Egyptian Journal of Aquatic Biology & Fisheries
Zoology Department, Faculty of Science,
Ain Shams University, Cairo, Egypt.
ISSN 1110 – 6131
Vol. 23(3): 207 – 223 (2019)
www.ejabf.journals.ekb.eg

Identification key by scales differentiation for some labrid fishes, Red Sea, Egypt

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ARTICLE INFO
Article History:
Received: June 17, 2019
Accepted: July 12, 2019
Online:July 15, 2019

Keywords:
Labrid fishes
Scale structure
Identification key
Hurghada
Red Sea
Egypt

ABSTRACT

The present study aimed to identification of labrid fish species (Family: Labridae) inhabiting coral reef in Hurghada, Red Sea, Egypt based on differences in morphology of scales as well as construction of a key to the identification of these species. Fishes were collected from land fish market in Hurghada of Egyptian Red Sea, during the period from April 2016 to May 2017. The scales of studied species were removed, stained and examined.

Scales in labrid fish were mainly of cycloid type and covered the whole-body regions in most species of family Labridae and absent on operculum region in remnant species. The shape, margin, focus, separation line and granulation area of scales in different regions of the fish body may constitute as criteria for differentiating between studied labrid fish species. Scale shapes were trapezium, triangle, circular, hexagonal, obliquely quadrate, rhombic and irregular. Scale margin were emarginated, crescent, circular, biconcave, blunt, triangle and irregular in shape. The focus of scales was central and caudal area in position. The focus in scales was rounded and oval in shape. In the caudal field, separation line shape in scales was reversed V shape (^), somewhat straight, semi straight and circular. Granulation area in scales was triangular, circular, semicircular and crescent in shape. In conclusion: the differences in morphology of scales can be used as diagnostic characters in identification of fish species in family: Labridae inhabiting coral reef in Hurghada, Red Sea, Egypt.

INTRODUCTION

Labridae (Wrasses fish) is one of the most interesting and numerically abundant groups of fishes. It is very widely distributed in marine waters; mostly from the coast line to about 160 m depth on sandy bottom, shallow coral and rocky reefs (Froese and Pauly, 2014). It contains about 580 species of marine fish found on coral and rocky reefs around the world. As conspicuous members of reef communities, they show an exceptional range of trophic habits, including herbivory, planktivory, piscivore, durophagy (hard prey including molluscs and corals), ectoparasite feeding, and species that feed on a broad range of the invertebrates found in reef environments (Randall, 1983; Gomon and Randall, 1984; Lieske and Myers, 1994; Bellwood *et al*., 2002; Floeter *et al*., 2007; Khalaf-Allah, 2013; Dang *et al.*, 2015; AL-Zahaby, 2015; Sampaio *et al.*, 2016 and Pradhan and Mahapatra, 2017).

Scale characteristics have been considered relevant for the fish taxonomy and phylogeny by some authors including (Lippitsch, 1991, 1992 and 1993; Helfman *et al.*, 1997 and Osman, 2000).

Indexed in Scopus ELSEVIER DOAJ IUCAT

Scale surface morphology provides new and useful information on fish taxonomy. Several characters of scales such as type of scales, size, shape and position of focus is established and being used as a taxonomic tool (Matondo *et al.,* 2010 and Ansari *et al*., 2016).

Scale morphology provides new and useful information for fish systematics. Scales have numerous hidden details in their structures that contribute effectively to fish identification and classification. Scale characteristics such as scale type, shape and size, position of the focus, circuli appearance, type of radii and shape of the posterior margin were the distinguishable features considered in describing fish scales. Scale characteristics can provide useful taxonomic information on the morphological differences between sexes of the fish (Jawad, 2005 and Ganzon *et al.,* 2012). Esmaeili *et al.* (2014) mentioned that, the scale surface morphology and microstructure may help in distinguishing the species. In addition, scale size represent a valuable tool for species separation, which corroborated earlier studies for the use of these indices in fish taxonomy.

An overlap in identification was noticed between adult labrid fish species and between individuals and sex at the same species by variations in color which change according to life stage, mode of life, age and with sex-reversal in this group. Another problem is the identification of juveniles since they do not show the adult characters on which the identification relies. Therefore, the present study aimed to identify the labrid fish species (Family: Labridae) inhabiting coral reef in Hurghada, Red Sea, Egypt based on the differences in scales structure as well as to construct a key to the identification of these species.

