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CLASSIFICATION STUDIES OF THE NILE PERCH (*Lates niloticus* LINNAEUS, 1758) PERFORMED IN THE SUDAN REGION

MOHAMMED OMER MOHAMMED*

Environment and Natural Resources Research Institute, the National Centre for Research, Khartoum, Sudan

***Corresponding Author: E mail: mom.7.3.11@gmail.com; Tel: +249 (9) 00209080**

ABSTRACT

The Nile perch (*Lates niloticus* Linnaeus, 1758) is considered as one of the most famous carnivorous freshwater fish in Africa. It is described as the strongest and fierce freshwater fish, which may reach large sizes counted over two meters. According to morphological classification, the Nile perch is one of many species belongs to family Latidae and genus *Lates* spreading along Equatorial and Ethiopian plateaus. Because of wide distribution of the Nile perch in African waters, it is called by different local names according to a particular region, but the famous ones in Equatorial countries are African snook, Victoria perch (a misleading trade name, as the species is not native to lake Victoria) and Capitaine; whereas, Ijle in Sudan region. Previous studies showed that the Nile perch family has been renamed from Serranidae through Centropomidae and lastly changed to be Latidae. Therefore, this review paper was written to provide brief taxonomic information regards to this fierce, commercial Nile fish.

Keywords: Freshwater Fishes, Nile Fishes, Carnivorous Fishes, Nile perch.

INTRODUCTION

The Nile perch (*Lates niloticus* L.) is a species of freshwater fish native to the Congo river, Nile river, Senegal river, Niger river, and lake Chad, lake Volta, lake Turkana and other river basins. It is now widespread through Africa and Australia **(Plate 1)**. It has many numbers of common names such as: snook, Capitaine and Victoria perch beside many local names in various accents scattered in Africa such as Luo name Mbuta and Ijle in Arabic accent. The maximum length that the Nile perch reaches is nearly two meters (more

than six feet), weighing up to 200 kg. Mature fish average 121–137cm though many fish are caught before they can grow this large. The Nile perch feeds on fish (including its own species), crustaceans, and insects; the juveniles also feed on zooplankton **[1, 2]**.Taxonomic information is necessary to understand ecosystem and genetic diversity, but the study of phyletic diversity cannot be considered separately from the taxonomic information upon which it is based **[3]**.

Proper identification of organisms is necessary to monitor biodiversity at any level **[4]**. Furthermore, if decisions are to be made about preserving species then relationships among species, must be known to determine the evolutionary uniqueness of the species **[3]**. Therefore, this short review paper attempts to shade light on the development steps of taxonomic hierarchy through the first established by Linnaeus(1758) up to date by **[5, 6]**.

The Nile Perch Family

There are many studies that have been carried out on classification of the Nile perch. They appeared differences in grouping the Nile perch under family. Taxonomists, therefore, have change family category that includes the Nile perch from Centropomidae as elucidated by [**7]** to be Latidae **[6, 8, 9]** as follows:

a) Taxonomic hierarchy by [7]

Kingdom: Animalia
Phylum: Chordata
Subphylum: Vertebrata
Superclass: Osteichthyes
Class: Actinopterygii
Subclass: Neopterygii
Infraclass: Teleostei
Superorder: Acanthopterygii
Order: Perciformes
Suborder: Percoidei
Family: Centropomidae
Subfamily: Latinae
Genus: *Lates*
Species: *Lates niloticus*

b) Taxonomic hierarchy by [6, 8, 9]:

Kingdom: Animalia
Phylum: Chordata
Class: Actinopterygii
Order: Perciformes
Suborder: Percoidei
Family: Latidae
Genus: *Lates*
Species: *L. niloticus*

GENUS *LATES*

Genus Lates has been recorded living in freshwater in Africa with many other fish species. The Nile perch is considered the most common species of *Lates* in African water **[8]**. Fish body of this genus is elongate or oblong, compressed, with elevated and

depressed back and, has a pointed head. *Lates* body is covered with moderate or large, adherent or deciduous, cycloid or ctenoid scales. Lateral line is continuous or by exception interrupted. Its mouth is moderately large, horizontal or oblique and moderately protractile. Maxillas expose a supplementary bone, which is present or absent. Preoperculum has a single posterior serrated border or two serrated or spinous ridges inferior to eyes. Second suborbital produces into a sub-ocular lamina or shell and usually has teeth on the palate. Lower pharyngeal bones are separated arches with free gill membranes **[10]**.

