

SNAKES OF THE WORLD

By RAYMOND L. DITMARS, Litt.D.

Curator of Mammals and Reptiles at the New York Zoological
Park; Fellow of the New York Academy of Sciences; Fellow
of the New York Zoological Society; Corresponding
Member of the Zoological Society of London

WITH ILLUSTRATIONS FROM LIFE

NEW YORK
THE MACMILLAN COMPANY

1936

PREFACE

FROM numerous queries presented in person and by correspondence to the author, the need of a general book on snakes has been clearly indicated. Of the several groupings of reptiles, that of the serpents ranks far above the others in general interest. The principal reason for this is the fair portion of their numbers being poisonous, the bites of some species dramatically dangerous to man and the larger animals.

The preparation of this book has been largely guided by queries about snakes. Hence the thought has been to make it as practical as possible. The author has endeavoured to inject not only details to make interesting reading, but helpful information where the same is possible. The arrangement of the poisonous snakes of the world in zoogeographical chapters imparts particular significance to prospectors, exploring scientists or sportsmen going into various countries.

The photographic plates have undergone intensive thought and study. The captions on these plates alone are in excess of eight thousand words in elucidating characteristic points about the subjects figured. The text throughout carries reference to the respective plates, which are also to be found listed in the index.

R. L. D.

ACKNOWLEDGMENTS AND CREDITS

IN the text of this work the author has drawn freely from scientific writings which he has in the near past prepared for publications of the New York Zoological Society; also from articles appearing in the Bulletin of the Antivenin Institute of America.

The Illustrations: The author and the publisher extend credit and their keen appreciation for photographs received from various sources, as follows: The greater number from the extensive photographic files of the New York Zoological Society. Also for series of photographs and separate illustrations from Dr. Afranio do Amaral, Chief of the Instituto Soro Therapico, at São Paulo, Brazil; the Antivenin Institute of America; John S. C. Boswell; Frederick Colville; William Fox (for the frontispiece of the king cobra); Andrew Halbren; Dr. Howard A. Kelly; L. M. Klauber (for the series of western rattlesnakes); Robert Lewis; Douglas D. H. March; Otto Martin Locke; Lewis Photographic Service of Panama City; R. Marlan Perkins; Raymond Stadelman; Anton Vestby (Honduran reptiles) and Dr. A. H. Wright.

CONTENTS

CHAPTER	PAGE
PREFACE	vii
I. THE SERPENT'S WORLD	1
II. THE SCOPE OF THE CLAN	8
III. DISTRIBUTION OF SNAKES	11
IV. GENERAL HABITS	16
V. GENERAL CLASSIFICATION	23
VI. THE GIANT SERPENTS	34
VII. THE NEW WORLD HARMLESS SNAKES	50
VIII. THE OLD WORLD HARMLESS SNAKES	77
IX. THE REAR-FANGED SNAKES	87
X. POISONOUS SNAKES OF NORTH AMERICA	96
XI. POISONOUS SNAKES OF CENTRAL AND SOUTH AMERICA	125
XII. POISONOUS SNAKES OF EUROPE AND ASIA	144
XIII. POISONOUS SNAKES OF AFRICA	165
XIV. POISONOUS SNAKES OF AUSTRALIA	188
INDEX	199

SNAKES OF THE WORLD

CHAPTER I

THE SERPENT'S WORLD

ALITTLE black form is stretched upon the top of an old stone wall. The long and slender body lies in slightly suggested undulations. It appears tense and yet again soft and pliant as its outline follows the slightly uneven surface of the stones. Its hue is really blue-black and it glows with the luster of a new gun-barrel. The effect upon the average observer is three-fold. The thing is startling, it is decorative, and it is wholly incongruous—this vivid form so bold in contrast to its surroundings. The head quivers slightly. If the observer's eyes are keen this is seen to be caused by the rapid darting of a forked tongue. Then the black object appears to flow over the opposite side of the wall. There is a rustling murmur among dried leaves—a hissing-scrape—the sound so characteristic of a rapidly moving snake, and the thing is gone.

