasha Alexander for all their support.

Prof. Graham Alexander sacrificed many hours of his valuable time to comment on the manuscript and suggest improvements. Dr Bill Branch has always been a great help and his excellent book *Field Guide to the Snakes and other Reptiles of Southern Africa* has been a most useful reference, especially with regards to behavioural and technical information, as well as distribution maps. I also thank Dr Don Broadley for all his help and advice.

Lynn Raw again kindly wrote the chapter on classification and relationships. Most of the line drawings were done by Randy Babb and it is a privilege to be able to include artwork by such an excellent artist. He drew the head line drawings using various reference works including various technical papers, photographs and the drawings in Broadley's *FitzSimons' Snakes of Southern Africa*. He also referred to preserved specimens that were photographed at the Port Elizabeth Museum and Transvaal Museum.

The sections on first aid and snakebite were read and commented on by Dr Colin Tilbury and Dr Roger Blaylock. I thank them for their time and effort.

Excellent photographs were supplied by Prof. Graham Alexander, Randy Babb, Richard Boycott, Dr Bill Branch, Marius Burger, S Davies, Peter Dawson, Dr Niels Jacobsen, Warren Schmidt, Steve Spawls, Dr Bruce Taubert, Dr Colin Tilbury, Andrew Turner and Atherton de Villiers.

I enjoyed working with Pippa Parker and Emily Bowles of Struik Publishers and look forward to future projects, and I thank Janice Evans and Robin Cox for their hard work and the effort that they put into designing the second edition.

To all of the above, thanks for your input. I take full responsibility for this book and trust that the end product meets with general approval.

Last, but by no means least, my thanks to my family. My father has always been very supportive and I thank him for all his love, wisdom and patience. I thank my wife Molleen and daughter Melissa, to whom this book is dedicated, for all their love, patience, enthusiasm, support and understanding. I spend a great deal of time away from home and, when I am with my family, I selfishly work on manuscripts and spend hours taking photographs. Without their support, so much of what I have attempted in life would never have happened.

JOHAN MARAIS
2004

Green Mamba

AUTHOR'S PREFACE

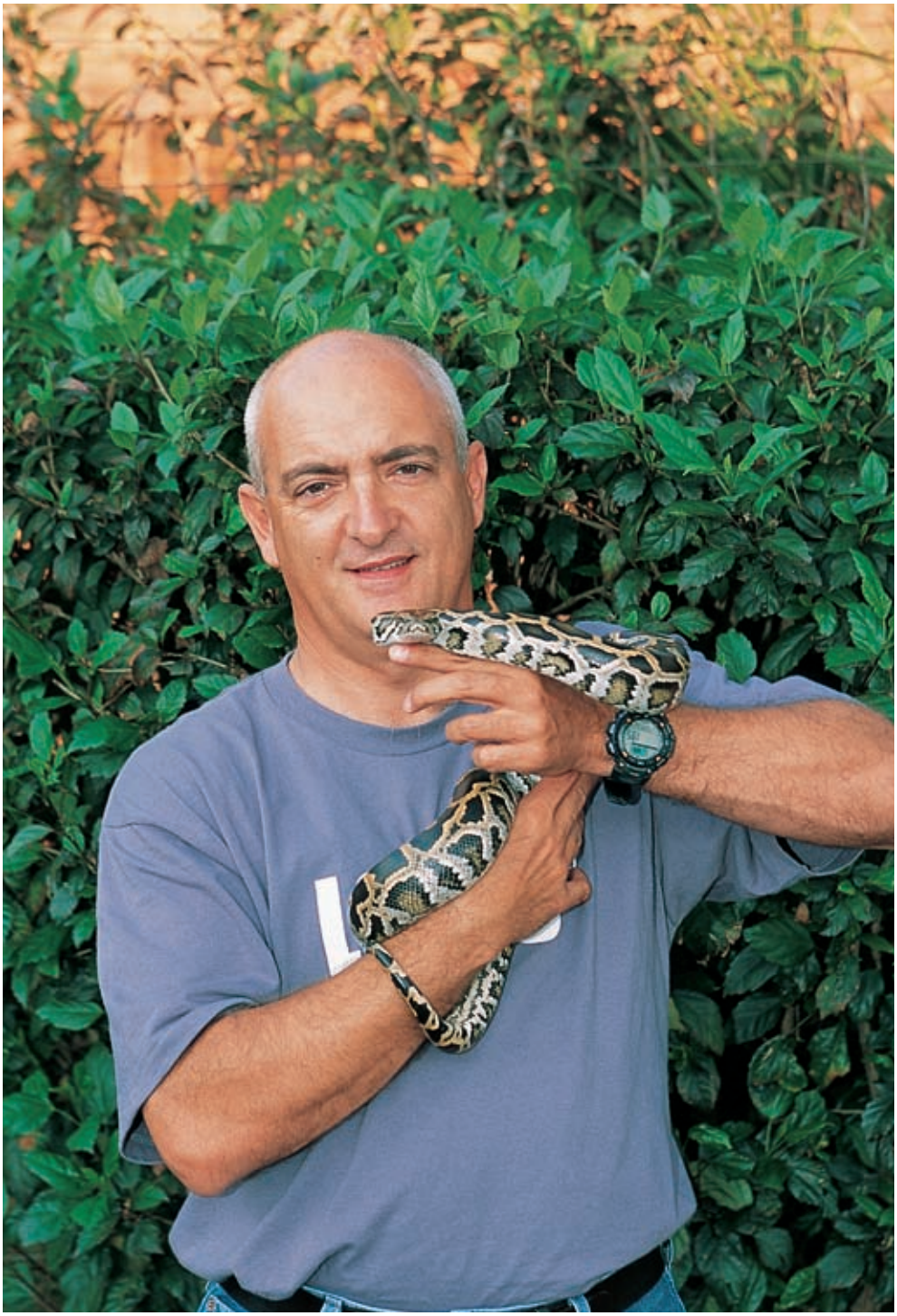
There are 170-odd species and subspecies of snakes in southern Africa, many of which are insufficiently studied and poorly understood. The aim of this book is not only to assist in identifying southern Africa's diverse range of snakes, but also to give the layperson, including snake enthusiasts, a fresh understanding and appreciation of these fascinating creatures.

