

A Study on the Lateral Line Scales of Some Bony Fishes in Hinthada Markets (Ayeyarwady Division)

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Abstract

The lateral line scales of some bony fishes in Hinthada markets, Hinthada Township, Ayeyarwady Division were studied and described. The study period was from February, 2006 to February, 2007. On undertaking the study, some bony fishes sold at the markets of Hinthada were first collected and identified. Measurements of the fishes were taken and fin counts were recorded as soon as possible. Four species recorded, belonging to four genera, four families and four orders were compiled. Discussion is given on the various structures of the lateral line scales of studied species.

Key words: Lateral line scales, Bony fishes.

Introduction

Hinthada is located at the tip of the triangular shape Ayeyarwady deltaic region in which freshwater fish fauna is abundant. Fishes reach Hinthada fish markets from the *Ins* and Lakes of surrounding villages.

The lateral line scale is one of the characteristics of true fishes. In many fishes, the lateral line system is housed in the lateral line canal; prominent along the sides of the body and the head. The morphological structure of the lateral line scales also differs. In some fishes, lateral line is single and complete and in some it is interrupted into two lines. The function is thought to be that of detecting pressure and movement of surrounding water in fishes (Lagler *et al.*, 1977).

Literatures on the lateral line scales of fishes are rarely available and only a few studies such as Thinzar Win (1979) and Kyi Kyi Khin (1982) have been done concerning the scales. In addition, the study on the fishes of Hinthada District is limited except Myint Myint Khaing (1994) and Aye Aye Thwe (2004). Therefore, the present study was carried out on the lateral line scales of some bony fishes from Hinthada markets.

The obtained baseline data would be useful as basic knowledge for further applied projects. The study aims at knowing the scales of the different species of fishes, and it may partially contribute to ichthyologists on the fish fauna in Ayeyarwady Division.

Materials and Methods

Study area

Specimen collections were made in some markets of Hinthada Township, Ayeyarwady Division. It is located in 94°48' - 95° 47' E, 17° 20' -18° 31' N. The area of Hinthada Township is 988.83 square kilometers.

Study period

The study period was from February 2006 to February 2007.

Identification

The specimens were identified following after Day (1878, 1899), Tint Hlaing (1971), Jayaram (1981), Talwar & Jhingran (1991). The classification of fishes was made according to Talwar & Jhingran (1991). Local names of the specimens were noted down from the information given by the local fish mongers.

Preservation

After collecting the specimens, fishes were identified, classified and measured. The lateral line scales were plucked off by means of forceps from three different regions of the fish, i.e. behind the operculum, below the dorsal fin and in front of the caudal peduncle. The lengths and widths of the collected scales were measured. The photographs for each specimen were taken and the fishes were preserved in 10% formalin. After the three regions of lateral line scales were measured, each of them was preserved in glycerin in separate bottles. Morphological features of lateral line scales of each species were recorded by photographs.

Systematic List of the Studied Species

Phylum	-	Vertebrata
Subphylum	-	Craniata
Class	-	Pisces
Subclass	-	Teleostomi
Order (1)	-	Osteoglossiformes
Family (1)	-	Notopteridae
Genus	-	<i>Notopterus</i>
Species	-	<i>N. notopterus</i> Pallas, 1769
Order (2)	-	Cypriniformes
Family (2)	-	Cyprinidae
Genus	-	<i>Labeo</i>
Species	-	<i>L. calbasu</i> Ham. & Buch., 1822
Order (3)	-	Channiformes
Family (3)	-	Channidae
Genus	-	<i>Channa</i>
Species	-	<i>C. striatus</i> Bloch, 1794
Order (4)	-	Perciformes
Family (4)	-	Anabantidae
Genus	-	<i>Anabas</i>
Species	-	<i>A. testudineus</i> Bloch, 1795

Results

Descriptive accounts of the studied species

Notopterus notopterus Pallas, 1769 (Figure 1)

Synonym	:	<i>Notopterus bontainus</i>
Local name	:	Nga-phe
Common name	:	Feather back
Fin formula	:	B.VIII; D.7-8; P.16-17; V= 5-6, A. 100-111; C.19; L.L.200-210; L. tr. 24-25 /52