Thus we meet the blacksnake, an inoffensive type and a useful one, but startling, nevertheless, unless one has some knowledge of serpent life.

The supposition may be that such creatures are aimless wanderers, to be thus encountered now and then; that they crawl into some hole to pass the winter and emerge the coming year to prowl again and bob up in unexpected places.

Summing up the life history of the average blacksnake produces an interesting picture. It gives an idea of snakes generally. The serpent is lifted from the thought of a mere gliding thing in the grass and assumes individuality among the legions of animal life.

To begin with, the blacksnake is hatched from an egg. Some snakes are viviparous and produce living young and others are oviparous; that is, they lay eggs. The egg-laying kinds exceed the others in number, but not by a great majority. But to return to the origin of the blacksnake.

A female blacksnake has been steadily searching for a suitable hollow under a large flat stone. She is seeking a stone thick enough to absorb the sun's rays and retain considerable of this heat during the night. The stone must also be thick enough not to pass too great an amount of heat directly through it to the ground. The hollow beneath must be in ground or debris soft enough to be readily shoved about with her body in forming a nest for her eggs. The ground must be moderately damp. The rock should be on a hillside. While moderate dampness is sought the ground should be well drained. A part of the necessary moisture needed to develop the eggs will come from condensation beneath the rock during the night. With these requirements to be met the search for a suitable place will take a number of days. The time is invariably during the very early summer.

Finding the proper place the female serpent crawls beneath the rock and from the center shoves the earth outward with folds of her body. A circular or ovoid area is hollowed, with protective, sharply sloping sides and within this the eggs are laid to the number of one to two dozen. They are creamy white with a pliable, but tough covering. In form and size they are not unlike the eggs of the smaller birds. They are a bit more cylindrical perhaps, but this does not hold good with all snake eggs. Their chief difference is the pliable shell, like very thin leather.

The female blacksnake takes no further interest in her eggs, and has no further thought of her future young. She goes her way.

The eggs actually grow. They absorb moisture and from thread-like embryos the infant serpents within them increase in size until they are tightly packed within the eggs which have increased a third in diameter and may become lumpy and irregular in outline. A sharp point upon each infant's snout has developed—the "egg tooth"—this used to slit the shell and escape. The period of incubation has covered about eight weeks.

Emerging from the eggs the little serpents stay close by their nest for a day or so. They are quite unlike the parent, being gray, with large brown blotches. Within a week they are eating insect larvae, possibly young grasshoppers. This is very different food from that which they will seek when they have grown a few inches, but that is the way with all very young snakes, the early feeding habits of many of which remain a mystery.

Growth is rapid. They increase to twice their size by Autumn, but

remain quite unlike the parent in retaining their gray coat, although the brownish blotches are becoming darker. With the tang of chilling nights the inclination is to seek a deep fissure among the rocks and once it is found not to wander far away from it during the day. This is to be the winter shelter. The young serpent has already explored it—gone deeply into it. Whether or not that force called instinct prompts the reptile to realize that the fissure is deep enough to shelter it from penetration from frost, is a question. Certain it is that its investigation leads it to shelter safe from that curious point on the thermometer we call “thirty-two” if the scale be Fahrenheit, or “zero” at Centigrade. That is a fateful point in the decrease of temperature for most snakes. They can endure, while benumbed and motionless in hibernation, a temperature of close to freezing, but at or below that point where water freezes they are likely to be killed.

Well before the first slight frosts the little serpents of the brood are safely stowed away. Possibly a few have found the same crevice. They are sleek and fat and as during the winter sleep animation is practically suspended, they will emerge in much the same condition with the spring. Their next year's hibernation will be under quite different conditions. Not far from where they are lies the parent's den and they will find it. A few of them may have already found it.

