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SYNCHRONY ON EMBRYONIC DEVELOPMENT OF MARINE TURTLES: INDIVIDUAL VARIABILITY AND ENVIRONMENTAL EFFECTS

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Abstract

For sea turtles, to hatch and emerge from the nest communally is essential to decrease hatchling mortality. Thus, it is very important within a nest the simultaneous fertilization and the synchronized embryonic development of all eggs. On loggerhead nesting beaches of Cape Verde we have studied the individual variability on developmental synchrony of embryos and the influence on this process of some biological, environmental and management factors. We have compared this trait within and between 34 nests naturally incubated on the beach and 34 nests relocated to a beach hatchery during the 2009 and 2010 nesting seasons. As an honest non-invasive indicator of embryonic development we have used the size of the white embryonic disc that it is externally visible and grow on the eggshell during the first 10 days of development. We studied the white spot at the first 48 hours of incubation and for 36 of these nests from both locations we also studied the white spot at the first 6 days (144 hours) of incubation. The rest of the nests where not studied at this second time to assess the possible effect of the experimental manipulation at day 6 on embryo viability. Because of the 2009 season results showed a delayed embryonic development within the first hours after egg laying, in 2010 season, we have done an additional study to improve our knowledge about the causes that explain such delay. We relocated 10 fresh-laid nests to a location very close to natural nests laid simultaneously to the relocated nest, to control for the environmental variability on the influence of nest relocation on embryonic development. The white spot was measured for both relocated and natural nests 2 days after egg laying. We detected a significant variability on the mean embryonic development stage at days 2 and 6 of incubation among nests of up to 5 days of difference. Relocation to a hatchery significantly delayed embryonic development in the first hours after egg laying. This delay was compensated at day 6 of incubation on most of nests in 2009 but remained at day 6 in most of nests of 2010. We could say that this delay on embryonic development was not due to hatchery or microhabitat conditions, because in the 10 pairs of nests located and incubated together the relocated nest had also a delay of embryonic development. We found a negative correlation among size of white spot and female size. Perhaps large females have a shorter egg retention period before laying and nest when eggs are at an earlier embryonic stag e than smaller females do. Finally, we detected a strong synchrony within each nest that only was altered on the deepest eggs of clutches that exceptionally had more than 95 eggs. Relocation on the beach or to a hatchery had no influence on the synchrony of embryonic development within a nest. Thermal, physiological and behavioral reasons are proposed to explain these patterns.