

LENGTH-WEIGHT RELATIONSHIP OF BENTHIC BIVALVES OF THE ANDONI FLATS, NIGER DELTA, NIGERIA

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ABSTRACT

The length weight relationship of three benthic bivalves namely, *Senilia* (= *Anadara*) *senilis* (bloody cockle), *Tagelus adansonii* (knife clam), *Tellina nymphalis* (soft shell clam) from the Andoni Flats were determined. The bivalves which are of ecological importance were obtained from the intertidal areas of the Andoni Flats. Shell lengths of the bivalves were measured and corresponding dry weight measurements were also taken. The data obtained were then subjected to regression analysis using the FAO-ICLARM Fish Stock Assessment Tools (FiSAT). The length weight relationships obtained from the FiSAT analysis indicated isometric growth for *Senilia* (= *Anadara*) *senilis*, with slope (b) value of 2.942; positive allometric growth for *Tagelus adansonii*, with a 'b' value of 3.395 and negative allometric growth for *Tellina nymphalis* with 'b' value of 2.633.

KEYWORDS: bivalves, length-weight, isometric growth, allometric growth, cockle, clam.

INTRODUCTION

Length-weight relationships are useful tools in fisheries research because they can be used in converting length in weight or in the estimation of biomass from length observations, and in comparing life histories of species in different regions (Stergiou and Moutopoulos 2001; Park and Oh, 2002). Several studies have been carried out in this regard for fin-fish species (King, 1991; King, 1996a and b; Cucalon – Zenck, 1999; Kleanthidis *et al*, 1999; Nasser, 1999; Bernardes and Rossi – Wongtschowski, 2000; Muto *et al.*, 2003); but there is a dearth of information on length-weight relationships in shellfish and bivalves in particular from Nigerian waters. Length-weight relationships of bivalves collected from the southwest coast of Korea were determined by Park and Oh (2002). The data obtained showed that estimates of 'b' ranged from 2.44 in *Atrina (servatina) pinnata japonica* to 3.31 in *Scaphora broughtonii*; with a mean value of 2.89 ± 0.212 . Out of 17 species reported, nine exhibited isometric growth patterns at 95% confidence limit.

Three species of benthic bivalves of the Andoni Flats, in the Niger Delta were studied in order to provide information on their length-weight relationship, namely:

- a) *Senilia* (= *Anadara*) *senilis* bloody cockle
- b) *Tagelus adansonii* (knife clam)
- c) *Tellina nymphalis* (soft shell clam)

MATERIALS AND METHODS

Study Area

Live specimens of three bivalves (*Senilia senilis*, *Tagelus adansonii* and *Tellina nymphalis*) were obtained from the intertidal zone of the Andoni Flats. The area is a brackish water habitat characterized by tides, mangroves, several species of fin and shellfish. Specimens were handpicked from sediments in randomly sampled areas; washed with water from the creek and preserved in 5% buffered formalin.

Morphometric Measurements and Growth Conversions

Specimens of bivalves, obtained were measured to determine the following morphometric parameters:

- a) Shell length in mm determined with the aid of a pair of Vernier calipers, model: mechanic type 6911.
- b) Dry weight in g determined after oven drying specimen for 72 h at a temperature of 60°C till constant weight and measured with Sartorius balance model BP 310S.

Length-weight conversions were then calculated for the different species using the log transformation of the regression.

$$W = aL^b \text{ (Winberg, 1971)}$$

Where L = length, W = weight, a = constant, b = exponent

Using the FAO-ICLARM Fish Stock Assessment Tools (FISAT) the relationship between length and dry weight were calculated and graphs constructed to show the regressions.

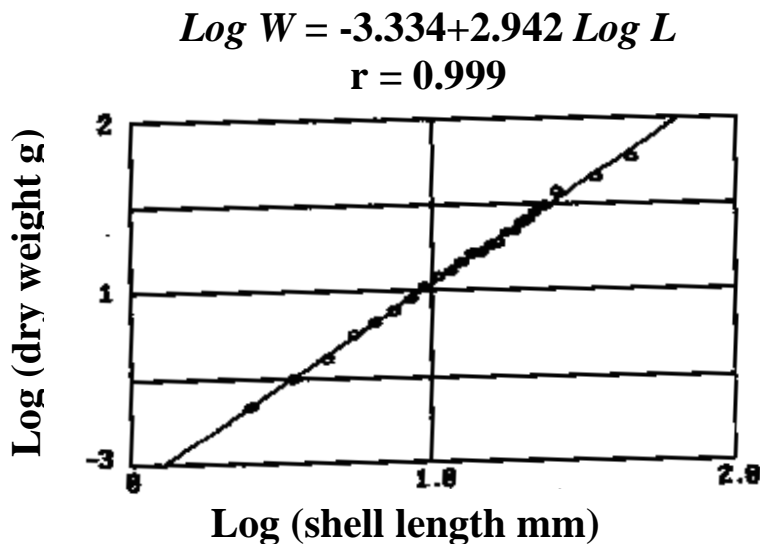


Fig. 1: Length dry weight relationship of *Senilia senilis* in the Andoni Flats

RESULTS AND DISCUSSION

The growth relationships of *Senilia senilis*, *Tagelus adansonii* and *Tellina nymphalis*, are shown in Figures 1 to 3; corresponding values of intercept, slope, standard deviations and coefficient of determination are presented in Table 1. The regression analyses for length-weight relationships were statistically significant at $p < 0.01$ for *Senilia senilis* and *Tagelus adansonii* and $p < 0.05$ for *Tellina nymphalis*.

