

A FEW FACTS REGARDING SOME TENNESSEE SNAKES

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The reptiles in general and the snakes in particular have, from time immemorial, occupied a unique position in the human mind. Condemned in Genesis and utilized by ancient priests, doctors, and rulers as a symbol of power, wisdom, subtility, and fear, the serpent and his endowed powers have become so firmly imbedded in man's consciousness that only a deliberate attempt to educate will free man of this fear, superstition, and ignorance.

The fear of anything is a terrible burden to carry through life, and yet man pets and pampers this so-called "Human Horror" by conferring upon the snake all kinds of amazing powers. Many people who scoff at the mildest "Fish Stories" eagerly accept and believe the most absurd "Snake Stories." A very few of the current snake stories are, perhaps, based upon a grain or so of scientific truth; but most of them are founded upon incorrect observations, incorrect interpretation of observations, or they are concoctions of fertile imaginations. Perhaps, even Delirium Tremens has played a part in their conception.

Stories that involve "Snakes stinging with their tails," "Blue Racers standing up on their tails to run," "Snakes being killed with a pistol shot without the weapon wielder taking the slightest aim," "Horse hair ropes that keep Rattlesnakes away," "Snakes that milk cows," "the Coachwhip snake which is supposed to bind humans to trees and lash them to unconsciousness with its tail," etc., etc., are absurd, and without an iota of scientific observation or common sense to support them. However, some of the more common stories may, perhaps, be based upon a bit of scientific truth or, at least, they may be explained upon a basis of faulty observation or incorrect interpretation of observed facts. Among this type are included stories of "The Hoopsnake," "Snakes swallowing their young," "Blue Racers chasing small boys," "Snakes charming birds and small mammals," and of "Snakes breaking into small pieces and coming back together again." To anyone familiar with the snakes in their native conditions, these stories all become more or less absurd, and simply indicate ignorance concerning the animals, or at best, a lack of coordination between the eyes and reason of the observer.

However, be that as it may, humanity is always interested in the snakes. Broach the subject of snakes to a business man or a mountaineer and one finds a ready topic of conversation. The average man will state that they give him a "creepy feeling," and that the sight of one will often spoil a whole day of hunting or fishing. It seems that the first impulse, regardless of observation or reason, is to get a club and kill the snake, whether it is harmless or not. A



CROTALUS HORRIDUS (LINNÉ)
Timber or Banded Rattlesnake. (Black phase)

cry of, "Snake!" "Snake!" is almost invariably followed by one of "Kill it!" "Kill it!" an absurd condition when one realizes that ninety per cent of all the snakes in Tennessee are harmless; indeed, they are beneficial. Invariably it is the sensation or feeling that accompanies the sight of a snake that induces man to seek ways and means of destroying it. With the exception of the rattlesnake, it is practically never the knowledge that a snake is harmful that induces that peculiar sensation which results in the animal's destruction.

Within the past year or so the writer has had the pleasure of speaking before many luncheon clubs, banquets, girl and boy scout troops, and he has even had the fascinating experience of discussing the topic of "Snakes" before clubs whose membership is confined to individuals of the sex associated with the serpent in the original sin. It is a good sign, and shows willingness on the part of mankind to learn the true facts relative to the snake and to throw off the bonds of superstition and ignorance. It surely should be so, for the snakes, as a group, have a very definite economic value, and, in many cases, the facts regarding them are more bizarre than the fancies. The United States Department of Agriculture has issued statements urging farmers to conserve the harmless snakes. Reptile study clubs have been formed in several of our larger cities. One, or perhaps more, of the states have passed laws protecting certain snakes and other states are contemplating similar laws. In the great grain belt

of the Middle West farmers frequently establish Ophidian households in their granaries to aid in destroying rats, mice, and gophers. They find them much more valuable than the common house cat, and aside from being voiceless on moonlight nights and not given to the wanderlust, they are less destructive of the beneficial insectivorous birds. As the birds have in the past come in for their share of favorable consideration, so now their lowly cousin, the snake, is coming in for his.

An examination of the subsequent "Preliminary List of the Reptiles of Tennessee" will show that, to date, thirty kinds of snakes have been recorded for the State. Of this number three are venomous and the other twenty-seven are harmless to man, and probably beneficial to the agricultural interests. Lack of available space prohibits a detailed consideration of all of these snakes, but a rapid survey will be made with the hope that some information will be dispensed that will be of value to the general reader.

