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Age and Growth Pattern and Biometric Features of Snake-Head Croaker, *Pseudotolithus typus* from Badagry and Ologe Lagoons, South-West Lagos, Nigeria

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Abstract

The current study examined the age and growth pattern and biometrics features of croaker *(Pseudotolithus typus*) sampled from Ologe and Badagry Lagoon respectively. A total of 20 individuals were collected between February and July 2019, from both lagoons respectively. The Length- frequency distribution of *Pseudotolithus typus* from Badagry Lagoon had five age groups while that from Ologe Lagoon had one age group. There were negative allometric growth in the length weight relationship of *Pseudotolithus typus* (b = 2.296, b = 2.433) for both lagoons respectively. Conditon factor was highest (1.26) for Ologe Lagoon and lowest (1.16) with a mean K-value of 1.42 for Badagry Lagoon. A comparative racial study of the meristic features of *Pseudotolithus typus* from Badagry and Ologe Lagoons showed no significant differences.

Keyword:

Growth, Biometrics, Pseudotolithus typus, Lagoon

Introduction

Croakers are important food in Nigeria, which represent bulk of the fishes landed in Nigerian coast. However, Croakers are threatened by mass mortality in Nigerian coastal waters, with *Pseudotolithus elongatus* being the most abundant, followed by *P. typus* and *P. senegalensis* (Oyebola *et al*., 2024). *Pseudotolithus typus* (Bleeker, 1863), also known as the long neck croaker, is a popular economic fish species in Nigeria and is consumed locally (Awotunde, 2021). *P. typus* is seen to have a lot of potential for fish farming in Nigeria because of its vast geographic distribution, rapid growth rate and ability to withstand stress. (Awotunde, 2021). There are limited information on the biology of some species such as *Pseudotolithus typus* in Badagry and Ologe Lagoons. Study on the fish length frequency distribution is essential so as to have knowledge about the composition of size and fish population structure. Length-weight relationships (LWR) is essential for the proper management of any fish species which have been applied in fish stocks assessment and population (King, 2007). Condition factor (K) is an essential tool, which indicates whether a water body is suitable for the growth of fish or not (Alam et al., 2014). Morphometric and meristic data are used to delineate and understand the critical adaptive

traits of species' phenotypes. This information will help in management and conservation of such species in changing ecosystems (Oyebola *et al*., 2024). Therefore, the study aims to estimate the growth pattern and biometrics characteristics of croaker, *Pseudotolithus typus* from Badagry and Ologe Lagoons

MATERIALS AND METHODS

Study Sites

(a) Badagry Lagoon

The Badagry Lagoon originated from River Queme in the Republic of Benin to the west of Nigeria, is located in Lagos State and opens into the Atlantic Ocean via the Lagos harbour (Akinwumi and Lawal-are 2019). It lies between longitudes 3°54″ and 4°13″E and latitudes 6°25″ and 6°35″N (Akinwumi and Lawal-Are 2019).

(b) Ologe Lagoon

The Ologe Lagoon is part of the Lagoons and creeks connected with the Lagos Lagoon and is close to the Badagry Lagoon. The Lagoon is located between latitudes $6^0$26' N and $6^0$30' N, and longitudes $3^0$03' E and $3^0$07' E.

