

EXTENSION BULLETIN 315

The
Snakes of Michigan

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EAST LANSING

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The Snakes of Michigan

By *RICHARD H. MANVILLE*¹

Of the many kinds of animals native to Michigan, probably none are more maligned or misunderstood than our sixteen species of snakes. Curiosity as to their habits and economic importance is annually incited by their appearance with the first warm days of spring. Gardeners wonder if they are useful or detrimental; sportsmen accuse them of killing game species; campers are apprehensive as to the safety of their children in snake-infested regions; summer cottagers are concerned about snakes in their cellars or yards. Many amateur naturalists, on the other hand, have a keen interest in the habits of our various snakes, and a genuine desire to learn more of their ways.

Actually, most Michigan snakes are harmless; many are decidedly beneficial. But since our snakes differ as much among themselves as do robins and jays, or squirrels and mice, we must consider each kind individually before estimating its value to man. This bulletin is an attempt to present, in a general way, interesting facts concerning our snakes—and aids to the identification of Michigan forms.

IDENTIFICATION OF SNAKES

All snakes are placed naturally into one group of reptiles (the *SERPENTES* or *OPHIDIA*)—just as the turtles, lizards, or alligators are placed in other groups. Reptiles as a whole share several characteristics: the body is covered with dry (not slimy) tough skin, usually scaled; the skeleton is completely bony; there is an imperfect four-chambered heart and blood with red corpuscles; breathing is accomplished principally by lungs; they are “cold-blooded,” (that is, the body temperature varies with that of the surroundings); fertilization is internal, and typically eggs with leathery or limy shells are laid; newborn young are like the adults in miniature.

GENERAL PHYSICAL TRAITS

In contrast to other reptiles, we find that snakes exhibit the following traits. The body is greatly elongated, and the limbs have been lost in the evolution of the species. The breastbone, as well as the

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bones of the limb girdles, are also lost—and there is absence of a bladder. The eyes lack movable eyelids, and the pupil of the eye is usually round (though vertical in the rattlesnakes). There is no external ear-opening, so snakes are virtually deaf. The nostrils are well-developed; in addition, the rattlesnakes have sensory “pits” situated on the snout between the eye and nostril—whence the name “pit viper.”

Another sensory organ is the long, forked, retractile tongue—often misidentified as part of the poison apparatus. The teeth are numerous, sharp structures, though often minute, slanting backwards; in poisonous kinds certain teeth are modified as “fangs.” The bones of the skull are delicate; those of the lower jaw are connected at the front only by elastic ligament, and at the back are hinged loosely to the skull, permitting a wide gape and the swallowing of prey actually broader than the snake itself.

IDENTIFYING CHARACTERISTICS

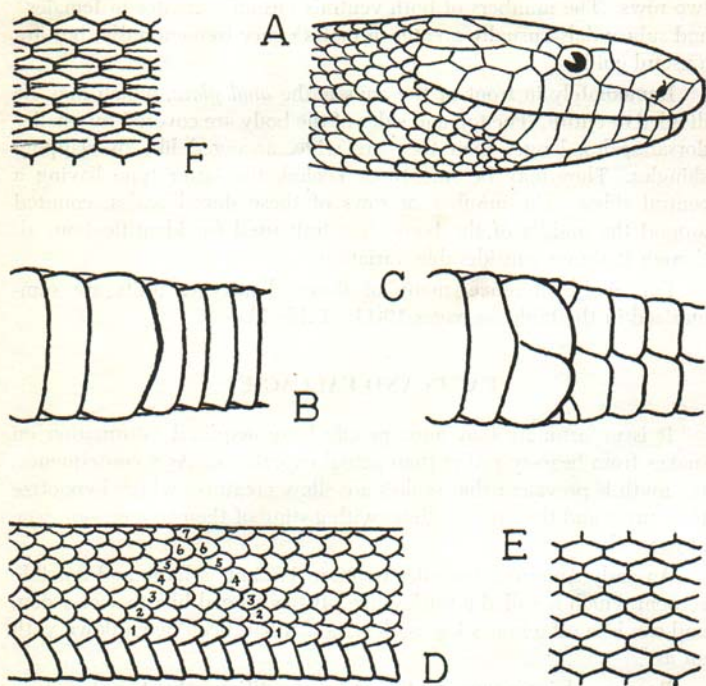
For the identification of particular kinds of snakes we make use of several sorts of characteristics. Relatively few of these are needed to identify our Michigan snakes, since only sixteen species are involved. We note the size and shape of the head; the general proportions of the body parts; whether the snake is slender or stocky in build; and the relative length of the “tail” or portion behind the anus or vent (ordinarily about one-fourth the total length).

