

Pakistan:

Cat 1:	<u>Elapidae:</u> <i>Bungarus caeruleus</i> , <i>Bungarus sindanus</i> ; <i>Naja naja</i> , <i>Naja oxiana</i> ; <u>Viperidae:</u> <i>Daboia russelii</i> ¹ ; <i>Echis carinatus</i>
Cat 2:	<u>Viperidae:</u> <i>Eristicophis macmahonii</i> (west); <i>Gloydius himalayanus</i> (north); <i>Macrovipera lebetina</i> (west)

Sri Lanka:

Cat 1:	<u>Elapidae:</u> <i>Bungarus caeruleus</i> ; <i>Naja naja</i> ; <u>Viperidae:</u> <i>Daboia russelii</i> ¹ ; <i>Hypnale hypnale</i>
Cat 2:	<u>Elapidae:</u> <i>Bungarus ceylonicus</i> ; <u>Viperidae:</u> <i>Echis carinatus</i> ; <i>Hypnale nepa</i> , <i>Trimeresurus trigonocephalus</i>

South-east Asia

Brunei Darussalam:

Cat 1:	<u>Elapidae:</u> <i>Naja sumatrana</i>
Cat 2:	<u>Elapidae:</u> <i>Bungarus fasciatus</i> , <i>Bungarus flaviceps</i> ; <i>Calliophis bivirgatus</i> , <i>Calliophis intestinalis</i> ; <i>Ophiophagus hannah</i> ; <u>Viperidae:</u> <i>Parias sumatranus</i> ¹ ; <i>Tropidolaemus subannulatus</i>

Cambodia:

Cat 1:	<u>Elapidae:</u> <i>Bungarus candidus</i> ; <i>Naja kaouthia</i> , <i>Naja siamensis</i> ; <u>Viperidae:</u> <i>Calloselasma rhodostoma</i> ; <i>Cryptelytrops albolabris</i> ¹ ; <i>Daboia siamensis</i> ¹
Cat 2:	<u>Elapidae:</u> <i>Bungarus fasciatus</i> , <i>Bungarus flaviceps</i> ; <i>Ophiophagus hannah</i> ; <u>Viperidae:</u> <i>Cryptelytrops macrops</i> ¹

Indonesia (Sumatra, Java, Borneo, Sulawesi & Lesser Sunda Islands):

Cat 1:	<u>Elapidae:</u> <i>Bungarus candidus</i> (Sumatra & Java); <i>Naja sputatrix</i> (Java & Lesser Sunda Islands); <i>Naja sumatrana</i> (Sumatra & Borneo); <u>Viperidae:</u> <i>Calloselasma rhodostoma</i> (Java); <i>Cryptelytrops albolabris</i> ¹ ; <i>Daboia siamensis</i> ¹
Cat 2:	<u>Elapidae:</u> <i>Bungarus fasciatus</i> , <i>Bungarus flaviceps</i> (Sumatra & Borneo); <i>Calliophis bivirgatus</i> , <i>Calliophis intestinalis</i> ; <i>Ophiophagus hannah</i> (Sumatra, Borneo & Java); <u>Viperidae:</u> <i>Cryptelytrops insularis</i> ¹ , <i>Cryptelytrops purpureomaculatus</i> ¹ (Sumatra); <i>Parias sumatranus</i> ; <i>Tropidolaemus subannulatus</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

The Lao People's Democratic Republic:

Cat 1:	<u>Elapidae</u> : <i>Bungarus candidus</i> , <i>Bungarus multicinctus</i> ; <i>Naja atra</i> (north), <i>Naja siamensis</i> ¹ (south & east); <u>Viperidae</u> : <i>Calloselasma rhodostoma</i> ; <i>Cryptelytrops albolabris</i> ¹
Cat 2:	<u>Elapidae</u> : <i>Bungarus fasciatus</i> ; <i>Naja kaouthia</i> (south & east); <i>Ophiophagus hannah</i> ; <u>Viperidae</u> : <i>Cryptelytrops macrops</i> ; <i>Protobothrops jerdonii</i> ; <i>Protobothrops mucrosquamatus</i>

Malaysia:

Cat 1:	<u>Elapidae</u> : <i>Bungarus candidus</i> (Peninsular Malaysia); <i>Naja kaouthia</i> (northern Peninsular Malaysia), <i>Naja sumatrana</i> (Peninsular Malaysia, Sabah & Sarawak); <u>Viperidae</u> : <i>Calloselasma rhodostoma</i>
Cat 2:	<u>Elapidae</u> : <i>Bungarus fasciatus</i> , <i>Bungarus flaviceps</i> ; <i>Calliophis bivirgatus</i> ; <i>Calliophis intestinalis</i> ; <i>Ophiophagus hannah</i> ; <u>Viperidae</u> : <i>Cryptelytrops purpureomaculatus</i> ¹ ; <i>Parias sumatranus</i> ¹ ; <i>Tropidolaemus subannulatus</i>

Myanmar:

Cat 1:	<u>Elapidae</u> : <i>Bungarus magnimaculatus</i> , <i>Bungarus multicinctus</i> ; <i>Naja kaouthia</i> , <i>Naja mandalayensis</i> ; <u>Viperidae</u> : <i>Cryptelytrops albolabris</i> ¹ , <i>Cryptelytrops erythrurus</i> ¹ ; <i>Daboia siamensis</i> ¹
Cat 2:	<u>Elapidae</u> : <i>Bungarus bungaroides</i> (Kachin State), <i>Bungarus candidus</i> (Thaninthayi Div.); <i>Bungarus flaviceps</i> (east Shan State), <i>Bungarus niger</i> (Chin State and Rakhine State); <i>Naja siamensis</i> (adjacent Thailand border) <i>Ophiophagus hannah</i> ; <u>Viperidae</u> : <i>Calloselasma rhodostoma</i> (Thaninthayi Div.); <i>Cryptelytrops purpureomaculatus</i> ; <i>Protobothrops jerdonii</i> , <i>Protobothrops kaulbacki</i> , <i>Protobothrops mucrosquamatus</i> (Kachin)

