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Notes on the Courtship and Mating Behavior of the Soft-Shell Turtle, *Trionyx muticus*
(Reptilia, Testudines, Trionychidae)

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NOTES ON THE COURTSHIP AND MATING BEHAVIOR OF THE SOFT-SHELL TURTLE, *TRIONYX MUTICUS* (REPTILIA, TESTUDINES, TRIONYCHIDAE)

The available information concerning courtship and mating behavior in the softshell turtles (*Trionyx*) has been summarized by Webb (1962) and is mainly anecdotal. Ernst and Barbour (1972) and Collins (1974) have written the most recent descriptions of behavior. Collins' (1974) report is based on my observations of *Trionyx muticus*, but further observations now permit a more detailed, albeit still incomplete, report on courtship and mating.

This behavior was observed on the Kansas River in Douglas County, Kansas on 4 May-5 June 1973, 27 April-15 May 1974, and 19 August 1972. Laboratory observations of mating behavior were made on 13 September 1973. All of the spring observations were made in a pool connected with the nearby Kansas River. Dense foliage around the pool permitted closer approach than the open sandbar habitat of the river itself and allowed easy observation through

seven-power binoculars. The summer observations were made on the river from the top of a tall tree through a 20-power spotting scope. Spring and summer behavior were qualitatively similar. No attempt was made to quantify the behavior. Table 1 summarizes the number of observations of the various aspects of behavior. Mature males were distinguished from mature females by their much smaller size and lack of the camouflage pattern of the female carapace. However, sex could be determined with confidence only when the turtles were clearly visible, as when basking or in very shallow water.

Males appear to actively search for females. Spring observations in the pool revealed much rapid surface swimming in erratic courses with short bursts, apparently random in direction, by male-sized turtles. When two or more such turtles came within a few meters they swam toward each other until within a few centimeters; each would then submerge and reappear on the surface within a few seconds, and go its own separate way. Occasionally, after a confrontation, both heads would submerge and reappear and chase would ensue, the pursuer usually within a meter of the pursued. In one instance the pursued turtle, approximately four m distant, stopped, turned about and moved toward the pursuer. When they were again in close proximity, they submerged a few seconds, and the chase resumed. Similar behavior also was observed by Legler (1955) in the laboratory. On another occasion when a chased turtle turned and faced its pursuer, both submerged a few seconds, and then went their separate ways. One chase lasted for about four minutes, during which the turtles traveled a linear distance of about 50 m. In some cases the pursued turtle was believed to be a female judging from its much larger size. In most cases sex could not be determined because only the heads were protruding from the extremely turbid water.

Males also actively investigated turtles that basked along the shoreline. The males often passed from one basking turtle to another, approaching with necks fully extended; the males placed their snouts under the edge of the carapace and probed around to the sides and back of the basking turtles. This behavior elicited several types of responses from the basking turtles. If the basking turtle was another male, its behavior usually was passive, especially if the investigating male did not move to its side; it would remain on its basking site until the other left or else would slowly move into the water. Figure 1 shows a male entering the water followed by another, which is probing with its neck partially extended. At times basking males would extend their necks and open their mouths when approached by others or when an intruder moved around to the side. In immediate response to this behavior, the investigating male would back off and leave.

If the basking turtle was a female she often would spin around and aggressively charge and bite at the male. Body spinning involved rapid locomotor movements of the limbs of one side while pivoting on the plastron, and it was common behavior to prevent mounting attempts. On one occasion four males were simultaneously investigating a

TABLE 1. Number of observations in various behavioral categories.

Category	Chases	Swimming approaches	Basking approaches	Attempted mountings	Successful mountings
Number	12	25	38	22	4



FIGURE 1. Investigatory behavior of male *Trionyx muticus*. The male on the right is investigating a male (notched carapace) which has just left its basking site on the shore. Photograph taken by Michael D. Cain.

basking female and she continually spun around in different directions with her mouth open as they encircled her attempting to mount. This incident lasted for more than a minute, then the males left. The female may aggressively chase a male for short distances and viciously bite at him if the male persistently investigates her and attempts to mount. This behavior was observed both on land and in shallow water. Semicircular wounds from bites, many still bleeding, are common on the posterior margins of males' carapaces in early spring.

A receptive female would remain passive while a male investigated and mounted. If basking, she would move slowly back to the water while the male attempted to mount. In several instances two or three males attempted to mount a female simultaneously. One female was observed for about 10 min while she slowly foraged in water about 5 cm deep. During this time three different males attempted to mount, but she appeared to ignore them completely. Successful mountings were seen in deeper water only. Males do not grasp the females with the forelimbs and consequently must continually "swim-on" the female to remain mounted. I could not determine in the murky water whether males grasped the females with their hindlimbs. Legler (1955) saw no hindlimb grasping in courting *Trionyx*. One apparently copulating pair was observed for 20 min as they swam slowly, occasionally submerging and making a disturbance so that the water surface would be agitated, reemerge, and resume their slow swimming at the surface. All the while the male was "swimming-on." Legler (1955) has described underwater courtship and mating behavior of a male *T. muticus* and a female *T. ferox* (= *spiniferus*) in a laboratory tank.

In September 1973 a male (plastron—83 mm) and an immature female (plastron—113 mm) were temporarily housed in a plastic shoebox with water to a depth of several centimeters. The male was observed by Randall N. Johnson mounted on the female for several minutes with the posterior margin of his carapace turned down as described by Legler (1955), but actual coital union was not clearly evident.

Although a comprehensive description of courtship and mating behavior in *T. muticus* has not yet been made, the present observations add to available information, agreeing with, and complementing observations of other authors, particularly those of Legler (1955) on submerged turtles in aquaria. This report also shows that sexual activity in *Trionyx* occurs both in the spring and in late summer as it does in other genera of aquatic turtles (Ernst and Barbour, 1972).

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A CASE OF INTERBREEDING BETWEEN *RANA AURORA* AND *BUFO BOREAS* (AMPHIBIA, ANURA)

At 1000 on 26 April 1973 I found a male *Bufo boreas* (79 mm, 52 g) in amplexus with a female *Rana aurora* (96 mm, 102 g) at a beaver pond near Beaver Creek 5 mi E of Bellingham,