GLOBAL JOURNAL OF PURE AND APPLIED SCIENCES VOL. 10, NO. 2, MARCH 2004: 263 - 269
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THE FOOD OF *PARACHANNA OBSCURA* IN ASEJIRE RESERVOIR, OYO STATE, NIGERIA.

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(Received 22 September 2003; Revision accepted 19 November 2003)

ABSTRACT

Investigations were carried out on the food of *Parachanna obscura* (Gunther, 1861). *Parachanna obscura* fed intensively during the rainy season. During this period 86.8% of its stomachs contained food, while 32.3% was observed during the dry season. Stomach content analysis showed that this species is a carnivore which feed both on fish and insects. The small fish specimens (TL 12.0 – 26.0cm) preferred insects (90.2%) as food to fish (37.5%), while the larger specimens (TL 27.0 – 41.0cm) preferred fish items (62.5%) to insects (9.8%) as revealed by the frequency of occurrence of these food items in the stomach of fish specimens examined. The relative importance of different food items ingested by this fish is documented. The weight of food ingested by *P. obscura* did not vary significantly ($P > 0.05$) with the size of fish, but with the type of diet consumed by the fish. Energy contents of ingested food by this fish also did not vary significantly with increase in fish body weight. The energy contents in food of wet season specimens were higher than those of the dry season specimens, though this difference was observed not to be statistical ($P > 0.05$).

Key words: Food-items, Dry weight, Energy, Fish-size, *Parachanna obscura*

INTRODUCTION

The analysis of the stomach contents of many African inland water fishes have been carried out with the objective of elucidating their food requirement in their natural habitats and also their interactions with their biotic environment (Bowmaker, 1969; Holden, 1970; Imevbore and Bakare, 1970; Hopson, 1972; Fagade and Olaniyan, 1973; Adebisi, 1981; Elliot, 1986 and Ugwumba, 1990). In the tropics, natural food of fish tend to vary quantitatively and qualitatively with seasons of the year (Ananichev, 1961). Lagler *et al.* (1977) noted that most fishes are highly adapted in their feeding habits and are not very specific as to the type of food they eat. The type of food a fish feeds on also depends on the age and size of the fish (Imevbore and Bakare, 1970; Fagade and Olaniyan, 1973).

The food and feeding habits of *P obscura* have been investigated by some authors. These include Imevbore and Bakare (1970) who reported that in Kainji reservior, *P. obscura* preyed on fish, prawns and insects. In Volta lake, this same species feeds on invertebrates (Petr, 1967). In Upper Ogun River Adebisi (1981) found *Parachanna obscura* to feed principally on fish. *Parachanna obscura* of Asejire reservoir have been described as carnivores which feed on prawns, fish eggs, bones and scales and nymphs of insects (Elliot, 1986).

The food and feeding habits of other species of *Parachanna* have been documented. Amongst which are those of *Parachanna orientalis* and *Parachanna gachua* in Sri Lanka which were found to be benthic carnivores that fed exclusively on aquatic insects and crustaceans (Nikramanayaka and Moyle, 1989) and that of *Parachanna arqus* (Guseva, 1990).

This work was aimed at carrying out stomach content analysis involving measurements of volume, and weights and the identification of the various food items, feeding intensity and the determination of the energy content of the different food items consumed. The result obtained would provide more information on this fish, so as to highlight its potential as culturable fish for food, sport fishing and revenue earner.

METHODS

Parachanna obscura caught by hired local fishermen (with local traps made of bamboo strips and long lines baited overnight with earthworms) were put in ice chest immediately to arrest posthumous digestion of the undigested food. In the laboratory, specimens not treated immediately were transferred into a deep freezer. Samples were collected thrice weekly at dawn for a year, because the reservoir was opened most times during the day to control water level. Preserved specimens from the deep freezer were allowed to thaw before examination.

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Table 1: Stomach content analysis of *Parachanna obscura* (11.7 – 44.5 cm)