The Philippines:

Cat 1:	<u>Elapidae</u> : <i>Naja philippinensis</i> (Luzon), <i>Naja samarensis</i> (Mindanao), <i>Naja sumatrana</i> (Palawan)
Cat 2:	<u>Elapidae</u> : <i>Calliophis intestinalis</i> ; <i>Ophiophagus hannah</i> ; <u>Viperidae</u> : <i>Parias flavomaculatus</i> ¹ ; <i>Tropidolaemus philippensis</i> ¹ ; <i>Tropidolaemus subannulatus</i> ¹

Singapore:

Cat 1:	<u>Elapidae</u> : <i>Bungarus candidus</i> ; <i>Naja sumatrana</i>
Cat 2:	<u>Elapidae</u> : <i>Bungarus fasciatus</i> ; <i>Calliophis bivirgatus</i> , <i>Calliophis intestinalis</i> ; <u>Viperidae</u> : <i>Cryptelytrops purpureomaculatus</i> ¹

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Thailand:

Cat 1:	<u>Elapidae</u> : <i>Bungarus candidus</i> , <i>Naja kaouthia</i> , <i>Naja siamensis</i> ¹ ; <u>Viperidae</u> : <i>Calloselasma rhodostoma</i> , <i>Cryptelytrops albolabris</i> ¹ , <i>Daboia siamensis</i> ¹
Cat 2:	<u>Elapidae</u> : <i>Bungarus fasciatus</i> , <i>Bungarus flaviceps</i> ; <i>Calliophis bivirgatus</i> , <i>Calliophis intestinalis</i> ; <i>Naja sumatrana</i> ; <i>Ophiophagus hannah</i> ; <u>Viperidae</u> : <i>Cryptelytrops macrops</i> ¹ ; <i>Parias sumatranus</i>

Timor-Leste:

Cat 1:	<u>Viperidae</u> : <i>Cryptelytrops insularis</i> ¹
Cat 2:	<u>Elapidae</u> : <i>Naja sputatrix</i> (reported)

Viet Nam:

Cat 1:	<u>Elapidae</u> : <i>Bungarus candidus</i> , <i>Bungarus multicinctus</i> , <i>Bungarus slowinskii</i> (north); <i>Naja atra</i> (north), <i>Naja kaouthia</i> (south); <u>Viperidae</u> : <i>Calloselasma rhodostoma</i> , <i>Cryptelytrops albolabris</i> ¹ (throughout); <i>Deinagkistrodon acutus</i>
Cat 2:	<u>Elapidae</u> : <i>Bungarus fasciatus</i> , <i>Bungarus flaviceps</i> (south); <i>Naja siamensis</i> (south); <i>Ophiophagus hannah</i> ; <u>Viperidae</u> : <i>Cryptelytrops macrops</i> ¹ ; <i>Protobothrops jerdonii</i> , <i>Protobothrops mucrosquamatus</i> (north); <i>Viridovipera stejnegeri</i> ¹

Australo-Papua (including Pacific Islands):

There are no medically important land snakes in American Samoa; Cook Islands; Fiji; French Polynesia; Guam; Kiribati; Marshall Islands; Nauru; New Caledonia; New Zealand; Northern Mariana Islands; Pitcairn Island; Samoa; Tokelau; Tonga; Tuvalu; or Wallis and Futuna Islands. Fiji possesses a single terrestrial venomous snake species (*Ogmodon vitianus*) while the Solomon Islands possess three terrestrial venomous species (*Salomonelaps par*; *Loveridgelaps elapoides* and *Parapistocalamus hedigeri*) with no and few snakebites, respectively.

Australia:

Cat 1:	<u>Elapidae</u> : <i>Notechis scutatus</i> ; <i>Pseudechis australis</i> ² ; <i>Pseudonaja affinis</i> , <i>Pseudonaja mengdeni</i> ¹ , <i>Pseudonaja nuchalis</i> , <i>Pseudonaja textilis</i>
Cat 2:	<u>Elapidae</u> : <i>Acanthophis antarcticus</i> , <i>Acanthophis</i> spp.; <i>Austrelaps</i> spp.; <i>Hoplocephalus</i> spp.; <i>Oxyuranus microlepidotus</i> , <i>Oxyuranus scutellatus</i> , <i>Oxyuranus temporalis</i> ; <i>Pseudechis</i> spp.; <i>Pseudonaja aspidorhyncha</i> ¹ , <i>Pseudonaja</i> spp.; <i>Tropidechis carinatus</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

² *Pseudechis australis* is common and widespread and causes numerous snakebites; bites may be severe, although this species has not caused a fatality in Australia since 1968.

Indonesia (West Papua and Maluku):

Cat 1:	<u>Elapidae</u> : <i>Acanthophis laevis</i> ¹
Cat 2:	<u>Elapidae</u> : <i>Acanthophis rugosus</i> ¹ ; <i>Micropechis ikaheka</i> ; <i>Oxyuranus scutellatus</i> ; <i>Pseudechis papuanus</i> , <i>Pseudechis rosignolii</i> ¹ ; <i>Pseudonaja textilis</i>

Papua New Guinea:

Cat 1:	<u>Elapidae</u> : <i>Acanthophis laevis</i> ¹ ; <i>Oxyuranus scutellatus</i>
Cat 2:	<u>Elapidae</u> : <i>Acanthophis rugosus</i> ¹ ; <i>Micropechis ikaheka</i> ; <i>Pseudonaja textilis</i> ; <i>Pseudechis papuanus</i> , <i>Pseudechis rosignolii</i> ¹

EUROPE

There are no venomous snakes in Iceland, Ireland, Isle of Man, Outer Hebrides, Orkney or Shetland Islands. Crete and most of the islands of the western Mediterranean are also without venomous snakes.

