

Notes on two cases of human envenomation
by the South American colubrid snakes
Philodryas olfersii latirostris COPE, 1862
and *Philodryas chamissonis* (WIEGMANN, 1834)
(Squamata: Serpentes: Colubridae)

Bemerkungen zu zwei Vergiftungsfällen durch die südamerikanischen Nattern
Philodryas olfersii latirostris COPE, 1862 und *Philodryas chamissonis* (WIEGMANN, 1834)
(Squamata: Serpentes: Colubridae)

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KURZFASSUNG

Es wird gewöhnlich angenommen, daß Schlangen der Familie Colubridae beim Biß mindestens mehrere Sekunden festhalten müssen, um für eine Vergiftung am Menschen ausreichende Mengen toxischen Sekretes der Duvernoy'schen Drüsen zu injizieren, und daß kurze Abwehrbisse nicht zu einer Vergiftung führen. Von einigen Arten sind jedoch Vergiftungen durch schnelle Bisse bekannt, und zu diesen können jetzt auch zwei Arten der südamerikanischen Gattung *Philodryas* gerechnet werden. Ein 13 Jahre altes Opfer eines Bisses von *P. olfersii latirostris* COPE, 1862 entwickelte ein Lokalödem mit Vergrößerung der axillaren Lymphknoten, Gelenksteifheit in den oberen Extremitäten und den Knien und Blutergüssen auf den Knien. Dieser Fall zeigt, daß *P. olfersii* in der Lage ist, schon mit einem schnellen Abwehrbiß beim Menschen eine systemische Intoxikation hervorzurufen. Nach einem schnellen Biß eines *P. chamissonis* (WIEGMANN, 1834) bei derselben Person viereinhalb Jahre später waren die dominierenden Symptome Taubheitsgefühl und Kälte des gebissenen Armes, Schmerzen, leichte Schwellung und Gelenksteifheit an Hand und Handgelenk. Wie schon frühere Berichte und das hier beschriebene schnelle Auftreten von Vergiftungssymptomen nach kurzen Abwehrbissen zeigen, sind *P. olfersii* und *P. chamissonis* im klinischen Sinne als Giftschlangen zu betrachten.

ABSTRACT

It is usually believed that snakes of the family Colubridae, when biting, must hold on at least several seconds in order to inject doses of toxic Duvernoy's glands secretion that are sufficient to cause envenomation in humans, and that quick defensive bites would not result in envenomation. However, some colubrid species are known to have caused envenomation by quick bites. Two species of the South American genus *Philodryas* can now be added to this kind of colubrids. A 13-year-old victim of a bite by *P. olfersii latirostris* COPE, 1862 developed local swelling, enlargement of axillary lymph nodes, joint stiffness in the upper extremities and the knees, and ecchymoses on the knees. This case demonstrates that *P. olfersii* is capable of inflicting systemic human envenomation with only a quick defensive bite. The predominant symptoms following a quick bite by *P. chamissonis* (WIEGMANN, 1834) inflicted on the same person 4.5 years later, were numbness and coldness of the bitten arm, pain, slight swelling, and joint stiffness of hand and wrist. Previous records, and the rapid onset of envenomation after quick defensive bites described herein, suggest *P. olfersii* and *P. chamissonis* to be regarded as venomous snakes in a clinical sense.

KEY WORDS

Serpentes, Colubridae; *Philodryas olfersii*, *Philodryas chamissonis*, snakebite, toxicology, South America

INTRODUCTION

In recent decades, growing interest in colubrid snake venom poisoning has contributed to the knowledge of the responsible animals and their ability to cause envenomations in humans (see MINTON 1990 and WEINSTEIN & KARDONG 1994 for reviews). In spite of early studies on the Duvernoy's gland secretions (DGS) of several Neo-

tropical colubrid snake species (MARTINS 1916; KRAUS 1922), the practical implications of the toxic potential of these animals had usually been underestimated until severe envenomations from the bite of "non-venomous" snakes were reported from Central and South America, and the Caribbean (RAYO & al. 1938; GAJARDO-TOBAR

1947, 1958; SCHENONE & al. 1954; HEATWOLE & BANUCHI 1966; LEMA 1978 b; SEIB 1980).

