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ZOOLOGY

Nesting Habits of the Soft-Shelled Turtles (Trionyx Sp.)

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Introduction: Soft-shelled turtles (*Trionyx* Sp.) are common along the Mississippi River but, in spite of their abundance, the literature contains very few accounts of their life history, particularly with respect to nesting. The principal contributions concerning the ecology of *Trionyx* have been made by Breckenridge (1944); Cahn (1937); Carr (1952); Ditmars (1936); and Pope (1939 and 1955).

The present study was undertaken to learn more about the nesting habits of the *Trionyx* turtles in the area near Winona, Minnesota. Because of the great similarity between species of *Trionyx* turtles, and because close observation would have disturbed their normal nesting activities, no attempt was made in this study to identify the turtles to species.

Methodology: Field work was done during the entire month of June and the first half of July, 1962. The study area was a peninsula which extends downriver on the Minnesota side of U.S. Lock and Dam No. 5A on the Mississippi River (Figure 1). This sand beach provided steep and gradually sloping areas, and open to heavily brushed shorelines. Observations were made three times weekly on the average, and more frequently during the period of heavy nesting. Observations included all times of day from sunrise to sunset.

A boat was used to reach the study area and sometimes to observe from off-shore. A pair of 8 × 30 binoculars aided in observing the turtles as they were too wary to be observed at close range. Most observations were made from a camouflaged blind of mosquito netting. A compass and a tape measure were used to plot nest locations.

DISCUSSION:

Observation of the Beach. Pope (1955) has noted that a soft-shell preparing to nest first makes an observation of the beach from the water. In this study it was also apparent that the turtles surfaced to observe and then submerged several times before coming ashore.

Leaving the Water. The turtles seemed to prefer coming ashore where the beach was not heavily brushed, and yet not open for more than about 15 feet along the shore. Cahn (1937) saw a soft-shelled turtle leave the water and then return several times before nesting. This was not observed in this study, but since only six turtles were actually observed in the act of nesting, the habit of returning to the water several times may not be uncommon.

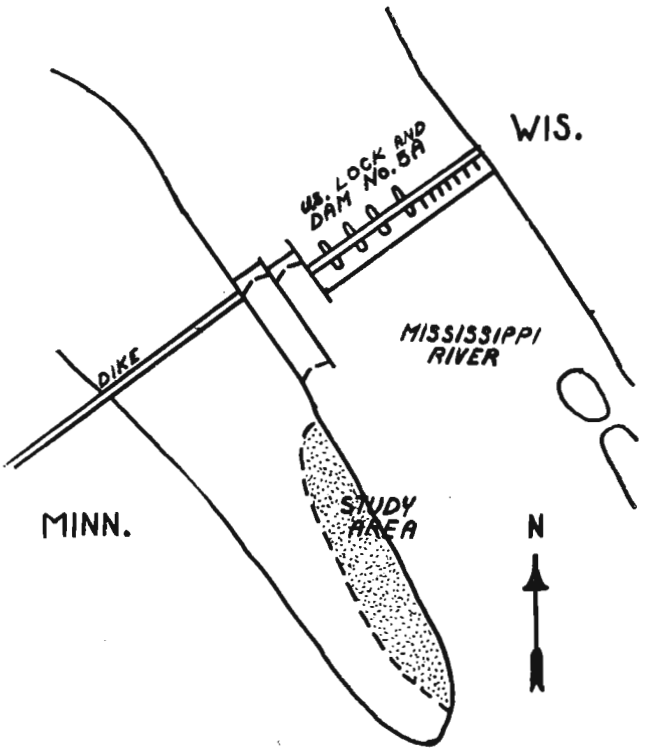

FIGURE 1. Mississippi River near Winona, Minnesota showing the location of the study area (shaded).

A factor which seems to play a part in the turtle's selection of the beach is the steepness of the beach. No definition of steepness will be used here as the study area only had steep and gradual beaches and none which were intermediate. Although other turtles were observed using the steep beaches, only gradually sloping beaches were used by the soft-shells.

Nesting activity was most intensive on warm, sunny days. All of the turtles which were seen nesting in this

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study were extremely alert from the moment they left the water until they returned.

Selecting a Site. Cahn (1937) noted that soft-shells often dig several holes before laying any eggs. Five of the six turtles seen nesting in this study dug and abandoned several holes before they finally laid eggs. The abandoned holes had not been excavated to the same extent as those containing eggs.

