

Reproductive Behavior in the California Lyre Snake, *Trimorphodon biscutatus vandenburgi*

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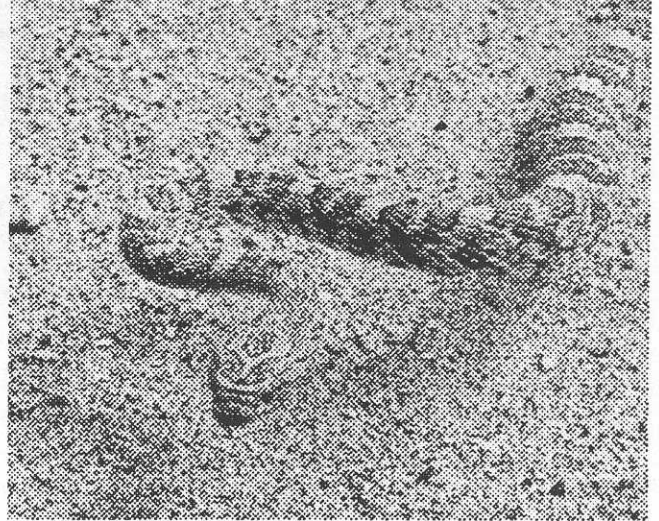
Photos by the Author

This article concerns reproductive behavior of the California Lyre Snake (*Trimorphodon biscutatus vandenburgi*), including male combat, breeding, egg-laying and hatching, as well as the treatment of neonates. These observations reflect my experience with the inter/intra-sexual behavior of a trio of wild-caught Lyre Snakes, resulting in the successful hatching of two clutches of eggs — within one season.

For a number of years, I have successfully propagated different species of colubrid and booid snakes. While I have witnessed the “combat” of males vying for mating rights in a few of these species (notably the *Lampropeltis* group), I have been unable to locate any accounts of this phenomenon in Lyre Snakes. I have similarly been unable to uncover any record of “double-clutching” in this species. As will be discussed in detail below, there were additional reproductive behaviors observed which I have yet to witness in other species.

At 1:00 a.m. on 25 April, 1992 I captured an adult female California Lyre Snake at the foot of a boulder-strewn slope. The animal was crawling in a small open area at the edge of a sandy wash, located in California’s eastern Colorado Desert. The temperature was 73°F (23°C).

The following night, at 3:00 a.m., while lantern-walking the edge of the same wash, I came across another Lyre Snake, this one a male. Interestingly enough, this animal was found in the exact spot as the one found the night before. The temperature was 70°F (21°C). My first thought was that the male was in the process of scent-trailing the female. The events that followed, while by no

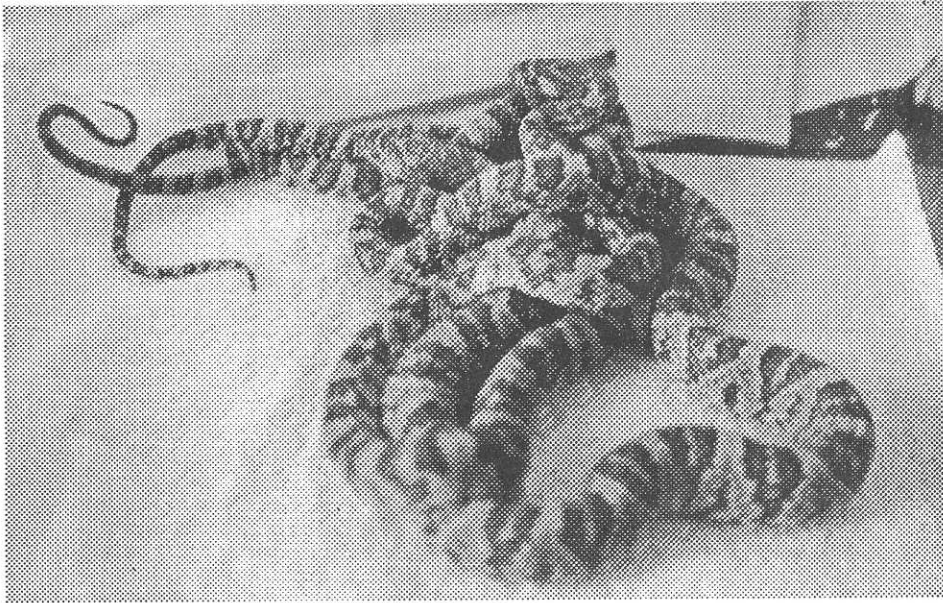


means conclusive, certainly were not at odds with this hypothesis.

