International Journal of

Agricultural Research

ISSN 1816-4897

Academic
Journals Inc.

www.academicjournals.com

International Journal of Agricultural Research 6 (10): 736-746, 2011
ISSN 1816-4897 / DOI: 10.3923/ijar.2011.736.746

Preliminary Study on Physico-chemistry and Comparative Morphometric Characterisation of *Cynothrissa mento* (Regan, 1917) from Ologe, Badagry and Epe Lagoons, Lagos, Nigeria

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ABSTRACT

Racial characterisation of fish species is important for taxonomic classification. The physico-chemical parameters of Ologe, Badagry and Epe Lagoons, Lagos, Nigeria were investigated and the morphometric characters of *Cynothrissa mento* from the three lagoons were compared to assess the possibility of this fish species from the three lagoons belonging to the same sub-population. The study was conducted between May, 2009 and April, 2010 and monthly sampling of fish and water was done in each sampling site. 9 physico-chemical parameters and 7 morphometric characters were assessed. A total of 386 specimens (Ologe 106, Badagry 174 and Epe 106) of *C. mento* were collected from the landings of the local fisher folks from the sampling sites. There was no significant difference ($p>0.05$) in all the physico-chemical parameters measured among the sampling sites except Biochemical Oxygen Demand (BOD). Coefficient of difference revealed that the *C. mento* from the three lagoons are uniform in all the morphometric parameters examined which means that the specimens from the three sampling sites belong to the same sub-population. Three morphometric characters (body depth, head length and head depth) with high correlations demonstrated isometric growth, that is, they were best described by simple linear regressions.

Key words: Sub-population, length-weight relationship, condition factor, co-efficient of difference, allometry, isometry

INTRODUCTION

Nigeria is a country that is very rich in aquatic biodiversity. The artificial and natural water bodies that inundate the landscape of the country have so many aquatic organisms that have not been adequately studied. A lot of them have been identified but more studies need to be carried out on indigenous species that are endemic to the Gulf of Guinea. Some of these species are only differentiated by colour band on the scale, morphological variations like number of dorsal fin rays etc or even the body weight or size (Yankova and Raykov, 2006).

The comparison of anatomical characters of aquatic organisms like fish has been an important aspect of fisheries biology for centuries (Verep *et al*., 2006). Taxonomic classification of organisms and good understanding of biodiversity of life have been based on descriptions of morphological forms for decades (Dean *et al*., 2004). However, in recent times the use of more sophisticated identification tools like amino acid electrophoresis and mitochondria DNA have been adopted in order to clearly differentiate species (Sulaiman *et al.*, 2011). Morphometric features are one of the commonly used elements for determining systematics, variation in growth, ontogenetic trajectories, well being and population dynamics in fish (Kovac *et al.*, 1999; Ayoade, 2011; Lawson *et al.*, 2011). However, investigation of morphometric variation in different fish species has in many cases disclosed a lack of homogeneity or uniformity with respect to certain characters (Ajado *et al.*, 2004).

Length and weight relationship is a tool in fisheries biology used for the evaluation of the state of health (well-being) of individual fish species in a particular aquatic environment. It can also be used to examine variability between populations of the same species (King, 2007; Sivashanthini *et al.*, 2009; Hajjej *et al.*, 2011). Furthermore, length-weight relationships are also used for comparing the growth of fish species as well as for management purposes (Moutopoulos and Stergiou, 2002; Elp *et al.*, 2006; Ahmed *et al.*, 2008). Pauly (1983) stated that Length-weight Relationship (LWR) gives important information on the habitat of the fish. This information includes the suitability of the water body to support fish and sustain its growth. Kulbicki *et al.* (2005) drew attention to the usefulness of LWR in modelling aquatic ecosystems for research purposes.

The condition factor is an important index or parameter in fisheries. It is used to estimate the condition and fatness of fish (Oniye *et al.*, 2006; Ndimele *et al.*, 2010). It is based on the theory that fish of a particular length and weight are in a better physiological condition (Bagenal, 1978; Lawson *et al.*, 2011). Condition factor is equally important for monitoring feeding intensity, age and growth rates in fish (Oni *et al.*, 1983; Adeyemi, 2011). Biotic and abiotic environmental conditions have significant influence on condition factor and can be used to assess the status (that is, ability of the water body to sustain life) of the aquatic ecosystem in which fish live (Anene, 2005).