In addition to the nests which the six observed turtles made, 38 others were excavated and examined. The chosen spots for nesting fell mainly in two ranges of distance from the water. These two ranges were from 14 to 30 feet and from 58 to 64 feet from the water. The preference for the former range was very evident as it contained 68% of the examined nests. One nest was found 121 feet from the water. As had been noted previously (Carr, 1952) all of the nesting sites provided a good view of the water and surrounding beach.

Digging the Hole. It has been pointed out (Breckenridge, 1944) that the female turtle is very wary while digging her nest. Cahn (1937) said that she "holds her neck erect and very stiff." This was observed in this study also. The turtle only lowered its neck to inspect the progress of the digging.

The digging was done with the hind feet which were used in alternating, circular sweeps while the turtle supported herself with her front feet and the rear of her plastron. While digging she gradually tipped backwards until the front feet were fully extended. The turtle sometimes also rotated about the hole with her front feet while she dug, and sand was thrown up to ten feet away from the hole. The average digging time for the six turtles observed nesting was 18 minutes.

Laying the Eggs. Laying was assumed to have started when the turtle stopped digging and became motionless on the nest, and was considered finished when the turtle started to cover the hole. This span averaged nine minutes for the six observed turtles.

One turtle laid several eggs and then walked several feet and, after digging another hole, laid several more eggs. Both nests were covered in a normal manner. Subsequent examination showed that the first nest had already contained some eggs laid by another turtle. Another nest also showed evidence of this multiple use.

The 44 nests which were examined contained from 8 to 30 eggs. The average number was 17. There seemed to be no particular number of eggs consistently laid, and the only conclusion that could be drawn was that over 25 eggs in a nest is a rare occurrence.

One very interesting observation was the close correlation between the depth of the eggs nearest the surface and the depth at which the sand became moist. In most cases these two measurements were identical. In no case were any eggs laid above this moisture level (Figure 2).

The uppermost eggs of most clutches were found at a depth of from three to four inches. However, it can not be known if this was due to instinct, the depth of the moisture level, or the turtles' physical limitations for digging.

Covering the Hole. Pope (1939) states that a soft-shell may leave without attempting to cover the nest, or she may so carefully pack the dirt that the nest is well hidden. In this study every nest found had been at least partially covered, although some had only a scant covering of sand.

Returning to the Water. After the eggs had been laid and the nest covered, the turtles returned to the water. All did this without hesitation, but none ran back as though frightened.

Aging Eggs and Determining the Nesting Season: Soft-shelled turtle eggs have been described by Ditmars (1936) as having a shell which is "hard and brittle but