The pair adjusted quickly to captivity. From the outset, the female readily consumed pre-killed “fuzzie” mice. The male (the smaller of the two) also accepted fuzzie mice; however, the initial feeding required scenting the rodent with a feeder lizard (*Uta stansburiana*). While I failed to measure the two at the time of capture, I estimated that the male (M1) was between 26 - 28 inches (66 - 71 cm) in length, and the female between 38 - 40 inches (96 - 101 cm). This estimation is based upon their current size.

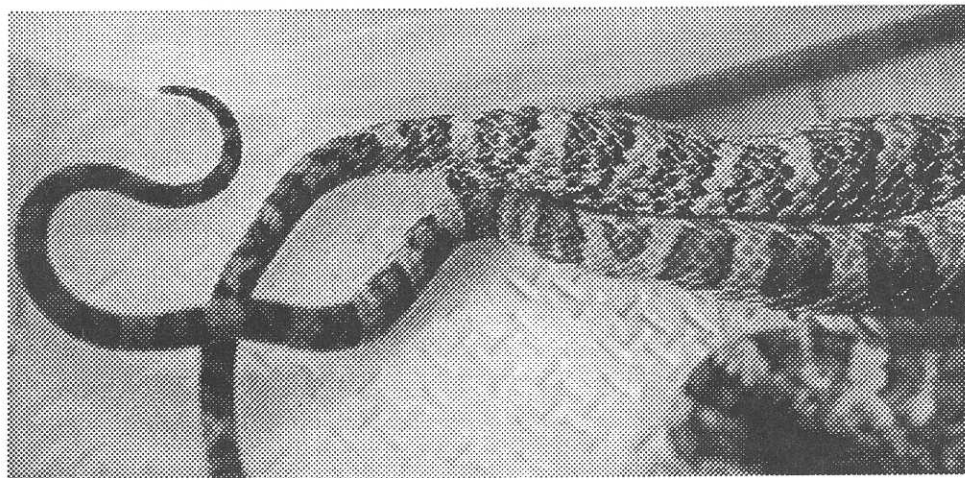
After the pair acclimated to captivity, I introduced the female into the male’s cage in what was to be the first breeding attempt. There was little or no sexual interest displayed by the male and the pair were soon separated.

Having received the loan of a second male Lyre Snake, I decided for a couple of reasons to place the trio together. First, I wanted to compare the color and pattern of each (they tend to be fairly variable, especially insofar as the head pattern



which gives rise to its common name). Secondly, I thought that the addition of the second male (M2) might trigger a sexual response in the first male, or vice-versa. M2 was approximately 23 inches (58 cm) in length and considerably thinner than M1.

I began by introducing the female into M1's cage and, as on the previous occasion, M1 showed no sexual interest in the female. I then placed M2 into the enclosure. After one or two tongue flicks, M1 immediately attacked M2. Seizing the smaller snake in its jaws, M1 delivered a quick series of powerful bites, which sent M2 into instant flight. M1 pursued M2, and after a second series of strong bites M2 was removed to prevent unnecessary injury. No retaliatory action was taken by M2 prior to his removal. M1 was clearly the dominant male.¹



After M2's removal, M1 remained quite agitated. He continued to travel about the enclosure with spasmodic, jerky movements, and his rapid tongue-flicking suggested that he was continuing to search for the intruding male. When M1's search of the cage brought him to the female, his tongue-flicking intensified. He began to pointedly investigate the female, while holding his head at an odd right angle to her dorsolateral surface.