Cynothrissa mento (Regan 1917), the Nigerian fangtooth pellonuline, is a member of the family Clupeidae (Kumolu-Johnson *et al.*, 2010). The family consists of other commercially important species like herrings, shads, sardines and menhadens. These members of the clupeidae family have been studied extensively across the globe (Soliman, 2006). However, C. mento have not been given adequate research attention either in Nigeria or even African except the work of Kumolu-Johnson *et al.* (2010). The study by Kumolu-Johnson *et al.* (2010) investigated the concentrations of Cu, Zn and Fe in C. mento from Ologe Lagoon. This is the only study on C. mento inspite of its contribution to the protein requirement of riverine communities in Nigeria (Anetekhai *et al.*, 2003).

The objectives of the present study are to provide basic background data on the morphometry of *Cynothrissa mento* from Ologe, Badagry and Epe Lagoons; and to examine morphometric variations between sub-populations of *Cynothrissa mento* from these lagoons for significant difference.

MATERIALS AND METHODS

Study area: The study was conducted between May, 2009 and April, 2010 and monthly sampling of fish and water was done in each sampling site. The study area comprises of three lagoons; Ologe, Badagry and Epe Lagoons (Fig. 1). Ologe Lagoon is a fresh water body with a surface area of 64.5 km^2. It lies between latitudes 6°27' and 6°30'N; and longitudes 3°02' and 3°07'E (Ndimele *et al.*, 2009). Badagry Lagoon lies between latitudes 6°22' and 6°42'N; and longitudes 2°42' and 3°42'E while Epe Lagoon lies between latitudes 6°29' and 6°38'N; and longitudes 3°30' and 4°05'E (Agboola and Anetekhai, 2008).

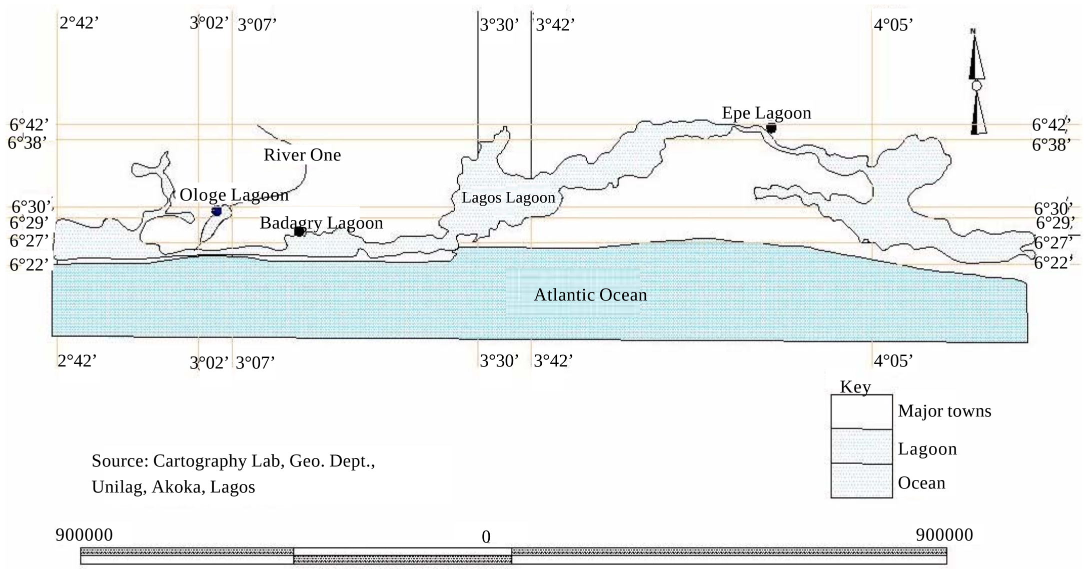

Fig. 1: Map of sampling sites (Ologe, Badagry and Epe Lagoons)