Color and Markings

Color characteristics and, more particularly, the patterns in which the colors are arranged prove useful. We encounter narrow lengthwise stripes, wider bands, blotches and smaller spots, and rings or transverse bands around the body. Usually the sexes are colored alike, but the young may vary considerably from the adults in color traits.

Scalation

Perhaps the most dependable identifying characteristics are those related to the “scalation,” or nature and arrangement of scales on the body surface. (See Fig. 1.) On the head, the scales are modified as *plates* or *shields* which are quite uniform within one species. From the throat back, the belly is covered by a row of *ventral plates*, which are wider than long. Behind the anus these continue as the *subcaudal plates* beneath the tail—which may be arranged in one or, usually,



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Fig. 1. Scale characteristics of snakes, as used for purposes of identification:

- A. Side view of head of blue racer.
- B. Anal plate entire, subcaudals in one row—as in rattlesnake.
- C. Anal plate divided, subcaudals in two rows—as in water snake.
- D. Side view of body of garter snake; numerals show the method of counting dorsal-scale rows.
- E. Dorsal scales smooth—as in milk snake.
- F. Dorsal scales keeled—as in ribbon snake.

two rows. The numbers of both ventrals (usually greater in females) and subcaudals (usually greater in males) vary tremendously, but are a useful guide.

Immediately in front of the anus is the *anal plate*, which may be divided or entire. The top and sides of the body are covered by smaller dorsal scales, longer than they are wide, arranged like overlapping shingles. They may be smooth or keeled, the latter type having a central ridge. The number of rows of these dorsal scales, counted around the middle of the body, is a trait used for identification, although it shows considerable variation.

For ready reference, many of these identifying traits are summarized in the table on pages 10-11 (Table 1).

FACTS AND FALLACIES

It is unfortunate that most people have acquired information on snakes from hearsay rather than actual experience. As a consequence, the myth is prevalent that snakes are slimy creatures which hypnotize their prey, and then poison them with a sting of their tongue—or even of the tail.

An early American traveller wrote in 1702 of “a large and horrible serpent which is called a rattlesnake. It has a head like that of a dog, and can bite off a man’s leg as clear as if it had been hewn down with an ax.”

Because of ignorance, myths and superstitions about snakes have grown beyond all bounds. We are told that, after death, a snake’s tail will vibrate until sundown; that the breath of a hog-nosed snake will kill a person twenty feet away; that the milk snake will extract milk from cows in the barn or pasture; that a poisonous snake will not cross a horsehair rope; that, when danger threatens, a mother snake will swallow her young to give them temporary protection. One of the most fantastic legends is that of the “hoop snake” which takes its tail in its mouth and rolls in pursuit of its victim, finally striking with a lunge of its tail. In some instances, its aim is imperfect and it may strike a tree, which invariably dies!

FACTS

Actually, one need not resort to fancy for interesting and curious tales of snakes. Many of their habits and characteristics are truly

stranger than the fictions we have invented about them. Although limbless, they have developed a sinuous, graceful type of locomotion all their own. Traction against the ground is promoted by the edges of the broad ventral plates, but a rough texture on which to move is essential (as is demonstrated by the futile writhings of a snake placed on a horizontal plate of glass). The body may be pulled along over the ground in a straight line—but more often it is thrown into a series of lateral curves, along which it undulates. Many snakes are unusually adept at burrowing, swimming, or climbing trees.

