

## Courtship of the Turtle, *Pseudemys nelsoni*

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With the exception of Jackson and Davis' studies of the courtship of *Trachemys scripta elegans* (1972a) and *Pseudemys concinna suwanniensis* (1972b), our knowledge of the courtship patterns of these genera is based on fragmentary and anecdotal accounts (e.g., Davis and Jackson, 1973; Lardie, 1973; Jackson, 1977). Here we describe the courtship behavior of male *Pseudemys nelsoni*.

Our results are based on the courtship behavior of two small adult males kept in the laboratory and 16 observations of courtship in the field at Rock Springs run, Apopka, Florida (Kramer, 1986). Most laboratory observations were made by UF on a male (plastron length = 18 cm) housed in a 100 × 40 × 40 cm aquarium. Water temperature varied from 22 to 30°C in the summer and from 20 to 26°C in the winter. An artificially heated basking board was provided. The aquarium was exposed to a natural light cycle. Most of this male's courtship behavior was directed toward a female *P. concinna*, an aquarium mate for over 5 years. A female *P. nelsoni* added later was ignored. Notes were taken on over 200 courtship episodes (over 20 hr total) involving this male. The male kept by MK (plastron length = 16.5 cm) was housed similarly in a 180 × 39 × 33 cm aquarium with a 12L:12D cycle. Water temperature varied from 20 to 27°C. This male shared the aquarium with a female *P. nelsoni*, and one male and two female *P. floridana peninsularis* after their capture in Sept. 1984. This male courted the female *P. nelsoni* almost exclusively throughout the 9 month observation period although copulation was never seen. Courtship of this male was documented using a super 8 camera at 18 frames/sec (parts of 13 courtship episodes totalling about 2 min) and by 40 hours of time-lapse videotaping (including 23 courtship episodes).

We were unable to detect any obvious differences in these males' courtship behavior when courting female *P. nelsoni* vs. courting other pseudemid species once courtship began. Therefore, we have combined all observations when describing the males' behavior.

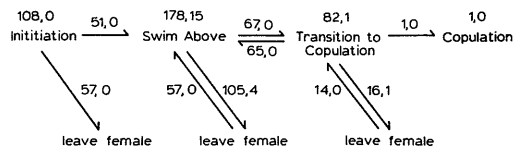


FIG. 1. The flow chart depicts commonly observed behavior transitions of male *Pseudemys nelsoni* during courtship. The numbers above each behavior or transition give the frequency the behavior or transition was recorded; the first for laboratory animals and the second for pairs in the field. Males were seen to investigate females in the field but, since this was not followed by Swim Above, those data are not included here.

Unless noted otherwise, the females' behavior is that of *P. nelsoni* females.

Behavioral observations in the field were primarily made underwater using a wetsuit, mask, and snorkel; notes were taken on roughened plastic sheets using a pencil (Kramer, 1986). Occasionally males courting females were observed from land or a canoe. Altogether the 16 field observations of courting *P. nelsoni* sum to about 31 minutes. Courtship in this species is lengthy, thus each of these field observations was only a small fragment of the entire courtship sequence. Only relatively small, non-melanistic male *P. nelsoni* were seen courting females; large males' interactions with females were often aggressive (Kramer, 1986).

Field and laboratory observations agree closely, thus the courtship sequence was reconstructed and analyzed by combining both data sets. For descriptive purposes courtship was divided into 4 phases: Initiation, Swim Above, Transition to Copulation, Copulation (Fig. 1).

**Initiation.**—This phase consists of all behaviors leading to the male positioning himself above the female once the animals are in close proximity. Instances of social investigation observed in other contexts appeared more perfunctory and were of shorter duration. The usual sequence of events are: the male follows (trails) the female, approaches her hindquarters and noses her thighs and cloacal region. If she moves or is moving he follows closely, neck extended, nosing her hindquarters. Courtship is commonly aborted at this point; the male ceases to investigate the female and leaves. Alternatively he may swim around to the female's side, sometimes partially perching on top of her, stretching his neck fully then bending it to bring his head near the female's (Fig. 2a). From this position he may nose the female's head several times. This behavior occurs in less than half of the courtship sequences and usually lasts less than 2 min. From this position he may swim up so that he is directly above the female or backwards and nose her thighs and cloacal region again. From the position behind the female the male swims forward over the female.

**Swim Above.**—This phase begins when the male first takes up the position above the female, from which he titillates her, described below. His neck is usually partially retracted, head pointing down. Repeatedly he brings his forelegs forward near the female's head.



