SOME BOLOGICAL ASPECTS OF *OTOLITHOIDES PAMA* (HAM-BUCH, 1822) FROM PHYAN YAY KYAW VILLAGE, NGA PU TAW TOWNSHIP, AYEYAWADY RGION

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Abstract

Study on some aspects of biology of *Otolithoides pama*, (Family: Sciaenidae) was studied in the Phyan Yay Kyaw village, Nga Wun River, Nga Pu Taw Township, Ayeyawady Region between June 2015 to May 2016. Fifty percent of male matures at the average length of 21.5cm and that of female at 17.5 cm TL. The overall sex ratio was 1male:1.2females (X^2=1.8). The highest gonadosomatic index value was observed in June and July for both sexes. Spawning season was from December to July and with the peak spawning months was June and July. Length-weight relationship of *O.pama* was negatively allometric growth (b<3). There was significanty difference between the slopes at 1% level; a combined relationship of male and females was obtained.

Keywords: Gonadosomatic index, spawning season, sex ratio, length-weight relationship

Introduction

In Myanmar Sciaenid fish are harvested by bottom gill nets, set bagnets and otter board trawlers. Sciaenids form a commercially important group of fishes in the catches of both the powered and non-powered craft. Ayeyawaddy region lies between north latitude 15˚40′ and 18˚30′ approximately and between east longitude 94˚15′ and 96˚15′ and has an area of 13,566 sq-miles (http:// myanmartravelinformation.com).

Length at first maturity is use for the potential spawners lost from the stock by fishing. The gonadosomatic index which is an index of gonad of eggs is determined size relative to fish size is a good indicator of gonadal development of fish (Dadzie and Wangila, 1980). The percentage of body weight of fish that is used for production by the gonadosomatic index. The slight variation in spawning time in different regions are primarily because of differening environmental parameters such as temperature, light, salinity which cause changes in physiological activities and subsequently spawning time (King, 1995).

Information on sex ratio is necessary for the assessment of the relationship between individuals the environment and the state of the population. In nature, the sex ratio showed the population of males and females proportion and could be expected to be 1:1 and any deviation from this ratio can examine the dominance of one sex over the other.

Length-weight relationship can be used to predict weight from length measurements made in the yield assessment (Pauly, 1993). Length-weight relationship is important in fisheries science, to raise length frequency samples to total catch, or to estimate biomass from underwater length observations. Fish can attain either isometric growth, negative allometric growth or positive allometric growth. Isometric growth is associated with no change of body shape as an organism grows.

Phyan Yay Kyaw village is situated near the Nga Pu Taw Township, located along the Nga Wun River in Southern part of Pathein. In this study area, the major catching fish was *Tenualosa sp*. and *Otolithoides pama* is the second fishing. The fishermen in this area were using man power motorized vessels and bottom-set gillnets for catching of this species. This fish is highly esteemed as food and the swimbladder of these fishes may be extensively used for making isinglass (Bhuiyan, 1964). Thus, the present study was conducted to assess size at first maturity, sex ratio,

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gonadosomatic index (GSI), spawning season and to estimate the length-weight relationship of *Otolithoides pama*

Materials and Methods

Study area and study periods

Nga Wun River which is a western branch of Ayeyawady River. Nga Wun River is also called the Pathein River. A total of (50) fishing boats from Phyan Yay Kyaw Village was fishing in the Nga wun River. Of the caught species, the average (70) kg of *Otolithoides pama* fishes was normally caught a boat per day. The specimens was conducted to Phyan Yay Kyaw Village (Lat. 16° 36′ N, Long. 94° 43′ E), Nga Pu Taw Township, Pathein District, Ayeyawady Region from June, 2015 to May, 2016.

Data collection

The fish samples were collected monthly from two fishing boats based on fish landing areas of Phyan Yay Kyaw village. The studied fishes are caught by bottom –set gill net (4.5 cm x 13.5 cm). The collected samples were then measured the body length (TL) (from the snout to the end of caudal fin) in centimeter by using fish measuring board and total wet weight (TW) in gram by using electronic balance. Identification was followed after FAO (1972, Vol-III)

Size at first maturity

The size at first maturity of the species was determined on the basis of the percentage occurrence of mature fishes in divided size groups for the purpose of determining the minimum length at first maturity in females and males.