Shedding the Skin

Periodically snakes shed the outermost layer of the skin—a process analogous to the molting of feathers by birds, or of fur by mammals. During the warmer months the skin may thus be shed about once every six weeks or so. The cuticle first loosens about the head, and some days before shedding begins, the eyes become milky in appearance; the snake is actually blind for several days. The snake loosens the skin by rubbing against rocks or shrubs, and then wriggles out, leaving the old dead cuticle intact and inside out. Immediately after molting the colors of the snake are most vivid.

Hibernation

All our Michigan snakes, with the coming of cold weather, retreat to winter quarters. There they hibernate—sometimes great numbers curled up together in a mass—in an inactive state. Usually caves, crevices in rocks or burrows in the ground are used for this purpose. Occasionally cold cellars, barns, or the foundations of buildings may be appropriated by snakes for their winter relaxation.

Feeding Habits

All snakes feed entirely on animal matter, usually alive or freshly killed. Since no limbs allow for tearing the prey apart, it is swallowed entire—a process which may sometimes take several hours. The prey is presumably located by means of the senses of sight or smell; and may be subdued by constriction, by holding with coils of the body, or by poison. The choice of food seems to be determined largely by its size and availability, although some species have marked preferences in the matter of diet.

Food items include many kinds of insects, caterpillars, earthworms, spiders, crayfish, snails and slugs, fishes, tadpoles, frogs and toads, other snakes, small birds, eggs, rats and mice, chipmunks and other small mammals. Snakes may go many weeks without feeding, but will feed voraciously when opportunity arises. Their economic significance, as regards the animals they consume, depends on the circumstances where they occur. But, as a rule, snakes are either beneficial or neutral in their relationships to man.

Natural Enemies

Snakes themselves have their own natural enemies, including hawks, skunks, raccoons, and other snakes. Robins and other birds may eat small snakes; bullfrogs may consume small aquatic forms. Hogs, cattle and deer will trample them with their hoofs. But chief among their enemies are humans—who persecute them individually or destroy their natural homes by lumbering, cultivation, draining or flooding operations.

BREEDING HABITS

In most snakes, the female exceeds the male in size (the fox snake and massasauga are exceptions among Michigan forms), and there are corresponding differences in number of ventral plates. Usually the tail is stouter in males, for retracted inside it and lying immediately behind the anal opening are the paired *hemipenes* or copulatory organs. Mating usually occurs in the spring, preceded by courtship behavior which may be quite intricate and is distinctive in each species.

Many Michigan snakes are egg-laying species (*oviparous*). The eggs are elongate in shape; of a white color; and covered by a tough, flexible shell. Their size and number varies greatly with different species. As a rule the eggs are laid during June or July, being deposited in rotting logs, loose vegetation, or holes in the ground. In most cases they are left to develop unaided, and the heat of the sun or of decaying vegetation may hasten the process somewhat. Sometimes hatching takes place within a week, sometimes after several months. The young usually hatch during August or September, and fend for themselves from the start.

Other snakes are of the live-bearing type (*ovoviviparous*). After a developmental period within the mother's body, the young are born in August or September. At birth they are encased in a thin membrane which soon ruptures, and they take off on an independent existence.

The number of young at a birth varies greatly, even within one species; but as a rule the larger forms are more prolific. The small DeKay's Snake may have two or three young at a time, while there are records of over seventy young in one litter of garter snakes.

Growth proceeds quite rapidly after birth or hatching, and maturity may be attained in two or three years. Actually, growth continues throughout life, though the rate is retarded in late years. Many snakes probably die from accidents or enemies in a few years' time. Most others probably succumb to old age well before 20 years.

POISONOUS SNAKES

Throughout all of the United States there are only four poisonous types of snakes: The coral snakes; the copperhead; the water moccasin, or cottonmouth; and twenty kinds of rattlesnakes. Their poison is primarily an aid in obtaining food, and only secondarily a defensive device. Nearly always snakes will retreat rather than attack, unless they are first molested. In the poisonous snake, the venom is developed in two specialized glands at the back of the head. It is injected into the victim by means of the fangs—highly modified teeth which function like hypodermic needles. Some poisons (as in rattlesnakes) are "haemotoxins," which attack the blood corpuscles and impair their ability to carry oxygen; others are "neurotoxins," which affect the nerve centers and lead to paralysis, especially of the respiratory centers.

