
ASPECTS OF THE BIOLOGY OF *Hyperopisus bebe occidentalis* IN A TROPICAL FRESHWATER ECOSYSTEM

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ABSTRACT

*Some aspects of the biology of Hyperopisus bebe occidentalis at Idah Area of River Niger were studied between October and December, 2010. A total of 129 fish samples were used for the study. The length-weight relationships were analyzed using the formula $W = aL^b$ and transformed to $\text{Log } W = \text{Log } a + b \text{ Log } L$. Stomach contents were analyzed by frequency of occurrence method. The standard length for males, females and combined sexes ranged between 10.9 – 21.04 (cm), 11.3 – 22.5 (cm) and 10.90 – 22.70(cm) with b – values of 3.2953, 3.5015 and 3.4071. The condition factors for the male, female and combined sexes ranged from 0.56 – 0.98, 0.57 – 0.98 and 0.46 – 0.98, respectively. The result of the food and feeding habits showed that the fish feeds mainly on plant part (23.2%), larvae (14.4%), mollusk (24.0%), sand grain (17.6%), detritus (24.8%), Worm (10.4%), Algae (28.8%) and unidentified item (25.6%), respectively. *H. bebe occidentalis* in Idah area of River Niger could be referred to as an omnivore, feeding mainly on plant materials.*

Keywords: Length-weight, Sexes, Stomach content, Feeding habits, Plant materials

INTRODUCTION

Fish is the critical food supply for the poor in the world, providing one billion people sustenance for their daily lives and 150 billion people employment in which 90% are in the artisan sector mostly in Africa. World wide per capita fish supply in 1997 stood at 16kg/year (World Fish Center 2005). The fishery sector is essentially in the economic development of many countries. The ability to meet world demand for fish from natural fish stock requires natural fisheries and genetically improved fast-growing fish species (Adeyemi *et al.*, 2011). The World Fish Center (2005) warned that exploitation of natural fish stocks is leveling off as population grows. Africa faces a major challenge to ensure fish supply to the estimated 200 million, mainly poor people relying on fish as a main part of diet.

The study of the biology of fishes could give important information necessary for fishery scientists in its management and sustenance. Several studies has been carried out on some aspects of the biology of some freshwater fish species across Nigeria (Oniye *et al.*, 2006; Malami *et al.*, 2007; Adeyemi *et al.*, 2009; Adeyemi, 2010) in order to generate useful information in positioning of the fishes in a food web in their environment and in formulation management strategy options.

Literatures on some aspect of the biology of mormyrids are vast (Nwani *et al.*, 2004; 2006 a, b; Oniye *et al.*, 2006; Malami *et al.*, 2007) among many others. This study is aimed at providing recent information on the length-weight relationship, condition factor and food and feeding habits of *Hyperopisus bebe occidentalis* a member of the family Mormyridae at Idah area of River Niger. This information is needful for sustainable management of River Niger mormyrid resources.

MATERIALS AND METHODS

Study Area: The study area (Figure 1) is Idah area of River Niger in Kogi State. The area is located on latitude 7° 06'N and longitude 6° 43'E of the Greenwich meridian in the Guinea Savannah vegetation zone of Nigeria. The study area experiences two weather conditions, dry season which starts from November to April and wet season which starts from April to October (Areola *et al.*, 1992).

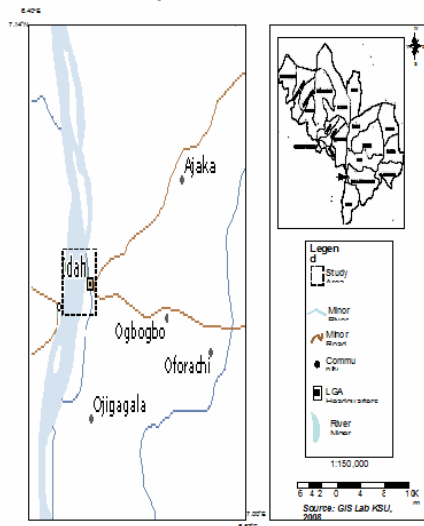


Figure 1: Map of Idah Area of River Niger, Kogi State, Nigeria

Sampling: A total of one hundred and twenty nine (129) samples of *H. bebe occidentalis* were purchased from fishermen at Idah area of River Niger between October and November, 2010 and identified (Idodo-Umeh, 2003; Olaosebikan and Raji, 2004) to species level. The fish samples were transported in plastic buckets to the Department of Biological Sciences Laboratory, Kogi State University, Anyigba for analysis.

