

CAPTIVE REPRODUCTION IN THE MEXICAN MILKSNAKE *LAMPROPELTIS TRIANGULUM ANNULATA*

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INTRODUCTION

The Mexican milksnake, or 'Falsa Coralillo' *Lampropeltis triangulum annulata*, which may reach one meter in length, is found from Southcentral Texas south into Tamaulipas, central Nuevo Leon, and southeastern Coahuila. In the northeastern part of its range, it intergrades with *Lampropeltis triangulum amauro* (Tennant, 1984; Williams, 1988), while in the southeastern portion of its range, it intergrades with *Lampropeltis triangulum polyzona* (Williams, 1988). It is found from sea level to about 2350 feet (770 meters) (Wright and Wright, 1957; Williams, 1988) in habitat described variously as the Tamaulipan Biotic Province (Blair, 1950), the Gulf Coastal lowlands, and in Coahuila, Mesa del Norte (West, 1964; cited in Williams, 1988) and desert shrub vegetation (Burger and Robertson, 1951 also see Martin, 1958). Data from preserved specimens show collecting dates from March-December, with the most frequent collection dates in May, June, and July (Williams, 1988). We collected most of our specimens (under objects and crawling across the road at night) from April-May. While *Lampropeltis triangulum annulata* is recorded as eating lizards, snakes and rodents in the wild (Conant, 1975; Tennant, 1984) adults usually accept lab mice (but not hatchlings, see below). This subspecies apparently does well in disturbed habitats; numerous specimens have been collected off roads adjacent to agricultural areas. Additional natural history references can be found in Dixon (1987). Information from the preserved collection of the Herpetological Laboratory and the live collection of Museo de Historia Natural, of the Facultad de Ciencias Biologicas of the Universidad Autonoma de Nuevo Leon have recorded of the species from the following municipalities: Apodaca, Caderyta Jimenez, General Escobedo, Lampazos de Naranjo, Monterrey y Santiago of the state of Nuevo Leon. Habitat found in Nuevo Leon as describe before from submontane are to desert scrub area.

Reproductive data from wild specimens have been reported (Werler, 1951; Vermersch and Kuntz, 1986; Shaw, 1951; Burchfield, 1979; Tryon and Murphy, 1982; Markel, 1990; Applegate, 1992). However, most of these reports are general, so we think a description

of the husbandry protocol that resulted in successful breeding (n=9) of captive *Lampropeltis triangulum annulata* is of benefit.

Our specimens (3:3) all came from Duval and surrounding counties, Texas. We field collected two of the specimens, that were road collected at night and had two specimens given to us. All of them were adults (from 630-810mm total length, and 162-225 grams in weight) when we obtained them.

METHOD

We initially housed males in 355 x 210 x 250 mm screen-topped aquaria. We did this because we felt the males would become habituated to one another, with less interest in exhibiting combat behaviour. The females were housed together in a 760 x 310 x 315mm glass screen-topped aquarium. The only time we had the males together was when they were in the female cage during reproductive attempts. However, we ran out of space, and began keeping the males together. The males continued to court/copulate with the females when placed in the females' aquarium, but the number of combat (agonistic) encounters seemed to decrease.

At time we were maintaining *Lampropeltis triangulum annulata*, we were using newspaper for cage substrate. Nonetheless, numerous anecdotal reports mention that *Lampropeltis*



Foto 1: *Lampropeltis triangulum annulata*.

sp. seem more comfortable (i.e. eat better, reproduce more, stay healthier) if kept in something they can exhibit natural burrowing behaviour in, like wood chips or mulch. We now keep the different *Lampropeltis* sp. (*Lampropeltis triangulum honduriensis*, *Lampropeltis triangulum oligozona*, *Lampropeltis triangulum sinaloae*, *Lampropeltis alterna* and *Lampropeltis mexicana*) on pine bark mulch. We provided rocks and plastic boxes for hiding areas, and water was available at all times, the reposition and cleaning of their water dish was done regularly.

We fed our specimens three or four 15-30 gram mice every 14-21 days. In general, we try to keep male snakes about what they would weigh (if healthy) in the wild, but female snakes a little fatter. In various snakes species, egg number and size, as well as neonate size, can be determined both by the size and the level of nutrition in the female (Seigal and Fitch, 1985; Ford and Karges, 1987; Seigal and Ford, 1987, 1991; Ford and Seigal 1989; Shine, 1991). If you want to 'double-clutch' a female (having two clutches of eggs in a single season from one female), you must feed her heavily immediately after she lays her first clutch of eggs, and in the following weeks.

Introducing the male(s) immediately after oviposition is also important; doing so seems to result in the most successful copulations. This also may avoid the problem of a female eating her own eggs, which has been reported in hognose snake *Heterodon nasicus kennerlyi* (Hammack, 1991) and has been observed at the Houston Zoo in *Lampropeltis triangulum campbelli* and *Lampropeltis triangulum honduriensis*.

In spite of the fact many authorities don't believe captive snakes need or are reproductively influenced by light quality (e.g. Duvall et al., 1982, but see discussions in Murphy and Campbell, 1987; Ford and Burghardt 1993), we provided our *Lampropeltis triangulum annulata* with a natural photoperiod with ambient light from west facing windows and two 40 watt full-spectrum fluorescent lights suspended 0.5 meter above the aquaria. We also provided them with 35°C basking sites by placing heat plates under 25% of the aquaria. Gravid females did bask, a behaviour associated with many other snakes genera (Lillywhit, 1987; Shine, 1993; Reinert, 1993; Peterson et al. 1993). We used a triple beam balance to weigh adults, eggs and neonates to the nearest 0.1 of a gram, vernier callipers to measure egg dimensions, and the squeeze box technique (Quinn and Jones, 1974) to measure adults and neonates.

Because northern populations of *Lampropeltis triangulum annulata* do experience cool winter temperature, from December-February we maintained our specimens at 15-20°C during the day and 10-15°C at night at all times. From March-November we maintained them at 20-25°C during the day (with a basking site) and 20°C at night (without a basking site). Temperature fluctuations during all the temperature cycles did periodically occur, but did not seem to have any effect.

We introduced the males to the females in late February. Throughout the 'captive breeding season', which we assumed was March-June, we left the males with the females up to a week, then separated them. Introducing males to females after one or more females shed resulted in increased courtship/copulation. At the same time, we lightly misted all specimens once or twice a day to raise the ambient humidity in their cages, since increased humidity is an important cue in snake reproduction (Seigal and Ford, 1987), especially in many tropical species. The earliest reproductive activity we have observed, has been on the 7 March, when we saw combat behaviour exhibited by the males. The combat and reproductive behaviour we observed was similar to that described in various *Lampropeltis* species by Carpenter and Gillingham (1977), Gillingham and Carpenter (1977), and Murphy et al. (1978).

RESULTS

Our females laid their first clutches from late April-June, and when they double-clutched, the second from late July-August. Egg dimensions averaged 51mm and 20mm wide, and averaged 13.8 grams in weight. We had incubation periods that ranged from 51-65 days, and neonates averaged 202mm snout vent length, 39mm tail length, and averaged 12.3 grams in weight. This data is similar to that reported in the literature for wild and captive data.

All neonates shed their skins within two week of hatching. Only a few ate newborn mice initially, the others ate ground skinks *Leiolopisma laterale* or small earless lizards *Holbrookia texana*, and newborn mice scented with the blood and skin of either lizard species.

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