

SHORT COMMUNICATION

HUMAN ENVENOMATION FROM THE BITE OF THE EASTERN GARTER SNAKE, *THAMNOPHIS S. SIRTALIS* (SERPENTES: COLUBRIDAE)

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W. K. HAYES and F. E. HAYES. Human envenomation from the bite of the eastern garter snake, *Thamnophis s. sirtalis* (Serpentes: Colubridae). *Toxicon* **23**, 719–721, 1985. — A 13-yr-old victim of a prolonged eastern garter snake (*Thamnophis s. sirtalis*) bite was hospitalized following development of coolness, edema and ecchymosis of the bitten hand. Although lymphatic involvement was noted, vital signs and laboratory tests were normal and rapid recovery followed. Subsequent asymptomatic *Thamnophis* bites of the subject indicate that these clinical changes were not allergic. This case from Delaware suggests that widespread toxicity within the genus is likely.

ONLY IN recent decades have the bites from certain colubrid snakes become recognized for their potential danger to humans. Several reviews reflect increasing concern regarding the toxicity of these so-called harmless serpents (GANS, 1978; KOCHVA, 1978; MCKINSTRY, 1978, 1983; MEBS, 1978; MINTON, 1976, 1978; MINTON and MEBS, 1978). The Duvernoy's gland and associated secretions are thought to be responsible for the toxic properties of colubrid saliva. Because venom poisoning following the bites of colubrids is exceptionally rare, documentation of potentially dangerous snakes is important, as recent sales of 'harmless' but dangerously toxic *Rhabdophis* specimens illustrate (CABLE *et al.*, 1984; MATHER *et al.*, 1978).

Garter snakes (*Thamnophis*) have long been considered innocuous, but two recent incidents of apparent envenomation (Anonymous, 1975a, 1975b; VEST, 1981a) testify to the presence of toxic saliva in this genus. Indeed, TAUB (1967) observed a Duvernoy's gland in several species of *Thamnophis*. Furthermore, VEST (1981b) demonstrated that Duvernoy's secretion from the wandering garter snake (*T. elegans vagrans*) is highly toxic to mice, causing pronounced internal and mild local hemorrhaging. Other oral secretions of this snake failed to produce lethal effects in mice. The present paper reports yet another case of apparent envenomation from *Thamnophis*.

Shortly after 1:00 p.m. on 3 May 1975, one of the authors (FEH) suffered a bite during the capture of a large eastern garter snake (*T. s. sirtalis*), approximately 1 m long, at Bombay Hook National Wildlife Refuge, Kent County, Delaware. The snake bit the victim, 13 years old at the time, at the base of the right index finger and released its painful grip about 10 min later when placed upon the ground. Swelling of the bitten hand developed immediately and increased alarmingly during the next 3 hr.

The next morning coldness and bluish discoloration of the victim's hand prompted admission at 9:45 a.m. to the Washington Adventist Hospital, Takoma Park, Maryland. While in the emergency room the patient received a tetanus toxoid booster. Past history was non-contributory except for allergies to ragweed and poison ivy. The victim had previously suffered numerous bites from colubrid snakes, including *Thamnophis*, with no obvious effects.

Hospital records indicate the patient was a well developed, well nourished, alert, white male in no acute distress. Blood pressure was 116/80, pulse 84, respiration 12 and temperature 36.8°C. Urinalysis, CBC and chest X-ray were normal, and serology was non-reactive. Lymphadenitis, involving slight enlargement of the axillary and supratrochlear lymph nodes, was noted. There was moderate edema and ecchymosis of the right hand, which was cool to touch but showed good radial and ulnar pulses. Finger movements were somewhat impaired, though the hand itself was freely movable and the fingers were sensitive to touch. The patient responded quickly to elevation of the hand, cortisone, antihistamines and antibiotics.

By the next day swelling had subsided, but lymphangitis appeared as linear discolorations along the full length of the anterior arm. The patient was discharged at about 1:00 p.m. and resumed normal activities. The final diagnosis was given as an acute toxic or allergic reaction to garter snake saliva. Secondary infection was ruled out. On 8 May, five days after the bite, signs of ecchymosis, lymphadenitis and lymphangitis were still present.

Because the victim has subsequently experienced non-reactive bites from *Thamnophis*, we do not consider the above symptoms the result of an allergic reaction to garter snake saliva. Rather, symptoms were remarkably similar to the other cases of *Thamnophis* bites which were attributed to toxic envenomation. Furthermore, in each instance the snake involved either chewed or maintained a grip on the victim for an estimated 4–10 min. These reports strongly suggest that bites of prolonged duration are necessary for envenomation to occur from garter snakes. This is consistent with the flow rates and lag times reported by VEST (1981*b*) for micro-aspiration of Duvernoy's secretion in *T. e. vagrans*. However, since 45% of the specimens in his study yielded no measurable secretion, even prolonged bites from this genus may not necessarily result in envenomation.

As KARDONG (1982) points out, a distinction based upon biological context should be made between a 'toxin' and a 'venom'. While a secretion may be toxic [i.e. possess an LD₅₀ or LD₁₀₀, as does human saliva (BONILLA *et al.*, 1971)], it may not function as a venom in the natural life of the animal producing it. In certain snakes Duvernoy's secretion may aid in subduing prey (CABLE *et al.*, 1984; GANS, 1978) and/or provide defensive measures (SEIB, 1980), but *Thamnophis* clearly lacks the functional anatomy (KARDONG, 1979, 1980; WRIGHT *et al.*, 1979) and behavior (GREGORY *et al.*, 1980; PETERSON, 1978) to use the secretion as a venom (KARDONG, 1982). Other roles suggested for Duvernoy's secretion include lubrication during swallowing, facilitation of digestion, detoxification of prey (e.g. amphibian) secretions and anti-bacterial action in the upkeep of dental surfaces (GANS, 1978; JANSEN, 1983; KARDONG, 1979, 1982; THOMAS and POUGH, 1977). Evidence for some of the latter roles in *Thamnophis*, and the cases described above, suggest toxicity is an incidental byproduct of secretions in this genus rather than a character of its 'venom'. However, when bites lead to clinically alarming effects in humans it seems appropriate to retain the term 'envenomation'.

The snakes implicated in the previous bites were the coast garter snake (*T. e. terrestris*) in California (Anonymous, 1975*a*, 1975*b*; identification by Minton, personal communication) and *T. e. vagrans* in Washington (VEST, 1981*a*). The present case indicates

that eastern forms of *Thamnophis* are also capable of inflicting venomous bites. Widespread toxicity within the genus seems likely. We therefore urge that caution accompany the handling of *all* snakes, even the relatively harmless and ubiquitous garter snake.

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