It is generally believed that colubrid snakes must hold on several seconds in order to inject DGS and that quick defensive bites would not result in envenomation (MINTON 1979). However, there are exceptions from this rule (SEIB 1980). To these we now can add two members of the South American colubrid snake genus *Philodryas*, one of which was capable of inflicting even systemic human envenomation with only a very quick defensive bite:

1. *Philodryas olfersii* is a large (maximum total length about 100-140 cm), green, arboreal opistholyphous colubrid snake species which is widely distributed in South America. It is currently subdivided into three subspecies - *P. o. olfersii* (LICHTENSTEIN, 1823), *P. o. herbeus* (WIED-NEUWIED, 1825) and *P. o. latirostris* COPE, 1862 (THOMAS 1976) - and is usually described as a common, very agile and aggressive species (LEMA 1978 a). Up to now, four bites by *P. olfersii* which led to local envenomation have been reported by MARTINS (1916), KRAUS & WERNER (1931) and NICKERSON & HENDERSON (1976), and a case of serious systemic envenomation following a *P. olfersii* bite has been described by SILVA & BUONONATO (1984). Four additional cases have been reported by SILVEIRA & NISHIOKA (1992), BUCARETCHI & al. (1993), and DE ARAUJO & DOS SANTOS (1997), and there is anecdotal evidence of a fatality due to a bite of this species (MELO DA SILVA, pers. comm. to FOWLER & SALOMÃO 1994). In the period 1987-1994 about 85 cases of snakebite in which the snake had been identified as *P. olfersii* were admitted to Hospital Vital Brazil in São Paulo (FOWLER & SALOMÃO 1994: fig. 4). How many of these accidents actually re-

sulted in envenomation is however not detailed.

2. *Philodryas chamissonis* (WIEGMANN, 1834) is a large (maximum total length about 100-150 cm), opisthomedont colubrid snake species which occurs in Chile. It is terrestrial and coloured in various shades of brown and gray with a distinct mid-dorsal stripe extending over 3-5 dorsal scale rows. This species is principally not aggressive. There are, however, several records of envenomations from the bite of *P. chamissonis* (e. g., GAJARDO-TOBAR 1947), only one of them (SCHENONE & al. 1954) including a detailed case report. The statement by THOMAS (1976) that "GIGOUX (1940: 7) surprisingly reported a death attributed to *P. chamissonis*" is apparently based on a translation error. GIGOUX (l.c.) mentions "una persona mordida" (= a person bitten) and not "una persona muerta" (= a dead person); SCHENONE & REYES (1965) and DONOSO-BARROS (1966) state that they were unaware of fatalities from envenomations by this species.

Studying and handling *Philodryas* species for some years, I was bitten three times by these snakes and twice experienced DGS induced reactions to bites. What follows are the case reports of mild systemic envenomation caused by the bite of *P. olfersii latirostris*, and mild local envenomation from a *P. chamissonis* bite. At the time of the bites, I (male, Caucasian) was 13- and 18-years-old, respectively, of normal size and weight (74 kg in case 2), in good health condition and without known allergies. I had never before experienced reactions to colubrid snake bites neither did I develop similar reactions to subsequent bites by these snakes, including a bite by *P. psammophideus psammophideus* GÜNTHER, 1872 in which only front teeth penetrated the skin.

CASE REPORTS

C a s e 1: On 15 October 1986 at 20:30 I was bitten by a large adult male *P. olfersii latirostris* while handling the snake. The specimen measured about 120 cm in total length. The bite was a very quick defensive action and the snake made no attempt to hold on. Its left maxillary teeth penetrated the skin at the base of my

left index finger. There was slight bleeding from the puncture marks of two front maxillary teeth and minimal bleeding from very small puncture marks of posterior maxillary teeth. Until 20:40 bleeding had stopped and slight burning pain was felt at the site of the bite. After 20:45 I noticed increasing joint stiffness in all fingers of

the left hand, the movement of which was difficult and painful. At about 20:50 swelling began to envelop the base of the index finger and the entire dorsum of the hand. Joint stiffness intensified rapidly and spread out to the wrist (21:00) and the elbow (21:10) of the left arm. Axillary lymph nodes were enlarged by 21:20. Shortly after that, stiffness of the left shoulder joint appeared, accompanied by pain in shoulder muscles. After 22:00 the swelling of the left hand did not increase any more, it was now similar to that illustrated by NICKERSON & HENDERSON (1976). At about 23:00 the symptoms in the left arm reached their maximum, and the left hand was nearly completely immobile. The swelling of the left hand subsided by 24:00. Inflexibility of the joints of the left arm diminished whereas slight stiffness of the right shoulder joint appeared. At 00:10 and 00:20, respectively, there was mild movement difficulty in the elbow and the wrist of the right arm. All signs of envenomation seemed to have subsided by 01:00. However, on 16 October 1986 at 09:20, I noticed decreased flexibility of the knee joints. Forced bending was painful and the knees were both slightly swollen. There was an ecchymotic area on the medial side of each knee, 7 cm in diameter on the left one and 3 cm on the right one. The flexibility of the knees returned to normal by 11:30 of the same day, and the ecchymosis subsided during the following days.