Aspect of the Biology: The total length of the sampled fish were measured with an aid of measuring board from the anterior end of the fish snout (mouth closed) to the posterior extremity of the caudal fin, with the aid of a measuring board to the nearest 0.1 cm. The standard length was measured from the anterior tip of the snout to the end of the caudal peduncle for every fish in centimeters (cm). The body weight of each fish was also measured to

the nearest 0.1g using top loading weighing balance in grams (g), respectively.

The sex of each fish was determined externally by the presence of a genital papilla (a corn-like projections of the genital aperture of the males which are absent in females). Each stomach was dissected and split open and the contents emptied into Petri-dishes containing 10% saline solution and observed under a compound microscope. The food items were counted and the stomachs were scored 0, 25, 50, 70 and 100% according to its fullness as described by Bagenal (1978).

Data Analysis: For each fish sample, parameters such as length (L) in centimeters (cm) and weight (W) in grams (g) were used to estimate Length-Weight relationship (LWR) formula, i.e. $W = aL^b$ and transformed to Log $W = \text{Log } a + b \text{ Log } L$ through base 10 logarithm transformation. Allometric growth of the fish was recorded when the regression co-efficient 'b' was less than 3.0 or greater than 3.0 (Ama-Abasi, 2004; Paugy *et al.*, 2004).

The stomach contents were analyzed by frequency of occurrence as described by Hynes (1950) and Bagenal (1978). The occurrence of each food item was expressed as a percentage of all stomach with food. That is, $P = (b/a) \times 100$ where a = Total number of fish examined with food in the stomach; b = number of fish containing a particular food; P = percentage of occurrence of each food item.

RESULTS

One hundred and twenty nine (129) specimens were used out of which 63 were males and 66 were females. Male standard lengths ranged between 10.9 – 21.04 cm, while total length between 12.0 – 24.7cm. Female standard length ranged between 11.3 – 22.5 cm; with total length ranging between 12.5 – 24.6 cm. The combined sexes have standard length and total length ranging from 10.90 – 22.70 and 12.0 – 24.7 cm, respectively (Table 1). In terms of weight (g) males, females and combined sexes weight ranged between 10.0 - 74.0, 12.0 – 91.0 and 10.0 – 97.0g respectively. There was no significant difference ($p > 0.05$).

Table 1: Body Measurement for *Hyperopisus bebe occidentalis* from Idah Area of River, Kogi State, Nigeria

Sex	Total No	SL(cm) Range	Mean SL (cm)	Wt (g) Range	Mean Wt (g)	a	b	r
Male	63	10.9 – 21.04	15.62±2.07	10.0 - 74.0	30.46±15.58	0.0033	3.2953	0.9629
Female	66	11.3 – 22.5	15.90±2.15	12.0 – 91.0	32.9±17.04	0.0019	3.5015	0.9788
Combined sex	129	10.90 – 22.70	15.90±2.4	10.0 – 97.0	44.92±15.70	0.0024	3.4071	0.9712