Central Europe

Albania; Bosnia and Herzegovina; Bulgaria; Croatia; Romania; Serbia; Montenegro; Slovenia; The former Yugoslav Republic of Macedonia:

Cat 1:	<u>Viperidae</u> : <i>Vipera ammodytes</i>
Cat 2:	<u>Viperidae</u> : <i>Vipera berus</i> , <i>Vipera ursinii</i>

The Czech Republic; Poland; Slovakia:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera berus</i>

Greece:

Cat 1:	<u>Viperidae</u> : <i>Vipera ammodytes</i> (including Corfu)
Cat 2:	<u>Viperidae</u> : <i>Macrovipera schweizeri</i> ; <i>Montivipera xanthina</i> ¹ ; <i>Vipera berus</i> , <i>Vipera ursinii</i>

Hungary:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera berus</i> ; <i>Vipera ursinii</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Eastern Europe

Belarus; Estonia; Latvia; Lithuania; The Republic of Moldova:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera berus</i> , <i>Vipera nikolskii</i> (Moldova), <i>Vipera ursinii</i> (Moldova)

The Russian Federation:

Cat 1:	<u>Viperidae</u> : <i>Vipera berus</i>
Cat 2:	<u>Viperidae</u> : <i>Gloydius halys</i> , <i>Gloydius intermedius</i> ¹ , <i>Gloydius ussuriensis</i> ; (far-east Russia); <i>Macrovipera lebetina</i> (Dagestan); <i>Vipera nikolskii</i> ; <i>Vipera renardi</i> , <i>Vipera spp.</i>

Ukraine:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera berus</i> , <i>Vipera nikolskii</i> , <i>Vipera renardi</i> , <i>Vipera ursinii</i>

Western Europe

Austria:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera ammodytes</i> , <i>Vipera berus</i>

Belgium; Denmark; Finland; Germany; The Netherlands; Norway:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera berus</i>

France:

Cat 1:	<u>Viperidae</u> : <i>Vipera aspis</i>
Cat 2:	<u>Viperidae</u> : <i>Vipera berus</i> , <i>Vipera ursinii</i>

Italy:

Cat 1:	<u>Viperidae</u> : <i>Vipera aspis</i>
Cat 2:	<u>Viperidae</u> : <i>Vipera ammodytes</i> , <i>Vipera berus</i> , <i>Vipera ursinii</i>

Portugal:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera latastei</i> , <i>Vipera seoanei</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Spain:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera aspis</i> , <i>Vipera latastei</i> , <i>Vipera seoanei</i>

Sweden; The United Kingdom of Great Britain and Northern Ireland:

Cat 1:	<u>Viperidae</u> : <i>Vipera berus</i> (not Northern Ireland)
Cat 2:	None

Switzerland:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Vipera aspis</i> , <i>Vipera berus</i>

THE AMERICAS

North America

Canada:

Cat 1:	None
Cat 2:	<u>Viperidae</u> : <i>Crotalus oreganus</i> ¹ , <i>Crotalus viridis</i> , <i>Sistrurus catenatus</i>

Mexico:

Cat 1:	<u>Viperidae</u> : <i>Agkistrodon bilineatus</i> , <i>Agkistrodon taylori</i> ¹ ; <i>Crotalus atrox</i> , <i>Crotalus scutulatus</i> , <i>Crotalus simus</i> ¹ , <i>Crotalus totonacus</i> ¹ ; <i>Bothrops asper</i>
Cat 2:	<u>Elapidae</u> : <i>Micruroides euryxanthus</i> , <i>Micrurus nigrocinctus</i> , <i>Micrurus tener</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Agkistrodon contortrix</i> ; <i>Atropoides mexicanus</i> , <i>Atropoides occiduus</i> , <i>Atropoides</i> spp.; <i>Bothriechis schlegelii</i> , <i>Bothriechis</i> spp.; <i>Cerrophidion godmani</i> , <i>Cerrophidion</i> spp.; <i>Crotalus basiliscus</i> , <i>Crotalus molossus</i> , <i>Crotalus oreganus</i> ¹ , <i>Crotalus ruber</i> , <i>Crotalus tzabcan</i> ¹ , <i>Crotalus viridis</i> , <i>Crotalus</i> spp.; <i>Ophryacus</i> spp.; <i>Porthidium nasutum</i> , <i>Porthidium</i> spp.; <i>Sistrurus catenatus</i>

The United States of America:

Cat 1:	<u>Viperidae</u> : <i>Agkistrodon contortrix</i> , <i>Agkistrodon piscivorus</i> ; <i>Crotalus adamanteus</i> , <i>Crotalus atrox</i> , <i>Crotalus horridus</i> , <i>Crotalus oreganus</i> ¹ , <i>Crotalus scutulatus</i> , <i>Crotalus viridis</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus fulvius</i> , <i>Micrurus tener</i> ; <u>Viperidae</u> : <i>Crotalus molossus</i> , <i>Crotalus ruber</i> , <i>Crotalus</i> spp., <i>Sistrurus catenatus</i> , <i>Sistrurus miliarius</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Central America

The medically most important species are *Bothrops asper* and *Crotalus simus*¹.

Belize:

Cat 1:	<u>Viperidae:</u> <i>Bothrops asper</i>
Cat 2:	<u>Elapidae:</u> <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Agkistrodon bilineatus</i> ; <i>Atropoides mexicanus</i> ; <i>Bothriechis schlegelii</i> ; <i>Crotalus tzabcan</i> ¹ ; <i>Porthidium nasutum</i>

Costa Rica:

Cat 1:	<u>Viperidae:</u> <i>Bothrops asper</i> ; <i>Crotalus simus</i> ¹
Cat 2:	<u>Elapidae:</u> <i>Micrurus nigrocinctus</i> , <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Agkistrodon bilineatus</i> ; <i>Atropoides mexicanus</i> , <i>Atropoides</i> spp.; <i>Bothriechis schlegelii</i> , <i>Bothriechis lateralis</i> , <i>Bothriechis</i> spp.; <i>Cerrophidion godmani</i> ; <i>Lachesis melanocephala</i> , <i>Lachesis stenophrys</i> ; <i>Porthidium nasutum</i> , <i>Porthidium ophryomegas</i> , <i>Porthidium</i> spp.