MICHIGAN'S ONLY POISONOUS SNAKE

In Michigan there occurs only one poisonous snake, the "massasauga" or pygmy rattlesnake. The "sauger" is only remotely related to the diamond-back, timber, and prairie rattlesnakes of other parts of the country—and compared to them it is less dangerous. Unit for unit, its toxin is as virulent as that of other species.

But because of its smaller quantity of venom and a less efficient mechanism for introducing it—as well as normally sluggish habits—the massasauga is not to be feared, although it certainly should be treated with caution and respect. There are records of domestic animals killed by the bite of this snake, but the writer knows of no case of a human fatality resulting from the bite of a Michigan rattlesnake. Quite possibly, however, such a bite might prove fatal in the case of a small child, or of an adult suffering from a heart disorder.

TABLE 1—A summary of the identifi

SPECIES OF SNAKE	Distribution in Michigan	Breeding habits
Ring-necked snake..... <i>Diadophis punctatus</i>	Upper and Lower Peninsulas	Egg-laying
Hog-nosed snake..... <i>Heterodon contortrix</i>	Lower Peninsula	Egg-laying
Green or grass snake..... <i>Opheodrys vernalis</i>	Upper and Lower Peninsulas	Egg-laying
Blue racer..... <i>Coluber constrictor</i>	Southern Lower Peninsula	Egg-laying
Pilot black snake..... <i>Elaphe obsoleta</i>	Southern Lower Peninsula	Egg-laying
Fox or pine snake..... <i>Elaphe vulpina</i>	Upper and Lower Peninsulas	Egg-laying
Milk snake..... <i>Lampropeltis triangulum</i>	Lower Peninsula	Egg-laying
Kirtland's snake..... <i>Natrix kirtlandi</i>	Southern Lower Peninsula	Live-bearing
Queen snake..... <i>Natrix septemvittata</i>	Southern Lower Peninsula	Live-bearing
Water snake..... <i>Natrix sipedon</i>	Upper and Lower Peninsulas	Live-bearing
DeKay's snake..... <i>Storeria dekayi</i>	Lower Peninsula	Live-bearing
Red-bellied snake..... <i>Storeria occipitomaculata</i>	Upper and Lower Peninsulas	Live-bearing
Butler's garter snake..... <i>Thamnophis butleri</i>	Southern Lower Peninsula	Live-bearing
Ribbon snake..... <i>Thamnophis sauritus</i>	Lower Peninsula	Live-bearing
Common garter snake..... <i>Thamnophis sirtalis</i>	Upper and Lower Peninsulas	Live-bearing
Massasauga..... <i>Sistrurus catenatus</i>	Lower Peninsula	Live-bearing

ying characteristics of Michigan snakes

Normal maximum adult length	Dorsal scales	Ventral plates	Subcaudal plates	Anal plate
18 inches	15 rows, smooth	145-168	43-64	Divided
3 feet	25 rows, keeled	120-141	33-57	Divided
2 feet	15 rows, smooth	123-140	65-95	Divided
6 feet	15-17 rows, smooth	171-192	74-92	Divided
8 feet	25-27 rows, keeled	223-241	71-84	Divided
5 feet	25-27 rows, keeled	190-216	50-68	Divided
3 feet	21-23 rows, smooth	189-212	42-53	Entire
18 inches	19 rows, keeled	121-136	44-69	Divided
2 feet	19 rows, keeled	142-154	64-81	Divided
4 feet	23 rows, keeled	137-149	56-83	Divided
1 foot	17 rows, keeled	120-140	40-63	Divided
10 inches	15 rows, keeled	116-133	43-54	Divided
1 foot	17-19 rows, keeled	130-148	53-72	Entire
30 inches	17-19 rows, keeled	150-172	87-137	Entire
3 feet	17-19 rows, keeled	137-167	54-84	Entire
3 feet	25 rows, keeled	134-147	20-32	Entire

Poisonous Snake Bites

First-aid treatment should be directed at preventing the venom from circulating through the body—by the application of a tourniquet; the stimulation of bleeding at the site of the wound, by an incision and suction (by mouth, if free of cuts or sores); and by refraining from any undue exercise. By all means, consult a physician as soon as possible; for only he can treat the complications that may arise and he will, if advisable, administer an “antivenin” to counteract the toxin.