Sex ratio

The sex of each specimens was identified by examination of the gonads. The proportion of the two sexes relative to one another was used to calculate the sex ratio. Sex ratio was calculated and tested for the expected ratio 1:1 by chi square(X^2) analysis according to the formula;

$$X^2 = \sum(O-E)^2/E$$

Where O= observed frequency of males or females, E=expected frequency of males or females

Gonadosomatic Index (GSI)

To examine, changes in the gonads as a means for estimating the spawning season of this species the gonadosomatic index (GSI) for females was computed according to Bichy (2004) as follow;

$$GSI = [OW / (BW – OW)] \times 100$$

Where OW = ovary weight (g) and BW = body weight (g).

Length–weight relationship

The length-weight relationship was calculated by the method of least squares using the parabolic equation:

$$W = aL^b \text{ (Le Cren, 1951)}$$

and after logarithmic transformation has the form of Log W = Log a + b Log L, Where W is the total weight of fishes in gram, L is the total length of fishes in cm, ‘a’ is a coefficient related to body form, and ‘b’ is an exponent indicating allometric growth when unequal to 3. The parameters a and b were estimated by linear regression of log-transformed weight and length.

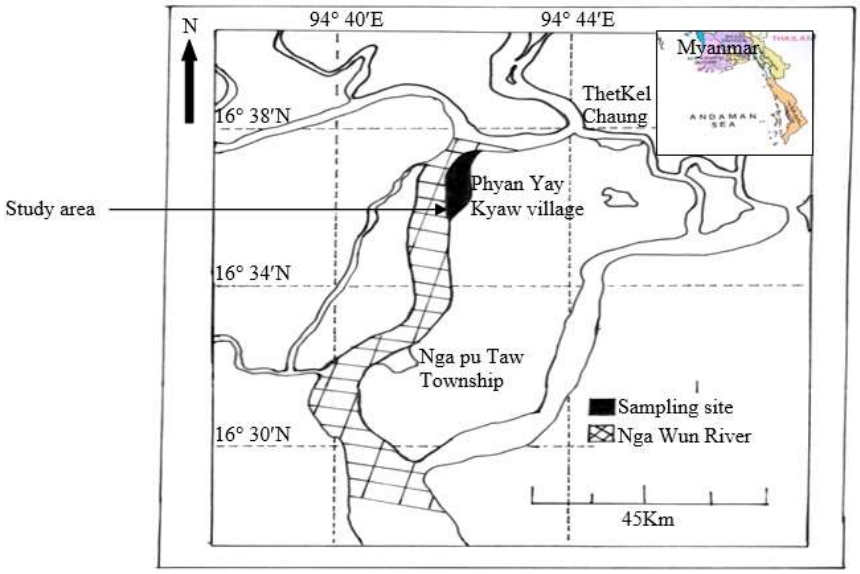

Figure 1 Map showing the study area

Results

Classification of *Otolithoides pama* (Ham-Buch., 1822)

Phylum	Chordata
Class	Acctinopter
Order	Perciformers
Family	Sciaenidae
Genus	*Otolithoides* Fowler, 1933
Species	*Otolithoides pama* (Ham-Buch., 1822)

Descriptive account on *Otolithoides pama* (Ham-Buch., 1822)

Synonyms **:** *Bola pama* Ham-Buch., 1822

Sciaenoides pama: Day, 1876

Pama pama: Fowler, 1993; Weber & de Beaufort, 1936

FAO name: Pama croaker.

Local name: Nga-poke-thin.