- Measurement : Total length – 20.1cm
The main lateral line scale extends from the post temporal bone above the operculum to the end of the caudal peduncle.
- Lateral line : It looks complete and distinct nearly straight and along the dorso-lateral side of the body. The number of lateral line scales about 200-210.
- Lateral line canal : Absent
- Lateral line scale : It is of cycloid type and found in minute size. Sizes of the lateral line scales vary in different regions. In *Notopterus notopterus*, the largest scales are located in place behind the operculum. The medium sized scales are present below the dorsal fin and the smallest ones on the caudal peduncle (Table 1).
- Lateral line grooves : The number of grooves in the scale also differs in different regions. The detailed measurements and number of grooves in the scales are described in Table 2.

***Labeo calbasu* Ham. & Buch., 1822** (Figure 2)

- Synonym : *Cyprinus calbasu*
- Local name : Nga-net-pya
- Common name : common carp
- Fin formula : B.III ; D.17;P.17; V.9; A.7;C.19; L.L-42; L.tr – 7 ½ -8
- Measurement : Total length – 20.0 cm. The main lateral line extends from behind the operculum to the end of the caudal peduncle.
- Lateral Line : It looks complete and distinct.
The number of lateral line scales about 42.
- Lateral line canal : The lateral line canal lies about 2/3 of the scale from middle to near tip of the scale.
- Lateral line scale : It is of cycloid type and found in moderate size. Sizes of the lateral line scales vary in different regions. In *Labeo calbasu*, the largest scales are located in place below the dorsal fin.
The medium sized scales are present behind the operculum and smallest ones on the caudal peduncle (Table 1).
- Lateral line grooves : The number of grooves in the scale also differs in different regions. The detailed measurements and number of grooves in the scales are described in Table 2.

***Channa striatus* Bloch, 1794** (Figure 3)

- Synonym : *Ophicephalus striatus*
- Local name : Nga-yant
- Common name : Striped snake head

- Fin formula : B.V ; D.37-42;P.17; V. ; A.23-26;C.13;
L.L-50-57; L. tr 45/6.2
- Measurement : Total length – 20.0 cm.
The main lateral line extends from above the operculum to the end of the caudal peduncle.
- Lateral line : It looks complete and distinct.
The number of lateral line scales about 50.
- Lateral line canal : The lateral line canal lies about 1/3 of the scale of the tip.
- Lateral line scale : It is of cycloid type and found in moderate size.
Sizes of the lateral line scales vary in different regions. In *Channa striatus*, the largest scales are located in place behind the operculum and below the dorsal fin. The smallest ones on the caudal peduncle (Table 1).
- Lateral line grooves : The number of grooves in the scale also differs in different regions. The detailed measurements and number of grooves in the scales are described in Table 2.

***Anabas testudineus* Bloch, 1795** (Figure 4)

- Synonym : *Anabas scandens*
- Local name : Nga-byay-ma
- Common name : Climbing perch
- Fin formula : B.VI ; D.XVI-XVIII/8-10;P.15; VI/5 ; A.IX-XI/9-10;C.17;
L.L-29-32;L.tr 4/19
- Measurement : Total length – 8.5 cm.
The main lateral line extends from the post temporal bone above the end of the caudal peduncle. It is not continuous, but interrupted into two lines. The anterior lateral line is longer and extends from above the operculum to about half of the tail region.
- Lateral line : It looks complete and distinct. The anterior lateral line is longer than the posterior lateral line. The posterior lateral line extends from about half of the tail region. The number of lateral line scale is about 32.
- Lateral line canal : The lateral line canal lies about 2/3 of the scale in the middle.
- Lateral line scale : It is of ctenoid type and found in both head and body. The size is moderately large although those on the operculum are of moderate size. Sizes of the lateral line scales vary in different regions. In *Anabas testudineus*, the largest scales are located in place below the dorsal fin. The medium sized scales are present behind the operculum and the smallest ones on the caudal peduncle (Table 1).

Lateral line grooves : The number of grooves in the scale also differs in different regions. The detailed measurements and number of grooves in the scales are described in Table 2.