El Salvador:

Cat 1:	<u>Viperidae:</u> <i>Crotalus simus</i> ¹
Cat 2:	<u>Elapidae:</u> <i>Micrurus nigrocinctus</i> ; <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Agkistrodon bilineatus</i> ; <i>Atropoides occiduus</i> ; <i>Bothriechis</i> spp.; <i>Cerrophidion godmani</i> ; <i>Porthidium ophryomegas</i>

Guatemala:

Cat 1:	<u>Viperidae:</u> <i>Bothrops asper</i> ; <i>Crotalus simus</i>
Cat 2:	<u>Elapidae:</u> <i>Micrurus nigrocinctus</i> , <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Agkistrodon bilineatus</i> ; <i>Atropoides mexicanus</i> , <i>Atropoides occiduus</i> , <i>Atropoides</i> spp.; <i>Bothriechis schlegelii</i> , <i>Bothriechis</i> spp.; <i>Cerrophidion godmani</i> ; <i>Crotalus tzabcan</i> ¹ , <i>Porthidium nasutum</i> , <i>Porthidium ophryomegas</i>

Honduras:

Cat 1:	<u>Viperidae:</u> <i>Bothrops asper</i>
Cat 2:	<u>Elapidae:</u> <i>Micrurus nigrocinctus</i> , <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Agkistrodon bilineatus</i> ; <i>Atropoides mexicanus</i> , <i>Atropoides occiduus</i> , <i>Atropoides</i> spp.; <i>Bothriechis marchi</i> , <i>Bothriechis schlegelii</i> , <i>Bothriechis</i> spp.; <i>Cerrophidion godmani</i> ; <i>Crotalus simus</i> ¹ ; <i>Porthidium nasutum</i> , <i>Porthidium ophryomegas</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Nicaragua:

Cat 1:	<u>Viperidae:</u> <i>Bothrops asper</i> ; <i>Crotalus simus</i> ¹
Cat 2:	<u>Elapidae:</u> <i>Micrurus nigrocinctus</i> , <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Agkistrodon bilineatus</i> ; <i>Atropoides mexicanus</i> ; <i>Bothriechis schlegelii</i> ; <i>Cerrophidion godmani</i> ; <i>Lachesis stenophrys</i> ; <i>Porthidium nasutum</i> , <i>Porthidium ophryomegas</i>

Panama:

Cat 1:	<u>Viperidae:</u> <i>Bothrops asper</i>
Cat 2:	<u>Elapidae:</u> <i>Micrurus mipartitus</i> , <i>Micrurus nigrocinctus</i> , <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Atropoides mexicanus</i> , <i>Atropoides</i> spp.; <i>Bothriechis lateralis</i> , <i>Bothriechis schlegelii</i> , <i>Bothriechis</i> spp.; <i>Cerrophidion godmani</i> ; <i>Lachesis acrochorda</i> , <i>Lachesis stenophrys</i> ; <i>Porthidium nasutum</i> , <i>Porthidium lansbergii</i> , <i>Porthidium</i> spp.

Caribbean

No medically important snakes occur naturally in Anguilla; Antigua and Barbuda; the Bahamas; Barbados; Bermuda; The British Virgin Islands; Cayman Islands; Cuba; Dominica; the Dominican Republic; Grenada; Guadeloupe; Haiti; Jamaica; Montserrat; the Netherlands Antilles; Saint Kitts and Nevis; Saint Vincent and the Grenadines; and Turks and Caicos Islands.

Aruba; Martinique; Saint Lucia; Trinidad and Tobago, and offshore islands:

Cat 1:	<u>Viperidae:</u> <i>Bothrops cf. atrox</i> (Trinidad), <i>Bothrops caribbaeus</i> (St Lucia), <i>Bothrops lanceolatus</i> (Martinique); <i>Crotalus durissus</i> (Aruba)
Cat 2:	<u>Elapidae:</u> <i>Micrurus circinalis</i> (Trinidad), <i>Micrurus lemniscatus</i> (Trinidad); <u>Viperidae:</u> <i>Lachesis muta</i> (Trinidad)

South America

No venomous snakes are naturally occurring in the Falkland Islands; and no dangerously venomous snakes are naturally occurring in Chile.

Argentina:

Cat 1:	<u>Viperidae:</u> <i>Bothrops alternatus</i> , <i>Bothrops diporus</i> ¹ <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae:</u> <i>Micrurus corallinus</i> , <i>Micrurus lemniscatus</i> , <i>Micrurus</i> spp.; <u>Viperidae:</u> <i>Bothrops ammodytoides</i> , <i>Bothrops jararaca</i> , <i>Bothrops jararacussu</i> , <i>Bothrops mattogrossensis</i> , <i>Bothrops neuwiedi</i> , <i>Bothrops pubescens</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Bolivia (Plurinational State of):

Cat 1:	<u>Viperidae</u> : <i>Bothrops atrox</i> , <i>Bothrops mattogrossensis</i> ¹ , <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus lemniscatus</i> , <i>Micrurus spixii</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothrocophias hyoprora</i> , <i>Bothrocophias microphthalmus</i> ¹ ; <i>Bothrops bilineatus</i> , <i>Bothrops brazili</i> , <i>Bothrops jararacussu</i> , <i>Bothrops jonathani</i> , <i>Bothrops moojeni</i> , <i>Bothrops sanctaecrucis</i> , <i>Bothrops</i> spp., <i>Bothrops taeniatus</i> ; <i>Lachesis muta</i>

Brazil:

Cat 1:	<u>Viperidae</u> : <i>Bothrops atrox</i> , <i>Bothrops jararaca</i> , <i>Bothrops jararacussu</i> , <i>Bothrops leucurus</i> , <i>Bothrops moojeni</i> ; <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus corallinus</i> , <i>Micrurus lemniscatus</i> , <i>Micrurus spixii</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothrocophias hyoprora</i> ¹ , <i>Bothrocophias microphthalmus</i> ¹ , <i>Bothrops alternatus</i> , <i>Bothrops bilineatus</i> , <i>Bothrops brazili</i> , <i>Bothrops diporus</i> , <i>Bothrops mattogrossensis</i> , <i>Bothrops neuwiedi</i> , <i>Bothrops pubescens</i> , <i>Bothrops taeniatus</i> , <i>Bothrops</i> spp.; <i>Lachesis muta</i>

