

The Genus *Thelotornis* (Vine Snakes)

Consequences of Envenomation

A Review By Andy Martin

20th June 2024.

Rupert Wilkey and I have been discussing this species in light of its status being highlighted as one of seven potentially lethal snakes in Rupert and Sarah Nann's new book '*A Field Guide to Snakes of Eswatini*.' Rupert felt it might be helpful to review this genus and post it on the SAH blog as an interesting and informative potential discussion topic.

The genus *Thelotornis*, commonly known as vine or twig snakes is distributed across various parts of sub-Saharan Africa. Differentiating between species is challenging due to their similar appearances and detailed morphological analysis and molecular studies are generally required. Understanding the exact distribution of each species is ongoing and complicated as ranges overlap in some regions.

The most recent taxonomic revisions recognise four species and one subspecies within this genus: *Thelotornis capensis capensis* (Southeastern Savanna Vine Snake) and *Thelotornis capensis oatesii* (Oates' Savanna Vine Snake) (subspecies), *Thelotornis kirtlandii* (Forest Vine Snake), *Thelotornis mossambicanus* (Eastern Vine Snake) and *Thelotornis usambaricus* (Usambara Vine Snake).

This group are known for their slender bodies and cryptic colouration, which help them blend into their natural arboreal habitat. Although they possess a potent venom, they are generally not considered highly dangerous to humans. Bites from *Thelotornis* are rare, as these snakes are typically shy and avoid human contact.

Growing up in Malawi, I collected many *Thelotornis capensis* specimens, some of which, I kept in captivity and handled freely and regularly once they became used to me being in their space. Most available written knowledge at that time suggested that this species was shy and although defensive, would rarely attempt to bite.

On one occasion in 1966, I received an accidental bite from an individual during feeding, where instead of taking a chameleon, the snake attached itself to the middle joint of my little finger on my left hand (my fault entirely). It punctured the fleshy underpart with both fangs, but released quite quickly and then proceeded to grasp, envenom and consume the chameleon. Surprised but not panicked, I washed my hands and waited to see what might happen. I was aware that the venom would be haemotoxic and sure enough, overnight, there was some evidence of subcutaneous bleeding, swelling in my hand and discomfort in my finger and heel of my hand, with a slight temperature. My hand and finger remained slightly swollen and tender for about 5 days.

My main source of detailed local herpetological information at the time of this bite was “Snakes of Nyasaland” by R C H Sweeney in which he notes: that Loveridge (1953) records being bitten in Tanganyika without symptoms of poisoning. (likely a dry bite). Sweeney records an envenomation of a 17-year-old Malawian youth, with moderate symptoms of poisoning lasting 8 days with full recovery and no hospitalisation. According to Sweeney in that epoch, “most authorities considered this species to be harmless and docile with a weak venom and rarely biting”

Looking back on this event now, it appears that I was fortunate, as during my research following the bite, I discovered that there had been a documented fatality in Tanganyika of a Mr Lock who died on 25th December 1953, having been bitten on the 22nd December 1953 by *Thelotornis kirtlandii capensis*. Although there was evidence of fang puncture, there was minimal localised evidence of envenomation, Mr lock according to the coroner, having sucked out any venom and swallowed it!

Findings of the Coroner:- “Death due to Bird Snake (*Thelotornis kirtlandii capensis*) venom poisoning after sucking the site of the bite and swallowing contaminated mucous...”

I also discovered that Donald G. Broadley, (most of us are very familiar with his extensive work and research on African Herpetology and his publications are referenced in this review), had been bitten by a *Thelotornis* in 1957. This incident closely followed the documented fatality, (also in 1957) of Robert Mertens, the German zoologist known for his work with reptiles and amphibians and his excellent reference work “The World of Amphibians and Reptiles (1960)”. (He died 18 days after the bite having catalogued his daily deteriorating condition.)

In Donald Broadley’s case, he experienced severe symptoms typical of haemotoxic envenomation, including bleeding and clotting disorders. His survival was attributed to prompt and appropriate medical intervention, which managed to mitigate the effects of the venom. Broadley’s experience with the vine snake bite highlights the effectiveness of timely medical response and supportive care, with potentially significant improvement in outcomes even in severe cases of envenomation by this genus.

Although there have been very few documented cases of fatalities from *Thelotornis* bites. Most cases of envenomation require prompt medical attention, particularly due to the risk of disseminated intravascular coagulation (DIC), a serious condition that can lead to internal bleeding and organ failure.

I have found two more recently reported cases that illustrate the importance of getting to a hospital for treatment as soon as possible. In **2014** - A 54-year-old man was bitten by *Thelotornis capensis* in KwaZulu-Natal, South Africa. He developed severe hemorrhagic symptoms and despite medical intervention, he died a few days later. This case underscores the severity of the haemotoxic venom and the importance of rapid medical response. In **2017** - A 28-year-old man in Zimbabwe was bitten by what was **suspected** to be *Thelotornis* sp. He experienced severe bleeding and clotting issues. Despite receiving medical care, he succumbed to the effects of the venom within a week. This case was reported in local news highlighting the need for better awareness and medical readiness for such rare but dangerous envenomations.

Conclusion

Envenomation by the genus *Thelotornis* while rare, requires prompt and appropriate medical attention which, is key to a potentially positive outcome due to the potent haemotoxic effects of their venom.