The response to *A Complete Guide to the Snakes of Southern Africa*, which was first published in 1992, was overwhelmingly positive and evoked many helpful comments. This new edition has been revised in the light of such comments and the many queries and suggestions I have received. The text has been updated and includes accounts of at least 11 new species and subspecies, while more than 30 species and subspecies have been reassigned. Snakes such as the Red Adder (*Bitis rubida*), the Albany Adder (*Bitis albanica*) and the Southern Adder (*Bitis armata*) were described fairly recently, while others such as the Vine or Twig Snakes of the genus *Thelotornis* have been reallocated. With the rapid advance of herpetology in southern Africa, new distributional data has also come to light. Herpetologists now have greater contact with colleagues worldwide and more research is being conducted than before, both locally and by overseas researchers. In addition, new techniques in DNA analysis are proving to be extremely helpful, especially in the field of taxonomy.

As much additional information as possible has been included in the species accounts that relates to behaviour, natural history, reproduction and snake venoms. Colour photographs now accompany the species descriptions and this, together with the simple icons that make essential information readily available at a glance, will, I hope, enhance the guide and make it even more user-friendly.

In view of the fear and superstition that surrounds snakes, it is worth stating that relatively few snakebite incidents are fatal. Snakebites can range from very dangerous to merely painful or even completely harmless. Several authoritative books have been written on the subject of snakebite and its management. Articles appear in scientific and medical journals, popular magazines and newspapers, while colour brochures on the subject are published from time to time. However, many of these contributions are very technical and focus on the medical treatment of snakebite, the use of antivenom in conjunction with steroids, adrenaline, etc. This book avoids technical terminology where possible and is a more general and practical guide that will appeal to the layperson: the farmer, housewife, gardener, hiker, hunter, fisherman or anyone else who spends time outdoors.

While it is crucial that correct procedures be followed if a snake does bite someone, we humans pose a far greater threat to snakes than they do to us. Urban development, industrialization and mass destruction of natural habitats to make way for agriculture have seriously threatened a number of species. Further study of the impact of these activities on snake populations is urgently required. It is my hope that this book will contribute to a more respectful attitude to these sensitive and skilled predators and to a better understanding of their importance in nature.



The author with a juvenile Burmese Python.

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Front cover: Eastern Natal Green Snake
Page 1: East African Egg-eater (Wulf Haacke)
Page 2: Black Spitting Cobra
Page 3: Anchieta's Dwarf Python

Common Brown Water Snake

Marius Burger

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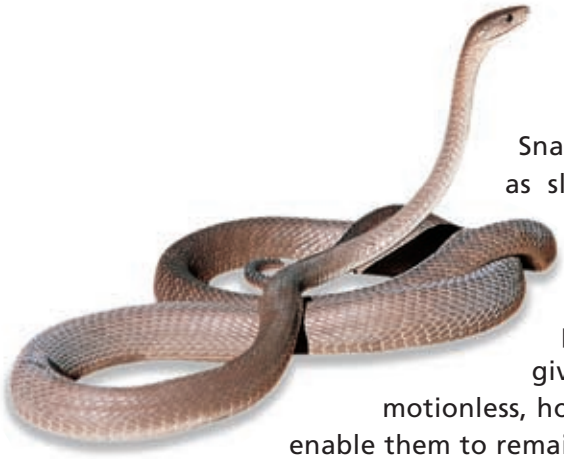


INTRODUCTION

Snakes have traditionally been looked upon as slimy, repulsive and aggressive creatures that attack people at every opportunity. If cornered or hurt, a snake may well defend itself but, even then, most snakes prefer to move off quickly and quietly if given the chance. Other snakes will remain motionless, hoping that their excellent camouflage will enable them to remain undetected.

The snake is without doubt one of nature's most efficient and skilful predators. For instance, a rodent, once it disappears down its network of burrows, is safe from most predators – except from snakes. With its elongate, limbless body a snake can easily move through the burrows and not only kill an individual rodent, but in many cases eradicate an entire rodent family in one session.

Some snakes rely on muscle power to kill their prey while others have evolved a venom apparatus. The venom is modified saliva and is produced and stored in salivary glands that are situated more or less behind the eyes on either side of the head. Not only does venom enable the snake to kill its prey, but it also assists with digestion. Saliva is one of the digestive juices secreted by animals and is particularly important to snakes, as they cannot chew their food.

FACTS AND FALLACIES

Few living creatures are as fascinating as snakes, yet although a great deal has been written about them, we still know very little about these interesting and misunderstood animals.

Fallacies are passed on from generation to generation and the same old stories are repeated endlessly. Have you heard about the man on horseback who was chased by a Black Mamba for kilometres on end? Or the snake that was so long it stretched from one side of the road to the other? Another favourite is that Puff Adders eat their babies. The most commonly asked questions about snakes are answered below:

Are snakes wet and slimy?

No, they are neither wet nor slimy, but perfectly dry. A snake that emerges from water will obviously be wet, but not slimy. The shiny, highly reflective skin may give the impression that a dry snake is wet.

Very little is known about the habits and behaviour of most snakes.

Do all snakes spit their venom?
The majority of snakes in the world and in southern Africa, including the cobras, cannot spit their venom. We have two common spitters, the Rinkhals (Hemachatus haemachatus) and the Mozambique Spitting Cobra (Naja mossambica). The other spitting cobras within our range are the Black-necked Spitting Cobra (Naja nigricollis nigricollis), the Black Spitting Cobra (Naja nigricollis woodi) and the Zebra Cobra (Naja nigricollis nigricincta). These snakes do not actually 'spit' their venom but rather squirt it, although 'spit' is commonly used.

Can the forked tongue of a snake sting?
The forked tongue is used only for smelling and cannot sting or harm in any way.

Does the Puff Adder strike backwards?
Contrary to popular belief, the Puff Adder (Bitis arietans) cannot strike backwards. Like most other snakes, it is capable of striking forwards or to the sides or, once it has turned around, striking in the opposite direction, but not backwards. This belief probably originated from the snake's habit of snapping into a coiled or striking position when disturbed, which may give the impression that it strikes backwards.

Do snakes lick their prey before swallowing?
A snake may inspect a dead prey item with flickering tongue, but does not lick it. If disturbed soon after eating, a snake may regurgitate its meal, which will be covered in mucus. People then often erroneously assume that it was licked prior to being swallowed.

Does a python need to anchor its tail before or during a kill?
This is not necessary, as the snake needs to throw only one or two coils around its prey in order to subdue it. The tail does not have to be anchored, although it may be an advantage when constricting large prey. Pythons do, however, always latch onto their prey with numerous sharp, strongly recurved teeth to prevent their prey from escaping.

Do snakes move in pairs?
Snakes usually pair up only to mate; at other times they are loners. If you do find a snake in your garden, it is highly unlikely that you will find a second one close by. If you happen to kill a snake you certainly do not need to fear a mate coming to take revenge.

