

Feeding Habits of *Aucheonoglanis biscutatus* (Geoffrey St. Hilaire, 1827) from Sebore Reservoir, Mayo – Belwa, Adamawa State of Nigeria

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Abstract

Feeding habit of *Auchenoglanis biscutatus* from Sebore Reservoir, Mayo – Belwa, Adamawa State was evaluated monthly for a period of one year. A total of 120 *A. biscutatus* were collected as samples, washed with clean water and preserved in ice chest to minimize any post – mortem changes, taken to the laboratory for stomach contents analysis, while stomachs were preserved in formalin solution of about four percent (4%). Stomach contents of each sample were identified and analysed using the numerical and frequency of occurrence methods. Five major groups of food items constituted the diet of *A. biscutatus*. Numerical analysis showed that insects were dominant and composed of 57.88% of the group of food items in the stomach, bottom organisms 15.84%, zooplankton 11.81%, other materials 6.61%, aquatic molluscs 6.44% and phytoplankton was least with 1.42%. Frequency of occurrence indicated that detritus was dominant and found in 78.50% of the stomach, *Chaoborus spp.* larvae 73.83%, sand particles 61.68%, *Culicoides spp.* larvae 60.74%, *Chironomus spp.* larvae 58.87%, bivalves 57.00%, while the least was *Phacus spp.* in 7.47%. Stomach content analysis of *A. biscutatus* indicated that they fed on various food items ranging from insects, detritus, zooplankton, sand particles and aquatic molluscs to phytoplankton. The *A. biscutatus* from Sebore Reservoir is an omnivore bottom feeder, as bottom dwelling immature insects dominated its food items which are of animal origin. Knowledge of the feeding habits of *A. biscutatus* in its natural habitat like Sebore Reservoir it's a good pointer towards the aquaculture potentiality of these fish species.

Keywords: Feeding Habits, *A. biscutatus*. Stomach Content, Omnivore, Sebore Reservoir.

Introduction

The domestication and culture of commercially important fish species remains the key to mitigating further decline and possible extinction of these fishes (Igbana *et al.*, 2024). One of the major areas of fish that needs to be concentrated on for a successful domestication program is the food and feeding habits of fishes. Research on the feeding habits of wild fish species is a subject of continuous study due to the fact that it plays the fundamental integral

part in the development of a successful fisheries management programme in fish capture and culture (Akongyuure, 2020). The feeding habitat of fish is an important attribute of its life history and strategy of the species to ascertain the foremost necessary functional role and survival within its living ecosystems (Kuebutornye *et al.*, 2019). Many researches which are aimed at collecting such information are based on the analysis of gut contents of organisms caught from their natural habitat (Chukwuemeka *et al.*, 2019). *Acheonoglanis biscutatus* (Geoffrey St. Hilaire, 1827) belongs to the family Claroteidae and genus *Acheonoglanis* (Olaosebikan and Raji, 2013). Idodo – Umeh (2003) reported the occurrence of only two species of the genus *Acheonoglanis* in Nigeria, these are; *A. biscutatus* and *A. occidentalis* (Valenciennes, 1840), one of the major distinctive features between these two species is that *A. biscutatus* has an angular posteriorly adipose fin while *A. occidentalis* possess a rounded adipose fin. *A. biscutatus* are widely distributed in the freshwater lakes, reservoirs, rivers, streams and swamps, it contributed significantly to the animal protein sources within many freshwater bodies and also made up of a portion of the inland fisheries in Nigeria; due to the fact that its flesh is nutritionally rich and oily, it is eaten by many people. Sebore Reservoir is enriched with many commercial and potential aquaculture species but there is paucity of information on their food and feeding habits especially *A. biscutatus*. Therefore, this study was aimed at providing information on the food and feeding habits of *A. biscutatus* from Sebore Reservoir.

Materials and Methods

Study area

Sebore Reservoir is located at Mayo – Belwa local government area (LGA), Adamawa State Nigeria. Mayo – Belwa LGA lies within latitude 9° 3' 0" north and longitude 12° 3' 0" east. It covers an area of 1768km² (682.63 sq. m) and is 75 km away from Yola which is the state capital.

Specimen collection

A total of 120 specimens of *A. biscutatus* were sampled monthly for a period of one year, from December 2021 to November 2022. Fishing was done using gill nets as the fishing gear and canoe was used as fishing craft. The fish specimens were washed with clean water and preserved in ice crest to minimize any post-mortem changes and taken to the laboratory for analysis of the food contents in their stomachs.

Laboratory analysis of specimen

Each specimen was weighed to the nearest 0.01 g using a top loading Sartorius balance (model BP 310S) and standard length was measured in centimetres (cm) using measuring board. The specimen body cavity was opened using a pair of scissors, beginning ventrally from the anus to the mouth, the entire visceral and intestinal organs such as the liver, fat and other organs attached to the intestine and stomach were gently removed and emptied into a dish, the length and weight of the stomach were measured and recorded. Thereafter,

the visceral and intestinal organs were kept in formalin solution of about four per cent (4%) to avoid any form of deterioration and contamination of the stomach contents (Yusuf *et al.*, 2023). The stomach contents were dissected using a pair of scissors and the complete stomach contents were emptied into petri – dish for examination and identification based on the work of Ali *et al.* (2024). The random samples of the stomach contents were taken and dropped on a slide (counting chamber) with the aid of a dropping pipette and were viewed under a light microscope. The general views were made with a binocular dissecting microscope Olympus SZ51 (0.80 – 4x). The stomach contents were studied and recorded. The stomach contents of each of the *A. biscutatus* sample were analysed using the numerical and frequency of occurrence methods as described by Balogun (2006). In the numerical method (NM), the number of individuals in each food category was expressed as a percentage of the total individuals in all food categories:

$$NM (\%) = \frac{\text{Total no. of a particular food item}}{\text{Total no. of all the food items}} \times 100$$

In the frequency of occurrence method (FO), all stomach containing food were recorded and expressed as the percentage of the total number of stomachs examined:

$$FO (\%) = \frac{\text{No. of stomach with a particular food item}}{\text{Total no. of fish examine with food in the stomach}} \times 100$$

Statistical analysis

Data collected were analysed using descriptive statistics.