The use of alcoholic stimulants internally, or of potassium permanganate on the wound, is not advised. Iodine, merthiolate, alcohol or other antiseptics may be used on the wound itself.

CONTROL OF SNAKES

Except in unusual circumstances, there is no real need to attempt to control snakes. In fields and gardens and about barns, where they are most likely to be encountered by the unsuspecting, the great majority are beneficial to man in view of the noxious insects and rodent pests they consume. Aside from the unlikely possibility of surprising a pygmy rattlesnake—which gives an unmistakable warning by its rattle—no Michigan snakes are dangerous to man.

Many people, however, due to an early exposure to anti-snake propaganda from their elders, look upon all snakes with an unreasoning fear or repugnance. In such cases, the presence of snakes in a garden or yard, or even hibernating among the foundations of a building, brings up the problem of controlling them.

Unfortunately, no simple and effective controls have been developed. The use of poisons or sprays offers little promise. The construction of a snake-proof wall or ditch about a property would be far too expensive to be practical. The most effective controls seem to be the old tried-and-true methods of dispatching the culprits with the aid of a rake or hoe, or of a good terrier.

A better solution would be to capture the snakes alive—by hand or with some implement—and transport them elsewhere in a gunny sack or deep pail. Snakes may be discouraged from frequenting a property by clean cultivation of the land, and by the plugging of burrows and crevices where they might retreat. With information on the habits of snakes given in this bulletin, once the kinds are identified many people may perhaps develop an interest in, or at least a tolerance toward, them.

ACCOUNT OF SPECIES

Proper identification of Michigan's snakes is not too difficult, even for the amateur. This is particularly so, because most of the species are distinctive enough—in markings, size, localities where they occur most commonly, or habits—to be readily recognized.

Each of the species is discussed here, identified by both its correct common name and its proper scientific name. Michigan's 15 non-poisonous snakes are listed first, with the "water snakes," "brown snakes," and "garter snakes" given their own groupings. Because of its reputation, the pygmy rattlesnake is discussed separately—but, again, it cannot be emphasized too strongly that this is Michigan's *only* poisonous snake.

NON-POISONOUS

RING-NECKED SNAKE, *Diadophis punctatus*.—This small snake occurs in both the Upper and Lower Peninsulas of Michigan, as well as on the Beaver, Fox and Manitou Islands. It has a flat, broad head and small eyes. Its color above ranges from bluish-slate to gray or black; below it is a striking yellow, red or orange—and a ring of the same color encircles the neck.

It is secretive in habits, and may be found beneath stones or boards, or under the bark of decaying logs and stumps in moist woods. It is active chiefly at night. Its food includes other small snakes, earthworms, salamanders, small toads, and a variety of insects.

HOG-NOSED SNAKE, *Heterodon contortrix*.—"Puffing Adder," "Blow Snake" and "Hissing Viper" are other names for this snake, which occurs widely throughout the Lower Peninsula. The body is stout, the head rather short and broad, and the plate at the tip of the snout projects upward to give a shovel-shaped appearance. The color of the back varies from yellowish or reddish brown to gray or black; the belly is yellow or greenish, and the entire body is well spotted or marked with dark blotches.

Its home is in dry woods, beaches and sandy fields where it can burrow. When alarmed, it flattens out the neck and hisses loudly; but in spite of this formidable appearance, it is harmless. In fact, if those wiles fail, it will feign death in a very realistic manner. Its food consists largely of toads, with occasional frogs, salamanders or insects.

GREEN OR GRASS SNAKE, *Opheodrys vernalis*.—This small, slender species is found in both peninsulas of Michigan, and on Drummond

and Beaver Islands. It is a uniform bright-green above, and whitish or yellowish below. It is secretive in habits and normally frequents meadows, dry clearings or marshes. Occasionally it climbs low shrubs. It is very active and quite harmless, and makes an interesting pet. Its food is largely insects—with reports of snails, spiders, caterpillars, and salamanders contributing to its diet.

