THE

BATRACHIANS AND REPTILES

OF THE

STATE OF INDIANA.

BY

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PROF. S. S. GORBY, State Geologist of Indiana.

DEAR SIR—I herewith present to you my report on the Batrachia and Reptilia of the State of Indiana. In the body of this work I have endeavored to include all the species known to inhabit the State, and to exclude all that are not known to occur within our limits. Since, however, there are several species which are, judging from their geographical distribution, likely hereafter to be taken within the State, I have added their names in an appendix.

Of all the species mentioned in this report I have given as accurate descriptions as I have been able to prepare; and I have endeavored to state also the most important facts known regarding their habits. It is to be hoped that this endeavor will incite others to study our lower vertebrates with respect to their manner of life, since too little is known about even the commonest species.

I am indebted to many friends for aid in preparing this report, so many that I can not here mention all their names. Under each species I have tried to give due credit for specimens and notes. I must here, however, acknowledge the liberality of Dr. Leonhard Stejneger, Curator of Reptiles in the National Museum, Washington, D. C., in giving me free access to the large collections there; also the kindness of Prof. B. W. Evermann, who allowed me to examine a considerable collection made by himself, mostly in the vicinity of Terre Haute. This collection is the property of the State Normal School. To yourself I owe the opportunity to examine the specimens in the State Museum. Some years ago I had occasion to study a collection made at New Harmony by the late Mr. James Sampson, of that place. For the opportunity of doing this I am indebted to Prof. John Collett. The writings of Agassiz, Cope and other naturalists have been consulted in the earnest desire to obtain a correct idea of our batrachian and reptilian fauna. Nevertheless, I have at times doubtless fallen into error.
The following is a summary of the species of each group known to occur in Indiana:

- Tailed Batrachians: 18 species.
- Tailless Batrachians: 12 species.
- Total Batrachians: 30 species.
- Snakes: 28 species.
- Lizards: 5 species.
- Turtles: 18 species.
- Total Reptiles: 51 species.
- Total of both classes: 81 species.

Thanking you for your many kindnesses, I am,

Yours sincerely,

O. P. Hay.
THE BATRACHIANS AND THE REPTILES OF INDIANA.

On the part of people who have not made a scientific study of animals no distinction is made between the group of creatures here called Batrachians and that group called Reptiles. The amphiuma and the snakes, the salamanders and the lizards, the common toad and the turtles are all called "reptiles." Nor is this strange when we consider how closely members of both groups resemble one another in outward form and in habits. It is indeed only recently that zoologists, who endeavor to found their systems on more important differences than appear on the outside, have agreed to regard the frogs, salamanders, and newts, as fundamentally different from the lizards, turtles, and snakes. In reality, the batrachians are more closely related to the fishes than to the reptiles, while the latter are more nearly akin to the birds. The batrachians form a class standing intermediate between the class of fishes and the class of reptiles.

Nevertheless, since zoologists have almost universally associated the two classes in their works, and since people do not usually distinguish the one kind of animals from the other, they are here described together.

The batrachians differ from the reptiles in several important respects. The skin of the former is usually smooth and moist, sometimes raised up into warts, as in the toads, but never disposed in overlapping scales or regular plates. Scales and plates, such as are seen in the lizards and snakes, and tortoises, are almost universal among the reptiles. No Indiana reptile is without such a covering, except our soft-shelled turtles. The life-history of the members of the two groups is also widely different. The batrachians almost always lay their eggs in the water, and the young pass their early days there as tadpoles. They respire by means of gills until the time of their metamorphosis approaches, when lungs are developed, the gills are absorbed, and the animal leaves the water and lives to a greater or less extent on the land. Reptiles, on the contrary, lay their eggs on land, the young are hatched with the form of the adults, and they never have gills. A few batrachians retain their gills life-long, breathing both by means of these and their lungs. Other differences exist, but since their determination would require dissections, they are not thought suitable for consideration in a work of this kind.
Since the animals herein described are a source of discomfort and alarm to many people, it may be well to say here that of all the batrachians and reptiles known to inhabit Indiana, but four, the yellow-banded rattlesnake, the prairie rattlesnake, the coral snake, and the copperhead, are poisonous. It is possible that the poisonous southern moccasin, or cottonmouth, may yet be found in the southwestern part of the State; if so, we shall have five poisonous species, and five only.

Key to the Classes.

A. Skin usually smooth and soft, sometimes rough and warty, never forming scales that overlap or are arranged in regular rows; eggs usually laid in the water and giving origin to tadpoles. (Water-dogs, salamanders, frogs and toads.)

Batrachia, p. 413.

AA. Skin usually having epidermal scales or large regular plates; these usually arranged in a regular manner, often overlapping. Eggs laid on land. Young with form of adults. (Snakes, lizards, turtles, alligators, etc.)

Reptilia, p. 481.

Batrachia.

The Batrachia include a great variety of animals that are found living in all except the coldest parts of the earth and the salt water. As already stated, they are, with rare exceptions, hatched in the water, where they spend at least a portion of their lives. A few forms retain their gills throughout life, and seldom or never leave the water. In a few cases the eggs are laid on the land, under sticks and stones; the young from such eggs may have very rudimentary gills and consequently never enter the water. Such species closely approach, in their habits, the reptiles. The gills may be either internal or external; usually they are of the latter kind. The external gills are attached to processes of the skin, and not to the branchial arches. The internal gills of the tadpoles or frogs grow out from the branchial arches, as in fishes.

The skin of the batrachians is richly provided with glands. These secrete a milky fluid, which is often acrid, and sometimes poisonous to the enemies of the species producing it. It thus serves as a means of defense to these animals, which are otherwise almost helpless. Often the glands are collected into groups, as in the case of those on the back of the head of the common toad. In some species the skin forms a fin on the upper and lower sides of the tail; but in such fins there are no rays, such as are found in the fins of fishes.
Reptiles having the trunk relatively short and broad, with the upper and
the lower walls forming two disks, which are united on the sides between
the fore and hind limbs. The disks strengthened by bony deposits, which
usually, but not always, involve the endo-skeleton. The bony dorsal
shield (carapace) usually formed of the expanded and suturedly united
ribs and vertebral spinous processes. The lower shield (plastron) com-
posed of the clavicles and a few dermal bones. No true sternum. Trunk
rigid; only the neck and tail flexible. Jaws without teeth and covered
with horny sheaths. Eyes with lids and a nictitating membrane. Tym-
panic membrane external, sometimes hidden by the skin. Tongue thick
and fleshy. Limbs four; developed for walking, except in the marine
turtles, in which they are formed for rapid swimming. Reproduction by
means of eggs, spherical or elliptical in shape and protected by a calcar-
eous shell.
Upper and lower disks without horny epidermal plates. A soft skin.

Trionychoidea, p. 550.

Shell covered with large, symmetrical horny epidermal plates.

Testudinata.

Suborder TRIONYCHOIDEA.

The dorsal vertebrae and the expanded ribs involved in the carapace.
Plastron composed of 9 bones, which enclose a fontanelle. The dorsal
disk rarely strengthened by marginal bones, its border therefore flexible.
The horny sheaths of the jaws hidden by fleshy lips. Fourth digit with
4 or more phalanges.
A single family living in the rivers of North America, Asia and Africa.

Family VII. TRIONYCHIDÆ.

Body broad and much depressed; the margins of the carapace thin
and leathery, in rare cases having marginal bones. No epidermic scutes.
Snout much produced, leathery, with the nostrils at the tip. Ear hidden.
Only the three inner digits furnished with claws. Head and neck com-
pletely retractile.
Of this family 6 genera are recognized, only one of which lives in
America.
Genus **Trionyx**, Geoff.

*Trionyx*, Geoffroy, 1809, 85, 84; Gray, 1855, 25, 64; Boulenger, 1889, 84, 242.

Plastron little developed behind, leaving the hinder limbs and tail completely exposed; with not more than 5 callosities. No marginal bones in the border of the carapace. Jaws strong.

A genus embracing about 15 species, residents in the rivers of North America, Asia and Africa.

A. Nostril circular, having no papilla projecting into it from the septum. (*Amyda*, Agassiz)  
*Trionyx muticus*, LeS.

**Spineless Soft-Shelled Turtle.**

*Trionyx muticus*, Le Sueur, 1827, 36, 263, pl. 7; Holbrook, 1842, 54, ii, 19. pl. 2; Gray, 1855, 25, i, 69; Boulenger, 1889, 84, 260.

*Amyda mutica*, Agassiz, 1837, 4, i, 399; *Aspidonectes muticus*, Baur, 1888, 22, 1122.

Head long, low, and pointed in front, descending rapidly in front of the eyes. Skull, from the eyes forward, drawn out, the margins of the upper and the lower jaw being concave outwardly. The horny upper jaw with a cutting edge, which is deepest forward and bluntly toothed posteriorly. Lower jaw also with a sharp edge, and both jaws furnished with an alveolar surface, the leathery snout ending obliquely, so that the nostrils are somewhat under the tip. The nostrils are circular, there being no papilla projecting into them from the septum.

Body flat and oval. No trace of keel along the middle of the back; often a depression instead. No spines along the anterior border of the carapace, nor any tubercles anywhere. Callosities well developed on the plastron of the adults, especially of the males.

The color above is brownish, olive, or bluish-gray. In the young there are some blotches of dark brown. On the margins of the carapace, laterally and posteriorly, is a band of yellow, bordered internally with black. These bands are likely to disappear later in life. Head with a white stripe, margined with black, from the eye over the ear and then descending on the neck. Head and neck below the level of the edge of the upper lip white, without any mottling. Under surface of the feet white or bluish-gray; never mottled as in *T. spiniferus*. 


A. Nostril crescent-shaped, having a papilla projecting into it from the septum. (*Aspidonectes*, Agassiz.)

a. Under side of feet white, not mottled with brown.  
*T. agassizii*, p. 552.

aa. Under side of feet mottled with white and brown.  
*T. spiniferus*, p. 554.
The length of the carapace of fully grown adults may be a foot, sometimes probably more. The females have tails that scarcely project beyond the edge of the carapace, while that of the male is much longer. Both Agassiz and Baur have noted the fact that the males are much smaller than the females. Baur has also made the observation that the males are not so numerous as the females (22, 22, 1122). It is not at all improbable that such is the case; yet it may be only apparently so, due to fewer of the males being captured, on account of their smaller size, or on account of the saving only of the larger, finer specimens.

The species inhabits North America from the St. Lawrence River to Florida and west to the plains. I have note of its occurrence in the rivers of Indiana at five points: Delphi (Agassiz); Madison (Yarrow); Mt. Carmel, Ill. (R. Ridgway); and Terre Haute (Blatchley). LeSueur described the species from specimens taken at New Harmony.

