

ENVENOMATION BY THE MADAGASCAN COLUBRID SNAKE,
Ithycyphus miniatus

MORI A. (1), MIZUTA T. (2)

(1) Department of Zoology, Graduate School of Science, Kyoto University, Sakyo, Kyoto, Japan; (2) Department of Biology, Faculty of Science, Toho University, Funabashi, Chiba, Japan.

ABSTRACT: We report two cases of envenomation by a Madagascan opisthoglyphous snake, *Ithycyphus miniatus*. In both cases, the snake bit the finger of a human who was preparing an experiment by tying a string around the snake body. Symptoms of the first case included temporal severe local pain and extensive bleeding. In the second case, severe pain accompanying obvious local swelling was caused and lasted for several hours. The present observations indicate that bite by *I. miniatus* potentially causes serious physiological effects in humans although the snake is basically calm and reluctant to bite.

KEY WORDS: Madagascar, Colubrid, *Ithycyphus miniatus*, envenomation, opisthoglyph, Duvernoy's glands.

CORRESPONDENCE TO:

AKIRA MORI, Department of Zoology, Graduate School of Science, Kyoto University, Sakyo, Kyoto, 606-8502 Japan. Email: gappa@ethol.zool.kyoto-u.ac.jp.

INTRODUCTION

Madagascan colubrid snakes show a high species diversity and endemism. Currently, 74 species are known, and all of them are endemic to Madagascan region (15). Approximately half of them are opisthoglyphous snakes (6, 15), but their potential dangerousness to human has been poorly demonstrated. *Ithycyphus* is a medium-sized, arboreal Madagascan colubrid genus, which is comprised of five species (6, 15). They have enlarged, grooved posterior maxillary teeth (1, 3), and Phisalix (14) listed the genus under "venomous" snakes of Madagascar. Domergue (3) observed that a chameleon seized by *Ithycyphus oursi* was paralyzed in two minutes before swallowing, which suggests mild effects of its "venom" on prey. On the other hand, there have been no reports that document effects of bite by *Ithycyphus* on humans (4, 16, 17). Here, we report two cases of human envenomation by *I. miniatus*, one of which caused local swelling and severe temporal pain.

CASES

On December 10, 2003, at 10:10 a.m., in the dry forest of Ampijoroa, Northwestern Madagascar, a male *I. miniatus* (snout-vent length = 1086 mm, body mass = 374 g) bit the right thumb of a man (33 years old, 53 kg) when he was trying to tie a hemp string around the anterior part of the snake for the preparation of an experiment on responses of birds to snake predators (Case 1). The enlarged posterior maxillary teeth firmly embedded into the dorsal side of the medium segment of the finger. He attempted to force to disengage the snake immediately, and when he successfully did it, within 30 seconds after the bite, severe local pain and extensive bleeding started. Because of the pain, he was not able to hold the snake with his right hand when he intended to continue the experiment. No details were recorded thereafter, but he still had difficulty to firmly grip a pencil approximately 8 hours after the bite although he did not feel pain at that time. No obvious local swelling was recognized although little attention was paid to confirm the occurrence of minor swelling.

In the second case (Case 2), a male *I. miniatus* (snout-vent length = 785 mm, body

mass = 103 g) bit the distal segment of the left fourth finger of a man (42 years old, 57 kg) on December 1, 2005, at 5:45 a.m., when he was loosening a hemp string that was tied around the anterior part of the snake body for another experiment similar to that mentioned above and in the same study place. The snake firmly seized the finger, and its enlarged maxillary teeth deeply embedded into the finger cushion. To avoid slashing hurt that would be caused by forced removal of the teeth, he let the snake untouched and attempted to induce its voluntary release. However, the snake continued the firm grasping, repeating chewing motions three or four times. Thus, approximately 60 seconds after the bite he managed to disengage the snake teeth deliberately so as not to cause slashing cut. When he successfully disengaged it, 1 minute after bite, he suddenly felt very severe sharp pain in his left finger so that he was unable to put forth his strength in the left hand. The pain continued for the next five minutes, but only slight bleeding was observed. Six minutes after the bite he began to feel local throbbing pain as well as severe sharp pain in the finger so that he hardly kept breathing. Then, he banded tissue paper around the finger to stop the bleeding, when no swelling was recognized. When the tissue paper was removed, after 4 minutes, he noticed a slight swelling of the distal segment of the ring finger (Figure 1). Severe pain began to abate 15 minutes after the bite, but swelling became conspicuous with discoloration on the palm side of the distal segment of the left ring finger. Thirty minutes after the bite, swelling extended to the basal segment of the ring finger, but by then sharp pain had mostly diminished; instead, pain associated with stiffness of the finger began. Forty-five minutes after the bite, swelling extended to the distal part of the hand, and the basal part of the ring finger swelled enormously (Figure 2).