The Nile Perch

The Nile perch **(Plate 1)** is silver in color with a blue tinge. It has distinctive dark black eyes with a bright yellow outer ring. Its body is deep, elongate, moderately compressed and sometimes grows stretching wider than a grown man's spread arm. It is covered with small ctenoid scales and having a continuous lateral line **[10, 11]**.

Dorsal fin is divided by a deep notch into anterior spiny ray, which consists of eight to nine spines besides a posterior soft-rayed section. Anal fins have three spines; whereas, pelvic fins with only one spine, situated close to pectoral fins. Caudal fin is rounded in shape, and not formed into two lobes. Its mouth is terminal and has protractile character; large and serrated with small bands arranged in bands **[11, 12]**. Pre-orbital and pre-opercula bones armed with spines; a large spine on the free edge of the operculum. Dark grayish-blue on dorsal part; whereas, grayish-silver on flank and ventrally **[13]**.

The common length (average size) of the Nile perch is between 85 cm-100 cm of SL male/unsexed **[14]**, but its maximum length is 200 cm TL male/unsexed **[13]**. It is usually seen around 2 kg to 4 kg, but it has been seen also at larger than uncommon sizes that reach up to both 200 kg and 232 kg. Length at first maturity L_m 70.1, ranges from 42 cm – 85 cm **[15]** and females are generally larger than males.

In Lake Nassir, it was found that the Nile perch weighing 175 kg and measured up to 2 meter in length **[16]**. In Lake Nubia, the Nile perch showed small weights ranged between 15.8 kg and 39.2 kg during 1972 and 1980; whereas, the maximum length was recorded reaching at 180 cm **[17]**. In the White Nile, existing ratio of the Nile perch coinciding with other fishes in a fishery of Jabel Awlia Dam Reservoir was 3.22%; whereas, it was only 6.52% in Al-Kalakla fishery near to the Blue and White Niles confluence in Khartoum city **[18]**.

Common Taxonomic Studies on the Nile Perch

a) Classification of Boulenger (1915)

[19] classified the Nile perch under family Serranidaeand gave a more precise description written on the Nile perch that other ones done in the Nile river. The description is as: depth of body **(Figure 1)** 2½ to 4 times in total length, length of head 2¾ to 3½ times; shape very variable, the upper outline of the head usually more or less concave. Snout rounded, as long as or a little longer than eye (much longer in very large species); lower jaw projecting; eye 4 (young) to 7 times I length of head, ⅘ to 1⅓ times in interorbital width; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity at least three-fourths diameter of eye; prae-and suborbital finely serrated; cheek, gill-cover, and occiput with large scales; praopercular border forming nearly a right angle, finely serrated on vertical limb, with 3 or 4 strong spines on lower limb, and with one or two still stronger spines at angle; a single opercular spine; clavicle with some strong denticulations above the base of the pectoral fin. Gill-rakers rather long, 15 to 17 (including knob-like rudiments) on lower part of anterior arch. Dorsal VII-VIII, I-II 10 – 14, connected at the base; spines strong, first and second short, third very strong, longest ⅓ (adult) to ⅔ (young) length of head, usually as long as or longer than longest soft rays. Anal III 7 – 9; spines short, second and third equal or third longest. Pectoral nearly ½ to $^{3}/_{5}$ length of head. Caudal rounded. All the soft rays of the vertical fins more or less densely scaled, at least at base. Caudal peduncle is as long as a deep or a little longer than deep. Scales are 12/22 – 24. Uniform brown or olive above in the adult, silvery beneath, sometimes tinged with yellow, young usually (occasionally up to a length of 250 millimeters) marbled with brown, sometimes uniform; very young species (under 70 millimeters) with more or less irregular dark brown cross-bands; the first of which extends on the deepest part of the dorsal fin; fins whitish, dark at the base in young. It reaches a length of 1800 millimeters (millimeters).

b) Classification of Sandon (1950)