From this point we will select the story of an individual. Possibly the story of the snake noted on the stone wall. Spring has warmed the ledgy bank and a young serpent issues from the hibernating crevice. It lurks near the sheltering fissure during the fickle weather of late April and early May then starts afield possibly reconnoitering along the borders of a marsh—for last year's frogs, developing during the summer from tadpoles, form ideal food for a snake of this size. There is a brief rest, hiding in a pile of loose stones as the serpent's lidless eyes are becoming dim with the thickening of the old skin. The eyes become white, like bubbles filled with smoke. Then they clear as an oily secretion forms under the old epidermis loosening it over the entire body.

The snake pushes the loose skin back over the upper jaw and lower jaw by rubbing among the rocks, then crawling forth catches the moist, tissue-like garment in the stubble and slowly crawls out of it, turning it wrongside out the entire length of the body clear to the tip of the tail. Right at the point where the skin is being turned backward there is a slight writhing of the scaly sides of the body—a con-

tracting to the rear, where the old epidermis is still encased and a muscular expanding forward of this. The skin slips backward and delicate as it is there is not a tear. It is an exquisite job, skillfully and slowly performed. It may take a full half hour. But there is a snake-skin in the grass! The whole garment is inverted. The integument that has covered the jaws gapes open and on the head-parts are the coverings of the lidless eyes like miniature, strongly concave lenses.

This early summer shedding is an event. The slim young creature glistens like new satin. It is a darker gray. The spots are fainter and will be gone after the next shedding. Wild mice are to be hunted in the nests, very young examples that are easily swallowed. With the assimilation of such prey growth is speeded. By late summer the young reptile is over two feet long and close to matching the lustrous blue-black of the parent. Only the abdominal parts are lighter—a pale, slaty gray.

A chill is again descending upon the woods at night. This is particularly apparent when the nights are still—when no breeze is stirring. On such nights there is a very heavy dew bringing into sharp evidence the webs of spiders which spin in the grass. At the very beginning of this period the blacksnake has turned its nose “homeward”. But what is home? This means the parent’s den. And here the snake is guided by an influence as remarkable and inexorably systematic as the autumnal migration of birds.

It may be two miles from the den when the seasons start to turn. Separating it from its goal may be marshes, undulating brooks, labyrinths of stone and tangles of vegetation. The force which appears to guide it is sense of direction. What else could there be? The topography of the ground produces hills and canyons. The vegetation is the equivalent to sightless jungle. The rocks present mazes of passages, but the serpent steadily works toward the den where its parents have hibernated for years, where their ancestors have hibernated, and their ancestors back for hundreds, and possibly much longer periods of years. The den of the adults is a specific spot—a ledge on a wild hillside, usually facing south. The whole side of the hill or mountain may be ledgy, but in that expanse of rock there is some spot where a fissure, or series of fissures lead a great distance inward and downward. The snakes found it ages ago. I have wandered over a whole mountainside and seldom found more than one den. The serpents that prowl the area for a mile or more know that spot and re-

turn to it each fall for shelter from *cold*. That word signifies the turning point in a snake's existence. Activity is influenced by the temperature of environmental air. The serpent's normal blood temperature is usually one degree lower than that of the air. A temperature of seventy to ninety is best conducive to its vivacity. Below seventy it slows down. At fifty it is nearly helpless. At forty it shows bare signs of life. Above ninety it seeks cooler shelter, undergrowth or damp ground where evaporation produces a lower temperature at the immediate surface. Even the serpents of the tropics avoid open places in the full glare of sun and desert types are averse to venturing abroad during the day unless scattered patches of vegetation offer close-lying oases of shelter from the heat.

So guided from the plight of exposure to cold the serpent starts for the den with the Autumn. It may linger at times through areas which I call "transient rocks".

These are large masses of stone retaining considerable heat from the sun as the night comes on. In such places, which are usually good feeding grounds, the snake may hesitate during a period of "Indian Summer", but moves on again after a shock or two from cool nights, warning it of frosts not far away.