It will probably be well to discuss the venomous snakes first in view of the fact that they are potential threats against the life of man and the domestic animals. The three poisonous snakes found within the boundaries of the State are the rattlesnake, the copperhead moccasin, and the cottonmouth moccasin. These three snakes belong to the family of Pit Vipers, so-called because of the occurrence of a pit of unknown function between the eye and the nostril. These snakes all have rather short, thick bodies and broad "heart-shaped" heads. The scales of the back and sides are strongly keeled. The pupils of their eyes are vertical, giving them a particularly vicious appearance. All three of these forms are equipped with a natural hypodermic apparatus consisting of a pair of hollow teeth, or fangs, located on the anterior portion of the upper jaws. These hollow teeth are connected by means of a duct or tube to poison sacs or glands which lie immediately behind the eyes. Here the poison is secreted, and when needed, this liquid, which is of a yellowish or straw color, is forced by a powerful muscle down the ducts to the fangs which serve as hypodermic needles and perforate the tissue into which the poison is injected. When not in use, the fangs fold back against the upper surface of the mouth. These reptiles are not equipped with merely one pair of hollow teeth, but nature has provided a replacement mechanism whereby broken teeth are promptly replaced by new ones which move into position from behind. Consequently, it is incorrect to assume that the removal of one pair of fangs results in a harmless snake, for within a few days at the most new ones have grown in and have functionally replaced the removed ones. Not only that, but there are other solid teeth in the mouth which can lacerate the skin and leave openings into which the venom may flow, thus causing superficial, though painful, wounds which, however, may become dangerous. The replacement of the fangs probably takes place throughout the life of the snake, for there are many partially grown fangs and tooth papillae capable of producing fangs behind the functional pair. As many as sixteen consecutive pairs

have been removed in as many weeks, and they were regularly and duly replaced by a new set.

The rattlesnake may be readily recognized by his rattle. Suffice it to say that these snakes seldom bite unless molested or accidentally injured. In the field they always seem anxious to escape to the underbrush or into crevices, but if irritated, they will coil and strike with lightning-like speed and rapidity. Unless stepped upon or suddenly injured they will always coil and sound the rattle before striking. The aim of the strike is accurate for a distance of only about one-third of the snake's length. However, if the snake is worked into a rage, it will throw its body and its bite may be effective for a distance of one-half to two-thirds of its length.

The common rattler found throughout Tennessee is *Crotalus horridus*, or the Timber Rattlesnake. It is sometimes known as the Banded Rattler because of the dark bands of color which run across the body. The color ranges from light yellow with brown or black cross bars to black with inconspicuous markings. Contrary to popular belief, the color has nothing to do with the sex. The diverse colors represent either the extremes of wide individual variation or perhaps a difference in age, as young snakes are usually lighter in color than adults.

From the name Timber Rattlesnake, one would infer that it prefers wooded tracts as a habitat, and, indeed, such seems to be the case, for all specimens that have been taken in East Tennessee have been found in wooded areas, on rock outcrops near timber, or on the "Balds" of lower altitudes. It is relatively certain that it may, on occasion, climb up into shrubs or low trees. Rattlesnakes eat warm-blooded animals, such as rabbits, squirrels, rats, gophers, mice and occasional birds. It has never been known to kill for the mere pleasure of destruction. It is pictured as a slow-moving, sluggish creature, irritable, and easily disturbed. Several specimens have been taken alive without attempting to escape or bite until the slip noose had tightened around their necks. Then their vicious fangs and the threshing of the heavy bodies made them very difficult to handle. In captivity they exhibit various reactions, some becoming docile and fairly easy to handle, others becoming very irritable and never submitting to even the most careful handling.

Among the mountaineers the number of rattles is considered a criterion of the age of the snake. This, however, is a misconception, for the snake gets a new rattle every time it sheds its skin. Shedding occurs, usually, at least twice a year, and may occur as many as six times; also the rattles are frequently broken off. The common number of rattles varies from seven or eight to twelve or fifteen.

