

## Studies on Poisonous Snakes of Indiana

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The stragglers remain of three species of poisonous snakes still inhabit certain sections of Indiana: the Timber Rattler (*Crotalus horridus*), Prairie Rattler or Massasauga (*Sistrurus catenatus*), and Copperhead (*Agkistrodon mokasen*).

The Timber Rattler appears to be confined to the high, dry, rocky, and wooded sections of the state. Some twenty-five specimens have been collected during the past five years, all of which came from Brown County and vicinity. Two phases have been found, the dark and light phases, and in both cases the female is the lighter of the two. The Timber Rattler is not vicious in captivity, as a rule, but appears melancholy and does not take food willingly. This species may be readily recognized by the roughly chevron-shaped black blotches on the back superimposed upon a sooty-yellow body. Posteriorly, the tail becomes black.

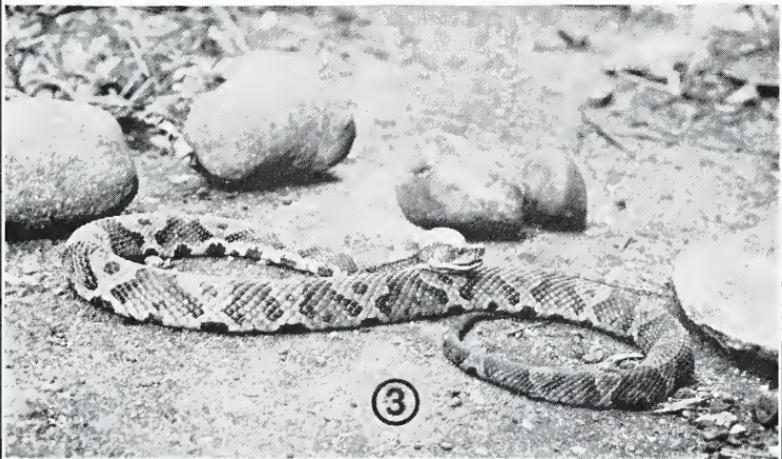
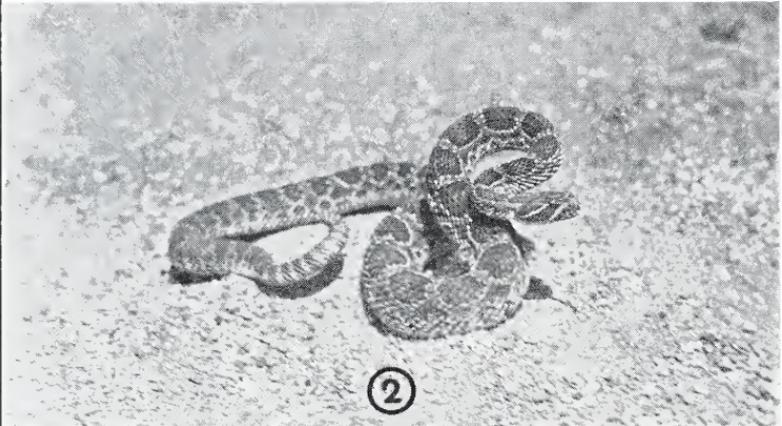
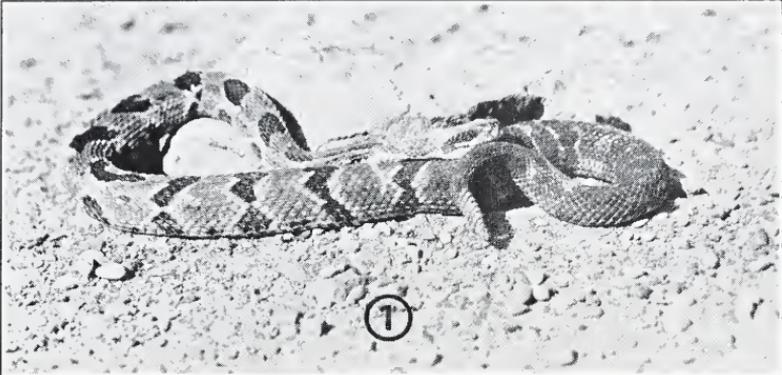
The Prairie Rattler has survived, it would seem, in the low, swampy regions of Northern Indiana—regions in the main not well adapted to agricultural pursuits. Only two specimens have been collected by the writer, both of which came from the vicinity of Cedar Lake. Unofficial reports, however, have been received from other sections.

