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PREDATION ON AVIAN EGGS BY THE BOID SNAKE, *Eunectes notaeus*

Besides the well-known, specialized egg-eater *Dasypeltis* (Gans 1974), several colubrid snakes (including *Boiga, Conophis, Elachistodon, Elaphe, Lampropeltis, Pseustes,* and *Spilotes*) include bird eggs in their diets (Cunha and Nascimento 1978, Greene 1989, Mushinsky 1987, Savitzky 1983, Scott 1983). To date, documented observations on avian egg-eating seem restricted to colubrid snakes.

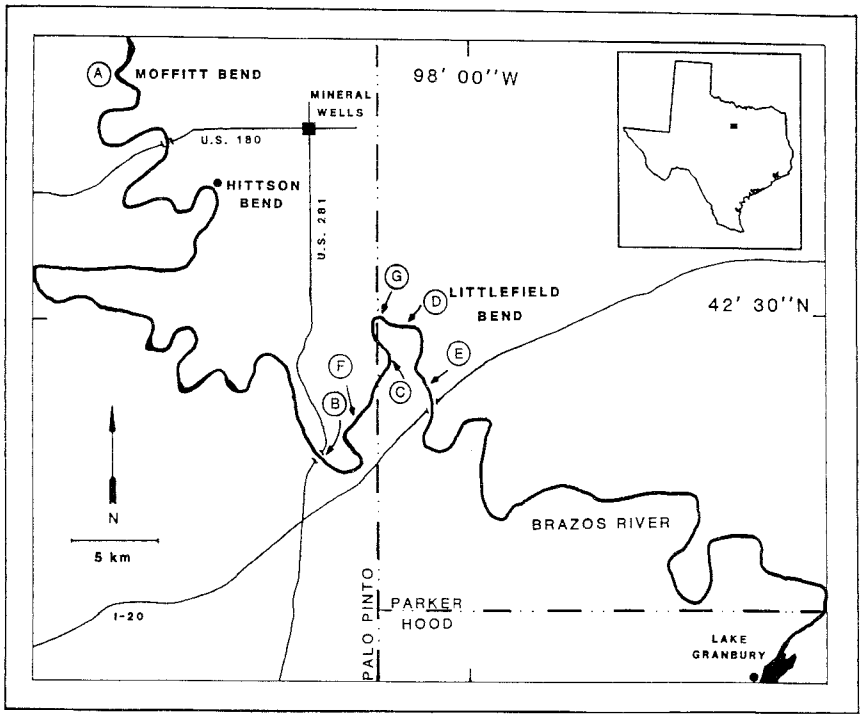

Figure 1. The 100 km hiatus in the distribution of *Nerodia h. harteri* along the Brazos River reported by Scott et al. (1989). Closed circles represent localities where snakes were found by Scott et al. (1989). Lettered localities are referred to in text.

Constricting anacondas, boid genus *Eunectes*, are known to mainly feed on avian and mammalian prey (Cunha and Nascimento 1978, Ditmars 1912, Wehekind 1955), and occasionally on crocodilians and turtles (Parker and Grandison 1977, Yamashita et al. 1985). In southwestern Brasil we observed the yellow anaconda, *E. notaeus*, feeding on prey as diverse as fishes, turtles, caimans, wading birds, and rodents; this snake even scavenges, a habit anticipated by Sazima and Strüssmann (1990). Here we report on an observation of avian egg-eating by *E. notaeus*.

Field work was done in the Pantanal wetlands at Poconé, Mato Grosso, southwestern Brasil. The Pantanal covers ca. 100,000 km^2 of almost flat, seasonally flooded terrain (additional information in Prance and Schaller 1982). As part of a study on the Pantanal herpetofauna, 33 anacondas were caught and palpated to determine whether their stomach contained food. Whenever a bolus was detected, the snake was forced to regurgitate its prey (Slip and Shine 1988), which was then examined.

A juvenile *E. notaeus* (165 cm SVL, 3.2 kg) was found on 11 July 1990, apparently basking on an emergent mat of aquatic vegetation at 1745 h, with an air temperature of 19.5°C. Upon manipulation the snake regurgitated two intact bird eggs; an additional egg was broken during palpation. The eggs were identified as those of limpkin (Harrison 1978), *Aramus guarauna*, a common wading bird in the Pantanal.

Head length and head width of the snake were 5.4 cm and 3.3 cm, respectively. The two intact eggs measured 6.2 x 4.3 cm and ca. 6.0 x 4.5 cm, and weighed about 60 g each, a prey/predator mass ratio (Pough and Groves 1983) of ca. 0.02. This is a very low mass food item for a boid snake (average of 0.36; see Greene 1983).