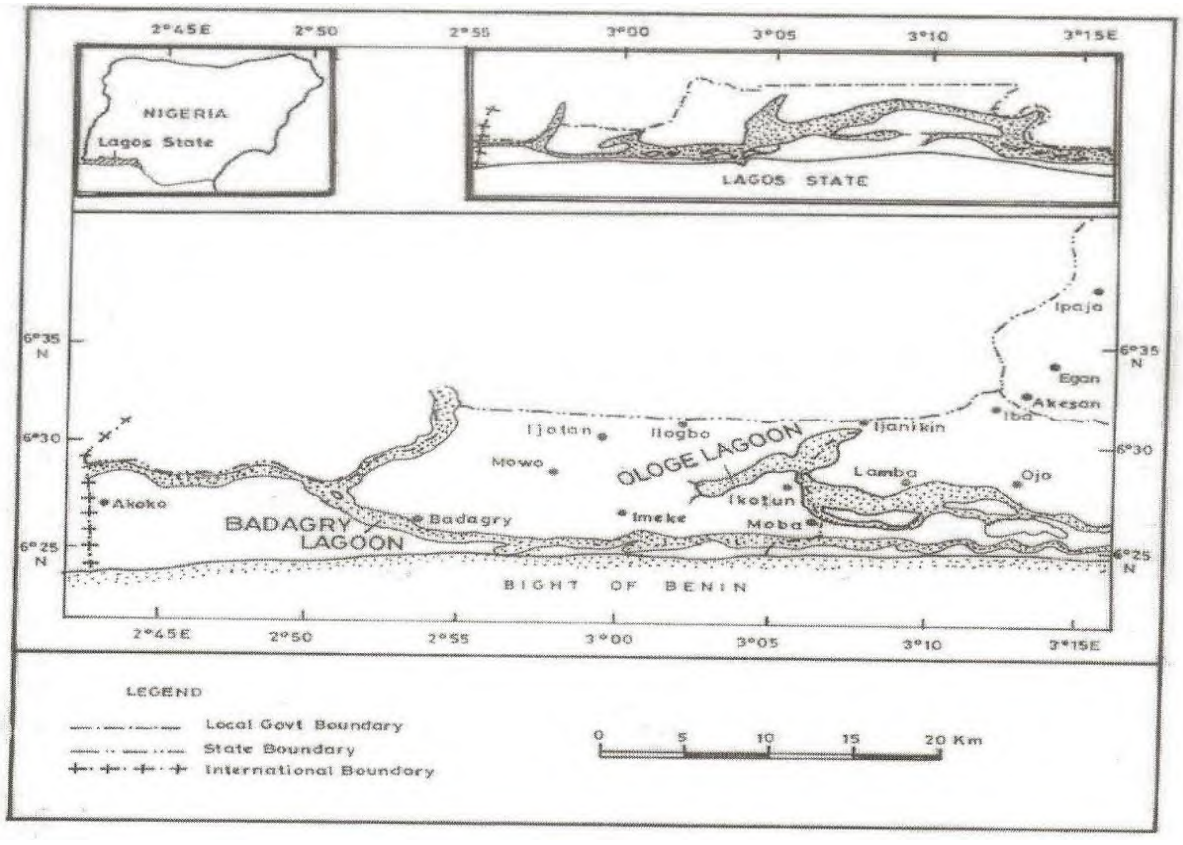

Fig. 1: The Badagry and Ologe Lagoons in south-west Nigeria

Source: Soyinka and Ayo-Olalusi (2009)

Sample Collection

Samples of *P. typus* used for this study were collected between February and July 2019, from the landing sites of artisanal fisher men from both Lagoons respectively. *P. typus* were immediately preserved in an ice chest and subsequently transported into a deep freezer in the Department of Marine Sciences, University of Lagos.

Laboratory Procedures

Samples of *P. typus* were allowed to thaw and filter paper was used to mop off the water before being examined. The fish specimens were arranged and labeled for proper identification.

(a) Length and Weight Measurement

The total length (distance from the snout of the fish to the tip of the tail fin); standard length (distance from the snout of the fish to the tip of the caudal peduncle) and forked length (distance from the snout of the fish to the tip of the forked end of the tail fin) of the specimens were taken on a measuring board and recorded in nearest 0.1 centimeters. The weight of the specimen was taken on an Electronic LCD digital weighing scale to the nearest gram.

(b) Length-Frequency Distribution

The specimens were grouped into different sizes, the percentage frequency and total length were used for length-frequency distribution.

Growth Pattern

(a) Length-Weight Relationship

The length-weight relationship was estimated by using the equation below

$W = aL^b$

Where, W = Weight in gram

L = Length in centimeter

a = Regression constant

b = Regression coefficient

The equation can also be transformed into a logarithm form to give: $\log W = \log a + b \log L$

If b = 3, the fish is said to grow isometrically. If b is less than 3 or above 3, the fish is said to grow allometrically. It can be positive or negative.

Where,

b = 3, isometric growth

b < 3, negative allometric growth

b > 3, positive allometric growth

In logarithm form, the equation gives a straight-line graph.

