

INVESTIGATIONS INTO THE BASIS OF THE REPRODUCTIVE BEHAVIORAL POLYMORPHISM IN *LEPIDOCHELYS OLIVACEA*

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Lepidochelys olivacea are well known for their spectacular synchronized mass nesting emergences commonly known as arribadas. Arribadas occur at only a few beaches worldwide, however the nesting range for this species extends far beyond these few select beaches. For example, in the eastern Pacific, arribadas occur annually at one beach in Mexico and two beaches in Costa Rica from June through December. During the same time, solitary *L. olivacea* emerge individually to nest along nearly the entire coastline from Mexico to Panama. Two clearly distinct reproductive behaviors exist within the genus as well as within populations; some females are solitary nesters, while others are arribada nesters. Very little is known about this reproductive behavioral polymorphism and how it is maintained in populations.

METHODS

We studied reproductive behavior and characteristics of female *L. olivacea* to determine if there are detectable life history differences between solitary and arribada nesters. We conducted field work at Nancite Beach, Guanacaste National Park, Guanacaste Province, Costa Rica from June through August 1998. We sampled 24 solitary nesters and 24 arribada nesters. For each turtle, we counted total number of eggs per clutch, removed and weighed 15 eggs per clutch, and measured the straight carapace length (SCL) and weight of each turtle.

RESULTS

Females ranged in size from 58.5 to 69.5 cm SCL and 31 to 46.8 kg in mass. The average sizes of solitary and arribada nesters did not differ in SCL or mass, but solitary nesters were more variable in mass.

Arribada nesters produced marginally larger clutches than solitary nesters (clutch size_{arribada} = 112.3 ± 3.18 , $n = 23$, $CV = 13.58$; clutch size_{solitary} = 104 ± 4.10 , $n = 19$; $CV = 17.19$) but the average difference was not significant at the $p = 0.05$ level. However, ANCOVA indicated that clutch size was related to female size. After accounting for the allometric effect of maternal size, mean clutch size showed a stronger and significant difference between solitary and arribada nesters.

Egg size varied substantially within a female's clutch and among females, but did not differ between solitary and arribada nesters. Of 41 females for which we were able to obtain egg size estimates, the mean egg size ranged from 27.54 g to 36.77 g, with an overall mean egg mass among females of 31.95 ± 0.31 g. Coefficients of variation of egg mass within a clutch ranged from 1.67 to 10.85, with a mean CV of 4.05. Neither mean egg mass, nor its variability differed between solitary and arribada nesters.

Egg size was not related to female size in terms of either SCL or mass. Nor was there any support for a trade-off between egg size and number either overall, or after accounting for effects of female size using ANCOVA. Although there appears to be a different relationship between clutch size and egg size for arribada versus solitary nesters, this difference was not significant.

CONCLUSIONS

Arribada nesters produced larger clutches than solitary nesters. The relatively larger clutch sizes of arribada nesters may have evolved to satiate predators. A diverse and abundant predator assemblage exists at Nancite Beach and intense predation occurs there when hatchlings emerge from nests and crawl toward the ocean. If predators can kill only a limited number of hatchlings, then the proportion of each clutch that survives predation increases with clutch size.

Alternatively, the relatively smaller clutch sizes of solitary nesters may be a result of higher energetic cost during the interesting period. If the solitary nesters we sampled had low site fidelity, as has been reported by Kalb (1999), their movements among beaches might have reduced energy resources that would have been allocated for

reproduction, resulting in smaller clutch sizes. In contrast, arribada nesters have relatively lower energetic cost during the interesting period. Arribada nesters have high site fidelity, stay nearshore during the interesting period, and are relatively inactive (Plotkin et al. 1991, Plotkin et al. 1995, Kalb 1999).

LITERATURE CITED

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