

LAND SNAKES OF MEDICAL SIGNIFICANCE IN MALAYSIA

THIRD EDITION 2022











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Ahmad Khaldun Ismail
Teo Eng Wah
Indraneil Das
Taksa Vasaruchapong
Scott A. Weinstein

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All enquiries should be forwarded to:

Director General

Forest Research Institute Malaysia

52109 Kepong, Selangor Darul Ehsan, Malaysia

Tel: +603- 6279 7000 Fax: +603-6273 1314 Website: www.frim.gov.my

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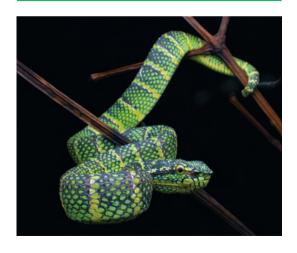
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Coordinators

Tan Kok Kiat, Nur Hazwanie Abd Halim, Yasser Mohamed Ariffin and Norazah Norddin are the coordinators who directly involved in materialising the publication. They performed a variety of editorial duties, include planning, designing, writing text, editing, managing to a prescribed budget and supervising.



Foreword

A developing country set in the tropics, Malaysia is blessed with a rich biodiversity associated with the tremendous varieties of natural habitats. An important component of this is a much neglected, and even maligned group are the snakes.

Although most of nation's herpetofaunal diversity are restricted to its rainforests and mountains, a rather significant portion do indeed dwell in close proximity to humans, and are known to cause morbidity and mortality in humans. Inadequate knowledge and lack of information about these important species often lead to incorrect medical practices, sometimes leading to fatalities. Some poorly informed rural folks are known to administer inappropriate first-aid measures, and consequently, vital time is lost before the patient is transported to a medical care facility. It has been estimated that at least one snake bite case occurs daily, resulting in over a thousand cases annually.

In Malaysia, animal bites and stings are not considered a notifiable disease, and as a result, not enough resources are allocated for this area of healthcare and for its education. It is hoped that this book will help healthcare professionals and the public gain knowledge on land snakes which are of substantial medical significance.

About 225 snakes are now known from Malaysia. This book recognises 36 of them that are of medical significance. Therefore, a vast majority of our snakes are not only harmless, and of the rest, only a few can potentially cause envenomation in humans, or are otherwise dangerous. The main groups of medically significant snakes are members of the families Elapidae (cobras, kraits, coral snakes and sea snakes), Natricidae (some of the back-fanged snakes), Pythonidae (pythons) and Viperidae (pit-vipers).

This book goes beyond making us aware of these important snakes in Malaysia. It covers the potentially dangerous snakes, along with a guide for treating snake-related injuries, and appropriate antivenom. Since healthcare professionals rarely, if ever, get formal training in managing envenomation, this book promises to be an essential resource for the identification and treatment of patients with potential envenoming from snake bites. In addition, those seeking to identify species for other purposes (e.g., biodiversity or medical research, husbandry, visiting the outdoors, etc) will gain much from it.

To conclude, this is a clearly written work, with pleasant infographics, and needs to be in every healthcare professional's library. My wish is to see improved knowledge and confidence level of healthcare professionals in treating snake-bite patient translate to improved patient care and a better appreciation of the country's biodiversity.

Thank you.

DR ISMAIL B. HJ. PARLAN

Director General

Forest Research Institute Malaysia (FRIM)



Overview

The range of snakes of medical significance in Malaysia currently encompasses four families of snakes (Natricidae, Elapidae, Pythonidae and Viperidae). There are limited data on the distribution of snakes in the country. The following account is based on available published information on snakes recorded from Peninsular Malaysia, Labuan, Sabah and Sarawak. This book should be viewed as a guide, especially for healthcare professionals, to identify and manage snake related injuries in Malaysia. Information on the snake species listed here is based on the local data and those from neighbouring countries. Due to their geographical proximity, snakes occurring in Peninsular Malaysia are genetically closer to those from Thailand and Singapore, while those on Sabah and Sarawak are naturally closer to populations from Brunei Darussalam, Kalimantan and islands of the southern Philippines.