Case 2: On 21 April 1991 at 19:00, I was bitten by an adult male *P. chamissonis* (total length 110 cm) while cleaning the cage of the specimen. The bite was very quick and the snake did not hold on. There was a total of eleven puncture marks at the finger tip and distal joint of my right ring

finger. Three of them showed minimal bleeding. A tooth was detected at the distal finger joint. At 19:10 I first noticed slight pain and minimal swelling of the right ring finger. Starting at 19:15 there was a feeling of pins and needles in the right forearm and a generalized feeling of heat. Transient pain appeared along the tendons of the right hand and forearm. At 19:30 moving of all joints of the bitten finger was difficult. A tearing feeling between the right thumb and index finger and a feeling of pins and needles in the right hand were present at 19:35. There was also distinct weakness, numbness and coldness of the right hand and forearm. From about 20:30 on there was in addition minimal swelling of the dorsum of the hand and the right forearm. At 20:40 movement difficulties were felt in all finger joints of the right hand, especially in the middle and ring fingers. At 20:45 movement of the central finger joints and some dorsal tendons of the right hand was painful. Moving the wrist became slightly difficult at 20:50. The tearing feeling extended to the right forearm. Mild movement difficulties of the right elbow and shoulder experienced at 21:10 could have been a result of the marked weakness now also present in the right upper arm. At about 22:00 the movement difficulties of the right arm reached their maximum. Throbbing pain appeared in the right thumb from 22:35 to 22:45. At 23:00 and 23:45, respectively, the right hand and forearm were found to be warmer than normal and slightly swollen. In the morning of 22 April 1991 and during the following days some movements of the right hand and arm, especially writing, remained painful. The other signs of envenomation had subsided.

DISCUSSION

Most symptoms described by MARTINS (1916), NICKERSON & HENDERSON (1976), and SILVA & BUONONATO (1984) agree with the observations made in case 1: Local swelling and enlargement of axillary lymph nodes has been observed in the case of mild local envenomation described by NICKERSON & HENDERSON (1976), burning pain and edema on hand and forearm appeared in the three cases presented by

MARTINS (1916), and SILVEIRA & NISHIOKA (1992), and the prominent symptoms of the envenomation reported by SILVA & BUONONATO (1984) were massive edema, large areas of ecchymosis, painful lymphatic involvement and tenderness of the lower extremities; coagulation time was normal. The present case differs in its very quick onset of symptoms and especially of rapidly spreading joint stiffness, which

might have been caused by myotoxic or proteolytic venom components, and the fast subsidence of all symptoms. In the case of NICKERSON & HENDERSON (1976) symptoms took four days to disappear, MARTINS (1916) mentions 15 days and "a few days", and SILVA & BUONONATO (1984) report that all symptoms had subsided on the 14th day after the bite, except the tenderness of the lower extremities, which persisted for several months (BUONONATO, pers. comm. to R. SCHNITZLER).

In the case reported by SILVA & BUONONATO (1984), the bite was inflicted on the left forearm by a large adult *P. o. olfersii*. Whether this bite was a quick or prolonged one is not known. The envenomation reported by NICKERSON & HENDERSON (1976) had been caused by a prolonged (about 4 sec) bite of an adult *P. olfersii* with one of the posterior maxillary teeth penetrating the skin between thumb and index finger of the left hand. The present case demonstrates that at least adult specimens of *P. olfersii latirostris* are capable of inflicting systemic envenomation in humans with only a very quick defensive bite.

In the case of *P. chamissonis* envenomation described by SCHENONE & al. (1954), there was intense painful swelling of the right hand that developed to a reddish, warm and hypersensible edema of the arm and the axillary region with ecchymosis and painful lymphatic involvement. In addition, the patient suffered from vertigo, mild headache, and fever. The involvement of the joints of the bitten arm as described above differs from previously reported cases, however, this may easily remain undetected in an extensively swollen extremity. The subsidence of all characteristic symptoms on the next day seems not to be unusual for such a mild case of local envenomation.

Whether the bite leading to the envenomation described by SCHENONE & al. (1954) was a quick or prolonged one is not known. The authors only mention that the snake was being handled when the bite occurred. The present case shows that *P. chamissonis*, too, is able to inflict human envenomation with only a very quick bite.