Physico-chemical parameters: Water samples were collected at a depth of 1 m below the water surface from each sampling site in 2 L plastic containers. These containers were soaked in 10% nitric acid for 24 h and then rinsed with deionised water to remove contaminants. Samples collected were stored immediately in a cooler, in order to ensure that the physical properties of the water samples were not altered. Then, the samples were transported to the laboratory for analyses. Temperature and pH were determined *in situ* using a mercury-in-glass thermometer and pH meter (Jenway 3050 model), respectively while dissolved oxygen, total alkalinity, total hardness, salinity and Biochemical Oxygen Demand (BOD) were determined by titration (Boyd, 1981). Turbidity was measured using nephelometer (Analite portable nephelometer Model 156, mcvan Instruments, Mulgrave) and conductivity with conductivity meter (Hanna portable conductivity meter model HI 8733).

Specimens of *Cynothrissa mento* from the three lagoons (Ologe, Badagry and Epe) were collected from the landings of local fisher folks during the sampling period (May, 2009-April, 2010). A total of 386 specimens from the three sampling sites were examined: Ologe Lagoon (n = 106), Badagry Lagoon (n = 174) and Epe Lagoon (n = 106). The following 7 morphometric characters were measured to the nearest 0.1 cm in the laboratory: Total Length (TL), Standard Length (SL), Body Depth (BD), Head Length (HL), Head Depth (HD), Eye Diameter (ED) and Interorbital Width (IW). Body weight was measured to the nearest gram using a top loading Metler balance.

For the purpose of comparisons between populations from the different water bodies being studied, all morphometric characters except SL and TL were expressed as a percent of SL while SL was expressed as percent of TL, although, comparisons were also done with their raw metric values. For comparison between two lagoons, the coefficient of difference (C_{dif}) was used in each of the morphometric character:

$$C_{dif} = \frac{X_2 - X_1}{SD_2 + SD_1}$$

where, X_1 and X_2 are the averages or arithmetic means, while SD_1 and SD_2 are the standard deviations of the morphometric characters at the two sites being compared. Mayr *et al.* (1953) stated that for significant difference in a morphometric character between 90% of the population from any two given sampling stations to exist, the absolute value of coefficient of difference, $C_{dif}>1.28$.

From the study of Verep *et al.* (2006), it was discovered that the relationship between SL and other morphometric characters of barbel (*Barbus tauricus*) can be linear (isometry), gradual allometry or split linear. A similar assumption/hypothesis was adopted in this study. Therefore, the relationships between individual characters (body depth, head length, head depth, eye diameter and inter-orbital width) and SL of *C. mento* and TL of *C. mento* were separately tested for linearity, gradual allometry and split linearity as described in Kovac *et al.*, (1999). The null hypothesis of this aspect of the study was that growth in each morphometric parameter was isometric and therefore simple linear regression gives the most appropriate description. There were two alternative hypotheses: the first states that growths of the morphometric characters were gradually allometric and quadratic equation gives the best description. The second alternative hypothesis states that growth of the morphometric parameters is a two phased isometric process, which is best described by a split linear regression.

The relationships between the dependent variables (BD, HL, HD, ED and IW) and SL as well as TL were separately tested for simple linear, quadratic and split linear models using F-tests as described by Sokal and Rholf (1995) and Kovac *et al.* (1999). Either of the two alternative hypotheses was only accepted if quadratic or split-linear fit was significantly ($p<0.05$) better than simple linear model.

Length-weight relationships of *C. mento* from the three sampling stations were evaluated using the equation (Ricker, 1973):

$$W = aL^b \quad (1)$$

where, W = Weight of fish (g); L = Length of fish (cm); a = y-intercept or the initial growth coefficient and b = Slope or the growth coefficient.

The values of constants a and b were estimated after logarithmic transformation of Eq. 1 using least square linear regression (Zar, 1984) to give:

$$\log W = \log a + b \log L \quad (2)$$

The slope or growth coefficients (b) obtained from Eq. 2 above by the linear regressions was tested for significant difference ($p<0.05$) from the isometric value (b = 3) using t-test as expressed by the equation according to Sokal and Rholf (1995):

$$t_s = (b-3)/SE$$

where, t_s is the t-test value, b the slope and SE the standard error of the slope (b).