HABITS.—This species, like all the soft-shelled turtles, is wholly aquatic, since they leave the water only on rare occasions. They delight to remain about the roots of trees which have fallen into the water or in drifts of timber. Here they can watch for prey and not be observed by any supposed enemy. Away from such means of concealment they are accustomed to bury themselves completely in the sand, leaving only their heads exposed. Since their heads do not differ much in color from the sand it is difficult for one to recognize them, even when the eye is directed to them. When air is required it is obtained by stretching out the neck until the pointed snout reaches the surface. The head is then again withdrawn. Like T. spiniferus, this species no doubt enjoys a true aquatic respiration. They subsist probably on insects, fishes, water snails, and similar small animals. Agassiz found the larvae of neuropteron insects in their stomachs. Max. Von Wied (103, xxii, 53) says that LeSueur found in their stomachs worms, snails, fruits, and even hard nuts. If there are potatoes growing near the water the turtles find their way to them and devour the stems, of which they are very fond.

The eggs are spherical in form, about seven-eights of an inch in diameter, and have a thick, but brittle, calcareous shell. They are deposited in the sand on the shores of the rivers where the adults live. The young are flatter and more nearly circular than the adults. This species, like the other species of Trionyx, is regarded as a great delicacy.

*Trionyx agassizii*, (Baur).

*Agassiz' Soft-Shelled Turtle.*

*Trionyx ferox*, in part, Boulenger, 1889, 34, 259; *Platypeltis ferox*, Agassiz, 1857, 4, i, 400, and ii, pl. vi, fig. 3 (young), pl. vii, fig. 22 (egg); *Platypeltis agassizii*, Baur, 1888, 22, xxii, 1121.
Head with the fore part not drawn out, the margins of the jaws not concave outwardly. Snout with the nostrils at the tip; the latter crescent shaped, there being a papilla projecting into it from the septum. Body with a low, obtuse keel along the middle line. Spines present along the anterior border of the carapace, these largest in the males. Upper surface of the carapace often rough with minute tubercles. Callosities of the middle and hinder part of the plastron well developed.

Color of the upper surface olive, with blotches or spots of black. A light streak, margined with black, starts at the tip of the proboscis, divides just in front of the eyes, and sends a branch through each eye to the side of the neck. The younger individuals have a yellow border around the lateral and posterior edges of the carapace, inside of which are two or three lines of black. The spots on the carapace of the young are solid, but later in life they may become ocellated. The lower surfaces are white. The bottoms of the feet are said by Agassiz to be always free from mottlings of black. In a specimen which came from Mississippi, however, the under surfaces of these are moderately mottled with black. Agassiz states that the largest individual of this species of which he had any knowledge was 18.5 inches long from the front to the hinder end of the carapace. They are usually much smaller. The tail of the male projects beyond the edge of the carapace; that of the female does not.

This species closely resembles *T. spiniferus*. It is to be distinguished by the solid spots and the two or three black lines around the carapace (when not too large), the light line of the head dividing behind the base of the proboscis, and the uniformly colored lower surfaces of the feet.

This species belongs to the Southern States from South Carolina to Texas. A single specimen has been forwarded to the National Museum from Madison, Ind. It ought to be sought for all along the Ohio River.

Whether or not this species is more vicious than its relatives can hardly be said. But all the American species are ready to snap and bite whenever they are teased, and their biting is not to be held in contempt. The head and long neck can be thrust out with great rapidity, and the sharp-edged jaws are like scissors. Holbrook says that it will sometimes leap up and give a loud hiss. He further states that it is very voracious, feeding on fish and such reptiles as it can secure, and is so greedy that it takes the hook readily when baited with any substance whatever. Yet he had never known them to take food in captivity, even after several months. They swim with great rapidity, and often conceal themselves in the mud, buried two or three inches deep, leaving only a small breathing hole for the long neck and small head. This it occasionally thrusts out, but usually keeps it concealed so that a passer-by might think the hole the residence of some large insect. They are often seen basking in the sun on rocks and apparently asleep.
In the South they lay their eggs in May. These are about 60 in number, have a thick, smooth, brittle shell, and are larger than those of *T. muticus*, being a little less than an inch in diameter. They are hidden in the sand along the shores of streams.

Dr. Baur considers the form found in the Mississippi Valley as an entirely distinct species from the *Testudo ferox* of Schneider. Should he be correct in this judgment, as he probably is, the species above described must be known as *Trionyx (Platypeltis) agassizii*.

**Trionyx spiniferus**, LeS.

*Spiny Soft-Shelled Turtle.*

*Trionyx spiniferus*, LeSueur, 1827, 86, 258, pl. vi; *Trionyx spiniger*, Boulenger, 1889, 84, 259; *Aspidonectes spinifer*, Agassiz, 1857, 4, i, 403, and ii, pl. vi, fig. 1 (young), pl. vii, fig. 23 (egg).

Resembling much *T. agassizii*. Skull tapering gradually to the snout. Proboscis with the nostrils at the tip; these crescentic in shape, a papilla projecting into each from the septum. A low obtuse keel along the middle of the back. A series of spines on the front edge of the carapace, largest in the females. Whole upper surface of carapace often covered with minute asperities, also more prominent in the females. Tail of the male projecting considerably beyond the carapace. Callosities well developed in the middle and hinder parts of the plastron. General color above olive or light brown. In the young there are numerous ocellated spots, or rings, of black all over the carapace. These may be retained until the size has become considerable, but they finally become irregular blotches. In the young and half grown there is a yellow border around the sides and posterior edge of the carapace, and just within the yellow border is a single line of black. Head olive, with a light line, margined above and below with black, starting at the tip of the proboscis, forking at its base, and sending a branch through each eye and down on the neck. The plastron is white. Under surface of the feet much mottled with white and black.

About the size of *T. agassizii*. Agassiz states that the largest of which he had knowledge had a carapace 14 inches long.

This species is to be distinguished from *T. agassizii* by the mottled lower surfaces of the feet, the line of the head, forking at the base of the proboscis, and, in case the specimen is not too old, the ocellated spots of the carapace, and the single dark line around the edge of the carapace.

Habitat from Vermont to Montana and south to the Gulf. More abundant in the Northern States. In Indiana it is the most common species of soft-shelled turtle, and is so generally distributed throughout the State that it is not necessary to mention localities.
Habits.—The habits of this turtle are much like those of *T. agassizii*. It lives in similar localities, captures the same kinds of food, and deposits its eggs in the sand, just as *agassizii* does. One was found by myself on the 14th of March buried in the sand where the water was so deep that she could only with difficulty reach the surface with her proboscis. The head, colored just like the sand, was drawn entirely under as soon as she saw that she was observed. It was with a good deal of exertion that she was dislodged. She was kept until the 13th of May, during which time she could not be induced to eat anything. On being put into a ditch she immediately buried herself in the mud, and when hidden she gave her body some sidewise movements so that the mud settled over her as though nothing had disturbed it. Here she remained a day and two nights. Prof. Blatchley (94, '91, 34), states that he has seen them moving freely about in the water as late as December 11, and as early as March 19. When hibernating they burrow in the mud at the bottoms of ponds and streams.

This specimen will bite severely, as several observers have had opportunity to learn. DeKay mentions the fact that one bit a dog and took out a mouthful of hair. These turtles can run rapidly on the land, and when in the water they swim with great swiftness, as any one knows who has tried to catch them. Profs. S. P. and S. H. Gage have demonstrated that both this species and *T. muticus* enjoy a true aquatic respiration. They say that these animals often remain voluntarily under the water for from two to ten hours consecutively. While under the water there are about 16 movements of the hyoid apparatus each minute, and by means of these the mouth and pharynx are filled with water and again emptied. The mucous membrane of the pharynx is closely beset with filamentous processes which have the appearance of the villi of the intestines, and are abundantly supplied with blood. Analysis of the water in which a turtle was kept some hours proved that it was deprived of its oxygen and filled with carbonic acid.

The number of eggs laid by this species is probably about the same as for *T. agassizii*. The eggs are spherical, have a thick, brittle calcareous shell, and under this a very tough membrane. The eggs are a little larger than those of *T. agassizii*, an inch in diameter. LeSueur (86, xv, 263) says that at New Harmony the females lay their eggs in April and May in the sand along the river bank. He has found in them 50 or 60 eggs, about 20 of which were ready to be laid. The others were probably the eggs of the next season. The young appear in August. This turtle is highly prized as an article of food.
Suborder TESTUDINATA.

Carapace usually very complete, formed by the expanded spinous processes of the vertebrae, the expanded ribs, and a series of dermal marginal bones. Plastron consisting of 8 to 11 bones; commonly united by suture with the carapace. Both carapace and plastron, with one exception, covered with large, symmetrically arranged epidermal plates. Jaws covered with horny sheaths; not hidden by fleshy lips. Fourth digit never with more than 3 phalanges.

**Key to the Families of Testudinata.**

Plastron narrow, cross-shaped; bridge long and narrow; marginals 23, not including the nuchal; tail long. *Chelydridae,* p. 556.

Plastron of small to moderate size; bridge short, but wider; marginals 28; tail short. *Kinosternidae,* p. 560.

Plastron filling the openings of carapace, or nearly so; marginal plates 25; tail short to moderate. *Testudinidae,* p. 563.

Family VIII. CHELYDRIDÆ.

Body broad and depressed; the shell highest in front, serrated along its posterior border. Plastron formed of 9 bones; small and cross-shaped; the bridge narrow. Abdominal scutes separated from those of plastron by a series of inframarginals. Head large, jaws strong and hooked. Tail long, with one or more rows of compressed, horny tubercles above. Eggs spherical.

Genera two, both of which are represented in Indiana.

Shell without additional plates between the marginals and costals. *Chelydra,* p. 556.

Shell with 3 or 4 extra plates between the marginals and costals. *Macrocemys,* p. 559.

**Genus CHELYDRA, Schweigg.**

*Chelydra, Schweigger, 1814, 88, 23; Agassiz, 1857, 4, 1, 416; Boulen-
ger, 1889, 94, 20.*

Carapace with three tuberculated keels, which disappear more or less with advanced age. No supernumerary scutes intervening between the marginals and the costals, just above the bridge. Plastron small, with five pairs of scutes, the abdominals apparently displaced and covering the bridge. Head large, jaws hooked. Head with the skin marked off into somewhat symmetrical plates. Tail with two rows of large scales beneath.
Chelydra serpentina, (Linn.).

Snapper; Snapping Turtle.

Testudo serpentina, Linneaus, 1758, 64, ed. x, 199; Chelydra serpentina, Schweigger, 1814, 88, 24; Agassiz, 1857, 4, i, 417, and ii, pl. iv, figs. 13-16, pl. vii, figs. 24-26; Boulenger, 1889, 84, 20, with figs. Chelonura serpentina, Holbrook, 1842, 54, i, 139, pl. 23.

Carapace broad and rather depressed, highest in front and notched behind. A median and two lateral, tuberculated keels, disappearing late in life. Marginal plates, exclusive of nuchal, 23. Vertebral scutes wider than long, tuberculated behind. Costal scutes tuberculated near the upper posterior angle. Plastron small, leaving the limbs exposed; covered with five pairs of scutes; the bridge very narrow. Two or three inframarginals at the outer end of the bridge.

