

Medically important snakes in Sri Lanka

1. **Highly venomous:** (envenoming by these snakes is possibly life-threatening with reported fatalities)

Naja naja (Cobra),

Bungarus caeruleus (Common krait),

Bungarus ceylonicus (Sri Lankan krait),

Daboia russelii (Russell's viper),

Hypnale hypnale (Merrem's hump-nosed pit-viper),

Hypnale zara (Lowlands hump-nosed pit-viper).

2. **Potentially highly venomous:** (envenoming by these snakes is potentially life-threatening, no reported fatalities)

Hypnale nepa (= *H. walli*) (Millard's hump-nosed pit-viper),

Echis carinatus (Saw-scaled viper),

Trimeresurus trigonocephalus (Green pit-viper).

3. **Venomous:** (bites by these snakes may result in systemic envenoming that is not life-threatening, responds to treatment, no reported fatalities)

Rhabdophis ceylonensis (= *Balanophis ceylonensis*) (Sri Lankan keelback, Blossom krait).

This article proposes a revised system (left) for classifying venomous land snakes based on their potential to cause life-threatening envenoming

The list of medically important snakes in Sri Lanka has seen changes in recent years, as a result of more research into snake identity and snakebite being published. The World Health Organisation (WHO) classifies medically important snakes into two categories as follows (WHO, 2010)¹:

CATEGORY 1: Highest Medical Importance - highly venomous snakes that are common or widespread and cause numerous snakebites, resulting in high levels of morbidity, disability or mortality.

CATEGORY 2: Secondary Medical Importance - highly venomous snakes capable of causing morbidity, disability or death, but for which (a) exact epidemiological or clinical data are lacking or (b) are less frequently implicated because of their behaviour, habitat preferences or occurrence in areas remote from large human populations.

¹ World Health Organization (2010): WHO guidelines for the production, control and regulation of snake antivenomimmunoglobulins and Venomous snake distribution and species risk categories, Geneva, World Health Organization. http://www.who.int/bloodproducts/snake_antivenoms/en/.

Based on the definition given above the WHO² places the medically important snakes in Sri Lanka in the two categories thus:

Category 1: Elapidae: *Bungarus caeruleus* & *Naja naja*; Viperidae: *Daboia russelli* & *Hypnale hypnale*.

Category 2: Elapidae: *Bungarus ceylonicus*; Viperidae: *Echis carinatus*, *Hypnale nepa*, *Hypnale walli* and *Trimeresurus trigonocephalus*. (Editor's note: *H. walli* is considered a junior synonym of *H. nepa*³)

In Sri Lanka, we have followed the practice of classifying snakes as highly venomous, moderately venomous and mildly venomous (or non-venomous) based on whether envenoming by such a snake could:

- be life-threatening (highly venomous);
- result in morbidity requiring treatment but unlikely to be life-threatening (moderately venomous);
- result in envenoming not requiring special treatment (mildly venomous).

Tables A, B & C list the snakes hitherto considered highly venomous, moderately venomous and mildly venomous by the SLMA⁴ (See ANNEX 1). These lists are outdated in the light of recent reports.

Recent reports highlight other, rarely encountered species, whose bites need to be taken seriously. A 2011 publication reports a death following a bite by *Hypnale zara*⁵. The three species of *Hypnale*—*hypnale*, *nepa* and *zara*—have hitherto been lumped together in the absence of reports of envenoming irrefutably ascribed to a species other than the widely distributed *H. hypnale*. In this publication, we recognise the place of *H. zara* as a snake of medical significance. Bites by *H. nepa* (= *H. walli*)—a snake confined to the central hills—have been reported recently⁶. Of 152 patients admitted to the Provincial General Hospital Ratnapura following proven hump-nosed pit viper bites over a 21-month period, 8 (5.26%) were bites by *H. nepa*, 22 (14.47%) by *H. zara* and 122 (80.26%) by *H. hypnale*. The manifestations of envenoming caused by the three species were similar, the authors remarking that larger series were needed to verify whether any differences existed.