The condition factor was calculated by the formula (Pauly, 1983):

$$\text{Condition factor (K)} = \frac{100W}{L^b}$$

Statistical analysis: Variations in physico-chemical properties among sampling sites were tested by one-way analysis of variance (ANOVA) (SPSS for Windows version 17.0) and where there is significant variation, Fisher's Least Significant Difference (LSD) was applied at $\alpha = 0.05$. Regression analysis (Pearson's product-moment correlation) was used to examine the relationship among the morphometric characters in the sampling stations separately and the three of them combined. In all cases, the level of significance was set at $\alpha = 0.05$, except in the regression analysis where $\alpha = 0.01$ was also used.

RESULTS

The results of the physico-chemical parameters of Ologe, Badagry and Epe Lagoons are presented in Table 1. There was no significant difference ($p>0.05$) in the physico-chemical parameters among the sampling stations. The water temperature ranges from 29.67±0.33°C in Badagry Lagoon to 30.33±0.67°C in Epe Lagoon. The pH of the three lagoons was neutral (7.44±0.07-7.63±0.03) throughout the duration of the study period. Salinity of the three sampling stations was below 0.5, which is the limit for freshwater bodies. The lowest salinity (0.17±0.07) was recorded in Ologe Lagoon while the highest value (0.23±0.06) was observed in Badagry Lagoon. The lowest value for turbidity (23±2 NTU) and total alkalinity (87±30 mg L^{-1}) were recorded in Epe Lagoon while their highest values were observed in Ologe Lagoon (turbidity: 95±15 NTU) and Badagry Lagoon (total alkalinity: 144±17 mg L^{-1}), respectively. Dissolved oxygen ranges from 3.07±0.70 mg L^{-1} (Ologe Lagoon) to 4.20±0.23 mg L^{-1} (Epe Lagoon) while total hardness varied from 104±27 mg L^{-1} (Ologe Lagoon) to 110±46 mg L^{-1} (Badagry Lagoon).

Table 2 shows the results of the morphometric characters (measured in cm), condition factors (CF), correlation coefficient (r) of body weight and standard length and the growth coefficient (b) of *C. mento* from the three sampling stations. There was significant difference ($p<0.05$) in all the morphometric characters among the three sampling stations. The values of the condition factors varied from 5.84±0.23 in Badagry Lagoon to 12.74±0.41 in Epe Lagoon. The correlation coefficients (r) of body weight and standard length for the three sampling stations were relatively high (0.81-0.93). The growth coefficient (b) of *C. mento* from the three sampling stations ranges from 2.27 (Epe Lagoon) to 2.53 (Badagry Lagoon) (Table 2).

Table 3 shows absolute values for the coefficient of difference (C_{diff}) between sub-populations of *C. mento* from the three sampling stations. The lowest coefficient of difference (0.01) was recorded in SL between Ologe/Badagry while the highest (1.22) was observed in IW between

Table 1: Physico-chemistry of Ologe, Badagry and Epe Lagoons

Physico-chemical parameter	OLOGE	BADAGRY	EPE
Temperature (°C)	30.00±0.58[a]	29.67±0.33[a]	30.33±0.67[a]
pH	7.44±0.07[a]	7.63±0.03[a]	7.55±0.05[a]
Salinity	0.17±0.07[a]	0.23±0.06[a]	0.20±0.17[a]
Turbidity (NTU)	95.00±15[a]	00.36±6.[a]	0.23±2[a]
Dissolved Oxygen (mg L^{-1})	3.07±0.70[a]	3.90±0.06[a]	4.20±0.23[a]
Total Alkalinity (mg L^{-1})	134.00±34[a]	144.00±17[a]	0.87±30[a]
Total Hardness (mg L^{-1})	104.00± 27[a]	110.00± 46[a]	0.110±18[a]
Conductivity (µS cm^{-1})	29.70±76[a]	473.00±42[a]	0.236±38[a]
BOD (mg L^{-1})	40.75±8.96[a]	48.24±6.93[a]	12.15±3.43[b]

All values are expressed as Mean±SE. Values in the same row and with the same superscript letters are not significantly (p>0.05) different

Table 2: Morphometric characters and condition factors of *Cynothrissa mento* from Ologe, Badagry and Epe Lagoons.