Table 1. Comparative characters of lateral line scales

Sr No.	Name	Scale (shape)	Complete/Incomplete	Spine	Pores	Canal	Size	Remarks
1	<i>Notopterus notopterus</i> (Nga-hpe) (Feather back)	Cycloid	Complete and distinct	Absent	Absent	Absent	Minute	Lateral line in upper third of the body is quite straight. The focus is in the center of the scale.
2	<i>Labeo calbasu</i> (Nga-net-pya) (Common carp)	Cycloid	Complete and distinct	Absent	Present	Present	Moderate	Pigmented cells present (3 regions)
3	<i>Channa striatus</i> (Nga-yant) (Striped snakehead)	Cycloid	Complete and distinct	Absent	Present	Present	Moderate	Pigmented cells present (3 regions) In 3 regions, canals are present in 1/3 of the scale
4	<i>Anabas testudineus</i> (Nga-byay-ma) (Climbing perch)	Ctenoid	Complete and distinct	Present	Present	Present	Moderately large	Pigmented cells present (3 regions) It is not in continuation interrupted into two lines.

Table 2. Measurements

Sr. No.	Scientific name	Behind the operculum	Below the dorsal fin	In front of the caudal peduncle	Remarks
1	<i>Notopterus notopterus</i>	Grooves = 7 Length = 0.3 mm Width = 0.3 mm Total length= 20.1 cm	Grooves = 5 Length = 0.2 mm Width = 0.2 mm	Grooves = 5 Length= 0.1mm Width =0.1mm	Grooves = (5-7) Length=(0.1-0.3 mm) Width=(0.1-0.3 mm) Scale account = 200-210
2	<i>Labeo calbasu</i>	Grooves = absent Length = 0.8 mm Width = 0.8 mm Total length=20.0 cm	Grooves= 10 Length =1.0mm Width=0.9mm	Grooves = 6 Length=0.7 mm Width = 0.5 mm	Grooves = (6-10) Length=(0.7-1.0 mm) Width=(0.5-0.9 mm) Scale account = 42
3	<i>Channa striatus</i>	Grooves = 4 Length = 0.8 mm Width = 0.8 mm Total length= 20.0 cm	Grooves = 16 Length = 0.8 mm Width = 0.8 mm	Grooves = 12 Length =0.4 mm Width= 0.4 mm	Grooves = (4-16) Length =(0.4-0.8 mm) Width = (0.4-0.8 mm) Scale account = 50
4	<i>Anabas testudineus</i>	Grooves = 6 Length = 0.6 mm Width = 0.6 mm Total length = 8.5 cm	Grooves = 11 Length = 0.6 mm Width = 0.7 mm	Grooves = 8 Length=0.4 mm Width = 0.4 mm	Grooves = (6-11) Length =(0.4-0.6 mm) Width = (0.4-0.7 mm) Scale account = 32

