

LAND SNAKES

OF MEDICAL SIGNIFICANCE IN MALAYSIA

THIRD EDITION



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



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2022

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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:

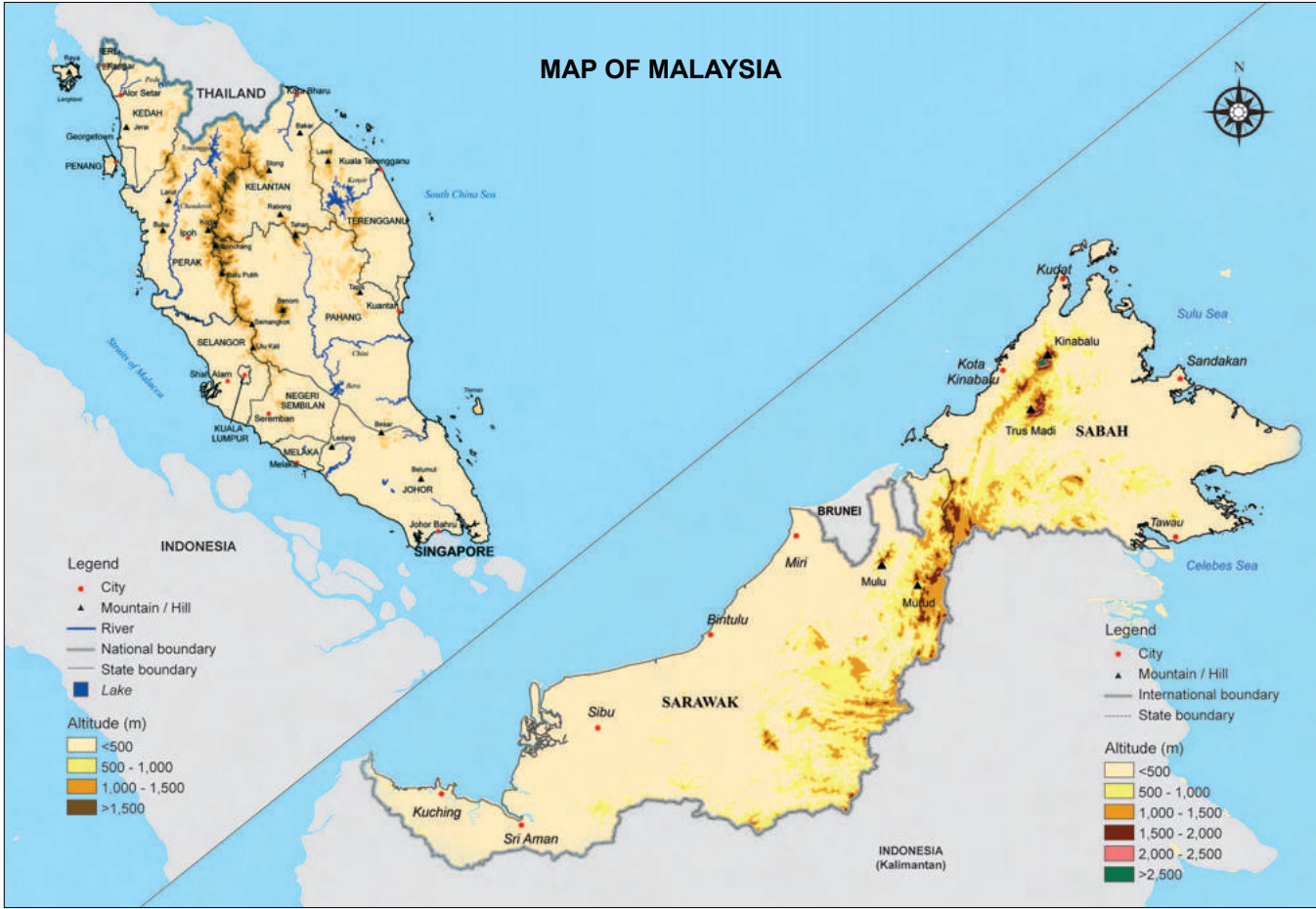
- Elapidae (front-fanged snakes) are venomous snakes, which are potentially dangerous and capable of causing significant systemic and local envenoming syndrome. This group includes all sea snakes, of which many are considered highly dangerous

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.