Head large and flattened above, with rather conspicuous bony ridges; tapering, but not descending toward the snout. Eyes directed upward and outward. Feet broad and webbed to the nails. Fingers five, all with nails. Toes five, the outer one without a nail. The outer border of all the limbs with a sharp fold of skin which greatly increases the surface of the limb, as aid in swimming. Tail long and pointed, equaling the length of the plastron. Tail furnished above with a median row of large bony tubercles, supported by a bony core. Each side of the tail with smaller tubercles. Under side of tail with two rows of large scales.

Skin of neck, under jaw, body, limbs and tail covered with wrinkles and large and small warts. Fore-arm and hands and feet with large, overlapping, sharp-edged scales. Color of the carapace chestnut brown to black. Plastron and soft skin whitish or yellow. Head and upper neck brown. Attains a total length, it is said, of four and a half feet, the shell two feet, usually much smaller. The weight may reach from 20 to 30 pounds.

This species has a remarkably wide distribution. It occurs from Nova Scotia to Ecuador, in South America. Westward it probably extends to the Rocky Mountains. It is found, no doubt, in every stream and pond in the State of Indiana.

Habits.—This turtle spends the greater portion of its life in, or closely about, streams and lakes and ponds. Although found living in clear rivers, it appears to prefer muddy ponds. It is often seen far away from any water, walking along with awkward and halting gait. Its mode of locomotion has been compared with that of the alligator. When seen on the land it may be seeking some spot in which to deposit its eggs, or seeking for food, or perhaps crossing from one stream to another. In the water they do not seem to swim, but they may often be seen floating along just
below the surface, with the snout and eyes only exposed. When dis-
turbed, they immediately go to the bottom, and conceal themselves there.
When traveling about they are often seen with a great amount of mud on
their backs as though they had been burrowing in the earth. The Snap-
ping-turtle is strong and courageous. When attacked they neither attempt
to retreat nor retire passively into their shells, as do most turtles. The
jaws are opened, the head and long neck are suddenly thrust out, and at
the same moment the animal leaps forward toward its tormentor. If the
aim has been correct, the jaws close on the enemy and the hold is dog-
gedly retained. It is a curious notion held by many people that, when
it has once secured a hold, it will not let loose until it has thundered. It
will sometimes permit itself to be carried around by a stick which it has
seized.

The Snapping-turtle is wholly carnivorous and extremely voracious.
Their food consists of frogs, fishes, the smaller and younger water fowl,
and crayfishes. They do not hesitate to eat any animal substance that pre-
sents itself. They have been accused of capturing young ducks. A large
specimen that I dissected had in its large intestine the feathers and par-
tially digested bones of a full grown robin. The wing and tail feathers
filled up the intestines. Its excrement contained the remains of a cray-
fish. I have been told that they will steal the sportsman's string of fish,
and use the forefoot in tearing off what they can not get into the mouth.

The eggs are laid during the month of June, and hatch in the autumn.
They number from 30 to 70, and are deposited in holes excavated along
the banks of streams. Agassiz says that the hole is excavated at first
directly downward and then laterally, so that the eggs are deposited on
one side of the mouth of the excavation. They are all deposited in one
hole. After the eggs are laid the female covers them up, smooths the
sand over them, and leaves them to their fate. The eggs are spherical,
about an inch in diameter, and provided with a calcareous shell. The
shell is not brittle, but somewhat less flexible than that of most tortoises.
Occasionally an elliptical egg is found. Agassiz is authority for the state-
ment that the young will snap before they have escaped naturally from
the egg.

The flesh of the Snapping-turtle is often used for food, especially that
of the younger individuals. When they grow old their flesh is likely to
have a musky and disagreeable smell. Mr. True states that these turtles
are regularly seen every spring in the markets of Washington ready for
cooking. Storer wrote that in Massachusetts many persons saved the
oil of this animal and used it to heal bruises and sprains. As a therapeu-
tical agent it is worthy to stand alongside of goose oil, skunk oil, and rattle-
snake oil.
Genus MACROCLEMYS, Gray.

Macroclemys, Gray, 1855, 25, 48; Macrochelys, Gray, 1855, 25, sup., 64; Gypochelys, Agassiz, 1857, 4, i, 413; Macroclemmys, Boulenger, 1889, 84, 23.

Carapace with three prominent keels, which persist throughout life. A series of three or four supernumerary marginal scales on each side, between the normal marginals and the costal scutes. Plastron small, cross-like, and with five pairs of scutes. Bridge narrow. Head very large, covered with smooth, symmetrical plates. Orbits looking outward and forward. Jaws very strong and hooked. Tail with three series of tubercles above; the lower surface with small scales.

Macroclemys temminckii, (Troost).

Alligator Snapping Turtle.

Chelomura temminckii, Troost, 1842, 54, ii, 47, pl. 24; Macroclemys temminckii, Gray, 1855, 25, 49; Macroclemmys temminckii, Boulenger, 1889, 84, 25, with figures; Macrochelys lacertina, Cope, 1872, 1, 23; Gypochelys, Agassiz, 1857, 4, i, 414, and ii, pl. v, figs. 23-27.

Carapace furnished with three prominent keels which do not vanish with age. Each median scute rises posteriorly into a knob, which is largest on the hindermost vertebral scute. The lateral keel is located on the upper ends of the costal scutes. The keel rises on the hinder border of each scute into a knob, and the knobs on the hinder scutes are the highest. Posterior border of the carapace serrated. Between the lower ends of the anterior three costal scutes and the marginals occur three or four supramarginals. The plastron resembles that of Cheyletra serpentina.

The head is of enormous size, broad behind, tapering rapidly to the acuminate beak and snout. Beak of upper jaw projecting beyond the lower, and strongly hooked, the outline of the cutting edge rising from the point of the beak, then descending to the middle, and then rising to the corner of the mouth. Lower jaw turned up into a strong hook. Head covered with large, symmetrical plates. Neck short. Tail about three-fourths the length of the carapace, furnished above with three rows of low tubercles, below with rows of small scales. Color yellowish or reddish brown to black.

This species attains a great size for a fresh-water turtle. Agassiz saw one alive that weighed about two hundred pounds. One of his correspondents speaks of a skull which measured nine inches between the eyes. A dry specimen that I examined in the National Museum had the carapace 23 inches long and 20 wide. The head was 8 inches long and 7 wide. The sternum was 16 inches long. A skull in the Indiana
Geological Museum, said to have come from Arkansas, is 9 inches wide and as many long. The length from the snout to the occipital condyle is 7½ inches.

Its range is from western Georgia to Texas and north to Indiana. It has been taken in the Wabash River, at Grayville, Ill., as Mr. Robert Ridgway, of the National Museum, informs me. The specimen captured there was exhibited at county fairs, and was so strong that it could easily walk about with a large man on its back. Dr. Yarrow (10, 50) reports two specimens of this species in the National Museum, from Northville, Mich., but an examination of the records at the Museum shows that the specimens sent from that place were not of this tortoise, but of Necturus.

Habits.—This is one of the most remarkable turtles occurring within our limits, if not within the United States. It is rare in collections, and persons living along the lower Wabash ought to secure all the specimens possible. It may at all times be distinguished from the common Snapping-turtle by the three extra plates above those marginals which are placed just above the bridge. Its great head and its rapidly descending snout are also good marks. It is an exceedingly strong and fierce turtle, and a large one would be hard to manage. Mr. True states that he has known a specimen of perhaps forty pounds to bite the handle of a broom quite in two when enraged. They live principally on fish, but will no doubt devour almost any animal that may be so unfortunate as to come within range of their powerful jaws. One is mentioned (4, i, 415) as catching a bass about fourteen inches long and holding it down on a rock with his fore feet and greedily eating it. The breeding habits are not well understood. Agassiz figures the egg. It is spherical and an inch and three-eighths in diameter.

Family IX. KINOSTERNIDÆ.

Body rather narrow and high. The greatest height behind the middle, beyond which the outline descends rapidly. Marginal plates 23. Plastron moderately to well developed; formed of 8 bones, the entoplastron being absent. Plastral scutes 10 or 11; the gulars present and united or absent; the pectorals not meeting the marginals; abdominals cut off from marginals by two small plates on the bridge. Head large; jaws strong; snout projecting. Digits moderately developed and webbed. Five fingers and four toes with claws. Eggs elliptical.

Plesa tron narrow, its hinder lobe not more than one-half the width of the carapace.  
Aromochelys, p. 561.

Pleastron wider, its hinder lobe considerably wider than one-half the carapace. 
Kinosternon, p. 562.
BATRACHIANS AND REPTILES.

Genus AROMOCHELYS, Gray.

Aromochelys, Gray, 1855, 25, 46; Goniochelys and Ozotheca, Agassiz, 1857, 4, i, 423, 424; Cinosternum, in part, Boulenger, 1889, 84, 33.

Shell of the young with a prominent keel, which may persist in the adult or more or less disappear. Plastron lacking much of filling up the opening of the carapace, the hinder lobe not more than one-half the width of the carapace. The lobes little movable on the middle portion, and the whole length of the plastron considerably less than that of the carapace. Suture between the pectorals longer than that between the humerals.

Gular scute present; head with yellow streaks from snout.

A. odorata, p. 561.

No gular scute; head with dark spots, no streaks of yellow.

A. carinata. Appendix.

Aromochelys odorata, (Bo-c.).

Musk Turtle.

Testudo odorata, Bosc., 1803, 69, 189; Sternotherus odoratus, Holbrook, 1842, 54, i, 133, pl. 22; Aromochelys odorata, Gray, 1855, 25, 46; Ozotheca odorata, Agassiz, 1857, 4, i, 425, and ii, pl. iv, figs. 1-6; Cinosternum odoratum, Boulenger, 1889, 84, 37.

Body of the young broadly oval and with a prominent keel, toward which the shell slopes roof-like. As the animal grows older the shell becomes proportionally narrower, the middle of the back more rounded, and the keel almost disappears. The first vertebral scute is long and narrow. Plastron narrow, leaving wide gaps between it and the carapace. The anterior lobe slightly movable on the transverse hinge. It extends forward from this hinge only about two-thirds the distance to the anterior end of the carapace. A small, triangular gular scute present. Suture between the humerals not quite equal to that between the pectorals. Posterior lobe not more than one-half the width of the carapace, falling considerably short of the hinder end of the shell; notched behind. Plastral scutes of the adults separated by tracts of soft skin.

Head large, snout projecting, jaws strong, the lower hooked. Toes extensively webbed. Soft skin everywhere provided with prominent fleshy papillae. Tail of males projecting beyond the carapace, coiled at the tip, and furnished with a small nail. Posterior borders of the thighs and lower leg with each a patch of horny, sharp-edged scales.

Color of the carapace brownish or horn-color; uniform or spotted and striped with dark brown. Upper surface of head, neck and limbs brown; the inferior surfaces paler. Head with two yellow stripes running back from the snout; one over, the other below, the eye. Plastron
yellow. A specimen that was taken in May at Lake Maxinkuckee had all the soft skin suffused with red.

Length of carapace 4 or 5 inches.

Distributed from Maine to Florida and west to Louisiana and Western Missouri. It is no doubt to be found throughout the whole State of Indiana. It is reported from Brookville (Hughes), Mt. Carmel, Ill. (State coll.), lakes of Northern Indiana (Dr. G. M. Levett), Lake Maxinkuckee and Marion county (Hay).