BLUE RACER, *Coluber constrictor*.—This species occurs in the southern half of the Lower Peninsula. It is a long, slender snake—with a head somewhat flattened, and large eyes. Adults are bluish or olive-gray above, and whitish below, often washed with green, blue or yellow.

Juveniles less than 18 inches long are colored quite differently, and are often confused with the Milk Snake. They have a ground color of olive or gray, and are conspicuously marked with blackish or brown blotches on the back, and smaller dark spots on the sides and belly.

The racer is equally at home on the ground or in trees or shrubs; it travels rapidly, usually with the head elevated. When captured and held behind the head, the body is thrashed violently. It is found in dry fields or open woods where stone walls or thickets provide cover. Despite its name, this is not a true constrictor. Its food includes many items, chief among which are rats, mice and chipmunks, birds and their eggs, frogs and toads, lizards, other snakes, and many kinds of insects. There are records of its killing and devouring both rattlesnakes and copperheads, and it may be that the racer is immune to their poison.

PILOT BLACK SNAKE, *Elaphe obsoleta*.—This species achieves the greatest length of any Michigan snake; it occurs sparsely in the southern half of the Lower Peninsula. It is sometimes called the "Mountain Black Snake" or, simply, "Black Snake." (The latter name is inappropriate, for it is also used in reference to the Water Snake and to a racer of the eastern states.) This snake is known to associate with copperheads and rattlesnakes, and one superstition holds that it leads them to safety when danger threatens; hence the name "pilot."

It is black or bluish-black above, sometimes tinged with reddish on the front half of the body; the belly is slate or black in color, mottled with yellowish in front and about the throat. Dark blotches are more conspicuous in juveniles. This snake is often confused with the Blue Racer—but may readily be distinguished by its weakly keeled scales, the greater number of dorsal-scale rows, the dark markings on the belly, and the elongate head with eyes of moderate size.

It is slower than the racer, and will sometimes "freeze" to avoid detection. It frequents woods and rocky hillsides, and is often found near farm buildings. It is the best climber of all our snakes, sometimes gaining heights of over thirty feet in trees. When captured or annoyed, it readily discharges a foul smelling substance from its anal scent glands.

The Pilot Black Snake is a true constrictor, killing its prey by squeezing. Its food includes mice, rats, weasels, birds and their eggs, frogs, lizards, other snakes, and insects; cottontails and opossums have been found in the stomachs of some specimens.

FOX OR PINE SNAKE, *Elaphe vulpina*.—This snake occurs in the western Upper Peninsula, and the southeastern Lower Peninsula. It is a stout-bodied form with a flat, broad head. It is yellowish or light-brown above, with rows of chocolate blotches edged in black; below it is yellowish with dark blotches. It is easily confused with the Milk Snake—and its coppery head has mistakenly earned it the name of "Copperhead" or "Spotted Adder," but it is quite harmless.

When alarmed it rapidly vibrates the tip of the tail—an action which in dry leaves produces a sound similar to that of a rattlesnake. It occurs in woods, fields, and among sand dunes. Food items include rats and mice, birds and eggs, salamanders and even earthworms. Like the Pilot Black Snake, the Fox Snake is a true constrictor.

MILK SNAKE, *Lampropeltis triangulum*.—This species occupies the Lower Peninsula of the state, and is especially common in the south. It is known also from Charity, Beaver, High, Whiskey, and North Fox Islands. The body is uniformly proportioned throughout; the head relatively small and flat; and the eyes small. The base color above is brownish or grayish, with a series of chestnut blotches bounded by black, and small dark spots on the sides; the belly is white with small black blotches.

Although it is easily confused with the Fox Snake, it may be identified by the smooth (not keeled) scales; the entire (not divided) anal plate; and the presence of three or four (not five or six) rows of scales between the ventral plates and the dark blotches above. The color pattern has earned it the name of "Checkered Adder," and its frequent presence about farm buildings the name of "House Snake." It occurs also in fields and beneath logs in woods. It is secretive in habits and prowls mostly at night.

There is no truth to the myth that it milks cows. It is not able to suck—and even if it had a taste for milk, its many small, sharp teeth would drive a cow frantic. Its real diet consists largely of various kinds of mice—with occasional birds, eggs, lizards, slugs, or other snakes.

