



SOME ASPECTS OF THE REPRODUCTIVE BIOLOGY OF *Hyperopisus bebe occidentalis* (GUNTHER) IN ZARIA DAM, NIGERIA

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ABSTRACT

Studies were conducted on the reproductive cycle of *Hyperopisus bebe occidentalis* in Zaria dam. Fish were captured by using nets of various mesh sizes for 24 months. Sex ratio of female to male was 1:1.084. Fully matured gonads were observed from July to October (rainy season). Fish with spent gonads were found from December to February, virgin or immature gonads (stage I and II) were found in February to May, with the peak in March in female fish and January in male. The estimated fecundity ranged from 2025 to 4192 eggs per female with mean of $2822.4 \pm SD 781.43$ eggs that had standard length range of 24.20 cm to 35.50 cm. The gonadosomatic index (GSI) ranged from 1.63% to 3.31%. There was a significant correlation ($r = 0.873$, $P > 0.05$) between the weight of the fish and fecundity and insignificant correlation ($r = 0.497$, $P < 0.05$) between the standard length and fecundity.

Keywords: gill net, morphometric measurement, Gilson's fluid, ovarian tissue

INTRODUCTION

Reproductive strategies depend on the abiotic environment, food availability, presence of predators and the habitat of parental fish (Wootton, 1990). Fecundity which is the number of ripe eggs in an ovary prior to spawning varies from one species to the other, and it is a function of body weight and or length. King (1997) studied weight-fecundity relationships of some Nigerian fish population and reported that as the body weight of fish increased, the number of eggs produced also increased, and opined that this was linked to the continuous growth of fish after fecundity had stabilized.

Hyperopisus bebe 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 Ezenwaj (2006) in Anambra river, Oniye and Aken'Ova (2002a) on *Rhadinorinchus horridus* (Acanthocephala) of the gastrointestinal tracts, and Oniye *et al.* (2002b) on the gill parasite of *H. bebe occidentalis* in Zaria. Information on the reproductive biology *H. b. occidentalis* in Zaria dam is not available, hence the subject of this study.

MATERIALS AND METHODS

A total of 793 samples of *Hyperopisus bebe occidentalis* were collected for 24 months, with the aid of artisanal fishermen using cast and gill nets of various mesh sizes, from 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 morphometric measurements were recorded. Sex of fish was determined by visual and microscopic examination of the gonads. The unsexed small fish were regarded as immature.

Gonads were classified as described by Bagenal and Braun (1978). Fecundity was estimated from fully matured ovaries stage (IV) (Ikomi and Odum, 1998; Ekanem, 2000). The ovaries were carefully excised from the body cavity of each fish and preserved in Gilson's fluid. The preserved ovaries were rinsed carefully several times to get rid of the preservative and ovarian tissues. The eggs were then placed on filter paper to remove excess water then weighed using a Mettler balance (model P : 1210). The fecundity estimates were obtained by weighing all eggs and then eggs in 1-gram subsamples were counted. Counting was done for three random subsamples. The mean number of eggs in the three subsamples gave the number of eggs per gram of weight. The relationship between fecundity and fish length/weight was described by the equation:

$$F = aX^b$$

Where:

F is fecundity

X is body length in centimeters or body weight in grams

b is the slope and

a the intercept (Lagler, 1978; Ekanem 2000).

Through a logarithmic transformation the equation becomes:

$$\log F = \log a + b \log X$$

The maturity stages of the ovary were classified using the modified Kesteven's scheme (Bagenal and Braun, 1978) as follows:

- Stage I: Immature, inactive
- Stage II: Ripening
- Stage III: Maturing
- Stage IV: Mature (Ripe)
- Stage V: Spent

The gonadosomatic index (GSI) was calculated for each gonad as described by Ikomi, (1996) from the equation:

$$GSI = \frac{Gonad\ Weight\ (g) \times 100}{Fish\ Weight\ (g)}$$

RESULTS

Male to female ratio in the sample was 1:1.08. Fully mature gonads (stage IV) were from July to October. Fish with spent gonad was found in the months of December to February. Those with virgin or immature gonads (stage I and II) were

obtained in February to May, with a peak in March in female fish (fig. 1) and January in male (fig. 2). The estimated fecundity ranged from 2025 to 4192 eggs per female with mean of $2822.4 \pm SD\ 781.43$ eggs that had standard length range of 24.20 cm to 35.50 cm. The relationship between fecundity and weight and fecundity and length are presented by the following equation $\log F = 3.3244 + 0.8730 W$ and $\log F = 3.5239 + 0.4940 L$. There was a significant correlation between the weight of the fish and fecundity ($r = 0.873, P < 0.05$) and an insignificant correlation ($r = 0.497, P > 0.05$) between the standard length and fecundity. The gonadosomatic index (GSI) ranged from 1.63% to 3.31% with mean of 2.25% among the different sizes of fish (Table.1).