Morphometric characters	OLOGE	BADAGRY	EPE
TL	12.51±0.21[a]	11.93±0.13[a]	16.74±0.32b
SL	9.83±0.19[a]	9.32±0.13[a]	12.98±0.29[b]
BD	3.08±0.06[a]	2.85±0.05[a]	4.68±0.15[a]
HL	2.81±0.12[a]	2.66±0.05[a]	4.06±0.09[b]
HD	2.66±0.06[a]	2.46±0.03[a]	3.94±0.14[a]
ED	0.72±0.04[a]	0.76±0.02[a]	0.94±0.03[a]
IW	0.41±0.02[a]	0.66±0.04[b]	0.50±0.01[a]
CF	9.62±0.27[a]	5.84±0.23[b]	12.74±0.41[c]
r	0.93	0.81	0.92
b	2.32	2.53	2.27
N	0.106	0.174	0.106

All values except correlation coefficient (r) and growth coefficient (b) are expressed as Mean±SE. Values in the same row and with the same superscript letters are not significantly (p>0.05) different

Table 3: Absolute values for the coefficients of difference (C_{dif}) between sub-populations of *Cynothrissa mento* from Ologe, Badagry and Epe Lagoons

Location compared	SL	BD	HL	HD	ED	IW
Ologe/Badagry	0.01	0.30	0.02	0.16	0.31	0.94
Ologe/Epe	0.23	0.13	0.57	0.74	0.02	0.28
Badagry/Epe	0.10	0.94	0.56	0.88	0.40	1.22

Table 4: Correlation matrix of morphometric characters of *Cynothrissa mento* from Ologe, Badagry and Epe Lagoons

	TL	SL	BD	HL	HD	ED	IW
TL	1						
SL	0.95**	1					
BD	0.94**	0.91**	1				
HL	0.93**	0.89**	0.89**	1			
HD	0.94**	0.92**	0.90**	0.88**	1		
ED	0.59**	0.58**	0.54**	0.51**	0.56**	1	
IW	-0.30*	-0.23	-0.28	-0.38**	-0.22	-0.32*	1

**Correlation is significant at $\alpha = 0.01$ (two-tailed); *Correlation is significant at $\alpha = 0.05$ (two-tailed)

Badagry/Epe. These values were not significant because they are lower than the critical values, 1.28. Table 4 shows the comparison between pairs of morphometric characters and the result revealed that there were strong (r = 0.88) and highly significant differences (p<0.01) in all the comparisons except those ones that involved Eye Diameter (ED) and Inter-orbital Width (IW). The lowest significant correlation (0.30) was found between TL and IW while the highest (0.95) was observed between TL and SL.

Table 5 shows the growth pattern (linear, quadratic and split linear regressions for morphometric characters) of *C. mento* from Ologe, Badagry and Epe Lagoons with standard length as the independent variable while Table 6 shows the growth pattern but with total length as the independent parameter. The values obtained for growth pattern with SL show that quadratic and split linear regression fits were not significantly (p>0.05) better than the simple linear model in the three water bodies. A similar result was obtained when SL was replaced with TL (Table 6).

Table 5: Growth pattern {Linear (L), Quadratic (Q) and Split linear (S) regression for morphometric characters} of *Cynothrissa mento* from (a) Ologe Lagoon, (b) Badagry Lagoon and (c) Epe Lagoon using standard length as the independent variable

Dependent Variable	r for L	r for Q	FQ/L	P	r for S	FS/Q	P	F S/L	P	Fit
Ologe lagoon										
BD	0.82	0.83	0.02	NS	0.79	0.01	NS	0.01	NS	L
HL	0.75	0.76	0.10	NS	0.73	0.06	NS	0.06	NS	L
HD	0.65	0.67	0.04	NS	0.64	0.02	NS	0.02	NS	L
ED	0.65	0.48	0.02	NS	0.62	0.03	NS	0.03	NS	L
IW	0.33	0.43	0.01	NS	0.35	0.03	NS	0.03	NS	L
Badagry Lagoon										
BD	0.47	0.58	0.31	NS	0.49	0.17	NS	0.18	NS	L
HL	0.53	0.54	0.25	NS	0.55	0.14	NS	0.14	NS	L
HD	0.71	0.80	0.08	NS	0.76	0.04	NS	0.05	NS	L
ED	0.43	0.44	0.06	NS	0.40	0.09	NS	0.09	NS	L
IW	0.20	0.34	0.17	NS	0.27	0.38	NS	0.38	NS	L
Epe lagoon										
BD	0.92	0.93	0.22	NS	0.91	0.12	NS	0.12	NS	L
HL	0.90	0.90	0.10	NS	0.90	0.06	NS	0.06	NS	L
HD	0.85	0.88	0.22	NS	0.83	0.12	NS	0.13	NS	L
ED	0.28	0.51	0.03	NS	0.30	0.03	NS	0.03	NS	L
IW	0.59	0.59	0.01	NS	0.59	0.01	NS	0.01	NS	L