MAP OF MALAYSIA



Legend

- City
- ▲ Mountain / Hill
- River
- National boundary
- State boundary
- Lake

Altitude (m)

- <500
- 500 - 1,000
- 1,000 - 1,500
- >1,500

Legend

- City
- ▲ Mountain / Hill
- International boundary
- State boundary

Altitude (m)

- <500
- 500 - 1,000
- 1,000 - 1,500
- 1,500 - 2,000
- 2,000 - 2,500
- >2,500

Identifying Snakes in Malaysia

1. 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.
5. 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.



© Ahmad Khaldun

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

1. 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).
2. 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.
3. 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.

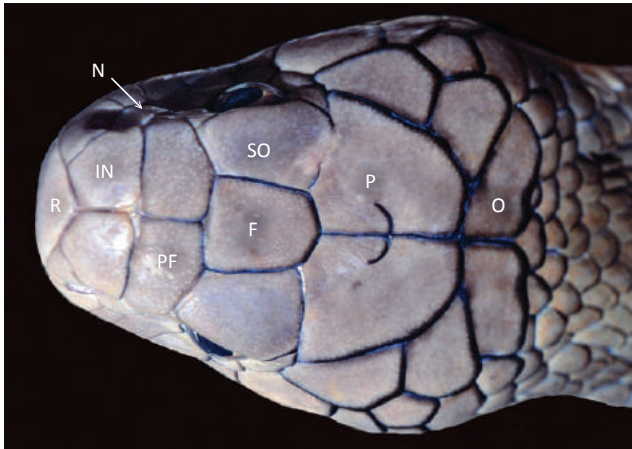
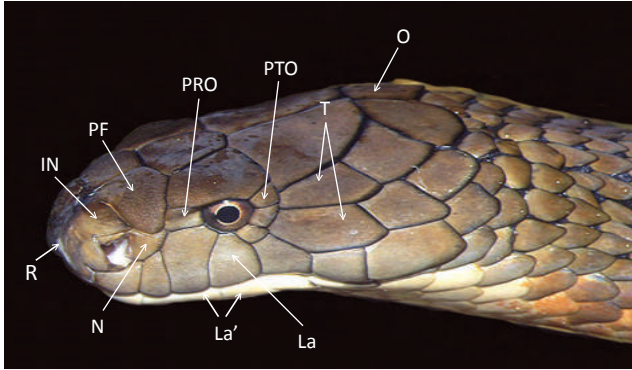
Pit Vipers – Head Shape & Scalation



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



Rodent / Mammal



Bird



Frog/Toad



Snake



Fish



Lizard

Venom Status



Non-venomous



Venomous



Undetermined

Habitat



SEMI-ARBOREAL
Living on low vegetation



ARBOREAL
Living on trees



TERRESTRIAL
Living on land



FOSSORIAL
Living underground



SEMI AQUATIC
Living partly on land and in water



AQUATIC
Living in water

Circadian Rhythms



Diurnal



Nocturnal

Antivenom

NKAV

Naja kaouthia
Antivenom

OHAV

Ophiophagus hannah
Antivenom

BCAV

Bungarus candidus
Antivenom

BFAV

Bungarus fasciatus
Antivenom

CRAV

Calloselasma rhodostoma
Antivenom

GPAV

Green Pit Viper
Antivenin

HPAV

Hemato Polyvalent Snake
Antivenom

NPAV

Neuro Polyvalent
Snake Antivenom

RTAV

Rhabdophis tigrinus
Antivenom







Species of Medical Significance

ELAPIDAE



Adult
© Teo Eng Wah

MyBIS: 20831



IUCN Red List



BCAV

NPAV



Malayan Krait (EN)
Ular Katam Tebu (BM)
Bungarus candidus





Adult
© Teo Eng Wah



Adult
© Teo Eng Wah



Juvenile
© Tom Charlton



Juvenile
© Taksa Vasaruchapong

ELAPIDAE



Juvenile
© Taksa Vasaruchapong

MyBIS: 9935



IUCN Red List



BFAV



NPAV



Banded Krait (EN)
Ular Katam Belang (BM)
Bungarus fasciatus





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Adult
© Muhammad Khaidir Arif bin Che Mat