The copperhead, (*Agkistrodon mokesen*), is probably to be feared more than the rattlesnake owing to the fact that it fails to indicate its presence, either by sound or movement. It is true that rattlesnake bites are much more common in Texas than those of the copperhead or cottonmouth moccasin, but this is probably due to the relatively greater numbers of rattlesnakes in that state.

This moccasin is commonly found throughout Tennessee, but it is more abundant in the southern and eastern parts. In thinly populated areas it is found in considerable numbers in dry woods and among rocks. It also abounds in brushy situations, often coming into close proximity to human dwellings. During the past summer four were taken within two hundred yards of the residence of H. P. Ijams on the Island Home Birds' Reserve at Knoxville.

The copperhead grows to a length of approximately two or three feet. It is of a light chestnut color with blotches of a darker color across the back. These blotches frequently split laterally, forming inverted Y-shaped marks on each side. The head is usually a distinct copper color, hence the name copperhead. The area immediately surrounding the mouth is yellow or white. The tip of the tail carries a spine-like projection which usually forms an obtuse angle with the mid-line of the body. This spine, which is a modified scale, should not be misconstrued to be a stinging organ.

As has been previously indicated, the copperhead is equipped with the characteristic poison apparatus, by means of which it deals its deadly stroke. It does not coil before striking, as does the rattlesnake, but often throws its body effectively from any position. The most frequent pose assumed by this snake when molested or irritated is that with the head slightly raised and the body arranged in smooth sigmoid curves. From this position it will strike quickly and viciously in any direction. Curiously, when irritated for any length of time, the copperhead has a habit of twitching the middle portion of its body as though extremely nervous or, perhaps, the muscles of its body become tired because of its rigid position of watchful waiting.

In captivity these snakes thrive and readily eat mice, young rats, and sparrows. Surface lists the following as stomach contents of the copperhead: "Polyphemus moth (larvæ), Regal moth (larvæ), Imperial moth (larvæ), seventeen-year cicada, oakworms, granite salamanders, house snake, sparrow, o'possum (young probably), meadow mice, white-footed mice, house mice, squirrel, and mole shrew." He found six individuals gorged with seventeen-year locusts.

Closely related to the copperhead is the cottonmouth moccasin, (*Agkistrodon piscivorus*), which occurs in the extreme southern and western parts of the State. This venomous snake should not be confused with the non-venomous so-called water moccasin, *Natrix*, which ranges over the entire State and which is so abundant along every river and stream.

The cottonmouth moccasin receives its name from the fact that it erects its head and opens its mouth before it strikes, thus displaying the cotton-white color of the inside of the mouth. It is chestnut in color, with darker bands or blotches which are arranged irregularly along the body. The top of the head is purplish black or purplish brown. The throat is yellowish or whitish, while the rest of the under parts are black or brown mottled with yellow or white. It grows to a length of three and one-half to four and one-half feet.

This reptile is a true water snake, and is always found near water. It is frequently seen near damp, swampy places, or basking in the sun on the shores, or on debris along the shores of ditches, streams, and rivers. It lives primarily on fishes, frogs, rats, mice, squirrels, and occasional birds. In captivity, it is said to even take raw meat. These snakes have a reputation for being very savage, and often attacking anything or anyone disturbing their hunting or basking.

Two additional venomous snakes may occur in Tennessee. They are the diamondback rattlesnake (*Crotalus adamnatus*), and the coral snake (*Micrurus fulvius*). However, no records are at present available; hence a discussion of these snakes will be left to a subsequent date.

The other twenty-seven kinds of snakes occurring in the State of Tennessee are of the harmless variety. They vary considerably in body form and color. They possess for the most part rather slender bodies and oval-shaped heads. There are no pits between the eyes and the nostrils, and the eyes have round pupils. They possess neither fangs nor venom glands. Their colors vary greatly from black and dusky browns to yellow, red, and green. Some are of a solid color, others may be striped longitudinally or transversely, while still others are mottled or blotched with various combinations of colors. They are all harmless, at the most being able to inflict but slight scratches or lacerations of the skin with their short recurved teeth. The damage that a few of them do in destroying beneficial birds is completely offset by the good that the majority do by killing great numbers of crop and grain destroying pests. If their economic value to the agriculturist of the State could be stated in dollars and cents, it would undoubtedly run into the hundreds of thousands.