Colombia:

Cat 1:	<u>Viperidae</u> : <i>Bothrops asper</i> , <i>Bothrops atrox</i> , <i>Bothrops bilineatus</i> ; <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus lemniscatus</i> , <i>Micrurus mipartitus</i> , <i>Micrurus nigrocinctus</i> , <i>Micrurus spixii</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothriechis schlegelii</i> ; <i>Bothrocophias hyoprora</i> ¹ , <i>Bothrocophias microphthalmus</i> ¹ , <i>Bothrocophias</i> spp.; <i>Bothrops brazili</i> , <i>Bothrops taeniatus</i> , <i>Bothrops</i> spp.; <i>Lachesis acrochorda</i> ¹ , <i>Lachesis muta</i> ; <i>Porthidium nasutum</i> , <i>Porthidium lansbergii</i>

Ecuador:

Cat 1:	<u>Viperidae</u> : <i>Bothrops asper</i> , <i>Bothrops atrox</i> , <i>Bothrops bilineatus</i> ; <i>Lachesis muta</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus lemniscatus</i> , <i>Micrurus mipartitus</i> , <i>Micrurus spixii</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothriechis schlegelii</i> ; <i>Bothrocophias hyoprora</i> ¹ , <i>Bothrocophias microphthalmus</i> ¹ , <i>Bothrocophias</i> spp.; <i>Bothrops brazili</i> , <i>Bothrops taeniatus</i> , <i>Bothrops</i> spp.; <i>Lachesis acrochorda</i> ¹ ; <i>Porthidium nasutum</i> , <i>Porthidium</i> spp.

French Guiana (France):

Cat 1:	<u>Viperidae</u> : <i>Bothrops atrox</i> , <i>Bothrops brazili</i> , <i>Bothrops bilineatus</i> ; <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus lemniscatus</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothrops taeniatus</i> ; <i>Lachesis muta</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Guyana:

Cat 1:	<u>Viperidae</u> : <i>Bothrops atrox</i> , <i>Bothrops bilineatus</i> , <i>Bothrops brazili</i> , <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus lemniscatus</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothrops taeniatus</i> ; <i>Lachesis muta</i>

Paraguay:

Cat 1:	<u>Viperidae</u> : <i>Bothrops alternatus</i> ; <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus corallinus</i> , <i>Micrurus lemniscatus</i> , <i>Micrurus spixii</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothrops diporus</i> , <i>Bothrops jararaca</i> , <i>Bothrops jararacussu</i> , <i>Bothrops mattogrossensis</i> , <i>Bothrops moojeni</i> , <i>Bothrops neuwiedi</i> , <i>Bothrops</i> spp.

Peru:

Cat 1:	<u>Viperidae</u> : <i>Bothrops atrox</i> , <i>Bothrops bilineatus</i> , <i>Bothrops pictus</i> ; <i>Crotalus durissus</i> ; <i>Lachesis muta</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus lemniscatus</i> , <i>Micrurus mipartitus</i> , <i>Micrurus spixii</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothriechis schlegelii</i> ; <i>Bothrocophias hyoprora</i> , <i>Bothrocophias microphthalmus</i> ; <i>Bothrops asper</i> ; <i>Bothrops brazili</i> , <i>Bothrops mattogrossensis</i> , <i>Bothrops taeniatus</i> , <i>Bothrops</i> spp.

Suriname:

Cat 1:	<u>Viperidae</u> : <i>Bothrops atrox</i> , <i>Bothrops bilineatus</i> , <i>Bothrops brazili</i> ; <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus lemniscatus</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothrops taeniatus</i> ; <i>Lachesis muta</i>

Uruguay:

Cat 1:	<u>Viperidae</u> : <i>Bothrops alternatus</i> ; <i>Crotalus durissus</i>
Cat 2:	<u>Elapidae</u> : <i>Micrurus corallinus</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothrops pubescens</i> ¹

Venezuela (Bolivarian Republic of):

Cat 1:	<u>Viperidae</u> : <i>Bothrops atrox</i> , <i>Bothrops cf. atrox</i> , <i>Bothrops venezuelensis</i> ; <i>Crotalus durissus</i> (including Isla de Margarita)
Cat 2:	<u>Elapidae</u> : <i>Micrurus circinalis</i> , <i>Micrurus lemniscatus</i> , <i>Micrurus mipartitus</i> , <i>Micrurus spixii</i> , <i>Micrurus surinamensis</i> , <i>Micrurus</i> spp.; <u>Viperidae</u> : <i>Bothriechis schlegelii</i> ; <i>Bothrops asper</i> , <i>Bothrops brazili</i> , <i>Bothrops bilineatus</i> ; <i>Lachesis muta</i> ; <i>Porthidium lansbergii</i>

¹ Recent nomenclatural change. Refer to Tables 1 and 2 for details of previous names.