A typical den is on the southerly slope of a hill or mountain of ledgy character. There may be a precipitous face of rock and at the bottom a jumbled mass of great fragments weighing tons. The spot denotes cataclysmic forces in action in dim ages past. Such forces have shattered the face of the cliff and among these shattered portions is a crevice at the bottom, or there may be several adjacent crevices. These form the den. The area is secluded and tangled. Wild grape writhes its way among the rocks. Numerous struggling trees have sought root wherever they could. "The crevice", however, is usually adjacent to a platform of broken stones or open patch, or patches, where in the spring the serpents emerge and in clusters lie intoxicated with the return of the life-giving sun with its temperature so necessary for their activity.

The blacksnake finds the hibernating lair of its parents and ancestors, ascending the slope past the first hibernating crevice of its early youth, where now with its stouter body it could barely squeeze in. It glides through the tangle of grape and woodbine to find other members of its kind, and still others of the serpent clan very different from itself. There are copperheads and rattlers on the shelf of the ledge, coiled tightly in precise circular fashion as is the way of these fanged

species, each with a symmetrical, and lateral loop of the neck laid flat upon its coils ready for a lunge of the head. The blacksnake may glide directly over some of these forms, but there is never a move on the part of the poisonous members, seldom as much as a tongue flash. The serpent clan is particularly tolerant or passive about the changing of position, arrival or departure of other members unless such are of the attacking or cannibal types and in the northerly areas of the blacksnake's range there are no such disturbing enemies. The blacksnake is alleged to attack the rattler, but he does nothing of the kind. He may eat an occasional young garter or ribbon snake, but he never battles with the rattler. He has no means of fighting such a powerful snake. Despite the scientific name constrictor, the blacksnake is not a constrictor. The title was applied to him years past by Linnaeus, in times when the respective habits of serpents were but vaguely noted.

So the rattlers, copperheads, and blacksnakes go into the den together in fine fraternity. I have seen be vies of heads of the three kinds peering from the crevices in spring when they had been lured by the warming ground to peek out, but were not inclined to venture forth as yet.

Such is the typical mountain den. Other kinds of serpents are not so keen about the higher ledges. The big mountain blacksnake, a slower and much heavier serpent than the racer occasionally takes advantage of such dens, but prefers sheltering deep in some disintegrating hollow of a big tree where the rotting debris is safe from freezing temperature. The striped snake and water snake prefer crevices in shaly banks close to streams.

During May the ledge-dens are populous with the emerged members—on certain days. These are times when the air is still and shade temperature along the ledge is close to seventy. As the ledge usually faces south and is in a great sheltered pocket of the mountain—for we have noted how particular the serpents are in selecting this spot—the ledge area is warmer than the outside open country.

May is the breeding season. It is the only breeding period throughout the warm months. During this time of the year occasional blacksnakes, of either sex may deliberately attack a human intruder upon the ledge. I have had them follow me twenty-five feet or more and make long sweeping strikes as high as my knees. Possibly one in twenty individuals will do this. The others skim over the rocks in flight with a grace and speed that invariably causes me to ponder just how they do

it. I have never noted a rattler or copperhead indicate any hint of actually attacking a human, as does the harmless member of the ledge clan.

There is no thought of eating among any of the serpents on the ledge until the mating period is over. By the end of May the exodus into surrounding woods and meadows where food is numerous is well under way. There is an outward stop at the transient rocks, then the clan radiates out in all directions. A favorite path of exploration is, oddly enough, provided by their greatest enemy—man. This is the old stone wall with its sheltering labyrinth of passageways and offering good hunting for the smaller rodents.

By mid-June, if the season is normally warm the average den is deserted. Selected as it is to get every benefit of the Spring sun the rocks are too hot for the snakes. On mountains running to a flat top and with numerous shelving rocks sun-sheltered by brush, some of the rattlers may remain not far from the den if hunting is good and water is available. Around the greater number of dens, however, one may look for days during the summer and see not the sign of a snake. The clan is scouting far afield and some may be as much as two miles away.

