

Linhaires municipality, Espírito Santo State, Brazil. *Tropidurus torquatus* was studied in a habitat locally called "Nativo," characterized by white sandy soil, low sparse shrubs, and patches of bromeliads and grasses. Inside a 50 x 100 m study plot, the lizards were captured (pitfalls with drift fences and noosing), measured, sexed, marked with paint, and released at their original positions. Individual lizards were precisely located on the plot according to a system of X, Y coordinates. To locate marked individuals I slowly walked inside the plot searching for them with binoculars. The positions of known lizards were marked with flags. To estimate home range I used the convex polygon method. I considered for analysis only those individuals with three or more positions.

*Tropidurus torquatus* showed sexual size dimorphism, with males being larger (mean =  $71.6 \pm 3.7$  (SD) mm; N = 6) than females (mean =  $58.2 \pm 2.6$  mm; N = 17) (t-test,  $t = 9.66$ ;  $p < 0.001$ ); similarly, males (mean =  $15.0 \pm 1.7$  g; N = 6) were heavier than females (mean =  $7.6 \pm 1.3$  g; N = 18) ( $t = 11.38$ ;  $p < 0.001$ ). Juveniles ranged in size from 30.7 to 62.1 mm (N = 39). The size of the home range of males was different from that of females and juveniles (ANOVA  $F_{2,13} = 12.56$ ;  $p = 0.001$ ). Males occupied larger areas (mean =  $57.9 \pm 18.0$  m<sup>2</sup>; N = 4) than females (mean =  $11.8 \pm 11.4$  m<sup>2</sup>; N = 6) (Tukey 46.07;  $p = 0.001$ ) and juveniles (mean =  $17.5 \pm 16.3$  m<sup>2</sup>; N = 6) (Tukey 40.35;  $p = 0.003$ ). Juveniles' home ranges were not significantly greater than those of females (Tukey 5.72;  $p = 0.79$ ). The home range ratio (male/female) was 4.8.

Individuals of *T. torquatus* occupied fixed areas. The mean home range size of both sexes at this site was smaller than that known for other *Tropidurus* species (Stamps 1983. In R. B. Huey et al., eds., Lizard Ecology, pp. 169–204. Harvard Univ. Press, Cambridge, Massachusetts), but follows the pattern of males using larger areas than females. A voucher specimen from the population is housed at the Museu de História Natural da UNICAMP (ZUEC 1774).

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## SERPENTES

**CHIONACTIS OCCIPITALIS ANNULATA** (Colorado Desert Shovelnose Snake). **PREDATION and DIURNAL ACTIVITY.** On 22 July 1984, 16.7 km east of the junction of Interstate 8 and Highway 98 and 0.3 km south of Highway 98, Imperial Co., California, USA in the Yuha Basin (NE 1/4 SEC 19, T17S, R11E; 110 m elev.), Bruce Barry discovered two adult *Chionactis occipitalis* impaled on an ocotillo, the apparent prey of a loggerhead shrike (*Lanius ludovicianus*). The habitat at the site is characterized as creosote bush scrub. At the time of the observation (1048 h; air temperature 32°C) one snake appeared to have been recently killed and measured 39.4 cm total length and was impaled 3.5 cm behind the snout. The second individual was desiccated. Both snakes were impaled about two meters above the ground and found intact with no evidence of mutilation. The site was visited for nearly 1.5 h and shrikes were not seen in the vicinity at this time.

This record represents the first record of a passerine bird preying upon *C. occipitalis* and apparent mid-summer diurnal activity of *C. occipitalis*, or perhaps seasonal crepuscular hunting of the loggerhead shrike. Impaled nocturnal prey (scorpions and solpugids) have been observed in the desert of Baja California (Clark and Frohlich 1982. Pan-Pacific Ent. 58:164).

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**ELAPHE OBSOLETA OBSOLETA** (Black Rat Snake). **FORAGING.** An observation of predation by a radio-tagged *E. o. obsoleta* on brown-headed nuthatch (*Sitta pusilla*) nestlings may help explain patterns of avian nest predation by semi-arboreal snakes and adaptive responses of breeding birds. On 29 May 1993 at 1500 h a female *E. o. obsoleta* (97 cm SVL) implanted with a motion-sensitive radio transmitter was located in a clearcut in the Ouachita National Forest, Arkansas, USA. The snake was beneath a log 1.5 m from a post oak (*Quercus stellata*) snag containing a cavity nest of *S. pusilla* 1.7 m above ground. The nest contained at least three nestlings nearly ready to fledge.