ASSAKURA & al. (1992) determined the intraperitoneal LD₅₀ of *P. o. olfersii* venom in laboratory mice to be 2.79 ± 0.58

mg/kg, about equal to the lethality of the venom of the pitviper *Bothrops asper* (GARMAN, 1883) (KOCHOLATY & al. 1971). *P. o. olfersii* venom has high haemorrhagic, edema-producing, fibrinogenolytic and fibrinolytic activities, hydrolyzes casein rapidly, but has only a low activity on arginine synthetic substrates. It is devoid of in vitro coagulant, procoagulant, phospholipase A, and platelet aggregating enzymes. So far five fibrin(ogen)olytic enzymes and a myotoxin from *P. o. olfersii* venom have been isolated and characterized, and a neurotoxic component has been identified that preferentially acts on avian nerve-muscle preparations (ASSAKURA & al. 1992, 1994; PRADO-FRANCESCHI & al. 1996, 1998). SILVA & BUONONATO (1984) and DE ARAUJO & DOS SANTOS (1997) pointed out that the symptomatology of the *P. o. olfersii* envenomations reported by them was very similar to symptoms commonly seen after *Bothrops* bites and that they would have recognized the cases as *Bothrops* envenomations had they not been sure of the identification of the snake. In fact, patients with envenomations following *Philodryas* bites have been treated with *Bothrops* antivenom (BUCARETCHI & al. 1993; NISHIOKA & SILVEIRA 1994), which showed a neutralizing effect on the haemorrhagic activity of *P. o. olfersii* venom in animal experiments (ASSAKURA & al. 1992).

Gland extracts of *P. chamissonis* studied by DONOSO-BARROS & CÁRDENAS (1959, 1962) had proteolytic activity but were devoid of haemolytic and coagulant activity in vitro. In laboratory mice intraperitoneal injection of lethal doses of *P. chamissonis* gland extracts caused haemorrhages, dyspnoea and movement difficulties with ataxia and paresia, while local edema and haemorrhages were seen after subcutaneous injection. Experimental envenomation in amphibians and lizards provoked similar clinical aspects (DONOSO-BARROS & CÁRDENAS 1959, 1962).

Apart from *P. chamissonis* and *P. olfersii*, three *Philodryas* species have been reported to have caused human envenomation: MARTINS (1916), NISHIOKA & SILVEIRA (1994), DE ARAUJO & DOS SANTOS (1997), HILLER (in litt.), and NORMAN (pers. comm. to A. HOHMEISTER) observed local pain, edema, and lymphatic involve-

ment after bites by *P. patagoniensis* (GIRARD, 1857). About 240 cases of *P. patagoniensis* bites were admitted to Hospital Vital Brazil from 1987-1994 (FOWLER & SALOMÃO 1994: fig. 5). A bite by *P. v. viridissimus* (LINNAEUS, 1758) caused swelling, discoloration and local pain (CAMPBELL & LAMAR 1989: fig. 546), and local edema and ecchymosis were the predominant signs of a *P. baroni* BERG, 1895 envenomation (KUCH & JESBERGER 1993). FOWLER & SALOMÃO (1994: fig. 6) recorded eight admissions to Hospital Vital Brazil due to *P. aestivus* (DUMÉRIL, BIBRON &

DUMÉRIL, 1854) bites, during an eight year period. How many of the latter resulted in significant envenomation is unknown.

As described above, *P. chamissonis* and *P. olfersii* are capable of inflicting local and systemic human envenomation, respectively, already with a very quick bite. In a clinical sense, these species are venomous snakes and at least *P. olfersii* is potentially very dangerous to humans. Special precautions in handling these animals, such as the use of gloves, appropriate clothing and snake hooks, are recommended.

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RESUMEN

Existe la opinión de que las culebras de la familia Colubridae, cuando muerden a humanos, tienen que masticar por lo menos varios segundos en el lugar de la mordedura para inyectar el secreto tóxico de las glándulas de Duvernoy, en cantidades capaces de causar envenenamiento; razón por la cual las rápidas mordeduras defensivas de las mismas culebras no resultarían en envenenamiento. No obstante, algunas especies de la familia Colubridae sí han causado envenenamiento por medio de mordeduras rápidas, y esto también es verdad para dos especies del género sudamericano *Philodryas*.

La víctima, 13 años de edad, de una rápida mordedura defensiva de *P. olfersii latirostris* COPE, 1862 presentó edema local, linfadenopatías axilares, movilidad reducida de las articulaciones de los brazos, espaldas, y rodillas así como áreas hemorrágicas en las rodillas. Este caso demuestra que *P. olfersii* es capaz de causar envenenamiento sistémico en humanos ya con una rápida mordedura defensiva. Luego de una mordedura rápida de *P. chamissonis* (WIEGMANN, 1834) 4.5 años después, los síntomas principales en el mismo paciente eran frialdad del brazo mordido, dolor, edema minimal, y movilidad reducida de la mano y muñeca. Otras publicaciones sobre envenenamiento por estas culebras y la rapidez con la que se desarrolló en los casos presentes, sugieren que las especies *P. olfersii* y *P. chamissonis* sean consideradas como serpientes venenosas en un sentido clínico.

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