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# Length–weight relationships of *Hyperopisus bebe occidentalis* in Zaria Dam

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**Abstract**

*The morphometric parameters of 54 Hyperopisus bebe occidentalis obtained from Zaria Dam were investigated. The length of H.b. occidentalis examined ranged from 18.9-41.0 cm and weight ranged from 25-425g, the largest male weighed 175g while the female was 425g.The length-weight relationship of H. Bebe occidentalis in Zaria showed a positive correlation (r=0.897) in both sexes. The regression exponent (b>3) for both sexes showed positive allometric growth pattern. The mean condition factor obtained range (0.95-1.26). In both sexes the condition factor generally increased with increase in individual size of the fish irrespective of sex but slightly in male than female.*

*Keywords: Microbiological, proximate analysis, biochemical characterisation, S. nigrita, Mormyruss rume, C. nigrodigitatus.*

## Introduction

The length-weight relationship of a fish is basically a measure of its growth pattern or age. Growth is an important component of biological production, which affects overall production directly. Negative changes in growth rates may result in decreased individual health, reproductive success and increased risk of predation and mortality (Wootton, 1990) Thomas et al. (2003) stated that the isometric value of b=3 was for an ideal fish that maintained a three dimensional equality. When the b-value is <3, a fish has negative allometric growth, and when it is >3 it has positive allometric growth (Khaironizam and Norma-Rashid, 2002). If fish have to maintain their shape as they grow their b-values must be equal to 3.

The condition factor can also be used in assessing the well-being of fish (Oni et al., 1983). In a study of some reproductive aspects of *Chrysichthys nigrodigitatus* from Cross River, Nigeria, Ekanem (2000) found that the condition factor of the population varied from 0.24 to 1.34, with 0.977 as the mean; 52.8% had condition factor higher than the mean and 47% had condition factor above unity and that the smaller fishes are more efficient in finding food than the bigger ones.

*H.b. occidentalis* is widely distributed in rivers and lakes throughout Nigeria except Cross River basin (Reed et al., 1967; Olaosebikan and Raji, 1998) and in catches of fishermen in Zaria Dam. Published information on some aspect of the biology of H.b. occidentalis include those of Ipinjolu et al. (1996) in Goronyo dam Sokoto, and Nwani and Ezenwagi (2006) in Anambra river and Oniye et al (2002) on the gill parasite of H.b. occidentalis in Zaria. Information on the present status of H.b. occidentalis in terms of length-weight relationship and condition factor in Zaria dam is not available, therefore, this study provide information on this subject matter for Zaria dam.

## Materials and Methods

*Hyperopisus bebe occidentalis* were purchased monthly, from the landings of fishermen of Zaria dam. The fish were transported in an insulated box containing ice to the laboratory of the Department of Biological Sciences, Ahmadu Bello University, Zaria, where the total length, standard length and weight of the fish were determined as described by Nwadiaro (1985). Fultons condition factor, defined as weight percent divided by the cube of the length of fish, (Ikomi and Odum, 1998) was calculated for each fish, using the relationship:

$$K = \frac{100W}{L^3}$$

Where K is the condition factor, L the total length in centimeters and W the weight in grams.

The length-weight relationship of the fish was described by the equation $W=aL^b$; Where W is the weight in grams, L the total length in centimeters a and b the regression constant. The logarithm-transformed data will give the linear regression equation:

Log W = log a + blog L

Sex of fish was determined by visual and microscopic examination of the gonads (Ikomi and Odum, 1998). The unsexed small fish were regarded as immature.

## Results

The weight of *H.b. occidentalis* sampled ranged from 25.0-425.0g. The largest male weighed 175.0g, while the largest female was 425.0g. The regression coefficients (b) for male and female fish were 3.814 and 4.019 respectively. Correlation coefficients (r) for male and female fish were 0.961 and 0.912 respectively (Table 1).Figure 1 show a scatter diagram of the length-weight relationship regardless of sex of *H.b. occidentalis* the relationship obtained reflect the exponential increase of weight with increase in length.

The overall mean condition factors (K) ranged from 0.59-0.89 (Table 3). The highest values were obtained in females. Mean condition factor values increased with size of fish irrespective of sex (Table 4). However, the overall (mean) K-values appeared to be marginally higher in the female (0.89) than in the male fish (0.83), but lacked significant difference ($p<0.05$).