MATERIALS AND METHODS

Samples collection:

A total of 206 specimens belonging to 19 species in family Labridae were seasonally collected from the commercial catch at land fish market in Hurghada of Egyptian Red Sea, during the period from April 2016 to May 2017; 128 of wrasses fish (9 of *Anampses caeruleopunctatus*, 9 of *Cheilinous digramus*, 10 of *C. abudjubbe*, 10 of *C. lunulatus*, 10 of *Cheilio intermis*, 10 of *Epibulus insidiator*, 10 of *Gomphosus coeruleus*, 20 of *Halichoeres hortulanus*, 10 of *Hologymnosus annulatus*, 10 of *Thalassoma lunare* and 10 of *Th. rueppellii*); 39 of coris fish (9 of *Coris aygula*, 10 of *C. cuvieri*, 10 of *C. gaimard* and 10 of *C. variegate*); 20 of thick-lip fish (10 of *Hemigymnus fasciatus* and 10 of *H. melapterus*) and 19 of razor fish (9 of *Novaculichthys taeniaurus* and 10 of *Iniistius pentadactylus*). In the laboratory, fishes were identified according to Randall (1983); Lieske and Myers (2004) and Carpenter and Niem (2001)

Staining of scales:

In the laboratory, for scale characteristic studies, removed scales from the four positions of each samples: below the anterior part of dorsal fin (region A), on operculum (region B), under pectoral fins (region C) and caudal peduncle area (region D).

Scales in four regions were physical cleaned by carful removing the adhering tissues without damage the scale surface by immersed in 3% KOH for 2 hours, then transferred in 70% ethyl alcohol + 3% Alizarin red for 3 days. Finally, the scales were microscopically examined, photographed by using camera (model UCMOS 03100 KPA, China) mounted on binocular light microscope and described**.**

RESULTS

General characteristics of labrid fishes:

The body of fish species in family Labridae is slightly to extremely compressed. Mouth terminal, usually with prominent and thick lips; mouth slightly to extremely protrusible, maxilla not exposed on cheek, teeth in jaws usually separate and canini-form in shape, a single pair of incise form forward projecting teeth at front of each jaw and no posterior canine teeth, no teeth at corner of mouth or on roof of mouth. A continuous or interrupted lateral line; when continuous it usually has a part below the soft portion of dorsal fin with angles sharply downward to a straight peduncle part. A single, long-based dorsal fin; the spines in dorsal fin ranged between 8 and 21; they rigid to flexible. The spines and rays usually similar in length, but some species have elongated first few spines or elongate posterior most rays. Anal fin usually contains three spines (Fig. 1).

Scales of fishes in family Labridae are cycloid type (smooth to touch), highly variable in size among species and the head in some species never fully covered by scales and in another species scales absent. Caudal fin short, varying from truncated to rounded. Most species with bright and intricate color patterns, including stripes, bars, spots, blotches, and ocelli of various shades of brown, blue, green, red, yellow and white. Patterns often change with age and with sex-reversal in this group.

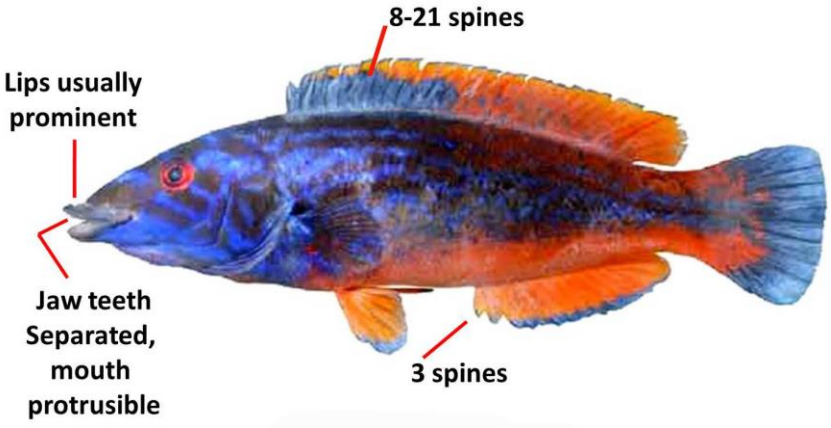

Fig. 1: Diagrammatic representation of general description of species in family Labridae

Scale characters in studied labrid fishes:

Scales in family Labridae are cycloid type and nearly circle in shape. Cycloid scales are typically smoothly disc-like, circular in outline. The scale can be divided into two parts (rostral field and caudal field) by line (separation line). Scales on the rostral part are thin and translucent, lacking both dense enameloid and dentinal layers. They are reduced to two extremely thin plates, an outer layer of bone and an inner layer of connective tissue. The bony layer is usually characterized by concentric ridges, which represent growth increment during the life of the fish. The innermost plate of the scale is called the focus. The focus positions may occur at the central, below center or towards the caudal part of the scale. Focus shape may be rounded, elongated, oval, or in some cases it indistinct. The focus appears as a dark point on the posterior portion of the scale followed by alternating hyaline and opaque zones. Each of hyaline and opaque zones together make an annual ring. By counting the annual growth rings on the scales, often lines called radii. The radii on the scales can

be categorized into three types according to the origin and ends (primary, secondary and tertiary). Lines of primary radii lead from the focus toward the edge of the scale.

Lines of secondary radii start from the margin and not reach to the focus. Lines of tertiary radii start from the focus and not reach to margin. Radii are strait in the end and regular in shape. The distances between circulus are regular and absence of distortions. No ctenii found in the granulation area of the caudal field (Figure 2). This scale morphology is varied in different labrid species in its microstructures such as shape, margin, size, focus, separation line and granulation area.

