

Injuries by Venomous Animals in Indiana

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Although injuries inflicted by venomous animals are by no means a major problem in the midwest, the interest and concern shown by the general public requires that the zoologists be able to recognize these animals and have some knowledge of their habits.

According to data obtained by the Department of Public Health Statistics of the Indiana State Board of Health, twenty-one deaths due to poisoning by venomous animals were reported from Indiana during the years 1930 to 1949 inclusive. This figure is almost certainly too low, however, for such deaths occurring in the occupations of agriculture or forestry have, since 1934, been merged into the general category of agricultural accidents and are not listed separately. The species of animal involved is not given in the statistical listings and is known only in those cases which have been investigated by the writer or others. At least 3 of the deaths in the series are ascribed to insect stings, one to spider bite, and 4 to snake bite. The age of the victim is not given in 12 cases; under 10 years in 5 cases, between the ages of 25 and 64 in 3 cases, and over 64 in one case. Males outnumber females about three to one. There has been a marked decline in the number of fatalities in recent years; 16 of the cases occurring prior to 1940. It is interesting to compare the Indiana data with that compiled by Swartzwelder (6) for Louisiana where there were 51 deaths during the years 1930 to 1945 inclusive.

Of the known venomous animals, only the spiders and snakes are represented in the midwest by potentially dangerous species. Stinging insects present a special case; since serious or fatal injuries result from hypersensitivity, multiple stings, or infection. The scorpions, an important group in tropical and subtropical regions, are absent except for an occasional accidentally introduced individual. The larger of our native centipedes, particularly the common orange or grey *Scolopendra* sp., will bite if restrained but produce only local pain and swelling.

The dangerous nature of the black widow spider, *Latrodectus mactans*, is well known. The dangerous form of this spider, the adult female, is ordinarily easy to recognize. No other medium-sized spider in our geographic area has such a shiny, black, polished appearance. The bright red hour-glass spot on the underside of the abdomen is a good field mark (Figure 1). In younger females it is often combined with a row of red spots along the dorsal midline. All red marks may be absent in rare cases. I saw one large female *Latrodectus* that was chocolate brown with cream yellow bars on the sides of the abdomen, a

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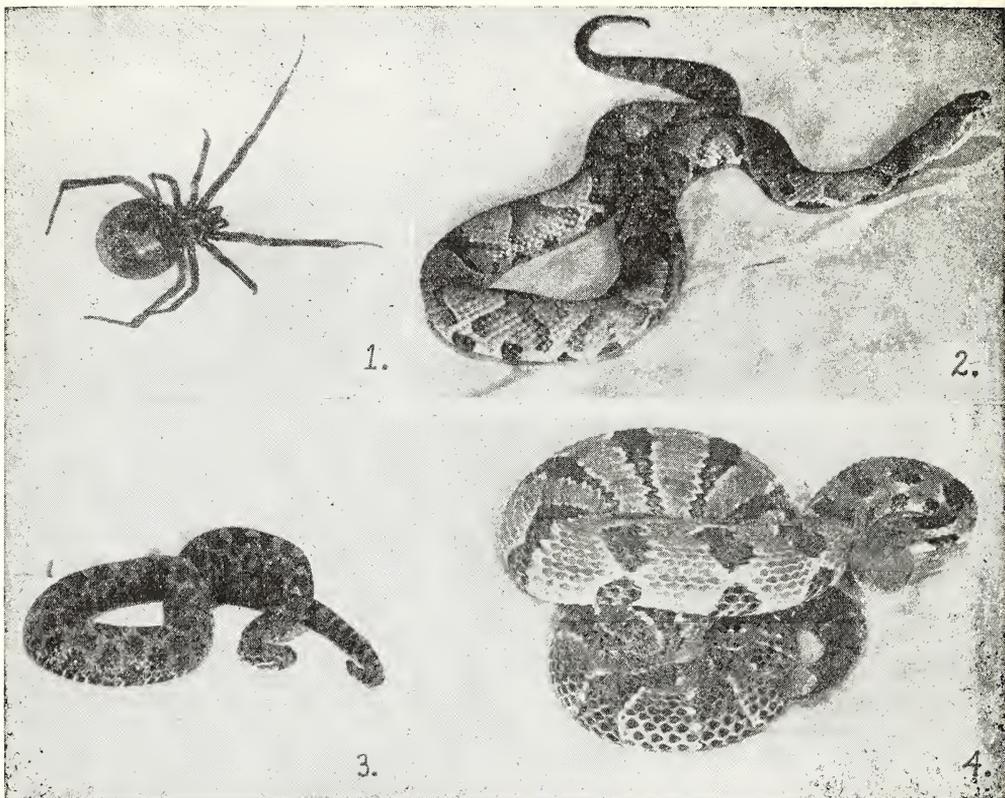


