

Theoretical Basis of Allometric Relationships in Juvenile Brachyura: Data from a West African Mangrove Swamp Crab Population

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Abstract

The carapace length-weight relationship in juvenile Brachyura (crabs) was studied theoretically to assess the relevance of the allometric factor and the validity of the condition factor as these factors are often not determined because most fishery investigations are conducted for adult population. The allometric factor appears to be the main parameter in the equation: $W = aL^b$ (where W = weight, a is a constant and L = carapace length). Parameters a (also called the condition factor K , known as the ponderal index) and $k = 10^3 W/L^3$ were found to be of less significance and they were closely related to b . The theoretical value of $b = 3$ was found to be rarely met in crab fishery studies; rather much wider range was observed. It was, therefore, recommended that the assumed theoretical value of $b = 3$ would not be applied in all ichthiofauna surveys as it is generally commonly done by fishery scientists. The present analytical studies has opened a new approach to the elucidation of the biological significance of the allometric factor b , through the theories of fractal geometry (where b is seen as a fractal dimension equivalent and salutatory ontogeny where b is a critical point in the early life history of crabs).