In a way, such habits apply to all serpents. They are not aimless wanderers. They live in little worlds of their own. Even in the mild winters of southern Florida, where hibernation is short and there may be practically no frost, I have noted that the great diamond rattler, found singly, here and there the greater part of the year, has its favorite spots to congregate in moderate numbers during the cool season. There are no extensive dens, but every rattler has its homing spot and six or eight may gather here each fall. The favorite sheltering place is under the roots of a great pine, which, standing well out of the soil at the base of the tree, offer cave-like shelters beneath, these extensively hollowed out by some burrowing mammal, or possibly a big gopher tortoise. The tropical serpents have similar places. And with them the shelter may be utilized in avoiding undue heat instead of the benumbing touch of lowering temperature avoided by their northern allies. The roots of sage brush or fissured rocks form dens for the desert kinds. But all of them have specific places to which they regularly return, which places are the mating grounds. Summer wanderings are directly guided by two necessities—food and water.

CHAPTER II

THE SCOPE OF THE CLAN

THERE are slightly over two thousand different kinds of snakes. A large majority of this number is composed of non-venomous kinds, in great variety of form and size. The extent of this majority is far greater than ordinarily surmised.

There is but an approximate one-eighth of the known species of serpents with highly-developed poison conducting fangs and of this fraction not more than sixty per cent are really deadly to man.

Owing to radiating phases of development the scope of the serpent clan has produced a rather complicated classification. There are over a dozen distinct families and three hundred genera. Snakes range in size from thirty foot pythons weighing in excess of three hundred pounds to midgets less than six inches long which could glide through an orifice an eighth of an inch in diameter. In relationship the serpents are immediately allied with the lizards, in fact are assigned to the same scientific order—that of the scaled reptiles. Snakes differ from lizards in the body skeleton, being composed simply of a backbone and ribs. With a few there are vestiges of pelvic bones and rudimentary (internal) hind limbs. In considering the relationship, it should be understood that there are forms of legless lizards, of serpentine outlines but they lack the loosely-connected, expansible jaw structure for engulfing the prey entire, characteristic of snakes.

But why, comes the natural question, can the snakes—limbless creatures so similar from a general point of view—form so many families? Classification is based on the following points:

On the structure of the skull, which is of major importance in the separation of families. The skull may be of a type not to enable the serpent to swallow comparatively large food; that is the lower jaws may not be provided with the lever-like connections to extensively move forward to grasp and swallow by subsequent pulling of recurved teeth. There is a fair-sized family distributed through the Old and New World tropics of such species. All are small and mostly live in ant-hills and feed upon ant larvae. There is the family of boas and

pythons of the New and Old Worlds respectively. They have elastically attached jaw mechanism enabling them to swallow very large food. They have rudimentary, internal hind limbs, which project as a pair of spurs from the body. The teeth of serpents, both in number, size and development greatly vary. The scalation covering their bodies, both in the number of rows, shape of the scales and their arrangement forms the basis for separation. With the poisonous serpents there is a sharp line of distinction from the other kinds owing to the presence of grooved or hollow fangs to inject poison. With one family the fangs are short and straight, and rigidly set. With two others they are of such length, they are necessarily attached to movable bones and fold back against the roof of the mouth when the jaws are closed. One family is composed of members which live in the sea and have a vertically compressed tail like an oar. Such are the differences which separate snakes into families.