Adult
© Tom Charlton



Adult
© Muhammad Khaidir Arif bin Che Mat

ELAPIDAE



Adult
© Teo Eng Wah

MyBIS: 9936



IUCN Red List



Red-headed Krait (EN)
Ular Katam Kepala Merah (BM)
Bungarus flaviceps





Adult (Peninsular Malaysia)
B. f. flaviceps
© Stephen Hogg



Adult (Peninsular Malaysia)
B. f. flaviceps
© Teo Eng Wah



Adult (Borneo)
B. f. baluensis
© Nick Weigner



Adult (Borneo)
B. f. baluensis
© Tom Charlton

ELAPIDAE



Adult
C. b. flaviceps
© Teo Eng Wah

MyBIS: 48553



IUCN Red List



Blue Malayan Coral Snake (EN)
Ular Pantai Biru (BM)
Calliophis bivirgatus





Adult (Peninsular Malaysia)
C. b. flaviceps
© Stephen Hogg



Adult (Borneo)
C. b. tetrataenia
© Indraneil Das



Adult (Peninsular Malaysia)
C. b. flaviceps
© Teo Eng Wah



Adult (Borneo)
C. b. tetrataenia
© Teo Eng Wah

ELAPIDAE



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MyBIS: 9937



IUCN Red List



Spotted Coral Snake (EN)
Ular Pantai Bintik (BM)
Calliophis gracilis





Adult
© Kaviarasu Munian

ELAPIDAE



Adult (Borneo)
C. i. thepassi
© Indraneil Das

MyBIS: 20886



IUCN Red List



Malayan Striped Coral Snake (EN)
Ular Pantai Belang (BM)
Calliophis intestinalis





Adult (Peninsular Malaysia)
C. i. lineata
© Teo Eng Wah



Adult (Peninsular Malaysia)
C. i. lineata
© Teo Eng Wah



Adult (Peninsular Malaysia)
C. i. lineata
© Teo Eng Wah

ELAPIDAE



Adult
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IUCN Red List



Speckled Coral Snake (EN)
Ular Pantai Bintik Kecil (BM)
Calliophis maculiceps





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Adult
© Tom Charlton



Adult
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Adult
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ELAPIDAE



Adult
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IUCN Red List



Banded Malaysian Coral (EN)
Calliophis nigrotaeniatus





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ELAPIDAE



Adult
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MyBIS: 21355



IUCN Red List



Monocled Cobra (EN)
Ular Senduk (BM)
Naja kaouthia





Juvenile
© Teo Eng Wah



Adult
© Teo Eng Wah



Adult
© Taksa Vasaruchapong

ELAPIDAE



Adult
© Teo Eng Wah

MyBIS: 21356



IUCN Red List



Sumatran Spitting Cobra (EN)
Ular Sanduk Sembur (BM)
Naja sumatrana





Adult (Peninsular Malaysia)
© Teo Eng Wah



Adult (Peninsular Malaysia)
© Teo Eng Wah



Juvenile (Borneo)
© Indraneil Das



Adult (Peninsular Malaysia)
Golden Spitting Cobra
© Teo Eng Wah



Adult (Thailand)
Golden Spitting Cobra
© Taksa Vasaruchapong



Adult (Thailand)
Golden Spitting Cobra
© Taksa Vasaruchapong

ELAPIDAE



Adult
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MyBIS: 9942



IUCN Red List



King Cobra (EN)
Ular Tedung Selar (BM)
Ophiophagus hannah





Adult
© Teo Eng Wah



Juvenile
© Tom Chariton



Adult
© Teo Eng Wah

NATRICIDAE



Adult
© Tom Charlton

MyBIS: 9927



IUCN Red List



Speckle-bellied Keelback (EN)
Ular Rabong Perut Bintik (BM)
Rhabdophis chrysargos