FIG. 1. Black widow spider *Latrodectus mactans*. Adult female collected in Ohio Co., Indiana.

FIG. 2. Copperhead *Agkistrodon contortrix mokeson*. Adult female collected near Kurtz, Jackson Co., Indiana.

FIG. 3. Massasauga *Sistrurus c. catenatus*. Adult male collected in Starke Co., Indiana.

FIG. 4. Timber rattlesnake *Crotalus h. horridus*. Adult female collected in Jackson Twp., Brown Co., Indiana.

midline row of orange spots, and an orange hour-glass. This seems to represent a case of abnormal persistence of the normal juvenile pattern and color.

The black widow is known from all parts of Indiana but appears to be considerably more plentiful in the southern half of the state. Most specimens I have encountered have been concealed beneath stones, boards, scraps of metal, cardboard, and other rubbish. Rather open, dry, warm situations are preferred; deep, moist woods and swampy areas are usually avoided. Reasonably clean, well-kept houses do not afford a favorable habitat for this spider; however, specimens may be introduced in baskets of vegetables, firewood, etc. Several alleged

black widows found in houses have been identified as *Phidippus audax*, a small blackish jumping spider with an orange dorsal spot. Barns, garages, tool sheds, and other outbuildings are better refuges for *Latrodectus* and may be quite heavily infested in some cases. The web of the black widow is never neat and geometrical and rarely located in the open. The construction of the web is very irregular; the strands coarse and unusually strong.

Most published data on cases of black widow poisoning have been obtained in the southern and southwestern United States and in tropical regions. This may be the result of greater interest in the problem, more accurate case finding, or greater abundance of the spiders. It is also possible that there may be geographic variation in potency and quantity of venom and with respect to the readiness with which the spiders attack man. In most published accounts, bites occurred when the spiders became entangled in clothing or when webs, particularly webs containing egg sacs, were accidentally touched. Several authors stress a high incidence of accidents among persons using outdoor privies. It has been my experience that the black widow almost invariably attempts to escape when disturbed in the field. An attack reaction may sometimes be elicited by touching the web of captive spiders particularly during the period of egg-guarding.

Bogen (1) reported 17 deaths in a series of 380 cases of black widow poisoning from 18 states. Stahnke (5) reports 7 fatal cases of spider bite in Arizona in a 20-year period. Three were definitely ascribed to the black widow. Data for Indiana and the surrounding territory are meagre. Cases of spider bite do occur; however, the offending arachnid is rarely identified. About four years ago, a fatal case occurred in Ripley County, the victim being an 81 year old woman. The spider was said to have been "probably a tarantula", but this would seem rather unlikely. I know of at least two non-fatal cases ascribed to the black widow and two cases ascribed to the wolf spider (*Lycosa* sp.). The latter were not accompanied by symptoms of generalized toxemia; although there was considerable local pain and swelling. It may be mentioned in passing, that severe cramping abdominal pain with marked muscular rigidity is perhaps the most pronounced symptom of arachnidism due to the black widow and may lead to confusion with such conditions as acute appendicitis or ruptured peptic ulcer especially since the bite may not be particularly painful and produce little local swelling or discoloration. Greer (3) considers burning sensations in the soles of the feet a highly significant symptom which may permit diagnosis when the history of a bite cannot be obtained.