Values of 'b' (Table 1) for *Senilia senilis*, *Tagelus adansonii* and *Tellina nymphalis* were 2.942, 3.395 and 2.633 respectively. Isometric growth pattern was observed in *Senilia senilis*; similar growth pattern was reported for an arcid clam *Scapharca subcrenata* from the coastal waters of Korea (Park and Oh, 2002). From our study positive allometric growth was observed in *Tagelus adansonii* while negative allometric growth was observed in *Tellina nymphalis*. Similar growth patterns were also reported by Park and Oh (2002) for the arcid clams *Scapharca broughtonii* and *Tegillarca granosa* showing positive allometric growth and negative allometric growth respectively.

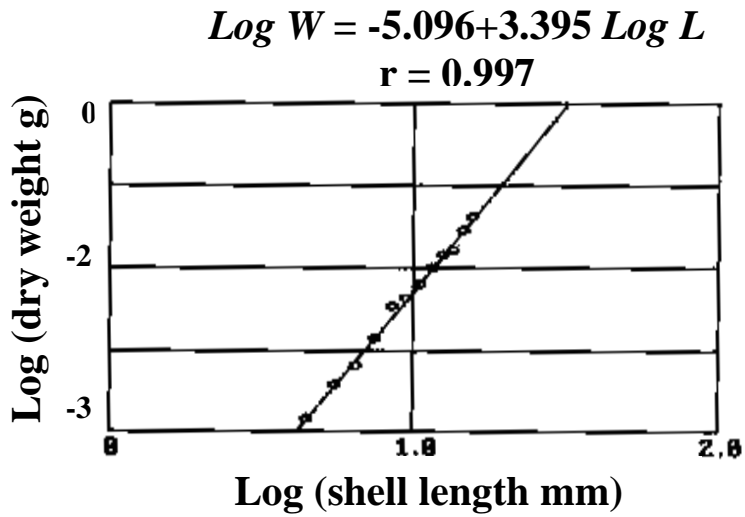


Fig. 2: Length dry weight relationship of *Tagelus adansonii* in the Andoni Flats

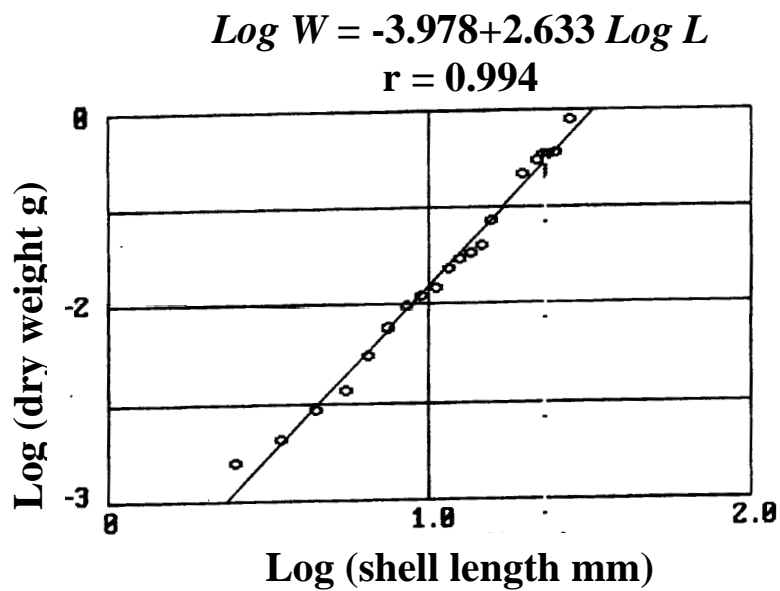


Fig. 3: Length dry weight relationship of *Tellina nymphalis* in the Andoni Flats

Table 1: Regression Analysis of Length Weight Relationships of Three Benthic Bivalves from the Andoni Flats, Niger Delta.

Species	Intercept a	S.D. of a	Confidence interval of a	Slope b	S.D. of b	Confidence interval of b	r	r ²	Confidence interval of r
<i>Senilia senilis</i>	-3.334	0.036	-3.408 to -3.259	2.942	0.032	2.877 to 3.008	0.999	0.997	0.997 to 0.999
<i>Tagelus adansonii</i>	-5.096	0.075	-5.264 to -4.928	3.395	0.077	3.224 to 3.565	0.997	0.995	0.991 to 0.999
<i>Tellina nymphalis</i>	-3.978	0.075	-4.136 to -3.821	2.633	0.069	2.487 to 2.779	0.994	0.988	0.984 to 0.998

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