Habits.—This is to be regarded as essentially an aquatic tortoise. It appears to be disposed to frequent the deeper parts of ponds and small lakes, since in such places it is safer than about shores or on the land. Its disposition is timid, and it prefers to seek safety in concealment or in retreat, to defending itself actively. Nevertheless its disposition is not altogether mild, since it will, when prevented from escaping, put out its head slowly and close its jaws on its assailant with a sudden snap. Holbrook states that it will bite severely, if provoked. In their native haunts they are often seen basking in the sun on some projecting rock or on some fallen tree, from which on the slightest alarm they drop off into the water. Their food is probably mostly or altogether of animal origin. They lay their eggs on shores in holes that they have dug in the sand with their hind feet. The eggs are from three to five in number, of an elongated elliptical shape, a little more than an inch long, and have a hard, smooth shell. One kept in confinement by Agassiz laid after the middle of June.

It takes its specific name from the strong, musky odor which it emits in life.

Genus KINOSTERNON, Spix.

Kinosternon, Spix, 1824, 90, 17; Kinosternum, LeConte, 1854, 1, 180; Cino sternum and Thyrosternum, Agassiz, 1857, 4, 1, 426; Cino sternum, Boulenger, 1889, 84, 33.

Shell with the median keel indistinct even in the young; almost or entirely disappearing in the adults. Plastron with its anterior and posterior lobes movable on the middle fixed portion. Length of plastron almost equal to the length of the carapace. The width of the posterior lobe more than one-half the width of the carapace. Suture between the pectorals considerably shorter than that between the humerals.

Kinosternon pennsylvanicum, (Gmelin).

Eastern Mud Turtle.

Testudo pennsylvanica, Gmelin, 1789, 64, ed. 13, 1042; Kinosternon pennsylvanicum, Holbrook, 1842, 54, i, 127, pl. 21; Thyrosternum pennsylvanicum, Agassiz, 1857, 4, i, 428, pl. iv, figs. 7–12 (y′g), and pl. v, figs. 16, 17; Cino sternum pennsylvanicum, Boulenger, 1889, 84, 39.

Body oval, not much elevated. The young with three indistinct
keels, a median and two lateral; these almost wholly disappearing in
the adults; often a depression along the middle of the back. First and
second vertebral scutes considerably longer than broad. Plastron well
developed, lacking but little of filling up the opening of the carapace.
The anterior lobe rounded, extending even beyond the end of the cara­
pace, freely movable on the transverse hinge. Gular plate single,
small and triangular. The humerals large, and the suture between
them much longer than that between the pectorals. Hinder lobe of
plastron movable on the fixed portion; notched behind. Head of mod­
erate size; snout not greatly projecting; lower jaw hooked. Soft skin
with a few or no fleshy papillae; a pair of barbels behind the symphysis
of the mandibles. Males with two patches of sharp-edged scales, one
above the hollow of the knee, the other below. Tail of the males pro­
jecting beyond the shell, ending in a horny curved nail.

Color of the carapace horn-color or brown, with the sutures black.
Plastron yellow or brown, with the lines of growth usually very distinct.
Soft skin above brownish, with spots of yellow. A yellow stripe from
the snout over the eye and back on the neck. Another from the eye to
the corner of the mouth and to the angle of the jaw. Skin of the lower
surfaces yellow. Size small, becoming probably not more than 5 inches
from front to back of carapace.

Distributed from Canada to Florida and west to Texas and Western
Kansas. In Indiana it has been taken by Mr. Robert Ridgeway, at
Wheatland, in Knox county. Prof. W. S. Blatchley reports to me
that he has collected a specimen at Terre Haute. Mr. Ridgway states
that it is common on the borders of Monteur's Pond, in Knox county.

HABITS.—This tortoise is quite similar to the musk turtle in its mode
of life. It remains about ponds and muddy ditches, where it can bury
itself in the mud whenever it becomes alarmed. They are more in­
clined to passively withdrawing into their shells when attacked than is
the musk turtle, since the shell forms a more perfect protection and
their jaws are not fitted for the infliction of severe wounds. Their food
consists of fish, insects and similar small animals. They are said to
take the hook readily, but they nibble the angler's bait so slyly that
their presence is not observed for some time. Their eggs are similar to
those of A. odorata, but rather larger. They are laid in similar situa­
tions.

Family X. TESTUDINIDÆ.

Shell completely ossified, varying in form from broad to narrow and
from high to depressed. Greatest height about the middle, whence the
shell slopes in all directions, flaring at the borders. Carapace with the
typical number of scutes, 4, 5, 4, with 25 marginals. Plastron large,
composed of 9 bones, the entoplastron being present. Plastral scutes
11 or 12; the pectorals coming into contact with the marginals.
KEY TO THE GENERA OF Testudinidae.

A. Parts of the plastron immovably sutured to one another and to the carapace.
   a. Alveolar surface of the upper jaw with a median ridge parallel with the cutting edge of the jaw.  
      *Chrysemys*, p. 564.
   aa. Alveolar surface without a ridge.
      b. Alveolar surface broad. Choanae even with posterior borders of the orbits.  
         *Malaclemys*, p. 572.
      bb. Alveolar surfaces narrow. Choanae between the eyes.  
         *Clemmys*, p. 576.

AA. Plastron with at least its anterior lobe movable on a transverse ligamentous hinge.
   c. Upper jaw not hooked. Shell two-thirds as wide as long.  
      *Emydoidea*, p. 578.
   cc. Upper jaw hooked. Shell three-fourths as wide as long.  
      *Cistuda*, p. 579.

Genus CHRYSEMYS, Gray.

*Chrysemys*, Gray, 1844, 91, 27; Boulenger, 1889, 84, 69; *Pseudemys*, Gray, 1855, 25, 33; *Ptychemys, Trachemys,* and *Chrysemys*, Agassiz, 1857, 4, i, 431, 434 and 438.

Shell moderately depressed. Bridge wide; the axillary and inguinal processes of the carapace (seen in the skeleton) well developed, the latter united to the 5th costal plate. Entoplastron lying wholly in front of the suture between the humerals and the pectoral scutes. Alveolar surfaces of the jaws broad, that of the upper with a median ridge parallel with the cutting edge of the jaw. Choanae well toward the anterior border of the eyes. Hind legs stout, all the digits webbed beyond the bases of the claws. Skull with a bony arch bounding the eyes behind (temporal arch).

KEY TO THE INDIANA SPECIES OF Chrysemys.

A. Alveolar surface of the upper jaw broad, with the median ridge tuberculated. Upper jaw slightly or not at all notched in front. (*Ptychemys, Ag.)*
   a. Cutting edges of both jaws smooth or nearly so; tubercles of alveolar surface not prominent. Shell quite flat, deeply serrated behind. Plastron with its hinder border distinctly notched. Head small.  
      *hieroglyphica*, p. 565.

AA. Alveolar surface of upper jaw of moderate width; the alveolar ridge not tuberculated, at most slightly denticulated. Upper jaw with a median notch, but no lateral teeth. (Trachemys, Ag.)

a. Head rather small; posterior border of the shell very slightly serrated; plastron with a shallow notch behind. Plastral scutes each with a central blotch and a dark border. troostii, p. 568.


AAA. Alveolar surface of the upper jaw rather narrow, widest behind; the median ridge not prominent. Upper jaw with a notch in front, on each side of which there is a small tooth. (Chrysemys.)

a. Costal scutes alternating with the vertebrals, the transverse rows not straight.

b. Costal scutes without red or yellow bands across them. marginata, p. 571.

bb. Costal scutes crossed by red or yellow bands. belii. Appendix.

aa. Costal scutes placed even with the vertebrals, the rows across the carapace being straight. picta. Appendix.

Chrysemys hieroglyphica, (Holbrook).

Hieroglyphic Terrapin.

Emys hieroglyphica, Holbrook, 1842, 54, i, 111, pl. 17; Ptychemys hieroglyphica, Agassiz, 1857, 4, 1, 434; Chrysemys hieroglyphica, Boulen-ger, 1889, 84, 76.

Head unusually small; snout somewhat projecting; upper jaw slightly notched in front; both upper and lower jaws smooth or slightly denticulated. Shell greatly depressed, and in large specimens without trace of keel. In specimens five inches long there is a slight keel. Shell sometimes smooth, occasionally longitudinally wrinkled. At its border, especially behind the thighs, the shell flares outward excessively, in some cases producing an actual concavity in the shell above. Hinder margin
deeply serrated. The bridge is narrow from front to back, the width being contained in the length of the plastron about three times or more. It rises little toward the carapace, and this contributes to the apparent flatness of the shell. Hinder border of the plastron with a deep notch. Longest suture that between the abdominals; the shortest, that between the humerals. Digits all strongly webbed. Hind feet very large and flat.

The ground color of the carapace varies from olive to dark brown. This is variegated with numerous lines and stripes of yellow. On the vertebrales the lines tend to run longitudinally. On the costals broad yellow bands divide each scute into three or four areas, inside of each of which are narrow concentric lines of the same color. The marginals are marked with yellow and brown. The plastron is yellow, with some splotches of brown on the bridge. The head, neck, feet and tail are all dark green, with numerous longitudinal bands of yellow. The length of the shell of large specimens is 12 inches.

Habitat from Georgia to Texas and north to the Wabash Valley.

Two shells of this species are in the State collection, which were sent from Mt. Carmel, Illinois, on the Wabash River. No doubt it will be found along the whole lower course of the Wabash. In the "Report of the State Geologist of Indiana" for 1875, page 499, Dr. G. M. Levette reports the occurrence of this species in the Kankakee River. Dr. Levette had given considerable attention to the study of our tortoises, and it is quite probable that he was correct in his determination of the species. I have had the opportunity of studying a number of specimens of this species in the National Museum.

Nothing appears to be known concerning the special habits of this terrapin. It is undoubtedly entirely aquatic, as are its immediate relatives.

**Chrysemys labyrinthica**, (LeS.).

*Emys labyrinthica*, LeSueur, MSS. in 113, 13; *Malaclemmys geographica*, in part, Agassiz, 1857, 4, 1, 436; Boulenenger, 1889, 84, 90; *Ptychlemys labyrinthica*, G. Baur, MSS.

The type of this species was taken by LeSueur in the Wabash River, probably at New Harmony, and is now in the Museum d' Histoire Naturelle, at Paris. Both Agassiz and Boulenenger regarded it as belonging to *Malaclemys geographica*, but it is evidently not this species. Duméryil, in his description, states that the lower jaw is denticulated and furnished with a hook which fits into a corresponding depression in the upper jaw. He correctly compares the species with *C. hieroglyphica*, but says that it differs from the latter in the less elongated oval of the carapace and the elevation of the vertebral line, the shell of *hieroglyphica* being much depressed. The species received its name, as said by Agassiz, from the
BATRACHIANS AND REPTILES.

numerous meandering lines upon the bridge of the sternum. Not having seen specimens, I am unable to state how it differs from *C. concinna*. Dr. G. Baur, of Chicago University, to whom I am indebted for notes regarding it, states that the skull is much different from that of all other species. He believes that Prof. H. Garman’s specimen from the Wabash River, described as *concinna*, belongs to LeSueur’s *labyrinthica*. The two species are closely related, and specimens should be carefully sought along the Wabash and preserved.