Among the twenty-seven kinds of harmless snakes are included six king snakes, four water snakes, three Elaphe or rat snakes, two hog-nosed snakes or spreading vipers, two racers, two garter snakes, two brown snakes, two Virginia snakes, and one each of the brown, green, ringnecked, and Tantilla snakes.

The six king snakes include the mole snake, the brown king snake, and the red and scarlet king snakes. These snakes are noted for their bright colors and striking color pattern. The bright colors are usually arranged in transverse bands or rings. Browns, reds, yellows, and black predominate in the Tennessee forms. They are not large snakes, seldom exceeding two and one-half or three feet in length. The head is usually small and their bodies are rather long but sturdy. They inhabit the entire State and may be found in valleys, in coves, and in the eastern mountains to an altitude of, at least, three thousand feet. Apparently they have little preference in so far as habitat is concerned, for they have been taken in grassy meadows, on wooded hillsides, and on rocky outcrops in the mountains. They are one of Tennessee's most valuable snakes in that they not only destroy many venomous snakes but eat rats, mice,

squirrels, and moles. They lead a semi-underground life and show no hesitancy about entering the burrows of crop-destroying rodents. They are powerful constrictors and hold and kill their prey by coiling about it and crushing or strangling it. King snakes are said to be immune to the poison of venomous snakes, but no credence can be given to the story that when bitten they seek and eat the leaf of a certain plant which renders the venom innocuous. In addition, it cannot be said that they are the particular enemy of venomous snakes, for when hungry they readily take non-venomous ones as well. They are mild tempered, inoffensive creatures and make excellent pets. If watered and properly fed they will live in captivity for years.

The snakes of the Genus *Elape* are probably the next most important harmless snakes of the State. There are three, the pilot or mountain black snake, the yellow chicken snake, and the red racer or corn snake. These forms are non-venomous and, except for occasional raids on birds' nests, they are economically valuable reptiles. The pilot black snake does not act as a pilot for venomous snakes as is popularly believed, and neither does the so-called yellow chicken snake eat chickens. The latter name comes from the fact that this snake frequents barns, chicken houses, and outbuildings in his search for rats and mice.

The pilot black snake is probably the largest snake in the State, often reaching a length of six or seven feet. It is found on wooded hillsides in more or less rugged country, and is very common. The yellow chicken snake is also found in well-wooded areas, and seems to be quite arboreal in its habits. It reaches a length of five and one-half feet. The red racer is most abundant in the Cumberland Plateau, where it has been taken in considerable numbers. All of these snakes will put up a vigorous defense when attacked, but the small size of their teeth prohibits injuries larger than a small cat scratch. The three forms all live on small mammals, occasional birds, and eggs. However, the fact that eggs and young birds are available for only a short time in the spring precludes the possibility of their ever seriously threatening the bird life. For the greater part of the year they live upon an exclusive diet of mice, rats, squirrels, gophers, and young rabbits. Their economic value to the farmer is high, and their persistent slaughter should be curtailed.

To date, four water snakes of the Genus *Natrix* are known to occur within the boundaries of the State. The common names of these reptiles are water snake, moccasin, queen snake, or moon snake, and water moccasin. Throughout the State the larger forms are known as moccasins, but they should not be confused with the venomous highland (copperhead) moccasin or cottonmouth moccasin. These snakes are dusky colored with darker blotches or sometimes (queen snake) with lighter stripes. They are, without exception, found along the shores of rivers, streams, lakes, ponds, and swampy places. They are good swimmers and usually take to the water as soon as

disturbed. In the water they hide under overhanging banks, or under submerged logs or grass. Their food consists of frogs, toads, tadpoles, salamanders, and small fishes. In captivity they are vicious and untamable. Occasional specimens will eat in captivity, but the majority starve themselves to death. They are apparently very susceptible to heat, for during the summer, unless water is at hand for them to lie in, they soon die. They are abundant throughout the state and it is possible that they destroy many young fishes. They are very prolific and bring the young forth alive.

