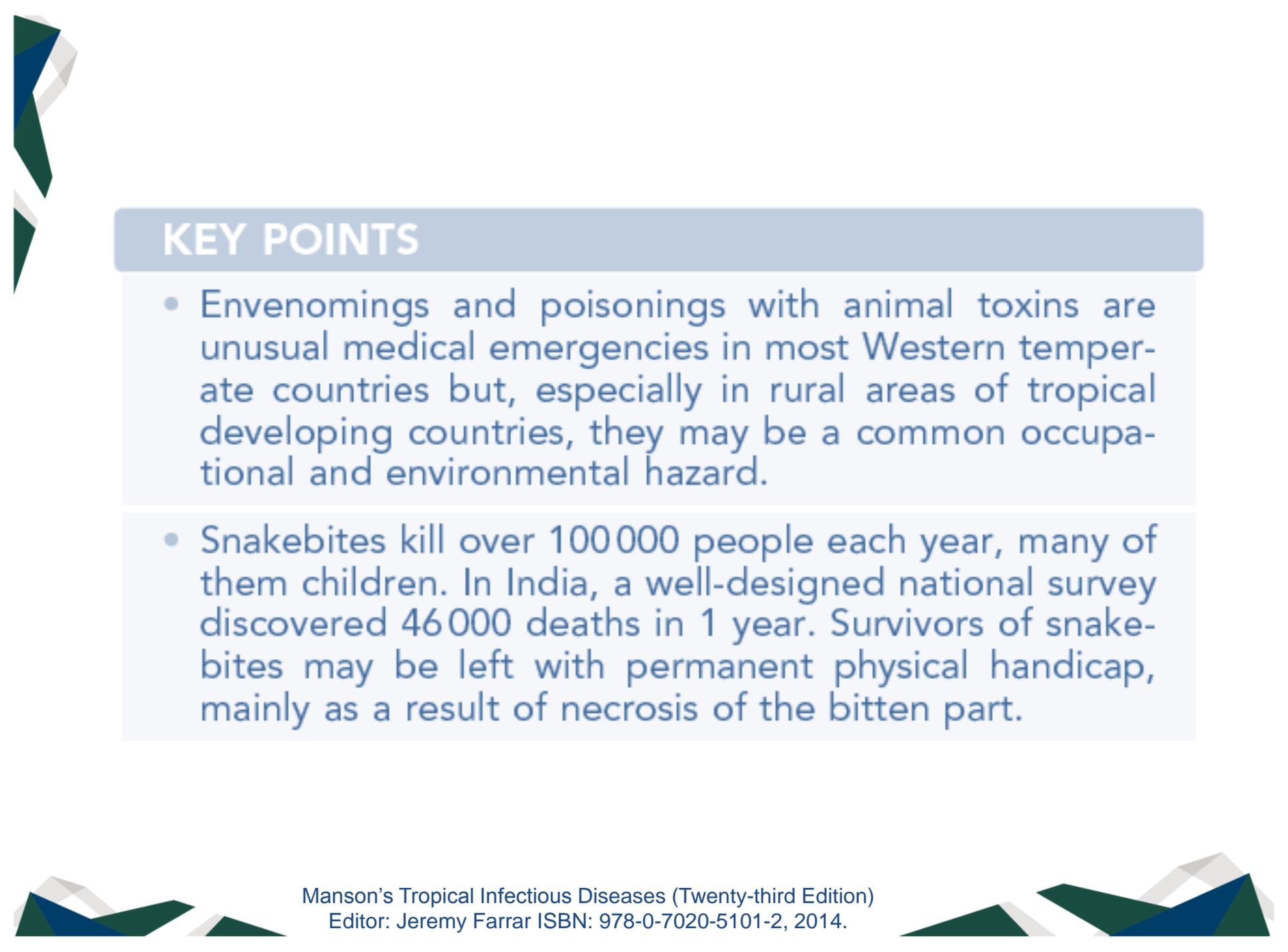


# Ofidismo

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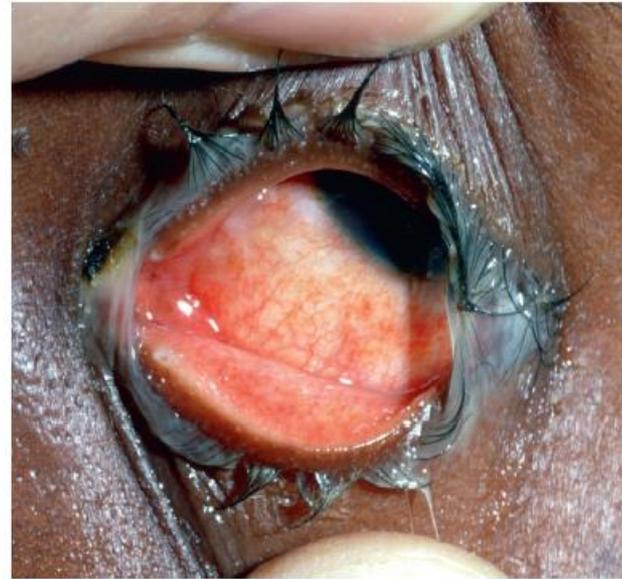


## KEY POINTS

- Envenomings and poisonings with animal toxins are unusual medical emergencies in most Western temperate countries but, especially in rural areas of tropical developing countries, they may be a common occupational and environmental hazard.
- Snakebites kill over 100 000 people each year, many of them children. In India, a well-designed national survey discovered 46 000 deaths in 1 year. Survivors of snakebites may be left with permanent physical handicap, mainly as a result of necrosis of the bitten part.



**Figure 75.13** Early bilateral ptosis in a patient bitten by a Papuan taipan (*Oxyuranus scutellatus*) in Papua New Guinea. (Copyright D. A. Warrell.)



**Figure 75.15** Intense conjunctivitis with leukorrhoea in a patient 'spat' at 3 hours previously by an African black-necked or spitting cobra (*Naja nigricollis*). (Copyright D. A. Warrell.)



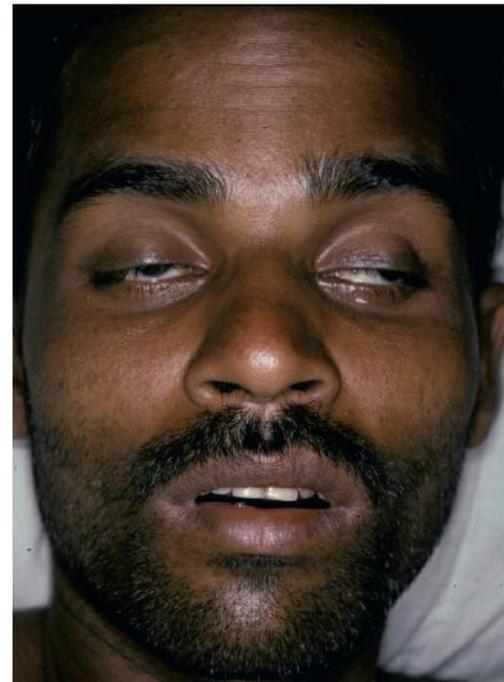
**Figure 75.17** Swelling, blistering and necrosis in a woman 4 days after being bitten by a Malayan pit viper (*Calloselasma rhodostoma*) in Thailand. Amputation was unavoidable. (Copyright D. A. Warrell.)



**Figure 75.16** Extensive swelling and bulla formation in a Thai patient 13 hours after being bitten by a Malayan pit viper (*Calloselasma rhodostoma*). (Copyright D. A. Warrell.)



**Figure 75.24** Conjunctival oedema (chemosis) in a Burmese man bitten 36 hours previously by an Eastern Russell's viper (*Daboia siamensis*). (Copyright D. A. Warrell)



**Figure 75.25** Sri Lankan man with neurotoxic envenoming by a Western Russell's viper (*Daboia russelii*). There is ptosis, ophthalmoplegia, facial paralysis and inability to open the mouth and protrude the tongue. (Copyright D. A. Warrell.)



**Figure 75.19** Extensive swelling, bruising and facial discoid haemorrhages in a 9-year-old Vietnamese girl 12 hours after being bitten on the elbow by a Malayan pit viper (*Calloselasma rhodostoma*). (Copyright D. A. Warrell.)



# Venomous Snakes

## *Taxonomy, Identification and Distribution*

- Of the 3346 species of snakes, **667** belong to the three families of venomous snakes:
  - *Lamprophiidae* subfamily *Atractaspidinae* (burrowing asps);
  - *Elapidae* (cobras, kraits, mambas, coral snakes, sea snakes, etc.) and
  - *Viperidae* (old world and pit vipers).
- Only about 200 species have caused death or permanent disability by biting humans.
  - The largest family, *Colubridae*, includes 1748 species of which **100** are capable of producing mild envenoming in humans, but only a few have caused fatalities.

Las serpientes ponzoñosas se agrupan en tres familias: Viperidae, con los géneros *Bothrops*, *Crotalus*, *Lachesis* y *Agkistrodon* en América; Elapidae, en donde están las corales de América; Colubridae, la mayoría son inofensivas, excepto las del género *Philodryas*. Las ponzoñosas poseen glándulas rodeadas de músculos que eliminan el veneno a través de conductos que desembocan a los colmillos. Las tres variedades de dentición se denominan: solenoglifas, proteroglifas y opistoglifas.

# Non-Venomous Snakes

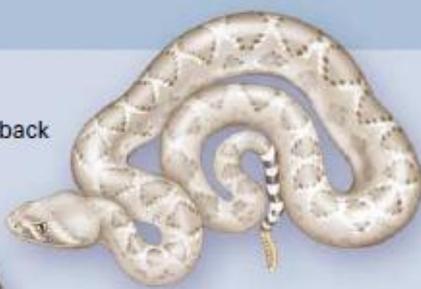
## *Taxonomy, Identification and Distribution*

- The giant constrictors (family *Boidae*) are potentially dangerous to man.
- There are reliable reports of fatal attacks by South-east Asian (especially Indonesian) reticulated pythons (*Python reticulatus*), African rock pythons (*Python sebae*), South American anacondas (*Eunectes murinus*) and an Australian scrub python (*Morelia amethystina*).
- Some of the victims were swallowed.

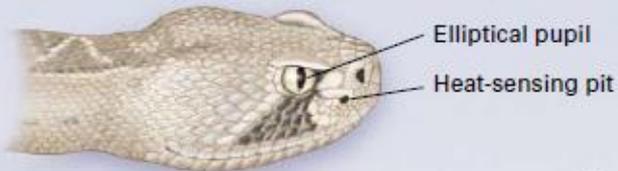


**Venomous snakes**

*Crotalus atrox*  
Western diamondback  
rattlesnake

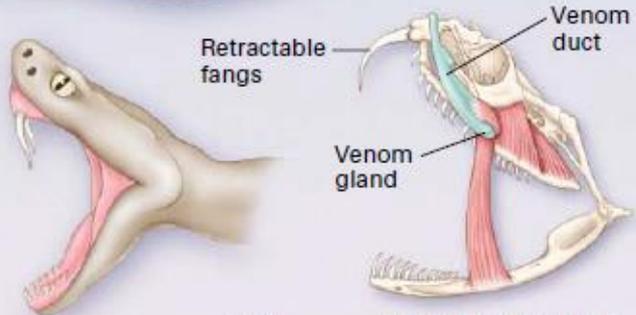


Triangle-shaped head



Elliptical pupil

Heat-sensing pit



Retractable fangs

Venom duct

Venom gland

Anal plate

Skull of a member of family Viperidae

Single row of subcaudal plates



Rattle (rattlesnakes)

**Nonvenomous snakes**

*Elaphe guttata*  
Corn snake

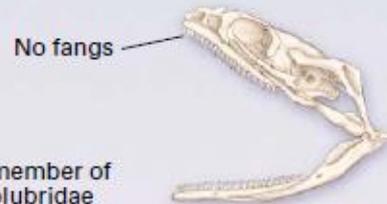


Rounded head



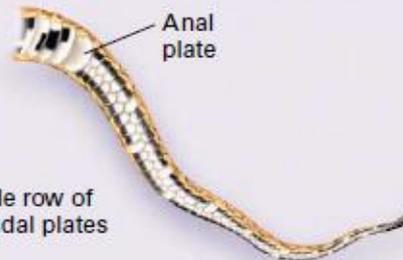
Round pupil

No heat-sensing pit



No fangs

Skull of a member of family Colubridae



Anal plate

Double row of subcaudal plates

Gold et al. N Engl J Med, Vol. 347, No. 5 . August 1, 2002.

