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Morphological Structure of Swimbladders in some Commercial Fishes from some Markets of Yangon, Myanmar

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Abstract:- The morphology of swimbladders from seven species of fishes *Lepidocephalichthys guntca, Cirrhinus mgrigala, Labeo rohita, Channa punctatus, Anabas testudineus, Macrognathus zebrinus and Clarias batrachu* were studied during July to September 2014. Fishes were purchased from some markets such as Nandawin, Sanpya and ten quarter markets situated in South Okkalapa Township.. Five individuals of each species were used. The general morphology of the swimbladders were recorded with figures and tabulated forms. Two types of swimbladder, physostomatous and physoclistous types were recorded. In order Cypriniformes, the swimbladders were two lobes with transparent walls. In order Perciformes, it is tube-shape, single chamber. In order Siluriformes, the swimbladder is heart-shaped and thick walled. In all studied fishes, the length of the swimbladder was strongly related to the standard length of the fish. The shape and size of swimbladder and the thickness of its wall are different from each other, so is the importance of swimbladder. Swimbladder has become an attractive and persuasive fish product because of its nutrient basic ingredient useful in other goods. To sum up, the production of swimbladder is very popular and economical. The study of swimbladder and their functions should further be observed due to a few researches concerning swimbladder of fishes.

Keywords:- *Swimbladders, Physostomatous, Physoclistous.*

I. INTRODUCTION

The swim bladder, gas bladder, fish maw or air bladder is an internal gas-filled organ that contributes to the ability of a fish to control its buoyancy, and thus to stay at the current water depth without having to waste energy in swimming. The swim bladder, or air-bladder, of a fish is situated dorsal to the coelom, between the alimentary canal and the vertebral column. It is a membranous sac containing the atmospheric gases [3].

The swim bladder is also of use as a stabilizing agent because in the upright position the center of mass is below the center of volume due to the dorsal position of the swim bladder. Another function of the swim bladder is the use as a resonating chamber to produce or receive sound [6].

Among the important functions assigned to the swim bladder are: (i) phonation, or sound producing; (2) respiration; (3) accessory audition; (4) hydrostatic activities. The most important function of the swim bladder is hydrostatic, by virtue of which a fish possesed of such an organ is able to alter the amount of contained air and consequently its own specific [1].

In some Asian cultures, the swim bladders of certain large sea fishes are considered a food delicacy. Swim bladders are also used in the food industry as a source of collagen [3].

The connection between the swimbladder and the alimentary canal, the pneumatic duct, may be lost or retained in the adult. The swimbladder of an adult teleost can be referred to two main types, the open or physostomatous, which open into the foregut through the pneumatic duct, and the closed or physoclistous. Many physostomatous fishes use the bladder as a temporary or supplementary organ of respiration [4].

The present study was conducted to investigate the morphology of swimbladder and to analyze the correlation between the standard length of fishes and their length of swimbladder.

II. MATERIALS AND METHODS

Some markets such as Nandawin, Sanpya and ten quarter markets situated in South Okkalapa Township were chosen as study sites and study period lasted from July to September 2014. Seven species of fishes *Lepidocephalichthys guntca, Cirrhinus mgrigala, Labeo rohita, Channa punctatus, Anabas testudineus, Macrognathus zebrinus and Clarias batrachus* were chosen as the studied species. Five individuals of each species were used. Identification of fishes was followed after [8].

Body cavity of the fish was opened by cutting from the anus to the base of head. The digestive tract and its associated glands were removed. The swimbladder was photographed. The standard lengths of the studied fishes were measured by using ruler. The length of swimbladder was also measured by using caliper. The relationship between standard length of fish and standard length of swimbladder were analysed by using Excel Program 2007.

III. RESULTS AND DISCUSSION

A. Morphology of swimbladder

Morphological structures of swimbladder such as shape, number of chambers, colour and type of the swimbladder were observed (Table I and II).