²WHO (2016) Guidelines for the management of snake-bites, 2nd edition, World Health Organization 2016.

³Maduwage, K., Silva, A., Manamendra-Arachchi, K., Pethiyagoda, R. (2009). A taxonomic revision of the South Asian hump-nosed vipers (Squamata: Viperidae: Crotalinae: Hypnale). *Zootaxa* 2232, 1–28.

⁴Snakebite Prevention & First Aid, SLMA, 2013.

⁵Kalana Maduwage, Keerthi Kularatne, Abdul Wazil, Indika Gawarammana (2011). Coagulopathy, acute kidney injury and death following *Hypnale zara* envenoming – The first case report from Sri Lanka. *Toxicon* 58 (2011) 641–643.

⁶RMMKN Rathnayaka, SAM Kularatne, PEAN Ranathunga, PPVJ Rajapakse, JGS Ranasinghe (2017). Species specific clinical manifestations following hump nosed pit viper (genus: *Hypnale*) envenoming in Sri Lanka. (Abstract) Sri Lanka Medical Association 130th Anniversary Medical Congress, 2017).

A 2015 paper⁷ reports a bite by the rarely seen forest dwelling colubrid the Sri Lankan keelback or blossom krait (*Rhabdophis ceylonensis*, previously *Balanophis ceylonensis*) that bit its handler in the course of a bio-diversity survey causing systemic envenoming that needed treatment. The authors remark “We conclude that *B. ceylonensis* should be regarded as a medically significant venomous snake.”

Trimeresurus trigonocephalus, the Green pit-viper, has been known to be venomous and has hitherto been listed as a moderately venomous snake causing severe local envenoming⁸, rarely systemic envenoming with spontaneous resolution over days⁹. Three recent case studies published in 2017¹⁰ confirm that they are capable of causing systemic envenoming to a potentially life-threatening degree. The bite victims developed coagulopathy treated with fresh frozen plasma. The authors remark that “these three cases prove potential life-threatening hazard ...” and that clinicians should be aware of and be warned against using the polyvalent antivenom available in hospitals. They also remark that the general public should not be unnecessarily alarmed by labelling the snake as ‘highly venomous’ to prevent pointless killing.

A classification of practical relevance to clinicians in Sri Lanka is suggested (Table 1):

Table 1: List of venomous land snakes in Sri Lanka ranked in order of medical importance

	Scientific name: English common name	Level of importance
<i>Envenoming is possibly life-threatening with reported fatalities</i>		
1.	<i>Naja naja</i> : Cobra	Highly venomous
2.	<i>Bungarus caeruleus</i> : Common krait	Highly venomous
3.	<i>Bungarus ceylonicus</i> : Sri Lankan krait	Highly venomous
4.	<i>Daboia russelii</i> : Russell’s viper	Highly venomous
5.	<i>Hypnale hypnale</i> : Merrem’s hump-nosed pit-viper	Highly venomous
6.	<i>Hypnale zara</i> : Lowlands hump-nosed pit-viper	Highly venomous
<i>Envenoming is potentially life-threatening, with no reported fatalities</i>		
7.	<i>Hypnale nepa</i> (= <i>H. walli</i>) : Millard’s hump-nosed pit-viper	Potentially highly venomous
8.	<i>Echis carinatus</i> : Saw-scaled viper	Potentially highly venomous
9.	<i>Trimeresurus trigonocephalus</i> : Green pit-viper	Potentially highly venomous
<i>Envenoming is not life-threatening, responds to treatment, no reported fatalities</i>		
10.	<i>Rhabdophis ceylonensis</i> (= <i>Balanophis ceylonensis</i>) : Sri Lankan keelback, Blossom krait	Venomous

⁷W.K.B.K.M. Fernando, S.A.M. Kularatne, S.P.K. Wathudura, A. de Silva, A. Mori, D. Mahaulpatha (2015). First reported case of systemic envenoming by the Sri Lankan keelback (*Balanophis ceylonensis*), *Toxicon* **93** (2015) 20-23.