[20] also grouped the Nile perch under family Centropomidae as a single fish species belongs to instead of Serranidae which was used by **[19]** when wrote the taxonomic hierarchy of the Nile perch. Moreover, **[20]** described the Nile perch spreading in the Nile river as: this great, fierce, carnivorous fish **(Figure 2)** is too well known to require detailed description, but the following points should be noticed: dorsal fin divided into two

parts, connected at the base; the anterior part with spines, of which, the third one is the longest and, the posterior part with 10-14 softrays; anal fin with three short spines in front, and 8-9 longer soft rays behind; ventral fins situated well forward with a large pointed scale at the base; caudal fin rounded, not lobed. The largest specimens run to nearly 2 meters in length and 120 kilograms in weight.

c) Classification of Amirthanlingham and Khalifa (1965)

[21] classified that the Nile perch **(Figure 3)** belongs to Serranidae in agreement with **[19]**; whereas, the description of the Nile perch was as: body is moderately long, compressed and covered with ctenoid scales. Head is moderate and covered with cycloid scales; preoperculum has toothed border; operculum ends in a spine. Mouth is large with jutting lower jaws. Two nostrils are on each side of head, close to the eye. Dorsal fin has spines and is deeply notched suggesting two fins; the posterior part is with only soft rays. Caudal fin is moderately long and slightly rounded in outline. Anal fin has three spines. Pelvic fin is thoracic with a single spine. Pectoral fin is average. Lateral line is single, complete and nearer to the dorsal than the ventral outline in the trunk and median in the caudal peduncle. It is silvery above, or dark, on dorsal side as well as on edge of fins. Specimens reach up to 200 cm; the largest specimen has weighed 360 pounds. It is fierce carnivorous fish; and good sporting fish; breeds from April to September near Khartoum. It feeds on fish. It can be caught with hook and line. It is an excellent eating fish, but those of more than 45 cm are inclined to be coarse.

d) Classification of Bailey (1994)

[22] did a survey in 1994 on the Nile river and recorded many local names related to the Nile perch **(Figure 4)** according to a particular region of the Sudan. In central Sudan where Arabic groups live, the Nile perch is named Ijle; in area of Shilluk tribe, is called Ceil; Dinka tribe calls it Gwet; Nuer tribe calls it Cal and in far south of Sudan where Zande people live, they call it Nganzi. Bailey also believed that family Centropomidae is the family of the Nile perch in harmonizing with **[20]**. Hence, He described the Nile perch as: it has deep body that is covered with small ctenoid scales and having a continuous lateral line. Its dorsal fin is divided by a deep notch into anterior spiny and posterior soft-rayed sections; anal fin is with three spines; pelvic fin has one spine, and situated close to the pectorals. Mouth is large protrusible, and has bands of small teeth. Juveniles are with irregular dark bars or mottling on flanks. It inhabits throughout the Nile drainage channels, lakes and irrigation

canals. It consumes essentially piscivorous; smaller fish and also large crustaceans and insect. Juveniles are zooplanktivorous.

e) Classification of Mohammed (2011)

[23] carried out a morphometric study on the Nile perch spreading in the White Nile in the Sudan region. He described the Nile perch **(Plate 2)** as: head is a pointed part of body, which lies horizontally and its upper outline forms a concave shaped-like that differs apparently between two different shapes of the study fishes. Measured head dimensions are as: head length is 6.0cm; head height is 5.0 cm and head depth is 1.9 cm. Mouth is a terminal in position, wide and bounded by two biting jaws as well as premaxillary and supermaxillary bones. Premaxillaryis laid at the tip of mouth and has a width of 0.2 cm; while, supermaxillaryis laid at the angle of mouth and has a width of 0.7 cm. The ratio between supermaxillary to premaxillaryis 0.4 cm, whereas lower jaw length is 3.4cm. There is one row of spinous on lachrymals lying interior to eyes and close to premaxillary. Their numbers ranged between 18→24.Eyes are distinctive circle-shape organs, built of a bright yellow outer ring surrounding a black small one. Eye diameter is 1.1 cm and eye interorbitalis 0.7cm. The ratio between eye diameter to eye interorbital distance is 1.6 cm. Nostrils are represented by two pairs of small openings on each side of head between eyes and snout. The anterior nostrils are smaller than posterior and laid at 0.7cm from the upper tip of mouth; while posterior ones laid at 0.9cm from the same place. Nostrils inter distanceis 0.8 cm. Length of snout is 0.7 cm.Pre- and opercula and cheek are placed at occiput with scales which end posteriorly in large ones. Praopercular border forming finely serrated edge on vertical limb range between 22→27 spinous and with 4→5 strong spines on base of the limb. One of these spines is the strongest placing at the angle and has a length 0.5 cm. The operculum or gill-cover is supported by interorbitals (branchiostegeal rays) which are 7. Total number of gill arches inside the gill-cover is 4. On clavicle closely above base of pectoral fins, there are 4→5 denticulations; two of them directed to mid-dorsal line are sometimes found merged **(Plate 2)**.