The female was lying in what may best be described as a loose, open, coiled position. As M1 moved forward along the female's body, I observed another peculiar behavior. Before M1 had aligned his cloaca with that of the female, he began to extend and retract one hemipenis (the left), in roughly one second intervals. What appeared to be sperm was emitted in small quantities from the distended organ.

While resting his head four inches (10 cm) or so posterior to the female's, M1 pulled his body forward and from the point that his head made contact with the female, mounted her, and began to extend his tail downward, carefully tracing each twist and turn of her body. M1's hemipenes were retracted during this attempt at cloacal positioning.

¹ Although it did not occur to me at the time, it would be interesting to determine whether M1's dominance was territorial in nature; i.e., if M1 were placed into M2's cage, would M2 have established dominance over M1, or would the result have been the same? This combat could not be characterized as a display of mutual aggression, as in the well-documented "dance" of male Western Diamondback Rattlesnakes (*Crotalus atrox*), or the similar (but horizontally-oriented) combat of male Common Kingsnakes (*Lampropeltis getulus*). M1 simply attacked M2, driving the latter into flight.



When in alignment with the female's cloaca, M1 once again extended his left hemipenis. In a quick and deliberate movement, M1 used the tip of his tail to lift the female's, thus gaining access to her cloaca. Then, with a sudden violent thrust M1 successfully completed intromission (penetration). The pair remained in this copulatory position for 20 minutes prior to separation. During this time, the male was observed to repeatedly contract the lower one third of his body as if consciously releasing sperm. There was no biting observed, and separation was initiated by the female.

The time which elapsed from the removal of M2 from the cage to successful intromission was less than one minute. During this time the female made little effort either to avoid M1's attentions or to assist in successful mating, i.e. tail lifting, cloacal opening, etc.

The date of this first mating was 21 May, 1992. Between that date and 2 June, the female consumed three small mice. On 12 June, ecdysis (shedding) occurred, and the following day she

refused to feed. On 15 June, eight fertile eggs were deposited into the vermiculite medium provided for that purpose. The gestation period was only 24 days, which suggested (especially in light of the following observations) that it was highly probable that the female had mated in the wild, prior to capture (see table 1).

The eggs were adhesive, and the female deposited them in a small cluster. Each egg was approximately 1-1/2 inches (4 cm) long and 3/4 inch (2 cm) in width. Since the eggs were adhering to one another, they were not weighed. They were placed into a plastic shoe box, with a medium of dampened vermiculite, and incubated at approximately 80° F (27° C).

Immediately after depositing this first clutch of eggs, the female consumed three small mice. On 18 June, I attempted a second mating, once again placing the pair together. As before, M1 displayed no sexual interest in the female until after engaging in combat with M2. All of the combat and mating behaviors were identical to those described above, including the pre-copulatory distension of M1's hemipenis and associated release of small quantities of seminal fluid.

In the three subsequent days the female consumed three small mice, and on 24 June, copulation was once again observed (after the now customary combat/courtship described above). The pair had been housed separately from 18 June through 24 June.

From the time of this second mating (24 June, 1992), the female consumed 11 weanling mice. On 23 July, after a 10-day fast, ecdysis occurred. The female thereafter refused all food, and on 29 July she deposited 9 fertile eggs. The gestation period was calculated between 35 and 41 days. As with the first clutch, the eggs were laid in an adhesive mass, and placed into a damp vermiculite medium for incubation (see Table 1).

On 23 August one egg in the first clutch pipped (was slit open), and over the following three

Table 1: Comparison of two clutches of Lyre Snake eggs

	First Clutch	Second Clutch
Copulation:	05/21/92	06/18/92 AND 06/24/92
Pre egg-laying shed:	06/12/92	07/23/92
Oviposition:	06/15/92	07/29/92
Clutch size:	8 eggs	9 eggs
Gestation:	24 days	35 through 41 days
Hatching:	08/29/92	10/11/92
Incubation:	75 days	74 days