**Chrysemys concinna**, (LeConte).

*Testudo concinna*, LeConte, 1828, 32, iii, 100; *Emys concinna*, Holbrook, 1842, 54, i, pl. 5; *Pseudemys concinna*, Gray, 1855, 25, 34; *Psycsemys concinna*, Agassiz, 1857, 4, i, 432, pl. ii, figs. 4-6; *Chrysemys concinna*, Boulenge, 1890, 84, 83.

Form of the shell somewhat variable in specimens of all ages, some having the greatest breadth at the middle, others at the hinder part; some are depressed, others more elevated. The young have a distinct keel, which is lost in half-grown specimens. The posterior border of the carapace is slightly serrated, the notches being between the scutes. Plastron with its posterior border with a distinct emargination; the hinder lobe not two-thirds the width of the carapace. Bridge wide, rising with moderate rapidity toward the carapace. Head of moderate size, the snout short and blunt. Upper jaw not at all notched in front; the cutting edge smooth; the alveolar ridge strongly tuberculated. Lower jaw with its sheath flat and rough on the outside, the cutting edge coarsely serrated, the tip with a sharp upturned point. Limbs well developed; all the digits webbed beyond the bases of the claws. Claws of the fore limbs of the males very long.

Color of the upper shell olive or brownish, with markings of yellow and dark brown. A yellow band usually runs down the middle of each costal scute. This usually sends off lateral anastomosing branches, which divide off the surface into a few large areas. Within these the yellow and brown are arranged in concentric lines. Both the upper and the lower surfaces of the marginals have eye-like spots of brown and yellow, one located across each suture. Across each scute there usually runs a yellow vertical band. Plastron almost uniform yellow, a few small spots of dusky on the anterior end, and about two on each bridge. Head, neck, legs, and tail brown, with many longitudinal stripes of yellow, or sometimes red. On the head there is a median stripe from the snout to the back of the head; another starting over the eye, widening on the back of the head; a stripe starting at hinder corner of the eye; another originating under the eye; and all, except the median stripe, running back on the
The lower stripe is met behind the corner of the mouth by a stripe from the middle of the lower jaw. At the tip of the jaw a stripe begins which further back divides into two, these including another yellow stripe.

The length of the shell may become as much as 16 inches.

The species ranges from North Carolina to Texas and north to Southern Indiana. Prof. Harry Garman, of Lexington, Ky., states (61, 1892, 185), that he received a fine, large specimen of this species from Dr. J. Schneck, of Mt. Carmel, Ills.; and he further says that several others have been observed in the same locality. The species will, therefore, be found along the lower part of the Wabash River, and possibly further north.

This species may always be readily distinguished from all others by the smooth edge of the upper jaw and the serrated edge of the lower.

Habits.—Not much appears to be known about the habits of this terrapin. It is quite common in the waters of the more southern States. Mr. Fred. W. True, of the National Museum, states (52 i, 155), that it seems to prefer brackish waters. Their diet consists principally of animal matter, and they are reported, in the South, to feed on certain species of worms, which they capture by inserting their claws into the worm-holes in the clay. This seems extremely doubtful. Agassiz found twelve eggs in the oviducts of one specimen. The eggs are of an elliptical form, about an inch and a half long and an inch in the shortest diameter.

Chrysemys troostii, (Holb.).

Emys troostii, Holbrook, 1842, 54, i, 123, pl. 20; Trachemys troostii, Agassiz, 1857, 4, i, 435; Pseudemys troostii, Cope, 1875, 12, 53; Chrysemys troostii, Boulenger, 1889, 84, 76.

Shell only moderately depressed; said by Holbrook to be “greatly depressed.” There is only a trace of the keel in the adults. Behind the bridge the shell flares outward, but not so much as in C. hieroglyphica. The posterior border is only slightly serrated. The upper surface is, in adult specimens, somewhat wrinkled. The plastron has a broad shallow notch behind. The bridge is wide, but does not rise much toward the carapace. The longest suture of the plastral scutes is that between the abdominals, the shortest that between the humerals. The head is relatively small, flat above, and pointed. The cutting edge of the upper jaw is convex on each side, with a slight nick in front; the alveolar ridge is low and smooth. Lower jaw ending in a turned up tip. Fore and hind limbs well developed; the digits all completely webbed; the claws of the fore foot of the males very long and curved. The tail of the males very long.

The ground color of this species may be regarded as greenish horn-color above, yellow below. The scutes of both the carapace and the
plastron are bordered with dark brown. On the carapace, within the areas thus formed, there may be a little black in splotches. Or this may increase in amount until nearly the whole scute is covered. This is especially true on the hinder half of the shell. On the plastron, besides the dark margin, each scute may have a central spot of black, and this by expanding may occupy most of the surface. This is also more likely to be the case on the hinder end of the plastron. On each of the two anterior scutes there is an eyelike spot, consisting of a circle of black enclosing another of the same color. The yellow of the plastron is to a considerable extent replaced by red. The soft skin of the head and upper side of neck is olive or dusky, varied with numerous fine anastomosing lines of pale yellow. At the back of the eye a stripe begins and runs back on the neck. This stripe is bright red, not well defined along the edges, but seeming to run into the surrounding dark color. In some cases the whole of the back of the head is red. The feet, legs, tail and lower side of the neck are ornamented with broad yellow or green stripes.

The length of the shell may reach 9 inches, probably more.

Mississippi River and its tributaries from the Gulf to Northern Missouri. It has been sent to the National Museum from Wheatland, Ind., by Mr. Robert Ridgway, to whom we are indebted for knowledge of many rare reptiles of this State.

This is a very beautiful and a characteristically marked species. It may readily be distinguished from _C. elegans_ by the brown borders of all the scutes, and the absence of yellow stripes on the carapace. Both have a blood-red stripe along the neck.

**Habits.**—Little is known, beyond the fact that it is aquatic. It presents a good subject for study to herpetologists who live on the lower reaches of the Wabash.

**Chrysemys elegans** (Wied).

_Elegant Terrapin._

_ENCYS ELEGANS, Wied, 1839, 63, i, 213; Trachemys elegans, Agassiz, 1857, 4, i, 435, pl. iii, figs. 9–11; Pseudemys elegans, Cope, 1875, 12, 53; Chrysemys scripta, var. elegans, Boulenger, 1889, 84, 78.

Shell broad and depressed, the young with a moderate keel, which disappears in the adults. Carapace serrated behind; a slight emargination in each scute and deeper ones between them. Surface of the costal scutes smooth or sometimes slightly wrinkled longitudinally. Nuchal scute very narrow. Plastron with its posterior border with a broad shallow notch; the width of the hinder lobe being hardly two-thirds the width of the carapace. Bridge wide, rising rapidly to the margin of the carapace. Longest suture of the plastron that between the abdominals,
the shortest that between the humerals. Head of moderate size; snout short and rather blunt. Edge of upper jaws convex along the sides, notched in front; smooth; the alveolar surface with a low smooth ridge. Lower jaw smooth or slightly denticulated. The tip curved upward. Limbs well developed; all extensively webbed; claws of forefoot of males very long and somewhat curved. Tail of moderate length.

Color of the carapace olive, with lines and spots of yellow and black. On the vertebral scutes the lines run mostly lengthwise, on the costals transversely. Down the middle of each costal scute runs a yellow band of varying width. Parallel with it are other lines and bands of black and yellow, narrow or wide. On both the upper and the lower surfaces of the marginal scutes are sutural spots consisting of concentric circles of yellow and black. Between them a yellow band crosses each marginal. The plastron is yellow, with a black blotch on each scute, these often ocellated with yellow. The spots on the bridge usually confluent. Head with numerous narrow stripes of greenish or yellow. A broad stripe starts under the eye and runs back on the neck, being met at the angle of the jaw by a stripe from the middle of the lower jaw. Another stripe, often blood-red, starts at the posterior corner of the eye and runs back on the neck. The stripe is wanting which in C. concinna starts above the eye and extends on the neck. The legs and tail are striped with yellow.

Length of the shell in large specimens about 10 inches.

This species has been found inhabiting the territory from South Carolina to Mexico, and north along the tributaries of the Mississippi to the Yellowstone. In Indiana it has been taken at New Harmony (Sampson's coll.); in the Wabash River at Mt. Carmel, Ills. (L. M. Turner). The species was originally described by Max Von Wied from specimens taken near New Harmony. About July 1, 1892, I took a specimen in the Tippecanoe River at Winamac.

Dr. Boulenger, as above cited, regards this terrapin as only a variety of C. scripta (Trachemys scabra, Ag.). However, at present it appears to me that there are sufficient differences in both the young and the adults of the two forms to justify their being regarded as distinct species. Their geographical distribution is likewise different. The specimen of C. elegans reported by Dr. Yarrow (10, 33) from Oakley, S. C., is a young C. scripta.

Habits.—Quite as little is known about the manners of life of this species as of most of the other aquatic turtles. Agassiz figures the egg. It is elliptical in form, an inch and a half in its long and seven-eights in its short diameter. This naturalist has also observed that this turtle has a voice, as he believed most turtles have. It is said to "emit a piping note." Dr. J. Schneck, of Mt. Carmel, Ills., kept a young elegans for more than two years, during which time it partook freely of food, but
made no perceptible growth. Prof. F. W. Craigin (49, 1, 101) thinks that these and other turtles are sometimes killed by minks and other carnivorous animals. To the attacks of such enemies may be due the great timidity of turtles, which seem to have so few enemies.

**Chrysemys marginata, Ag.**

*Western Painted Tortoise.*

*Chrysemys marginata,* Agassiz, 1857, 4, i, 439, pl. i, fig. 6 and pl. v, figs. 1–4; *Chrysemys cinerea,* Boulenger, 1889, 84, 73.

Shell broad and depressed, broadest behind the middle; the shell flaring considerably posteriorly; its surface very smooth; no traces of a keel, even in the young. Scutes of the carapace arranged as usual among tortoises, the suture between the costals meeting the lateral border of the proper vertebral about its middle. Vertebrals 2 and 3 wider than long, but narrower than the costals. Anterior border of the carapace often with a few dentations; the posterior border not serrated. Plastron broad and flat, truncated before and behind; the anterior end often dentilated. Bridge wide, flat, and rising rather rapidly to the margin of the carapace. Head of moderate size; snout not much projecting. Jaws with smooth cutting edge, the front with an evident notch, on each side of which is a small tooth. Alveolar ridge feeble. Lower jaw little upturned. Limbs with moderate development; the digits webbed to the claws. Tail of moderate length, that of the males longest.