In *Lepidocephalichthys guntca*, swimbladder is tube-shaped consisting of single chambered. It is creamy white in colour. Pneumatic duct is present and swimbladder is physostomatous type.

In *Cirrhinus mgrigala*, swimbladder is cylindrical-shaped consisting of two- chambered. It is white in colour. Pneumatic duct is present and swimbladder is physostomatous type.

In *Labeo rohita*, swimbladder is also cylindrical-shaped consisting of two- chambered. It is white in colour. Pneumatic duct is present and swimbladder is physostomatous type.

In *Chnna punctatus*, swimbladder is tube-shaped consisting of single- chambered. It is clear white in colour. Pneumatic duct is absent and swimbladder is physoclistous type.

In *Anabas testudineus*, swimbladder is tube-shaped consisting of two-chambered. It is white in colour. Pneumatic duct is absent and swimbladder is physoclistous type.

In *Macrognathus zebrinus*, swimbladder is tube-shaped consisting of two-chambered. It is clear white in colour. Pneumatic duct is absent and swimbladder is physoclistous type.

In *Clarias batrachus*, swimbladder is heart-shaped consisting of single-chambered. It is milky white in colour. Pneumatic duct is present and swimbladder is physostomatous type.

Three types of fishes were chosen as studied species based on their breathing types such as skin-breathing fishes, water-breathing fishes and air breathing fishes to the observe the morphology of swim bladder. In the present study, two types of swim bladder were recorded; physostoratous swim bladder and physochistus type.

Two types of shape, tube shapes and cylindrical-shaped were found. It agrees with the finding of [7] and [2] who studied that the shape of Siluriformes, heart shape, Cypriniformes, having anterior and posterior chambers and in Perciformes, tube shaped swim bladder.

The walls of swim bladder of catfish were found to be thick and firmly attached to the vertebral column [2]. In the present study, swim bladder of *Clarius palricus* was thick and attracted to the vertebral column.

Skin-breathing fishes, such as *Lepidocephalichthys guntca* and *Macrognathus zebrinus* have thin walled swim bladder. Air-breathing fishes such as *Channa punctatus; Anabas testudineus* and *Clarias batrachus* have single-chambered. Water-breathing fish such as *Cirrhinus mgrigala* and *Labeo rohita* have well-developed and two chambered swimbladder. It is assumed that the physostomatous swimbladders release expending air from their swimbladder through a pneumatic duct directly into the gut [5].

No	Order	Family	Scientific Name	Common Name
1	Cypriniformes	Cobitidae	*Lepidocephalichthys guntca*	Guntea loach
2	Cypriniformes	Cyprinidae	*Cirrhinus mgrigala*	Mrigal Carp
3	Cypriniformes	Cyprinidae	*Labeo rohita*	Rohu carp
4	Perciformes	Channidae	*Channa punctatus*	Spotted snake head
5	Perciformes	Anabantidae	*Anabas testudineus*	Climbing perch
6	Perciformes	Mastacembelidae	*Macrognathus zebrinus*	Zebrinus spiny-eel
7	Siluriformes	Clariidae	*Clarias batrachus*	Magun

Table 1:- List of studied species

No	Species	Shape	No of chamber	Colour	Type
1	*L. guntca*	tube	single	creamy white	I
2	*C. grigala*	cylindrical	two	white	I
3	*L. rohita*	cylindrical	two	white	I
4	*C. punctatus*	tube	single	clear white	II
5	*A. testudineus*	tube	two	white	II
6	*M. zebrinus*	tube	two	clear white	II
7	*C. batrachus*	heart	single	milky- white	I

