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TROPICAL DOCTOR

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EDITORIAL

Snakes and snake bite in Nepal

At Nepal's northern border with Tibet is the great Himalaya Range, capped by Mount Everest itself (8848 m) and including four of the other eight highest mountains in the world. South of the Kathmandu Valley at the centre of the country are the lesser mountains of the Mahabharat Range and Churia Ghati Hills, below 3000 m, and in the far south, stretching to India, are the fertile alluvial Terai Plains with scattered swamps and hardwood and bamboo forests. The distribution of the 14 species of venomous snakes known to inhabit Nepal is determined by geography and climate^{1,2}. The range of only one species, the Himalayan pit viper (*Agkistrodon himalayanus*), extends into the higher elevations. There is a record in the Indian Museum at Calcutta of a specimen collected at the foot of the Dharmasala Glacier (Himachal Pradesh, India) at 16 000 feet (4877 m)³. This may be a world altitude record for snakes⁴. The four other species of pit viper (*Trimeresurus albolabris*, local name 'hareu' or green snakes), *T. jerdonii*, *T. stejnegeri* and *Ovophis monticola* inhabit wooded montane slopes below 3000 m. Russell's viper (*Daboia russelii*, local name 'baghe' or 'leopard-spotted') (Figure 1), an important cause of snake bite mortality and morbidity in many parts of Asia, occurs in western Nepal. Three species of kraits [*Bungarus caeruleus* (Figure 2), *B. fasciatus* and *B. sindanus*] occur below 2000 m, sometimes in farming areas, while the two species of typical cobra, both of great medical importance (monocellate *Naja kaouthia*, local name 'paniadaraj' and spectacled *Naja naja* - Figure 3) and the world's largest venomous snake, the king cobra (*Ophiophagus hannah*) are confined to the Terai. MacClelland's coral snake (*Hemibungarus macclellandi univirgatus*) is a lowland species.

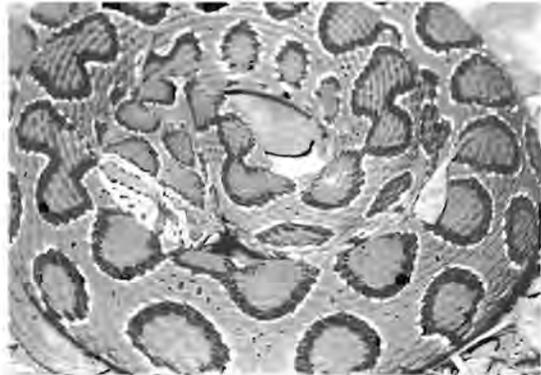


Figure 1. Russell's viper (*Daboia russelii russelii*). Royal Bardia National Park, Nepal (copyright Mark O'Shea)



Figure 2. Common Indian krait (*Bungarus caeruleus*). Royal Bardia National Park, Nepal (copyright Mark O'Shea)



Figure 3. Common Indian cobra (*Naja naja*). Royal Bardia National Park, Nepal (copyright Mark O'Shea)

Little has been published on the problem of snake bite in Nepal^{5, 8}. Most is known about the clinical pattern in envenomed patients presenting to the former British Military Hospital in Dharan (altitude about 400 m above sea level). The Director of the National Zoonosis and Food Hygiene Research Centre in Kathmandu, Dr D D Joshi, estimates that there are between 150 and 200 deaths in Nepalese hospitals each year. Dharan in the eastern foothills, Hetaunda, Butwal, Chitwan, Nepal-ganj in the west and Dhangadi in the far west, are thought to have a particularly high incidence of snake bites. According to a World Health Organization (WHO) report, more than 20 000 cases of snake bite with 1000 deaths, occur every year in Nepal⁶. Dr Y Sawai, a WHO consultant, set up an epidemiological study in 15 district hospitals. From 1980 to 1985, 3189 cases were treated with 144 deaths (case fatality, 4.5%). The highest seasonal incidence of bites is during the

monsoon from June to October, with a peak in August. Much remains to be learnt about the medically-important species in the different regions of Nepal. It is clear from the small literature, including the paper by Hansdak *et al.* published in this edition of *Tropical Doctor* (p. 223), that bites are being inflicted by species with neurotoxic venoms (notably cobras and kraits) and by vipers producing severe local bleeding, swelling, bruising, blistering and necrosis together with systemic bleeding and clotting disorders. An unusual case of fatal snake bite was reported by Eugen Kramer of the Musée de l'Histoire Naturelle, Genève². While collecting reptiles and amphibians near Pokhara in 1964, his friend, Hans Schnurrenberger was bitten by a juvenile specimen of the elapid species, *H. maccllelandi univirgatus*, approximately 30 cm long, and no thicker than a pencil. There were no symptoms for 2 h and so he ignored the bite, but 6 h later he developed pain on movement and died of respiratory paralysis 8 h after the bite. This fatal accident illustrates the risk of handling potentially dangerous species and, in small specimens, of underestimating the lethal capacity of their venom. There is a strongly held local belief that the bite of the chequered keelback (*Xenochrophis-Natrix-piscator*) is lethal to cattle but harmless to humans. Members of the superficially similar genus of keelbacks (*Rhabdophis*) are venomous, back-fanged colubrid snakes, two species of which (*R. subminiatus* and *R. tigrinus*) have caused life-threatening envenoming in human victims⁹. There are no records of bites by *R. himalayanus* which occur in Nepal.

About 3000 vials of polyspecific antivenom (*Naja naja*, *Bungarus caeruleus*, *Daboia russelii*, *Echis carinatus*) manufactured by the Serum Institute of India are imported from India each year but this is insufficient. Because of chronic shortage of antivenom in government hospitals and belief in traditional remedies, most victims of snake bite in Nepal do not seek help in western style hospitals and dispensaries. Popular traditional methods of treatment involve chanting, incantations, attempts to suck the venom from the site of the bite (e.g. using the anal sphincter of a chicken) and the application of mithridates, lexis, tiriyaq and latex from a climbing plant known as the snake gourd. Pastes of herbal medicines, snake stones and special kinds of earth are applied to the wounds and multiple tourniquets and local incisions are popular first aid methods. Only when the symptoms deteriorate are the patients brought to hospital but many are thought to die on the way.

As in so many tropical countries, snake bite in Nepal is an occupational hazard for poor rural people and is not regarded as an important medical problem by most senior health officials in the capital city. To discover how to reduce the morbidity and mortality it will be necessary first to carry out prospective studies in different regions of the country in which the species of snake responsible for bites can be determined by

immunodiagnosis. Appropriate antivenoms can then be identified and their efficacy and safety investigated. Results of this research will be relevant to bordering areas of India, Sikkim, Bhutan and Tibet.

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