Control of these spiders in the vicinity of dwellings requires the cleaning up of such trash as may shelter the animals with destruction of adults and eggs as found. Insecticides including DDT are not particularly effective. A spray of 15% unslaked lime in kerosene is recommended by Gowanloch (2) but must come in direct contact with the spiders. Creosote is repellent to *Latrodectus* and may be used for the treatment of privies.

The incision and suction treatment recommended as a first aid

measure in snake-bite seems to be of little value in arachnidism. In fact, no first aid treatment except possibly the local application of cold appears useful. The intravenous injection of 10% calcium gluconate, which is readily available and stable indefinitely, often gives dramatic relief from the symptoms. Commercially prepared antivenin or the serum of patients who have recovered from bites has been used with good results but is rarely available.

The species of poisonous snakes known to inhabit Indiana are the timber rattlesnake, *Crotalus h. horridus*, the massasauga or swamp rattlesnake, *Sistrurus c. catenatus*, and the copperhead, *Agkistrodon contortrix mokeson*. None of these snakes pose much of a recognition problem except the copperhead whose rather distinctive pattern and form (Fig. 2) may be learned by the observation of a few captive or freshly-preserved specimens and the very young massasauga with its tiny rattle and markings like a young fox snake or hog-nosed snake. Dead specimens of any of these snakes may, of course, be readily identified by the presence of fangs, loreal pits, elliptical pupils, and undivided sub-caudal plates. All of the numerous Indiana reports of water moccasins I have investigated have been based upon harmless species; however, the venomous moccasin is common in parts of southern Illinois and may occur in Posey and adjoining counties. Older writers sometimes include Indiana in the range of the coral snake on the basis of a specimen from Ripley County reported by Bigney in 1891. There have been no further reports from the state, although a specimen turned up recently in the suburbs of Cincinnati.

The massasauga (Fig. 3) originally inhabited wet prairies, peat bogs, and swamps throughout the northern half of Indiana. It has never been reported in the state south of Indianapolis. Its present-day distribution is very local and spotty. Drainage and agriculture have greatly reduced its numbers particularly in the Till Plains where it is virtually extinct. Copperheads occur throughout the southern part of the state and range northward in the west at least to the Turkey Run area. I have records for 20 counties. Dry, rocky, wooded ridges are the preferred habitat, and the species may be quite numerous locally. The timber rattlesnake (Fig. 4) has similar habitat preferences, and its original range in Indiana was probably much the same as that of the copperhead. It is now quite rare except in a few wild areas. Specimens are regularly taken in sections of Brown, Monroe, Morgan, and Martin Counties with a few reports from other places. The reforestation of considerable tracts in southern Indiana with restoration of much of the original biota may well cause both these reptiles to increase in number.

Information on 30 cases of snake bite in Indiana has been collected and is presented in Table I. The mortality rate in the series is probably too high; for it is the severe and complicated cases that are reported or remembered. The copperhead and the massasauga, which account for 25 of the cases reported, are probably unable to inflict a fatal bite upon an adult unless the picture is complicated by infection,