Adult nuthatches were making frequent feeding visits to the nest, when at 1603 h rain began, temperature fell 10°C, and the birds ceased their visits. At 1619 h the snake emerged and attempted to climb the snag, which was devoid of bark at its base and smooth to the touch. It abandoned the attempt after 30–45 s and retreated to the log.

At 2024 h (1 min past sunset) the snake attempted to climb the barkless portion of the snag, but descended after 7 min. It began another climb at 2034 h, struggling 3 min on the smooth surface and extending only 85 cm. At last it secured a grip on a slab of bark and moved upward. Upon reaching the cavity the snake ingested the nestlings, the posterior half of its body hanging outside the cavity. At 2131 h it emerged, climbed up 1.5 m, then descended to the ground. At 2234 h the snake was still moving. The next day at dawn the snake was located in grass 4.1 m from the snag. At 0940 h it began a move of 70 m, then entered a cavity 3 m high in a snag and remained there at least 27 h.

Our observation was typical in that most accounts of avian nest predation by *E. obsoleta* report predation on cavity-nesting species rather than open-nesters (Withgott 1994. M.S. thesis, Univ. Arkansas, Fayetteville. 147 pp.). In addition, *E. obsoleta* often attack nests in the latter part of the nestling stage (Neal et al. 1993. Wildl. Soc. Bull. 21:160–165; Withgott, *op. cit.*), a pattern also noted for *Pituophis melanoleucus* (Eichholz and Koenig 1992. Southwest. Nat. 37:293–298).

By climbing the nest snag at dusk, the snake we observed was able to avoid harassment by nuthatches defending the nest and was able to lessen its vulnerability to diurnal predators such as hawks.

The snake's difficulty gripping the snag's smooth, barkless surface is of interest. Had the entire trunk lacked bark, it seems likely the snake could not have reached the nest. Birds nesting in such smooth-surfaced snags may possess some degree of protection from predation by climbing snakes. Withgott (*op. cit.*) found in experiments with *E. o. obsoleta* that climbing ability decreased sharply with increasing trunk smoothness. Several woodpecker species at our study site preferred barkless snags as nest sites (Withgott, *op. cit.*). Such nest-site selection may be an adaptive response to the threat of nest predation by semi-arboreal snakes.

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**FARANCIA ABACURA (Mud Snake). DEATH FEIGNING.**

Incidents of death feigning have been reported for a number of snake species, including xenodontine colubrids (Carpenter and Ferguson 1977. In C. Gans and D. W. Tinkle (eds.), *Biology of the Reptilia*, Vol. 7. pp 335–554. Academic Press, New York; Gehlbach 1970. *Herpetologica* 26:24–34). Since those reviews, additional species have been reported to letisimulate (e.g., Tryon and Guese 1984. *Herpetol. Rev.* 15:108). Davis (1948. *Copeia* 1948:208–211) observed a juvenile *Farancia abacura* feign death in captivity and included the following description: "The specimen...when annoyed by poking or patting with the hand, persistently thrust its head under the coils of the body and elevated the tail...with the conspicuously colored underside uppermost. Additional molesting caused the snake to turn over on its back, thus exhibiting the entire brilliantly colored underside. The animal would lie quietly in this position...." Davis (*op. cit.*) noted that it was remarkable that death feigning had not been reported previously for *F. abacura*, especially by Meade (1946. *Sci. Mon.* 63:21–29), who apparently handled over one hundred individuals. Here we report observations of death feigning in *F. abacura* in captivity, and attempt to reveal why the behavior has not been observed in adults.

On 3 August 1994 a gravid female (SVL = 110.5 cm, mass = 611.2 g) *F. abacura* was captured (by RAF) following a heavy rain along the Pascagoula River near Vancleave, Mississippi, USA. We housed this snake until she deposited 24 eggs, 14 of which hatched in the laboratory 11–16 September. The eggs were placed in moist vermiculite and incubated at a constant temperature (30°C). On day 42 of incubation the snakes began to hatch, with the last snake hatching on day 47.

Shortly after emergence, gentle handling would cause the snakes to roll up their tails, as reported by Davis (*op. cit.*). If further provoked (e.g., when picked up, or when lightly tapped on the dorsum) the snakes would thrash once or twice, empty their cloacal contents, and turn over, remaining motionless (Fig. 2). If harassed while in this position, the snakes would often crawl away on their dorsum, keeping the brightly colored ventrum visible at all times. The snakes (mean =  $17.54 \pm 1.087$  cm SVL, mean =  $4.40 \pm 0.841$  g, N = 14) feigned death in a variety of positions, from curled up to relatively straight, and righted themselves within four minutes, if left alone. All 14 snakes were harassed at least once, and all feigned death.