Where, a = intercept on the straight-line graph

b = slope on the straight-line graph

(b) Condition Factor

The growth in fish was measured with the use of condition factor also. The condition factor indicates the "state of wellbeing" or condition of the fish that is how lean or fat the fish is. It is represented by the equation:

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

Where, K = condition factor, W = weight in gram, L = length in centimeter b = growth exponent. Condition factor is usually useful for investigating effects of seasonal and habitat differences in fishes.

Biometric Characters

(a) Meristic Count

The meristic features were counted using a magnifying lens. The meristic characters counted include: First dorsal fin spines, First dorsal fin rays, Second dorsal fin rays, Pectoral fin spines, Pectoral fin rays, Pelvic fin spines, Pelvic fin rays, Anal fin spines, Anal fin rays, Caudal fin rays.

Statistical Analysis

SPSS 11.0 Window application and Microsoft Excel were used for the bio statistical analyses.

RESULTS

Age and Growth Pattern

(a) Length-Frequency Distribution.

The total length of *Pseudotolithus typus* from Badagry Lagoon ranged from 23.4cm to 32.6cm. The standard length as shown in Fig 2, ranged from 18.9cm to 28.5cm with a mean value of 22.97cm while a total of 20 specimens of *Pseudotolithus typus* were studied and analyzed from Ologe Lagoon. The total length from this lagoon ranged from 23.4cm to 30.4cm. The standard length from Ologe Lagoon as shown in Fig 3 ranged from 18.9cm to 25.6cm with a mean value of 22.5cm. Five age groups of *Pseudotolithus typus* were recorded for Badagry Lagoon while One age group of *Pseudotolithus typus* was recorded for Ologe Lagoon.

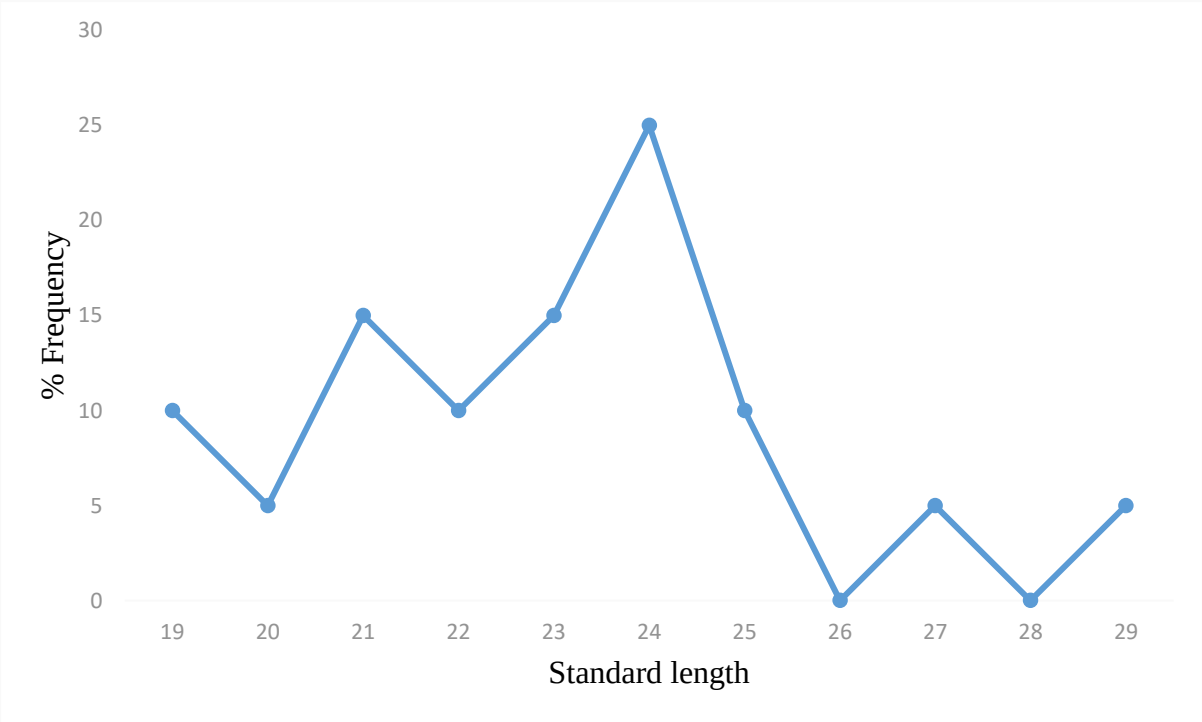

Fig. 2: Length-Frequency distribution of *Pseudotolithus typus* from Badagry Lagoon.