TABLE I. Snake-bites in Indiana 1930-1950

Patient & Locality	Site of Injury	Species of snake	Circumstances under which injury sustained	Treatment	Result
Boy 12 Clark Co.	finger	Copperhead	Attempting to capture snake	Incision & suction Permanganate	Uneventful recovery
Adult female Jefferson Co.	ankle	Large Copperhead	Stepped on snake while climbing hill	Incision & suction Antivenin	Recovery. Swelling of leg persisted several weeks Died "in a few minutes"
Infant Crawford or Perry Co.	face	Copperhead?	Child crawled under porch of house	Apparently none	
Adult male Clark Co.	hand	Copperhead	Attempting to capture snake	Incision & suction	Uneventful recovery
Adult male St. Joseph Co.	finger	Massasauga 18"	Clearing obstruction from blades of mowing machine	Incision & suction	Uneventful recovery
Boy 4 LaPorte Co.	finger	Large Massasauga	Unknown	Incisions Antivenin—3 doses	Death 7 days later from hemolytic anemia
Boy 16 Floyd Co.	finger	Copperhead 23"	Touched captive snake in sack	Incisions Antivenin	Recovery: some residual stiffness of finger
Adult male Monroe Co.	right forefinger	Copperhead	Taking up rug in old house	Incision Antivenin	Uneventful recovery
Girl about 6 Morgan Co.	leg	Timber Rattlesnake	Stepped on snake in high grass	Unknown	Died
Girl 7 Brown Co.	right ankle	Copperhead	Unknown	Incisions, Antivenin MgSO ₄	Minimal symptoms. Recovery
Boy 3 Brown Co.	left foot	Copperhead	Unknown. Apparently bitten at same time as preceding patient	Same as above	Moderate symptoms. Recovery

TABLE I. Snake-bites in Indiana 1930-1950—Continued

Patient & Locality	Site of Injury	Species of snake	Circumstances under which injury sustained	Treatment	Result
Boy 2 Floyd Co.	foot	Copperhead 20"	Playing near woodpile	Incisions Antivenin	Moderately severe symptoms. Recovery
Adult male Crawford Co.	unknown	"Water Moccasin" 2	Working on construction gang near river	Said to have drunk a large quantity of whiskey	Died
Boy 10 Floyd Co.	finger	Copperhead	Touched a snake while climbing among rocks	Antivenin only	Recovery
Adult male Marion Co.	finger	Copperhead 11"	Measuring captive snake	Incision & suction MgSO ₄ soaks	Uneventful recovery
Adult male Parke Co.	thumb	Timber Rattlesnake	Showing captive snake to friends	Incisions, antivenin	Severe local reaction. Recovery
Adult male Parke Co.	hand	Copperhead	Picked up snake—mistaken for harmless species	Unknown	Uneventful recovery
Girl 4 Fulton Co.	foot	Massasauga 12"	Playing in yard	Incisions	Severe symptoms. Recovery
Adult male Marion Co.	2 bites hand	Diamond-back Rattlesnake	Handling snake in sideshow	Antivenin Incision & suction	Severe symptoms. Recovery
Adult male Brown Co.	finger	Copperhead	Transferring captive snakes from cage to bag	Antivenin	Severe serum reaction. Recovery
Boy 14 Miami Co.	left leg	Massasauga 24"	Unknown	Antivenin, Incisions, Tetanus antitoxin	Uneventful recovery
Adult male LaGrange or Noble Co.	finger	Young Massasauga	Picked up snake—mistaken for harmless species	Unknown	Recovery

Boy 10 Bartholomew foot Co.	right hand	Copperhead?	Moving a large rock in woods	Incisions. Antivenin, Tetanus & gas-gangrene antitoxin	Minimal symptoms. Recovery
Adult female Porter Co.	left hand	Massasauga	Working in yard	Antivenin	Recovery
Adult male Orange Co.	finger	Copperhead	Reached into empty feed sack	Unknown	Recovery
Girl 7 Brown Co.	hand	Copperhead	Playing in abandoned woodshed	Unknown	Recovery after rather pro- longed illness (poss. second- ary infection)
Adult male Dubois Co.	hand	Copperhead	Reached into corn crib	Antivenin	Recovery
Boy 3 Parke Co.	right hand	Copperhead?	Unknown	Incisions & packs. Tetanus antitoxin	Moderate symptoms with good recovery
Adult male Vigo Co.	left forefinger	Florida pigmy Rattlesnake 20" in laboratory	Working with captive snake	Incisions, MgSO ₄ and Borax packs	Minimal symptoms Recovery
Adult male Vigo Co.	hand	Small Massasauga	Working with captive snake in laboratory	Incisions MgSO ₄ packs	Recovery

¹ Cases previously reported by Lyons and Bishop (1935).