**Venomous snakes**

*Crotalus atrox*  
Western diamondback  
rattlesnake



**Triangle-shaped head**



**Nonvenomous snakes**

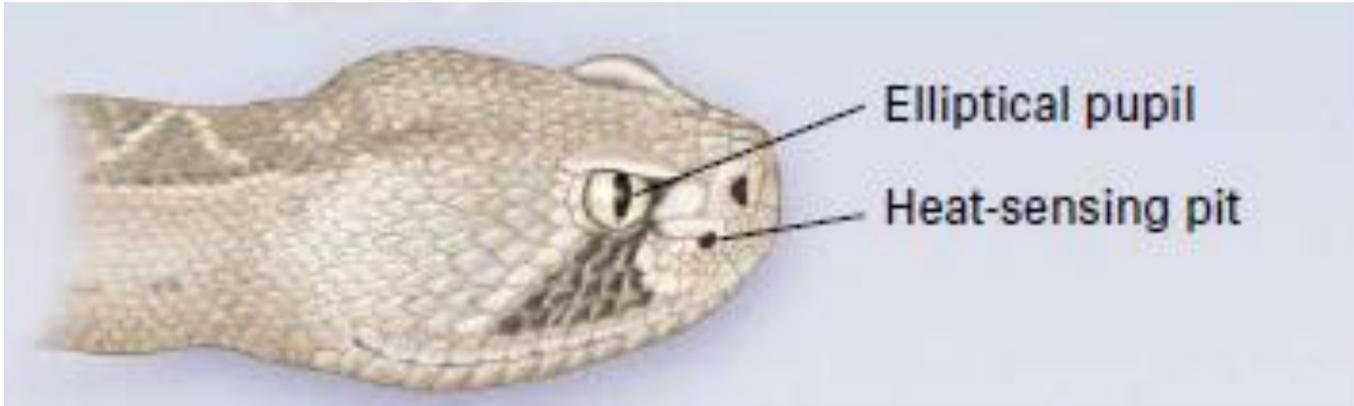
*Elaphe guttata*  
Corn snake



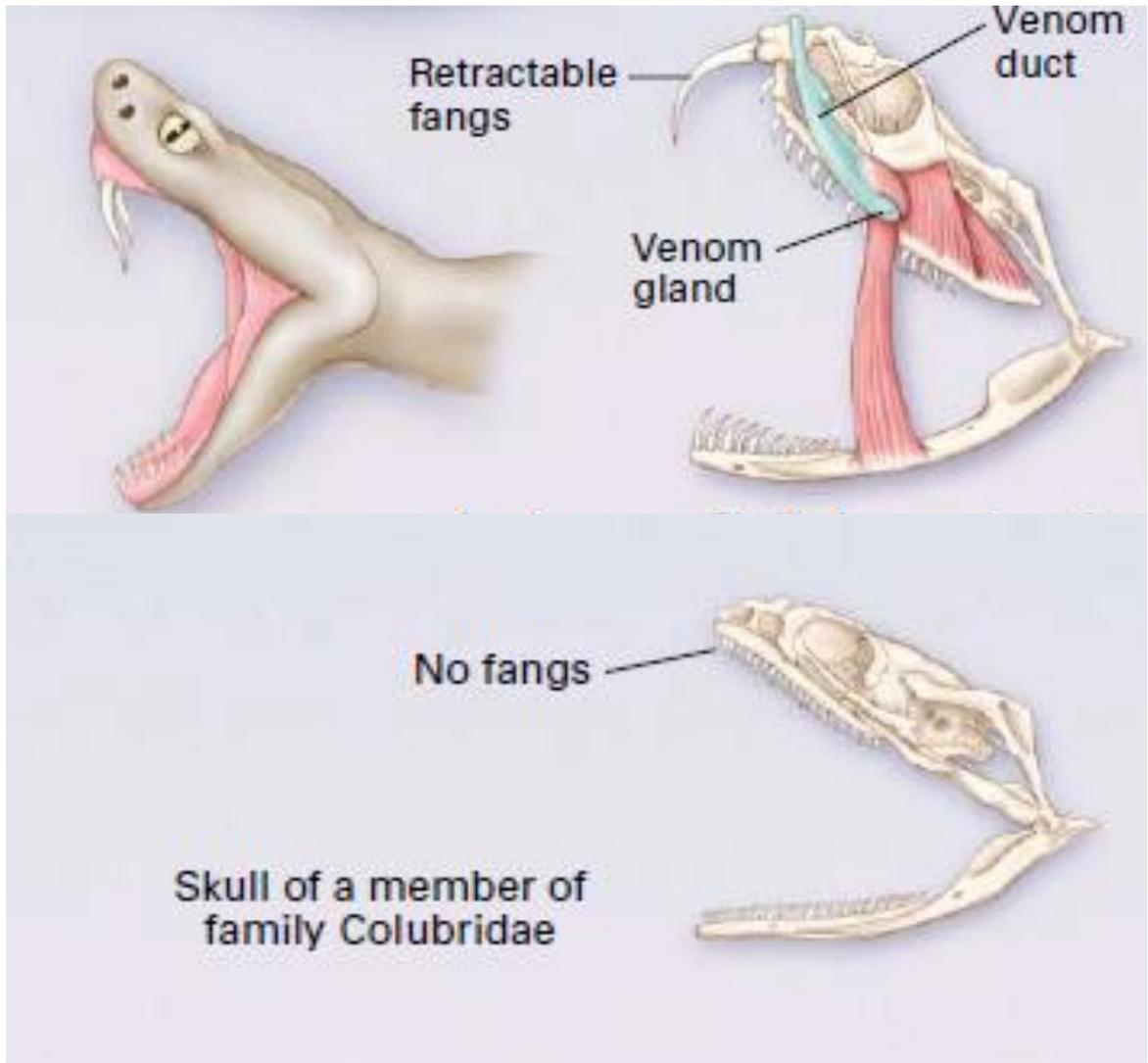
**Rounded head**



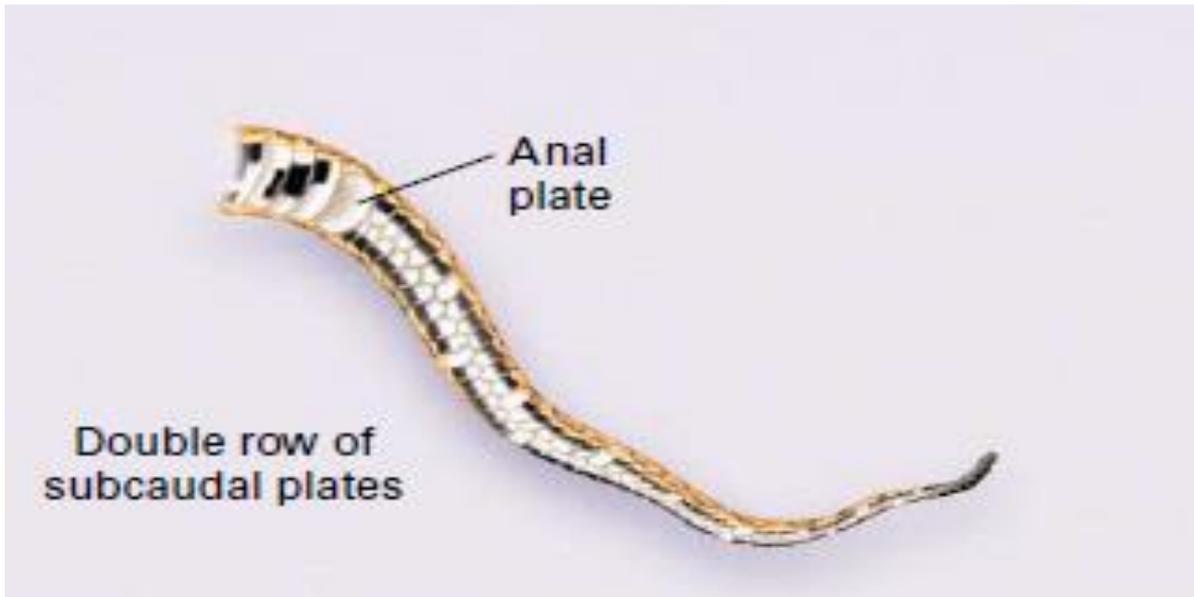
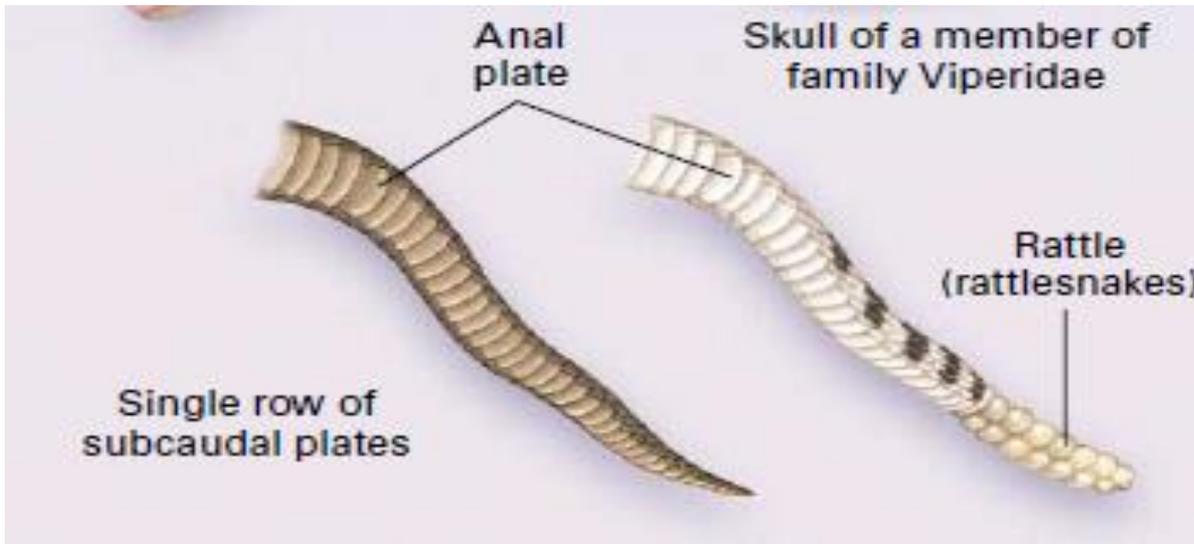
Gold et al. N Engl J  
Med, Vol. 347, No. 5 .  
August 1, 2002.



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Med, Vol. 347, No. 5 .  
August 1, 2002.



Gold et al. N Engl J Med, Vol. 347, No. 5 . August 1, 2002.



Gold et al. N Engl J Med, Vol. 347, No. 5 . August 1, 2002.

# Dentición

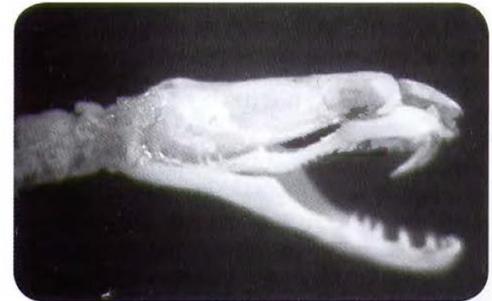
**Aparato ponzoñoso con dentición solenoglifa.** Propio de víboras (Viperidae). Es el más dinámico y efectivo. Colmillos afilados, tubulares, cuya longitud puede sobrepasar los 2.5 cm, unidos al maxilar superior que es corto y móvil (figura 17-51).

**Aparato ponzoñoso con dentición proteroglifa.** Propio de elápidos (Elapidae), maxilares superiores cortos y fijos, colmillos cortos no más largos de 3 mm en las corales americanas del género *Micrurus* (figura 17-52). Algunas especies de cobras “spraying cobras”, mal llamadas escupidoras, tienen la habilidad de proyectar la ponzoña en forma de rocío hacia la víctima, hasta una distancia aproximada de 1.50 m.

**Aparato ponzoñoso con dentición opistoglifa.** Presente en algunas serpientes de colubridos (Colubridae), en el extremo posterior del maxilar superior presentan colmillos ranurados hacia adelante, comunicados con un tejido llamado glándula de Duvernoy. No es un diseño mecánicamente muy eficiente, pero en casos excepcionales, la mordedura puede ser fatal por la toxicidad de la ponzoña (figura 17-53).



**Figura 17-51. Solenoglifa. Dentición.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



**Figura 17-52. Proteroglifa. Dentición.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



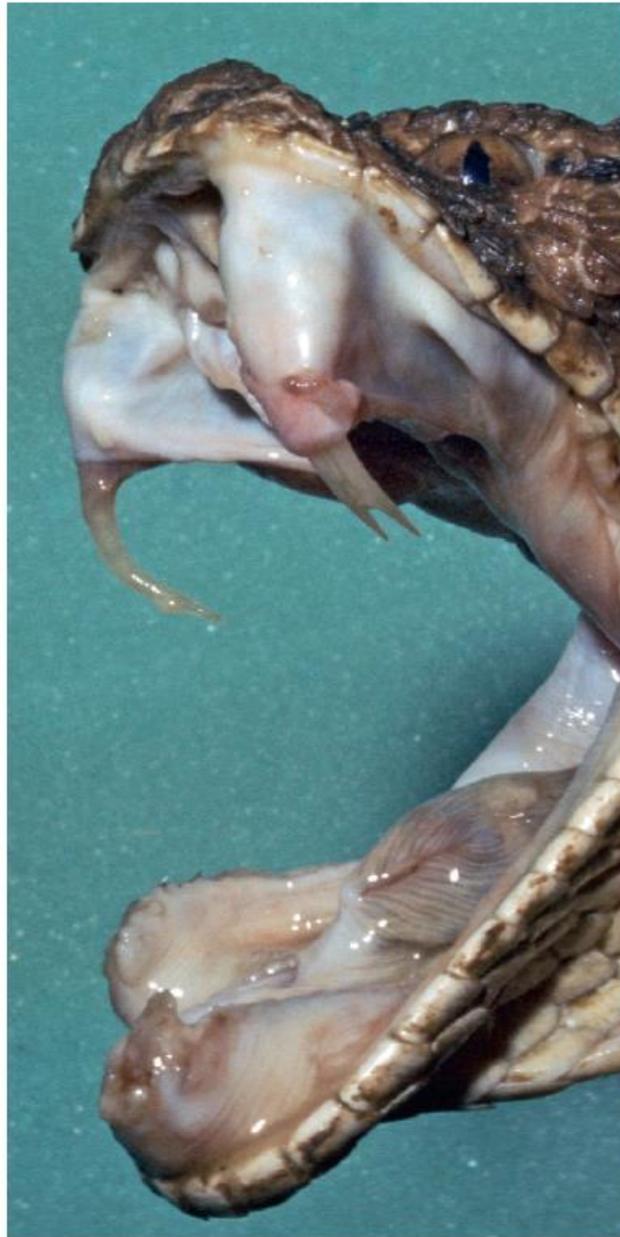
**Figura 17-53. Opistoglifa. Dentición.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).

## Solenoglyfa



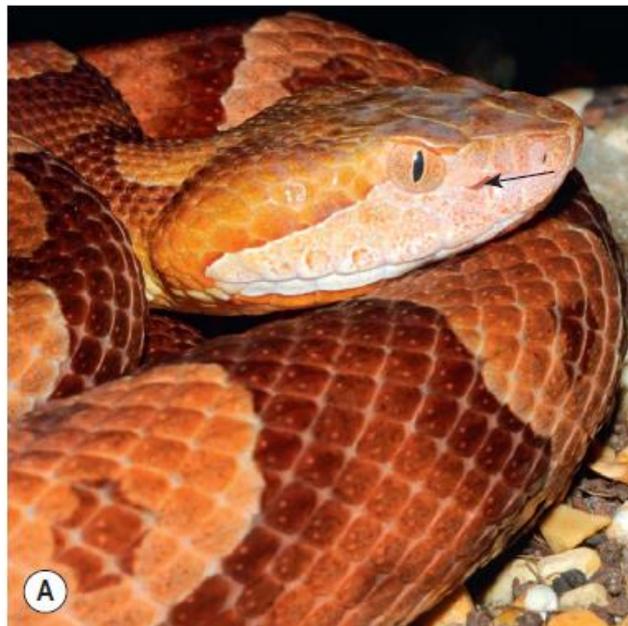
**Figure 75.2** Very long front fang of a West African burrowing asp (*Atractaspis aterrima*: subfamily Atractaspidinae). Specimen from Zaria, Nigeria (Copyright D. A. Warrell.)

# Solenoglyfa



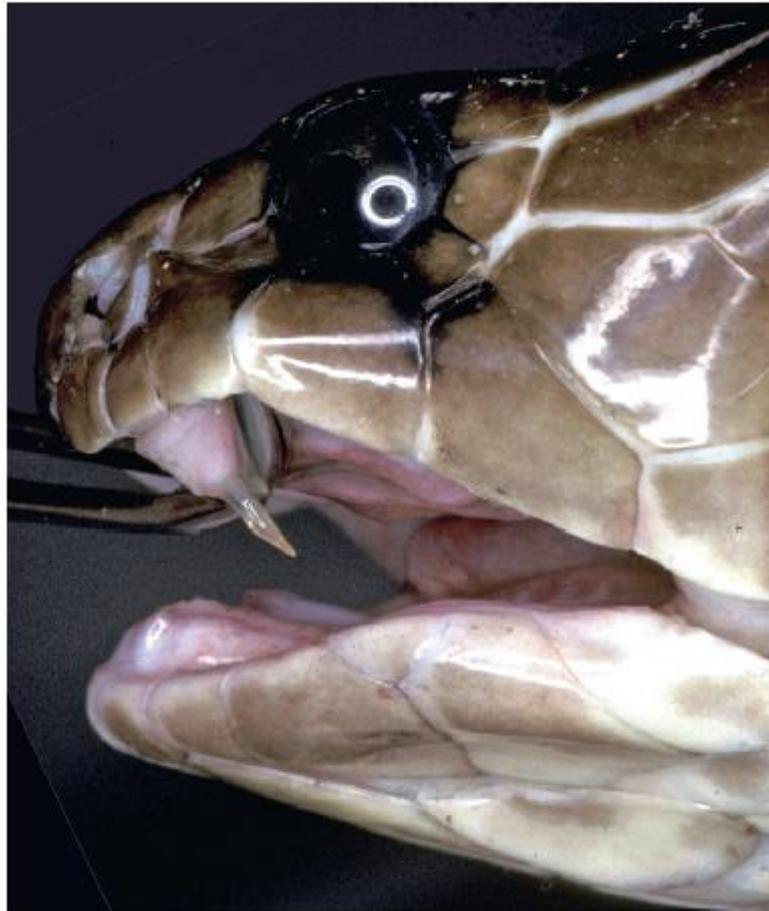
**Figure 75.4** Long hinged front fangs of the puff adder (*Bitis arietans*: family Viperidae; subfamily Viperinae). Specimen from Garki, Nigeria (Copyright D. A. Warrell.)