Fin Formula: B. VII; D.X/I/40-45; P.I.20; VI /7; A.II/8; C.16; LI. (54-57)

Diagnostic features: A large species with a conical snout and large terminal mouth; upper jaw reaching back beyond eye. Body oblong-elongate in shape. Teeth enlarged in both jaws, with 1or 2 pairs of canines in upper jaw and sometimes a pair of large teeth at tip of lower jaw. Lower gill rakers 11 to 14, long at joint of arch, shorter in front. Swimbladder carrot-shaped, with a single pair of appendages, arising from posterior end of bladder and running forward beside it to enter the head where they branch under the skull. Dorsal fin with 10 spines, followed by a low notch, second part of the fin with 1 spine and 40 to 45 soft rays. Pectoral fin as long as or longer than head; anal fin with 2 spines and 7soft rays, the 2nd spine short and weak. Caudal fin pointed. Scales cycloid

(smooth) on head and ctenoid (rough to touch) on body, very small above anterior part of lateral line; lateral line scales reaching to tip of caudal fin. Colour: no distinctive markings; light brownish along back and white beneath; head shot with gold and purple. Fins are yellowish.

Local occurrence: Rakhine Coast, Ayeyawady Delta and and Tanintharyi Coast.

Geographical distribution: Bay of Bengal, Myanmar, Malay Peninsula; India.

Main fishing gear: Caught with bottom gill nets, set bag nets and otter board trawls.

Figure 2 Study species, A) Otolithoides pama B) Swimbladder

Size at first maturity

Size of *Otolithoides pama* at first maturity was determined the average size at which 50 percentage of occurrence in total length. The total length ranging (7.5-31.5 cm) for female and (15.5-31.5 cm) for male were observed during the study period. Appearance of sexual maturity was observed at 19.5-23.5 cm length group in male and 15.5-19.5 cm length group in female. Fifty percent of male matures at the average length of 21.5cm and that of female at 17.5 cm indicating that females mature at smaller than their male counterparts.

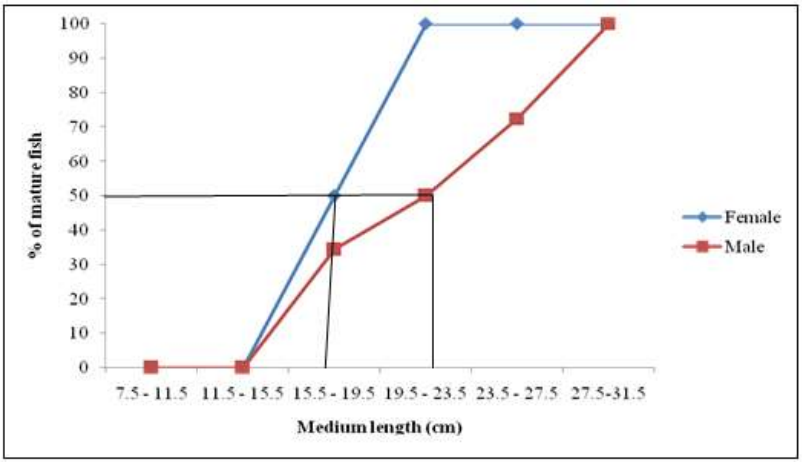

Figure 3 Size at first maturity of male and female *Otolithoides pama*

Sex ratio

A total of 780 specimens of *Otolithoides pama*, 353 males and 427 females were examined for sex ratio. The sex ratio for monthly variation was shown in Table1. Females were abundantly dominance than males during the study period except the month of July, November and January. The overall sex ratio was 1male:1.2females (X^2=1.8). Therefore, chi square test of the average ratio shows that the sex ratio was not significantly difference from the excepted 1:1.

Table1 Monthly sex ratio of *Otolithoides pama*

Months	M:F	X^2	Months	M:F	X^2
June	1:1.1	0.04	December	1:2.3	4.6
July	1:0.6	1.1	January	1:0.8	0.7
August	1:2.4	8.4	February	1:0.7	1.6
September	1:1.8	2.6	March	1:0.8	2.2
October	1:1.4	1.1	April	1:0.7	2.1
Nov	1:0.9	0.1	May	1:0.8	1.1

Gonadosomatic Index (GSI)

Gonadosomatic index was used to corroborate the spawning period of study species. In male *Otolithoides pama*, the high GSI value was observed in June and July. The GSI value decreased from August to December and then gradually increased from January to July. In femal *O. pama*, the peak GSI was observed in July. The GSI value was gradually decreased from August to November and then increased from December to May. The trends of GSI values in both sexes were similar. Gonadosomatic index of females were found remarkably higher in values over males. The peaks of GSI values showed that it closely related to the peaks of spawning period.