The patient started walking back to the campsite 55 minutes after the bite, and when he arrived there after 10 min, he no longer felt sharp pain but continued feeling throbbing pain and tenderness, and he noticed that the basal parts of his middle and little fingers began swelling. In spite of the continuous local pain, he was able to have breakfast (rice porridge and coffee) as usual between 7:15 and 7:45 a.m. Swelling

continued extending (Figure 3), and 165 minutes after the bite it covered the whole left ring finger, distal half of the hand (both dorsal and ventral sides), and basal half of the middle and little fingers accompanying intermittent severe throbbing and tenderness, especially on the ring finger. Because of the stiffness, he was not able to move the fingers. He lay down in the tent at 9:15 a.m. and took a nap between 10:45 and 11:55 a.m. The progress of swelling seemed to cease before he fell into sleep. While having lunch, between 12:00 and 12:50 p.m., the progress of swelling completely stopped, and only an intermittent local pain on the distal segment of the ring finger persisted. He took another nap between 1:10 and 4:00 p.m., during when swelling and pain rapidly started resolving. Approximately 12 hours after the bite, only an occasional slight pain on the bite site remained, and he was able to bend the middle and little fingers slightly. When he had dinner at 7:00 p.m., he felt slight stomach discomfort and did not have much appetite although he felt no pain in the finger. He went to bed at 9:00 p.m.

In the following morning, only a little swelling of the dorsal surface of the hand was recognizable, and he was able to move the middle and little fingers normally. Although he was not able to bend the ring finger completely, he felt no pain even if he moved the finger. A little discoloration of the bite site was still recognizable. Forty-one hours after the bite, slight pain occurred only when the bite site was touched and pressed strongly. Swelling completely resolved at 12:00 a.m. on December 5. Slight pain in the finger, which was only caused by strong pressure, completely diminished at 10:30 p.m. on December 6.

Signs or symptoms of general systemic effects, such as dizzy and headache, were not recognized in either case. Both patients were healthy when they were bitten, and no medical treatment was conducted.

DISCUSSION AND CONCLUSIONS

Among the 18 colubrid genera currently described in Madagascar (15), physiological effects of their bite on humans have only been reported for two opisthoglyphous

(*Madagascarophis* and *Mimophis*) and one aglyphous (*Leioheterodon*) genera (2, 4, 5, 13). Serious local effects, such as swelling, blistering, and necrosis, have been caused by *Madagascarophis meridionalis* (4). The present observation provides another case of serious effects by a Madagascan colubrid bite accompanying temporal local swelling and severe pain.

It is likely that the observed pharmacological effects were caused by the secretions from Duvernoy's glands (4) although no explicit description of these glands in *I. miniatus* is available (12). Kardong (8, 9) pointed out that refined definition and careful use of the term "venom" are necessary at least when used in a biological context. It would be safe to describe the present cases as human envenomation because there is evidence that prey grasped by *Ithyocyphus* seems to be quickly immobilized [or possibly killed] (3), which fulfills the biological definition of "venom" (8, 9). Weak envenomation effects in Case 1 may be probably due to the quick disengagement of the snake, which might have an inefficient venom injection system (7, 10). Also, extensive bleeding in Case 1 may be caused by the forced disengagement of the fangs that cut the skin rather than by the pharmacological effects of the venom. Severe pain in Case 2 suddenly starting only after the disengagement of the snake may reflect the slow and inefficient delivery of venom associated with low-pressure system and occlusion of the fang groove by the finger skin (7, 8, 10, 11).

The present report demonstrates that *I. miniatus* is a potentially harmful snake capable of envenoming humans. Nonetheless, despite handling this species dozens of times, we have never experienced a bite attempt, except for these two cases, in which snakes were restrained for several minutes. It seems that the snake is basically calm and attempts to bite only as a final resort. It is worth noting that the local belief by Malagasy people that *Ithyocyphus* can transfix humans (6) might have originated from its envenomation capability to cause severe sharp pain.



Figure 1: Beginning of swelling 12 min after the bite by *Ithycyphus miniatus* (Case 1). The enlarged posterior maxillary teeth of the snake were embedded into the ventral surface of the distal segment of the left ring finger for 60 s during the bite.



Figure 2: Swelled left ring finger photographed 45 min after the bite (Case 1).



Figure 3: Maximum swelling of the left hand and fingers photographed 130 min after the bite (Case 1).

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