
VARIABILITY ON INCUBATION TEMPERATURE AND METABOLIC HEATING AS A FUNCTION OF EMBRYONIC SURVIVAL IN LOGGERHEADS

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The nest thermal environment on endangered species whose sex is determined by temperature could be crucial for their survival. The incubation temperature is also an important ecological parameter in conservation management programs of these species. During the last half of the incubation, embryonic development produce the metabolic heating of the nest. But this endogenous process could be affected by the number of alive embryos that develop together inside the nest or external factors such as eventual floodings by high tides or storms may affect the amount of metabolic heating. All these ecological interactions are not fully understood and make it necessary to conduct studies about the thermal biology of the nest environment. We have studied temperature variations within and between nests of 60 loggerhead nests on Boavista Island in Cape Verde. Nests were selected from different microhabitats (dry sand, wet sand and silky substrate), where sea turtles commonly deposit eggs, in order to study possible variations on thermal profiles among microhabitats. Eight nests were controlled with 4 temperature data-loggers in each to know spatial differences in temperature within the nest (bottom, middle-centre and middle-side of nest incubation chamber). In order to understand the vertical thermal gradients of different substrate environments without eggs, to compare substrate temperature at the same depth with and without eggs and to estimate metabolic heating, we excavated a simulated nest 75cm apart from logged nests containing eggs. In these simulated nests we placed 3 thermometers at the same depth of those in real nests. We also put two more temperature loggers at 10cm below the sand surface, one above the nest and the other above the simulated nest. Additionally, we placed one thermometer in the centre of all of the other nests observed during our study in order to calculate the incubation temperature and correlate it with hatching success, hatching duration and hatchling characteristics. During the first third of the incubation there is no evidence of metabolic heating and incubation temperature is affected by external factors. Also during this period, the mean temperature in the middle of nest chamber was not affected by nest depth but varied seasonally during 2005. Nests laid in July had an average temperature of 28.1°C, while nests laid in September had a mean temperature of 29.8°C. Incubation duration was correlated with mean temperature during this first period ($r=0.62$). However, during the last third of incubation, the nest temperature was correlated with emergence success ($r=0.80$), offspring size ($r=0.54$) and mass ($r=0.57$), but not with incubation time. We found significant spatial variation in nest temperature within the nests.