Do snakes have nests?
Although many eggs may hatch from a clutch laid in a hole or other suitable spot, there is no such thing as a nest of snakes. Several snakes may use the same hiding place or hibernate together, but if you find a snake in a hedge, it does not mean that the hedge conceals a nest full of snakes. One exception, not found in this country, is the King Cobra (Ophiophagus hannah) of Asia. The female does actually build a crude nest.

Do snakes only die after sunset?
Obviously, a snake dies the moment it is killed. Owing to the normal irritability of muscle tissue when it has been deprived of blood, there may still be movement long after a snake has died.

The forked tongue of a snake is used for smelling and cannot sting or harm in any way.

Snakes such as the Black Mamba may take refuge in neglected areas.

PEOPLE AND SNAKES

Snakes are attracted to dark and neglected areas and will be encouraged to take refuge beneath sheets of corrugated iron or asbestos, building rubble, firewood, grass heaps, and rubbish tips in gardens. Most snakes prey upon rodents, lizards, frogs and toads and will be drawn to gardens that harbour such creatures. To deter snakes, always keep your property clean and tidy. Dripping taps and fish ponds will attract frogs and toads as well as snakes, which may come to drink water or seek food. Fowl runs, birdcages and rabbits will also attract snakes.

Dense shrubs and hedges or a combination of wall, hedge and a nearby pond may also encourage some of the arboreal species to move in, and if there are plants growing near or against windows there is a greater likelihood of snakes entering your home. Ensure that hedges and other plants do not grow against windows.

If you do happen to see a snake in your garden and it does not move off of its own accord, get someone to watch it from a safe distance of eight metres or more, and contact a competent snake collector. Keep children and pets well out of the way. If you do not know of a collector, try calling the local conservation department, snake park, museum, zoo, fire department, traffic department, health department or police station and ask them to remove it.

If nobody is available to remove the snake and you cannot let it move off at its leisure, the only alternative may be to kill it. Avoid using a firearm, as bullets ricochet. A snake is not an easy target and if you intend killing one with a firearm, a shotgun would be the best choice. Even then, be very careful and think before you shoot. Blasts from shotguns can often cause extensive damage. Also bear in mind that there are

Deadly snakes like the Black Mamba often venture into suburban gardens. In such an instance, call a competent snake collector.

various laws governing the use of firearms, especially in urban areas.

Alternatively, and only if you feel that it is absolutely necessary, approach the snake very carefully (it might be a spitter) and give it one or two heavy blows on the front third of the body with a solid object such as a golf club or broomstick. The idea is to kill the snake by breaking its back. Do not touch the snake with bare hands, as it may be feigning death. Rather sweep it into a cardboard box or a bucket.

Take the dead snake to your local snake park, museum or university for identification. It will, in all likelihood, be the most abundant species in your area and you will probably come across another one sooner or later. Have a good look at the dead snake so that you will be able to identify that species in future. Remember that there will be only a few dangerous snake species in your area and it is therefore worthwhile to get to know them.

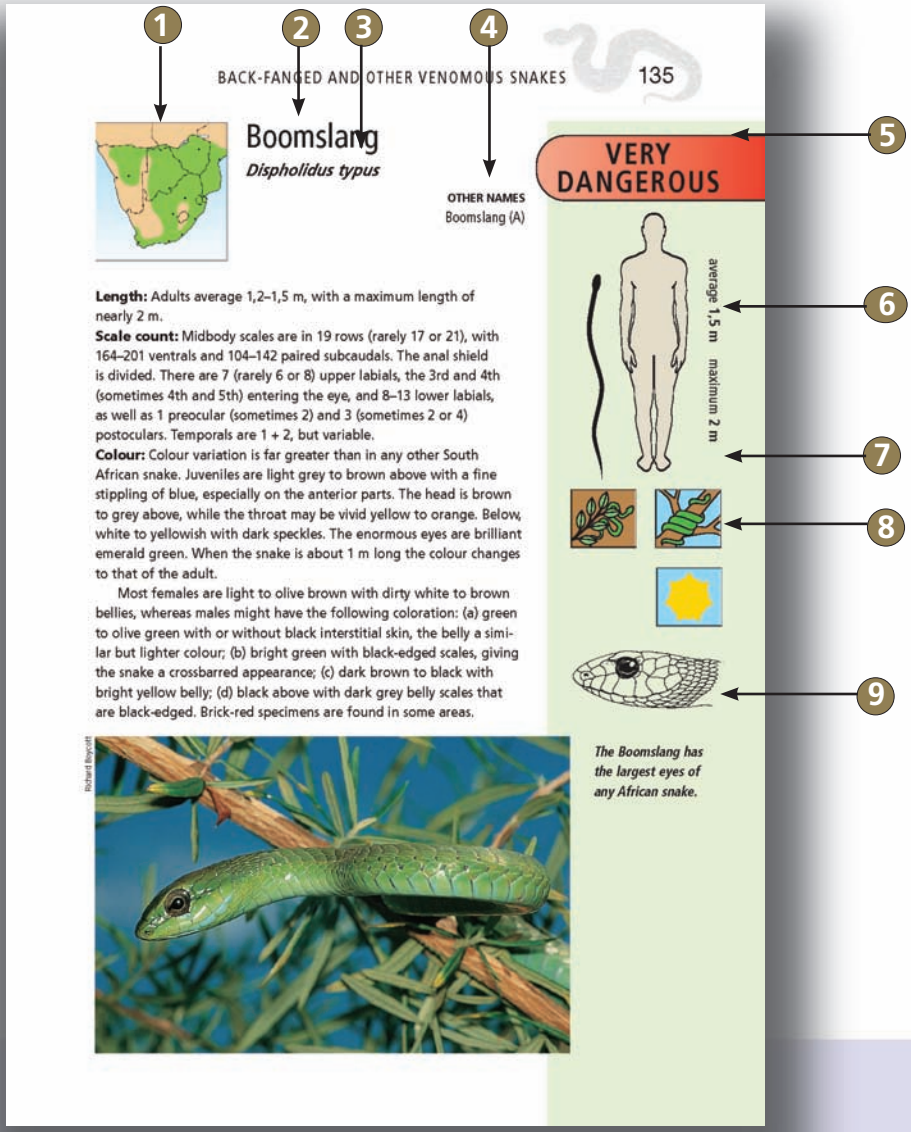
Some people take an active interest in snakes and know how to identify and handle many of them. Track down a local snake enthusiast and keep that person's contact number handy in case you ever have to deal with a snake in your immediate environment.