² So reported to me. Probably copperhead or timber rattlesnake.

psychogenic shock, marked debility, or the results of injudicious treatment. Some cases are so mild a doctor may not be consulted. The bite of a large timber rattlesnake is much more serious, but the rarity and rather mild disposition of this snake make accidents uncommon.

In this series of cases, almost one third involved individuals attempting to capture venomous snakes or persons engaged in handling these animals. Two additional cases were the result of picking up a venomous snake that had been mistaken for a harmless species. Poisonous snakes should be captured and maintained in captivity only by responsible individuals aware of the danger involved and willing to take all due precautions. The handling of snakes purely as a display of bravado is deplorable.

Eleven cases, three of them fatal, occurred in children of ten years or less. In addition to the child's greater susceptibility to the venom, small stature and a greater tendency to assume the quadrupedal posture predispose to bites high upon the limbs or upon the body or face.

Many of the snake-bites in this series were sustained close to home. Snakes become abundant about dwellings only if there is a plentiful supply of food—usually small rodents—and suitable shelter. A loosely-constructed stone wall or foundation, a pile of old lumber, or a tumble-down shed if located in a favorable spot will attract snakes in surprising numbers. Thorough search of a large log pile in Floyd County revealed six copperheads and six other species of reptiles and amphibians including a black kingsnake that had eaten a seventh copperhead. The cleaning up of such habitats will greatly reduce the incidence of snakes about dwellings. It is safer to remove boards and other litter during the winter or early spring when snakes are inactive; however, a campaign in mid-summer may dispose of gravid females before young are born. Occasionally country residents report a brief but rather striking invasion of their premises by snakes usually during the late summer. There is good evidence that timber rattlesnakes and copperheads as well as certain harmless species follow rather well-defined routes between summer ranges and hibernating areas. The snakes will continue to use these routes despite the presence of human habitation. On the Morgan-Monroe State Forest there is a rattlesnake crossing where one or more of these reptiles is killed each August in nearly the same spot on the black-top road.

Observations on the copperhead in southern Indiana indicate that the snakes hibernate on wooded, rocky hillsides. They emerge from hibernation late in April but remain close to the hibernating area for about a month before gradual dispersal to summer ranges. During the summer, the reptiles hide by day and forage actively by night. Late in August, the snakes return to the hibernating area rather promptly and remain there basking on mild days until the middle of October. It is probable that both local species of rattlesnake follow a similar schedule. Nearly all snake-bites in this series excluding those by captive reptiles were sustained during the period of summer activity which also coincides with the peak of human outdoor activity. Although

information is available in only a few cases, the majority of bites seem to occur between the hours of six and nine in the evening. It is fortunate that, during the summer, the snakes are feeding frequently thus reducing the possibility of receiving a maximum dose of venom.

Since the treatment of snake bite is unpleasant and not without danger in itself, it is important to determine first that the suspected bite was really caused by a venomous snake and second that an appreciable amount of venom was injected. Much unnecessary alarm and undeservedly vigorous treatment has been occasioned by bites of harmless snakes or even wounds by inanimate objects. There are also a few well-authenticated cases where actual bites by venomous snakes have not been accompanied by any indications of poisoning. Insofar as our species are concerned, an effective bite is promptly followed by pain, marked local swelling, and discoloration.

In the treatment of snake bite, opinion is divided as to the relative merits of surgical treatment—ligature, incision, and suction—and the use of antivenin. Although further clinical observations and experimental work are required, it appears that antivenin may be used to supplement surgical treatment but should never supplant it. If a tourniquet is used as a first aid measure, it must be loosened at intervals. Gangrene has resulted from improper use of ligatures. Potassium permanganate has no place in the treatment of snake bite. Weak solutions are inferior to epsom salts as a wet dressing while strong solution can cause great damage. The definitive treatment of snake bite, particularly the injection of antivenin, should be entrusted to a physician except in the most dire emergency.

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