ABSTRACT

Sea turtle hatchlings generally emerge from their nests and crawl rapidly to the sea. They then migrate offshore following a number of physical cues and natural physiological responses. This offshore swim which includes a frenzy and post-frenzy period is an important mechanism for dispersal and predator avoidance during the first few days at sea. The behaviour during the first few days at sea is only known for green, leatherback and loggerhead hatchlings, and until present nothing was known of the behaviour of other species. The present study was carried out to determine the characteristics of the hawksbill hatchling frenzy period, including swimming duration, locomotor pattern and speed. Trial's were conducted on Gulisaan Island (6° 09' N, 118° 03' E), in the Turtle Islands Park, lying 40 km north of Sandakan, Sabah, Malaysia.

Hatchling swimming durations were recorded in 2 m diameter and 50 cm deep wading pools filled with seawater. Hawksbill hatchlings contrasted significantly in their frenzy and post-frenzy swimming duration with the other species, with a frenzy period lasting only 128 min (SD = 101.77, range 2 to 405, n = 40). Hatchlings exhibited higher levels of swimming activity during daylight periods than at night. These results indicate that hawksbills are different from green, leatherback and loggerhead hatchlings with regard to frenzy and post-frenzy swimming durations.

Hawksbill hatchlings also differed from other sea turtle species in their use of swimming locomotor patterns during the frenzy and post-frenzy periods. Three swimming locomotor patterns were observed; powerstroking, rear flipper kicking and dogpaddling. Locomotor patterns were observed in tanks for: (1) the first 60 minutes, and (2) the first six days. During the first 30 minutes in the water, 49.2 % (n = 30) of the hatchlings employed the powerstroke. After 30 minutes, the pattern changed from powerstroking to rear flipper kicking (51%, n = 30). Regression analysis indicated that the use of the powerstroke significantly decreased over time ($r = -0.742$, $p < 0.05$), while rear flipper kicking significantly increased over time ($r = 0.679$, $p < 0.05$). Over the first six days, hatchling locomotion became less predictable. Additionally, hatchlings often combined swimming patterns in one swimming bout, a behavior not reported in previous studies of locomotion among sea turtle hatchlings.

The average swimming speed for 50 hawksbill hatchlings (5 hatchlings from 10 nests) was 0.65 km/h (0.18 m/s). Average swimming speeds were: powerstroking, 0.779 km/h; dogpaddling, 0.475 km/h and rear flipper kicking, 0.340 km/h. Correlation analyses indicated a significant relationship between swimming speed and fore-flipper surface areas ($r = 0.240$, $P < 0.05$), total limbs surface areas ($r = 0.472$, $P < 0.005$), straight carapace width ($r = 0.523$, $P < 0.05$) and straight carapace length ($r = 0.373$, $P < 0.05$). Hatchling swimming speeds were not significantly correlated with hind limb surface area or body weight.

The results support the hypothesis that hawksbill hatchlings are "less vigorous" compared to green, leatherback and loggerhead hatchlings during the frenzy period. Hawksbill hatchlings are not counter-shaded but have a dark brown plastron, suggesting that they employ a different predator-avoidance strategy than green turtle hatchlings. The lack of a vigorous swimming strategy during their offshore migration suggests hawksbill hatchlings might not have a prolonged offshore migration, and possibly drift close to shore rather than have a prolonged oceanic phase. Given this, it is believed that hawksbill hatchlings rely more on water currents and less on active swimming to distance themselves from shore during the initial phase of the offshore migration.