

NOTES ON NATRIX RHOMBIFERA AS OBSERVED AT REELFOOT LAKE¹

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Natrix rhombifera, or the diamond back water snake, was the most common snake of the Reelfoot Lake region. At least two thirds of the snakes captured were of this species. The lake and surrounding territory provided an ideal environment for water snakes. The creeks and basins supported a dense growth of vegetation about their borders, and fish and frogs were abundant in the shallow waters. The remains of half-submerged giant cypress trees furnished excellent retreats for food-filled, sluggish adults. A large portion of this area was quite isolated and was rarely visited by fishermen or sportsmen. With a plentiful supply of food, unmolested by man, and having few natural enemies, water snakes were numerous.

The specimens obtained at Reelfoot Lake had a rusty brown ground color with three rows of black rectangular spots (Plate I, 1). The dorsal spots alternated with the lateral spots when extended onto the eighth to the tenth scale row. Although in most specimens these dorsal spots were connected to the lateral spots by an irregular diagonal line (Plate I, 2), many specimens were examined in which the alternation and connection were not definite. The number of lateral spots varied from 30 to 64. The ventrals were yellow with a series of semi-circular brown spots on the anterior edge of each. The number and arrangement of these spots varied considerably (Plate I, 3). The head was brown with an olive-brown tinge on the dorsal surface. A chevron-shaped mark was apparent in the younger specimens but disappeared with growth.

This snake demonstrated great variation in scalation, particularly about the head. In many cases the right side differed radically from the left. The upper labials had various types of scale insertions. These insertions usually were found in the vicinity of the seventh labials (compare Plate I, 4, 5, 6). The posterior labials varied extensively in shape and size (Plate I, 4, 5, 7). Temporal scales were found in various stages of division. In most specimens only one temporal was evident (Plate I, 7), but others were partially or entirely divided into two distinct scales (Plate I, 4, 8, 9, 12). The single frontal scale was often completely or incompletely divided into two or more smaller scales (Plate I, 9, 10, 13). The two parietals of these

¹Contributions from the Reelfoot Lake Biological Station No. 5. The study here reported on was made possible by a grant from the Reelfoot Lake Biological Station of the Tennessee Academy of Science, to whom the author wishes to express his appreciation.