# Solenoglyfa



**Figure 75.5** (A) North American copper head (*Agkistrodon contortrix*; family Viperidae; subfamily Crotalinae), a typical pit-viper showing heat-sensitive pit (arrow). (B) Ethiopian mountain viper (*Bitis parviocula*; family Viperidae; subfamily Viperinae), a typical Old World viper (A,B, Copyright D. A. Warrell.)

## Proteroglifa



**Figure 75.3** Short front fangs of the Indian spectacled cobra (*Naja naja*: family Elapidae). Specimen from Anuradhapura, Sri Lanka (Copyright D. A. Warrell.)

# Proteroglifa



**Figure 75.6** Egyptian cobra (*Naja haje*: family Elapidae), showing spread hood in threatening/defensive attitude. Specimen at Bio-Ken, Watamu, Kenya. (Copyright D. A. Warrell.)

# Proteroglifa



**Figure 75.9** (A) Texas coral snake (*Micrurus tener*). Specimen from Kingsville. (B) South American coral snake (*Micrurus frontalis*; family Elapidae). Specimen from Brazil. (A,B, Copyright D. A. Warrell.)

# Opistoglyfa



**Figure 75.1** Rear fangs of the boomslang (*Dispholidus typus*: family Colubridae). Specimen at Bio-Ken, Watamu, Kenya. (Copyright D. A. Warrell.)

TABLE  
75.1

Species of Snake Responsible for Most Human Snakebite Deaths and Morbidity

Area	Scientific Name	Common Name
North America	<i>Crotalus adamanteus</i>	Eastern diamondback rattlesnake
	<i>Crotalus atrox</i>	Western diamondback rattlesnake
	<i>Crotalus oreganus</i> and <i>Crotalus helleri</i>	Western rattlesnakes
Central America	<i>Crotalus simus</i> subsp.	Central American rattlesnakes
	<i>Bothrops asper</i>	Terciopelo
South America	<i>Bothrops atrox</i> , <i>B. asper</i>	Fer-de-lance, barba amarilla
	<i>Bothrops jararaca</i>	Jararaca
	<i>Crotalus durissus</i> subsp.	South American rattlesnakes, cascabel
Europe	<i>Vipera berus</i> , <i>V. aspis</i>	Vipers, adders
	<i>Vipera ammodytes</i>	Long-nosed or nose-horned viper
Africa	<i>Echis ocellatus</i> , <i>E. leucogaster</i> , <i>E. pyramidum</i> , <i>E. jogeri</i>	Saw-scaled or carpet vipers
	<i>Bitis arietans</i>	Puff adders
	<i>Naja nigricollis</i> , <i>N. mossambica</i> , etc.	African spitting cobras
	<i>Naja haje</i>	Egyptian cobra
Asia, Middle East	<i>Echis</i> spp.	Saw-scaled or carpet vipers
	<i>Macrovipera lebetina</i>	Levantine viper
	<i>Daboia palaestinae</i>	Palestine viper
	<i>Naja oxiana</i>	Oxus cobra
	<i>Naja naja</i> , <i>N. kaouthia</i> , <i>N. siamensis</i> , etc.	Asian cobras
Indian subcontinent and South-east Asia	<i>Bungarus</i> spp.	Kraits
	<i>Daboia russelii</i> , <i>D. siamensis</i>	Russell's vipers
	<i>Calloselasma rhodostoma</i>	Malayan pit viper
	<i>Echis carinatus</i>	Saw-scaled or carpet viper
	<i>Naja atra</i> etc.	Asian cobras
Far East	<i>Bungarus multicinctus</i>	Chinese krait
	<i>Protobothrops (Trimeresurus) flavoviridis</i>	Japanese habu
	<i>Protobothrops (Trimeresurus) mucrosquamatus</i>	Chinese habu
	<i>Gloydus blomhoffii</i> , <i>G. brevicaudus</i>	Mamushis
	<i>Acanthophis</i> spp.	Death adders
Australasia, New Guinea	<i>Pseudonaja</i> spp.	Brown snakes
	<i>Notechis</i> spp.	Tiger snakes
	<i>Oxyuranus scutellatus</i>	Taipan



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**TABLE 1. MAJOR VENOMOUS SNAKES OF THE WORLD.**

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FAMILY	SUBFAMILY	DISTRIBUTION AND EXAMPLES	COMMENTS
Viperidae	Crotalinae (pit vipers)	North America: crotalus and sistrurus species (rattlesnake), agkistrodon species (cottonmouth, copperhead) Central and South America: crotalus species (rattlesnake), agkistrodon species (copperhead), bothrops species (fer-de-lance), <i>Lachesis muta</i> (bushmaster)	Heat-sensing foramen “pit” between each eye and nostril; elliptical pupils; retractable, canalized fangs
Viperidae	Viperinae (true vipers)	Africa, Europe, Middle East: <i>Bitis arietans</i> (puff adder), <i>B. gabonica</i> (Gaboon viper), <i>B. nasicornus</i> (rhinoceros-horned viper), echis species (saw-scaled viper), cerastes species (horned or desert vipers), vipera species (vipers) Indian subcontinent and Southeast Asia: <i>Daboia russelli</i> (Russell’s viper)	No heat-sensing pit
Elapidae		Tropical and warm temperate zones: naja species (cobras), dendroaspis species (mambas), bungarus species (kraits), micrurus, calliophis, and maticora species (coral snakes), and most venomous snakes of Australia	Short, fixed fangs; venom injected by succession of chewing movements
Hydrophidae	Hydrophinae (true sea snakes)	Indopacific region: <i>Pelamis platurus</i> (pelagic sea snake)	Fangs similar to those of elapidae; highly neurotoxic venom; rarely bite humans

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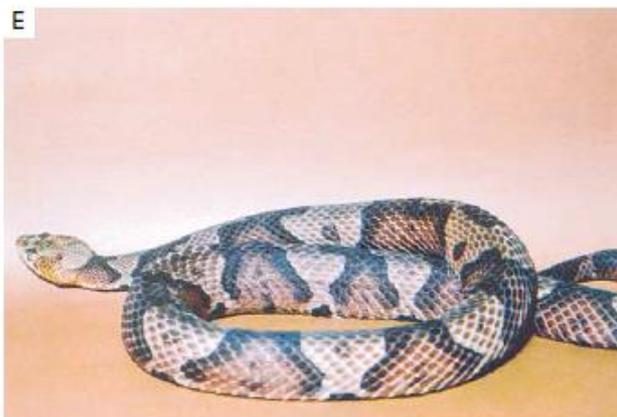


Figure 1. Venomous Snakes of North America.

Panel A shows an eastern diamondback rattlesnake (*Crotalus adamanteus*), Panel B a western diamondback rattlesnake (*C. atrox*), Panel C a timber rattlesnake (*C. horridus*), Panel D a cottonmouth (*Agkistrodon piscivorus*), Panel E a copperhead (*A. contortix*), and Panel F an eastern coral snake (*Micrurus fulvius fulvius*). (Photos in Panels A, B, and F courtesy of James Harrison, Kentucky Reptile Zoo.)

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2002.

Figure 75.10 (A) Distribution of venomous terrestrial snakes.

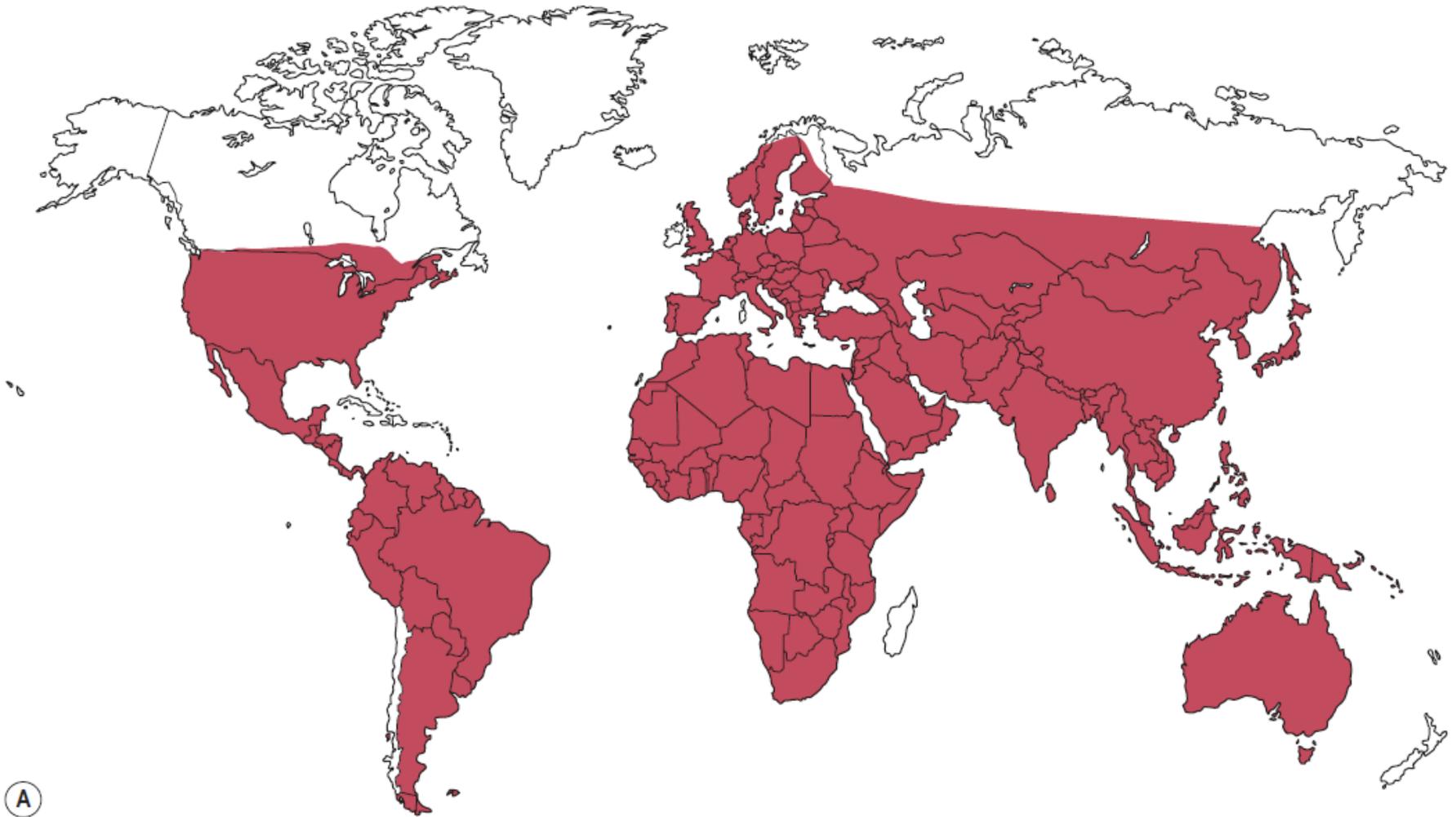
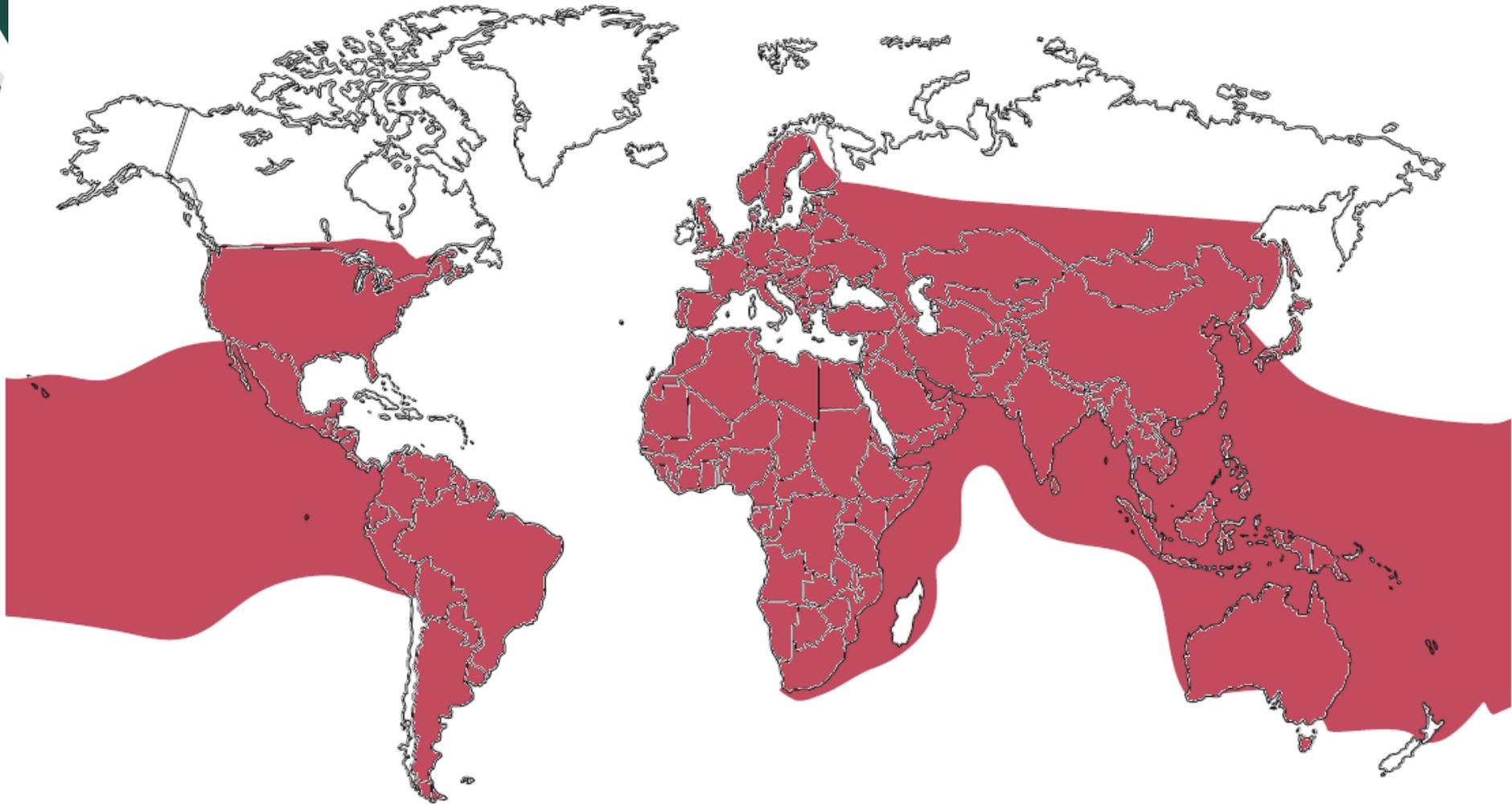


Figure 75.10 (B) Distribution of venomous sea snakes.