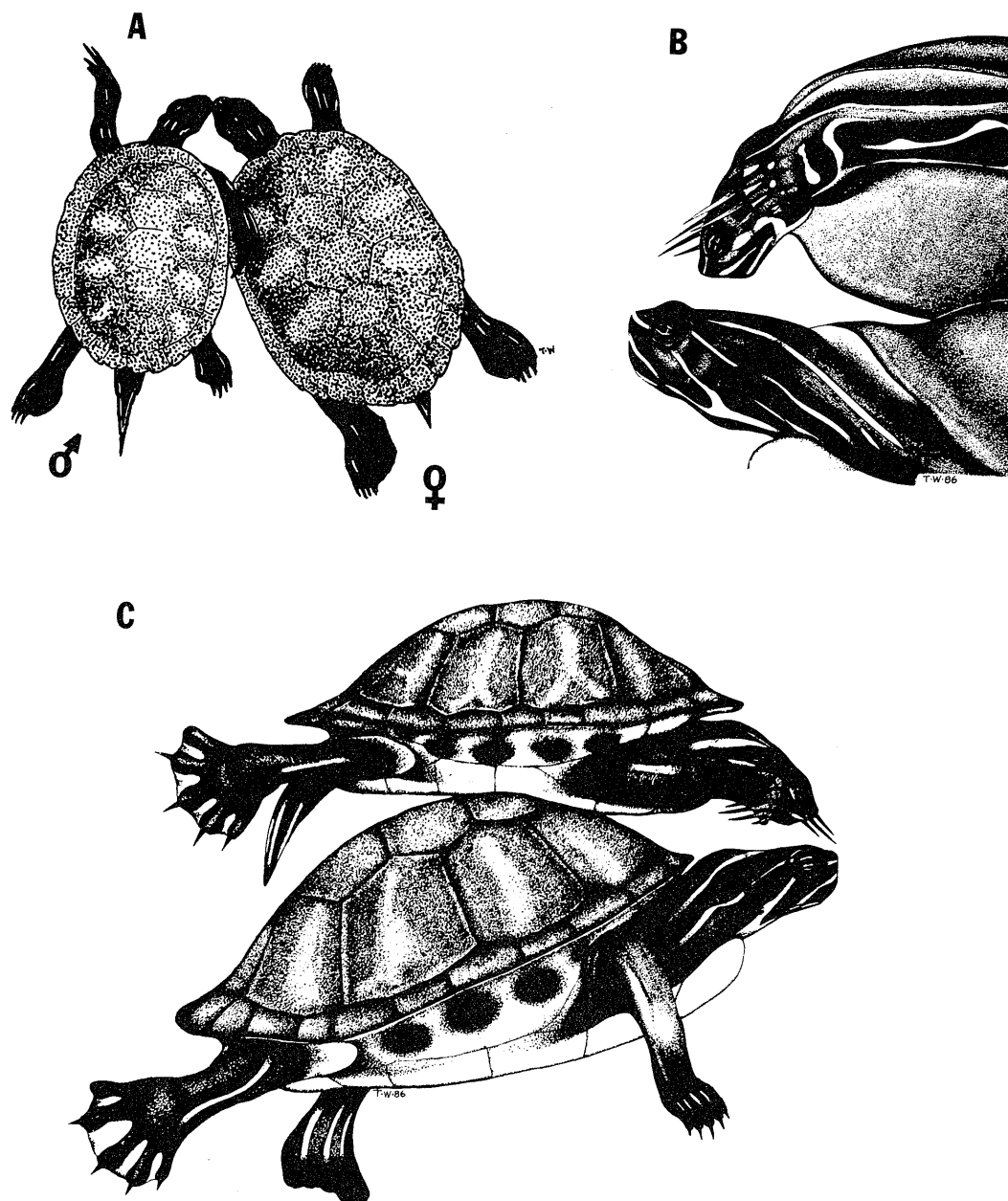


FIG. 2. Typical positions of courting pairs. A. Initiation, male nosing the female's head. B. Swim Above, position of the male's head and forelimbs in relation to the female one frame prior to the first vibration in a titillation bout. The male lowers and extends his forelimbs during the titillation bout. C. Swim Above, position of the male and female between two bouts of titillation.