TABLE 1

Scale characteristics of *Natrix rhombifera*

SEX	VEN-TRALS	LENGTH	CAU-DA LS	PREOCU-LARS	POSTOCU-LARS	LATERAL SPOTS	LABIALS	SCALE ROWS
		mm.						
Male	133	680	70	1-1	3-3	47	8-9/11-11	27-26-24
	143	590	81	1-1	3-4	47	8-8/11-11	27-26-23
Female	141	72½	78	1-1	3-3	43	9-8/11-11	27-26-23
Male	144	530	52*	1-2	3-3	45	9-8/11-11	27-26
Female	148		68	1-1	4-3	55	8-8/12-13	29-25
Male	143	683	69	1-1	4-3	47	8-8/13-12	25-24-22
Female	142		67	1-1	3-3	43	8-8/11-11	
Female	141	690	64	1-1	3-3	46		27-25-23
Female	143	594	60	1-1	3-3	41	7-8/11-11	29-29-25
Female	141	683	63	1-1	3-3		8-8/10-11	29-28-26
	142	100	68			55		27-25-23
	139	880	61	1-1	3-3		6-8/10-11	27-25
	139	710	59	1-1	3-3			29-27-25
	144	620	63	1-1	4-3	45	8-8/12-11	27-25
Female	143	1258	57	2-1	3-3	39	8-9/12-12	29-27-26
Female	143	1273	60	1-1	3-3		8-8/11-11	26-25
Female	141	630	63	1-1	3-3	43	10-10/13-12	29-27-25
Female	141	1250	61	1-1	3-3	42	8-8/10-10	27-25
Male	144	1120	65	1-1	3-3		8-8/10-10	29-27
	139	405	81	1-1	3-3	56	8-8/11-11	25-21
Female	143	299	75	1-1	4-3	46	8-8/14-10	27-26-24
Male	140	563	79	1-1	3-3		8-8/12-11	27-26-23
Male	143		79	1-1	3-3	46	8-8/11-10	25-21
Male	141	365	76	1-1	3-3	45		29-28-24
Male	144	700	79	1-1	3-3	48	9-10/12-13	27-25-23
Male	139	815	80	1-1	3-3	45	8-9/12-12	27-26-23
Male	142	550	71	2-2	3-4		10-9/10-11	27-25
	137		64	2-1	3-3	50	9-9/12-13	27-28
Male	144	1100	77	2-1	3-3		9-8/10-11	25
Male	143	920	73	1-1	3-3	30	8-8/11-11	27-26
Male	146	624	64	1-1	3-3	44	9-8/10-12	
Male	144	940*	21	1-1	3-3	42	8-8/10-12	28-27
Male	150	820	75	2-1	3-3	51	8-8/11-11	28-27
Male	143	1120	64	1-1	3-5	40	8-8/11-12	29-28
Male	145	1070	61	1-1	3-3	56	8-8/12-11	27-29
Male	143	89½	75	2-2	3-3	64	8-8/12-12	25-23
Female	144	142	69	1-1	3-3		7-8/14-12	
Female	142		70	1-1	3-3	51	9-11/10-10	27-25
Female	141		64	1-1	3-3	45	8-8/10-10	29-28
Female	143	1050				41	9-8/12-11	29-28
	144	840		1-1	3-3	42	8-8/11-11	27-25
Female	138	1038	61	2-2	4-4		9-8/13-12	27-29
Male	146	510	61	1-1	3-3	42	8-8/12-12	28-27
Female	143	1450		1-1	3-3	44	8-8/12-12	27-23
Male	143	700	64	1-1	3-3		8-8/11-11	28-27

*Clipped tail.

same snakes formed smaller scales between them. These scales varied in number from 1 to 6. Scale rows varied from 25-29, the lower ones were weakly keeled and the upper ones strongly keeled. Preoculars 1; post oculars 3-5; temporals 1 or 2, parietals two, often

including a series of small scales between them (Plate I, 10, 11); upper labials 8-11; lower labials 10-13. Table 1 gives detailed scale characters of a series of the snakes examined from this area.

Most of the snakes examined were captured in the shallow waters of the numerous basins near the lake. No *Natrix rhombifera* were observed on the open lake although the molted skin of a cottonmouth was found on a cypress stump. The diamond back water snake was easily captured at night. Wading along the edges of the bayou or basins, the interested collector can capture them as they glide away from his light or rest on a partially sunken log. Practically all of the water snakes examined were captured in this fashion. *Natrix rhombifera* was particularly abundant in Yankapin Basin, a shallow area of water about one-half mile from the lake. A fisherman informed us that he had shot fifteen snakes there and the bodies we found floating about testified to the accuracy of his statement. On two trips to Yankapin Basin twelve water snakes were captured.

These snakes were easily identified by the yellow plates on the under-surface of the head which made a distinct mark on the surface of the water as they thrust their heads upward into the light. When alarmed, those in the water swam rapidly toward the shore and slid away into the brush lining the banks. Numerous cottonmouths were also observed in the basins. They were usually found stretched out on the mud flats with their heads up, jaws wide, and fangs erect as they threatened the unknown danger of the light. During the daylight hours the water snakes would be coiled tightly in the dark cavities at the base of the straggly rooted cypress trees. With the aid of powerful flashlights they could be seen resting snugly in these wet cavities.