The first documented death from a bite by *Thelotornis* appears to have been reported in 1953 in Tanganyika, where the victim, Mr Lock a Game Ranger in the service of the Tanganyika Government, kept a collection of live and preserved snakes for scientific purposes. A further documented case in 1957 where the victim was German Herpetologist Robert Mertens, known for his significant work with reptiles and amphibians. Mertens was bitten by his pet vine snake (*Thelotornis capensis*) and succumbed to the effects of the venom 18 days after the bite.

These incidents and others highlighted in this review confirm the potential severity of envenomation by the genus *Thelotornis*, despite their relatively shy and docile nature and the infrequency of bites. Lock, Mertens' and Broadley's cases remain significant examples in herpetology and toxicology, highlighting the importance of caution when handling even mild-mannered venomous snakes and the need for prompt and appropriate medical treatment in the event of envenomation. Fortunately, the medical management of snake bites has improved significantly, reducing the likelihood of fatal outcomes when proper care is administered promptly.

For those interested in more technical aspects of this species venom and treatment, please read on:

Thelotornis Genus Venom Characteristics

Hemotoxic Venom: The venom primarily affects the blood and vascular system, causing problems with blood clotting, leading to haemorrhaging.

Slow-acting: The symptoms might take several hours to manifest, delaying the recognition and treatment of envenomation.

Proteolytic Enzymes: The venom contains enzymes that break down proteins, contributing to tissue damage and bleeding.

Symptoms of Envenomation

Local Effects: Pain and swelling at the bite site are typically mild or even absent.

Systemic Effects: Bleeding from gums, nose, and other mucous membranes. Bruising and spontaneous bleeding under the skin. Blood in urine and stools. Severe cases can lead to disseminated intravascular coagulation (DIC), a serious condition causing widespread bleeding and clotting throughout the body.

Management and Treatment

Immediate First Aid: Keep the victim calm and immobilise the affected limb to slow the spread of venom. Avoid cutting the bite site, sucking out the venom, or applying a tourniquet, as these methods are ineffective and can cause additional harm.

Medical Attention: Hospitalisation is often required to monitor and manage symptoms. Supportive care includes fluid replacement and blood transfusions if necessary. There is no specific antivenom for Thelotornis bites, so treatment focuses on symptom management and supportive care.

Monitoring and Support: Regular monitoring of blood parameters to detect and manage coagulopathy. Coagulation/clotting factors or fresh frozen plasma may be required in severe cases.

Prognosis

Prompt Medical Care: The prognosis is generally good with timely and appropriate medical intervention. Severe complications are rare but can occur without proper treatment.

Without Treatment: Delayed or inadequate treatment can lead to severe complications, including DIC, which can be fatal.

Bibliography

- Benjamin, J.M., Abo, B.N., Brandehoff, N. (2020): Review Article: Snake Envenomation in Africa. Published online: 13 January 2020 <https://doi.org/10.1007/s40475-020-00198-y>.
- Branch, W.R. (1998): Field Guide to Snakes and other Reptiles of Southern Africa. London: New Holland, 328pp.
- Broadley, D.G. (1957): Fatalities from bites of Dispholidus and Thelotornis and a personal case history. Journal of the Herpetological Association of Rhodesia 1: 5.
- Broadley, D.G., Cock, E.V. (1989): Snakes of Zimbabwe, (revised). Zimbabwe: Longman, 152pp.
- Broadley, D.G. (2001): A review of the genus Thelotornis A. Smith in eastern Africa, with the description of a new species from the Usambara Mountains (Serpentes: Colubridae: Dispholidini), African Journal of Herpetology, 50:2, 53-70.
- Broadley, D.G., Wallach, V. (2002): Review of the Dispholidini, with the description of a new genus and species from Tanzania (Serpentes, Colubridae). Bulletin of The Natural History Museum Zoology Series. 68(2): 57-74. doi:10.1017/S0968047002000079.
- Chippaux, J-P. (2006): Venoms And Envenomations. Malabar, Florida. Krieger Publishing Company
- FitzSimons, V.F.M. (1962): Snakes Of Southern Africa. Dunstable and London: Waterlow & Sons Limited, 423pp.
- FitzSimons, D.C., Smith, H.M. (1958): Rear-Fanged South African Snake Lethal to Humans. Herpetologica, Vol. 14, No 4, pp. 198-202
- Kornalik, F., Tr~làorská, E., Mebs, D. (2002): Biochemical Properties Of A Venom Gland Extract From The Snake Thelotornis Kirtlandii. Taxidon. Vol. If, pp. 533-342.
- Marais, J. (2004): A Complete Guide To The Snakes Of Southern Africa. Struik Nature, 312pp.
- Sweeney, R.C.H. (1961): Snakes of Nyasaland. The Nyasaland Society, Zomba, Nyasaland: The Government Printer, 200pp.
- Sweeney, R.C.H. (1971): Snakes of Nyasaland, with new added corrigenda and addenda. Amsterdam: Asher & Co, 200pp.
- Kuch, U., Mebs, D. (2002): Envenomations By Colubrid Snakes In Africa, Europe, And The Middle East, Journal of Toxicology: Toxin Reviews, 21:1-2, 159-179.
- Wilkey, R.J., Terrell, R.J. (2013): Snakes of Malawi. A field guide to the snake species of Malawi, 5th edition 2019, Njoka Books, 325pp.
- Wilkey, R.J., Nann, S. (2024): A Field Guide To Snakes Of Eswatini. Hermit Books.