SOUTHERN AFRICAN HABITATS

A habitat is the particular environment in which an organism lives. Southern Africa has eight distinct habitats or vegetation types in which snakes (and other wildlife) may be found. These are depicted on the map below.

HOW TO USE THIS BOOK

The snakes featured in this book have been grouped according to five snake types, namely adders or vipers (pages 62–93), cobras, mambas and their relatives (pages 94–133), back-fanged and other venomous snakes (pages 134–209), fangless and non-venomous snakes (pages 210–277) and blind and worm snakes (pages 278–300).



- Photographs accompany most species, including as far as possible any variant colour forms or subspecies. To limit confusion, photographs of similar or easily confused species are also featured along with the snake under discussion.
- To facilitate identification, each species account is split up into several headings and is accompanied by a series of icons (explained below).
- A separate 'Look out for' box highlights each snake's most prominent features for quick identification.
- Essential technical terms are explained in the glossary on page 301.

1 Locator map: Each species is accompanied by a distribution map. The distributions indicated on these maps reflect the areas in which the snakes may be found, rather than being derived from general museum records, which are not always comprehensive. This is merely a precautionary approach, as in several regions little museum collecting has been done, although certain species of snakes are known to live there. For more precise distribution information, readers are referred to the various museums that house herpetological collections as well as *Fitzsimons' Snakes of Southern Africa* (see bibliography).

2 Common name: The common name is given at the start of each species account. The same snake may have several common names, and names may also vary from one area to another. Any comments regarding common names will be welcomed and can be e-mailed to **johan@inkbooks.com**.

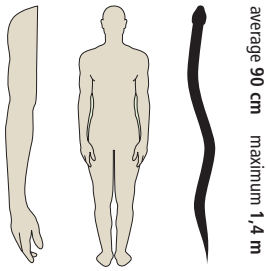
3 Scientific name: The scientific name is provided for each species. This usually consists of two parts, the first indicating the genus to which the snake belongs, the second giving the actual species name. If there are three names, the third name indicates that the snake under discussion is a subspecies or subgroup of a particular species.

4 Other names: Where available Afrikaans, Zulu and Xhosa names have also been included.

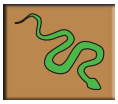
GUIDE TO ICONS

5 Danger bar: Indicates whether the snake is very dangerous, dangerous, mildly venomous, or harmless. Some non-venomous snakes e.g. the Southern African Python, are labelled dangerous because they can inflict a painful wound. Where the venom of species is unknown, the assessment is based on closely related species and anecdotal information.

6 Average size: Shows the snake's size relative to an average human male 1,8 m in height, or to an average human arm of 60 cm.

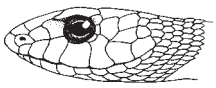


7 Habitat: Indicates whether the snake lives mostly in trees, in shrubs, on the ground or any combination of the three.



8 Nocturnal/Diurnal: Indicates whether the snake is active during the day (diurnal), at night (nocturnal), or both.

9 Head scale diagram: These detailed drawings of the head scales are very useful when trying to identify a snake.




Hatchlings use a fine ‘egg-tooth’ on the tip of the nose to cut the leathery eggshell from the inside

1 BIOLOGY AND BEHAVIOUR

Even though snakes are related to other reptiles, they are thought to have evolved from lizard ancestors and are most closely related to lizards and amphisbaenids (worm lizards). However, the fossil record is still incomplete and the evolutionary history of snakes is hotly debated. The first snakes appeared about 100 to 150 million years ago, somewhere on the southern continents.

Snakes are most clearly defined by their highly adapted and delicate skulls. The lower jaw bones are not fused in the front, which allows them to operate independently. The upper jaw bones are also loosely articulated and, together with several other adaptions, this allows snakes to consume large prey items, in spite of the fact that they cannot bite off easily manageable pieces. All snakes are, to some degree, long and slender, and their internal anatomy is also elongated. The majority of species have only the right lung, which is greatly elongated in slender species, although some primitive species such as pythons still have a reduced left lung.

Snakes shed the entire skin, from the tip of the snout to the tip of the tail, including the eyecaps.

SNAKE BIOLOGY

Vision

Snakes have good vision, but it is used mainly for detecting movement. However, a snake moving through grass can certainly see and, if it so chooses, carefully avoid even small objects in its path. Hence the old, but true, maxim that if you encounter a snake the best thing to do is to stand perfectly still. Snakes do not strike at stationary objects unless, perhaps, they resemble prey. Two southern African snakes are believed to have superior vision and are capable of seeing stationary prey – the Boomslang (*Dispholidus typus*) and the Twig or Vine Snake (*Thelotornis* spp.). Furthermore, for reasons that are not fully understood, these species have binocular vision, while most other snakes have monocular vision.

Snakes do not have movable eyelids; instead, a fixed transparent shield that is shed with the rest of the skin during sloughing covers the eye.

Hearing

As external ear holes are absent, snakes cannot hear most airborne sounds. They do, however, have an auditory nerve and can hear sounds travelling through a dense medium. Snakes are sensitive to vibrations and can often detect the approach of a person or animal.

Smell

The forked tongue of a snake cannot harm or sting in any way and is used only for smelling. The tongue pushes through a groove in the front of the mouth and is flickered, in order to pick up particles in the air. When it is drawn back into the mouth these particles are deposited onto organs situated in the roof of the mouth, known as the organs of Jacobson. The epithelium of this organ functions in exactly the same way as a human's olfactory epithelium. This means that a snake enjoys a similar sense of smell to our own.

Unlike lizards, snakes do not have movable eyelids and cannot blink. The eye is covered by a fixed transparent shield.

The constantly flickering forked tongue is used for smelling.

The tongue is forked so that the snake can follow scent trails. The tips are kept apart so that it can discern differences in the strength of odours and enable it to locate its prey quickly.

Sloughing or shedding

Shedding of the outer layer of skin occurs as often as 15 times a year in juvenile snakes and about one to four times a year in adults, depending on growth rate. The external layer of skin does not grow and is therefore shed periodically, irrespective of the time of year. The entire skin, from the tip of the snout to the tip of the tail, including the caps that cover the eyes, is shed. Prior to sloughing the eyes become opaque and the snake may go into hiding, as its vision is restricted and it is more vulnerable to predators. The nose is rubbed against a rough surface until a piece of skin comes loose. Then, in most instances, the entire skin is shed in one piece and comes off inside out like an inverted sock. In older and larger snakes, as well as in captive snakes, the skin is often shed in pieces. Prior to shedding, snakes may select higher temperatures (by basking for longer periods) to speed up the development of new skin, effectively shortening the vulnerable period during which they cannot see well.