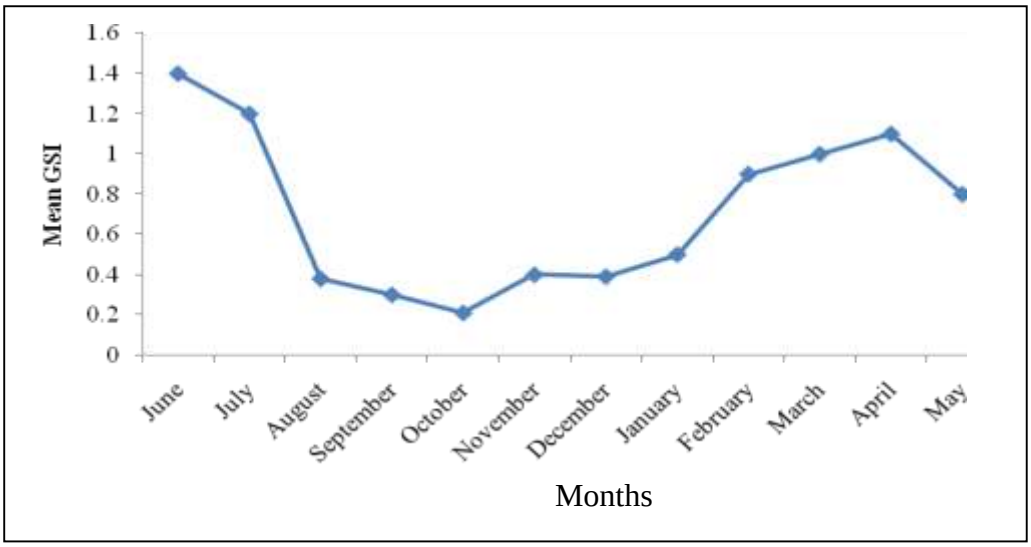

Figure 4 Monthly mean GSI of male *Otolithoides pama*

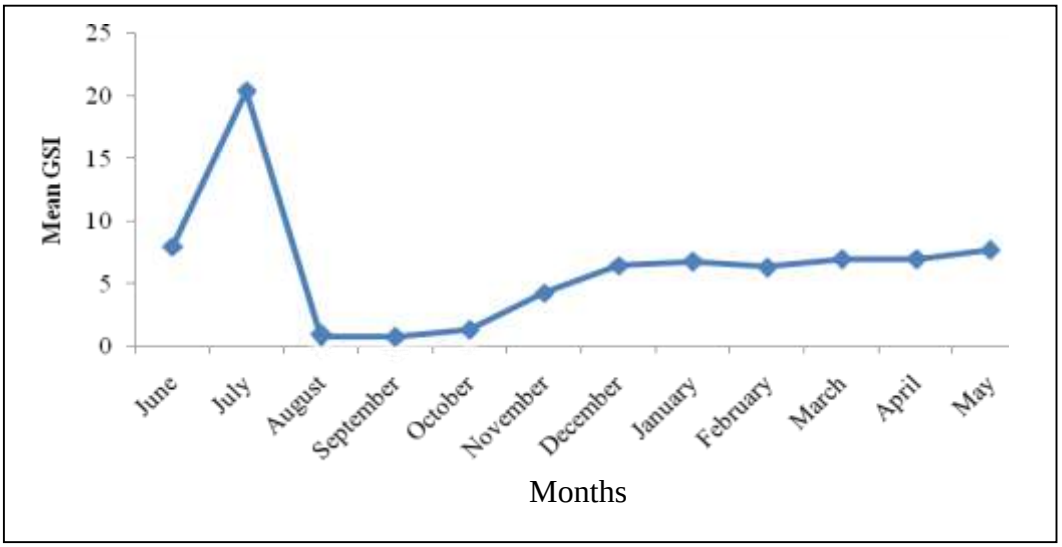

Figure 5 Monthly mean GSI of female *Otolithoides pama*

Spawning season

The GSI values of gonad maturation of the males and females indicated the presence of mature and spent stages of *Otolithoides pama*, with higher GSI values indicating the reproductive period of *O. pama*. Spawning season to be formed December to July with the peak spawning months was June and July.