Food items	Frequency of Occurrence	% F	Weight of food item (W) (g)	% W	Volume of food item (V) (cm^3)	% V	Number of food items (N)	% N	RI
Tilapia	38	11.7	96.7	83.2	97.1	58.7	51	15.7	25.7
Clarias	1	0.3	5.0	4.3	4.5	2.7	1	0.3	1.1
Unidentified Fish skeleton	27	8.3	40.5	34.8	37.6	22.7	28	8.6	12.0
Fish spines	7	2.2	2.0	1.7	3.0	1.8	26	8.0	2.8
Fish scales	5	1.5	0.5	0.4	0.9	0.5	13	4 0	1.4
Hymenopterans	34	10.5	5.0	4.3	7.6	4.6	35	10.8	6.0
Odonates	72	22.2	14.0	12.3	23.4	14 2	72	22.2	12.2
Isopterans	11	3.4	1.7	1.5	3.9	2.4	11	3 4	1.9
Hemipterans	50	15.4	12.9	11.1	19.4	11.2	63	19.4	10.7
Unidentified insect	34	10.5	12.4	10.7	12.6	7 6	34	10.5	7.4
Arachnids	1	0.3	0.2	0.2	0.5	0 3	1	0.3	0.2
Shrimps	9	2.8	5.5	4.7	7.3	4.4	9	2.8	2.4
Crab	1	0.3	0.5	0.4	0.5	0.3	1	0.3	0.2

The total lengths were measured to the nearest millimetre using a meter rule. Weight measurements were taken to the nearest milligramme with a top loading electrical balance after mopping off excess water from the body surface of the fish with a blotting paper.

Fishes were dissected and their stomach contents identified either with the naked eye or under a simple laboratory microscope.

Food items of each specimen was determined by analysis of its stomach contents using "points", volumetric, numerical, gravimetric and occurrence methods as reviewed by Hyslop (1980). The relative importance index (RI) (George and Hadley, 1979; Hyslop, 1980) of each group of food organism was also computed using the expression:

$$RI = \frac{100 \times AI}{\sum_{i}^{n} AI}$$

where AI = absolute importance index, n = number of different food items

AI = % F + % N + % V.

The data on feeding intensities were obtained by counting the stomachs of individual specimens with food each month of the year.

The energy contents of food weight consumed were obtained from analysing the stomach contents of the fish. The contents were evacuated into filter paper and the fluid allowed to drain before their weights were taken. The stomach contents were then dried in oven at 70°c to a constant weight. Energy contents of each dried sample of the stomach content was determined using a ballistic bomb calorimeter which measured the amount of heat released during the combustion of the sample. The energy contents were calculated and expressed in joules per unit weight of food consumed. Relative dry weights of food items ingested whole and were prominent in the fish diet were calculated as dry weight of the ingested over fish body weight expressed in percentage. Scatter plots were then carried out between the percentage dry weight of the different food items consumed and fish body weight. Data obtained were subjected to t-test to note if significant differences (at 5% level) existed between the dry and wet season samples.

Correlation and linear regression analyses were carried out from scatter plots between dry weight of food consumed by *Parachanna obscura* and fish body weight. Another was between energy content in food consumed and fish body weight.

RESULTS

The stomachs of 1135 (one thousand one hundred and thirty-five) specimens of *Parachanna obscura* were examined for their content. Stomach without food were 792 (69.2%). Of the stomachs with food, 55.7% were a quarter filled with food, 24.9% contained food half of its capacity, 9.5% had their stomachs three-quarter filled with food and the remaining 9.9% totally filled with food.

The food items in the stomachs of *Parachanna obscura* examined are itemized in Table 1. These included *Tilapia* spp., *Clarias sp.*, unidentified fish, fish scales and vertebrae, prawns, crabs, insects and arachnids (*Galeodes arabs*). The insects included hymenopterans (ants and few wasps), odonates, *Macrotermes* spp. and hemopterans. Tilapia was the most important food

Table 2: Ontogenic variation in food items consumed by *Parachanna Obscura* based on frequency of occurrence

		Percentage Occurrence							
Total length (cm)	Total No. of stomachs examined	Tilapia	Clarias	Unidentified fish, fish scales and vertebrae	Dragon fly	Water bug	Termites	Shrimps	Crabs
12-14	140	-	-	1.4	2.9	2.1	1.4	-	0.7
15-17	441	1.1	-	3.0	3.6	3.9	0.7	-	-
18-20	270	3.7	-	3.7	5.6	3.0	1.9	-	-
21-23	119	3.4	-	5.0	7.6	5.7	1.7	-	-
24-26	59	25.4	-	25.4	6.8	1.7	1.7	-	-
27-29	56	17.9	-	19.6	1.8	-	-	1.8	-
30-32	27	11.5	-	25.9	33.7	-	-	3.7	-
33-35	13	30.8	15.4	15.4	-	7.7	-	-	-
36-38	5	20.0	-	20.0	-	20.0	-	-	-
39-41	5	40.0	-	20.0	-	-	-	-	-