Apparently, death feigning has not been observed in adult *F. abacura* (the individual Davis observed was 29.8 cm (TL)). One of us (JSD) has captured and handled several adult *F. abacura* without inducing the behavior. We thus conclude that either (1) there is an ontogenetic loss in the behavior, or (2) the behavior is difficult to induce in adults. We tested these ideas in an attempt to explain the apparent absence of the behavior in adults.

The timely arrival of a road killed barred owl (*Strix varia*) prompted us to perform a mock predation event. Owls and hawks

are ophiophagus (Earhart and Johnson 1970. *Condor* 72:251–264), and probably represent a significant threat to adult mud snakes.

The same adult female mud snake was placed on the floor of the laboratory. One of us held the owl over the snake, brushing the talons and feathers against the snake's dorsum. The action of the owl's talons were simulated by grabbing the snake repeatedly at mid-body and near the head. After approximately one minute of harassment, the snake everted its cloaca, discharging its contents on and around itself (Fig. 2). It then thrashed its tail, and began turning it over. Finally it made a tight coil with its head hidden, and twisted over on its back, exposing its entire ventral surface (Fig. 2). The snake remained motionless for several minutes. It may be worth noting that the juvenile snakes did not hide their heads, as did the adult.

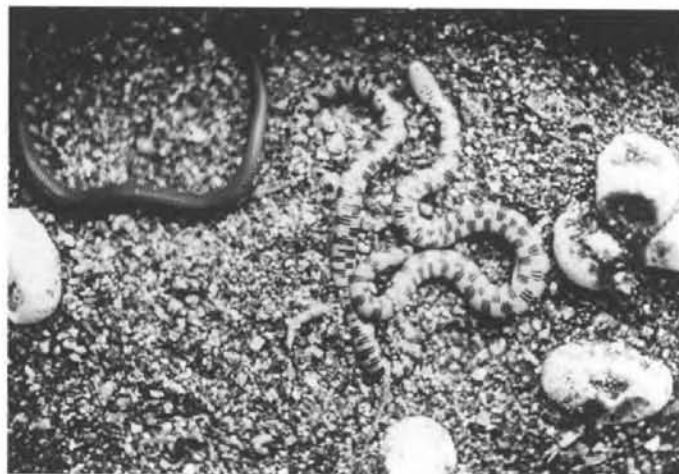


FIG. 1. Neonate *Farancia abacura* feigning death.

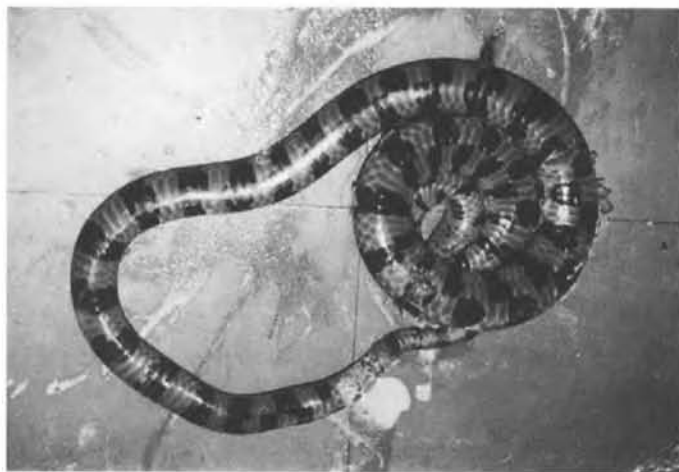


FIG. 2. Adult female *Farancia abacura* feigning death. Note the cloacal discharge.

Tryon and Guese (*op. cit.*) considered the failure of hatchling *Lampropeltis alterna* to death feign to be the result of an absence of odors or other natural stimuli from natural (versus unnatural) predators. To test whether or not the snake recognized the owl as a predator (i.e., by olfaction) or simply responded to increased molestation, the snake was harassed 3 days later by hand. Within one minute similar death feigning behavior resulted. Thus, we were able to confirm that death feigning can be induced in adult *F. abacura* without any specific olfactory cues. It appears that adult *F. abacura* require a greater degree of "molesting" than juvenile snakes based on this report, hence the lack of documented