Three first spines of dorsal fin, all spines of anal and pectoral fins were studied. It was used the third spine of dorsal fin as referee in comparing with lengths of the other spines, due to it is the longest one. Results of spines lengths were: lengths of first (1^{st}DFS), second (2^{nd}DFS) and third (3^{rd}DFS) of dorsal fin were 0.6 cm, 1.4 cm and 3.7 cm respectively. The 1^{st}DFS equaled 6.2 times in length of 3^{rd}DFS; while, the 2^{nd}DFS equaled 2.6 times

in length of 3rdDFS. Length of first anal fin spine (1stAnFS) was 0.9 cm, which equaled 4 times in length of the 3rdDFS. Length of second anal fin spine (2ndAnFS) was 1.6 cm, which equaled 2.3 times in length of the 3rdDFS. Length of the third one of anal fin (3rdAnFS) was 1.4 cm, which equaled 2.6 times in length of the 3rdDFS. Pelvic fin contained only one spine (PvFS) that had 2 cm in length and equaled 1.9 times in length of the 3rdDFS.

Plate 1. Nile perch (*Lates niloticus* L.) photographed by Mohammed (2011)

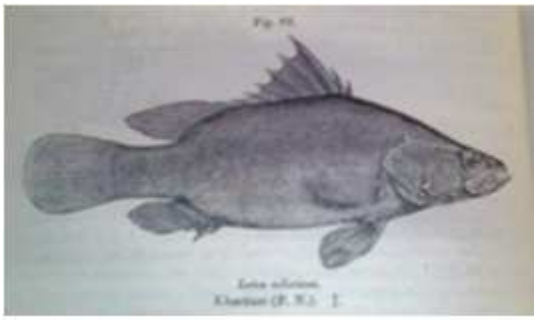

Figure 1. Nile perch drawn by Boulenger (1915)

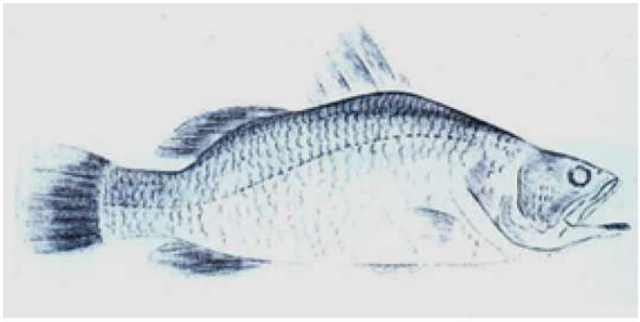

Figure 2. Nile perch drawn by Sandon (1950)

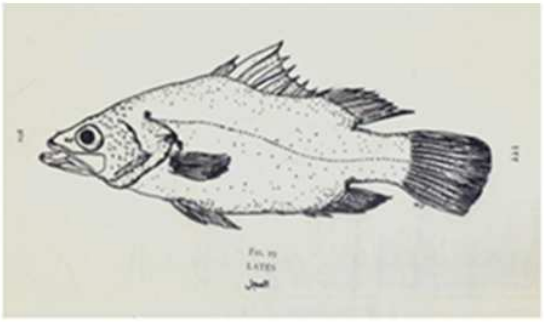

Figure 3. Nile perch drawn by Amirthalingham and Khalifa (1965)

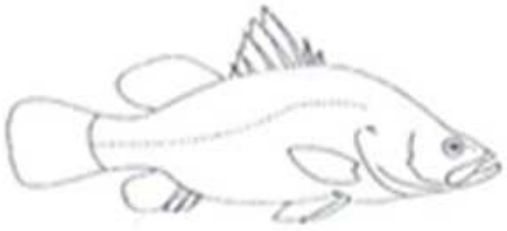

Figure 4. Nile perch drawn by Bailey (1994)

Plate 2. Nile perch photographed by Mohammed (2011)

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