⁸Namal Rathnayaka, Anusha Nishanthi Ranatunga, Kasun Fernando(2013).Epidemiology and Clinical features of Green pit viper (*Trimeresurus trigonocephalus*) envenomation, Abstract, 12th Annual Congress of Asia Pacific Association of Medical Toxicology (APAMT), Dubai.

⁹S. A. M. Kularatne and M. Pathirage (2005). Life threatening envenoming by green pit viper (*Trimeresurus trigonocephalus*) bite, *Lyriocephalus* Special issue, 2005 November, Volume **6** Numbers 1 & 2: 327-328

¹⁰R.M.M.K. Namal Rathnayaka, S.A.M. Kularatne, P.E.A.N. Ranathunga (2017). Coagulopathy and extensive local swelling following Green pit viper (*Trimeresurus trigonocephalus*) envenoming in Sri Lanka, *Toxicon* **129** (2017) 95-99.

Table 2: List of mildly venomous land snakes in Sri Lanka of low medical importance

	Scientific name: English common name
1.	<i>Boiga</i> spp. : Cat snakes
2.	<i>Calliophis melanurus sinhaleus</i> : Sri Lankan coral snake
3.	<i>Ahaetulla</i> spp. : Whip snakes, Vine snakes
4.	<i>Cerberus rhynchops</i> : Dog-faced water snake
5.	<i>Gerarda prevostianus</i> : Gerard's water snake
6.	<i>Chrysopelea</i> spp. : Flying snake, Gold and black tree snake



ANNEX 1

Tables reproduced from 'Snakebite Prevention & First Aid', SLMA, 2013

Table A: The historical highly venomous land snakes of Sri Lanka (2013 list)

Scientific name	English name	Sinhala names	Tamil names
<i>Naja naja</i>	Cobra	Naya, Nagaya	Naga pambu, Nalla pambu
<i>Bungarus caeruleus</i>	Common krait	Thel karawala, Magamaruwa, Habaralaya, Mavilla	Yennai pambu, Yennai viriyan, Yettadi viriyan
<i>Bungarus ceylonicus</i>	Ceylon krait	Dunu karawala, Polon karawala, Mudu karawala	Yennai viriyan, Yettadi viriyan
<i>Daboia russelii</i>	Russell's viper	Dhara polonga, Tith polonga	Kannardi viriyan
<i>Echis carinatus</i>	Saw scaled viper	Weli polonga	Surattai pambu Pal surattai
<i>Hypnale</i> spp.	Hump-nosed viper	Polonthelissa, Kunakatuwa	Konal mooku-pudayan, Kopi viriyan

Table B: The historical moderately venomous land snake of Sri Lanka (2013 list)

Scientific name	English name	Sinhala name	Tamil names
<i>Trimeresurus trigonocephalus</i>	Green pit viper	Pala polonga	Pachai viriyan, Kopi viriyan

Table C: Some historical mildly venomous land snakes of Sri Lanka (2013 list)

Scientific name	English name	Sinhala name	Tamil names
<i>Boiga</i> spp.	Cat snakes	Mapila	
<i>Calliophis melanurus sinhaleus</i>	Sri Lankan coral snake	Depath-kaluwa	
<i>Ahaetulla</i> spp.	Whip snakes, Vine snakes	Ahaetulla, Asgulla, Henakadaya	Kankuthi pambu
<i>Cerberus rhynchops</i>	Dog-faced water snake	Kunudiya kaluwa, Diyabariya	Tanni pambu
<i>Chrysopelea</i> spp.	Flying snake, Gold and black tree snake	Polmal karawala	Parrakum pambu
<i>Rhabdophis ceylonensis</i> = <i>Balanophis ceylonensis</i>	Blossom krait	Nihaluwa, Mal karawala	

Compiled by Malik Fernando
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