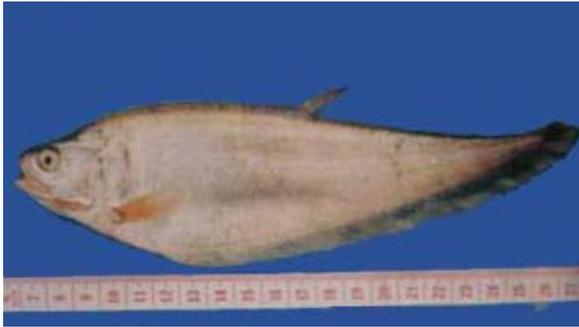


Figure 1 (A) *Notopterus notopterus*



Figure 2 (A) *Labeo calbasu*

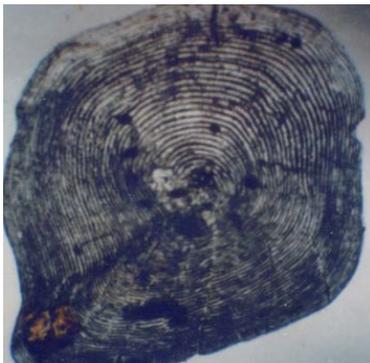


Figure 1 (B) The scale behind the operculum



Figure 2 (B) The scale behind the perculum



Figure 1 (C) The scale below the dorsal fin



Figure 2 (C) The scale below the dorsal fin

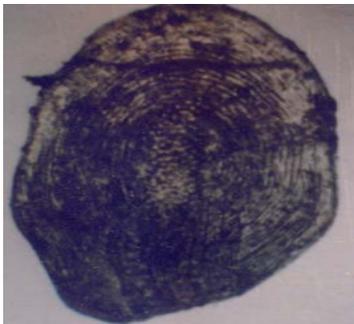


Figure 1 (D) The scale in front of the caudal peduncle



Figure 2 (D) The scale in front of the caudal peduncle

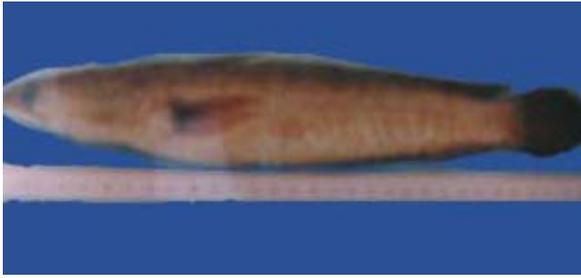


Figure 3 (A) *Channa striatus*

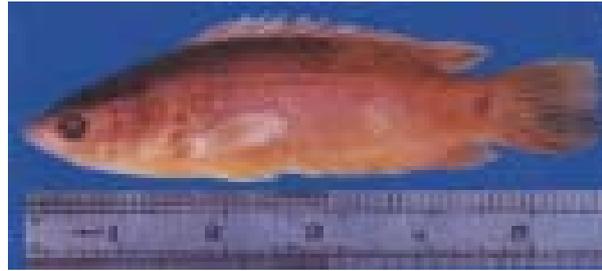


Figure 4 (A) *Anabas testudineus*



Figure 3(B) The scale behind the operculum.

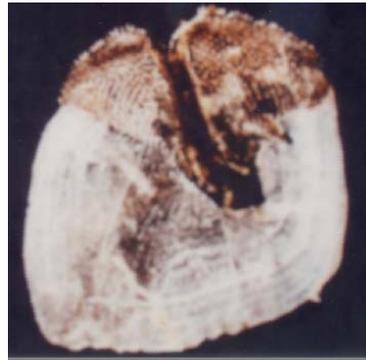


Figure 4(B) The scale behind the operculum.

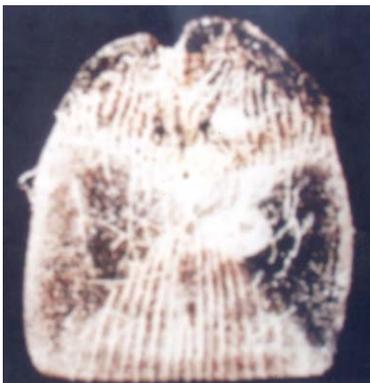


Figure 3 (C) The scale below the dorsal fin

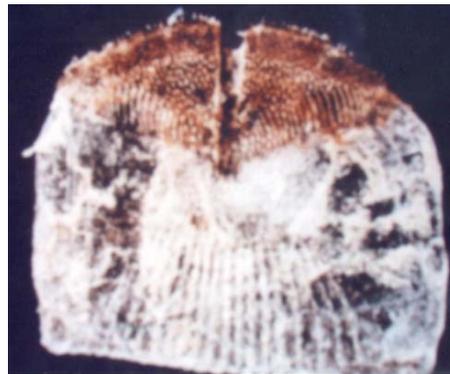


Figure 4 (C) The scale below the dorsal fin



Figure 3 (D) The scale in front of the caudal peduncle



Figure 4 (D) The scale in front of the caudal peduncle

Discussion

The study area chosen for this record is some markets in Hinthada which is located on the west bank of the Ayeyarwady River. The fishes with lateral line scales studied for the present research are *Notopterus notopterus*; *Labeo calbasu*; *Channa striatus* and *Anabas testudineus*.

