Insights into the mating systems of green turtle populations from molecular parentage analyses

Submitted by

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

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ABSTRACT

Gaining a good understanding of marine turtle mating systems is fundamental for their effective conservation, yet there are distinct gaps in our knowledge of their breeding ecology and life history, owing largely to the difficulty in observing these highly mobile animals at sea. Whilst multiple mating by females, or polyandry, has been documented in all marine turtle species, the fitness consequences of this behaviour have not been fully investigated. Furthermore, male mating patterns, operational sex ratios and the number of males contributing to breeding populations are poorly understood, impeding accurate assessments of population viability. In this thesis, I use molecular-based parentage analysis to study, in detail, the genetic mating system of two green turtle (*Chelonia mydas*) populations. In the focal population in northern Cyprus, I show that, despite exhibiting a strongly female-biased hatchling sex ratio and contrary to our expectations, there are at least 1.3 breeding males to every nesting female. I go on to assess the breeding frequency of male turtles in the population and determine that males do not breed annually at this site, demonstrating that the observed relatively equal sex ratio of breeders is not the result of a few males mating every year, but that the number of breeding males in the population is greater than expected. I show that 24% of nesting females in the population produce clutches with multiple paternity, but do not detect any fitness benefits to polyandrous females, and discuss the potential role of sexual conflict in influencing female mating decisions. Finally, I reveal a high frequency of multiple paternity in green turtle clutches on Ascension Island, one of the largest green turtle rookeries in the world, and discuss possible causes of variation in the level of polyandry among marine turtle populations. The results presented here shed new light on aspects of marine turtle mating systems that are challenging to study, and illustrate the value of molecular data, not only in describing mating patterns, but in elucidating aspects of life history and behaviour that would otherwise be very difficult to ascertain.

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