Comparatively few snakes were taken during the day. These were captured from a boat with the aid of an automatic frog gig that closed steel jaws about the body of the snake. Although the bayou was traveled by many fishermen daily, the water snakes were quite numerous. The snakes enjoyed basking in the early morning sun and a few specimens could always be taken in the bayou between eight and ten o'clock. Reluctant to move from their comfortable spot, they made no effort to escape if a boat passed quietly by, but if they sensed any unusual movements they glided smoothly into the water to reappear a few feet away. Unless badly frightened, the snake usually remained in the immediate vicinity of the log. A head projecting from the water, a part of a wet body hanging over a fallen tree, or a movement on the shore indicated that the snake was still in the neighborhood.

The large gravid females seemed to particularly enjoy these few minutes of sun bathing each morning. Several large specimens were taken on the logs in the northern part of Bayou du Chien. These water snakes are quite vicious and although they are not poisonous they can do considerable physical injury to the hand. They strike awkwardly but rapidly and when captured they must be handled with care.

EXPLANATION OF PLATE I, VARIATIONS IN
NATRIX RHOMBIFERA

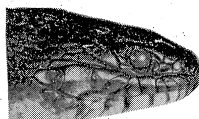
1. Dorsal view. The dorsal spots are regularly rectangular and are connected with narrow diagonal lines.
2. Dorso-lateral view of a four-foot specimen. From the central portion showing the anterior spots connected with lateral spots by diagonal lines.
3. Ventral surface of a small specimen.
4. The division of the temporal is complete forming two distinct temporal scales. The seventh and eighth upper labials are divided.
5. The typical condition with entire temporal. The eighth upper labial is divided into an upper and lower section by a portion of the seventh labial.
6. The head of a small snake showing the usual shape of the temporal scale. The sixth upper labial is elongated and has two small scales above it.
7. One temporal but with an additional scale below the postorbitals. The seventh upper labial is divided.
8. Temporal partially divided, almost forming two temporals. Seventh upper labials divided to form an elongated lower and an upper triangular scale.
9. A group of two inter-parietal scales are formed and other inter-parietals are partially formed. A division is appearing in the frontal.
10. Inter-parietal scales completely formed; frontal divided into three scales anteriorly and one posteriorly. The posterior scale is partially divided by a longitudinal division.
11. The inter-parietal scales are partially formed. The frontal is entire, but there is a ridge across the anterior portion.
12. There are two distinct temporals, each reaching to the postorbitals. The seventh and eighth upper labials are divided.
13. Three inter-parietal scales are formed and two other scales are partially formed. The frontal scale is incompletely divided into three parts.



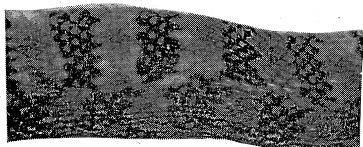
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6.



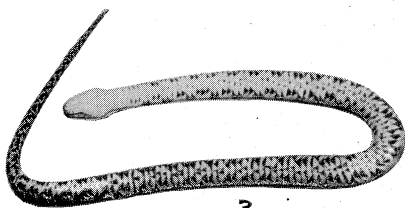
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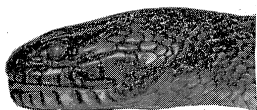
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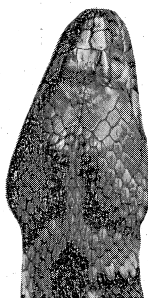
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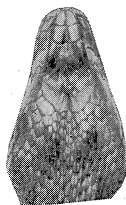
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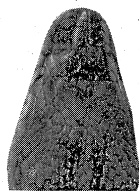
10.



11.



12.



13.

PLATE I.

The water snake apparently prefers to feed under the cover of darkness. Snakes taken late at night invariably contained freshly swallowed food. Apparently they were not particular about their food. Stomach examinations of twenty snakes yielded the following: 4 catfish, the largest measuring 9 inches; 1 snapping turtle with the carapace softened by digestive processes; 8 sunfish, two of the largest measuring 7 inches; 2 large fish heads; 3 shad; 11 whole frogs and the remains of others.