Throughout the State there occur two colubers, the blue racer, and the coachwhip snake. The blue racer is feared for his supposed habit of chasing people, and for his imaginary venomous bite. On the other hand, the coachwhip snake is feared because he is supposed to bind humans to trees and lash them with his whip-like tail, occasionally stopping long enough to put the tip of his tail into the nostrils of his victim to see if he is unconscious. These stories are all pure myths, but the latter reaches the height of absurdity. The blue racer does not chase man, and he is not venomous. When surprised in the woods, the racer becomes excited and, in his anxiety to escape, he is just as apt to start toward the person who disturbs him as in the opposite direction. His excitable nature, and his courageous attempts at defense when cornered have won him a reputation which he does not deserve. The coachwhip snake derives its name from its appearance, and not from the fractious habit attributed to it. Neither of these snakes possesses the power to charm birds and mammals, as is sometimes reported; nor is their speed over the ground as rapid as stories would have one believe. It is stated that these animals can outstrip a running horse, but, as a matter of fact, a running man can overtake them with ease. It is their agility that makes them difficult to capture. These snakes live, for the most part, in dry, open situations located near thickets or dense patches of long grass to which they can retreat at the approach of danger. The food consists of wild mice, birds, eggs, frogs, rats, and occasional specimens have been known to take other small snakes. They are good climbers and, while not spending much time in the trees, they have been known to ascend to a considerable height in their search for young birds or eggs, of which they seem to be very fond. They are not constrictors and, hence, do not wind their bodies about their prey in order to crush it to death. This precludes the possibility of their strangling men as stories would have us believe.

The hog-nosed snake, sometimes called "spreading vipers" or "puff adders" (*Heterodon*) are slow moving, thick bodied, and vicious looking creatures. The end of the snout turns up, hence the name hog-nose snake. They have the ability to spread or flatten the head; consequently they are sometimes called spreading adders. They are great bluffers, seldom, if ever, actually biting, and certainly never causing more than small lacerations. The spreading of the head, the puffing or blowing, and the accompanying threatening motions are all defensive and not offensive actions. They are

in no way associated with the adders, which are foreign snakes, and, needless to say, they possess no poison apparatus. If teased or handled roughly, they seek to hide their heads under the coils of their body and, frequently, they will roll over on their backs and feign death. While engaged in these actions, they may be turned back on the ventral surface, but when released they immediately roll over on the back again as though possessed with the idea that a snake, to appear dead, must lie on its back with the mouth open. There are two types of this snake in Tennessee; one is dark, and the other is light in color with darker blotches or spots on the back. They are not very abundant in the State, but occasionally the dark form may be found in dark, damp woods, while the lighter one occurs in dry, sandy places. Their food seems to consist entirely of frogs and toads. Most people look upon them with a great deal of fear, but they are one of the State's most harmless snakes.

The smaller and less conspicuous snakes may be discussed very briefly. Owing to their small size and secretive habits, the garter snake, the rough green snake, the ring-necked snake, the brown snake, the Virginia snake, the Tantilla snake, and the worm snake are seldom seen by the casual observer. They inhabit grassy areas or bury themselves under logs, leaves, stones, or debris. Their food consists of grubs, worms, insect larvæ, insects, salamanders, and small toads and frogs.

The rough green snake is probably the most interesting of these named. It lives in bushes, shrubs, and low trees where it goes to capture insects and tree frogs for food. It is bright green in color, and hence, is not easily seen while lying along a leafy branch. This tree snake is well adapted for climbing in that it possesses a long, slender body and tail. Its head is proportionately large, the neck is distinct, and the eyes are large and bright. They are docile creatures and interesting pets.

The grass-loving garter snakes are the largest of those previously mentioned. The brown, the ringneck, the worm, the Virginia, and the Tantilla snakes are small, seldom ever exceeding ten or twelve inches in length. With the exception of the brown garden snake, which is very abundant, the others are very rare and difficult to find. Although very little space has been devoted to these latter forms, they are certainly of great economic importance to the farmer who needs their valuable assistance in his fight against crop plagues.

In conclusion, the writer wonders whether it will make any difference to the farmer, gardener, or orchardist to learn that every time he destroys a harmless snake he is virtually discarding one of the most effective weapons in his fight for freedom from pests and crop destroyers.

Chemical and mechanical weapons must be purchased, they require an expenditure of time to be properly utilized, the situations in which they may be used are limited, and many of them are only partially effective. In the snakes the agriculturist has a costless,

automatic weapon urged into the fight by one of nature's strongest impulses, the desire to obtain food for survival. This weapon replaces itself automatically year after year, and is a very potential factor in the balance of nature, thus going far to prevent scourges of rodent and insect pests.