The eggs were all swallowed by their pointed end first, an orientation commonly found in other instances of egg-eating by snakes (see Gans 1974). Egg handling by *E. notaeus* may possibly be similar to that employed by the boid *Loxocemus bicolor* when feeding on reptile eggs—either pushing the egg against the body using its mouth, or enveloping the eggs with body loops (Mora 1987). A young yellow anaconda was observed to engulf small fishes using the first technique (A. S. Abe, pers. comm.).

Feeding on avian eggs is regarded as a kind of durophagy (Savitzky 1983), and anacondas also take turtles (Parker and Grandison 1977), another hard-shelled prey ingested intact. The snake-necked turtle, *Platemys macrocephala*, was reported from intestinal contents of *E. notaeus* in the Pantanal (Yamashita et al. 1985), and we observed the turtle *Phrynops vanderhaegei* in the contents of an *Eunectes* rotting carcass (probably *E. murinus*) at another locality in Mato Grosso.

Limpkin nests may be found on bushes up to 1 m above water level in flooded terrain, or near the water in low trees up to 2 m (pers. obs.). Anacondas are known to occasionally climb (Parker and Grandison 1977), and we observed *E. notaeus* foraging at night and taking birds perched on bushes and trees at heights of about 2.5 m. Large nesting colonies of herons and ibises are a common sight in the Pantanal (see Yamashita and Valle 1990), and at these places arboreality would be advantageous for the anaconda. Nestlings and eggs found by *E. notaeus* foraging in trees probably fall prey to this apparently generalized predator.

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THE IWAKUNI SHIROHEBIS, A GROUP OF ALBINO *Elaphe climacophora*

Albinism in wild populations of snakes is rare or uncommon (Bechtel and Bechtel 1981; Dyrkacz 1981; Hensley 1959; see Satoh and Miyamoto (1987) for records of albino snakes in Japan). The Iwakuni shirohebis are a group of albino *Elaphe climacophora* occurring in a limited area of the city of Iwakuni (34°10'N, 132°13'E), Japan. As far as we know, this is the only instance among snakes where albinism has become established in a wild population. Due to the rarity of this phenomenon, the habitat known to support albino snakes was designated as a natural monument by the Japanese government in 1924. In 1972, the subject of designation was changed to the snakes themselves. Although the Iwakuni shirohebi has been briefly mentioned in English-language literature (Goris and Naganuma 1979; Maki 1931), the accounts were brief and little information was provided concerning the status of the snakes. This paper summarizes the past and present status of this group of snakes.

Among several types of color abnormalities described (Bechtel 1978; Bechtel and Bechtel 1985), the Iwakuni shirohebi consists of amelanistic albinos. All adult snakes are white to yellow. They have golden irises, red pupils, and red tongues. Juveniles have orange blotches on the dorsal and lateral surfaces of the body. The pattern of the blotches is the same as that of wild type juveniles. As the crossing of the albino snakes always produces albino snakes, the gene for albinism is presumed to be allelic.

Little information on historical abundance and distribution exists. In 1924, the residents of Marifu village, one of the predecessors of Iwakuni city, were questioned as to the number of snakes in each block of the village (Yamaguchi Prefecture 1925). The number of snakes was estimated as "no fewer than 1000" and the estimated distribution was about 400 ha (Yamaguchi Prefecture 1925; Watasé 1926). Habitats occupied by snakes were reported to be houses, storehouses, river banks, and stone walls. Active snakes were observed in the streets, gardens, and fields (Watasé 1926). It was not rare to see the albino snakes in human residences (Yamaguchi Prefecture 1925).

Since the 1970s, the city of Iwakuni has appealed to its citizens to report occurrences of albino snakes. The number of snakes reported is declining; the average number per year (followed by SD and range) was 22.6 (12.3, 12-40), 8.8 (3.6, 4-12) and 4.8 (3.0, 0-8) for 1974-1978, 1981-1985, and 1986-1990, respectively.

The authorities and citizens of Iwakuni city are concerned about the decreasing number of albino snakes. The city of Iwakuni and the Society for the Conservation of the Iwakuni shirohebi, organized by volunteers, are making great efforts to conserve the shirohebi. To breed the snakes, they constructed an indoor breeding facility (total floor space of 240 m^2) and three outdoor pens (total space of 1560 m^2). Financial aid from the Japanese government was obtained for construction of one of the outdoor enclosures. In general, the adult snakes are allowed to breed at random in the pens, and emerging hatchlings are collected and raised in the indoor facility. Juveniles are released into the outdoor pens after three years. Approximately 400 snakes are maintained in these facilities.

The normal type of *E. climacophora* is abundant in the city. Studies are under way in an attempt to elucidate the circumstances surrounding the establishment and maintenance of high-frequency albinism in *E. climacophora*.

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