Adult
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Juvenile
© M. A. Muin



Juvenile
© M. A. Muin

NATRICIDAE



Adult
© Indraneil Das

MyBIS: 9926



IUCN Red List



Red-bellied Keelback (EN)
Rhabdophis conspicillatus



Adult
© Teo Eng Wah



NATRICIDAE



Adult
© Mary-Ruth Low

MyBIS: 21336



IUCN Red List



Orange-necked Keelback (EN)
Rhabdophis flaviceps





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© Mary-Ruth Low



Juvenile
© Guek Hock Ping @ Kurt



Juvenile
© Guek Hock Ping @ Kurt



Juvenile
© Guek Hock Ping @ Kurt

NATRICIDAE



Adult
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MyBIS: 21530



IUCN Red List



Gunung Murud Keelback (EN)
Rhabdophis murudensis





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Adult
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Adult
© Remco Hofland

NATRICIDAE



Adult
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Blue-necked Keelback (EN)
Rhabdophis rhodomelas





NATRICIDAE



Adult (Thailand)
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IUCN Red List



Thai Red-necked Keelback (EN)
Rhabdophis siamensis





Adult
© Taksa Vasaruchapong



Juvenile
© Max Jackson



Adult
© Guek Hock Ping @ Kurt



Juvenile
© Gernot Vogel

PYTHONIDAE



Juvenile
© Teo Eng Wah

MyBIS: 58057



IUCN Red List



Reticulated Python (EN)
Ular Sawa Batik (BM)
Malayopython reticulatus





Juvenile
© Teo Eng Wah



Adult
© Ahmad Khalidun



Juvenile
© Teo Eng Wah



Adult
© Teo Eng Wah

PYTHONIDAE



Adult
© Teo Eng Wah

MyBIS: 21538



IUCN Red List



Borneo Python (EN)
Ular Ripen (BM)
Python breitensteini





Adult Female
© Teo Eng Wah



Adult
© Teo Eng Wah



Adult Female
© Teo Eng Wah



Adult Female
© Teo Eng Wah

PYTHONIDAE



Adult
© Teo Eng Wah

MyBIS: 21539



IUCN Red List



Blood Python (EN)
Ular Sawa Darah (BM)
Python brongersmai





Adult
© Teo Eng Wah



Adult
© Teo Eng Wah



Juvenile
© Teo Eng Wah



Juvenile
© Teo Eng Wah

VIPERIDAE



Adult
© Teo Eng Wah

MyBIS: 20891



IUCN Red List



Malayan Pit Viper (EN)
Ular Kapak Bodoh (BM)
Calloselasma rhodostoma





Adult
© Teo Eng Wah



Adult (Thailand)
© Taksa Vasaruchapong



Adult
© Teo Eng Wah



Adult
© Teo Eng Wah

VIPERIDAE



Adult
© Tom Charlton

MyBIS: 22578



IUCN Red List



Kinabalu Brown Pit Viper (EN)
Ular Kapak Perang Kinabalu (BM)
Garthius chaseni





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Adult
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VIPERIDAE



Adult
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MyBIS: 21434



IUCN Red List



Indo-Malayan Mountain Pit Viper (EN)
Ular Kapak Gunung (BM)
Ovophis convictus





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Adult
© Muhammad Khaidir Arif bin Che Mat