Herpetological references¹

1. **Ananjeva NB et al.** *The reptiles of Northern Eurasia*. Sofia, Pensoft, 2006.
2. **Ashton KG, de Querioz A.** Molecular systematics of the western rattlesnake, *Crotalus viridis* (Viperidae), with comments on the utility of the D-loop in phylogenetic studies of snakes. *Molecular Phylogenetics and Evolution*, 2001, **21**:176–189.
3. **Babocsay G.** A new species of saw-scaled viper of the *Echis coloratus* complex (Ophidia: Viperidae) from Oman, Eastern Arabia. *Systematics and Biodiversity*, 2004, **1**:503–514.
4. **Basoglu M, Baran I.** *The reptiles of Turkey. Part II. The Snakes*. Izmir, University of Matbaasi, 1980.
5. **Buys PJ, Buys PJC.** *Snakes of Namibia*. Windhoek, Gamsberg Macmillan. 1983.
6. **Bons J, Geniez P.** *Amphibiens et Reptiles du Maroc*. Barcelona, Asociación Herpetológica Española. 1996.
7. **Boycott RC.** A herpetological survey of Swaziland [MSc thesis]. Durban, University of Natal, 1992.
8. **Branch B.** *Field guide to the snakes and other reptiles of Southern Africa*. Cape Town, Sruik 1988.
9. **Broadley DG et al.** *Snakes of Zambia: An atlas and field guide*. Frankfurt am Main, Edition Chimaira, 2003.
10. **Broadley DG.** *FitzSimons snakes of Southern Africa*. Cape Town, Delta Books, 1983.
11. **Broadley DG.** The herpetofaunas of the islands off the coast of south Moçambique. *Arnoldia Zimbabwe*, 1990, **9**:469–493.
12. **Broadley DG.** Reptiles and amphibians from the Bazaruto Archipelago, Mozambique. *Arnoldia Zimbabwe*, 1992, **9**:539–548.
13. **Broadley DG.** Review of the Dispholidini, with the description of a new genus and species from Tanzania (Serpentes, Colubridae). *Bulletin of the Natural History Museum London (Zoology)*, 2002, **68**:57–74.
14. **Broadley DG.** A review of the genus *Thelotornis* A. Smith in eastern Africa, with the description of a new species from the Usambara Mountains (Serpentes: Colubridae: Dispholidini). *African Journal of Herpetology*, 2001, **50**:53–70.
15. **Broadley DG.** The herpetofaunas of the islands off the coast of south Moçambique. *Arnoldia Zimbabwe*, 1990, **9**:469–493.
16. **Campbell JA, Lamar WW.** *The venomous snakes of the western hemisphere*. Vols. I and II. Ithaca, NY, Comstock-Cornell, 2004.
17. **Creer S et al.** Genetic and ecological correlates of intraspecific variation in pitviper venom composition detected using matrix-assisted laser desorption time-of-flight mass spectrometry (MALDI-TOF-MS) and isoelectric focusing. *Journal of Molecular Evolution*. 2003, **56**:317–329.

¹ Major regional guides have author names italicized.

18. **da Silva VX.** The *Bothrops neuwiedi* Complex. In: Campbell JA, Lamar WW (eds) *The venomous reptiles of the Western Hemisphere*. Vol. I. Ithaca, NY, Comstock Publishing 2004:410–422.
19. **David P, Ineich I.** Les serpents venimeux du monde: systématique et répartition. *Dumerilia*, 1999, 3:3–499.
20. **De Smedt J.** *The vipers of Europe*. Hablech, JDS Verlag, 2001.
21. **Dobiey M, Vogel G.** *Venomous snakes of Africa*. Frankfurt am Main, Terralog Edition Chimaira, 2006.
22. **El Din SB.** *A guide to the reptiles and amphibians of Egypt*. Cairo, American University of Cairo Press, 2006.
23. **Gasperetti J.** Snakes of Arabia. *Fauna of Saudi Arabia*, 1988, 9:169–450.
24. **Geniez P et al.** *The amphibians and reptiles of the Western Sahara*. Frankfurt am Main, Edition Chimaira, 2004.
25. **Gloyd HK, Conant R.** *Snakes of the Agkistrodon complex*. Oxford, OH, SSAR, 1990.
26. **Guo P et al.** New evidence on the phylogenetic position of the poorly known Asian pitviper *Protobothrops kaulbacki* (Serpentes: Viperidae: Crotalinae) with a redescription of the species and a revision of the genus *Protobothrops*. *The Herpetological Journal* 2007, 17:237–246.
27. **Gumprecht A et al.** *Asian Pitvipers*. Berlin, Geitje Books, 2004.
28. **Gutberlet RL Jr, Campbell JA.** Generic recognition of a neglected lineage of South American pitvipers (Squamata: Viperidae: Crotalinae), with the description of a new species from the Colombian Chocó. *American Museum Novitates*, 2001, 3316:1–15.
29. **Khan MS.** *A guide to the snakes of Pakistan*. Edition Chimaira, 2002.
30. **Kreiner G.** *The snakes of Europe*. Edition Chimaira, 2007.
31. **Latifi M.** *The snakes of Iran*. Oxford, OH, SSAR, 1985.
32. **Le Berre M.** *Faune du Sahara 1: Poissons-amphibiens-reptiles*. Editions Raymond Chabaud, 1989.
33. **Lenk P et al.** Phylogeny and taxonomic subdivision of *Bitis* (Reptilia: Viperidae) based on molecular evidence. In: Joger U (ed) *Phylogeny and systematics of the Viperidae*. *Kaupia, Darmstädter Beiträge zur Naturgeschichte*, 1999, 8:31–38. ,
34. **Lenk P et al.** Evolutionary relationships among the true vipers (Reptilia: Viperidae) inferred from mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution*, 2001, 19:94–104.
35. **Leviton AE et al.** *Handbook to Middle East amphibians and reptiles*. Oxford, OH, SSAR, 1992.
36. **Leviton AE et al.** The dangerously venomous snakes of Myanmar. Illustrated checklist with keys. *Proceedings of the California Academy of Sciences*, 2003, 54:407–462.
37. **Malhotra A, Thorpe RS.** A phylogeny of four mitochondrial gene regions suggests a revised taxonomy for Asian pitvipers (*Trimeresurus* and *Ovophis*). *Molecular Phylogenetics and Evolution*. 2004, 32:83–100.