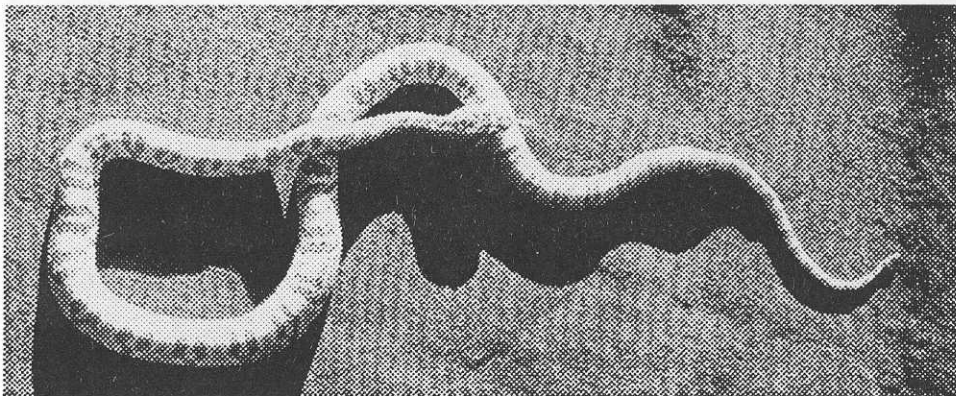
days the remaining seven eggs followed suit. On average, the neonates remained in the egg for 24 hours after pipping occurred. They were quite small, averaging six to seven inches (15 - 17 cm) in length. The sex ratio of the young was fairly even, with the results being 5.3 (5 males, 3 females).

Each of the young Lyre Snakes underwent their first molt between 10 and 12 days after hatching. Believing that they would more readily take lizards than pink-mice, I first attempted to feed them scented pinkies — a few of which were further “disguised” as lizards by draping small portions of lizard skin over their heads. To my disappointment, none of the scented pinkies were eaten by the young snakes.

In the intervening weeks, I gave away four of the eight hatchlings. On 23 September I placed thawed-out frozen pinkies into the cages of the remaining four (they were caged separately). In

further hope of stimulating a feeding response, I elected to perform the somewhat grisly task of “nose-cutting” the pinkies — exposing the sinus/brain tissue with the aid of forceps. This procedure proved effective. The pinkies were left overnight with the young Lyre Snakes, and by morning I was happy to discover that all four had taken the offered meal. From that point on they readily consumed pink-mice, gaining weight at a surprising rate.

With the second clutch of eggs, pipping occurred on 11 October, 1992. As with the first young, ecdysis occurred approximately 10 days after hatching. Soon after that, all of the neonates eagerly consumed thawed, unscented, nose-cut pinkies. With this clutch, there was a higher male to female sex ratio of 7.2. There was no appreciable difference in the incubation temperatures of the two clutches; each were maintained at a fairly constant 80° F (27° C).



In the literature at hand, food preferences for Lyre Snakes have been listed as: lizards, small birds, and mammals. The Peterson (Stebbins) Field Guide expands upon “mammals” to include bats. It is believed that the prey is seized by the Lyre Snakes and immobilized by venom delivered via the grooved

upper-rear teeth of this species. Despite this information, most of the hobbyists I have spoken with are of the opinion that Lyre Snakes are strict lizard eaters, and therefore they are disregarded as captive subjects. In fact, while anticipating the hatching of the two clutches of eggs, I was advised by fellow herpers that I'd never get the hatchlings to eat, let alone feeding on rodents.

I find it interesting to note that, contrary to this apparently erroneous belief, Lyre Snakes are easily maintained and propagated in captivity. In my experience, the young of many of the more commonly kept species (*Lampropeltis*, *Elaphe*, etc.) can be considerably more difficult to convert to a rodent diet. In this instance, out of 13 hatchlings (four were given away), 13 voluntarily consumed unscented pink mice. Not a bad track record!

In conclusion, while the observations contained herein are limited to a single breeding pair and to a single season, I believe that they are noteworthy. I will continue this "study" in the hope of gathering additional data, and welcome input from anyone else working with this species.

References

Behler, J. L., and F. W. King, 1979. *The Audubon Society Field Guide to North American Reptiles and Amphibians*. Alfred A. Knopf, Inc., New York. 743 pp.

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