Type I= Physostomatous, Type II= Physoclistous

Table 2:- Different morphological features of swimbladders among studied species

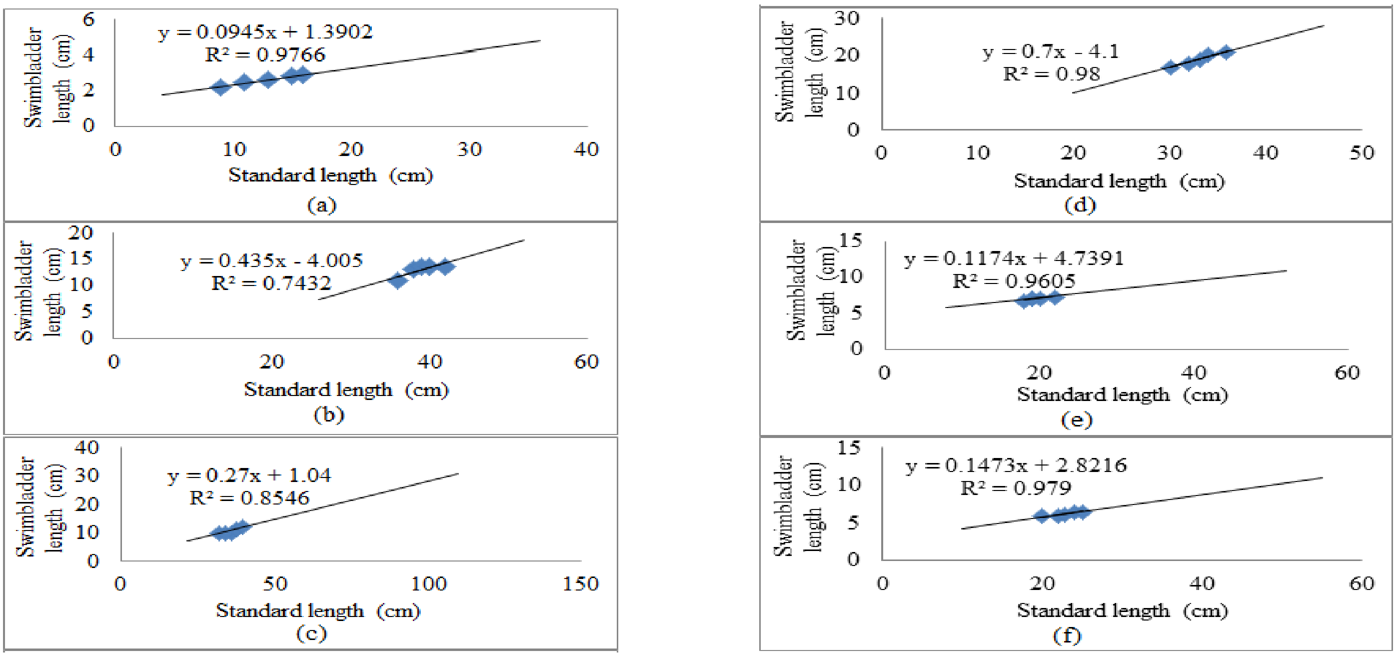
B. Relationship between standard length of fish and length of swimbladder

The correlation and coefficient between standard length and swimbladder length were found 0.976 for *Lepidocephalichthys guntca*, 0.743 for *Cirrhinusm grigala*, 0.854 for *Labeo rohita*, 0.980 for *Channa punctatus*, 0.960 for *Anabas testudineus*, 0.979 for *Macrognathus zebrinus* and 0.937 for *Clarias batrachus* (Fig. 1 and 2).

In all studied fishes, the length of the swimbladder was strongly related to the standard length of the fish (Table III).

No	Species	Mean of Standard Length (cm) (n=5)	Mean of Swimbladder Length(cm) (n=5)	Correlation coefficient
1	*L. guntca*	12.8±2.56	2.6±0.24	0.976
2	*C. grigala*	39±2	12.96±1.01	0.743
3	*L. rohita*	36±2.83	10.76±0.82	0.854
4	*C. punctatus*	33±2	19±1.41	0.980
5	*A. testudineus*	19.6±1.36	7.04±0.16	0.960
6	*M. zebrinus*	22.8±1.72	6.18±0.26	0.979
7	*C. batrachus*	29.4±2.72	2.38±0.12	0.937