The Prairie Rattler is by far the more vicious of the two Indiana rattlers. This nervous little warrior shows no signs of retreat when approached. In fact, on one occasion while adjusting the lens of a motion picture camera, the writer glanced up in time to find this fellow edging up closer and expressing all indications of fight. Its body color is olive-gray with a dorsal series of rounded dark blotches. A characteristic dark brown band bordered with white extends diagonally from the corner of the mouth down the side of the head below the eye. The belly is dark and mottled.

The Copperhead remains generally but sparsely distributed in the high, dry, and rocky regions of Indiana from the central portion south. Specimens have been collected from Brown County and vicinity, Harrison, Perry, Posey, and Putnam counties.

The Copperhead can be readily recognized by the coppery-colored head and a series of uniform hour glass-shaped blotches of chestnut-brown on the back. This reptile is an unpretentious, graceful, and beautiful little creature, but treacherous. It never spars with its adversary, as do the rattle-snakes, but throws itself into a figure S coil and strikes simultaneously. On several occasions, alley rats were introduced into an open pen containing both rattle-snakes and copperheads. Invariably a copperhead killed the rat while the rattlers were sparring for alignment on the victim.

**Quantities of Venom Exuded.**—It is recognized that no great importance is attached to the exact quantities of venom exuded by poisonous reptiles. Moreover, such factors as the age, size, and species of reptile, together with the degree to which the animal may have been depleted of venom before the test, offer considerable variation. The



Figs. 1-3. Venomous snakes of Indiana. Fig. 1. Timber Rattler (*Crotalus horridus*). Fig. 2. Prairie Rattler (*Sistrurus catenatus*). Fig. 3. Copperhead (*Agkistrodon mckaseni*).

viscous nature of the venom, the small quantities exuded at a single bite, and the hazards accompanying the extraction also present technical problems.

Simple apparatus was devised for measuring the venom. A small glass funnel was sealed on the end of a 1 cc. pipette. The opposite end of the pipette was stopped with a paraffin plug and the funnel covered with two layers of gauze tied about its neck with a rubber band. The funnel was manipulated with one hand and the reptile with the other. The snake, held close behind the head, was brought up to the funnel and permitted to sink its fangs through the gauze and deposit its venom into the funnel. The venom was kept suspended up in the pipette by an air cushion between it and the paraffin plug. After disposing of the reptile, the paraffin plug was punctured and the venom let down into the pipette for measuring.

Healthy snakes were used and they were permitted to remain some seven to ten days undisturbed prior to the test. The reptiles were not permitted to chew on the gauze but to insert the fangs one time only at each trial test.

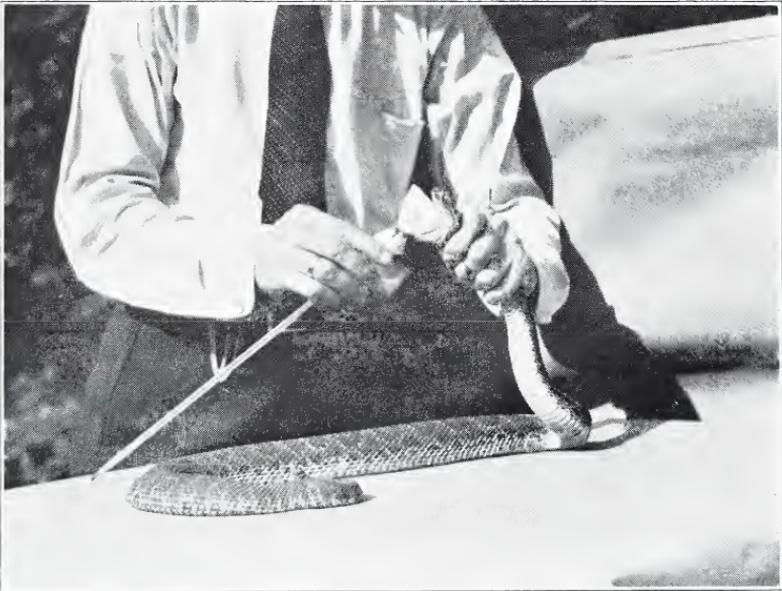


Fig. 4. Method of extracting and measuring venom (*Prairie Rattler*).

The Timber Rattler (4 ft. 9 in. long) gave out approximately 0.5 cc. of venom at the first and second bites; at the third, between 0.2 and 0.3 cc.; and at the fourth bite the quantity was materially reduced to about 0.1 cc.