The lateral line system is one of the significant morphological characters of a fish. The anterior edge of the scale being entirely embedded in the skin, only the posterior exposed portion is furnished with chromatophores. The scale is ctenoid when spines are present on its exposed hind part or it is termed cycloid when there are no spines. Cycloid scales are found on *N. notopterus*; *L. calbasu*; *C. striatus* and ctenoid scales almost universally characterize the spiny rayed bony fishes. For example, ctenoid scales are found on *A. testudineus*. Some spiny rayed species exhibit both cycloid and ctenoid scales. For instance, in *Otolithoides* scales are cycloid on the head, ctenoid on the body.

Lateral line scales are absent in some fishes, as in *Glossogobius giuris*. In this study, lateral line scales were plucked off from three different regions from the fish body. The morphological structures also differ, so do the numbers of grooves they possess.

In comparing the sizes of the scales on all these fishes, the largest one is found in *A. testudineus* and the smallest in *N. notopterus*. In the remaining fishes, the scales are of moderate size. The sizes of lateral line scales are usually different on various parts of the body of fishes. The largest scales are located in the middle part of the body and the smallest ones are found on caudal peduncle. This condition is found to be the same in all studied fishes.

The lateral line canals morphologically differ. Most of them are tube like in shape but some are in goblet shape. Lateral line canal is absent in *N. notopterus*. The lateral line canal communicates with the exterior by the lateral line pores in scale below the dorsal fin. But in scale behind the operculum and on caudal peduncle, the rim of the lateral line pores is raised above the surface of the epidermis.

The lateral line pores that open to the interior are situated on the medial surface of the scale, the exterior is situated on the lateral surface of the scale in common specimens.

The lateral lines are complete in all, except in *A. testudineus*. Their lateral lines are not in continuation, but interrupted into two lines.

The anterior lateral line is longer and extends from above the operculum to about mid region of the body beneath the spiny rayed dorsal fin. The posterior lateral line starts beneath the anterior lateral line and ends in the tip of the caudal fin. There are numerous spines in *A. testudineus*.

The lateral line is well known for its supplementary stimulation and equilibrium functions. The first lateral line function is to stimulate by slow vibrations of the watery environment and series for the orientation of the animal in relation to waves and currents. The second is to serve for equilibrium in space and hearing.

In the use of scales for the classification and identification of fish or the study of the life history, it has sometimes been desirable to describe various regions of a scale. Although they comprise only a few basic structural types, scales exhibit many modifications that are often characteristic of groups or species.

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References

- Aye Aye Thwe (2004). Seasonal occurrence of fishes found in market of Hinthada (Ayeyarwady Division) *Research paper*, Zoology Department, Hinthada University.
- Day, F. (1878). *The fishes of India, being a natural history of the seas and freshwater of India, Burma and Ceylon*. vol-I and II. William Dawson and Sons Ltd., London, England.
- Day, F. (1889). *The fauna of British –India, including Ceylon and Burma, fishes*. vol -I , II. Taylor and Francis, London, England.
- Jayaram, K.C. (1981). *The freshwater fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka*. Zoological survey of India, Calcutta.
- Kyi Kyi Khin (1982). *A study on lateral line scale and its associated nerve of some bony fishes*. M.Sc. Thesis, Zoology Department, University of Yangon.
- Lagler, K., Bardach, J. and Miller, R. R. (1977). *Ichthyology* (2nd Edition). Toppan Co., Ltd. Tokyo, Japan.
- Myint Myint Khaing (1994). *The taxonomic study of the fishes of Duya “In” from Hinthada Township*. M.Sc. Thesis, Department of Zoology, University of Yangon.
- Talwar, P.K. and Jhingran, A.G. (1991). *Inland fishes of India and adjacent countries*. Oxford and ISH Publishing Co. PVT .Ltd. Calcutta.
- Thinzar Win (1979). *The main lateral line system and neuromast system of some bony fishes*. M.Sc. Thesis, Department of Zoology, University of Yangon.
- Tint Hlaing (1971). Classified list of fishes of Burma (Classification after Leo’s –Berg, (1940). *Union of Burma J. Life Sci.*, **4**: 507-528.