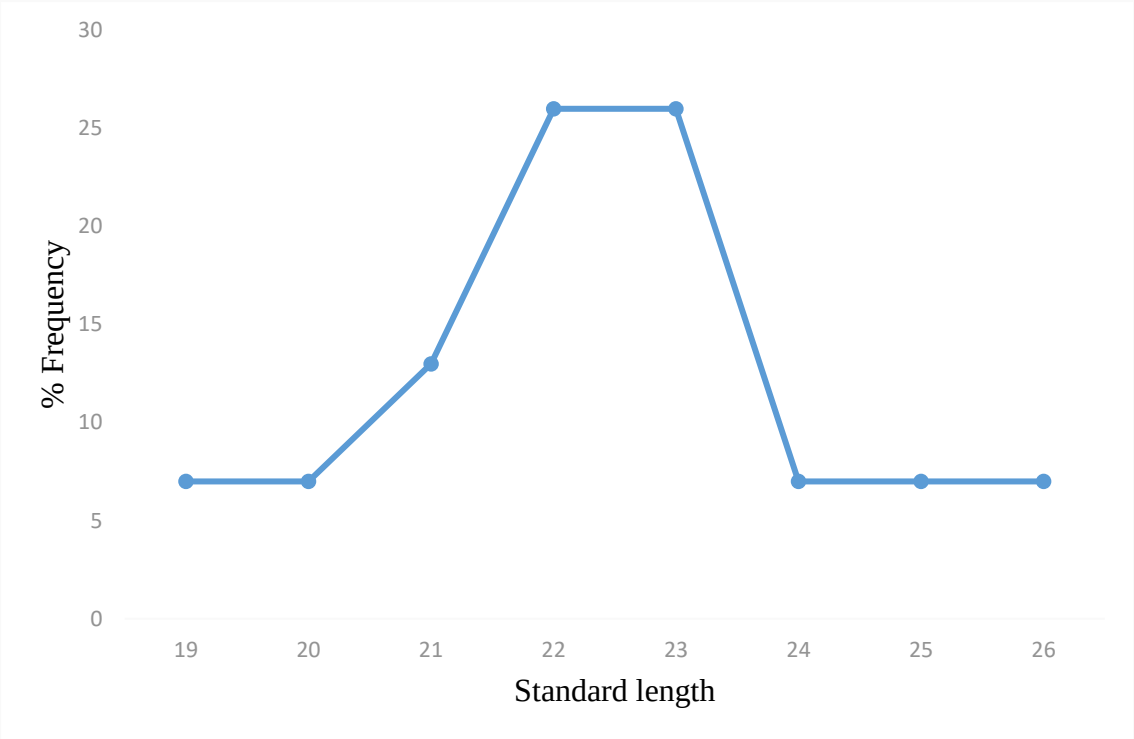

Fig. 3: Length-Frequency distribution of *Pseudotolithus typus* from Ologe Lagoon.

(b) Length-Weight Relationship

The standard length of *Pseudotolithus typus* from Badagry Lagoon as shown in Fig 4 ranged from 18.9cm to 28.5cm with a weight range of 79g to 300g while the standard length of *Pseudotolithus typus* from Ologe Lagoon as shown in Fig 5, ranged from 18.9cm to 25.6cm with a weight range of 68g to 198g.

The relationship between log standard length and log weight of *P. typus* for both Lagoons are presented in the regression equations shown below.