Juvenile
© Teo Eng Wah



Juvenile
© Teo Eng Wah

VIPERIDAE



Adult
© Indraneil Das

MyBIS: 21659



IUCN Red List



GPAV

HPAV



Bornean Palm Pit Viper (EN)
Ular Kapak Borneo (BM)
Trimeresurus borneensis





Sub-Adult
© Tan Song Wei



Sub-Adult
© Tan Song Wei



Sub-Adult
© Tan Song Wei



Juvenile
© Indraneil Das



Juvenile
© Indraneil Das



Adult
© Teo Eng Wah

VIPERIDAE



Adult
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MyBIS: 09931



IUCN Red List

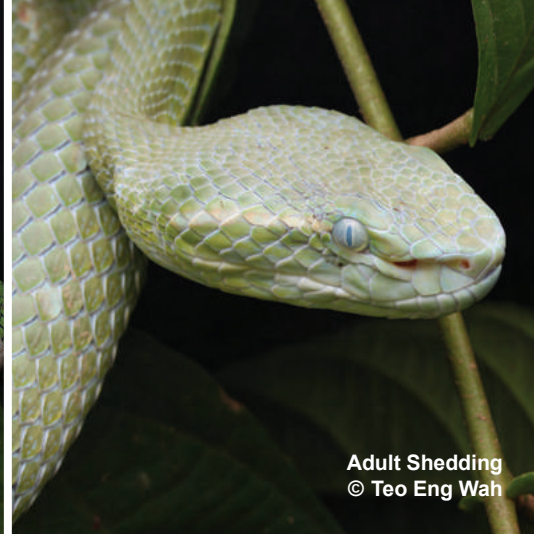


Hagen's Pit Viper (EN)
Ular Kapak Hagen (BM)
Trimeresurus hageni





Juvenile
© Teo Eng Wah



Adult Shedding
© Teo Eng Wah



Adult Female
© Teo Eng Wah



Adult (Thailand)
© Taksa Vasaruchapong

VIPERIDAE



Adult
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IUCN Red List



Malcolm's Pit Viper (EN)
Ular Kapak Malcolm (BM)
Trimeresurus malcolmi





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VIPERIDAE



Adult
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IUCN Red List



Cameron Highlands Pit Viper (EN)
Ular Kapak Cameron (BM)
Trimeresurus nebularis





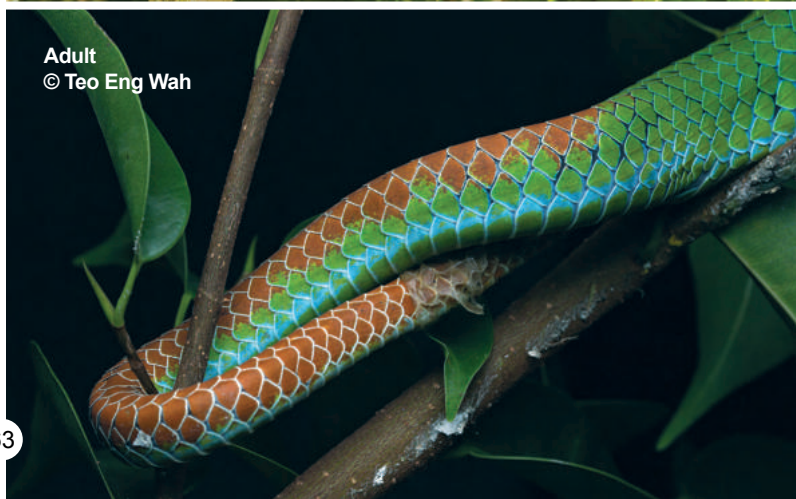
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Adult
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VIPERIDAE



Adult
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MyBIS: 57766



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GPAV



HPAV



Mangrove Pit Viper (EN)
Ular Kapak Bakau (BM)
Trimeresurus purpureomaculatus





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Adult
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Adult
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VIPERIDAE



Adult
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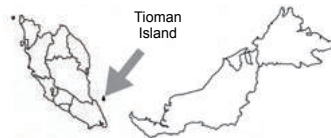
MyBIS: 58159



IUCN Red List



Fairy Pit Viper (EN)
Ular Kapak Pulau Tioman (BM)
Trimeresurus sabahi buniana





Adult
© Peter Lee Shiuh Hwa



Adult
© Peter Lee Shiuh Hwa

VIPERIDAE



Adult Male
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MyBIS: 58164



IUCN Red List



GPAV

HPAV



Siamese Peninsula Pit Viper (EN)
Trimeresurus sabahi fucatus





Adult Male
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Adult Female
© Teo Eng Wah



Adult Male
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Adult Female
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IUCN Red List