38. **McDiarmid RW et al.** *Snake species of the world: A taxonomic and geographical reference*. Vol.1. 1999.
39. **Murphy JC.** *Amphibians and Reptiles of Trinidad and Tobago*. Malabar, FL, Krieger, 1997.
40. **Nilson G, Rastegar-Pouyani N.** *Walterinnesia aegyptia* Lataste, 1887 (Ophidia: Elapidae) and the status of *Naja morgani* Mocquard 1905. *Russian Journal of Herpetology*, 2007, **14**:7–14.
41. **Orlov NL, Barabanov AV.** Analysis of nomenclature, classification, and distribution of the *Agkistrodon halys – intermedius* complexes: a critical review. *Russian Journal of Herpetology* 1999, **6**:167–192.
42. **O’Shea M.** *A guide to the snakes of Papua New Guinea*. Port Moresby, Independent Publishing, 1996.
43. **Parkinson CL et al.** Phylogeography of the pitviper clade *Agkistrodon*: historical ecology, species status, and conservation of cantils. *Molecular Ecology*, 2000, **9**:411–420.
44. **Pitman CRS.** *A guide to the snakes of Uganda*, 2nd ed. Codicote, Wheldon & Wesley, 1974.
45. **Quijada-Mascareñas JA et al.** Phylogeographic patterns of trans-Amazonian vicariants and Amazonian biogeography: the Neotropical rattlesnake (*Crotalus durissus* complex) as an example. *Journal of Biogeography*, 2007, **34**:1296–1312.
46. **Roman B.** *Serpents de Haute-Volta*. Ouagadougou, CNRST, 1980.
47. **Schleich HH et al.** *Amphibians and reptiles of Nepal*. Ruggall, Gantner Verlag, 2002.
48. **Schleich HH et al.** *Amphibians and reptiles of North Africa*. Koenigstein, Koeltz. 1996.
49. **Spawls S, Branch B.** *The dangerous snakes of Africa*. London, Blandford, 1995.
50. **Spawls S, et al.** *A field guide to the reptiles of East Africa: Kenya, Tanzania, Uganda, Rwanda and Burundi*. London, Academic Press, Natural World, 2002.
51. **Steward JW.** *The snakes of Europe*. Newton Abbott David & Charles, 1971.
52. **Street D.** *Reptiles of northern and central Europe*. London, Batsford 1979.
53. **Sweeney RCH.** *Snakes of Nyasaland*. Amsterdam, Asher & Co, 1971.
54. **Thorpe RS, Pook CE, Malhotra A.** Phylogeography of the Russell's viper (*Daboia russelii*) complex in relation to variation in the colour pattern and symptoms of envenoming. *The Herpetological Journal*, 2007, **17**:209–218.
55. **Visser J, Chapman DS.** *Snakes and snakebite*. Cape Town, Struik, 1978.
56. **Vogel G.** *Venomous snakes of Asia*. Frankfurt am Main, Terralog Edition Chimaira, 2006.
57. **Vogel G et al.** Revision of the *Tropidolaemus wagleri*-complex (Serpentes: Viperidae: Crotalinae). I. Definition of included taxa and redescription of *Tropidolaemus wagleri* (Boie, 1827). *Zootaxa*, 2007, **1644**:1–40.
58. **Whitaker R, Captain A.** *Snakes of India: The field guide*. Chennai, Draco Books, 2004.

59. **Williams DJ et al.** Origin of the eastern brownsnake, *Pseudonaja textilis* (Duméril, Bibron and Duméril) (Serpentes: Elapidae: Hydrophiinae) in New Guinea: evidence of multiple dispersals from Australia, and comments on the status of *Pseudonaja textilis pughii* Hoser 2003. *Zootaxa*, 2008, **1703**:47–61.
60. **Williams DJ, Wüster W.** Snakes of Papua New Guinea. In: Williams DJ et al (eds) *Venomous bites and stings in Papua New Guinea*. Melbourne, AVRU University of Melbourne, 2005:33–64.
61. **Wüster W et al.** Snakes across the strait: trans-Torresian phylogenetic relationships in three genera of Australo-Papuan snakes (Serpentes: Elapidae: *Acanthophis*, *Oxyuranus* and *Pseudechis*). *Molecular Phylogenetics and Evolution*, 2005, **34**:1–14.
62. **Wuster W, Broadley DG.** A new species of spitting cobra from north-eastern Africa (Serpentes: Elapidae: *Naja*). *Journal of Zoology, London*, 2003, **259**:345–359.
63. **Wüster W, Broadley DG.** Get an eyeful of this: a new species of giant spitting cobra from eastern and north-eastern Africa (Squamata: Serpentes: Elapidae: *Naja*). *Zootaxa*, 2007, **1532**:51–68.
64. **Wüster W et al.** Origin and evolution of the South American pitviper fauna: evidence from mitochondrial DNA sequence analysis. In: Schuett GW, Höggren M, Douglas ME, Greene HW (eds) *Biology of the vipers*. Eagle Mountain, Utah, Eagle Mountain Publishing, 2002:111–128.
65. **Wüster W et al.** Origin and phylogenetic position of the Lesser Antillean species of *Bothrops* (Serpentes: Viperidae): biogeographical and medical implications. *Bulletin of the Natural History Museum London (Zoology)*, 2002, **68**:101–106.
66. **Wüster W et al.** Redescription of *Naja siamensis* Laurenti, 1768 (Serpentes: Elapidae), a widely overlooked spitting cobra from Southeast Asia: geographic variation, medical importance and designation of a neotype. *Journal of Zoology*, 1997, **243**:771–788.
67. **Wüster W et al.** Systematics of the *Bothrops atrox* species complex: insights from multivariate analysis and mitochondrial DNA sequence information. In: Thorpe RS, Wüster W, Malhotra A. (eds) *Venomous snakes: ecology, evolution and snakebite*. Oxford, Clarendon Press, 1997:99–113 (Symposia of the Zoological Society of London, No. 70).
68. **Wüster W et al.** The phylogeny of cobras inferred from mitochondrial DNA sequences: evolution of venom spitting and the phylogeography of the African spitting cobras (Serpentes: Elapidae: *Naja nigricollis* complex). *Molecular Phylogenetics and Evolution*, 2007, **45**:437–453.
69. **Wüster W et al.** Synopsis of recent developments in venomous snake systematics. *Toxicon*, 1997, **35**: 319–340.
70. **Wüster W et al.** Synopsis of recent developments in venomous snake systematics, No. 2. *Toxicon*, 1998, **36**:299–307.
71. **Wüster W et al.** Synopsis of recent developments in venomous snake systematics, No. 3. *Toxicon*, 1999, **37**:1123–1129.
72. **Wüster W, McCarthy CJ.** Venomous snake systematics: Implications for snake bite treatment and toxinology. In: Bon C, Goyffon M (eds) *Envenomings and their treatments*. Lyon, Fondation Mérieux, 1996:13–23.
73. **Zhao E, Adler K.** *Herpetology of China*. Oxford, OH, SSAR 1993.