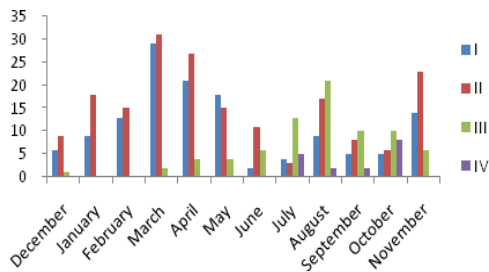


Fig. 1: Stages of gonads in female *H.b. occidentalis*

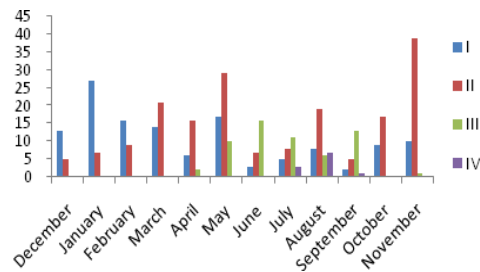


Fig. 2: Stages of gonads in male *H.b. occidentalis*

Table 1: Fecundity and gonadosomatic index (GSI) of ten matured ovaries of *H.b. occidentalis*

Standard length (cm)	Weight (g)	GSI (%)	Fecundity
24.2	133.0	1.69	2025
27.1	212.3	1.75	2296
27.8	223.3	1.80	2213
30.4	351.5	2.51	4082
31.2	240.0	3.31	3357
31.3	240.2	1.98	2726
31.5	220.0	2.32	2532
33.6	250	1.95	2318
34.6	271.3	2.20	2483
35.5	375.2	2.55	4192

DISCUSSION

There were more female than male *H.b. occidentalis* in this study, the observed male/female ratio of 1:1.1 was not significantly different ($P > 0.05$) from the expected ratio of 1:1. The breeding season (the period when mature gonads were found), extended from June to October which coincide with the rainy season. Olatunde (1989) reported that most tropical fishes breed during the rainy season when physicochemical conditions of the aquatic environments are favorable. However some tropical fishes such as the croakers *Pseudotolithus senegalensis* and *P. typus* off the coast of Lagos, and the cichlids, spawn throughout the year (Longhurst, 1964; Lowe-McConnell, 1987; Anyanwu, 1990).

The fecundity of *H.b. occidentalis* found in this study ranged from (225 to 4192) with an average of 2822.4 eggs. Fawole (2002) reported an average fecundity of 2991 eggs in *Momyrus rume* of the Lekki Lagoon, suggesting that the momyrids have low fecundity; however, these results are lower than the range of (7,130 to 73,000) recorded in *Synodontis schall* in Lake Kainji (Willoughby, 1974), but higher than (13 to 110) found in *Epiplatys sexfasciatus* in Adadu River, South-eastern Nigeria (Inyang and Anozie, 1987). There is an insignificant correlation ($r = 0.497$, $P < 0.05$) between the standard length and fecundity of *H.b. occidentalis*, indicating that increase in fish length is not necessarily commensurate to increase in fecundity. Fagade and Adebisi (1979) and Ikomi and Odum (1998) made a similar observation in studies with *Tilapia guineensis* and *Chrysichthys auratus* respectively. However, there is a significant correlation ($r = 0.873$; $P > 0.05$) between weight and fecundity which suggests that as the weight of the fish increase fecundity is also increasing. King (1997) also reported that, as the body weight of fish increased, the number of eggs produced per gram also increased and remarked that growth continues after fecundity had stabilized.

The mean GSI value in this study show that the species uses 2.25% of its body weight for egg production, however, it fluctuates even among fish of similar sizes; similar result was also reported by Ikomi (1996) on the GSI values of the mormyrid *Brienomyrus longianalis*.

CONCLUSION

In conclusion, fecundity of *H.b. occidentalis* may be considered as low in the specimens used in this study. Weight of the fish was more important to fecundity than its length. Further study using more

gravid fish with heavier weight and length may elucidate fecundity of *H.b. occidentalis*.

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