The "Water Snakes"

KIRTLAND'S SNAKE, *Natrix kirtlandi*.—This species is rare in Michigan, known only from the southernmost tiers of counties. The head is small and pointed; the eyes small. The color is brown or gray above, with a checkered pattern of round black blotches; the belly is red, with an unmistakable black spot on the outer edge of each ventral plate. It lives in marshy meadows or moist woods, resting beneath logs and stones by day. When alarmed, it flattens the entire body to an almost ribbon-like shape. It is said to feed on frogs, toads, earthworms and slugs.

QUEEN SNAKE, *Natrix septemvittata*.—This slender, medium-sized water snake is uncommon in the southern half of the Lower Peninsula. It is chestnut or chocolate-brown above, with a distinct yellow band low on each side; below it is yellowish with two bands of brown, which unite at the throat. The vicinity of slow streams, ponds or canals is a favored habitat.

This timid snake basks in the sun on logs or branches overhanging water, but at the slightest alarm it drops and seeks refuge beneath a log or stone at the water's bottom. Crayfish appear to form its principal food; but frogs, toads, or small fish may also be eaten.

WATER SNAKE, *Natrix sipedon*.—This is the common water snake throughout Michigan, found along streams and lakes, and recorded from Charity, Drummond, Bois Blanc, North Fox, and the Beaver Islands. It is frequently called the "Water Moccasin" because of its habitat, its pugnacious habits, its stout body and long, narrow head that is swollen below, but it is completely non-poisonous. Another misnomer is that of "Black Snake." Many old specimens are quite dark, nearly black, in color.

Younger individuals or those freshly molted have a gray or tan ground color above—with a pattern of broad brown, reddish or gray cross-bands or blotches; the belly is gray or yellowish, brilliantly marked with a series of brown or red spots. It frequents branches overhanging water or driftwood along the shores, and is a capable swimmer. The nostrils can be closed when the snake is submerged.

When captured, it emits a most disagreeable odor from the anal glands. Its food, obtained in or near water, includes many small fishes, salamanders, frogs and toads, tadpoles, mice and shrews, crayfish, and various kinds of insects.

The "Brown Snakes"

DEKAY'S SNAKE, *Storeria dekayi*.—This and the following species, comprising the brown snakes of Michigan, are diminutive relatives of the water snakes, although not aquatic in habits. Like their kin, they both exude a musky substance from the anal glands when disturbed. DeKay's Snake occurs throughout the Lower Peninsula, where it may be found beneath stones or logs in dry woods and fields, or even in vacant lots and along city sidewalks. The head is small, the body tapers gradually. It is dark brown or gray to yellowish above, with a central pale yellow or greenish band margined by a series of dark spots; below it is pale yellow, brown or pink, sometimes with a small dark spot on each ventral plate. Its food consists largely of slugs, earthworms, insects and small toads.

RED-BELLIED SNAKE, *Storeria occipitomaculata*.—Our smallest Michigan snake occurs throughout both peninsulas and is known from Isle Royale, Drummond, Squaw and Whiskey Islands. Its color above is rich brown, grayish or nearly black, sometimes with a pale central band; the belly is reddish, whence the name of Copper Snake, and is speckled with black along the margin; there may be three yellow spots just back of the head. This secretive species dwells beneath stones or logs in wooded areas, and is occasionally found in pastures, fields, or along roadside ditches. Its food includes earthworms, slugs and insects.

The "Garter Snakes"

The garter snakes (of the genus *Thamnophis*) are probably the most common snakes of Michigan, as well as of North America generally. They may be distinguished by the number of dorsal-scale rows, in which the scales are strongly keeled; by the undivided anal plate; and by the presence of three light stripes on the back, one in the center and one on each side. In these snakes, the male normally has more of both ventral and subcaudal plates than does the female, an exception to the general rule.

Garter snakes are related to the water snakes, but are more terrestrial in habits—although they can swim with agility. Like the

water snakes, they possess well-developed anal scent glands. Three species occur in Michigan.