Marius Burger

A Herald Snake with a piece of shed skin on its head. Note the vivid colours immediately after shedding.

SNAKE BEHAVIOUR

Reproduction

In early spring snakes get together to mate, the male usually locating a female by following a scent trail that she leaves behind. Once he locates her, the male will inspect the female with flickering tongue and will eventually twist the base of his tail beneath hers to copulate. Males have two penises, referred to as hemipenes, and one of the penises will protrude for copulation to take place.

Strictly speaking, all snakes hatch from eggs, the majority of them from eggs that are laid and left for external incubation. These snakes are referred to as oviparous or egg-laying and they produce leathery eggs. Some snakes, such as the Southern African Python (*Python natalensis*) and the Rhombic Skaapsteker (*Psammophylax rhombeatus*), coil around their eggs throughout incubation. This serves not only to protect the eggs, but also raises their temperature, which assists with incubation.

Other snakes retain the eggs within their bodies to produce fully developed live young, and are referred to as viviparous or 'live-bearing', although this is not to be confused with mammalian live birth. These eggs do not have the usual leathery shell and the young may be covered in a fine membrane that is easily ruptured.

Between four and eight weeks after mating, a female will select a suitable site to lay her eggs. The eggs are usually deposited in a hollow tree trunk, in rotting vegetation or in some other suitably protected place. The number of eggs, which may depend on the size of the female and, of course, the species, varies from one or two to as many as 60 eggs, or even more. The eggs have soft, leathery shells and require a certain amount of heat and humidity in order to hatch, usually one to three months later. The young are equipped with an 'egg-tooth' consisting of a sharp ridge on the tip of the snout, which is used to slit the eggshell from the inside. Soon after leaving the egg the 'egg-tooth' is shed. Hatchlings usually resemble the adults and are often perfect replicas of their parents. The young of venomous parents are equipped with fangs and venom glands from birth.

Egg mortality is often high as eggs may be flooded, eaten by scavengers, desiccated or otherwise damaged. This is probably why some snakes retain the eggs within their bodies and give birth to young that are covered in a fine membranous envelope, which is ruptured soon after birth. There are no hard and fast rules as to which snakes are oviparous or viviparous. Mambas, cobras, the Boomslang (*Dispholidus typus*) and house snakes lay eggs, while most adders, the Mole Snake (*Pseudaspis cana*) and the Rinkhals (*Hemachatus haemachatus*) produce live young.

Once the eggs have been laid or the young produced, most snakes show no further interest in their progeny. Recent research indicates that hatchling Southern African pythons (*Python natalensis*), however, may remain with the female for several days after hatching, leaving the burrow during the day to bask, but returning to the protective coils of the female at night.

Bill Branch

The eggs of worm snakes are often stuck to one another, like sausages.

Martin Harvey / SIL

Horned Adders retain their eggs within their bodies to produce fully developed live young.

Hibernation

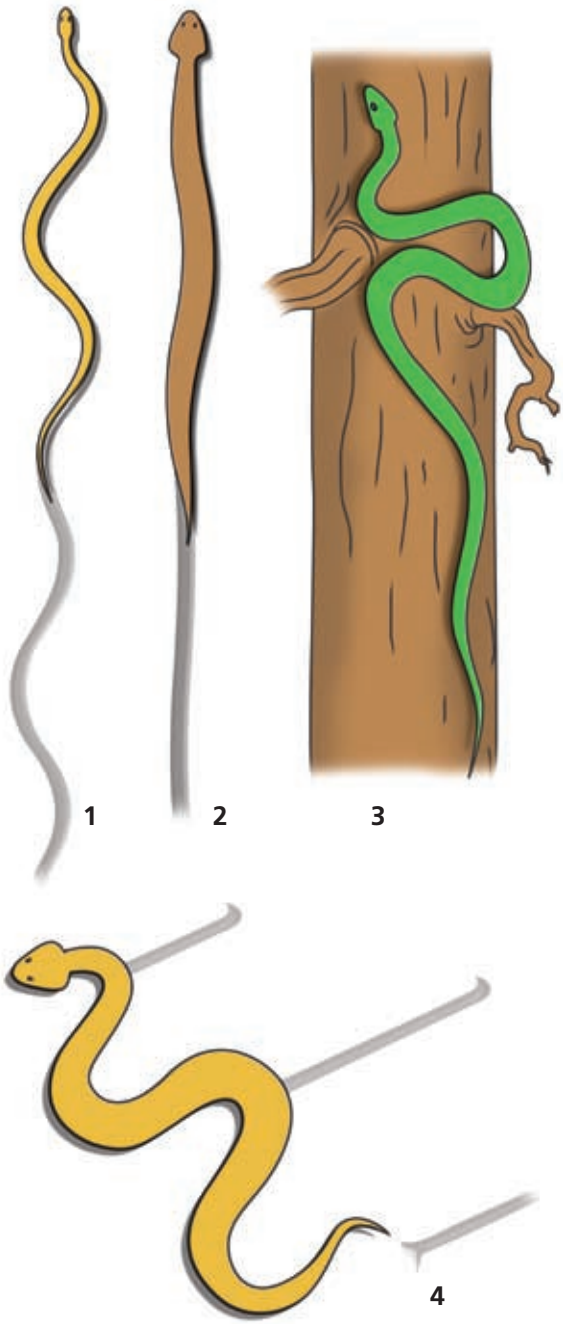
Snakes are often referred to as being cold-blooded (ectothermic). This does not mean that their blood is cold, but rather that they have no internal mechanism to control body temperature and must depend on the immediate environment to supply their body heat requirements.

In areas where there is a marked difference in temperature between summer and winter, snakes will go into hibernation, or more correctly torpor, for as long as cold conditions prevail. During this period they live off accumulated body fat and show very little, if any, activity. However, on a warm winter's day, a snake may bask near its hideout. Most snakes hibernate in animal holes, beneath rocks, or in deserted termite mounds. Individuals of different species may congregate in the same spot and hibernate together.

Snakes depend on the environment for their heat requirements.

LOCOMOTION AND SPEED

There are four basic modes of progression in snakes:



1 SERPENTINE MOVEMENT: This is the normal mode that most snakes use, especially when disturbed or when chasing prey. The body undulates from side to side while its hindpart makes contact with irregularities and the body is pushed forward in the direction the snake intends to go. This procedure is also followed when swimming.

