UNCOVERING AGING PATTERNS ACROSS CAPTIVE AND WILD SEA TURTLES*

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A driving force behind centuries of biological inquiry has been the profound desire to understand the ecological and evolutionary mechanisms shaping aging patterns in nature. At the heart of this fascination lies the challenge of unravelling how trait assemblages define a species' position in life history space, and how this position presupposes a species' susceptibility to the negative effects of aging, i.e., senescence. Protective phenotypes (e.g., shells and venom) and specialized life modes (e.g., flight and fossoriality) have emerged as key drivers of macroevolutionary patterns that reduce aging rates, yet empirical tests have been strongly biased toward birds, mammals, and terrestrial ectotherms. Marine ectotherms, despite their ecological importance, remain critically understudied. Here, we synthesize a combined 130 years of census data from wild and captive sea turtle populations across three continents to provide an unprecedented view of aging in this group. Using long-term nesting records for more than 1,800 first-time breeding female green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) turtles from Cyprus, Australia, and the Cayman Islands, we show that sea turtles exhibit negligible but positive actuarial senescence. Across populations, individuals maintain high reproductive viability late into their lives, a finding consistent with other studies on testudines. Captive green turtles had lower aging rates compared to their wild counterparts, with wild loggerheads having similar aging rates to wild green turtles. These findings establish a new empirical baseline for aging in highly fecund long-lived marine ectotherms and emphasize the exceptional capacity of sea turtles to sustain reproduction across extended lifespans, with broad implications for both evolutionary theory and conservation biology.

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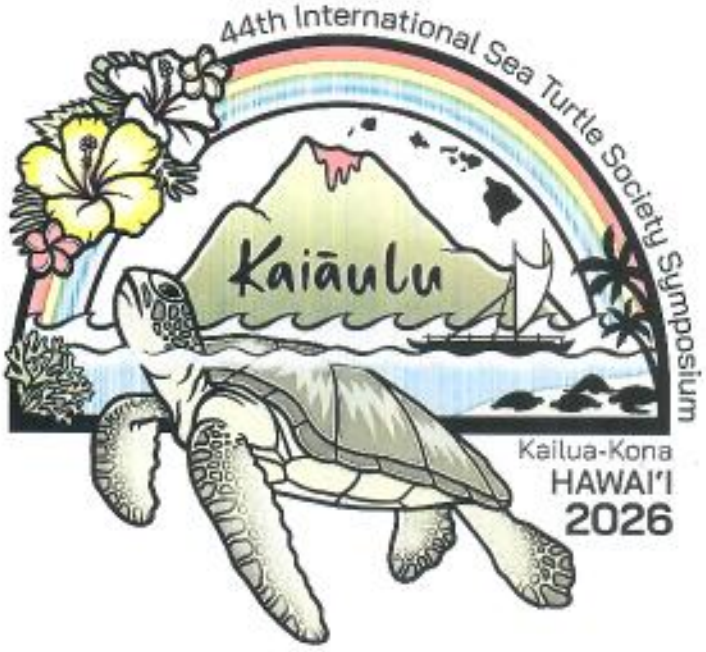

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