The color of the carapace is usually dark green. The hinder border of the costal and vertebral scutes is narrowly bordered with black. On the anterior border of the same scutes, and lying immediately against the black margin, are slightly wider lines of bright red (yellow in alcoholic specimens). These red or yellow lines do not join so as to form straight lines across the back. A very narrow line of red runs along the middle of the back. Upper surfaces of the marginal plates with many crescent-shaped marks of bright red. Lower surfaces of the marginals black, with large splotches of blood-red and bright yellow. Plastron bright yellow or brownish red, with a large dusky blotch occupying its central portion. Soft skin of head, legs and tail dark olive, with red stripes. On the occipital region are two large waxy yellow spots, nearly as large as the eye; these prolonged backward into two narrower pale yellow stripes. Another short yellow stripe from the upper corner of the eye; another from the lower side of the eye and running back on the neck. Two red stripes on the front of the fore legs, and similar ones on the posterior surfaces of the thighs. Besides these, there are numerous small spots of red all over the soft parts. All the red fades to yellow in alcohol.

The usual length of the shell is about 4 or 5 inches; a length of 7 inches may be attained. This species is an inhabitant of the Northern
States of the Mississippi Valley from Ohio to Kansas, and north to Lake Superior. In Indiana it is to be found everywhere. I have proofs of its occurrence at so many points that it seems unnecessary to state them.

Habits.—This is at once our most beautiful and most common species of tortoise. It is, however, probably less well known than the Snapping-turtle, because of its strictly aquatic mode of life and its excessive timidity. It appears to prefer to abide in ponds, pools, and the sluggish parts of our streams. In such places it may be often seen lying with its fellows on some fallen tree-trunk or on some projecting stone, basking in the sunshine. The senses of sight and hearing appear to be acute, for it easily takes alarm and tumbles into the water and disappears. It is then often to be found buried in the mud close to where it entered the water. It is an entirely harmless turtle, and can hardly be provoked to bite, and its effort is then a feeble one. The food of the Western Painted Turtle probably consists of insects, tadpoles and other feeble and small animals.

Smith (18, 665) states that in Michigan this turtle has been found out of its winter quarters as late as October 22, and in the spring on March 31. From tortoises that have been marked, it appears that all these animals wander but short distances from where they have been hatched. According to Agassiz’ figures, the eggs of this tortoise are about an inch and a quarter long and nearly seven-eighths in the shorter diameter. Many interesting things are to be found concerning the closely related C. picta in Agassiz’ work on the Testudinata of North America (4).

Genus MALACLEMYS, Gray.

Malaclemys, Gray, 1844, 97, 28; 1855, 25, 37; Graptemys and Malaclemys, Agassiz, 1857, 4, i, 436, 437; Boulenger, 1889, 34, 88.

Shell depressed, with a distinct keel. Bridge wide, with the axillary and inguinal processes well developed, the latter united to the 5th costal plate. Entoplastron lying wholly in front of the suture between the humerals and pectorals. Jaws with the alveolar surface broad to very broad and entirely without a median ridge. Choanae behind the level of the eyes. Skull without a bony temporal arch. Digits extensively webbed.

Keel strongly tuberculated; an elongated, transverse, yellow streak behind each eye. Carapace strongly serrated behind.

\[ \text{pseudogeographica, p. 573.} \]

Keel not tuberculated; a triangular yellow spot behind each eye. Carapace feebly serrated behind.

\[ \text{geographica, p. 574.} \]
Malaclemys pseudo-geographica, (LeS.).

LaSueur’s Map Tortoise.

_E. pseudo-geographica_, LeSueur, MSS. in Holbrook, 1842, 54, i, 103, pl. 15; _Graptemys le8ueurii_, Agassiz, 1857, 4, i, 436, pl. 2, figs. 10-12; _Malaclemmys lesueurii_, True, 1875, 10, 34; Boulenger, 1889, 34, 91 (not Emys lesueurii of Gray).

Shell oval, depressed, rising roof-like to the distinct medial keel. Posterior border of some or all of the vertebral scutes with each a prominent tubercle, largest on the 2d and 3d vertebrals. Shell strongly serrated behind. Nuchal with a notch in its hinder border. Plastron with its hinder lobe not much over one-half the width of the carapace; a broad shallow notch in its hinder border. Bridge broad and flat, rising little toward the carapace. Head of the males small; that of the females rather large. Snout not at all projecting. Cutting edge of the upper jaw smooth, convex, the jaw not notched in front; the alveolar surface of moderate width, wholly separated in front by soft skin. Lower jaw with smooth, concave cutting edge, not hooked at the tip. Limbs well developed, the digits webbed to the bases of the claws. Tails of the males, as with most turtles, bringing the vent beyond the edge of the carapace.

The color of the upper surface of the carapace is olive or occasionally brownish. Usually there are no black spots on the carapace; but occasionally there is a blotch, as if made with the inked end of the finger, on each of the larger scutes and on most of the marginals. Over all the scales there is a network of greenish lines, often obscure, which divide each scute into about 4 or 5 areas. The plastron is yellow, with a little clouding or mottling of brown, or with many irregular and obscure stripes and lines of dark color. Bridge almost uniform brown or with numerous streaks of yellow and brown. Head, neck, limbs, and tail dark green, with many stripes of yellow, and many rows of small yellow spots. Behind the eye there is a very characteristic transverse streak of yellow, sometimes short, sometimes turned forward beneath the eye. When the streak is short, there is a yellow dot under the eye.

The shell of this species may reach a length of 10 inches. Adult female specimens will average 8 inches or less; males usually smaller.

This is a species belonging to the Mississippi Valley, ranging from Ohio to Kansas, south to Louisiana, north to Wisconsin. It doubtless occurs throughout the State of Indiana; nevertheless, I did not find it at Lake Maxinkuckee, and Dr. Levette does not give it in his list of turtles found in the northern part of the State. It is abundant about New Harmony (LeSueur, Max. V. Wied, and Sampson’s coll.); found at Brookville (Hughes); Terre Haute, rare (Blatchley); Monroe county (Bollman).
This species is quite distinct from *M. geographica*, as shown by the much narrower alveolar surfaces of the jaws, the strongly tuberculated vertebral spines, the more distinct keel, the transverse streak behind the eye, the coarser network of lines on the carapace, and the greater amount of brown on the plastron. Some authors, among them recently Dr. Boulenger and Prof. Harry Garman (42, xxii, 70) have given as distinctive characters the large head of *geographica* and the smaller head of *pseudo-geographica*. The size of the head is a sexual character in both species, the males having a small head, the females a large head. Females of the two species of the same size have heads of approximately the same width, and the same is true of the males. Of this I have satisfied myself by measurement of specimens in the National Museum and in my own collection. The head is, however, variable in relative size in different individuals of the same sex. Moreover, it will be found, I think, that the males average considerably smaller in size than do the females.

**Habits.**—This is an eminently aquatic tortoise, spending its life in rivers, lakes and ponds, and coming out of the water only to bask in the sun on some rock or fallen tree, or to deposit its eggs. The food of LeSueur’s Map-Turtle has hitherto been regarded as animal in nature, such as small fishes, reptiles and the like, but Prof. Garman states that the digestive canal of most of the specimens that he observed were filled with the bulbs of a sedge. In some cases, however, it was found to have eaten crayfishes. The eggs are large, being an inch and a half in the longest and an inch in the shortest diameter. According to Agassiz this species deposits its eggs earlier in the season than any others of our turtles. At Natchez, Miss., one was found to have laid her eggs as early as the first of June. It may here be stated that Agassiz concluded that our fresh-water turtles do not lay eggs before the eleventh or fourteenth year.

This species does not appear to be employed to any considerable extent as food, yet there seems to be no reason why its flesh should not be as savory as that of many species which are highly esteemed.

**Malaclemys geographica**, (LeS.).

**Geographic Terrapin; Map Tortoise.**

*Testudo geographica*, LeSueur, 1817, 2, 86, pl. v; *Emys geographica*, Holbrook, 1842, 54, i, 99, pl. xiv; *Graptemys geographica*, Agassiz, 1857, 4, i, 436, pl. ii, figs. 7-9; *Malacoclemys geographica*, Cope, 1875, 12, 53; Boulenger, 1889, 84, 90; *Emys leseuerii*, Gray, 1831, 112, 31.

Shell depressed, and keeled in small individuals, becoming more elevated, higher and more rounded in full grown adults. Keel with rudimentary tubercles, this evidence of the keel persisting even in adults.
Carapace feebly serrated posteriorly. Nuchal narrow, its hinder border notched. Carapace rounded behind in the females, more pointed in the males. Plastron with its posterior lobe about two-thirds the width of the carapace; distinctly notched behind. Bridge wide, rising little toward the carapace. Limbs well developed, scaly, the digits well provided with webs. None of the claws of the male much elongated. Head of the males small, that of the females large. Snout not at all projecting. Upper jaw with the cutting edge smooth, somewhat sinuated, not notched in front; the alveolar surface very broad, united with its fellow back nearly to the choana. Lower jaw flat, its alveolar surface resembling that of the upper jaw. The jaw not hooked at the tip.

Ground-color of the carapace dark olive. Over all the scutes there is a network of greenish lines, so that each of the large scutes is divided into about 8 to 10 areas. Under side of the marginals with sutural spots of dark green, which enclose irregular lines of yellow. Head, neck, limbs and tail dark green, almost black, with numerous lines and streaks of greenish yellow. Behind the eye is a somewhat triangular spot of greenish yellow, often elongated backward. Plastron yellow, with the sutures of the scutes marked with a dark line. Occupying the center of the plastron is a large lyriform blotch of brown, which looks as if the color had almost faded out.

The size of this species averages larger than that of *M. pseudo-geographica*, full grown specimens being about 10 inches long. It may become still larger.

This species is distributed from Pennsylvania and New York to Michigan and Arkansas. It is found no doubt in all the streams and lakes of Indiana. Known localities are New Harmony; Brookville; North Manchester, Wabash county (A. B. Ulrey); Lake Maxinkuckee; Eel and St. Joe rivers; Terre Haute (Blatchley); Fall Creek, Marion county (W. P. Hay); Kankakee River at English Lake; Tippecanoe River at Winemac.

This turtle can be readily distinguished from any other species occurring in Indiana by the extremely expanded masticatory surface of the jaws. From *M. pseudo-geographica* it may be distinguished by the reduced keel, especially of the large females, the rudimentary tubercles of the keel, and especially by the triangular spot behind the eye. As stated in the description of *M. pseudo-geographica*, it is the head of the female that is large; that of the male is little, if any, larger than males of the same size of *pseudo-geographica*. My observation is that the females are usually much larger than are the males. Dissections made of 7 specimens taken at Lake Maxinkuckee showed that 4 were females, all with carapace more than 6 inches long; the others were not over 4 inches long, and all were males. I think that males may become somewhat larger than these, but not nearly so large as the largest females.
HABITS.—The mode of life of the Map Turtle is as thoroughly aquatic as that of its relative, *M. pseudo-geographica*. It probably never, unless compelled to do so, leaves the immediate vicinity of its native stream. Holbrook states that it is bolder and more active than most other turtles, those that he had seen approaching even the snapping turtles in their disposition to bite when disturbed. The food of this species consists of animals of various kinds. Prof. Harry Garman (42, xxii, 70) states that an examination of the contents of the alimentary canal showed that the food consisted exclusively of mollusks, the young eating the thinner shelled species, the adults the larger and thicker shelled kinds. At Lake Maxinkuckee three persons caught about 30 specimens of this species in a few hours. Without probably an exception they were found near the shores, where there were great numbers of the water-breathing univalves. After a number had been kept for a few days in a tub there were found in it large numbers of the opercles of such mollusks; and in the intestines of one were the remains of a crayfish, some fish scales, and what appeared to be the cases of some kind of caddis-worm. Its broad masticatory surfaces are well fitted for crushing the shells of mollusks.