**Table 1: Length–weight relationship of male and female *H.b. occidentalis*.**

| Sex | Total length range (cm) | Weight range (g) | n | b | r |
|---|---|---|---|---|---|
| Combined | 18.90-34.00 | 25.00-425 | 54 | 4.124 | 0.897 |
| Male | 18.90-34.00 | 25.00-175 | 22 | 3.814 | 0.961 |
| Female | 19.80-41.00 | 30.00-425 | 32 | 4.019 | 0.912 |

*n = sample size, b = regression coefficient; r = correlation coefficient*

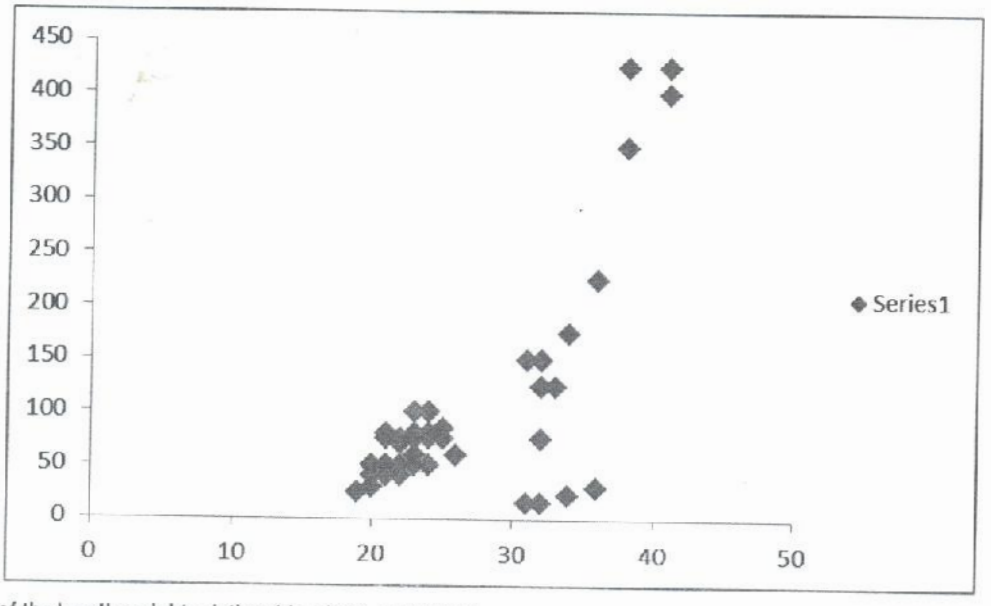


**Fig. 2: Scatter plot of the length-weight relationship of *H.b. occidentalis***

**Table 2: Condition factor according to standard length groups and sex of *H.b. occidentalis*.**

| | | | Standard length | | | |
|---|---|---|---|---|---|---|
| cm | Male | K±SE | Female | K±SE | Combined | K±SE |
| 16.5-23.8 | 17 | 0.95(0.04) | 20 | 0.95(0.04) | 37 | 0.94(0) |
| 23.9-31.2 | 5 | 1.01(0.02) | 6 | 1.05(0.02) | 11 | 1.03(0) |
| 31.3-38.6 | 0 | 0 | 6 | 1.26(0.06) | 6 | 1.26(0) |
| Total | 22 | | 32 | | 54 | |

## Discussion

The length–weight relationship of *H.b. occidentalis* in Zaria showed positive correlation ($r = 0.961$) in both sexes, indicating an increase in weight as the length increases. The regression exponent ($b>3$) for both sexes shows a positive allometric growth pattern, i.e. the fish becomes heavier for its length as it grows longer (Tesch, 1968).The isometric value of b=3 is for an ideal fish that maintains three dimensional equality (Thomas et al., 2003). Khaironizam and Norma-Rashid (2002) stated that when b-value is <3,the fish has a negative allometric growth and b-value >3 is positive allometric growth but there is no

existing theory that says the b-value must be negatively or positively allometric (Pauly,1993). According to Pauly and Gayanilo (1997), b-values may range from 2.5 to 3.5. Most fish species often deviate from isometric growth as the shape of their bodies change with growth (Thomas et al., 2003).

The condition factor ranged from 0.95 to 1.26, these values are approximately 1(i.e unity) this shows that the fish is in good condition. This result is similar to 1.20 obtained for the population of other momyrid, *Momyrus rume* in Lekki Lagoon (Fawole, 2002). Atar and Secer (2003) reported that numerical magnitude in condition factors can be attributed to sex, in addition to many other factors like time of the year, stage of maturity and stomach contents. The smaller group had the lowest condition of 0.95 than the largest fish this is probably because the bigger fish are more efficient in finding food than the smaller fish. There was a general increase in the condition factor of the fish with increase in length however slightly higher in female than in male this is probably due to the deposition of material for gonad formation which lead to increase in weight.

In conclusion the length-weight relationship of *H bebe occidentalis* in Zaria showed positive correlation (r=0.96) in both sexes indicating an increase in weight as the length increases. The regression exponent (b>3) for both sexes shows positive allometric growth pattern. The condition factor ranged (0.96-1.26) varied marginally between male and female but increases with increase in length irrespective of sex.

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