The family of Colubrine serpents dominates all others by its size in numbers and far flung distribution of its members. It is made up largely of the typical harmless serpents of the world but there is an extensive series of species which have short fangs at the rear of the upper jaw and a comparatively mild poison to benumb their prey. The Colubrine serpents occur in every country where snakes are found. The family is so extensive that it is divided into several subfamilies. Its members differ from boas and pythons in having no vestiges of rudimentary hind limbs. This family contains approximately half the genera of all the known species of serpents. Some of these genera are so extensive that the family greatly dominates in the classified lists of serpents. While some of its members attain a length of ten feet, these larger kinds are slender and whip-like and are nowhere near the bulk of a boa or python of that length. Diminutive species are abundant, some of them scant of an eighth of an inch in diameter. Among species of moderate size, form varies from stout to extremely slender. While the greater number are moderately slender some have wide heads, thick bodies and resemble poisonous snakes of the viper type. Thus it is incorrect to figure that harmless serpents may be readily distinguished by slender outline. The blacksnake, "milk" snake, striped snake, water snake, tropical rat snakes and the European grass snake are among the Colubrine kinds without rear fangs—in fact, typical harmless snakes. The family contains many species of great value to man as rodent destroyers.

Closely allied to the Colubrine snakes is a family which warrants recognition as such, only by possession in the upper jaw of a pair of short, rigidly set poison fangs. The members are ninety per cent slender, looking quite like the typical harmless serpents, yet among them are some of the world's most deadly reptiles. Here again is an illustration to shatter the common idea that poisonous serpents may be distinguished by form alone. Indiscriminately mixed with harmless serpents of ordinarily narrow head and moderately slender body, no one but an expert could distinguish members of this dangerously deceptive family. They are known as the Elapine snakes, the cobras of Africa and Asia, the Indian kraits, the African mambas, the Australian black and tiger snakes, and the brightly colored, slender coral snakes of the New World.

In the development of serpent life a number of the Elapine types appear to have taken to the sea and become highly specialized in the development of a vertically compressed, oar-like tail. These actual sea serpents form a recognized family, although they might be regarded as marine kraits or cobras. There are over fifty species, which range in size from three to twelve feet. They abound in the Indian ocean and western tropical Pacific.

Two families are composed of members which have reached the zenith of perfection in fang development. The long, poison-conducting teeth are like hypodermic needles. With their excessive development has come the perfection of a mechanism enabling them to be folded against the roof of the mouth when the jaws are closed. These are the vipers. The typical vipers are found only in the Old World and form a family in which is the European viper or adder, the Indian *tic-polonga* or Russell's viper ("The Speckled Band" of Conan Doyle's tales), the puff adder, rhinoceros viper and Gaboon viper, of Africa.

The other family of vipers is both New and Old World, although more elaborately represented in the former. Its numbers are distinguished by a deep pit between the eye and the nostril. Owing to this marked and curious development they are known as pit vipers. Among them are the rattlesnakes, copperhead and water moccasin of North America, the fer-de-lance and bushmaster of the American tropics and species rather similar to the copperhead and moccasin occurring in Asia, besides a number of medium-sized terrestrial and arboreal Asiatic species.

CHAPTER III

THE DISTRIBUTION OF SNAKES

WHEN serpents are collectively considered their distribution offers some interesting details. These might receive but cursory attention if injected here and there along extended descriptions.

While allied to lizards, the serpents present a rather different condition in world occurrence. Both lizards and snakes are far more abundant in species or kinds in the tropical latitudes, but lizards rapidly decrease in species in the temperate latitudes north and south of the equator, while serpent life is represented by a generous number of species well through the temperate zones and some of these, particularly in the northern temperate latitudes are abundantly represented in numbers well beyond the areas where lizards cease to occur. An example of this might be given in the New England states, where the lizards have dwindled to a single small species and that but sparingly seen. In that same area there are over a dozen species of snakes, the greater number rather generally common. Hence the serpent among all reptiles has become adapted to lower temperature conditions and through its care in selecting favorable hibernating quarters, as indicated by specific snake "dens", has most extensively pioneered in extending its numbers from the headquarters of the reptiles—the zones of heat and humidity.