Figure 75.10 (A+B) Distribution of venomous snakes.





*Wilderness and Environmental Medicine*, **18**, 209–213 (2007)

BRIEF REPORT

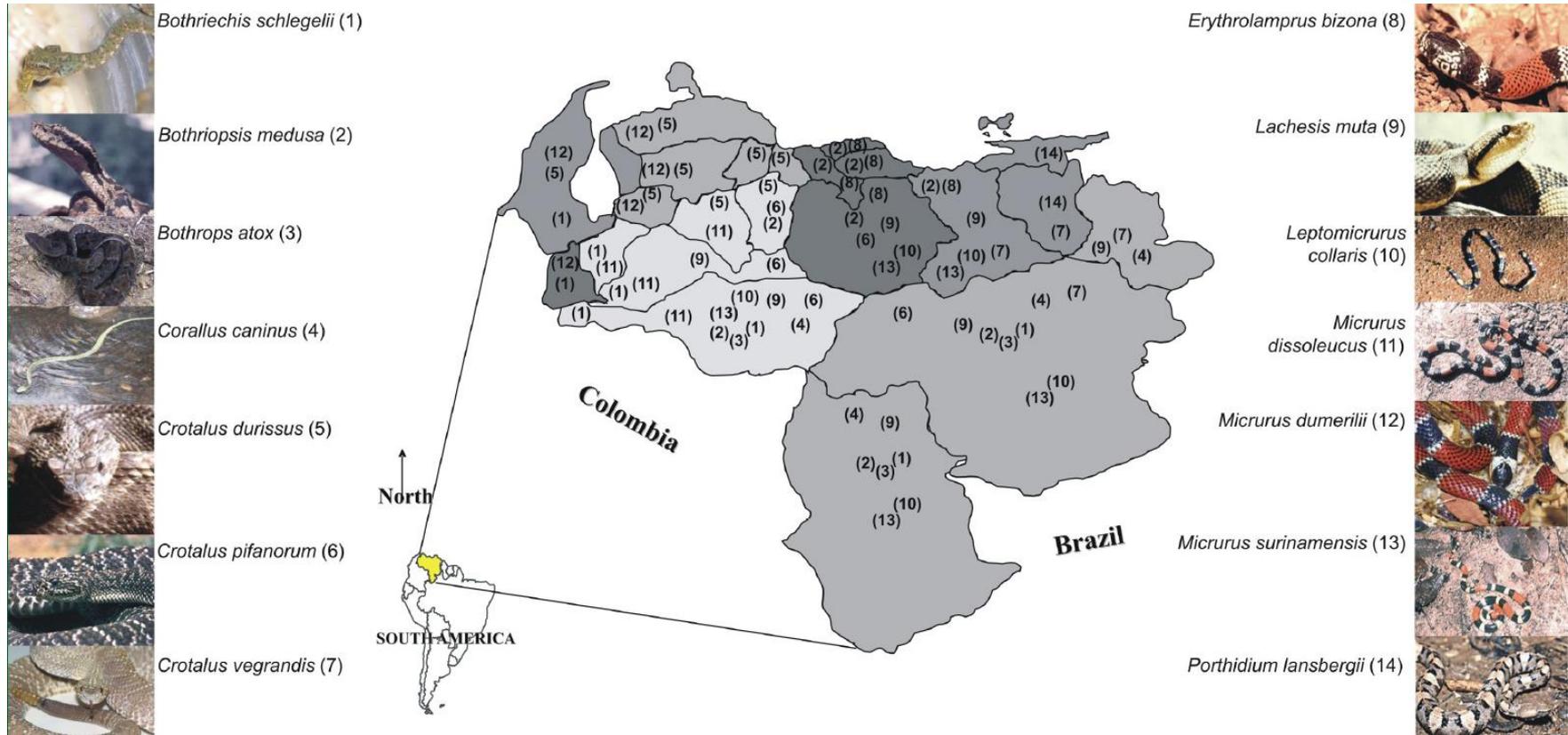
# Trends in Fatal Snakebites in Venezuela, 1995–2002

Jesús A. Benítez, MD, MSc; Pedro M. Rifakis, MD; Jair A. Vargas, MD; Gilberto Cabaniel, MD;  
Alfonso J. Rodríguez-Morales, MD

*From the Direction of Environmental Health, Ministry of Health, Maracay, Venezuela (Dr Benítez); the Division of Internal Medicine, Pérez de León Emergency Hospital, Caracas, Venezuela (Dr Rifakis); the Collaborative Group of Clinical Infectious Diseases Research, Caracas, Venezuela (Dr Vargas); Salud Miranda, Los Teques, Venezuela (Dr Cabaniel); and the Experimental Institute José Witremundo Torrealba, Universidad de Los Andes, Trujillo, Venezuela (Dr Rodríguez-Morales).*



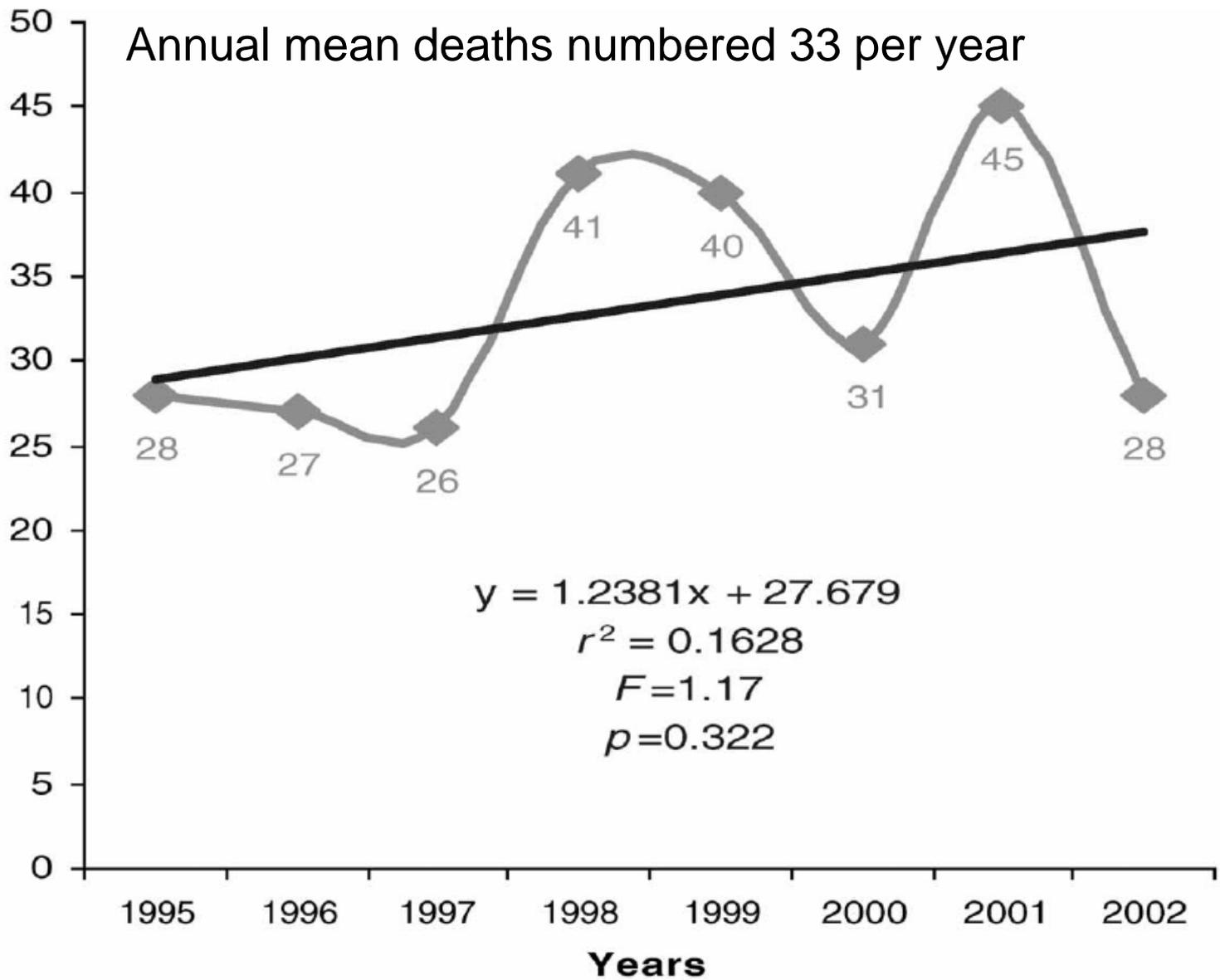
# 266 reports of death due to snakebite



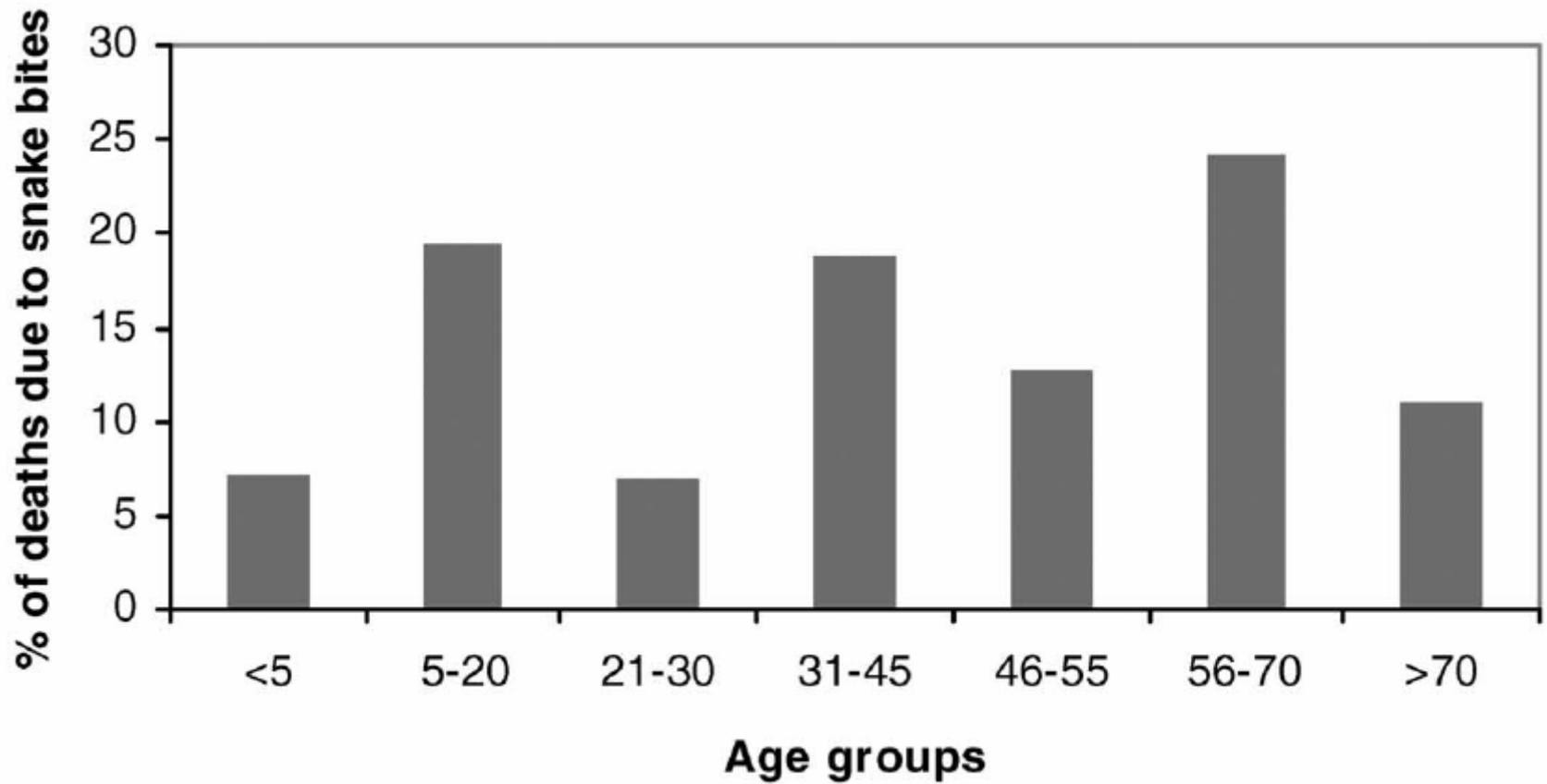
Modified from CAIBCO-UCV: <http://serpientesdevenezuela.ucv.ve/>

**Figure 1.** Relative position of Venezuela and a list of most important snake species distributed in the country.

Deaths



Benítez JA, Rifakis PM, Vargas JA, Cabaniel G, Rodríguez-Morales AJ. Trends in fatal snakebites in Venezuela, 1995-2002. Wilderness Environ Med. 2007 Fall;18(3):209-13.



Benítez JA, Rifakis PM, Vargas JA, Cabaniel G, Rodríguez-Morales AJ. Trends in fatal snakebites in Venezuela, 1995-2002. Wilderness Environ Med. 2007 Fall;18(3):209-13.