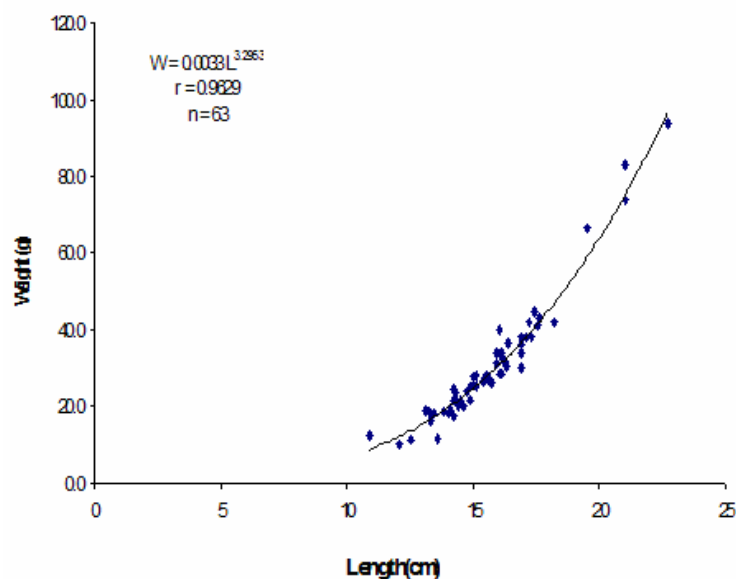


Figure 2a: Length-weight relationship of male *Hyperopisus bebe occidentalis* at Idah Area of River Niger, Kogi State, Nigeria

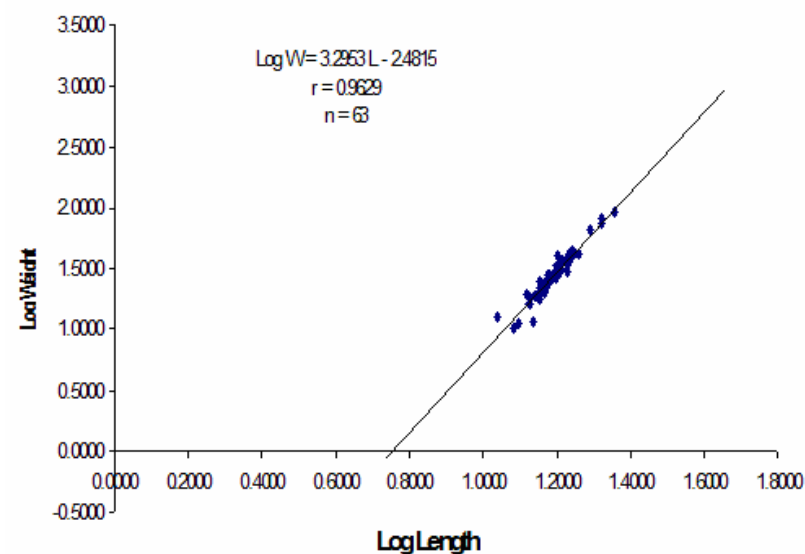


Figure 2b: Log length-weight relationship of male *Hyperopisus bebe occidentalis* at Idah Area of River Niger, Kogi State, Nigeria

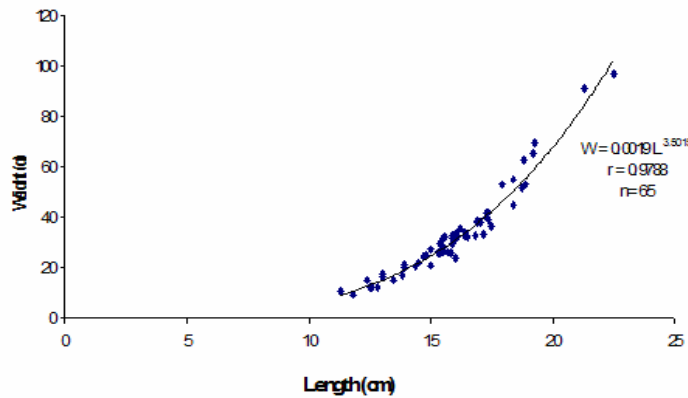


Figure 3a: length-weight relationship of *Hyperopisus bebe occidentalis* at Idah Area of River Niger, Kogi State, Nigeria