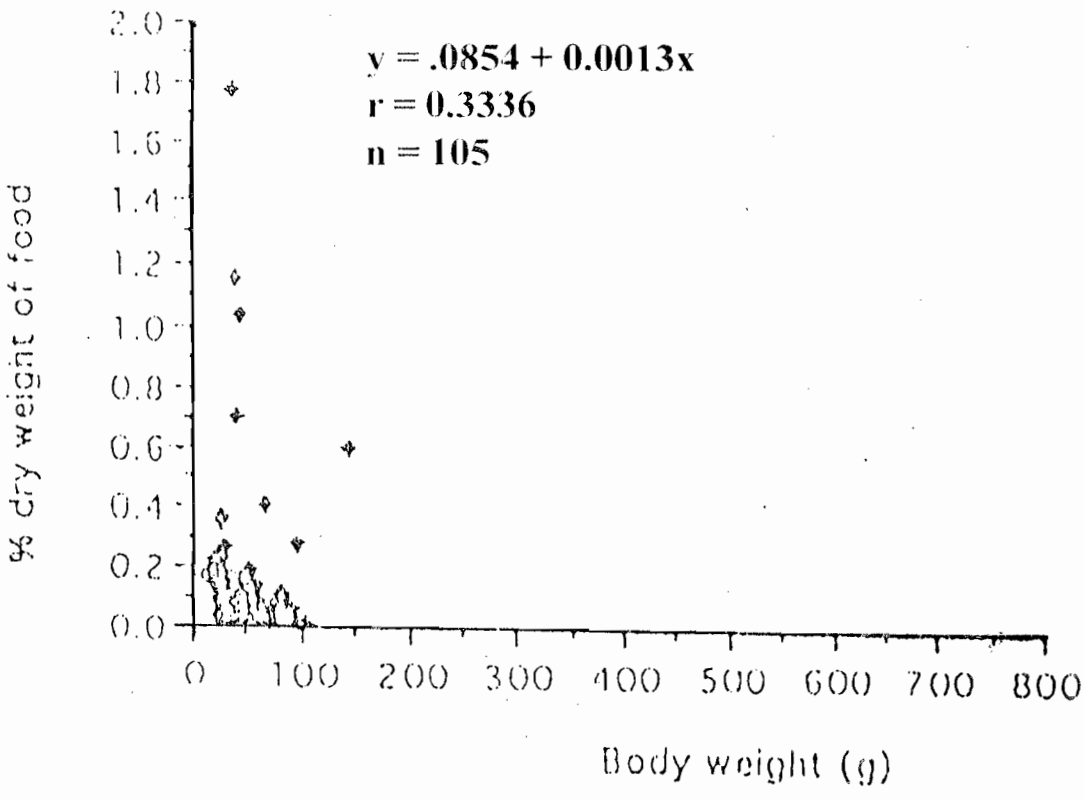
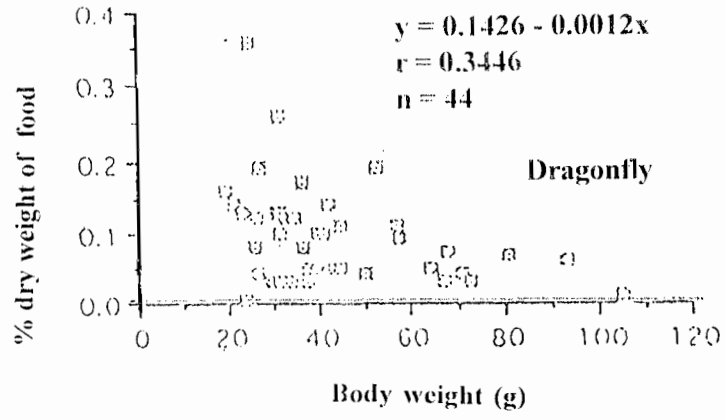
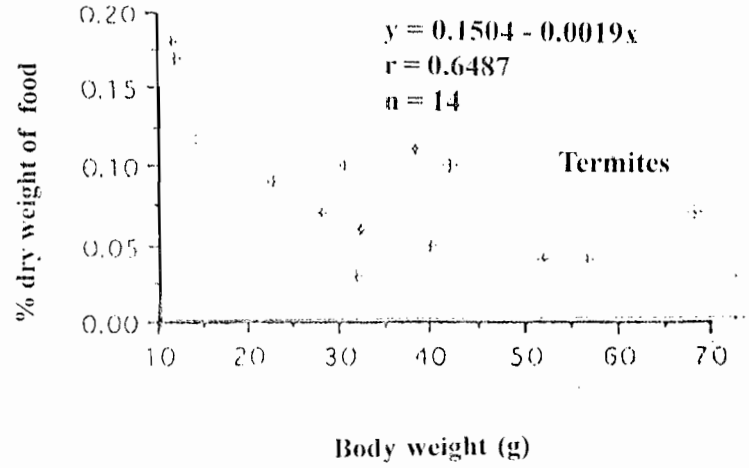
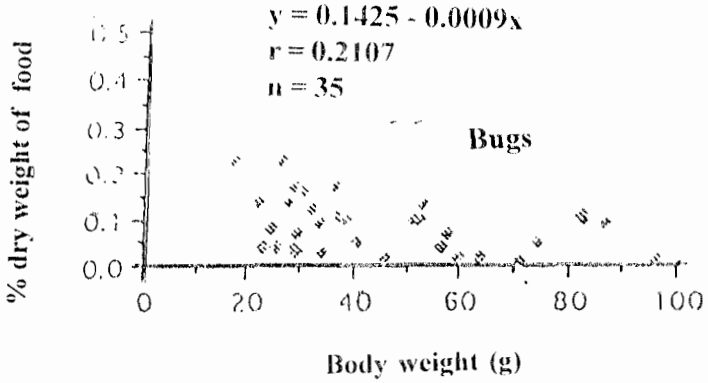


