An Investigation of Growth Strategies Utilizing American Alligator Growth Rate Data

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Growth rates underpin numerous critical facets of life history. For instance, predation rates are often many fold greater in juveniles than those experienced by adults, thus strong selection is expected to occur to maximize growth. If kept under ideal thermal and feeding regimes, one wonders if an ectotherm can be induced to grow as quickly as an endotherm. To answer this question, ten male American alligators (Alligator mississippiensis) were held in a tank at a temperature of approximately 28°C and fed ad libitum for 387 days. Body weight and snout-to-vent length were recorded at irregular intervals. Total length was calculated using a known relationship between snout-to-vent length and total length. All alligators grew in body weight, snout-to-vent length, and total length linearly relative to time. It was found that the alligators did not grow significantly different from alligators in similar controlled environments or in the wild. Furthermore, when the alligators' growth was compared to endothermic growth at similar percent body mass at somatic maturity it was found these ancient vertebrate ectotherms were incapable of growing as quickly as endotherms regardless of the conditions imposed. This result raises the question: Is growth intrinsically limited in ectotherms when compared to growth in endotherms? In addition, assuming that the power equation best models American alligator growth relative to time, a mathematical analysis determined that the percent increase in size per day is indirectly related to the slope of the linearized power equation.