Length-weight relationship

As fish grow in length, they increase in weight. A total of 182 females ranging from 7.5 to 31.5cm length with weighing from 21.7 to 156.1g and 166 males ranging from 15.5 to 31.5cm length and weighing from 34.7 to 181.4g, were used to calculate the length-weight relationship. The relationship between length and weight for males, females and pooled sexes were shown respectively.

In male: Log W= 2.803Log TL - 1.939

In female: Log W=2.075TL - 0.984

The data of sexes were pooled and a common relationship calculated by the equation: Log W=2.403TL - 1.406.

According to "b" value, male represented the highest (b=2.803), followed by b=2.403 in combined sex and b=2.075 in female. The specimens of *O. pama* were observed less than 3. The value of the slope b was lower than 3 (isometric growth) indicating that the growth of *O. pama* was negatively allometric growth and the weight increased slowly as compared to the cube of length. However, the b values in male showed nearly isometric growth compared to the other sexes. The length and weight of male was greater than the female. There was significantly difference between the slopes at 1% level; a combined relationship of male and females was obtained.

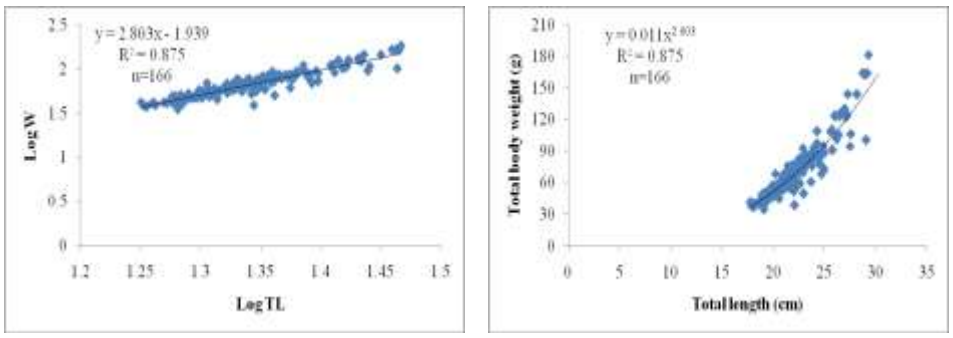

Figure 6 Length-weight relationship in male of *Otolithoides pama*

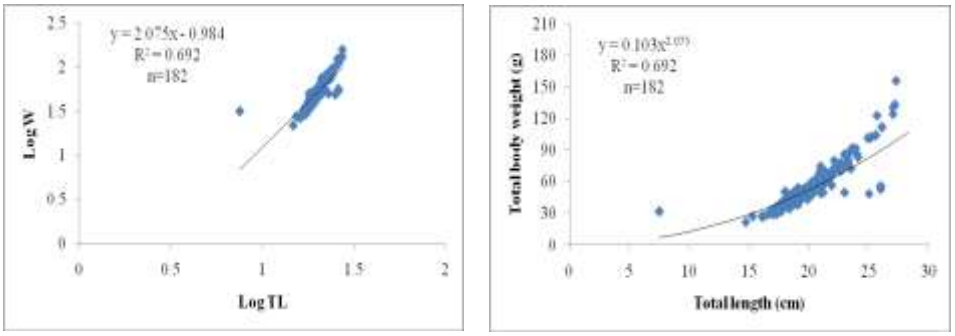

Figure 7 Length-weight relationship in female of *Otolithoides pama*

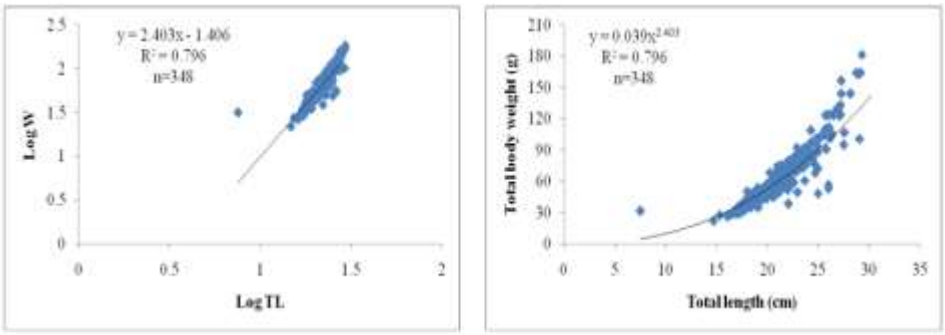

Figure 8 Length-weight relationship in pooled sexes of *Otolithoides pama*

Discussion

Size at first maturity is considered as a mark to assess the minimum catch size of study species. Min Oo (1995) reported that the minimum size at first maturity in *Otolithoides pama* can be taken as 145-170mm size groups. In the present study, female *Otolithoides pama* mature between size group15.5-19.5 cm and male mature between size group19.5-23.5 cm that was a little variation above the author.

The first sexual maturation is an important point in the animal's life history and must be taken into account for successful fish management. In the present study, appearance of sexual maturity at a mean total body length of 17.5cm in female and 21.5cm in males indicated that females mature at smaller size than their male counterparts in study area.

. Hashmi (1966) reported that the male to female ratio of *O.argenteus* was 1:2 and Ghosh (2008) also stated that male to female ratio was 1:1.09 in *O.biauritus*. Tin Hnin Wai (2010) studied the reproductive biology of *Otolithoides pama* in Pathein River, the sex ratio of males to females

was 1:2 in her study. San San Myaing (2010) described the sex ratio of *O.pama* was 1male:5.98females. In the present study, the overall sex ratio of males to females was 1:1.2 and according to the monthlty sex ratio, females were more abundantly dominance than males throughout the study period except the month of July, November and January. And so, these findings agree with above author.