Ular Kapak Sabah (BM)
Trimeresurus sabahi sabahi





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VIPERIDAE



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Sumatran Pit Viper (EN)
Ular Kapak Sumatra (BM)
Trimeresurus sumatranus





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GPAV

HPAV



Beautiful Pit Viper (EN)
Trimeresurus venustus





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VIPERIDAE



Adult
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IUCN Red List



Wirot's Palm Pit Viper (EN)
Trimeresurus wiroti





Adult
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Adult
© Teo Eng Wah



Adult
© Teo Eng Wah



Adult
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VIPERIDAE



Adult Female
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IUCN Red List



Bornean Keeled Pit Viper (EN)
Tropidolaemus subannulatus





Adult
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Adult Female
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Juvenile Male
© Teo Eng Wah



Juvenile
© Teo Eng Wah



Juvenile
© Teo Eng Wah

VIPERIDAE



Adult Female
© Teo Eng Wah

MyBIS: 21662



IUCN Red List



Wagler's Pit Viper (EN)
Ular Kapak Tokong (BM)
Tropidolaemus wagleri





Adult Female
© Teo Eng Wah



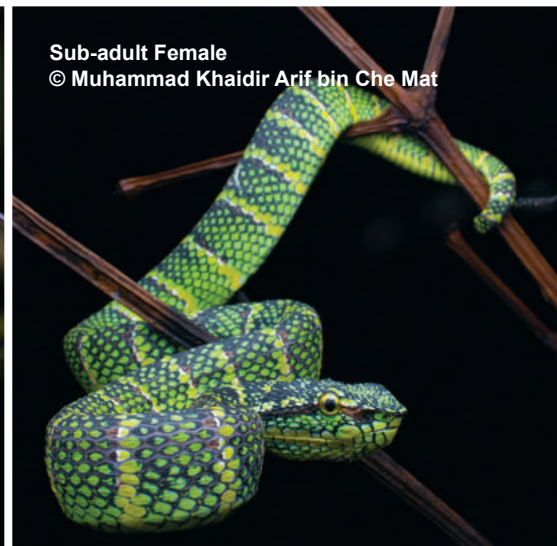
Adult Male & Female
© Teo Eng Wah



Adult Male
© Teo Eng Wah



Adult Male
© Teo Eng Wah

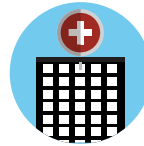


Sub-adult Female
© Muhammad Khaidir Arif bin Che Mat



Recommendations for Early Intervention Following Snake Related Injuries

Do's



- Calm patient, reduce movement and immobilise
- Remove jewelry from affected limb
- Bring patient to nearest hospital with emergency services