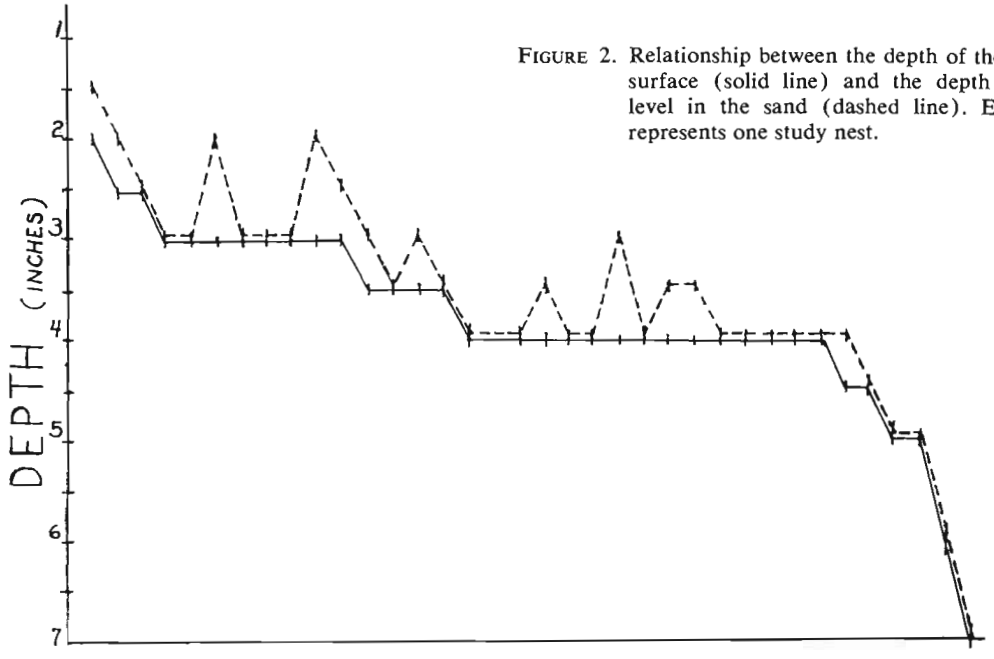

FIGURE 2. Relationship between the depth of the eggs nearest the surface (solid line) and the depth of the moisture level in the sand (dashed line). Each vertical axis represents one study nest.

very thin." This seems to be a very accurate description, but descriptions of color vary, with one observer stating that the eggs are white, and another that they are pink.

During the course of this study it was noted that most of the eggs uncovered were partly white and partly pink. It had also been noted that those eggs which were known to have just been laid were all pink. This led this observer to suspect that a color transition takes place after the eggs are laid. Subsequent reexamination of the eggs whose color had been noted previously proved this to be true. All of the eggs were reexamined several times and a definite rate of change worked out (Figure 3).

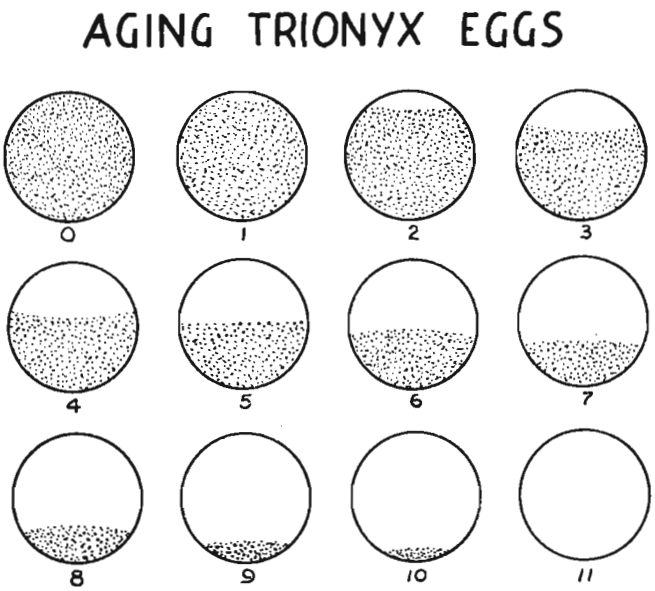

FIGURE 3. Color transition in *Trionyx* eggs after laying. The pink portion of the egg (shaded area) is replaced by white at a rate indicated by the number of days since laying.

Another very interesting thing regarding this color change is that the white area always started on the side of the egg nearest the surface and gradually extended downward until the egg was entirely white. Outwardly, it would seem that heat from the surface or drying were the factors causing this change. All of the eggs in a nest, however, changed at an equal rate regardless of depth.

The establishment of the rate of change enabled the observer to work backwards and establish the time of laying for many of the eggs. The nests that had entirely white eggs could not be evaluated other than to say that they were at least eleven days old, which is the time required for the entire color transition to take place.

Using this technique the limits of the nesting season and the intensive laying period within those limits were established. It was determined that the nesting season in the Winona, Minnesota area was from June 6 to June 29. Over 46% of the examined nests were established from June 8 to June 11 inclusive. The calculated season was almost exactly one week later than that on Lake Minnetonka, which has a nesting season from June 14 to July 6 (Carr, 1952). This difference was probably due to the more northern position of Lake Minnetonka.

General Conclusions:

1. Female *Trionyx* turtles usually emerged from the water where the open beach did not exceed 15 feet in length, but seldom where the beach was entirely brushed.
2. The female may dig several holes before laying any eggs.
3. The eggs may be laid in more than one nest.
4. Eggs may be laid in a nest already containing eggs.
5. The 1962 nesting season in the Winona, Minnesota area was from about June 6 to June 29, with the peak of laying from June 8 to June 11 inclusive.
6. The eggs when laid are all light pink in color. This gives way to white, starting at the upper part of the egg and progressing downward at a steady rate. All of the eggs in a nest change at the same rate, and they are always at the same stage of transition regardless of depth. The entire color transition takes eleven days.

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