Factors that Cause the Dietary Anomaly of a Diamondback Terrapin Population (Malaclemys terrapin)

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Northern diamondback terrapins (Malaclemys terrapin) do not consume eastern mudsnails (Ilyanassa obsoleta), despite the snail's abundance and availability throughout the mudflats of New York. Instead, terrapins generally consume similarly sized prey. For example, terrapin populations from Jamaica Bay, NY, mainly consume bivalve species, such as soft-shell clams (Mya arenaria) and Atlantic ribbed mussels (Geukensia demissa). It has been shown that terrapins avoid consuming mudsnails due to their robust shell strength. However, one terrapin population in Oyster Bay, NY, uniquely consumes mudsnails as its main diet. To resolve this paradox, two terrapin populations and two mudsnail populations were studied and compared in Oyster Bay and Jamaica Bay. Bite force measurements were taken from Jamaica Bay to measure jaw strengths, which were then compared to those from Oyster Bay. Mudsnails from each sites were collected and crushed under a force compressor to measure shell strength. An independent sample t-test, with a p-value of less than 0.05 being considered significant was performed to determine the significance of the differences in terrapin bite force and mudsnail shell strength. Bite force measurements showed that the JB terrapins possessed a greater jaw strength than the OB terrapins; shell resistance tests showed that the JB mudsnails possessed a notably stronger shell resistance than the OB mudsnails. These results, along with mudsnail soft tissue mass and shell length comparisons, both of which were greater in OB, suggest that while JB terrapins have a greater bite force, they are deterred from consuming JB mudsnails due to a lower energy reward. In contrast, the abundance of weaker and more rewarding OB mudsnails allow OB terrapins to mainly consume mudsnails.