Frogs and sunfish probably do form the greater part of the food of water snakes in this area. The fish heads were puzzling until we consulted a fisherman who lived near the station. He pointed out a small fish dock on the bank of the bayou and told of several occasions

TABLE 2

Embryo numbers and size in relation to size of female and date of examination

LENGTH OF FEMALES	NUMBER OF EMBRYOS	SIZE OF EMBRYOS	DATE OF EXAMINATION
cm		mm.	
124.0	30	6	5/15/36
1325.0	42	20	5/16/36
1125.0	30	23	5/21/36
110.5	28	18	5/21/36
122.6	31	12	5/17/36
95.0	26		6/20/36
110.5	31		6/12/36
102.5	22	15	5/10/36
110.0	28	Large	6/26/36
85.0	18	Very small	6/26/36
82.0	No mature eggs*		
122.6	41	Very small	7/8/36
111.3	32	25	7/3/36
121.2	17†		9/10/36
101.0	18†		9/3/36
111.9	13†		8/27/36

*Very small eggs in oviduct.

†Number of young born on this date.

on which he had observed water snakes carrying away portions of fish thrown away. During the next week snakes were observed carrying away the discarded fish heads from the fish dock. Whether they swallowed them in the water or carried them to a safe place on the bank was not determined. This water snake can swallow its food under water. On one occasion a large *N. rhombifera* was found caught in a turtle trap made of chicken wire which had openings about 1½ inches wide. The snake had entered the trap, swallowed a large catfish, and then attempted to escape; but its enlarged body would not pass through the opening in the wire. The snake, therefore, could not have entered the trap after eating the fish. The trap was completely submerged; thus, the snake necessarily swallowed

the fish under water. These snakes fed readily in captivity. They always removed their food from the water before swallowing it.

Sixteen gravid females were examined in the laboratory of the biological station. All of them contained well developed eggs. (Fig. 1).

Table 2 indicates the lengths of the females and the number and size of the embryos.

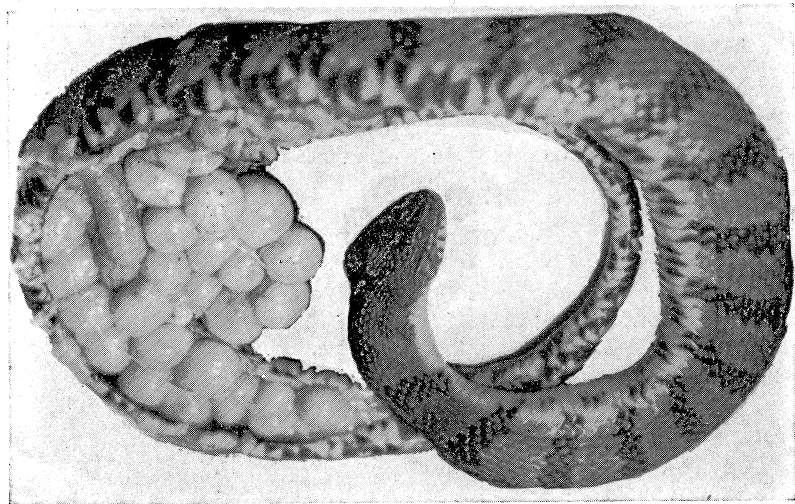


Fig. 1. An opened female *Natrix rhombifera* showing numerous eggs in the oviducts. Each egg contained an embryo in an early stage of development.

This data indicates a direct correlation between the number of young borne and the length of the adult. The smallest mature female contained only eighteen eggs; the largest contained forty eggs. One would suppose that the larger snakes would bear 30-40 young, but the three large females retained in captivity had comparatively few young (13-18). Dissections of females of the same size in the early stages of pregnancy indicated 26-42 embryos. Does a number of the embryos fail to develop beyond a certain stage?

Although sufficient data was not assembled to justify any definite conclusions, this paper is submitted as a preliminary report on *Natrix rhombifera* at Reelfoot Lake.