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A PRELIMINARY LIST OF THE REPTILES OF TENNESSEE

<i>Scientific Name</i>	<i>Common Name</i>
1. <i>Anolis carolinensis</i> (Voigt)	"Chameleon," "Anolis."
2. <i>Sceloporus undulatus undulatus</i> (Latreille)	Brown Lizard, Fence Lizard.
3. <i>Ophisaurus ventralis</i> (Linné)	Glass, Joint, or Hoop Snake.
4. <i>Cnemidophorus sexlineatus</i> (Linné)	Road Runner, Sand Scrapper.
5. <i>Leiopisma laterale</i> (Say)	Ground or Leaf Lizard.
6. <i>Eumeces fasciatus</i> (Linné)	Blue Tailed Lizard, Scorpion.
7. <i>Carphophis amoena helenae</i> (Kennicott)	Worm Snake.
8. <i>Diadophis punctatus stictogenys</i> (Cope)	Ring-necked Snake.
9. <i>Heterodon contortrix</i> (Linné)	Puffing or Spreading Adder.
10. <i>Heterodon simus</i> (Linné)	Puffing or Spreading Adder.
11. <i>Ophedrys aestivus</i> (Linné)	Rough Green Snake.
12. <i>Coluber constrictor constrictor</i> (Linné)	Black Snake or Blue Racer.
13. <i>Coluber flagellum flagellum</i> (Shaw)	Coachwhip Snake.
14. <i>Elaphe obsoleta obsoleta</i> (Say)	Pilot or Mountain Black Snake.
15. <i>Elaphe obsoleta confinis</i> (Baird & Girard)	
16. <i>Elaphe quadrivittata</i> (Holbrook)	Red Racer or Chicken Snake.
17. <i>Lampropeltis getulus holbrookii</i> (Stejneger)	
18. <i>Lampropeltis getulus niger</i> (Yarrow)	Mole Snake.
19. <i>Lampropeltis rhombomaculata</i> (Holbrook)	Brown King Snake.
20. <i>Lampropeltis triangulum triangulum</i> (Lacepède)	Milk Snake.
21. <i>Lampropeltis triangulum sispila</i> (Cope)	Red King Snake.
22. <i>Lampropeltis elapsoides elapsoides</i> (Holbrook)	Scarlet Snake.
23. <i>Natrix cyclopion</i> (Dumeril & Bibron)	Water Snake.
24. <i>Natrix rhombifera</i> (Hallowell)	
25. <i>Natrix septemvittata</i> (Say)	
26. <i>Natrix sipedon sipedon</i> (Linné)	"Moccasin" Water Snake.
27. <i>Storeria dekayi</i> (Holbrook)	DeKay's Snake.
28. <i>Storeria occipito-maculata</i> (Holbrook)	Red-bellied Snake.
29. <i>Virginia valeriae valeriae</i> (Baird & Girard)	
30. <i>Virginia valeriae elegans</i> (Kennicott)	
31. <i>Thamnophis sauritus</i> (Linné)	Ribbon Snake.
32. <i>Thamnophis sirtalis sirtalis</i> (Linné)	Garter or Striped Grass Snake.
33. <i>Tantilla coronata</i> (Baird & Girard)	
34. <i>Agkistrodon mokasen</i> (Beauvois)	Copperhead.
35. <i>Agkistrodon piscivorus</i> (Lacepède)	Cotton-mouth Moccasin.
36. <i>Crotalus horridus</i> (Linné)	Banded or Timber Rattlesnake.
37. <i>Kinosternum subrubrum subrubrum</i> (Lacepède)	
38. <i>Chelydra serpentina</i> (Linné)	Snapper, Snapping Turtle.

39. *Terrepene carolina carolina* (Linné) Box Turtle.
 40. *Pseudemys elegans* (Weid)
 41. *Pseudemys concinna* (LeConte)
 42. *Sternotherus odoratus* (Latreille) Musk Turtle, Stink Pot.
 43. *Chrysemys marginata dorsalis* (Agassiz)
 44. *Amyda mutica* (LeSueur) Soft-shelled Turtle.
 45. *Amyda spinifera* (LeSueur) Soft-shelled Turtle.
 46. *Pseudemys hieroglyphica* (Holbrook)
 47. *Pseudemys troosti* (Holbrook)

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