Tin Hnin Wai (2010) reported that the high values of GSI were observed during the period from January to May with a peak in March. In the present study, high values of GSI were recorded in June and July for both male and female of *O. pama*, which suggested that the spawning period of *O.pama* was June and July. Osman (2011) stated that the highest value of GSI was in June and minimum value was in May. This suggestion was agreeing with the present study.

In the present study, the value of GSI was high in June and July and decreased from August to November and then increased from December to May, which show a longer spawning period of this species. Ohnmar Min (2013) assumed that the individuals of the *O.pama* population in Mon Coastal waters are asynchronous spawners. The present findings were nearly similar to those of Ohnmar Min (2013).

Ghosh (2008) stated that the peak breeding season of *Otolithoides biauritus* was in the monsoon season from May to August as evidenced by maturity stages and gonadosomatic index. San San Myaing (2010) described the spawning season of *Otolithoides pama* to be from January to December with the peak spawning months were reported February, March and September. In this present study, spawning season to be formed December to July with the peak spawning months was June and July.

Ghosh *et al*., (2008) stated that the length-weight relationship of *Otolithoides biauritus* showed that growths allometric and there was no significant difference between sexes and this was not agreed with the present finding. The length and weight of male was greater than female in this study. There was significanty difference between the slopes at 1% level; a combined relationship of male and females was obtained. The length –weight relationship of *O.pama* , the b value was lower than 3 in the study of Min Oo (1995), Ohnmar Min (2013) and Zaw Myo Hein (2014).

In the present study, the "b" value for male represented the highest (b=2.803), followed by b=2.403 in combined sex and b=2.075 in female. The specimens of *Otolithoides pama* were observed less than 3. The value of the slope b was lower than 3 (isometric growth) indicating that the growth of *O.pama* was negatively allometric growth and the weight increased slowly as compared to the cube of length. The present results were thus agreement with the above author.

Conclusion

The present study shows that sexual maturity at a mean total body length of 17.5cm in female and 21cm in male indicate that females mature earlier than males. The spawning season of *Otolithoides pama* to be formed December to July with the peak spawning months was June and July. In male and female sex ratio, females were more abundantly observed than males throughout the study period. Moreover, the present study could conclude that some biological aspects *O.pama* from Phyan Yay Kyaw village, Nga Pu Taw Township, Ayeyawady region shows similar to those found for this species in other regions.

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