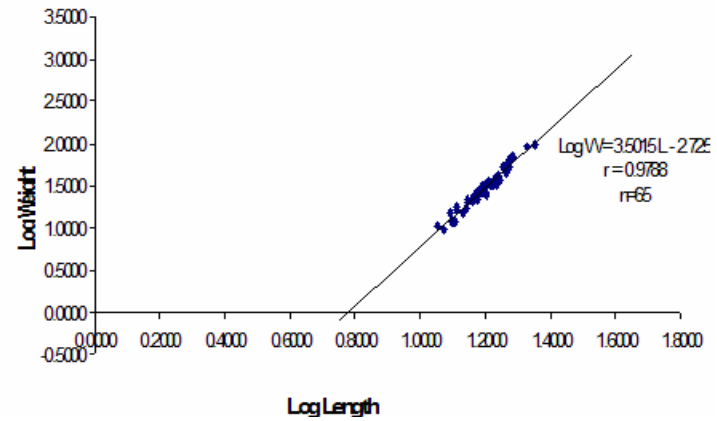


Figure 3b: Log length-weight relationship of *Hyperopisus bebe occidentalis* at Idah Area of River Niger, Kogi State, Nigeria

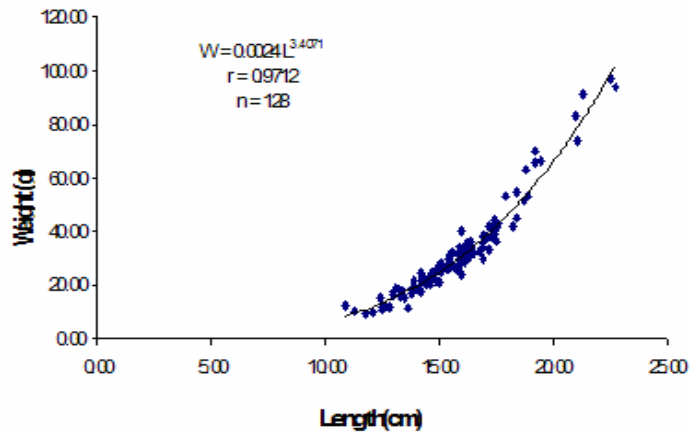


Figure 4a: Length-weight relationship for combine sex of *Hyperopisus bebe occidentalis* at Idah Area of River Niger, Kogi State, Nigeria

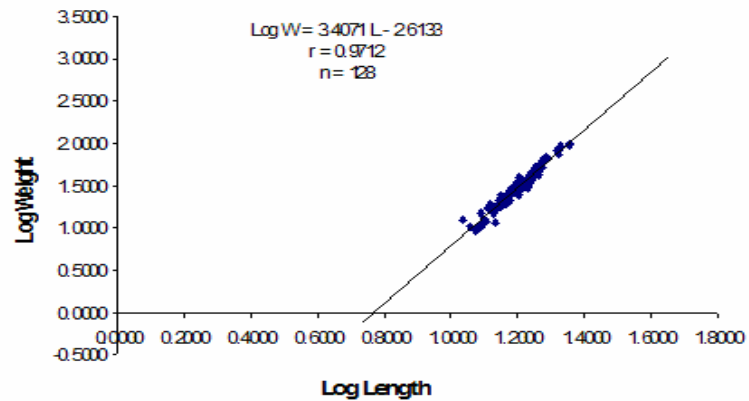


Figure 4b: Log length-weight relationship for combine sex of *Hyperopisus bebe occidentalis* at Idah Area of River Niger, Kogi State, Nigeria

Figure 2a showed the length-weight relationship of male *H. bebe occidentalis* from Idah area of River Niger, Kogi state. This conforms to the curvilinear plot represented by the formula $W = aL^b$. The values of a, b and r are 0.0033, 3.2953 and 0.9629, respectively.

Table 2: Analysis of stomach contents of *Hyperopisus bebe occidentalis* at Idah Area of River Niger

Items	Frequency of Occurrence
Plant part	23.2
larvae	14.4
mollusk	24.0
sand grain	17.6
detritus	24.8
Worm	10.4
Algae	28.8
unidentified item	25.6

Table 3: Stomach content classification of *Hyperopisus bebe occidentalis* at Idah Area of River Niger, Kogi State.