DB: Body depth; LH: Head length; DH: Head depth; DE: Eye diameter; WI: Interorbital width; r: Correlation coefficient; F: F-test

Table 6: Growth pattern {Linear (L), Quadratic (Q) and Split linear (S) regression for morphometric characters} of *Cynothrissa mento* from (a) Ologe Lagoon, (b) Badagry Lagoon and (c) Epe Lagoon using total length as the independent variable

Dependent Variable	r for L	r for Q	FQ/L	P	r for S	F S/Q	P	F S/L	P	Fit
Ologe Lagoon										
BD	0.61	0.74	0.03	NS	0.57	0.02	NS	0.02	NS	L
HL	0.73	0.74	0.13	NS	0.69	0.07	NS	0.08	NS	L
HD	0.82	0.85	0.03	NS	0.83	0.02	NS	0.02	NS	L
ED	0.78	0.80	0.02	NS	0.80	0.02	NS	0.02	NS	L
IW	0.40	0.61	0.01	NS	0.40	0.02	NS	0.02	NS	L
Badagry Lagoon										
BD	0.65	0.67	0.27	NS	0.66	0.15	NS	0.16	NS	L
HL	0.73	0.74	0.20	NS	0.74	0.11	NS	0.12	NS	L
HD	0.58	0.65	0.10	NS	0.60	0.05	NS	0.06	NS	L
ED	0.34	0.48	0.09	NS	0.29	0.09	NS	0.10	NS	L
IW	0.50	0.50	0.15	NS	0.46	0.35	NS	0.35	NS	L
Epe Lagoon										
BD	0.92	0.90	0.23	NS	0.89	0.12	NS	0.12	NS	L
HL	0.93	0.93	0.09	NS	0.93	0.05	NS	0.05	NS	L
HD	0.86	0.87	0.22	NS	0.84	0.12	NS	0.12	NS	L
ED	0.23	0.52	0.03	NS	0.26	0.03	NS	0.03	NS	L
IW	0.55	0.62	0.01	NS	0.58	0.01	NS	0.01	NS	L

DB: Body depth; LHP: Head length; DH: Head depth; DE: Eye diameter; WI: Interorbital width; r: Correlation coefficient; F: F-test

DISCUSSION

The results of the physico-chemical parameters showed that there was no significant difference ($p>0.05$) in these parameters among the sampling sites except BOD (Table 1). The range of values of temperature (29.67±0.33-30.33±0.67°C), pH (7.44±0.07-7.63±0.03), salinity (0.17±0.07-

0.23±0.06) and dissolved oxygen (3.07±0.70-4.20±0.23 mg L^{-1}) (Table 1) recorded in the three sampling sites were within the range (temperature <40°C, pH 6.5-9.5, salinity <0.5 for fresh water and 3.0-5.0 mg L^{-1}) recommended by the Federal Environmental Protection Agency (FEPA, 2003). However, the concentrations of total alkalinity (87±30-144±17 mg L^{-1}) and total hardness (104±27-10±46 mg L^{-1}) were above the values (total alkalinity 3.05-5.3 mg L^{-1}; total hardness 0-75 mg L^{-1}) recommended by FEPA, 2003) and the values of turbidity (23±2-95±15 NTU) recorded in this study is below the standard recommended by World Health Organisation (WHO, 1996).