Don'ts



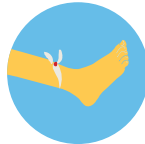
Go to traditional healer



Suck the wound



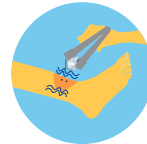
Cut the wound



Tie ligatures



Massage



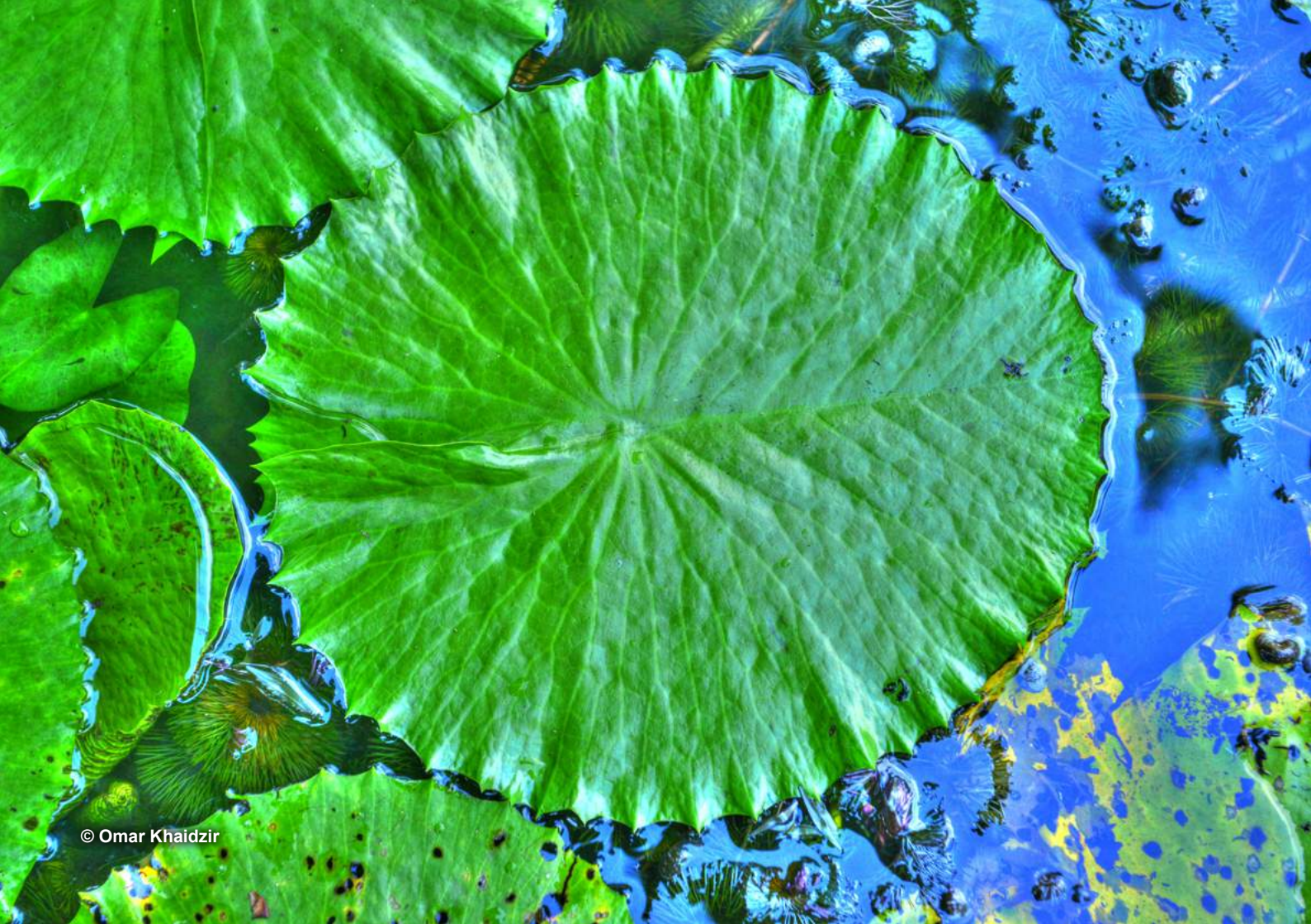
Apply ice or electric shock



Burn the wound



Apply or ingest herbal remedies



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APPROPRIATE ANTIVENOMS FOR MALAYSIA

Antivenom raised from	Antivenom manufacturer	First Dose/vials
Monocled Cobra, <i>Naja kaouthia</i>	QSMI Thai Red Cross: Cobra Antivenom to neutralize 0.6 mg/ml of venom	100mls/10 vials Subsequent dose 1-2 hr
King Cobra, <i>Ophiophagus hannah</i>	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, <i>Bungarus candidus</i>	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, <i>Bungarus fasciatus</i>	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, <i>Calloselasma rhodostoma</i>	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, <i>Trimeresurus albolabris</i>	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, <i>Rhabdophis tigrinus</i>	Japan Snake Institute: Tiger Keelback, <i>Rhabdophis tigrinus</i> Antivenom	One vial (one additional vial if clinically indicated/available)
Beaked Sea Snake, <i>Hydrophis schistosus</i>	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, *Bungarus 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



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



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



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



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



QSMI Thai Red Cross: Malayan Pit Viper Antivenom to neutralize 1.6 mg/ml of venom



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



QSMI Thai Red Cross: Hemato Polyvalent Snake Antivenom



QSMI Thai Red Cross: Neuro Polyvalent Snake Antivenom

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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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