Fig. 1: % dry weight of food consumed by C. obscura *and body weight relationship*







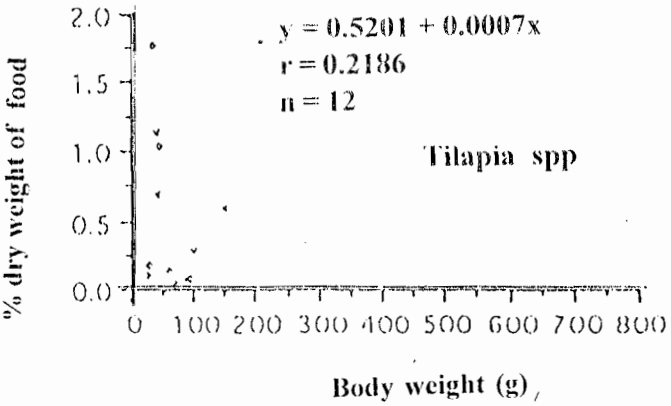


Fig. 2: % dry weight of food in the stomach consumed by C. obscura and body weight relationship.

Table 3: Feeding intensity of *Parachanna obscura*

Months	Total No. of specimens examined	No. of specimens with food in their stomach	% No. of specimens with food in their stomach
January	48	10	20.8
February	40	16	40.0
March	46	19	41.3
April	40	7	17.5
May	40	15	37.5
June	204	66	32.4
July	237	65	27.4
August	151	31	20.5
September	144	56	38.9
October	105	28	26.7
November	62	21	33.9
December	18	9	50.0

item of the fish. It scored the highest by the occurrence, gravimetric, volumetric and RI methods of stomach contents analyses. Next were odonates and the hemipterans. Insects scored 61.9% of the stomachs of fish with total lengths 12.0 – 29.0cm compared to 1.9% obtained in the stomachs of fish with total lengths 30.0 – 41.0cm (Table 2). Fish with total lengths 12.0 – 29.0cm accounted for 30.1% of stomachs with fish as food, while the stomachs of fish with 30.0 – 41.0cm total lengths had 75.0% fish as food. This showed that larger fish specimens preferred fish as food, while the smaller ones preferred insects.

Table 3 indicates that feeding intensity in December, February and March were higher than in all wet season months. Although this table does not show any discernable pattern, it eludicate that this fish feeds actively all year round.

The percentage dry weight of entire stomach contents relative to fishe's body weight was 0.01 to 1.77 (mean = 0.16 ± 0.25). The regression equation below was obtained for that relationship: Y = 0.0854 + 0.0013 x (r = 0.3336)) (Fig. 1). The estimated correlation coefficient (*r*) = 0.3336 for the relationship which was positive but not significant (P > 0.05), which indicates that dry weight of food in stomach of this fish is not significantly correlated with fish body weight.

Scatter plots with regression equations for the percentage dry weights relative to fish's body weights of the different food species ingested by *P. obscura* are illustrated in Fig. 2. The mean percentage relative dry weights of different items of prey ingested by this fish were termites 0.08 ± 0.04%, Bugs 0.11 ± 0.07%, dragon fly 0.09 ± 0.07% and *Tilapia* spp. 0.60 ± 0.53%.

Correlation coefficients (r) obtained for the dry weights of these different food items were negative except for *Tilapia* spp. Correlation coefficient (r) was significant (P < 0.05) in the dry weights of termites ingested by *P. obscura*.

The stomach contents of *P. obscura* contained energy varying from 18.7 to 296.2 KJ/g (mean = 84.24 ± 61.38 KJ/g) (Fig. 3). The relationship between energy value of the stomach contents of this fish and its body weight is linear, and is described by the equation: Y = 91.1 + 0.12X (r = 0.3854) (P < 0.05).