Badagry Lagoon

Log W= - 0.902 + 2.296Log L

(n = 20, r = 0.696)

b = 2.296

b < 3 = negative allometric growth (the species grow faster in length than weight)

Ologe Lagoon

Log W= -1.137 + 2.433Log L

(n = 15, r = 0.829)

b = 2.433

b < 3 = negative allometric growth (the species grow faster in length than weight)

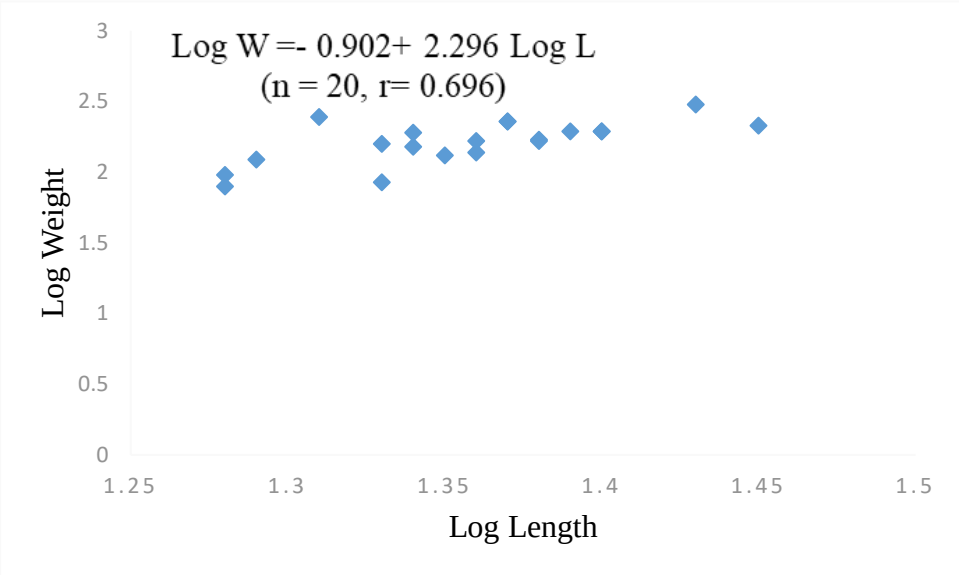

Fig. 4: Length-weight relationship of *Pseudotolithus typus* from Badagry Lagoon.

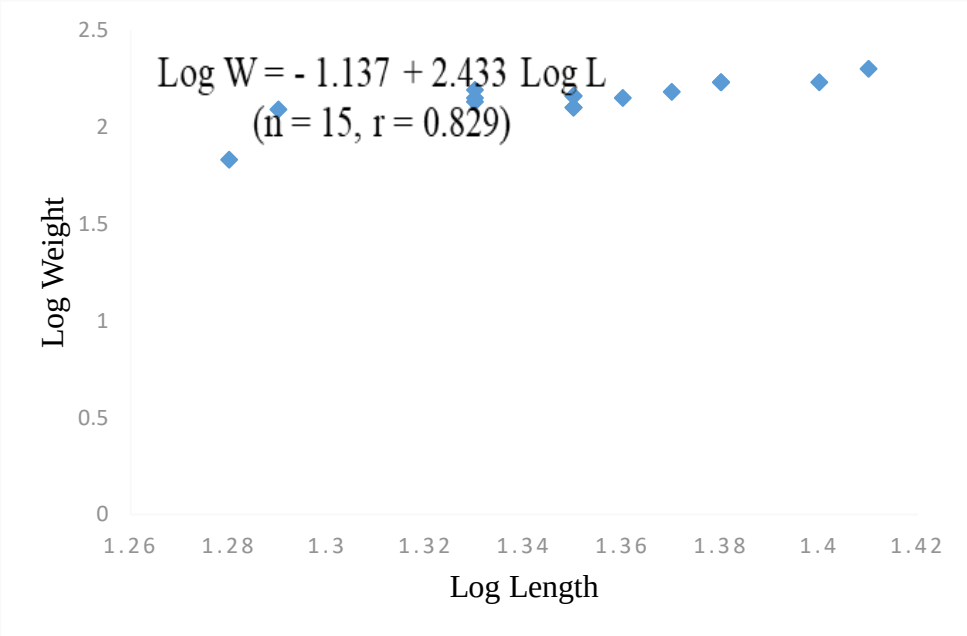

Fig. 5: Length-weight relationship of *Pseudotolithus typus* from Ologe Lagoon.

(c) Condition factor

The K-values of *Pseudotolithus typus* ranged from 1.20 to 1.83 for Badagry Lagoon as shown in Table 1(a) while the K-values for Ologe Lagoon ranged from 1.16 to 1.35 as shown in Table 1(b). The mean K-values were 1.42 and 1.26 for Badagry and Ologe Lagoons respectively.