The eggs of this species, as figured by Agassiz, appear to be somewhat smaller than those of LeSueur’s tortoises. I have found 16 eggs in a large female. DeKay states that the flesh of this tortoise is good for food. Where they are abundant they might be turned to good account.

**Genus CLEMMSYs, Wagler.**

*Clemmys*, Wagler, 1830, 75, 136; Bouleniger, 1889, 84, 100; *Nanemys, Calymys, Glyptemyys*, etc.; Agassiz, 1857, 4, i, 442 seq.

Shell moderately to strongly depressed. Bridge wide, with strong axillary and inguinal processes of the plastron just reaching the 1st and 5th costal plates. Entoplastron crossed by the suture between the humerals and the pectorals. Alveolar surfaces of the jaws narrow and without a median ridge. Choana toward the front of the eyes. Skull with a bony temporal arch. Digits more or less extensively webbed.

**Clemmys guttata**, (Schneider).

*SPECKLED TORTOISE.*

*Testudo guttata*, Schneider, 1792, 120, x, 264; *Emys guttata*, Holbrook, 1842, 54, i, 81, pl. 11; *Nanemys guttata*, Agassiz, 1857, 4, i, 442, pl. i, figs. 7-9; *Chelopus guttatus*, Cope, 1875, 12, 53; *Clemmys guttata*, Bouleniger, 1889, 84, 109.

Shell oval, widest behind, rather depressed, no traces of keel in the adult, little trace even in the young. Nuchal scute very narrow. Plastron large; the hinder lobe about three-fourths the width of the carapace,
with a shallow emarganation in the posterior border. The anterior lobe truncated, not movable on a transverse hinge. Bridge rather narrow, not more than half the width of the hinder lobe of the plastron, rising rather rapidly to the carapace. Plastron of the male concave. Head of moderate size, covered with a hard smooth skin. Snout not at all projecting. Upper jaw notched in front; the alveolar surface very narrow. Lower jaw with the sheath externally very wide; the tip upturned. Choanae well forward, under the front of the eyes. Legs and feet all covered with scales, those of the front limbs large and overlapping. Feet not large, the claws rather short, the web not extensive. Tail long, that of the male bringing the vent beyond the carapace.

The general color of the carapace is black. Sometimes there appear to be patches of reddish brown showing through the darker. On each scute there appear from one to a dozen round spots of bright orange, each larger than the pupil. The plastron is red, orange and black, the black generally predominating. The orange usually occupies the center of the plastron and the margin. Head above black, with orange dots. Generally there is a large spot of orange just above the ear. The neck is black, with more or less red mingled therewith. The shoulders are extensively red or orange. The upper surfaces of the limbs are black, with dots of yellow and red; the lower surfaces red and orange. The tail is black, with red at the base. Length of shell 4 or 5 inches.

Distribution from New England to North Carolina, west to Indiana. In this State it appears to be found only in the northern portion among the numerous lakes, streams and swamps found there. Dr. G. M. LeVette first found it in that region, reporting it as occurring "in ditches around Kendallville, and doubtless over the whole region." Two specimens were picked up one morning at Lake Maxinkuckee in May, 1891, by members of the Indiana Academy of Science. Taken also at Rochester, Fulton county, by Dr. Vernon Gould; English Lake (Dr. Baur).

HABITS.—This little turtle is less exclusively aquatic than any of those that have been described, except the snapping-turtle. It seems to delight in being in the neighborhood of swamps and sluggish streams, and it probably spends the greater part of its time in the water. Nevertheless it often leaves the water, and it may be picked up while it is making its journeys. It is a very harmless animal, and deserves protection. Holbrook says that it is timid and gentle, and can easily be domesticated. When at freedom they collect in numbers on objects above the water and enjoy the sunshine; but if any fancied enemy is seen approaching they slide off rapidly into the water and soon bury themselves in the mud. Their food is said to consist of tadpoles, young frogs and other weak animals. On land they devour earthworms, crickets and grasshoppers. Their eggs are few in number; never, according to Agassiz, exceeding.
three or four. They are about an inch and a quarter long and three-quarters in the shorter diameter. The eggs are laid about the 20th of June, in a perpendicular hole dug by the use of the hind legs. After the eggs are deposited the dirt is pushed back over the opening so as to conceal it entirely.

**Genus EMYDOIDEA, Gray.**

*Emys*, Duméril, 1806, 119, 76; Agassiz, 1857, 4, i, 441; Boulenger, 1889, 84, 114; *Emydoidea*, Gray, 1870, 25, Sup. 19; Baur, 1890, 22, xxiii, 1099.

Shell moderately elevated. Bridge narrow, the plastron not sutured to the carapace, but united to it by ligament; therefore, more or less movable on it. Plastron divided by a transverse hinge at front end of bridge into two lobes, which are movable on each other. Axillary and inguinal processes of the plastron short, the latter just reaching the fifth costal plate. Entroplastron reaching but hardly intersected by the suture between the humerals and the pectorals. Alveolar surface narrow, without a median ridge. Choanae between the eyes. Skull with a bony temporal arch. Digits webbed.

According to Dr. Baur, this genus differs from the Old World *Emys* in that the frontals enter the orbits, and the rib-heads are long, as in *Chelydra*.

*Emydoidea blandingii*, (Bolb.).

*Blanding's Tortoise.*

*Cistuda blandingii*, Holbrook, 1842, 54, i, 39, pl. 3; *Emys melagrìs*, Agassiz, 1857, 4, i, 442, pl. iv, figs. 20–22; *Emys blandingii*, Boulenger, 1889, 84, 114; *Emydoidea blandingii*, Gray, 1870, 25, sup. 19; Baur, 1890, 22, xxiii, 1099.

Shell elongated oval, widest just behind the middle; rather high, convex, and without keel. Carapace not serrated behind. Plastron large, entirely closing the shell; movable on carapace on the ligamentous hinges, the two lobes movable on each other on a transverse hinge covered by the suture between the pectorals and the abdominal scutes; the posterior lobe somewhat excavated behind. Posterior border of the entroplastron reaching the humero-pectoral suture, but not intersected by it. Bridge narrow and very short, almost obliterated. Head long and wide, the eyes opening somewhat upward. Upper jaw with the cutting edge convex at the sides and notched in front. The alveolar surface narrow. Lower jaw with narrow alveolar surface and with a hooked tip.

Limbs, including the feet, scaly; the toes short and provided with a narrow web. Tail covered with scales; that of the male about two and two-thirds times in the length of the shell, that of the female shorter.
Color of the shell above, dark green to black, each scute with several round, triangular or oblong spots of yellow or orange, those of the marginals largest; all, however, sometimes wanting. Plastron yellow, with the outer posterior portion occupied by a blotch of brown. This blotch may expand so as to take in almost the whole scute. Head and neck above and along the sides dusky, with numerous yellow dots; chin, throat and under side of the neck yellow. Legs yellow, with mottlings of brown. Tail striped longitudinally with yellow and brown.

The carapace may attain a length of nine inches, but this is uncommon.

This species is wholly Northern in its distribution, being found from Massachusetts and Canada to Northern Illinois. In Indiana it occurs only in the region of lakes in the northern portion. Dr. Levette (93, 1875, 499) reports it as occurring "sparingly in the northern parts of Lagrange and Steuben counties." A live one was seen at Lake Maxinkuckee in May, and I have a shell of one that was taken at Rochester, Fulton county, by Dr. Vernon Gould, of that place. It does not appear to be rare in that region. It is also common at English Lake, in Starke county.

HABITS.—Not much accurate information has been gathered concerning the habits of this tortoise. It is probably somewhat less aquatic than the speckled tortoise, Clemmys guttata, yet it undoubtedly prefers the neighborhood of streams and ponds. I find no account of its food, but this is probably of an animal nature. Its eggs, as figured by Agassiz, are large and oval, measuring an inch and three-eighths by almost an inch. There are from seven to nine of them laid together once a year. The shell is thick, smooth and hard. According to Agassiz's figures there are no yellow or orange dots on the shell of the very young. In this respect they are in contrast with the young of Clemmys guttata, which are said to have the spots developed long before leaving the egg, even before the lungs are developed.

This species is to be distinguished from the box-tortoise by the more elongated, less elevated and less convex shell, the posteriorly notched plastron, and absence of anything like a hook to the upper beak.

Genus CISTUDA, Fleming.

Cistuda, Fleming, 1822, 115, ii, 270; Cistudo, Bonaparte, 1830, 116, 162; Agassiz, 1857, 4, i, 444; Boulenger, 1889, 84, 115.

Shell high and very convex. Plastron united to the carapace by ligament and movable on it; the axillary and inguinal processes rudimentary. Plastron divided by a transverse hinge into two movable lobes, the hinge covered by the suture between the pectoral and abdominal scutes. Entoplastron cut by suture between the humerals and the pectorals. Alveolar surface of jaws narrow, without median ridge.
Upper jaw with the beak projecting downward, notched or not. Cheek between the eyes. Skull without a bony temporal arch. Digits with short or no web.

Shell with traces of a keel, rounded above; no bridge.

Shell without traces of a keel, flat above; a distinct bridge.

*Cistuda carolina* (Linn.).

**Box Tortoise.**

*Testudo carolina*, Linnaeus, 1758, 64, x, 198; *Cistudo carolina*, Gray, 1831, 112, 18; Holbrook, 1842, 54, i, 31, pl. 2; Boulenger, 1889, 84, 115; *Cistudo virginica*, Agassiz, 1857, 4, i, 445, pl. iv, figs. 17–19.

Shell broadly oval, sometimes four-fifths as wide as long; high and very convex; extremely solid. On at least the posterior part of the carapace are evidences of a keel; this in the young quite distinct. Margin of the carapace sloping rapidly upward from transverse hinge of the plastron. Plastron large, tightly closing the opening of the carapace, consisting of two lobes movable on each other and the carapace. The bridge entirely abolished; no axillary or inguinal scutes. The plastron rounded in front and behind. Head of moderate size, the snout not projecting; upper jaw with the cutting edge drawn down in front into a hooked beak, the hook not notched; the alveolar surface narrow. The lower jaw turned upward at the tip. Limbs and feet scaly, especially the anterior. Claws stout; the web between the digits narrow. Tail short. Scutes sometimes very smooth, sometimes showing distinctly the concentric lines of growth.