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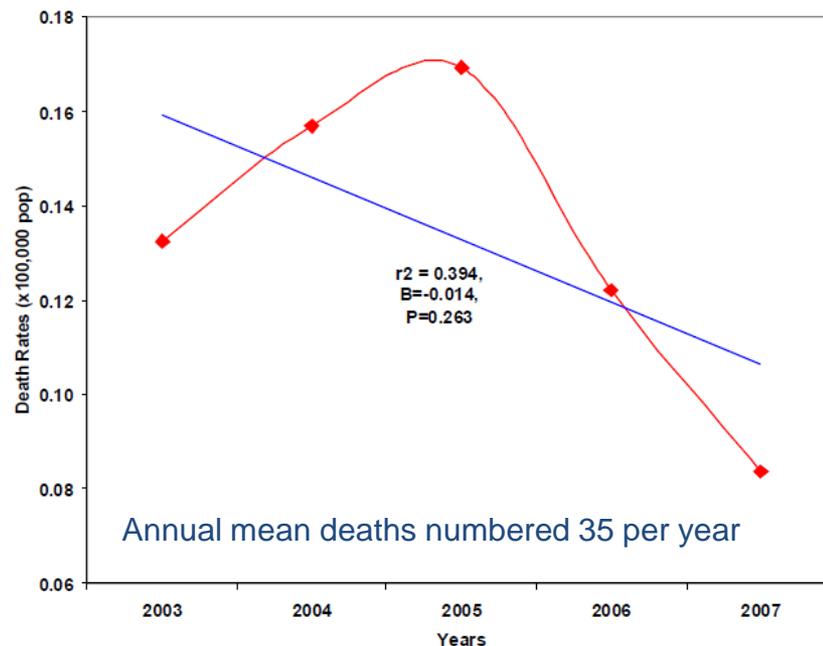
## Trends in fatal snakebites in Venezuela, 2003–2007

• [L. Parra<sup>1</sup>](#), [J. Peña<sup>1</sup>](#), [A. Rísquez Parra<sup>2</sup>](#), [L. Echezuria<sup>2</sup>](#), [A. Rodriguez-Morales<sup>2</sup>](#)

International Journal of Infectious Diseases  
Volume 14, Supplement 1, March 2010, Pages e138

**176 reports of death due to snakebite**

**Figure 2.** Mortality rates due to snakebites in Venezuela, 2003 -2007 (x100,000 pop).



32.017

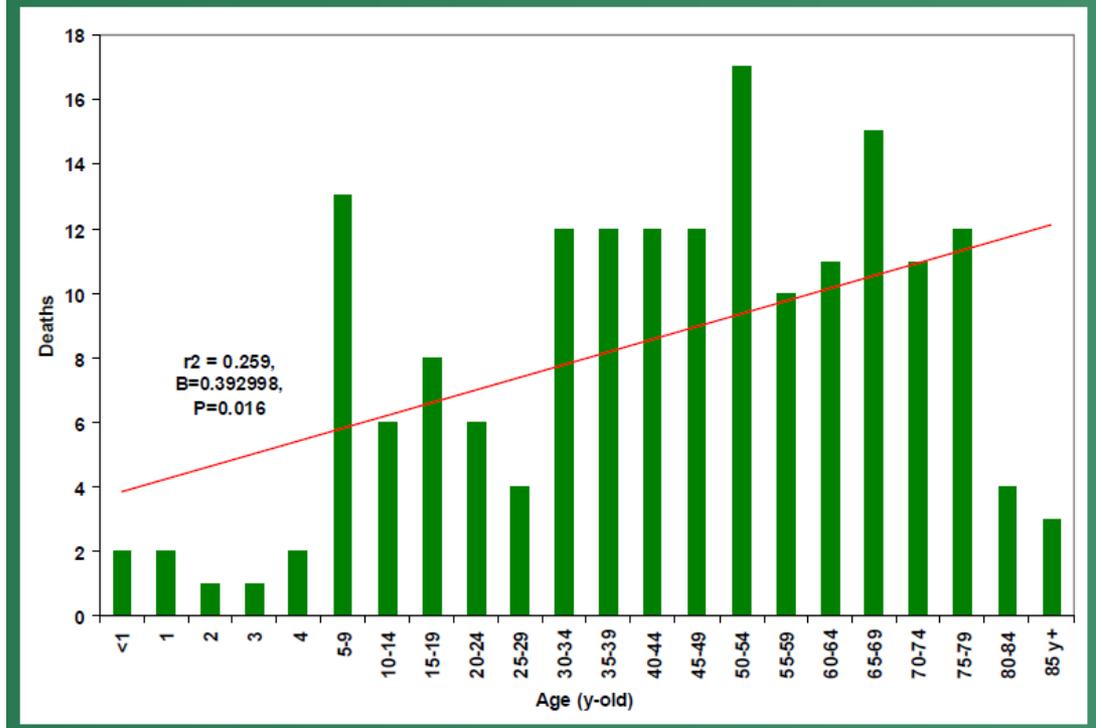
## Trends in fatal snakebites in Venezuela, 2003–2007

• [L. Parra<sup>1</sup>](#), [J. Peña<sup>1</sup>](#), [A. Rísquez Parra<sup>2</sup>](#), [L. Echezuria<sup>2</sup>](#), [A. Rodriguez-Morales<sup>2</sup>](#)

International Journal of Infectious Diseases

Volume 14, Supplement 1, March 2010, Pages e138

**Figure 3.** Deaths due to snakebites among age/groups in Venezuela, 2003 -2007.





Departament	Municipalities	Cases per year					
		2007-2011	2007	2008	2009	2010	2011
17 - Caldas	17001 - Manizales	49	17	7	8	12	5
17 - Caldas	17013 - Aguadas	9	6	2	1		
17 - Caldas	17042 - Anserma	3	1		1		1
17 - Caldas	17050 - Aranzazu	4	1	1			2
17 - Caldas	17088 - Belalcázar	6	2		2		2
17 - Caldas	17174 - Chinchiná	8			3	4	1
17 - Caldas	17272 - Filadelfia						
17 - Caldas	17380 - La Dorada	49	12	6	10	13	8
17 - Caldas	17388 - La Merced	4		2		2	
17 - Caldas	17433 - Manzanares	13	9	1		2	1
17 - Caldas	17442 - Marmato	1	1				
17 - Caldas	17444 - Marquetalia	9	1	3	1	2	2
17 - Caldas	17446 - Marulanda	5	1	3	1		
17 - Caldas	17486 - Neira	12	2	1	5	1	3
17 - Caldas	17495 - Norcasia	34	8	10	7	7	2
17 - Caldas	17513 - Pácora	18	4	5	5	2	2
17 - Caldas	17524 - Palestina	2	2				
17 - Caldas	17541 - Pensilvania	14	5	2	4		3
17 - Caldas	17614 - Riosucio	16	3	2	5	2	4
17 - Caldas	17616 - Risaralda	4	1		2	1	
17 - Caldas	17653 - Salamina	10	3	1	2	3	1
17 - Caldas	17662 - Samaná	52	5	11	5	11	20
17 - Caldas	17665 - San José						
17 - Caldas	17777 - Supía	2	2				
17 - Caldas	17867 - Victoria	11	3	2	2		4
17 - Caldas	17873 - Villamaría	8		1	5	2	
17 - Caldas	17877 - Viterbo	3			2	1	
<b>17 - Caldas</b>	<b>Total 17 - Caldas</b>	<b>346</b>	<b>89</b>	<b>60</b>	<b>71</b>	<b>65</b>	<b>61</b>

<b>Municipalities</b>	<b>Morbidity rates (cases/100,000pop)</b>					
	<b>2007-2011</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
17001 - Manizales	12,67	4,43	1,82	2,07	3,09	1,28
17013 - Aguadas	38,48	25,17	8,47	4,28	0,00	0,00
17042 - Anserma	8,68	2,87	0,00	2,89	0,00	2,91
17050 - Aranzazu	32,64	7,97	8,07	0,00	0,00	16,71
17088 - Belalcázar	52,31	17,13	0,00	17,43	0,00	17,76
17174 - Chinchiná	15,19	0,00	0,00	5,69	7,62	1,91
17272 - Filadelfia	0,00	0,00	0,00	0,00	0,00	0,00
17380 - La Dorada	65,67	16,26	8,08	13,40	17,33	10,61
17388 - La Merced	64,19	0,00	31,48	0,00	32,75	0,00
17433 - Manzanares	53,38	36,40	4,08	0,00	8,28	4,17
17442 - Marmato	11,46	11,63	0,00	0,00	0,00	0,00
17444 - Marquetalia	60,41	6,73	20,16	6,71	13,40	13,39
17446 - Marulanda	144,66	28,76	86,41	28,98	0,00	0,00
17486 - Neira	41,20	6,98	3,46	17,16	3,41	10,14
17495 - Norcasia	507,80	117,65	148,15	104,49	105,42	30,35
17513 - Pácora	130,36	27,61	35,38	36,25	14,85	15,20
17524 - Palestina	11,14	11,11	0,00	0,00	0,00	0,00
17541 - Pensilvania	53,03	18,93	7,57	15,15	0,00	11,37
17614 - Riosucio	27,96	5,37	3,54	8,74	3,45	6,82
17616 - Risaralda	39,07	9,56	0,00	19,54	9,87	0,00
17653 - Salamina	53,44	15,42	5,24	10,69	16,35	5,56
17662 - Samaná	202,24	19,47	42,80	19,45	42,76	77,70

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coodesuris

**Introduction:**

Snakebites still continues to be a significant cause of morbidity in many developing countries in Africa, Asia and Latin America. In this region, excepting Brazil, few countries are undertaking surveillance studies to assess the trends in the occurrence of snakebites and its burden in the population.

**Objectives:**

To assess the number and rates of incidence of snakebite in an ecoregion of Colombia (Risaralda department) where no previous studies on this have been made. In this study we evaluate trends in morbidity between 2007 and 2009. Incidence rates were calculated based on official population estimates for each municipality of the department. Risaralda has 14 municipalities totaling a population of 919,656 people for 2009 (ranging from 6,344 in Balboa municipality up to 454,495 in Pereira, the capital municipality).

**Methods:**

Epidemiological data for this study were retrieved from the records of the Secretary of Health of Risaralda after the collection from each of the municipalities through the epidemiological surveillance system (SIVIGILA). Using these data, we analyzed the epidemiological impact of snakebites in each municipality during the study period.

**Table 1.**

Snakebites morbidity and mortality, Risaralda, Colombia, 2010.



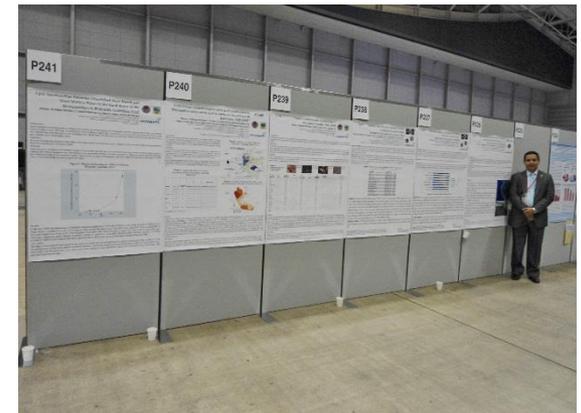
Snakebites Municipality	2007		2008		2009		2007-2009			2007-2009 Cumulated rate (/100,000pop)	
	Cases	Incidence rate (/100,000pop)	Cases	Incidence rate (/100,000pop)	Cases	Incidence rate (/100,000pop)	Cumulated Cases	Median	Min		Max
Agua	4	23.70	3	16.70	5	27.60	12	4	3	5	66.94
Balboa	0	0.00	1	15.80	0	0.00	1	0	0	1	15.76
Bejen	5	18.80	1	3.50	2	7.20	8	2	1	5	28.86
Dosquebradas	0	0.00	3	1.50	2	1.10	5	2	0	3	2.70
Guatoca	0	0.00	0	0.00	1	6.40	1	0	0	1	6.40
La Celia	1	12.00	0	0.00	1	11.50	2	1	0	1	22.96
La Virginia	0	0.00	1	3.20	0	0.00	1	0	0	1	3.17
Manizales	0	0.00	2	9.10	0	0.00	2	0	0	2	9.10
Mistrato	3	24.10	5	32.30	5	32.10	13	5	3	5	84.37
Pereira	4	0.90	12	2.70	10	2.20	26	10	4	12	5.75
Pueblo Rico	3	26.20	15	121.30	12	96.00	30	12	3	15	243.95
Suancha	2	6.30	4	12.00	1	3.00	7	2	1	4	20.94
Sib Riosa	2	3.00	1	1.40	1	1.40	4	1	1	2	5.66
Santuario	3	20.40	5	32.20	2	12.90	10	3	2	5	64.52
Other Code	2	-	1	-	1	-	4	1	1	2	-
Total	29	3.40	54	5.90	43	4.70	126	43	29	54	13.78
Deaths	0	0	0	0	1	1.087	1	0	0	1	-

**Results:**

During the study period, there were 126 reports of snakebites (median per year of 43, ranging from 29 to 54). Cumulated incidence rate of snakebites for the period was 13.78 cases/100,000pop; ranging from 2.7 to 243.95 cases/100,000pop. As expected the most rural and undeveloped municipality (Pueblo Rico) registered the high number of cases (30) and incidence rate (243.95/100,000pop). Pereira, the capital municipality, having the high proportion of urban population registered 26 cases for an incidence rate of 5.75 cases/100,000pop. During the study period only one death was registered (for a mortality rate of 1.09/1,000,000pop for the department). Snake species involved in Risaralda are: *Micrurus dumerilii*, *M. mipartitus*, *Bothrops asper*, and *Lachesis muta*.

**Discussion:**

Snake envenomations are an important cause of injury in endemic areas of Colombia as in many American countries. Surveillance of envenomations is essential for establishing guidelines, planning therapeutic supplies, and training medical staff on snakebite treatment, as well as assessing risk zones for travelers.





*Submitted, under consideration*

1 **Original Article**

2  
3 **Snakebites mapping in municipalities of the Coffee Triangle Region in Colombia**  
4 **using Geographic Information Systems (GIS)**

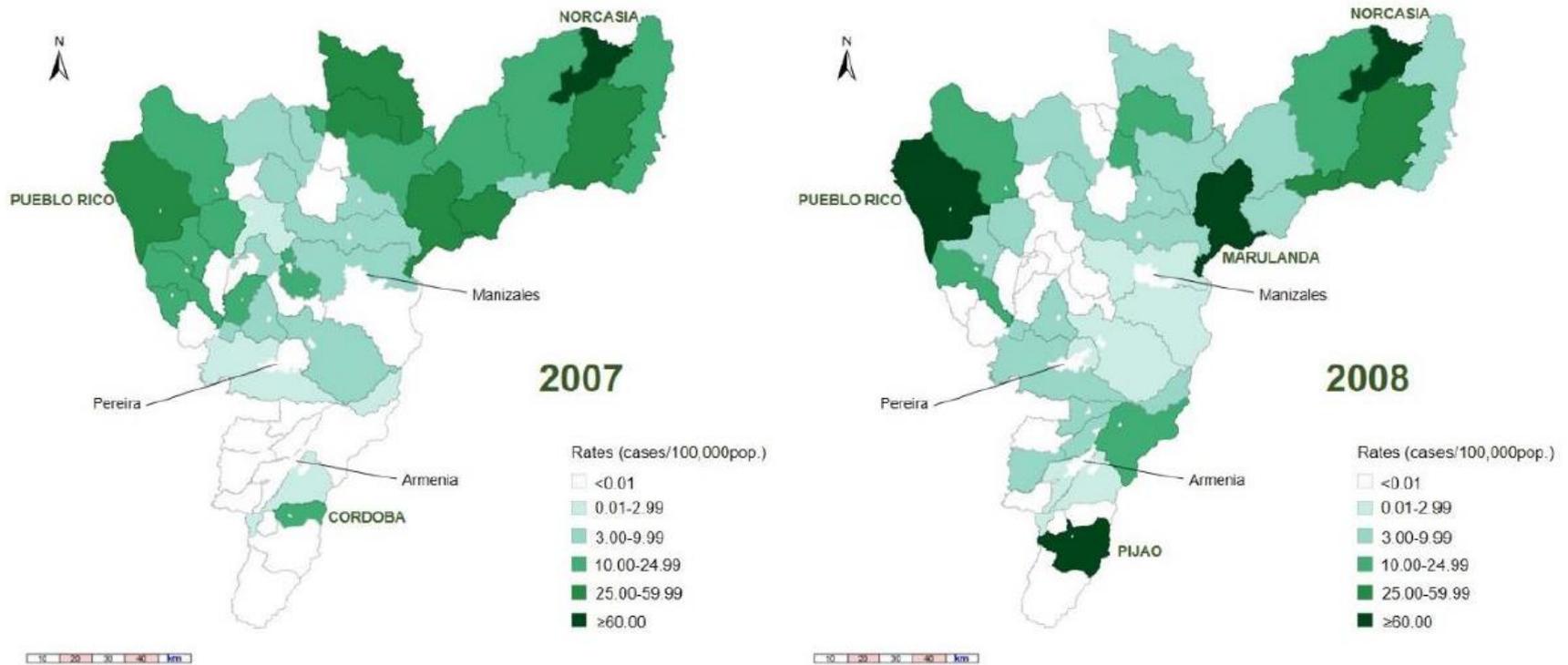
5  
6 Andrés M. Patiño-Barbosa, BSc; Albert Cristian Herrera-Giraldo, MD, MPH; Carlos O. Lozada-Riascos, MSc;  
7 Alfonso J. Rodríguez-Morales, MD, MSc, DTM&H, FFTM RCPS(Glasg).