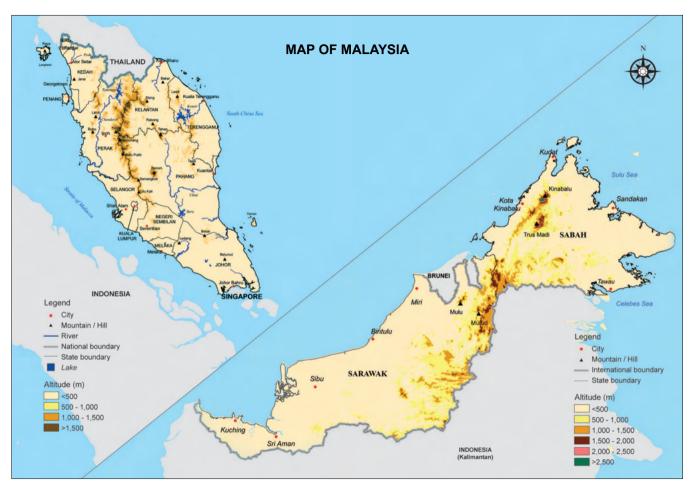
The terms "poisonous" and "venomous" refer to the biological use (functionality) of the toxins on its intended prey or natural enemies. The evolution of venom is mainly influenced by predation and defense. The clinical effect of venom on humans may or may not be the same. While a majority of snakes occurring in Malaysia are non-venomous, and constitute no threat to humans, a number of species can cause mild to severe envenoming that may lead to permanent disability or even death in humans.

The groups of interest include the following families:

 Elapidae (front-fanged snakes) are venomous snakes, which are potentially dangerous and capable of causing significant systemic and local envenoming syndrome. This group includes all sea snakes, of which many are considered highly dangerous

- and may cause significant systemic envenoming syndrome. Other members include cobras, the king cobra, kraits and coral snakes.
- Viperidae (vipers and pit vipers are also front-fanged snakes), which could cause significant local and systemic envenoming syndrome.
- Natricidae (non-front-fanged) snakes, of which two or three species in Malaysia are potentially dangerous, in being able to cause significant systemic and local envenoming syndromes, while some of the others could probably cause limited local reactions.
- Pythonidae (the giant constricting snakes), including pythons, all species in this family are potentially dangerous to humans and can cause significant local injuries. Large-growing members of this species can even constrict and consume adult humans.

The purpose of this book is to highlight the potentially dangerous species to humans, with a list of the main potentially medically significant snakes. It is important to note that if a species is not listed below, it does not necessarily mean that it does not exist in Malaysia nor that its bite cannot cause harmful effects in humans. In particular, the list of non-front-fanged snakes has been selective, to include only a number known to be of potential medical significance. Therefore, many common species belonging to several non-front-fanged families (e.g., Colubridae) are not included. It is also important to note that a poor surveillance of the pet trade and irresponsible importation of exotic snakes may introduce a medically significant species, which is not indigenous to Malaysia. This may add to the complexity of managing envenomings in this country.



Identifying Snakes in Malaysia

- A reliable reference is invaluable for helping accurate identification of snakes. Several are available in the market, and all illustrate the species of medical significance. One should be familiar with at least some of the identification characteristics of the potentially dangerous snakes in Malaysia.
- 2. The most noticeable characteristic about any snake, at first glance, will be its colour. This can help identify some snakes that are very distinctive in colouration. However, snakes also vary in colouration, and several non-venomous snakes are known to mimic venomous ones. Within the same species, the sexes and growth stages may display different colouration.
- 3. An excellent character for the identification of snakes is its scales. The shape, texture and number of scales are often unique to each species. A knowledge of scale morphology is useful if you have found a dead snake or a shed skin, but not always useful for the identification of a live snake, for obvious reasons!
- 4. Knowledge of the geographical distribution of a snake is helpful for its identification. Several snakes are found widespread in the country, while others have limited range, and may be further restricted to specific altitudes and habitats.

- Knowledge of the biology, including habitat (e.g. terrestrial/ arboreal/fossorial/aquatic) is also useful for making a positive identification–knowing where particular snakes tend to live will help you identify them.
- 6. Knowledge of patterns of activity (diurnal/nocturnal/crepuscular) of snakes may also help in identification.



Elephant Trunk Snake Acrochordus javanicus

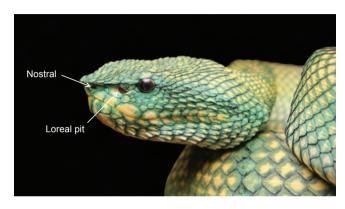
Note:

The scientific names used in this book's snake profiles are based on Uetz P. & Hošek, J. 2021. The Reptile Database. 6 July 2021. http://www.reptile-database.org. Accessed 6 July 2021.

Instructions for Identification

- Measure the length (and diameter) of the snake. Standard measurements of snakes include tail length, head to vent length and head width (especially relative to its neck).
- Notice and describe the colours on the snake's body, as well as any patterns. Stripes are marks lengthwise along the body; bands are marks across the body.
- Look at the shape of snake's head and tail (size and arrangement of scales on the top of its head and under its tail are important for identification).
- 4. Observe and count the scales (on head/midbody/anal/ subcaudals) on dead snakes. Observations on scales, including texture (bearing a keel or not), pattern (overlapping or situated next to each other) and colouration, in combination with other morphological characteristics, are the principal means of classifying snakes to level of species.
- 5. Take pictures from different perspectives, especially entire body in dorsal and ventral views (so that scale counts can be made later), head from dorsum, venter as well as lateral views. Specialists of snakes can typically identify the snake from these images.