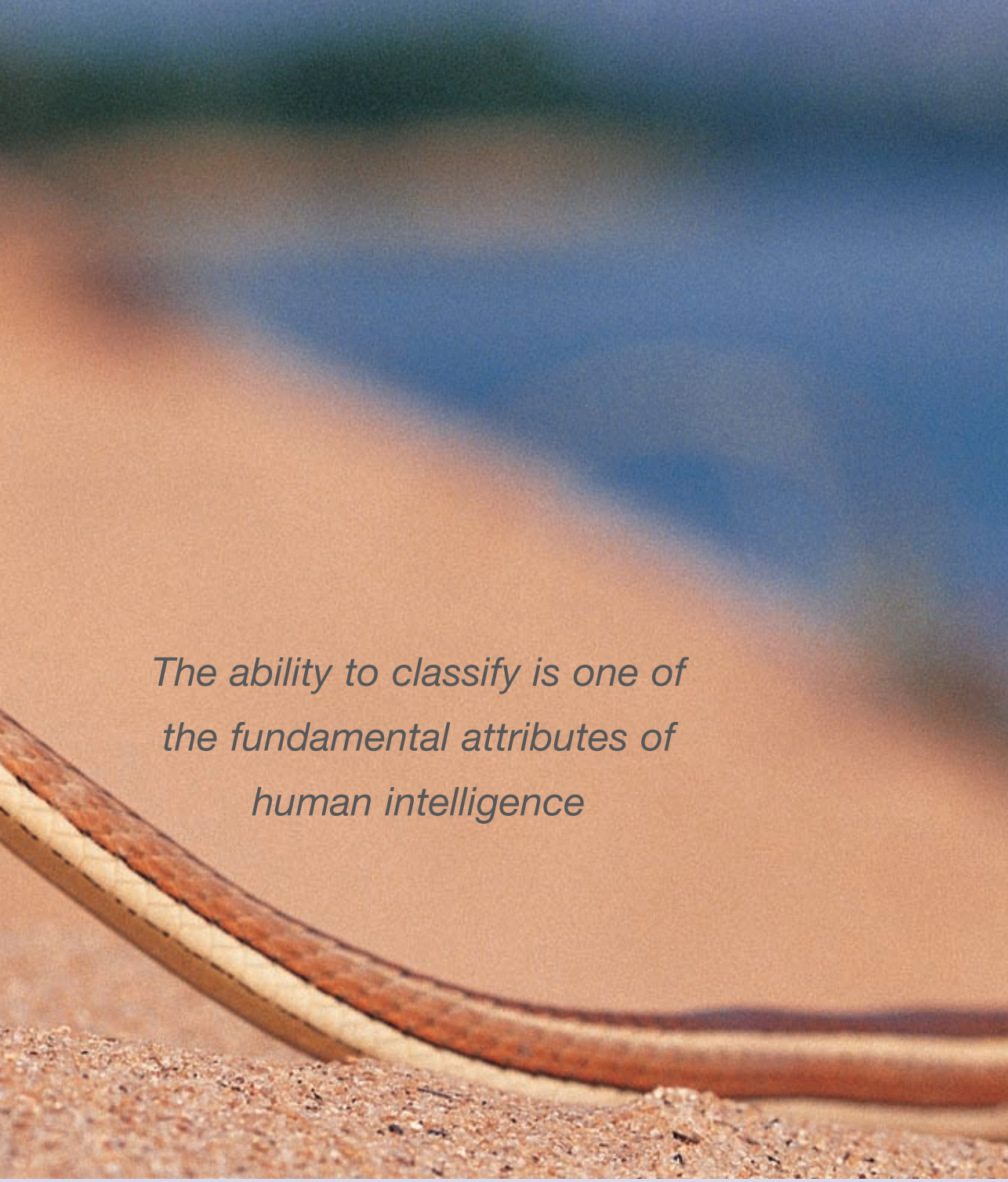
2 CATERPILLAR-LIKE MOVEMENT: The snake progresses in a straight line using the ventral scales only. Heavy-bodied snakes, especially the Puff Adder (*Bitis arietans*), often use this slow method of moving.

3 CONCERTINA-TYPE PROGRESSION: The snake anchors its head and drags the rest of the body along. This can sometimes be seen in trees where snakes may have difficulty negotiating smooth branches. Some burrowing snakes' tails end in sharp spikes, which are dug into the sides of burrows while the snake pushes itself forward.

4 SIDEWINDING: Certain snakes have adopted the sidewinding motion to move about on unstable dune sand. Only one or two sections of the body touch the ground at any one time. A section of the body is thrown sideways and is followed by the next section. One advantage is that most of the body does not make contact with the hot sand while moving.

The speed of snakes has been grossly exaggerated in the past, and still is today. It is highly unlikely that even a snake capable of fast movement, such as a large Black Mamba (*Dendroaspis polylepis*), would ever exceed 20 km/h. Snakes (and most other reptiles) do not receive as good a supply of oxygenated blood as birds and mammals and therefore tire more easily when compelled to exercise more vigorously than usual for any period of time. Snakes never chase after people and a person could easily outrun any snake if they were both moving rapidly in the same direction.

uff adder black mamba common slug-eater boomslang gaboon adder
nake eastern congo stiletto snake slender blind snake desert mo
ong-tailed worm snake forest cobra yellow-bellied house snake
nake berg adder cape cobra anchieta's dwarf python green water
nake red adder common shield-nose snake. common purple-glossed
any-horned adder green mamba aurora house snake variegated slug



The ability to classify is one of the fundamental attributes of human intelligence

2 CLASSIFICATION AND RELATIONSHIPS

BY LYNN RAW

The ability to classify is one of the fundamental attributes of human intelligence. Even before we developed a vocabulary, humankind needed to identify what was good to eat and what was not, what was dangerous and what was benign, what was useful and what was not. Classification systems are limited by the extent of our knowledge. Essentially they attempt to group similar objects or concepts according to a particular purpose or design. They summarize and act as filing or information retrieval systems for our knowledge of the things we classify.

In the case of snakes, early zoologists tended to classify them with other long, slender, limbless animals such as worms and eels. As the knowledge of snake anatomy improved, scientists noticed that snakes have far more in common with lizards than they do with either eels or worms. At a more detailed level, snakes are also further classified into subcategories of snakes. Because certain snakes are venomous, some even dangerously so, their teeth and venom delivery apparatus have been used as a guide to their classification. To a degree, these features are still used, but earlier classifications had to be modified when it was discovered that some similarities did not indicate close relationships but, rather, convergent adaptations.

