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Observations on Terrestrial Feeding Behavior and Growth in Diamondback Terrapin (*Malaclemys*) and Snapping Turtle (*Chelydra*) Hatchlings

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ABSTRACT. – **Food acquisition, feeding, and growth in moist terrestrial laboratory conditions were compared in 2 species of turtles that inhabit brackish water environments. *Malaclemys* hatchlings showed normal growth, but *Chelydra* hatchlings became severely stressed. The results suggest that the extended use of terrestrial habitats as a means of osmoregulation in high salinity habitats is a viable adaptive strategy for diamondback terrapin but not for snapping turtle hatchlings.**

Osmotic stress, particularly on hatchlings, is an important factor that determines the distribution of turtle species in estuarine environments. Dunson (1985) found that hatchling diamondback terrapins are unable to grow in the high salinities found in the vicinity of many nesting sites without periodic access to freshwater for drinking. Kinneary (1993) reported that water salinity is a dominant factor that limits snapping turtle distribution in estuaries and that the turtles will, on occasion, use nesting sites at which the nearest water is not suitable for hatchlings because of high salinity (Kinneary 1996). Laboratory studies conducted by Dunson (1985) and Dunson and Mazzotti (1989) identified incidental swallowing of saline water during feeding as the major source of sodium influx in hatchling diamondback terrapins and a primary source of salinity toxicity in hatchling snapping turtles kept in 50% sea water. Hatchlings of both species appear to make use of terrestrial refugia (Pitler 1985; Lovich et al. 1991; Buhlmann and Gibbons 2001), and adults have been observed to feed on land (Pearse et al. 1925; Ernst et al. 1994). However, the ability of hatchlings to grow under terrestrial conditions has not been considered. The objective of this study was to observe and compare feeding and growth of snapping turtle and diamondback terrapin hatchlings under moist terrestrial conditions in the laboratory.

Table 1. Monthly growth of diamondback terrapin hatchlings ($n = 4$) and snapping turtle hatchlings ($n = 4$; in parenthesis) kept in the laboratory under moist terrestrial conditions. Mass in grams. Values are means ± SD.

Month	Wet mass	% Change wet mass
0 (hatching)	5.39 ± 0.22 (7.63 ± 0.20)	—
2	5.09 ± 0.40 (7.08 ± 0.23)	–5.57 (−7.21)
3	7.24 ± 1.51 (6.03)[a]	42.24 (−14.83)[a,b]
4	12.06 ± 4.24	66.57
5	20.45 ± 7.78	69.57
6	39.30 ± 11.53	92.18
7	51.17 ± 10.35	30.20

[a] $n = 2$.
[b] By month 3.5, 3 of 4 snapping turtle hatchlings had died after losing more than 20% hatching wet mass.

Methods. — Turtle eggs were incubated at room temperature in a sealed plastic container that contained 50% vermiculite and 50% distilled water by mass. Upon hatching, 4 turtles of each species were placed in a communal, covered, clear plastic container (57 × 24 × 18 cm) that contained 1 part sphagnum moss to 10 parts tap water by mass. Additional water was subsequently added periodically during the course of the experiment. An effort was made to saturate the sphagnum moss without providing any free water other than that formed from condensation on the top and sides of the container. This was done to minimize desiccation, yet, at the same time not provide any free water to aid in the capture and swallowing of food items. The sample size was limited because of the difficulty in obtaining a variety of live-food items small enough for newly hatched turtles to easily handle. Food items were offered 5 to 7 times per week and included a wide variety of live annelids, mollusks, isopods, and insects, as well as chopped fish (*Menidia*) and commercial pet food. Drinking water was not overtly provided, however, the hatchlings did have access to water droplets that continually formed on the sides of the container. The animals were kept at room temperature (21.6 ± 1.3°C). A light (Gro-Light, 75 W) was placed at one end of the container. The photoperiod was 12L:12D. Wet mass (WM) was recorded upon hatching and at subsequent monthly intervals.

Results and Discussion. — All 4 diamondback terrapin hatchlings (WM = 5.4 ± 0.2 g SD) began accepting live food approximately 1 month after hatching, and, during the third month, other foods, such as chopped fish and commercial pet food, were readily accepted. They ate voraciously whenever food was offered and appeared to have no difficulty or hesitation in obtaining and swallowing food in the absence of water. The turtles grew at an average rate of 3.7% of their hatching WM/d over the

230-day test period (Table 1). Straight-line carapace length increased to 6.4 ± 0.05 cm SD by the end of this period. These data show that hatchling terrapins are capable of normal growth (Ernst and Barbour 1972) when kept in the laboratory under terrestrial conditions. It is suggested that, in addition to their complex suite of behavioral and physiological responses to high salinity environments (summarized in Davenport et al. 2005), extended use of terrestrial habitats by hatchlings and juveniles may be a viable strategy for dealing with osmotic stress in the field.

As a group, the snapping turtle hatchlings lost 7.2% WM after 60 days, compared with a WM loss of 5.57% for the diamondback terrapin hatchlings over the same period. By contrast, however, the snapping turtles showed little interest in the variety of foods offered and were never observed feeding. Three of 4 died after losing more than 20% of their initial WM during the first 3.5 months of the experiment. The remaining animal, which appeared severely stressed, was placed in enough tap water to cover the carapace on day 113. This specimen immediately accepted food after being placed in water and continued to feed underwater, eventually regaining its vigor. Although snapping turtle hatchlings can be induced to accept and swallow food in the absence of water (*pers. obs.*), the results of this study suggest they are maladapted in terms of food acquisition, feeding, and growth in terrestrial habitats. When considering their high degree of water permeability and evaporative water loss (Dunson 1986; Finkler 2001), the extended use of even very moist terrestrial habitats in high salinity environments is probably not a realistic alternative for these animals.

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Ecology of the Bushmanland Tent Tortoise (*Psammobates tentorius verroxii*) in Southern Namibia

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ABSTRACT. – **Tortoises are the group of reptiles most under threat in Namibia and are poorly researched, with little understanding of their basic ecology. This paper investigates some aspects of the ecology of female Bushmanland tent tortoises (*Psammobates tentorius verroxii*) in southern Namibia, specifically their movement, home range, activity pattern, diet, resting site selection, and orientation.**

The ecology of *Psammobates tentorius verroxii* is poorly known (Boycott and Bourquin 2000), and despite