Energy value of stomach contents varied from 23.0 to 106.7 KJ/g (mean = 49.86 ± 28.42 KJ/g) in the dry season (n = 49), while in the wet season, it varied from 18.7 to 296.2 KJ/g (mean: 53.33 ± 23.27 KJ/g) (n = 49). These values did not differ significantly (t = 0.31, df = 47, P > 0.05) despite the higher value observed in the wet season samples.

DISCUSSION

The diet of *Parachanna obscura* which consisted of fish, shrimps and insects was similar to the diet of the same species in River Niger as recorded by Imevbore and Bakare (1970), Adebisi (1981) for Upper Ogun River, and Fagade (1983) for the species in the lower River Benue. Results

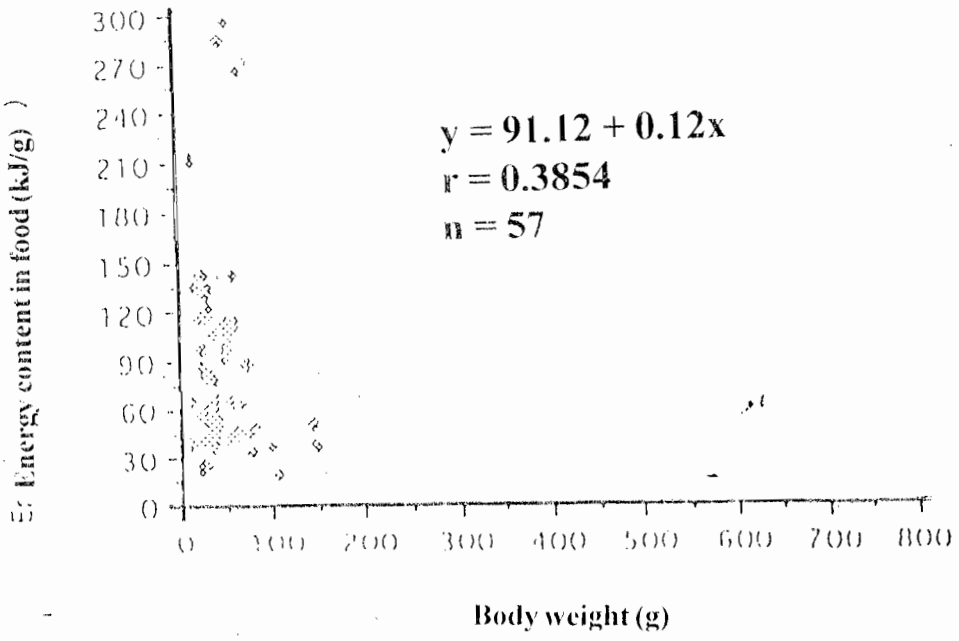


Fig. 3: Energy content in food consumed by C. obscura and body weight relationship

from analyses of stomach contents of this fish revealed that there were variations in the dietary composition with size of fish. The smaller fish fed on insects mainly, while the larger specimens fed on fish predominantly. Guseva (1990) had earlier reported that *Channa argus* in Sri Lanka also exhibited this dietary preference amongst the size groups.

Feeding intensity in *P. obscura* was higher during the dry seasons, as more stomachs of specimens that contained food occurred during this period when compared to the wet seasons. Despite this slight variation, this fish was observed to have fed actively all year round. The very high proportions of fish stomachs without food is similar to the observations on feeding habits documented by Jackson (1961), Sagua (1979), Adebisi (1981) and Fagade (1983). Reasons for piscivores having high numbers of empty stomachs have been elucidated by Green (1967), Munro (1967), Arawomo (1976) and Popoova (1978). Munro (1967) reported that *H. Vittalus*, a related species probably locates its food by sight, and most of its feeding takes place during the day. So the high number of fishes captured without food in their stomachs were those caught just before dawn and had digested the meal taken the previous day. Also the sampling period due to the fishing regulations of the day could also have contributed to high number of empty stomachs observed.

The weight of food ingested by fish did not vary significantly with body weight but rather, varied with food type. This observed variation with food type is likely to be associated with the variation in the chemical composition of the different food types(Jobling, 1983)

Energy contents of food of *P. obscura* did not vary significantly with increase in fish size. The variation observed between the wet and dry season energy contents of food ingested was not significantly ($P > 0.05$) different. Jobling (1983) reported that the variation of energy contents in diet with size and season are likely to be associated with variations in the chemical composition of the food with season and size of fish on one side and the metabolic activity on the other, without reporting whether these variations were significant or not.

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