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10 *(UTP), Pereira, Risaralda, Colombia (Mr Patiño-Barbosa and Dr Rodríguez-Morales); the Operative Direction of Public*  
11 *Health, Risaralda Department Secretary of Health, Pereira, Risaralda, Colombia (Dr Herrera-Giraldo), and the Regional*  
12 *Information System, Universidad Tecnológica de Pereira (UTP), Pereira, Risaralda, Colombia (Mr Lozada-Riascos).*

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**Figure 2.** Snakebites incidence rates, Coffee-Triangle Region, Colombia, 2007-2011.





*Micrurus dumerilii*



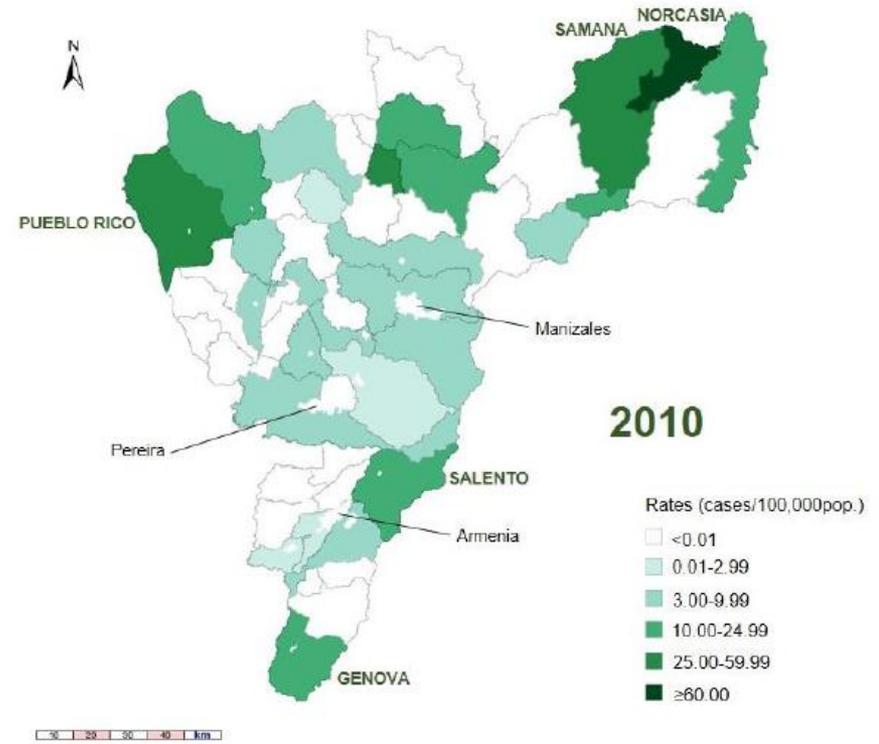
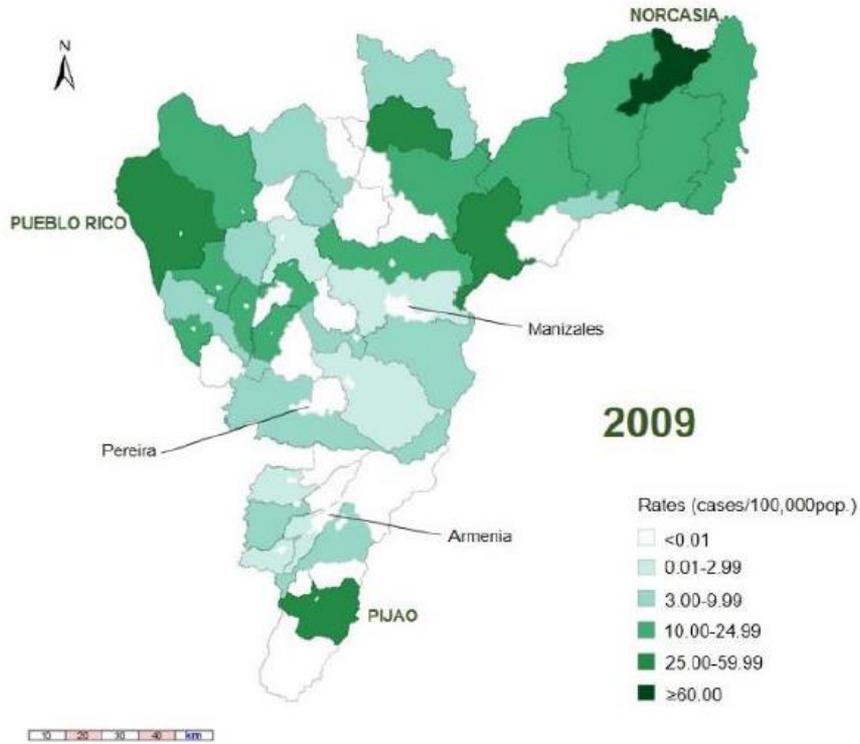
*Micrurus mipartitus*

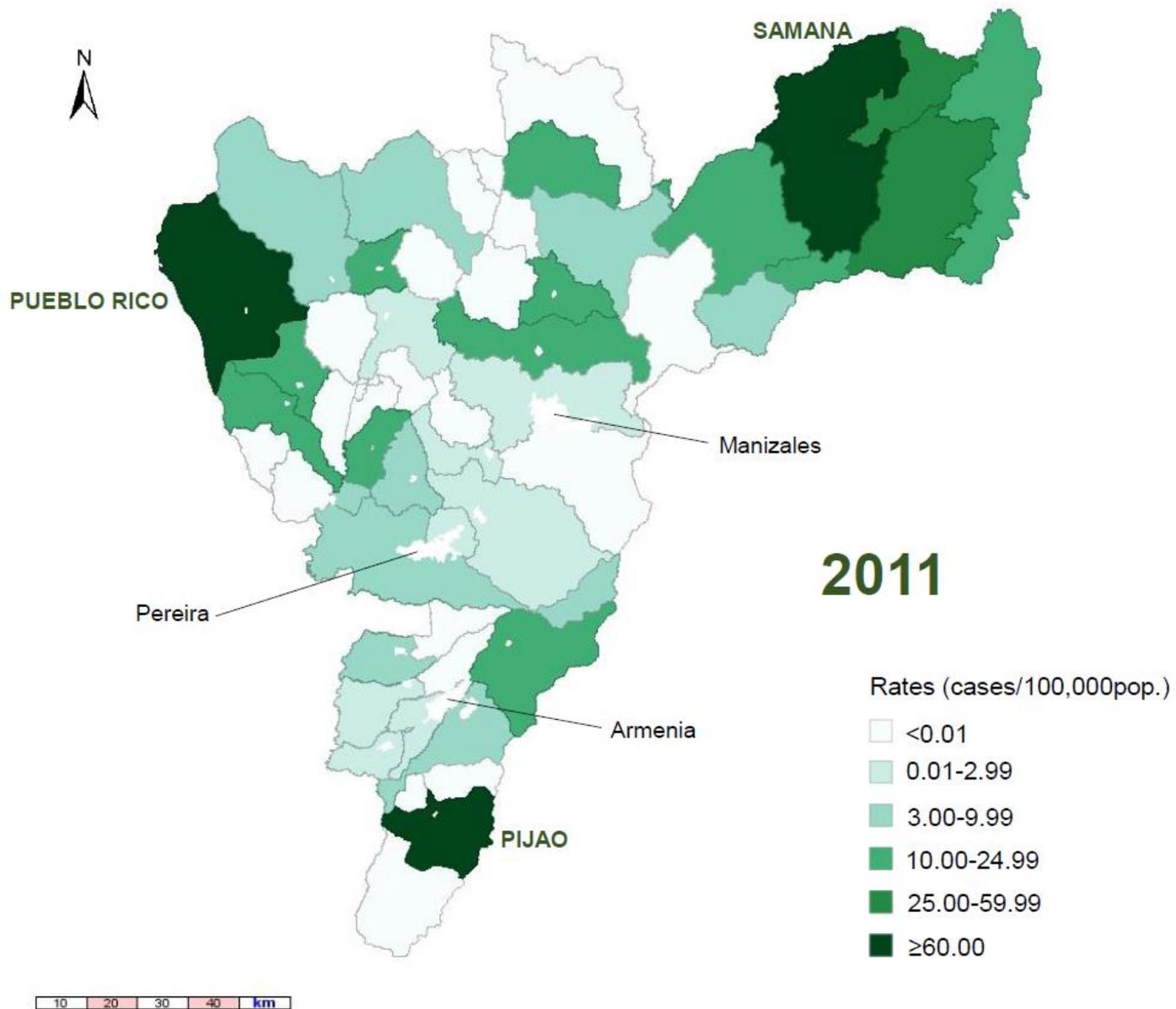


*Bothrops asper*



*Lachesis muta*





**TABLE  
75.2**

## **Determinants of Snakebite Incidence and Severity of Envenoming**

### **Incidence of Bites**

1. Frequency of contact between snakes and humans, depends on:
  - (a) Population densities
  - (b) Diurnal and seasonal variations in activity
  - (c) Types of behaviour (e.g. human agricultural activities)
2. Snakes' 'irritability' – readiness to strike when alarmed or provoked – varies with species

### **Severity of Envenoming**

1. Dose of venom injected – depends on mechanical efficiency of bite and species and size of snake
2. Composition and hence potency of venom – depends on species and, within a species, the geographical location, season and age of the snake
3. Health, age, size and (?) specific immunity of human victim
4. Nature and timings of first aid and medical treatment

**TABLE 2. GUIDELINES FOR ASSESSING THE SEVERITY OF NORTH AMERICAN PIT-VIPER ENVENOMATIONS.\***

TYPE OF SIGNS OR SYMPTOMS	SEVERITY OF ENVENOMATION		
	MINIMAL	MODERATE	SEVERE
Local	Swelling, erythema, or ecchymosis confined to the site of the bite	Progression of swelling, erythema, or ecchymosis beyond the site of the bite	Rapid swelling, erythema, or ecchymosis involving the entire body part
Systemic	No systemic signs or symptoms	Non-life-threatening signs and symptoms (nausea, vomiting, perioral paresthesias, myokymia, and mild hypotension)	Markedly severe signs and symptoms (hypotension [systolic blood pressure <80 mm Hg], altered sensorium, tachycardia, tachypnea, and respiratory distress)
Coagulation	No coagulation abnormalities or other important laboratory abnormalities	Mildly abnormal coagulation profile without clinically significant bleeding; mild abnormalities on other laboratory tests	Markedly abnormal coagulation profile with evidence of bleeding or threat of spontaneous hemorrhage (unmeasurable INR, APTT, and fibrinogen; severe thrombocytopenia with platelet count <20,000 per mm <sup>3</sup> ); results of other laboratory tests may be severely abnormal

\*The ultimate grade of severity of any envenomation is determined on the basis of the most severe sign, symptom, or laboratory abnormality (e.g., systolic blood pressure <70 mm Hg in the absence of local swelling should be graded as a severe envenomation). INR denotes international normalized ratio, and APTT activated partial-thromboplastin time.

## Emponzoñamiento bothrópico

El género *Bothrops* tiene más de 70 especies y causa el 90% de los emponzoñamientos ofídicos en Latinoamérica. Las dos especies más importantes en Colombia son: *Bothrops asper* (Mapaná, Talla equis) y *Bothrops atrox* (Mapaná, cuatronarices). Los principales efectos tóxicos son: anticoagulante, necrozante y vasculotóxico. Los síntomas principales son: hemorragia local y sistémica, adenopatías, anemia, en casos graves puede haber insuficiencia renal y choque cardiovascular. El tratamiento se basa en controlar la deshidratación y la anemia y en utilizar el antisuero poliespecífico. Está contraindicado usar torniquete, hacer cortes en la piel, succionar la ponzoña con la boca y usar sustancias caseiras en el sitio de la picadura.



AJRM



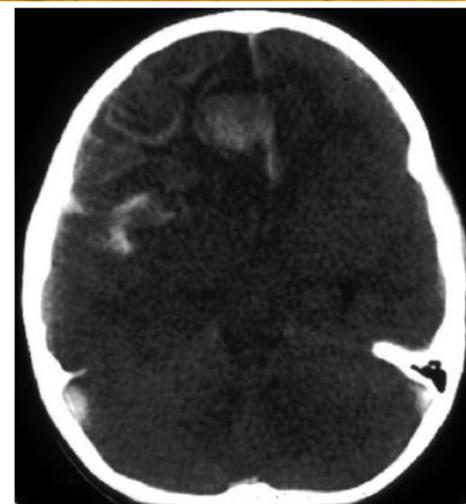
**Figure 75.18** Bleeding from gingival sulci in a patient bitten by a jararaca (*Bothrops jararaca*) in Brazil. (Copyright D. A. Warrell.)

## Emponzoñamiento bothrópico

El género *Bothrops* tiene más de 70 especies y causa el 90% de los emponzoñamientos ofídicos en Latinoamérica. Las dos especies más importantes en Colombia son: *Bothrops asper* (Mapaná, Talla equis) y *Bothrops atrox* (Mapaná, cuatronarices). Los principales efectos tóxicos son: anticoagulante, necrozante y vasculotóxico. Los síntomas principales son: hemorragia local y sistémica, adenopatías, anemia, en casos graves puede haber insuficiencia renal y choque cardiovascular. El tratamiento se basa en controlar la deshidratación y la anemia y en utilizar el antisuero poliespecífico. Está contraindicado usar torniquete, hacer cortes en la piel, succionar la ponzoña con la boca y usar sustancias caseiras en el sitio de la picadura.



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**Figure 75.20** Cerebral CT scan of a 7-year-old Ecuadorian girl who had developed sudden headache followed by loss of consciousness 25 hours after being bitten by a common lancehead (*Bothrops atrox*). (Copyright D. A. Warrell.)



**Figura 17-54. *Bothrops atrox*.** Llamada mapaná, jergón, cuatronarices. (Cortesía: Juan J Silva, Leticia, Amazonas, Colombia).