Results

Results from the 120 samples of *A. biscutatus* collected from the Sebare Reservoir shows that 58 specimens representing 48.33% had their stomach filled with food, while 49 individuals representing 40.88% were observed to have a half – filled stomach and 13 individuals representing 10.83% were observed to have an empty stomach (Table 1). The relative contributions of the food items were expressed by the numerical and frequency of occurrence methods. Five major groups of food items constituted the diet of *A. biscutatus* from Sebare Reservoir. In the numerical method, insects were the dominant and composed of 57.88% of the items in the stomachs, bottom organisms made up 15.84%, while zooplankton were 11.81%, other materials 6.61%, aquatic molluscs 6.44% and phytoplankton were the least with 1.42%. In the frequency of occurrence method detritus was dominant and composed of 78.50% of the items in the stomachs, *Chaoburus spp.* larvae made up 73.83%, sand particles made up 61.68%, *Cullicoides spp.* larvae 60.74%, *Chironomus spp.* larvae 58.87%, bivalves 57.00%, while the least was *Phacus spp.* with 7.47 (Table 2).

Table 1: Stomach Fullness of *A. biscutatus* from Sebore Reservoir

No. of Full Stomach	Percentage of Full Stomach	No. of Half Stomach	Percentage of Half Stomach	No. of Empty Stomach	Percentage of Empty Stomach
58	48.33%	49	40.88%	13	10.83%

Table 2: Stomach Contents of *A. biscutatus* from Sebore Reservoir

Food items	Numerical method		Frequency of occurrence method	
	Number of Items	Percentage (%)	Number of stomachs	Percentage (%)
Aquatic molluscs:				
Bivalves	379	6.44	61	57.00
Bottom organism:				
Detritus	932	15.84	84	78.50
Insects:				
<i>Anax</i> spp. nymph	237	4.02	47	43.92
<i>Chaoborus</i> spp. Larvae	1083	18.40	79	73.83
<i>Chaoborus</i> spp. Pupae	364	6.18	52	48.59
<i>Chironomus</i> spp. Larvae	542	9.21	63	58.87
<i>Chironomus</i> spp. Pupae	231	4.00	41	38.81
<i>Culicoides</i> spp. Larvae	725	12.32	65	60.74
<i>Culicoides</i> spp. Pupae	221	3.75	40	37.38
Other materials:				
Sand particles	—	—	66	61.68
Unidentified worms	389	6.61	38	35.51
Phytoplankton:				
<i>Chlorella</i> spp.	18	0.33	7	6.54
<i>Diatomella</i> spp.	21	0.35	9	8.41
<i>Oscillatoria</i> spp.	24	0.40	12	11.21
<i>Phacus</i> spp.	20	0.34	8	7.47
Zooplankton:				
<i>Arcella</i> spp.	98	1.67	26	24.29
<i>Centropyxis</i> spp.	84	1.42	22	20.56
<i>Daphnia</i> spp.	76	1.29	19	17.75
<i>Diaptomus</i> spp.	90	1.53	23	21.49
<i>Moina</i> spp.	93	1.58	25	23.36
<i>Nauplius</i> spp.	175	2.97	46	43.00
<i>Rotaria</i> spp.	81	1.35	21	19.62

Discussion

The feeding habits of *A. biscutatus* from Sebore Reservoir indicated that they fed on the various food items ranging from insects, detritus, aquatic molluscs, sand particles,

zooplankton and phytoplankton which was in agreement with the findings of Hassan (2015) who reported similar results for these fish species in Kiri Reservoir, Adamawa State, Nigeria and Edem and Opeh (2018) for the same fish species from lower River Benue, Makurdi. These indicated that *A. biscutatus* is an omnivorous bottom feeder since bottom dwelling immature insects and aquatic molluscs dominated most of the food items that were of animal origin. The broad food spectrum of these fish species shows that they feed on or near the substrata. The sand grains which significantly constituted the stomach contents might have been accidentally ingested along with food, but their contribution to the nutrition of these fish species is not very clear. The discovery of sand in the stomach contents of *A. biscutatus* was reported by Hassan (2015); however, Edem and Opeh (2018) reported that the bacteria and protozoa associated with sand grains may be of nutritional benefit in terms of aiding in the digestion of cellulose in these fish species. Other food items such as *Rotaria spp.*, *Nauplius spp.* and *Oscillatoria spp.* were mainly supplementary. Variations in the food and feeding habits suggested that *A. biscutatus* fed both during the day and night; therefore, light is not a limiting factor in its search for (Idodo – Umeh, 2003).

Conclusion

Findings from this study indicated that *A. biscutatus* from Sebare Reservoir feeds on a wide range of food including plant and animal food items which could make it to be regarded as an omnivore.

Recommendations

- Further study for a longer duration of least 3 to 5 years is recommended on the food and feeding habits of *A. biscutatus*.
- Further efforts to culture this fish species should be investigated to explore the aquaculture potential of *A. biscutatus* in addition to its feeding habits.

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