Water temperature range for the three lagoons compares well with those recorded for other tropical freshwater bodies (Adakole *et al.*, 2003; Ibrahim *et al.*, 2009; Tiseer *et al.*, 2008). The normal range of temperature to which fish is adapted and can tolerate in the tropics is between 8°C and 30°C (Alabaster and Lloyd, 1982). The water temperature range of 29.67±0.33-30.33±0.67°C recorded for the three lagoons in this study is within the range of 10-50°C for rivers and dam water meant for domestic purposes and for fish culture in tropical waters (WHO, 1996; Huet, 1973). The neutral hydrogen ion concentration (pH) obtained throughout this study is adequate for fish production and within the range for inland water (6.5-8.5) (Antoine and Al-Saadi, 1982).

The results of the morphometric characters (measured in cm) (Table 2) showed that there was significant difference ($p<0.05$) in all these parameters among the three sampling sites. However, Yankova and Raykov (2006) reported that student t-test and analysis of variance (ANOVA) may not be the appropriate statistical tools to measure variation in morphometric characters of fish species. These tests do not explain the morphological differences in fish species. They show variations in fish specimens that are individuals of the same subspecies. Therefore, coefficient of difference (Mayr *et al.*, 1953) was then used to evaluate differences between pairs of sub-populations. Values of coefficient of difference varied from 0.01-1.22, that is, all the coefficients of difference for the morphometric characters for the pairs of sampling sites compared in each case were below critical value of 1.28. This means that specimens from any two samples do not belong to different sub-populations (Table 3), that is, all the specimens from the three sampling sites are members of the same sub-populations.

The values of the condition factors (5.84±0.23-12.74±0.41) recorded in the three lagoons are higher than the range (2.9-4.8) recommended as suitable for matured freshwater fish by Bagenal (1978). This could have been caused by adverse environmental factors (Anene, 2005), because the fish was not available all year round but comes with the influx of marine water into the lagoons, which indicates that *C. mento* may be a brackish water fish. The range of value of b (2.27-2.53) obtained in this study is similar to the values (2.607-3.254) recorded by Agboola and Anetekhai (2008) which studied the length-weight relationships of 35 fish species from Badagry Creek, Lagos and 2.012-2.991 reported in Kumolu-Johnson and Ndimele (2010), which studied the length-weight relationships of twenty-one fish species from Ologe Lagoon, Lagos, Nigeria. The values of b in the three sampling sites showed that the growth of *C. mento* in the sampling sites were negatively allometric. The correlation coefficients (r) between body weight and standard length for the fish species in the three sampling sites were high (Ologe $r = 0.93$, $n = 106$, $\alpha = 0.05$; Badagry $r = 0.81$, $n = 174$, $\alpha = 0.05$; Epe $r = 0.92$, $n = 106$, $= 0.05$).

Comparisons were also made between pairs of morphometric characters (Table 4) and the result revealed that there were strong ($r = 0.88$) and highly significant differences ($p<0.01$) in all the comparisons except those ones that involved Eye Diameter (ED) and Inter-orbital Width (IW).

Three characters (body depth, head length and head depth) examined showed consistently high correlations when their relationships with standard length and total length were investigated separately. However, the correlations were highest in Epe Lagoon. Although, all the morphometric characters were fitted to the three models regardless of their level of correlation, all the characters investigated were best described by simple linear regression, that is, all the morphometric characters (especially body depth, head length and head depth) in *C. mento* demonstrated isometric growth. This means that in *C. mento*, morphometric characters like body depth, head length and head depth are consistently linearly proportional to the size of the fish. That is, the linear relationship does not change regardless of the size of the fish. It can then be recommended that these morphometric characters should be used in taxonomical and/or comparative studies.

CONCLUSION

The fish specimens (*Cynothrissa mento*) from the three lagoons (Ologe, Badagry and Epe Lagoons) belong to the same sub-population despite the fact that the specimens from Epe Lagoon were generally bigger than those from the two other lagoons. Three morphometric characters (body depth, head length and head depth) with high correlations demonstrated isometric growth, that is, they were best described by simple linear regressions and thus are recommended to be used in taxonomical and/or comparative studies.

ACKNOWLEDGMENT

Authors are grateful to fisher folks in Badagry, Ologe and Epe Lagoons for their assistance during sample collection.

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