Table 3:- The relationship between standard length of fish and length of swimbladder



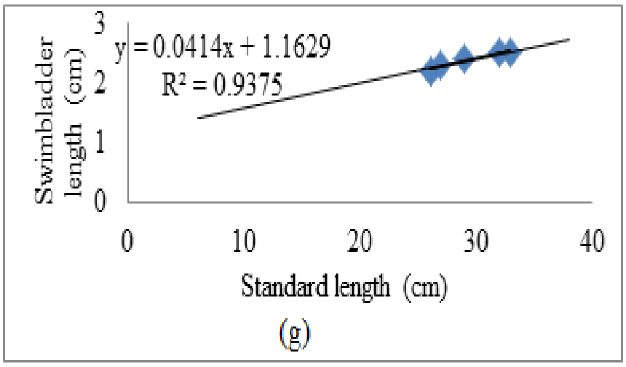


Fig.1:- Relationship between standard length and swimbladder length of (a) *Lepidocephalichthys guntca*, (b) *Cirrhinus mgrigala* and (c) *Labeo rohit*a, (d) *Channa punctatus*, (e) *Anabas testudineus*, (f) *Macrognathus zebrinus* and (g) *Clarias batrachus*.

IV. CONCLUSION

The morphology of swimbladders were studied during July to September 2014. Two types of swimbladder, physostomatous and physoclistous types were recorded. In order Cypriniformes, the swimbladders were two lobes with transparent walls. In order Perciformes, it is tube-shape, single chamber. In order Siluriformes, the swimbladder is heart-shaped and thick walled. The study of swimbladder and their functions should further be observed due to a few researches concerning swimbladder of fishes. In all studied fishes, the length of the swimbladder was strongly related to the standard length of the fish.. Swimbladder has become an attractive and persuasive fish product because of its nutrient basic ingredient useful in other goods. To sum up, the production of swimbladder is very popular and economical.

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REFERENCES

[1]. C.eHow. David. What Are the Function of the swimbladder? (internet) (Cited 2013 Dec) Available from; www.ehow.com/Hobbies,Games and Toys, 1999.

[2]. Ei Khaing Phyo. Comparative Morphology of the Swimbladders in Some Fish Species. *M.Res.* Department of Zoology, Mague University, 2014.

[3]. Encyclopedia. *Definition of the Swimbladder*. (internet) (Cited 2014 Jan) Available from; www.britanniea.com/ EBchecked/ topic/ 57704/, 2013.

[4]. S. Gwens. Introduction to the swimbladder. (internet) (Cited 2014 Jan) Available from; www.bio.devidson.deu/course/anphys/2000/martin, 2010.

[5]. St. John. Is your fish "bent" and will it survive? SPC Live Reef Fish Information Bulletin (internet) (Cited 2013 Dec) Available from; www.spc.int/.../Doc/.../LRF11-31-St.John pdf, 2003.

[6]. K.V. Kardong. *Vertebrates: Comparative Anatomy, Function, Evolution,* 2nd edition, by WCB/McGraw-Hill, p.12, 1998.

[7]. Shwe Sin. Histological study on the gas bladder of some bony fishes. *M.Sc Thesis.* University of Yangon (Rangoon), 1982 .

[8]. P.K. Talwer and A.G. Jhingram. *Inland fishes of India and Adjacent Countries*. Vol. I and Vol. II. Oxford and IBH Publishing Co. PVT. Ltd. New Delhi, Bombay Calcutta. 1158pp, 1991.

Fig 2:- Swimbladder of *Cirrhinus mgrigala*

Fig 3:- Swimbladder of *Labeo rohita* in situ

Fig 4:- Swimbladder of *Channa punctatus* in situ

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Fig 5:- Swimbladder of *Anabas testudineus* in situ

Fig 6:- Swimbladder of *Macrognathus zebrinus* in situ

Fig 7:- Swimbladder of *Clarias batrachus* in situ