Sex	Male n = 64	Female n = 65	Combined n = 129
% Stomach with food	37(28.6)	63(48.8)	100(77.5)
% stomach without food	27(20.9)	2(1.5)	29(22.4)
	% Degree of fullness		
Full (4/4)	0(0)	0(0)	0(0)
Almost full (3/4)	15(11.6)	16(12.4)	31(24.0)
Half full (1/2)	37(28.6)	35(27.1)	72(55.8)
Almost empty (1/4)	8(6.2)	9(6.9)	17(13.1)
Empty (0/4)	2(1.5)	2(1.5)	4(3.1)

Table 4: Summary of Condition Factor for *Hyperopisus bebe occidentalis* from Idah Area of River Niger, Kogi State

Condition factor	Total Number	Range (cm)	Mean
Males	63	0.56 – 0.98	0.75±0.09
Females	66	0.57 – 0.98	0.75±0.09
Combined sex	129	0.46 – 0.98	0.75±0.09

This relationship is log transformed to give the plot (Figure 2b) with the formula $\text{Log } W = \text{Log } 3.2953 - 2.4815 \text{ Log } L$. Figure 3a showed the

length-weight relationship of female *H. bebe occidentalis*. The values a, b and r are 0.0019, 3.5015 and 0.9788, respectively. The log transformed relationship also gives the linear plot (Figure 3b) represented by the formula, $\text{Log } W = \text{Log } 3.5015 - 2.725 \text{ Log } L$.

Figure 4a also showed the length-weight relationship for the combined sexes of *H. bebe occidentalis* from Idah area of River Niger, Kogi State. The values a, b and r were 0.0024, 3.4071 and 0.9712, respectively. The log transformed plot (Figure 4b) is represented by the formula $\text{Log } W = \text{Log } 3.4071 L - 2.6133 \text{ Log } L$.

Nine items were recorded from the stomach of the fish. These includes plant parts (23.2%), larva (14.4%), mollusk (24.0%), sand grain (17.6%), detritus (24.8%), worm (10.4%), algae (28.8%) and unidentified items (25.6%) (Table 2). The stomach fullness classification of *H. bebe occidentalis* based on degree of stomach fullness indicated that 37 (28.6%) had food in their stomach while 27 (20.98) had no food in their stomach. There was food in 63 (48.8%) stomachs of females while 2 (1.5%) had no food. There was no full stomach (0%) in the males, 15 (11.6%) almost full, 37 (28.6%) half full, 8 (6.2%) almost empty and 2 (1.5%) empty. There was significant difference ($p > 0.05$) in the degree of stomach fullness of the fish except for full stomach ($p < 0.05$) content (Table 3).

The values of condition factor for male, female and combined sexes range from 0.56 – 0.98, 0.57 – 0.98 and 0.46 – 0.98 for combined sexes respectively. The mean was 0.75 ± 0.09 , 0.75 ± 0.09 and 0.75 ± 0.09 , respectively (Table 4).

DISCUSSION

The b-values of 3.2953, 3.5015 and 3.4071 were observed for male female and combined sexes of *H. bebe occidentalis* is quite similar to the b-value of 3.051 reported by Konan *et al.* (2007) on *Labeo coubie* in the coastal rivers of South-Eastern Ivory Coast.

The condition factor parameter for *H. bebe occidentalis* reveals the males, females

and combined sexes to have mean condition factor of 0.75 ± 0.09 , 0.75 ± 0.09 and 0.75 ± 0.09 respectively. These values are greater than 1. This means that the fish is in a good condition in the Idah area of River Niger.

This study showed that the items found in the diet of this species include plant part, larvae, mollusk, sand grain, detritus, worm, algae and unidentified items. Malami *et al.* (2007) reported substances of plant (69.8%) animal origin (20.0%) and (4.4%), respectively. This suggests that the species is an omnivore feeding more on substances of plant and animal origin.

Growth in the species could be said to be allometric. The condition factor also indicated that the species was thriving very well in the Idah area of River Niger. The findings of this study showed that 23.2% of items in the diet of *H. bebe occidentalis* were plant materials. *H. bebe occidentalis* at Idah area of River Niger, Kogi state could be referred to as an omnivore feeding on both plant and animal substances.

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