The colors of the carapace are yellow and brown or black. Sometimes the darker color predominates, sometimes the yellow. Usually the ground is brown or reddish brown, while the yellow appears as spots of various shapes; often radiating from the point of growth of the scute. The ground color may appear to be yellow, relieved with black spots. The plastron is variously ornamented with black and yellow. The young have a single yellow spot on each of the scutes of the carapace. The head, neck, limbs, and tail are brown, with numerous spots of yellow and orange. Often the scales of the fore-legs are especially bright yellow.

The length of the carapace is about 4 or 6 inches in full grown examples.

This tortoise is distributed from New England to the Gulf and westward to Texas. It inhabits the whole of Indiana, and appears to be especially abundant in the southern portion. New Harmony (Sampson's coll.); Brookville (Hughes and Butler); Monroe county (Bollman); Terre Haute (Nor. Sch. coll.); Lafayette and Westfield (F. C. Test); Jefferson, Marshall, and Marion counties (Hay); Wabash county (C. Ridgley).
HABITS.—This species is a thoroughly terrestrial animal; so much so that the statement has been made that it never goes near the water, cannot endure even rain. This is a mistake, however, as I have seen the tortoise in a small, shallow rivulet which it might easily have avoided. On the other hand, it appeared to be enjoying the bath. Mr. Ed. Hughes of Brookville tells me that he too has seen them in the water; but also that he has seen them dead in deeper water, as though they had drowned. Considering the great thickness and weight of their shells it is not to be thought that they can swim readily or even at all.

These animals are entirely harmless, and when disturbed, retire within the shell and submit passively to their captor. They may be regarded as comparatively feeble animals, and in their thick, strong shells, which may be almost hermetically closed, we see a due compensation for their indifferent powers of self-defense.

The food of the box-tortoise appears to be of a mixed nature. Holbrook states that it feeds on insects, such as crickets, etc.; but he mentions LeConte's statement that they feed on fungi, such as Clavaria. Mr. Ed. Hughes of Brookville says that he dissected one and found in its stomach what appeared to be vegetable matter, but no insects. Max. Von Wied states (103, xxii, 6) that they greatly love cucumbers and lettuce, and do great injury to these plants. They are said to be very fond of mushrooms. Holbrook further says that this tortoise may be easily domesticated, and will eat whatever is offered it, as bread, potatoes, apples, etc. The notion that it will destroy mice and serpents as food he properly regards as improbable. The eggs of this species are of the usual shape, oval, about an inch and a half by three-fourths of an inch. They number from four to six, have a rather thin shell, and are laid about the latter part of June or later. During the winter these tortoises, like all others in our climate, remain buried in the earth. They appear to have been favorites for persons who attempt to secure immortality of name by engraving their names on terrapins' backs. From this practice something has been learned of their longevity. Dr. J. Schneck of Mt. Carmel, Ills., states (22, 20, 897,) that one at Albion, Ills., had had some initials engraved on it in 1824. It was found in the same vicinity in 1865, and marked with an additional letter. Again in 1885 it was seen within a half mile of the spot where it was liberated 20 years before. All the markings were quite distinct. Other cases of the kind prove that this tortoise lives a long time, and furthermore that it does not wander far from its early home.
APPENDIX.

The following species seem to require description here on account of the fact that they have been found not far from the borders of Indiana, and may, therefore, yet be taken within our limits.

**Ambystoma xiphias**, (Cope).

*Sword-tailed Salamander.*

*Ambystoma xiphias*, Cope, 1866, 1, 192; 1889, 51, 87, with figures; Boulenger, 1882, 28, 40.

The only known specimen of this species is in the National Museum, and was taken at Columbus, Ohio. It is a very close relative of *A. tigrinum*. The head is narrower, the width being contained in the distance from the snout to the groin 4.5 times. The lower jaw projects prominently beyond the snout. The tail is longer than in most specimens of *A. tigrinum*, being considerably longer than the rest of the animal. The color, also, is different, yellow predominating in *A. xiphias*, dusky in *A. tigrinum*. Any specimens of apparent *tigrinum* which have peculiarities approaching those here mentioned should be carefully preserved and examined. Prof. W. S. Blatchley has shown me a specimen from Terre Haute which has the color peculiarities of *xiphias*, but it lacks the projecting jaw and the very long tail. It appears to be a true *A. tigrinum*.

**Ambystoma talpoideum**, (Holbrook).

*Mole Salamander.*

*Salamandra talpoidea*, Holbrook, 54, v, 73, pl. 24; *Amblystoma talpoideum*, Cope, 1889, 51, 52, with figures; Boulenger, 1882, 28, 40.

Most of the known specimens of this species are from the Southern States, but it has been sent to the National Museum by R. Kennicott, from about Cairo, Ill. It is, therefore, to be sought for in the southwestern portion of our own State.

It is the smallest, stoutest, and most clumsily constructed of the species of the genus. The head is described as being broad and large, the width being contained in the length to the groin 3.5 times. There are only ten costal grooves. The tail is very short, being contained in the rest of the length 1.5 times. The color is a light brown, paler below, with sprinklings and marblings of silvery or leaden gray. There are some obscure dark spots on the back and tail. The length of the animal when full grown is less than four inches. Prof. Cope states that it lives in damp places below logs and stones.
Posey county, Ind. However, no specimens of it were in the collection of Mr. Sampson, of New Harmony. It ought to be diligently sought for in that region, and specimens saved. It is entirely aquatic and will be found hiding among stones, and in fallen timber, or basking in the sun along the banks of ponds and streams.

This reptile differs from the Copperhead in having no loral plate, no suborbitals, the scales in 25, instead of 23 rows, and colors darker. The ground color is dark chestnut-brown, with blotches of still darker brown. The head is very dark. Upper lip with a whitish streak that continues back on the neck. Belly yellowish, with many blotches of black.

Aromochelys carinata, Gray.

Keeled Mud Turtle.

Aromochelys carinata, Gray, 1855, 25, 47, pl. 20; Yarrow, 1875, 19, v, 582; Gonochochelys triqueta, Agassiz, 1857, 4, i, 423; Cinosternum carinatum, Boulenger, 1889, 34, 38.

This species is common in the streams and ponds of the Southern States from Georgia to Arizona. It has been reported from Northern Illinois by Messrs. Rice and Davis, and if their determination is correct it adds to the known range of this turtle in a remarkable manner, and as a consequence it is to be looked for in Indiana along the Wabash River. It differs from A. odorata in attaining a larger size, in having a larger head and stronger jaws, and in having a high shell with a median sharp keel toward which the slightly convex sides slope up roof-like. The scutes of the carapace overlap those lying behind them. The plastron is truncated in front and notched behind. The gular scute is wanting. The pectorals are large, and the suture between them is longer than that between the humerals. The males are furnished with two patches of small, sharp-edged scales, one above, the other below, the hollow of the knee. The color of the shell and skin above is olive, with streaks of yellow and spots of brown. The posterior borders of the scutes of the carapace are blackish. All the inferior surfaces are more yellow. There are no streaks of yellow on the head. Habits in general those of its relative, the Musk Turtle.

Chrysemys picta, (Schneider).

Painted Tortoise.

Testudo picta, Schneider, 1783, 87, 348; Emys picta, Holbrook, 1842, 54, i, 75, pl. 10; Chrysemys picta, Gray, 1855, 25, 32; Agassiz, 1857, 4, i, 438, pl. i, figs. 1-5, and pl. iii, fig. 4; Boulenger, 1889, 34, 72.

This species has at various times been reported from localities in this State, and was given as a resident of Indiana in my "Preliminary List."
There is, however, now so much doubt concerning it that I give it as merely one of the possibilities and leave it to the future to settle.

*C. picta* is a close relative of *marginata*, so close that some authors regard the latter as only a variety of the former. *Picta* differs from *marginata* principally in the arrangement of the vertebral and costal scutes, these being so disposed that the sutures between the costals meet the corresponding sutures between the vertebrals. Hence the scutes form four straight rows right across the back, an unusual thing among turtles. The red or yellow margin of the front of the scutes is also much wider than in *marginata*, and they produce conspicuous colored bands across the shell. In the collection of the National Museum I have seen a specimen with the plates somewhat intermediate in arrangement; nevertheless I believe that *picta* has quite thoroughly and in a remarkable manner freed itself, as a species, from *marginata*.

**HABITS.**—The habits of *C. picta* are similar to those of *C. marginata* and have been more carefully observed. The reader is referred to Agassiz's "Contributions" for further information. Prof. J. A. Allen says of these turtles, as known to him in Massachusetts: "The shrill, piping notes of this species is frequently heard in May and June, especially during intervals between showers on hot sultry days."

*Chrysemys bellii*, (Gray).

*Emys bellii*, Gray, 1831, 112, 31; *Chrysemys bellii*, Gray, 1855, 25, 33; Agassiz, 1857, 4, i, 439, pl. 6, figs. 8-9; *Chrysemys cinerea*, var. bellii, Boulenger, 1889, 84, 74,

This is another species that has not yet been taken within our limits, but which may nevertheless be an inhabitant of the State. It occurs from Mississippi to western Illinois, thence northwestward to British Columbia. It has been taken in western Illinois by Agassiz, and more recently by Prof. Harry Garman, and it appears to be very common in the sloughs of the "bottom land" about Quincy. It should be looked for in the lower Wabash.

The arrangement of the scutes of the carapace is the same as in *C. marginata*. The ground-color is copper-red or bronze-color. Across the costal scutes there are some irregular red or yellow bands and some red dots. The marginals are divided above by a yellow streak, while on their lower surface there are black, eyelike spots on a red ground. The plastron is covered all over with blackish markings of various shapes. The size becomes greater than that of either *picta* or *marginata*, some 8 inches as the length of the shell.
BATRACHIONS AND REPTILES.

Cistuda ornata, (Ag.).

*Ornate Box-tortoise.*

*Cistudo ornata,* Agassiz, 1857, 4, i, 445, pl. iii, figs. 12 and 13; Boulenger, 1889, 84, 118.

This species of the genus *Cistudo* occurs abundantly west of the Missouri River, being, as reported by F. W. Cragin, "so abundant in some sections of Southern Kansas that it amounts to a nuisance as a cumberer of the ground." (49, 100.) The species, however, ranges further east into Illinois, and some years ago specimens were sent to the National Museum from Fairfield, Wayne County, Illinois, within 35 miles of the Wabash River (10, 37), hence its occurrence within Indiana territory may be discovered at any time.

The shell of *ornata* is proportionally shorter and broader than that of *carolina.* The back is also flatter, especially along the middle line, and there is no trace of a keel, even in the young. The plastron does not completely close the shell, and there is a short but distinct bridge. The head is larger, the snout shorter, and the upper jaw is notched in front. The shell is more elegantly marked than in *carolina,* the ground color being olive-brown to black, while there are numerous spots and streaks of bright yellow. The yellow markings usually seem to radiate from the center from which each scute began to grow.
Figure 11. Carapace of *Chrysemys marginata*; *v.*, the neural epidermal plates; *c.*, the costals; *m.*, the marginals; *n.*, the nuchal. Natural size.

Figure 12. Plastron of *Chrysemys marginata*; *g.*, the gular plates; *h.*, the humerals; *p.*, the pectorals; *a.*, the abdominals; *f.*, the femorals; *an.*, the anals. Natural size.