The arms are rotated inward so that the palms face out and the claws are directly above the female's eyes (Fig. 2b). Films of the male kept by MK showed the claws to be vibrated at about 10.8 vibrations/sec (SD = 3.9, N = 9), the number of vibrations ranging from 3 to 10 (mean = 5). The duration of the filmed titillation bouts averaged 0.62 sec (SD = 0.34, N = 9). However, longer bouts were seen in both the lab and field. This behavior is very similar to titillation in *T.*

*scripta elegans* described by Jackson and Davis (1972a) although "fanning" was not seen and the male was above the female rather than facing her. Six measurements from filmed courtship of the male kept by MK immediately prior to titillation yielded a mean angle of 20° to the female's long axis (range 12.5–25°) (Fig. 2c). The male's tail is usually oriented vertically down, perpendicular to his long axis, but the penis is not visible.

The female's response to the male's titillation is to withdraw her head, often accompanied by turning her head sideways and down. She may rub her head with a forefoot, as if brushing away an irritant. Otherwise she appears to pay no attention to the male's efforts.

This phase is frequently interrupted when the female surfaces for air, eats, or performs some other activity. In the lab the male may leave the female for up to 10 min, then resume Swim Above without performing any of the behaviors characteristic of Initiation. Titillation never occurs when the female's head is above water. After several minutes in this phase the male's penis may be seen intermittently. His head bends further downward, clearly oriented to the cleft made by the skin fold of the female's neck. His biting motions become exaggerated and erratic, unlike the smaller, more regular movements in earlier sequences (see below). Unsuccessful courtship attempts usually terminate in this phase. We were unable to observe any change in the female's behavior that might cause the male to cease courtship.

The only obvious differences between field and laboratory observations occurred in this phase, probably due to space limitations in the laboratory. Females would swim during this phase in the field. The male would titillate the female, fall behind, then approach her again. This was repeated several times until the male left the female or the pair swam out of view. Occasionally the male would trail behind the female for several m before approaching her again. In the lab the female often turned rather than swam during Swim Above. In the field the male's behavior appeared better synchronized with the female's, they would swim, turn, rise for air, and submerge together. The male kept by MK appeared somewhat less attentive to the female's movements than males observed in the field.

**Transition to Copulation.**—Only the *P. concinna* female kept by UF appeared to be receptive, and then only on one occasion when she stopped moving and elevated her hindquarters. The male grasped the margins of the inguinal region with his hind feet, contacting her carapace with his plastron, slid backward, and twisted his tail around the female's. The forelegs were used to support the male on the female, but not to clasp her shell. The male's neck was slightly withdrawn.

In all other cases the females did not appear receptive. In some of these cases, when the female stopped moving, the male clasped the female's carapace with his hind feet and tried to bring his cloaca near hers. He often extended his penis into the water, in the direction of her cloaca. These copulation attempts were never consummated.

**Copulation.**—Copulation lasted 4 min in the single instance it was observed, by the male kept by UF with the *P. concinna* female, and terminated when a third turtle disturbed the pair. The male completely withdrew his head, then rhythmically extended and retracted his neck, each cycle lasting approximately 2 sec. During copulation the mouth was slightly opened but there were no chewing or biting motions. The male fell back to a vertical position, similar to the posture of copulating *T. scripta elegans* (Davis and Jackson, 1970). This behavior appears virtually identical

to copulation of *T. scripta elegans* as described by Davis and Jackson (1970).

The fine "chewing movements" that have been reported during the courtship of other pseudemid turtles (e.g., Jackson and Davis, 1972b) probably involve the movement of water through the nares and mouth for olfaction. Pulses of the hyoid apparatus alternate with movements of the mouth. These movements are slow and regular during nonsocial activity but quicken during social interactions, especially by the male during courtship.

One behavior pattern that seems to be characteristic of emydid turtles is nose-touching, when two turtles touch the tips of their snouts together. This is sometimes seen during Initiation, more rarely in Swim Above, and often during other social encounters (Jackson and Davis, 1972b; MK and UF, unpubl. data). Nose-touching may last several seconds and is often repeated. Its function is presumably olfactory.

Courtship of *P. nelsoni* appears to be similar to that of *P. concinna*, as described by Jackson and Davis (1972b). In both species adult males always court females from above, never facing them as in *T. scripta elegans*. One apparent difference in the posture of courting *P. nelsoni* from that of *P. concinna* is the large angle between the long axes of the male and female. In *P. concinna* the animals appear almost parallel (see Jackson and Davis, 1972b, fig. 1g, h). Titillation by the female, in a *P. nelsoni* pair described by Jackson (1977), was never observed in courting adults in the field or the lab. The titillation behavior may function outside of courtship, a possibility that requires additional investigation.

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