Table 1: Condition factor in relation to size of *Pseudotolithus typus* collected from Badagry (i) and Ologe (ii) Lagoons from February to July 2019.

(i)

Standard Length (cm)	**N**	**SL (cm)**	**W (g)**	**K**
18.00-20.90	4	19.48	135.00	1.83
21.00-23.90	9	22.49	164.00	1.44
24.00-26.90	5	24.68	183.80	1.22
27.00-29.90	2	27.80	257.50	1.20

(ii)

Standard length (cm)	**N**	**SL (cm)**	**W (g)**	**K**
18.00-20.90	2	19.25	96.00	1.35
21.00-23.90	9	22.22	140.89	1.28
24.00-26.90	4	24.75	176.25	1.16
	W = Average weight (g)			

KEY:

N = Number SL = Average Standard length (cm) K = Condition factor

Biometric Features

(i) Meristic Count

Result of t-test comparing each parameter from the two locations is shown in Tabe 2 and it indicated there was significant difference ($p<0.05$) in the counts observed in the species from both lagoons.

Table 2: Meristic data of *Pseudotolithus typus* from Badagry and Ologe Lagoons during the month of February to July, 2019.

	BADAGRY LAGOON			**OLOGE LAGOON**				
Meristic characters	**Max.**	**Min.**	**Mean**	**Max.**	**Min.**	**Mean**	**t.**	**P**
D1Fs	9	9	9.00± 0.00	9	9	9.00± 0.00	-------	----
D2Fs	1	1	1.00± 0.00	1	1	1.00± 0.00	-------	----
D2Fr	32	30	30.92± 0.67	32	30	30.89± 0.60	0.098	0.923
PecfR	16	13	15.25± 1.14	18	14	14.78± 1.39	0.855	0.403
PelfS	1	1	1.00± 0.00	1	1	1.00± 0.00	-------	------
PelfR	5	5	5.00 ± 0.00	5	5	5.00± 0.00	-------	------

AfS	1	1	1.00± 0.00	1	1	1.00± 0.00	------	------
							-	
AfR	8	7	7.42± 0.52	8	7	7.22± 0.44	0.909	0.375
CfR	18	16	17.00± 0.43	18	17	17.11± 0.33	- 0.646	0.526

DISCUSSION

Pseudotolithus typus from Badagry Lagoon had five age groups while that from Ologe Lagoon had one age group. Soyinka and Ayo-Olalusi (2009) reported that the *Tilapia maria* had one age group and two age groups from Badagry and Ologe Lagoons respectively.

In this study, *Pseudotolithus typus* from both Badagry and Ologe Lagoons showed negative allometric growth patterns. Studies of the growth pattern of *Cirrhinus mrigala* and *Cyprinus carpio* by (Soni and Kathal, 1979) were found to have "b" value of 4.36 and 3.75, respectively. This could be attributed to the feeding habit of the fishes. (Abdallah, 2002) recorded a "b" value between 2.50 and 3.44 for fishes from different marine water bodies. The log standard length-log total weight relationship of *Pseudotolithus typus* from both Badagry and Ologe Lagoons showed a faster growth in length than weight (negative allometric growth). Allometric growth has been observed in other species such as female *Clarias gariepinus* (b = 2.84) and *Barilius ngwana* (b = 3.29) (Olapede and Tarawallie, 2014). The highest K-value of *Pseudotolithus typus* from Badagry Lagoon was recorded as (1.83), while the least was (1.20). The highest K-value of *Pseudotolithus typus* from Ologe Lagoon was recorded as (1.35), while the least was recorded as 1.16. These results differ from the K-value ranging from 0.49 to 1.48 obtained for *Pseudotolithus senegalensis* in Adoni river (Olapede and Tarawallie, 2014). Although all the groups in this investigation were in good condition, the highest K- values were from the small sized groups which indicated active growth process of this stage in some other species (Ikusemiju, 1975). *Pseudotolithus typus* showed no significant differences in meristic counts between Badagry and Ologe Lagoons, indicating genetic homogeneity across the sampled populations. The information documented in this work may be useful for the management and conservation of the species.

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