When VFM FitzSimons published the classic book *Snakes of Southern Africa* in 1962, snake classifications were based on dentition and snakes were grouped as follows: blind snakes (Typhlopidae), thread or worm snakes (Leptotyphlopidae), pythons (Pythonidae), the colubrids (Colubridae), the cobras, rinkhals and mambas (Elapidae), and the adders (Viperidae).

Advances in the knowledge of snake biology have made two things obvious. Firstly, these older classifications group together species that are not closely related, while separating others that are. Secondly, there is still not enough information available to establish a sound classification, and we are still not sure of the relationships of some groups.

For the purposes of this book, we have retained the general guidelines of the old structure, because no new classification is firmly in place.

The binomial system of nomenclature was introduced by Carolus Linnaeus (Carl von Linné) in 1758.

LINNAEAN OR BINOMIAL CLASSIFICATION SYSTEM

The binomial system of nomenclature was introduced by Carolus Linnaeus (Carl von Linné) in 1758 and has formed the basis for zoological scientific names ever since. Most species have just two Latin or Greek names called a *binomen*. The first word always begins with a capital letter and is the genus name given to a group of species, while the second begins with a small letter and is the species name. Both of these names are always printed in italics (or underlined if the situation does not allow for italics), e.g. the Natal Green Snake is named *Philothamnus natalensis* or Philothamnus natalensis. The full citation of the name will also include the name of the person (or persons) who first described and named the species, and the year that this was first published, for example *Philotham-nus natalensis* (Smith, 1840). In this example you will notice that the describer's name (Smith) and date (1840) are enclosed in brackets. This parenthesis (bracketing) is used to indicate that Smith originally placed his new species in a different genus (in this case it was *Dendrophis*) that has subsequently been changed to *Philothamnus*.

In some cases three names are used instead of two. If there are three names, the second and third do not start with capital letters and there are no brackets. The third name indicates that this is a subspecies, that is, a subgroup of a particular species differentiated by a particular feature, e.g. colouring. An example of a subspecies name is *Philothamnus natalensis occidentalis* Broadley, 1966, where 'occidentalis' indicates that this is a subspecies of the Natal Green Snake. It is common practice to abbreviate the generic and even the specific name in the case of subspecies, so that the species is referred to as *P. n. occidentalis*. However, the first reference to the species is always written in full.

These definitions will give you an idea of the categories / names used in zoological taxonomy.

- TAXONOMY – the branch of biology concerned with the classification of plants and animals into groups based on their similarities and differences.
- TAXON (plural taxa) – an inclusive group of organisms in a classification. For example, a taxon could be a group at species, genus or family level.
- PHYLUM (plural phyla), CLASS, ORDER AND FAMILY – these are taxonomic groups that are arranged hierarchically (i.e. several classes make up one phylum, several orders make up one class). The members of any one of these units are grouped on the basis that they share unique characters or suites of characters that are not shared by taxa that do not belong (e.g. all and only birds have feathers).
- GENUS (plural genera) – a group of species that share a common suite of characters unique to the members of the genus.
- SPECIES (plural species) – a population of animals that forms a single interbreeding entity. Species may interbreed to produce occasional hybrids and sometimes a hybrid zone at a point of contact with another closely related species. Closely related species that are geographically isolated are more likely to hybridize artificially than those that have overlapping ranges. It is worthwhile noting that there are many definitions of species and that the one given here is based on general considerations that may not agree entirely with all other definitions.
- SUBSPECIES (plural subspecies) – a distinctive subunit of a species, which may be defined by small but consistent differences in traits from other subspecies within the same species. Generally, individuals from different subspecies within the same species can interbreed. Different subspecies within a species are usually geographically separate.
- TRIBE – A taxonomic group between family and genus.

Here is an example of a systematic classification using our previous example:

CLASS
Reptilia
ORDER
Lepidosauria (or Squamata)
SUBORDER
Serpentes (or Ophidia)
SUPERFAMILY
Colubroidea (or Xenophidia = Caenophidia)
FAMILY
Colubridae
SUBFAMILY
Colubrinae
GENUS
Philothamnus
SPECIES
P. natalensis
SUBSPECIES
P. natalensis occidentalis

In the above classification you will notice some alternative names in brackets. These indicate that some scientists have differing opinions about which names are correct. This is a normal state of affairs in systematics and this disagreement is one of the driving forces of scientific investigation and the search for scientific truth.

IDENTIFICATION AND SCALE COUNTS

Even with little knowledge about the subject, it is possible to identify some snakes (to broader groupings anyway) by virtue of certain characteristics. For example, adders have distinctive coloration; cobras typically spread their hood when alarmed; some species are particularly prevalent in certain areas, etc. However, whereas the group or even the genus might be relatively obvious, it is a greater challenge to identify some snakes to species level. It is at this stage that specific scale counts can help precisely pinpoint a species.

Examination of dead specimens is easiest and safest. Obvious care must be taken when handling a live snake closely. Where the head scales comprise very small, usually keeled scales, the specimen is likely to be an adder; and if a loreal scale is absent (a shield on either side of the head between the nasals and preocular), you may have a cobra or one of its front-fanged relatives.

How to count scales

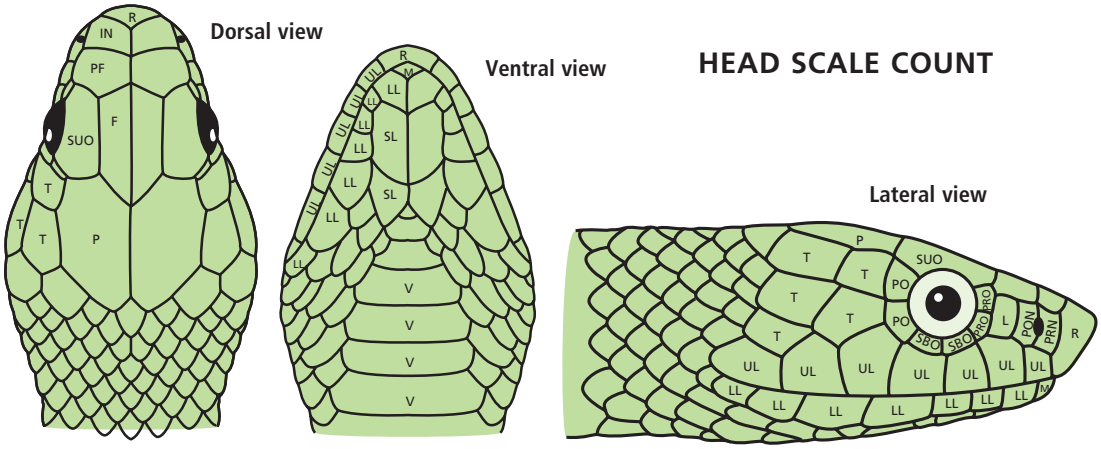
HEAD SCALES

Count the upper and lower labials (i.e. the scales bordering the lips) on each side, and note which upper labials are in contact with the eye. Check whether the nasal scale is single, semi-divided or fully divided. Check whether a loreal is present. Count the number of preoculars and postoculars. Note the arrangement of the scales on the temples, i.e. the temporal formula. Note any fused scales. Observe the relative sizes of the internasals, prefrontals, frontal and parietals (see the head scale drawings). Note the shape and proportions of the rostral scale at the front of the nose.