© World Health Organization

APPENDIX 2

Summary protocol for manufacturing and control of snake antivenom immunoglobulins

1. Antivenom batch information

- a. Name and address of manufacturer.....
- b. Batch number
- c. Date of filling.....
- d. Liquid or freeze-dried
- e. Expiry date
- f. Number of vials or ampoules.....
- g. Temperature of storage

2. Control of the venom batch(es) used for animal immunization

- a. Producer of venom and location
- b. Information on the snake contributing to the venom batch:
 - i. Scientific names of the snake species
 - ii. Number of snakes.....
 - iii. Geographical origins of the snakes
- c. Dates of collection of the venoms.....
- d. Expiry date of the venoms preparation
- e. Biochemical and biological characterization of the venoms
- Test performed
- Results.....

3. Control of plasma donor animals

- a. Location of the animal herd
- b. Animal species used for immunization.....
- c. Vaccinations performed
- d. Dates of animals immunization.....
- e. Control of antivenom antibody titre
- f. Veterinary certificate of health of animal donor.....

4. Collection and storage of plasma

- a. Method of collection
- b. Date of collection.....
- c. Date of storage
- d. Type of containers.....
- e. Temperature of storage
- f. Type and content of preservatives added (if any).....

5. Transport of plasma to fractionation facility

- a. Date of transport.....
- b. Temperature of transport.....
- c. Date of arrival

6. Plasma pooling and fractionation

- a. Temperature of plasma storage at fractionation facility.....
- b. Volume of plasmas of different specificity pooled for the production of polyspecific antivenoms (if applicable)
- c. Date of plasma pooling
- d. Volume of the manufacturing plasma pool.....
- e. Number of animal donors contributing to the manufacturing plasma pool
- f. Quality control of the manufacturing plasma pool
 - Test performed
 - Results
- g. Type of active substance (intact IgG, fragments)

7. Preparation and control of final bulk

- a. Volume of bulk antivenoms of different specificity pooled for the production of polyspecific antivenoms (if applicable).....
- b. Concentration of preservatives (if used)
 - Type.....
 - Method
 - Result.....
- c. Quality control of manufacturing plasma pool
 - Test performed
 - Results

8. Filling and containers

- a. Date of filling
- b. Quantity of containers
- c. Volume of antivenoms per container
- d. Date of freeze-drying (if any).....

9. Control tests on final product

- a. Appearance.....
- b. Solubility (freeze-dried product).....
- c. Extractable volume.....
- d. Venom-neutralizing potency test
 - Method
 - Venom used.....
 - Results
- e. Osmolality
- f. Identity test
 - Method
 - Result.....
- g. Protein concentration
 - Method
 - Result.....

- h. Purity
 - Method
 - Result
- i. Molecular size distribution
 - Method
 - Result
- j. Test for pyrogens
 - Method
 - Result
- k. Sterility test
 - No. of containers examined
 - Method
 - Date at start of test
 - Date at end of test.....
- l. Concentration of sodium chloride and other excipients
 - Method
 - Result
- m. Determination of pH
 - Result
- n. Concentration of preservatives (if used)
 - Type
 - Method
 - Result
- o. Chemical agents used in plasma fractionation
 - Type
 - Method
 - Result
- p. Inspection of final containers
 - Results.....
- q. Residual moisture in freeze-dried antivenoms
 - Method
 - Result

10. Internal certification

Certification by person taking overall responsibility for production of the antivenom

I certify that the batch No. of snake antivenom immunoglobulin satisfies the WHO Guidelines for the production, quality control and regulation of snake antivenom immunoglobulins.

Signature.....

Name (typed)

Date.....

**Blood Products and Related Biologicals
Quality and Safety: Medicines
Essential Medicines and Pharmaceutical Policies
Health Systems and Services**

World Health Organization
20, Avenue Appia
CH-1211 Geneva 27, Switzerland

www.who.int/bloodproducts/snakeantivenoms



**World Health
Organization**

Epidemiology and Prevention of Vaccine-Preventable Diseases

11th
EDITION
Revised May 2009

This book was produced by the Education, Information and Partnership Branch, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, who is solely responsible for its content. It was printed and distributed by the Public Health Foundation. For additional copies, contact the Public Health Foundation at 877-252-1200 or website <http://bookstore.phf.org/>.

Slide sets to accompany this book are available on the CDC Vaccines and Immunization website at <http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm>.

E-mail address for comments, questions or suggestions about the contents of this book: nipinfo@cdc.gov.

EDITED BY:

William Atkinson, MD, MPH
Charles (Skip) Wolfe
Jennifer Hamborsky, MPH, CHES
Lynne McIntyre, MALS

CONTRIBUTIONS FROM:

PerStephanie Thompson, MS Ed
Donna Weaver, RN, MN
Steven Stewart

LAYOUT AND DESIGN:

Susie P. Childrey

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

On the cover

“Die Spanische Krankheit” (“The Spanish Flu”) ink drawing by Alfred Kubin, circa 1920. Kubin (1877-1959) studied in Munich and was associated with German expressionism. He was a contemporary of Edvard Munch, who also recorded his experience with the 1918 influenza pandemic. This work illustrates the figure of Death and the victims of the influenza pandemic in a way similar to that used in European woodcuts to depict the bubonic plague centuries earlier. The drawing is in a private collection.

Suggested Citation:

Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. 11th ed. Washington DC: Public Health Foundation, 2009.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the Public Health Services or the U.S. Department of Health and Human Services. References to non-CDC sites on the Internet are provided as a service to readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of these sites. URL addresses were current as of the date of publication.

Milestones in the History of Vaccination

400BCE

Hippocrates describes diphtheria, epidemic jaundice, and other conditions

1100s

Variolation for smallpox first reported in China

1721

Variolation introduced into Great Britain

1796

Edward Jenner inoculates James Phipps with cowpox, and calls the procedure vaccination (“vacca” is Latin for cow)