With the exception of several inconsistencies in island distribution snakes occur in practically every part of the world where reptile life is possible. In the northerly hemisphere they dwindle to scant numbers in Canada slightly beyond the 50th parallel of latitude, while the grass snake and the European viper extend into Siberia. Serpents are usually more abundant, however, in the representation of their respective kinds in the temperate zones, than in the warmer climes. In all of the areas through which I have traveled and hunted I have never noted a greater abundance of serpent life than in some of the easterly counties of New York, or adjacent counties of New Jersey

and Pennsylvania. The same condition may be observed in Europe with the widespread and common occurrence of the grass snake and the viper, and similar conditions exist in the temperate latitudes of eastern Asia.

In number of species the United States is rich in serpent life. Here are over a hundred kinds of non-venomous snakes and close to twenty poisonous species. Many of the species are extremely abundant. Europe, to the contrary, has rather a scant number of species, there being not much over a dozen non-venomous and half a dozen venomous kinds, although several of the species are extremely common.

Serpents have also spread through various types of terrain and many have become highly specialized to markedly different environment.

Thus even the deserts have their respective types, while strictly arboreal forms inhabit the jungle forests, swift, gliding kinds the open places, semi-aquatic species the margins of ponds and streams and forms with a vertically compressed, oar-like tail live in the tropical seas. The more highly specialized, poisonous species are particularly interesting in their distribution. Rattlesnakes occur only in the New World and their headquarters are in the southwestern United States where over a dozen kinds occur. Thence their distribution radiates northward with but a single species in the northerly Pacific region and plains states and two in the northeasterly portion of North America.

There are two other species in the southeastern states. Several of the essentially southwestern species extend easterly into Texas and southerly into Mexico. Curiously enough, the extension of rattlesnake distribution ranges all the way to the Argentine, but is represented by only a single species throughout the tropical area. There is no doubt but that in time some particularly keen scientist specializing in tropical life will gather a series of Central and South American rattlers and by their markings indicate the advisability of defining separate species, but even in that event there can be no doubt as to the fact that the tropical rattler is a distinct type, varying only a bit in pattern and lacking among its wide-spread races the variety in size, pattern and form of the rattlers in their headquarters, which is the United States.

Practically every portion of the United States is inhabited by poisonous snakes except northern Maine, although a full two thirds

of this area is inhabited only by rattlers. The copperhead is confined to the easterly states, the water moccasin to the southeast and the coral snake to the southerly areas.

Southern Mexico, Central America and South America, have a quite different race of poisonous serpents. The lance-head vipers, of which the fer-de-lance is a common type, are the dominating poisonous snakes of the New World tropics. There is also the great bushmaster and numerous coral snakes.

Consider then, the continents of North and South America, with their connection of Mexico and Central America. That far-flung area is practically everywhere inhabited by poisonous serpents. Where the continents join, the Gulf of Mexico and Caribbean indent the shores to form a great crescentic nest within which rest the luxuriant, tropical islands of Cuba, Jamaica, Hayti and Porto Rico, which harbor extensive series of reptilian species. Yet no poisonous serpent occurs upon these large islands. Nor does any poisonous snake occur anywhere in the West Indies except far southward in the chain, in Martinique and St. Lucia. Other great islands have no poisonous snakes, though close to infested mainlands and one of these is Madagascar.

The viper has never been found in Ireland although common in England and Scotland. Hawaii has no serpents. In marked contrast to this lack of island distribution is the case of a particularly deadly lance-head viper found on a very small island off the coast of southern Brazil about forty miles southwest of the Bay of Santos. This island is of steep and rocky slopes with separated patches of tropical vegetation. It has barely three quarters of a square mile of surface. Yet it teems with this tree viper which attains a length of between three and four feet and has developed a powerful poison to instantly subdue its prey, which consists of small birds which live upon the island. It has been found only on what is little more than a large sea rock washed on all sides by the open ocean.

Asia and the Malayan regions in the aggregate, despite their vast tropical areas have no greater variety of poisonous snakes than the New World. A considerable number may be listed from the entire area, but the species are actually not so bunched in their occurrence as in the New World. Several pit vipers, rather similar to the moccasin and copperhead are common in eastern Asia as are a number of