**Figura 17-55. *Bothrops brazili*.** (Cortesía: Juan J Silva, Leticia, Amazonas, Colombia).



**Figura 17-56. *Bothrops schlegelii*.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



**Figura 17-57. *Bothriopsis bilineatus*.** (Cortesía: Juan J Silva, Leticia, Amazonas, Colombia).



**Figure 75.23** Colombian lancehead pit-viper (*Bothrops colombiensis*). (Copyright D. A. Warrell.)



**Figura 17-59. *Bothrops atrox*.** Accidente por mordedura. (Cortesía: Juan J Silva, Leticia, Amazonas, Colombia).

Accidente  
botrópico



AJRM



AJRM



AJRM



Fig. 1. Variability of color pattern in *B. asper* specimens from the Departments of Antioquia and Chocó, Colombia. Photos: D. A. Warrell and R. Otero.

**Table 1**  
Clinical gradation of envenoming in *B. asper* bites.

Grade	Clinical local signs	Clinical systemic signs
Non-envenoming	Mild pain, negligible edema and hemorrhage	Normal vital signs and blood coagulation.
Mild envenoming	Swelling involving one or two segments of the bitten limb (e.g., foot and leg), circumference of extremity increased <4 cm, ecchymosis; scarce or no bleeding in the bite site, no necrosis	Incoagulable or normal blood, no systemic bleeding, no hemodynamic alterations
Moderate envenoming	Swelling involving two or three segments of the bitten limb (e.g., foot, leg, thigh), circumference of extremity increased >4 cm; local bleeding, no local necrosis, blisters in few cases	Incoagulable blood, systemic bleeding (gingival, hematuria, recent wounds, etc.), no hemodynamic alterations, no renal failure
Severe envenoming	Swelling extending beyond the bitten limb (to trunk); blisters; local bleeding; necrosis or compartmental syndrome. See text for cases of bites by specimens >1 m body length	Incoagulable blood, multiple systemic bleeding, hypotension or shock, disseminated intravascular coagulation or renal failure, cerebral hemorrhage or multi-systemic failure

Adapted from Silva-Haad (1989); Bolaños (1984); Wingert and Wainschel (1975); Reid et al. (1963a,b); and as recommended by Otero (1994, 2007); Otero and Mesa (2001, 2005); Otero et al. (1992a, 1996, 1999, 2002a, 2006); Otero-Patiño et al. (1998, 2007).



**Fig. 2.** Twelve-year-old patient with swelling involving foot and leg (mild local envenoming), 12 h after *B. asper* bite, without systemic envenoming.



**Fig. 4.** Thirty-year-old patient with swelling extending beyond the affected limb (to trunk), many hemorrhagic blisters, necrosis, coagulopathy and gingival bleeding 24 h after *B. asper* bite. She had acute renal failure and necrotizing fasciitis as complications (severe local and systemic envenoming).



**Fig. 3.** Five-year-old patient, with swelling involving foot, leg and thigh, 8 h after *B. asper* bite. In addition, this patient presented coagulopathy and hematuria (moderate local and systemic envenoming).



**Fig. 5.** Two-year-old patient bitten three times at the leg 12 h before by *B. asper*. She presented swelling involving three segments of the lower extremity, blisters, extense ecchymosis, necrosis, cyanosis and lack of voluntary movement of toes (suggesting compartmental syndrome), hematuria and coagulopathy, without shock and acute renal failure (severe local and moderate systemic envenoming). The limb was amputated.



**Fig. 6.** Cellulitis and abscess by *M. morgani*, complicating moderate local envenoming by *B. asper*.



**Fig. 7.** Baby fifteen months of age, with necrotizing fasciitis and sepsis (bacteremia, pneumonia) by *S. aureus* 48 hr after severe local envenoming by *B. asper*.



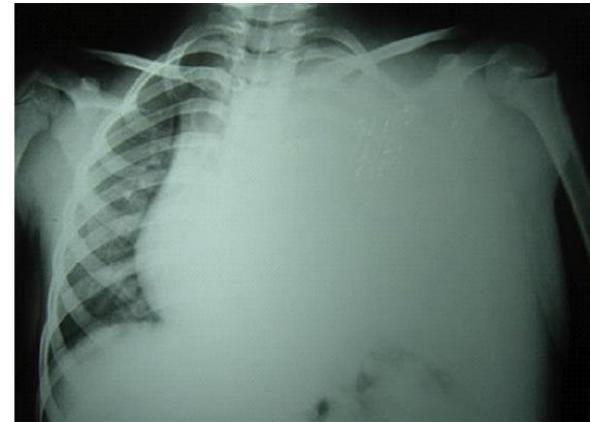
**Fig. 8.** Radiograph of the left hand of a young man taken 14 days after *B. asper* bite on the proximal phalanx of the first finger. The patient received polyvalent antivenom within the first hr of the bite. He presented septic arthritis treated with broad spectrum antibiotics since the third day. Arthritis was then drained surgically (purulent liquid, no bacteria) at the sixth day. Observe the conspicuous narrowing of the first metacarpophalangeal articular space and subluxation of the first phalanx, as sequelae.



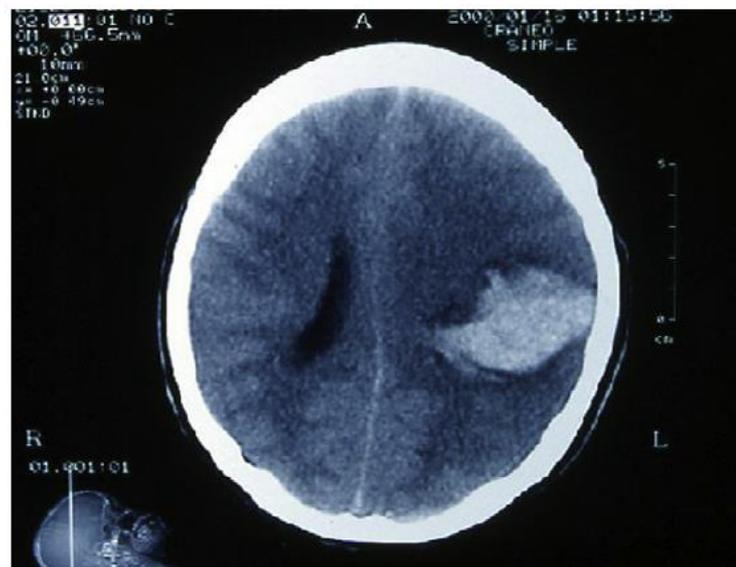
**Fig. 9.** Radiograph of the left leg of a 12-year-old boy taken 28 days after a *B. asper* bite. The patient, presenting moderate envenoming on admission, was treated with polyvalent antivenom and G crystalline penicillin per i.v. route in the local hospital, during three days. Notice the large periosteal reaction, several sequestrations into the cortex of fibula and pathologic fractures, corresponding to chronic osteomyelitis. Finally, he was treated with surgery (sequestrectomy), immobilization and oxacillin during six months, with recovery.



**Fig. 10.** Patient 12-year-old who sought medical attention 36 h after severe *B. asper* bite on a hand, and treated initially by traditional healers. He developed a compartmental syndrome with lack of all voluntary movements of the hand, fingers and of sensitivity in the palmar region, with blisters and skin necrosis of dorsum of the hand and forearm. Local swelling affected three segments of the limb and trunk. The IP into forearm was 73 mm Hg. Additionally, the patient presented anuria (acute renal failure secondary to acute tubular necrosis, requiring hemodialysis), coagulopathy, pleural effusion and pneumonia. Finally, the extremity was amputated when the clinical condition improved.



**Fig. 12.** Radiograph of the chest of a seven-year-old patient, taken 12 h after a bite inflicted on precordial area by an adult specimen of *B. asper*. 2 h after the bite, 15 vials of a polyvalent antivenom were administered. Observe the severe left pleural effusion with mediastinum deviation. Adequate drainage by a thoracic cannula was started (hematic liquid). Photo courtesy of Dr. Carlos Paredes (Colombia).



**Fig. 11.** Cerebral hemorrhage affecting left parietal lobe and ventricle (fluid level), with midline deviation and coagulopathy, 48 h after *B. asper* bite. The patient (18-year old), who was treated initially (30 h) by traditional healers, died. Reproduced with permission from Elsevier.

Table 1  
Clinical and epidemiological features in 39 patients with *Bothrops*, *Porthidium*, and *Bothriechis* snakebites

	<i>B. asper</i> <i>n</i> = 29	<i>B. punctatus</i> <i>n</i> = 2	<i>P. nasutum</i> <i>n</i> = 2	<i>B. schlegelii</i> <i>n</i> = 1	Bothropic syndrome <i>n</i> = 5	Total <i>n</i> = 39
Traditional therapy	18(62.1%)	2	0	0	1	21(53.8%)
Time from bite to antivenom therapy (h)						
0–2	4(13.8%)	1	0	0	0	5(12.8%)
3–5	5(17.2%)	0	0	1	0	6(15.4%)
≥ 6	20(69.0%)	1	2	0	5	28(71.8%)
Envenomation grade						
Mild	0	1	0	1	0	2(5.1%)
Moderate	5(17.2%)	0	1	0	2	8(20.5%)
Severe	24(82.8%)	1	1	0	3	29(74.4%)
Complications <sup>a</sup>						
Acute renal failure	11(37.9%)	1	0	0	3	15(38.5%)
Cellulitis/abscess/fasciitis	11(37.9%)	0	0	0	1	12(30.8%)
Cerebral hemorrhage	3(10.3%)	0	0	0	2	5(12.8%)
Compartmental syndrome	3(10.3%)	0	0	0	0	3(7.7%)
Soft-tissue hematoma	6(20.7%)	0	0	0	0	6(15.4%)
<i>Abruptio placentae</i>	1(3.4%)	0	0	0	0	1(2.6%)
None	3(10.3)	1	2	1	2	9(23.1%)

<sup>a</sup> Some patients had more than one complication.

Table 3  
Renal and neurological aspects in 39 patients with *Bothrops*, *Porthidium*, and *Bothriechis* snakebites

	<i>B. asper</i> <i>n</i> = 29	<i>B. punctatus</i> <i>n</i> = 2	<i>P. nasutum</i> <i>n</i> = 2	<i>B. schlegelii</i> <i>n</i> = 1	Bothropic syndrome <i>n</i> = 5	Total <i>n</i> = 39
Hematuria	22(75.9%)	1	2	0	4	29(74.4%)
Serum creatinine > 1.5 mg/dl	11(37.9%)	1	0	0	3	15(38.5%)
Proteinuria	9(31.0%)	0	1	0	1	11(28.2%)
Oliguria	6(20.7%)	0	0	0	3	9(23.1%)
Metabolic acidosis	6(20.7%)	0	0	0	1	7(17.9%)
Arterial hypertension	3(10.3%)	1	0	0	2	6(15.4%)
Hyperkalemia	3(10.3%)	0	0	0	1	4(10.3%)
Urine erythrocyte casts	3(10.3%)	0	0	0	0	3(7.7%)
Hemodialysis	3(10.3%)	0	0	0	1 <sup>a</sup>	4(10.3%)
Peritoneal dialysis	1(3.4%)	0	0	0	1 <sup>a</sup>	2(5.1%)
Unconsciousness	3(10.3%)	0	0	0	2	5(12.8%)
Motor deficit	3(10.3%)	0	0	0	2	5(12.8%)
Meningeal irritation signs	3(10.3%)	0	0	0	0	3(7.7%)
Seizures	1(3.4%)	0	0	0	0	1(2.6%)

<sup>a</sup> One patient 4 years old received initially peritoneal dialysis and then hemodialysis.

Table 4

Isolated bacteria and antimicrobial sensitivity in 10 of 12 patients with soft-tissue infection (CFZ: ceftazidime; AMK: amikacin; CFX: cefotaxime; NFX: norfloxacin; TMP–SMZ: trimethoprim–sulfamethoxazole; CFM: cefuroxime; CPF: ciprofloxacin; SAM: sulbactam–ampicillin; GTM: gentamicin; CDM: clindamycin; VNM: vancomycin; SPZ: sulperazone; MPM: meropenem; TVF: trovafloxacin)

Bacteria	No. of isolations	Site	Antimicrobial sensitivity
<i>Morganella morganii</i>	2	Abscess, fasciitis	CFZ, AMK, CFX, NFX, TMP–SMZ, SAM <sup>a</sup>
<i>Proteus rettgeri</i>	1	Blisters	CFZ, AMK, CFM, TMP–SMZ
<i>Aeromonas hydrophila</i>	2	Abscess	CPF, SAM <sup>a</sup>
<i>Staphylococcus aureus</i>	2	Abscess, blisters	SAM, CPF, GTM, CDM, TMP–SMZ, VNM
<i>Klebsiella</i> sp.	1	Blisters	SPZ, MPM, TVF
<i>Enterobacter cloacae</i>	2	Abscess, fasciitis	VNM, TMP–SMZ, CFP

<sup>a</sup> Only one strain was sensitive.

## Emponzoñamiento lachésico

La principal especie es *Lachesis muta* (verrugoso), con varias subespecies. Produce efectos hemorrágicos, necrosis local y síntomas neurológicos. Estos últimos lo diferencia del accidente bothrópico. El tratamiento se hace con medidas generales y anti-suero poliespecífico.



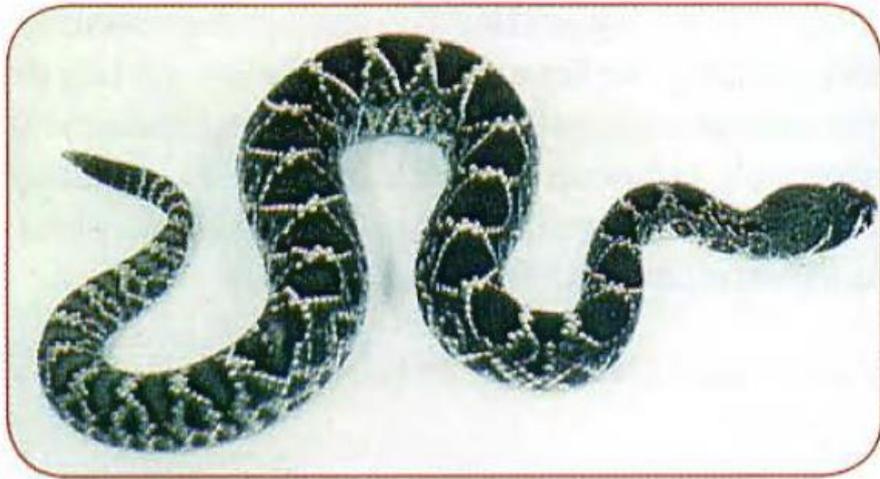
**Figura 17-60. *Lachesis muta*.** Verrugosa. (Cortesía: Juan J Silva, Leticia, Amazonas, Colombia).

## Emponzoñamiento crotálico

El género *Crotalus* (cascabel) tiene muchas especies y subespecies. Posee ponzoña que afecta la coagulación, y los músculos, además efectos neurológicos. En el punto de la picadura hay edema discreto y poco dolor. Los síntomas generales afectan la visión, producen flaccidez de la musculatura facial, mialgias, mioglobinuria y en casos graves, insuficiencia renal. Puede también producir necrosis hepática que puede ser fatal. El tratamiento se hace con aplicación precoz de antisuero específico y manejo de la insuficiencia renal.



**Figura 17-61. *Crotalus durissus cumanensis*.**  
Serpiente cascabel. (Cortesía: Juan J Silva, Leti-  
cia, Amazonas, Colombia).



**Figura 17-62. *Crotalus sp.*** Víbora cascabel. (Cortesía: Atlas de Dermatosis Tropicales, No. 2: Infecciones parasíticas. Schering Corporation, USA).