BUTLER'S GARTER SNAKE, *Thamnophis butleri*.—Our smallest garter snake, known only from the southeastern part of the Lower Peninsula, is a rather thick-bodied form. The ground color above is dark olive-brown, with the lateral yellowish stripes principally on the third row of scales; the belly is pale greenish, with a black spot at the outer edge of each ventral plate. Moist meadows, and the edges of streams and ponds, are its normal habitat. Its efforts to escape are often accompanied by much futile wriggling, as though it were attempting to swim on land. Its food includes such items as earthworms, small frogs, leeches and minnows.

RIBBON SNAKE, *Thamnophis sauritus*.—This form occurs throughout the Lower Peninsula of Michigan, as well as on Beaver and North Manitou Islands. It is a very slender, long-tailed snake—the tail being more than 27 percent of the total length, in contrast to other garter snakes. It is dark brown above, ranging from olive to black; the central yellowish stripe may be tinged with orange, and the lateral stripes, on the third and fourth scale rows, may have a greenish cast; the belly is pale greenish, usually unmarked.

This snake may be found in damp woods, and along the margins of streams and bogs. It is graceful and swift both on land and in water, and climbs shrubs bordering water to a height of several feet. It feeds largely on salamanders, tadpoles, frogs and toads; insects, spiders, and small fishes have been reported in its stomach contents.

COMMON GARTER SNAKE, *Thamnophis sirtalis*.—This is probably our most common and best-known Michigan snake, being the last to go into hibernation in the autumn and the first to emerge in the spring. Frequently it appears while snow is still on the ground. It occurs throughout the state—including Isle Royale, Drummond, Charity, and the Beaver, Fox and Manitou Islands. "Streaked Snake" and "Garden Snake" are other names.

It is black or brownish above, with black spots between the light stripes; the central stripe is never orange in color, and may be entirely lacking; the lateral stripes, on the second and third scale rows, may be yellow, green or blue in color. The belly is yellow or greenish-white, with small dark spots on the edges of each ventral plate. Many habitats are occupied, but most typical are fields or open woods—

usually near water, farm lands, suburban areas, or even vacant lots and ditches in villages.

This snake is primarily a ground-dweller, but climbs or swims on occasion. Some are rather docile, others pugnacious when captured. Its foods include frogs and toads, salamanders, earthworms and insects; small birds and mammals, possibly found dead, and carrion are consumed at times.

POISONOUS

MASSASAUGA OR PYGMY RATTLESLAKE, *Sistrurus catenatus*.—Michigan's only poisonous snake is easily distinguished by the terminal rattle on the tail. Other distinctive features are the thick body; the short slender tail; the triangular head, much swollen at the back; the small eyes, with their elliptical pupils; and the deep pit between the eye and the nostril.

In color the snake is gray above—often nearly black—with many dark-brown blotches merging into cross bands on the tail. The belly is black, sometimes with pale markings. "Black Snapper" and "Swamp Rattler" are other names for this species—the latter reflecting its preference for swamps, logs and marshy areas where it sometimes basks in the sun on clumps of vegetation. It is not, however, essentially aquatic, and during midsummer it frequently resorts to drier situations.

It was formerly widespread throughout the Lower Peninsula, as well as on Bois Blanc and Charity Islands; but its numbers have now been much reduced through drainage of its natural homes and constant persecution by man. Although definitely venomous, no deaths from its bite have been reported. It is a sluggish creature, slow to bite even when provoked, and it usually warns with its rattle before striking.

The rattle is a curious structure, consisting of a series of tough, dry segments loosely fastened together. When the tail is vibrated rapidly (at a rate of about 48 cycles per second) a very distinctive sound is produced, really more a *hiss-s-s* or a *buzz-z-z* than a "rattle." The purpose is questionable, inasmuch as rattlesnakes cannot hear each other; but the sound serves to warn possible enemies, and so possibly protects the snake.

The snake's age cannot be accurately told from the number of segments in the rattle, for a new one is produced each time the skin is shed, from three to five times a year. Furthermore, the terminal seg-

ments are usually broken off after the snake attains fair size. Frogs, rats and mice are the chief food items; a pygmy rattlesnake is probably a better mouser than most cats. Small birds or other snakes may also occasionally be eaten.

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