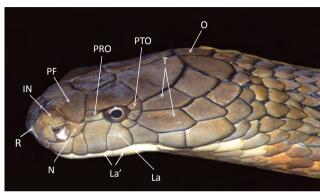
Pit Vipers – Head Shape & Scalation

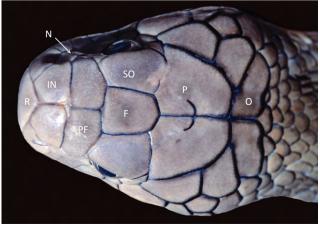


Note:

There is no simple way of differentiating a venomous snake from a non-venomous one. Determining whether a snake is venomous is correctly done by identification of the species with the help of snake systematists. In their absence, close examination of the snake (make sure that they are truly dead! Wounded snakes may appear dead, and venomous species can inject venom after death if carelessly handled – always treat a 'dead' specimen with great caution and confirm the specimen is truly dead before relaxing such cautions!) or good quality pictures, and using authoritative references on the snakes of the particular geographical region, will help to identify it. Reliable identification can be used to guide the most appropriate management of the patient.

King Cobra – Head Scalation





F - frontal

IN - internasal

La – supralabial

La' – infralabial

N - nasal

P – parietal

PF – prefrontal

PRO - preocular

PTO - postocular

R - rostral

SO - supraocular

T – anterior & posterior temporals

O – occipital



Symbols for Snake Profile

Food Source











Venom Status







Rodent / Mammal

Bird

Frog/Toad

Snake

Fish

Lizard

Non-venomous

Habitat













AQUATIC

Circadian Rhythms





Diurnal

Nocturnal

Living on low vegetation

SEMI-ARBOREAL ARBOREAL Living on trees

TERRESTRIAL Living on land

FOSSORIAL

Living underground

SEMI AQUATIC Living partly on land and in water

Living in water

Antivenom













Ophiophagus hannah Antivenom

Bungarus candidus Antivenom

Bungarus fasciatus Antivenom

Calloselasma rhodostoma Antivenom



Antivenin











Rhabdophis tigrinus Antivenom





APPROPRIATE ANTIVENOMS FOR MALAYSIA		
Antivenom raised from	Antivenom manufacturer	First Dose/vials
Monocled Cobra, Naja kaouthia	QSMI Thai Red Cross: Cobra Antivenom to neutralize 0.6 mg/ml of venom	100mls/10 vials Subsequent dose 1-2 hr
King Cobra, Ophiophagus hannah	QSMI Thai Red Cross: King Cobra Antivenom to neutralize 0.8 mg/ml of venom	100mls/10 vials Subsequent dose 1-2 hr
Malayan Krait, Bungarus candidus	QSMI Thai Red Cross: Malayan Krait Antivenom to neutralize 0.4 mg/ml of venom	50mls/5 vials Subsequent dose 1-2 hr
Banded Krait, Bungarus fasciatus	QSMI Thai Red Cross: Banded Krait Antivenom to neutralize 0.6 mg/ml of venom	50mls/5 vials Subsequent dose 1-2 hr
Malayan Pit Viper, Calloselasma rhodostoma	QSMI Thai Red Cross: Malayan Pit Viper Antivenom to neutralize 1.6 mg/ml of venom	30mls/3 vials Subsequent dose 6 hr
Green Pit Viper, Trimeresurus albolabris	QSMI Thai Red Cross: Green Pit Viper Antivenom to neutralize 0.7 mg/ml of venom	30mls/3 vials Subsequent dose 6 hr
Malayan Pit Viper, <i>Calloselasma rhodostoma</i> , Green Pit Viper, <i>Trimeresurus albolabris</i> , SEA Russell's Viper, <i>Daboia siamensis</i>	QSMI Thai Red Cross: Hemato Polyvalent Snake Antivenom	30mls/3 vials Subsequent dose 6 hr
Monocled Cobra, <i>Naja kaouthia</i> , King Cobra, <i>Ophiophagus hannah</i> , Banded Krait, <i>Bungarus fasciatus</i> , Malayan Krait, <i>Bungarus candidus</i> .	QSMI Thai Red Cross: Neuro Polyvalent Snake Antivenom	50-100mls/ 5-10 vials Subsequent dose 1-2 hr
Tiger Keelback, Rhabdophis tigrinus	Japan Snake Institute: Tiger Keelback, <i>Rhabdophis</i> tigrinus Antivenom	One vial (one additional vial if clinically indicated/available)
Beaked Sea Snake, Hydrophis schistosus	CSL, Australia: Sea Snake Antivenom	10-30mls/1-3 vials Subsequent dose 1-2 hr

Note:

Subsequent doses are according to the clinical symptoms. Monocled cobra, *Naja kaouthia* antivenom has good cross neutralization with the Equatorial spitting cobra, *Naja sumatrana* venom. Malayan pit viper, *Calloselasma rhodostoma*, SEA Russell's Viper, *Daboia siamensis* and Monocled cobra, *Naja kaouthia* are not indigenous to Borneo. The ViNS Indian Polyvalent antivenom is not appropriate for treating pit viper envenomations in Malaysia. It may have limited neutralizing capacity against the venoms of Equatorial spitting cobra, *Naja sumatrana*, Monocled cobra, *Naja kaouthia*, King cobra, *Ophiophagus hannah* and Malayan krait, *Bunqarus candidus*. However, its use is not recommended in Malaysia or SEA region.

Tiger keelback, *Rhabdophis tigrinus* antivenom neutralizes Red-necked keelback, *Rhabdophis subminiatus* venom in animal models and should be considered for severe Red-necked keelback, *Rhabdophis subminiatus* envenomings in humans whenever possible. However, at this time, this antivenom is not manufactured and supplies are limited to a single archived lot produced in 2000. Therefore, this antivenom is very difficult to obtain and may remain unavailable, but should be sought for treatment of serious envenoming by *R. subminiatus*.

Appropriate Antivenoms for Venomous Land Snakes in Malaysia









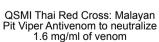
of venom

QSMI Thai Red Cross: Cobra Antivenom to neutralize 0.6 mg/ml Antivenom to neutralize 0.8 mg/ml of venom

QSMI Thai Red Cross: Malayan Krait Antivenom to neutralize 0.4 ma/ml of venom

QSMI Thai Red Cross: Banded Krait Antivenom to neutralize 0.6 ma/ml of venom







QSMI Thai Red Cross: Green Pit Viper Antivenom to neutralize 0.7 ma/ml of venom



QSMI Thai Red Cross: Hemato Polyvalent Snake Antivenom



QSMI Thai Red Cross: Neuro Polyvalent Snake Antivenom

Authors



AHMAD KHALDUN ISMAIL

Associate Professor & Consultant Emergency Physician Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Bandar Tun Razak, Cheras, Kuala Lumpur, Malaysia



TEO ENG WAH (VINCE ADAM)

Senior Lecturer

Centre For Sport and Exercise Science, Universiti Malaya, Kuala Lumpur, Malaysia



INDRANEIL DAS

Professor

Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia



TAKSA VASARUCHAPONG

Veterinarian

Snake Farm, Queen Saovabha Memorial Institute, Thai Red Cross Society, Bangkok, Thailand.



SCOTT A. WEINSTEIN

Associate Professor & Clinical Toxinologist
Department of Toxinology,
Women's & Children's Hospital,
North Adelaide, South Australia, Australia.

Image Contributors

Ahmad Khaldun Ismail

Universiti Kebangsaan Malaysia

Gernot Vogel

Heidelberg, Germany

Guek Hock Ping (Kurt aka orionmystery)

Orion Herp Adventure Travel, Malaysia

Indraneil Das

Universiti Malaysia Sarawak

Kaviarasu A/L Munian

Forest Reserve Institute Malaysia

Mary-Ruth Low

Wildlife Reserves, Singapore

Max Jackson

Queensland, Australia

Mohd Abdul Muin Md Akil

Universiti Sains Malaysia

Muhammad Khaidir Arif Bin Chek Mat @ Chemat

ID Ular Malaysia

Nick Weigner

James Cook University, Australia

Peter Lee Shiuh Hwa

Singapore

Remco Hofland

Rotterdam, The Netherlands

Stephen Hoga

Fraser's Hill, Malaysia

Steven Wong

Malaysian Nature Society Selangor & Nature Inspired, Malaysia

Taksa Vasaruchapong

Snake Farm, Queen Saovabha Memorial Institute, Thailand

Tan Song Wei

Sarawak, Malavsia

Teo Eng Wah (aka Vince Adam)

Universiti Malaya

Tom Charlton

Eco Animal Encounters, United Kingdom

Zee Kum Yena

Penang, Malaysia

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Land Snakes of Medical Significance in Malaysia

While a majority of snakes occurring in Malaysia are not equipped with venom and constitute little threat to humans, a number of species can cause envenoming that may lead to permanent disability or death. The range of snakes of medical significance in Malaysia encompasses the families Natricidae, Elapidae, Pythonidae and Viperidae. The third edition of *Land Snakes of Medical Significance in Malaysia* covers 36 land snakes, each account with easy to use infographics and multiple images when available, to show the different life history stages and sexes. It is intended as a guide for healthcare providers, and the general public permitting them to identify and manage potential snake related injuries. The purpose of this book is also to increase awareness of the beauty and diversity of a critical component of Malaysia's biodiversity.

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