**Figura 17-63. Víbora cascabel.** Etapa precoz de la mordedura en un niño, muestra edema pronunciado de la mano, muñeca y antebrazo. (Cortesía: Atlas de Dermatosis Tropicales, No. 2: Infecciones parasíticas. Schering Corporation, USA).

## Emponzoñamiento micrúrico

El género *Micrurus* (corales) tiene varias especies y está distribuido en toda América. Se distingue por sus anillos de colores a lo largo del cuerpo. Son poco agresivas pero cuando muerden inoculan neurotoxinas, que aunque no producen síntomas locales, causan mareo, parestesias, sialorrea y compromiso motor de los músculos del cuerpo incluyendo los oculares. Después de veinticuatro horas se pueden presentar síntomas graves como cuadriplejía, insuficiencia respiratoria y en algunos casos la muerte. Existe un antisuero específico anticoral pero es de difícil obtención. Es indispensable tener los cuidados hospitalarios para controlar la insuficiencia respiratoria.



**Figura 17-65. *Micrurus lemniscatus*.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



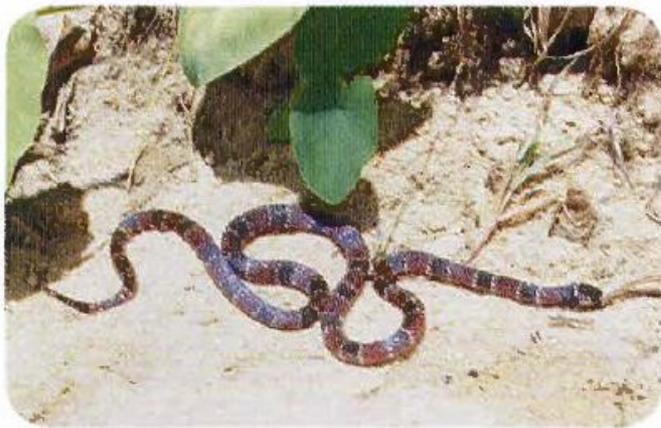
**Figura 17-66. *Micrurus spixi obscurus*.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



**Figura 17-64. *Micrurus mipartitus*.** Serpiente rabo de ají. (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



**Figura 17-67. *Micrurus surinamensis*.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



**Figura 17-68. *Micrurus ornatissimus*.** (Cortesía: Juan J Silva, Leticia, Amazonas, Colombia).



**Figura 17-71. *Micrurus lemniscatus*.** Accidente por picadura, obsérvese la facies neurotóxica. (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



**Figura 17-69. *Micrurus dissoleucus*.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).



**Figura 17-70. *Micrurus ancoralis*.** (Cortesía: Rodrigo Ángel, Instituto Colombiano de Medicina Tropical, Medellín, Colombia).

TABLE  
75.3

Guide to Initial Dosage of Some Important Antivenoms

Species		Antivenom	
Latin Name	English Name	Manufacturer, Antivenom (Abbreviations Explained at Foot of Table)	Approximate Initial Dose
<i>Acanthophis</i> spp.	Death adders	CSL, death adder or polyvalent	6000–18 000 units (1–3 vials)
<i>Bitis arietans</i>	African puff adders	SAVP, polyvalent Sanofi-Pasteur ('Fav Afrique' and 'FaviRept'), polyvalent	80 mL 80 mL
<i>Bothrops asper</i>	Terciopelo	ICP polyvalent	5–20 vials
<i>Bothrops atrox</i>	Common lancehead	LBS Antivipmyn Trivalent Brazilian manufacturers, <i>Bothrops</i> polyvalent	2–12 vials
<i>Bothrops bilineatus</i>	Papagaio	Butantan polyvalent	2–4 vials
<i>Bothrops jararaca</i>	Jararaca	Brazilian manufacturers, <i>Bothrops</i> polyvalent	2–12 vials
<i>Bungarus caeruleus</i>	Common krait	Indian manufacturers, polyvalent	100 mL
<i>Bungarus candidus</i>	Malayan krait	TRC Malayan krait antivenin monovalent or 'neuro-polyvalent'	50 mL
<i>Bungarus fasciatus</i>	Banded krait	TRC Banded krait antivenin or 'neuro-polyvalent'	50 mL
<i>Calloselasma (Agkistrodon) rhodostoma</i>	Malayan pit viper	TRC monovalent or 'haemato-polyvalent'	100 mL
<i>Cerastes</i> species	Desert (horned) vipers	NAVPC polyvalent Vacsera AntiViper or polyvalent	30–50 mL 30–50 mL
<i>Crotalus adamanteus</i>	Eastern diamondback rattlesnakes	Protherics ('CroFab')	7–15 vials
<i>Crotalus atrox</i>	Western diamondback rattlesnakes		
<i>Crotalus viridis</i> , <i>C. oreganus</i> , <i>C. helleri</i>	Western rattlesnakes		
<i>Crotalus durissus</i>	Tropical (South American) rattlesnakes	Brazilian manufacturers <i>Crotalus</i> or <i>Bothrops-Crotalus</i>	5–20 vials
<i>Crotalus simus</i>	Central American rattlesnakes	ICP polyvalent LBS polyvalent	5–15 vials 5–15 vials

TABLE  
75.3

## Guide to Initial Dosage of Some Important Antivenoms

Species		Antivenom	
Latin Name	English Name	Manufacturer, Antivenom (Abbreviations Explained at Foot of Table)	Approximate Initial Dose
<i>Cryptelytrops (Trimeresurus) albolabris</i> and <i>C. macrops</i>	White-lipped green pit viper and dark green pit viper	TRC Green pit viper antivenin or 'haemato-polyvalent'	50–100 mL
<i>Daboia (Vipera) palaestinae</i>	Palestine viper	Rogoff Medical Research Institute, Tel Aviv, Palestine viper monovalent	50–80 mL
<i>Daboia (Vipera) russelii</i>	Western Russell's viper	Indian manufacturers, polyspecific	100 mL
<i>Daboia (Vipera) siamensis</i>	Eastern Russell's viper (Thailand)	TRC Russell's viper antivenin 'haemato-polyvalent'	50 mL
<i>Daboia (Vipera) siamensis</i>	Eastern Russell's viper (Burma)	Myanmar Pharmaceutical Factory monovalent	80 mL
<i>Dendroaspis</i> species	Mambas	SAVP Dendroaspis or polyvalent	50–100 mL
<i>Dispholidus typus</i>	Boomslang	SAVP boomslang monovalent	1–2 vials
<i>Echis carinatus</i> Asia	Asian saw-scaled viper	Indian manufacturers polyvalent	50 mL
<i>Echis</i> species Africa	African saw-scaled or carpet vipers	MicroPharm EchiTAB-G	10 mL
		ICP EchiTAB-Plus	30 mL
		SAVP Echis monospecific	20 mL
<i>Echis</i> species Middle East	Middle Eastern saw-scaled vipers	Sanofi-Pasteur ('Fav Afrique')	100 mL
		NAVPC polyvalent	50 mL
		Vacsera polyvalent or antiViper	50 mL
Hydrophiinae	Sea snakes	CSL, sea snake	1000 units
<i>Lachesis</i> species	Bushmasters	ICP polyvalent	10–20 vials
		FED Bothrops Lachesis	10–20 vials
		Butantan polyvalent	10–20 vials
<i>Micrurus</i> species Central America	Central American coral snakes	ICP coral snake antivenom	1–5 vials
<i>Micrurus</i> species South America	South American coral snakes	Butantan anti Elapid antivenom	1–5 vials
<i>Naja kaouthia</i> and <i>N. siamensis</i> etc.	Monocellate Thai cobra and SE Asian spitting cobras	TRC cobra antivenin or 'neuro-polyvalent'	100 mL
<i>Naja haje</i> , <i>N. nigricollis</i> and other African cobras	Egyptian cobra, black-necked spitting cobra, Cape cobra etc.	SAVP polyvalent	100 mL
<i>Naja arabica</i> and <i>N. haje</i> (Egypt and Middle East)	Arabian and Egyptian cobras	Sanofi-Pasteur FaviRept and Fav Afrique	100 mL
		Vacsera polyvalent	100 mL
		NAVPC bivalent Naja/Walterinnesia or polyvalent	100 mL
<i>Naja naja</i> , <i>N. oxiana</i>	Indian cobras	Indian manufacturers, polyspecific	100 mL
<i>Notechis scutatus</i>	Tiger snake	CSL tiger snake or polyvalent	3000–6000 units
			1–2 vials
<i>Oxyuranus scutellatus</i>	Taipan	CSL taipan or polyvalent	12 000 units
<i>Pseudechis</i> species	Australian black snakes and king brown snake	CSL black snake antivenom or polyvalent	18 000–54 000 units
			1–3 vials

**TABLE 4. COMPARISON OF ANTIVENIN (CROTALIDAE) POLYVALENT AND CROTALIDAE POLYVALENT IMMUNE Fab (OVINE).\***

VARIABLE	ANTIVENIN (CROTALIDAE) POLYVALENT	CROTALIDAE POLYVALENT IMMUNE Fab (OVINE)
Animal source	Horse	Sheep
Venoms used to immunize animal	<i>Crotalus adamanteus</i> (eastern diamondback), <i>C. atrox</i> (western diamondback), <i>C. durissus terrificus</i> (tropical rattlesnake), <i>Bothrops atrox</i> (fer-de-lance)	<i>C. adamanteus</i> (eastern diamondback), <i>C. atrox</i> (western diamondback), <i>C. scutulatus</i> (Mojave rattlesnake), <i>Agkistrodon piscivorus</i> (cottonmouth)
Immunoglobulin	IgG (150 kD)	Fab fragment (50 kD)
Purification method	Ammonium sulfate precipitation	Sodium sulfate precipitation and affinity purification
Constituents		
Total protein	2.1 g/vial	<1.5 g/vial
Albumin	120 mg/vial (6% w/w)	<0.5% w/w
Total antibody	IgG (18.9% w/w)	Fab fragment (>85% w/w) Fc (<3% w/w)
Color	Yellow	White

\*The abbreviation w/w denotes weight per weight.

Table 2  
Early adverse reactions (EAR<sub>S</sub>) to the initial antivenom dose

EAR	Probiol <i>n</i> = 9/17 (52.9%)	INS <i>n</i> = 1/5 (20%)	Bioclón <i>n</i> = 4/17 (23.5%)	Total <i>n</i> = 14/39 <sup>a</sup> (35.9%)
Fever	8	1	0	9(23.1%)
Chills	8	1	0	9(23.1%)
Urticaria	3	0	1	4(10.3%)
Facial flushing	3	0	1	4(10.3%)
Generalized rash	0	0	1	1(2.6%)
Severe hypotension (shock)	1	0	1	2(5.1%)
Moderate hypotension	0	1	0	1(2.6%)

<sup>a</sup> *n* represents the ratio of the number of patients developing an EAR to the total number of patients in each group. Some patients presented more than one sign of an EAR.

## ACTUAÇÃO PRÉ-HOSPITALAR

1. Resgate da vítima da área de perigo
2. Imobilização do membro em posição gravitacional neutra (ao nível do coração)
3. Limpeza da ferida e aplicação de penso (evitar soluções alcoólicas ou corantes)
4. Identificação do ofídio sem manipulação directa
5. Transporte rápido ao hospital mais próximo, em posição de imobilização completa e com monitorização de sinais locais e sistémicos.

## CONTRA-INDICADOS

- Crioterapia
- Incisão com sucção mecânica
- Torniquetes ou outras aplicações compressivas com vista a atrasar o envenenamento sistémico

## ACTUAÇÃO HOSPITALAR

### ABORDAGEM INICIAL

- Estabilização das funções vitais (ABC)
- Canalização de duas veias periféricas e avaliação analítica
- Exame físico detalhado (sinais locais e possíveis complicações sistémicas)
- Marcação dos limites dos sinais inflamatórios locais e a reavaliação seriada (15 - 30 min)
- História clínica breve (incluindo local, hora da mordedura e tipo de ofídio)
- Articulação com centro terciário

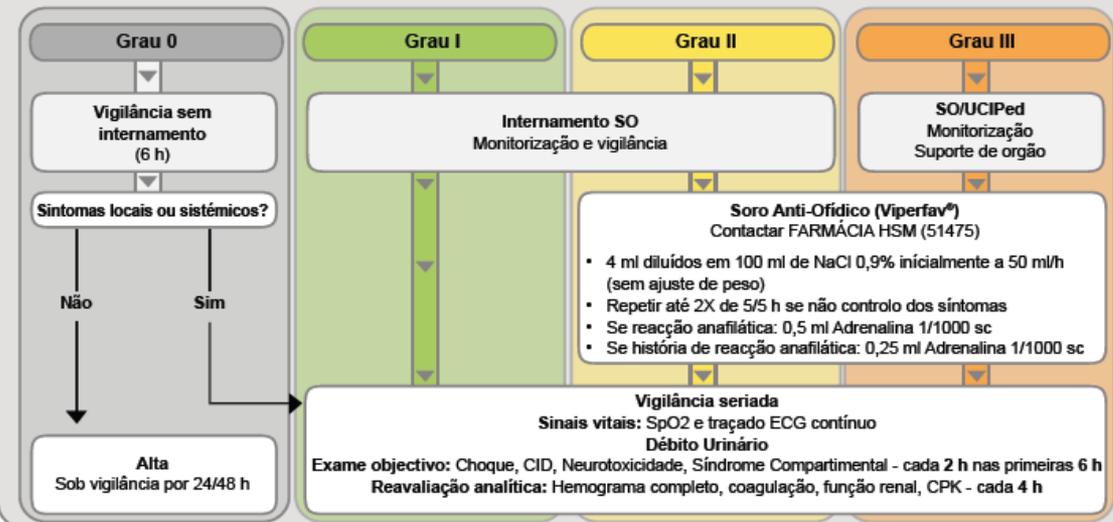
### Exames complementares de diagnóstico

Essencial	Se possível
Hemograma completo	AST/ALT, CPK
INR, APTT, TP Fibrinogénio	Gasometria
D-dímero e PDFs	Tipagem
Ionograma	Urina tipo II
Creatinina, Ureia	Pesquisa mioglobinaúria
Electrocardiograma	

### ESTRATIFICAÇÃO DE GRAVIDADE

Classificação	Gravidade	Manifestações locais	Manifestações locais
Grau 0	"Mordedura branca"	Ausentes (apresenta marca de mordedura)	Ausentes
Grau I	Ligeira	Dor, edema eritema e/ou equimose localizados e não progressivos	Ausentes
Grau II	Moderada	Dor, edema eritema e/ou equimose com progressão regional para os membros superiores/inferiores	Náuseas, vómitos, hipotensão, parestesias periorais, dor abdominal
Grau III	Grave	Dor, edema eritema e/ou equimose rapidamente progressivos com envolvimento do tronco	Choque, falência de órgão, anafilaxia, alterações do estado de consciência, taquicardia, dispneia, coagulopatia grave

### ABORDAGEM SUBSEQUENTE



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Jan-Feb;27(1):141-145

Figura 1 – Mordedura de ofídio – Protocolo de atuação em urgência pediátrica

Quito, Ecuador, Mayo 2015