Warren Schmidt

Night Adders can be identified without counting scales by the distinct V-markings on the head. However, they may be mistaken for Rhombic Egg-eaters.

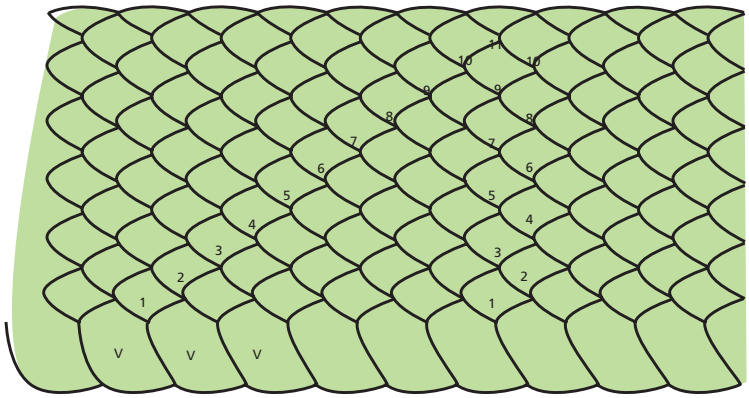
HEAD SCALE COUNT

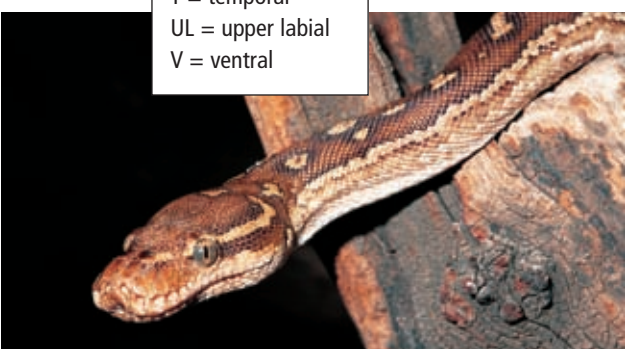


KEY

F = frontal
IN = internasal
L = loreal
LL = lower labial
M = mental
P = parietal
PF = prefrontal
PO = postocular
PON = postnasal
PRN = prenasal
PRO = preocular
R = rostral
SBO = subocular
SL = sublingual
SUO = supraocular
T = temporal
UL = upper labial
V = ventral

DORSAL SCALE COUNTS





BODY SCALES

Count the number of scales around the body at one head length behind the head, one head length in front of the vent and at mid-body. Do not include the ventral scales. Examine the dorsal scales. Note whether they are keeled or smooth. Some snakes have double keels on the scales over the middle of the back. Often snakes have minute pits on the rearmost tips of the dorsal scales. These can be paired or single.

Scientists have differing opinions about which names are correct. This disagreement is one of the driving forces of scientific investigation and the search for scientific truth.

VENTRAL SCALE COUNT (DOWLING SYSTEM)

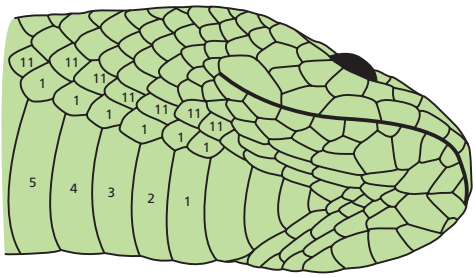
To count the ventral scales, begin by locating the first ventral. To do this, look behind the head. The first ventral is the first scale bordered on both sides by the first row of dorsal scales. From that scale, count the ventral scales back to the one immediately before the anal scale. This total is the number of ventrals. Note whether the ventral scales are keeled with a sharp lateral ridge at each side of the body. Check whether these also extend onto the subcaudals.

SUBCAUDAL SCALE COUNT

The first subcaudal is the single scale or pair of scales that meets the lateral scales on each side. Count back along the tail up to and including the scale, or pair of scales, immediately before the conical tip. If the tail appears to have lost the tip or to have been regenerated, indicate this with a '+' after the total. Note whether the anal scale is single or divided.

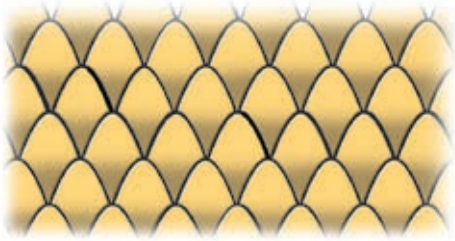
VENTRAL SCALE COUNT

(Dowling system)



Keeled dorsal scales

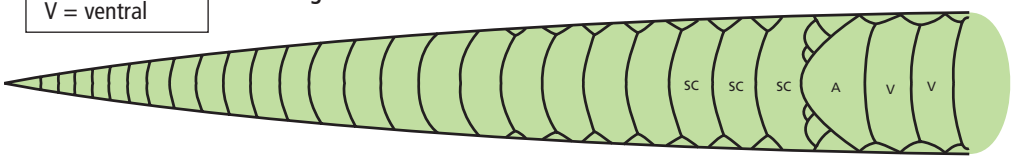
Smooth dorsal scales



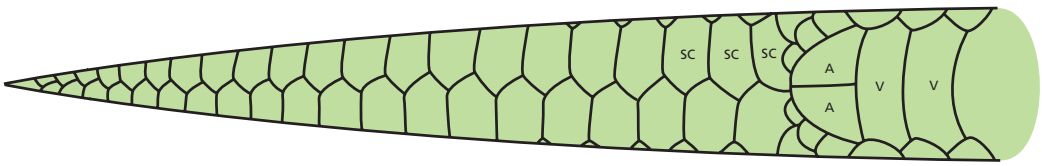
SUBCAUDAL SCALE COUNT

KEY
A = anal
SC = subcaudal
V = ventral

single subcaudals and entire anal



paired subcaudals and divided anal



In practice you may not need to make all the counts mentioned above.