The Copperhead (3 ft. 3 in. long) gave a dosage of approximately one-half that of the Timber Rattler but decreased at successive bites in much the same ratio.

**Effects on Rats.**—The lethal effect of the first and successive dosages of the Timber Rattler was then tried on alley rats as experimental animals. The rats were trapped in a wire box to prevent injury. A type of harness was made to shackle the rat during the tests. *Reptiles frequently strike but fail to make contact.* In order to assure actual contact, the snake was held close behind the head and induced to sink its fangs into the peritoneal cavity of full grown rats. The first rat traveled about ten feet, fell over on its side, palpitated, and died within ten minutes. The snake was released and permitted to regain its composure before each successive test. The second and third rats died within ten to fifteen minutes, whereas the fourth rat quaked a bit but recovered.

Moreover, it was noted that the Prairie Rattler was able to kill a full grown rat every day for five successive days, the end of the experiment. Hence it would appear dangerous to assume that a rattle-snake is devoid of venom after an engagement with an adversary and will remain so seven to ten days as is popularly believed. The supply of venom obviously is gradually depleted and restored in much the same way.

**Effects of Venom by Self-inflicted Wounds.**—Sentimental stories have found way into current periodicals about reptiles growing melancholy in captivity and taking their own lives. An effort was made to check the effect of self-inflicted wounds on the Indiana species, which probably are no rare exception to the rule.

In each case the reptile was caught and agitated, and then its head was thrust around into a biting position at the mid-section of its own body. The rattle-snakes and copperheads were all very reluctant about sinking their fangs into the flesh of their own bodies. It was possible, however, with repeated effort to induce the animal to sink its fangs deep into its own flesh and inject its venom. In no case did the venom prove fatal. Some swelling was observed within the immediate regions of the wounds. Also the Prairie Rattler showed signs of sluggishness, but all recovered within a few days.

**Effects of Bites on Other Poisonous Species.**—A triangular experiment was arranged in which each of the three venomous species was permitted to bite another—the Copperhead to bite the Prairie Rattler; the Prairie Rattler, the Timber Rattler; and finally the Timber Rattler, the Copperhead. After a seven-day interval the program was reversed; thus each reptile was induced to bite both of the other two and was bitten in return by them. In all cases the animals were controlled and the bites directed to the mid-section of the other animal's body.

In no case did the venom prove fatal. Slight swelling occurred in the region of the wounds and the snakes appeared somewhat sluggish for a few days but recovered readily. The Copperhead, the smallest of the group, seemed to exhibit less signs of toxemia than either of the other two.

**Effects on Non-venomous Species.**—The bite of a Timber Rattler proved fatal to a Pilot Blacksnake (*Elaphe obsoleta*), 5 ft. 6 in. long, within thirty-six hours after the incident, and to a common Water Snake (*Natrix sipedon*), 3 ft. long, within three hours. The wounds in both

cases were inflicted under controlled conditions about one foot behind the head in the heavy portion of the body. Both snakes went into a coma and haemorrhaged at the nose before death. A post-mortem indicated that the fangs had entered the lungs and that large haemorrhagic areas were present around the wounds, both in the body wall and lung tissue. Obviously the venom itself had played an important role aside from the mere punctures made by the fangs.

On another occasion a common Blacksnake (*Coluber constrictor*) was placed in the cage with a small Diamond-back Rattler, 3½ ft. long. The rattler viciously attacked the Blacksnake and there was no doubt that the fangs hit their mark repeatedly during the encounter. Surprisingly enough the Blacksnake did not die, nor did it show any appreciable ill effects from the engagement.

It is generally understood, on the other hand, that the King Snake (*Lampropeltis getulus*) is immune to the venom of poisonous species. A small King Snake was accidentally placed in a cage with a small Massasauga by one of the assistants in the laboratory. A stick was placed over the neck of the sturdy little rattler for safety while attempting to remove the King Snake. It happened that the King Snake maneuvered over near the struggling little Massasauga and was bitten just behind the head in the neck. Within one hour the King Snake was removed from the cage dead.

It is recognized that the incidents cited here are not sufficient to warrant any general conclusions; nevertheless, it would appear that the lethal effect of venoms, explained in terms of species-variation alone, is probably subject to considerable variation. The ages of the reptiles, the quantity of venom injected at the time of the bite and the region of the victim's body receiving it, the general physiological state of both the donor and recipient, as well as species-variation, may all be contributing factors.