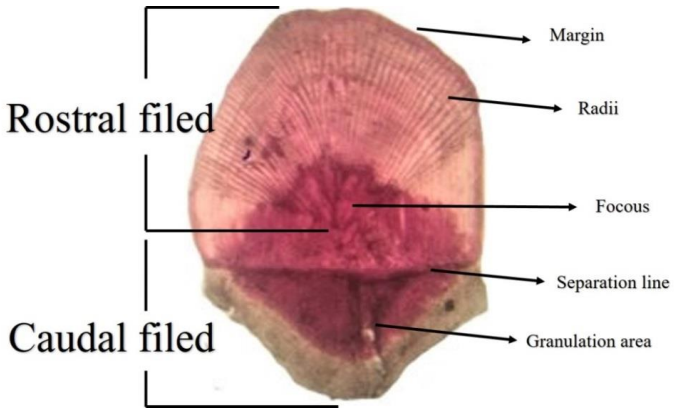

Fig. 2: Digital photograph showing scale morphology in family Labridae

1. Focus central in position (except in *Epibulus insidiator* and *Iniistius pentadactylus*) …. … …. …..... …. ….. …. …. … …. …. …. …. …. ….. **2**
1`. Focus caudal in position … .. … ….. … .. … … … … … … … … … … .. .**12**
2. Focus shape rounded … ... … … … .. … … … … … … … … … … .. . … **3**
2`. Focus shape oval … .. … … … … … … … … … … … … … … … .. . … … . **6**
3. granulation area circular … .…. …...…. … .. .*Anampses caeruleopunctatus*
3`. granulation area triangular … .…. … … ….. … … … … … … … ... … **4**
4. granulation area triangular in all regions … ..... *Novaculichthys taeniaurus*
4`. granulation area triangular in some regions …. … … … … … … … .. .**5**
5. Scale shape rhombic in under dorsal fin … … .. . … *Halichoeres hortulanus*
5`. Scale shape triangular in under dorsal fin … … .. … .. .*Cheilinus lunulatus*
6. Scale shape trapezium in all or in some regions .... … … … … … … … .. .**7**
6`. Scale shape hexagonal in all or in some regions ... … …… … … … … .. .**8**
7. Scale shape trapezium in all regions … … .. … ... *Hologymnosus annulatus*
7`. Scale shape trapezium in some regions … …… … .. *Epibulus insidiator*
8. Scale shape hexagonal in all regions … … … ... … … … .. *Cheilio intermis*
8`. Scale shape hexagonal in all or in some regions … …… … … .. … … … **9**
9. Scale shape hexagonal in under pectoral fin .. …… *Gomphosus coeruleus*
9`. Scale shape hexagonal in caudal peduncle area … … …... … .. … … … **10**
10. Scale shape quadrate in under dorsal fin . … … ..…. *Iniistius pentadactylus*
10`. Scale shape triangular in under dorsal fin … … . … … … … … … … **11**
11. Scale margin emarginate in under dorsal fin … ... *Thalassomma rueppellii*
11`. Scale margin semicircular in under dorsal fin … …… *Thalassoma lunare*
12. Separation line reversed V shaped (^) … … … . … .. ... … ... … … … **13**
12`. Separation line non-reversed V shaped (^) … ….. … *Cheilinus digramus*
13. Separation line reversed V shaped (^) in all regions … . … ..…. … … **14**
13`. Separation line reversed V shaped (^) in some regions . … .. … … … **15**

14. Granulation area triangular in most regions … ….. … … … *Coris aygula*
14`. Granulation area crescent shape in most regions .. *Hemigymnus fasciatus*
15. Granulation area circular in all regions … …… … … … ...*Coris cuvieri*
15`. Granulation area triangular … …… … … … … . … … ... . … … … **16**
16. Granulation area triangular in all regions … …… …... … .… …… … **17**
16`. Granulation area triangular in some regions … …… … .. … … ... … **18**
17. Scale shape trapezium in all regions … …… … … … … *Coris gaimard*
17`. Scale shape triangular in all regions … …… … *Hemigymnus melapterus*
18. Scale shape trapezium in some regions … …… … … *Cheilinus abudjubbe*
18`. Scale shape hexagonal in most regions … …… … …... ... *Coris variegate*

Diagnostic characters of species:

***Anampses caeruleopunctatus*:**

The scales of *A. caeruleopunctatus* are mainly of cycloid type and don't found on operculum region. The scale shape is trapezium in all regions except in under dorsal fin is rectangle and large in size with margin crescent in all regions except in under dorsal fin is emergent. The focus is central in position and the shape is rounded in all regions. In the caudal area, type the separation line is reversed V shape (^) and the granulation area is circular (Plate I).

***Cheilinus digramus*:**

The scales of *C. digramus* are mainly of cycloid type and found on operculum region. The scale shape is triangular in under dorsal fin, circular in operculum and trapezium in under pectoral fin and caudal peduncle area and large in size with margin circular in under dorsal fin and operculum; and biconcave in both of under pectoral fin and caudal peduncle regions. The focus is caudal area in position and the rounded with smooth area fins and caudal peduncle regions with smooth surface in all regions. In the caudal area, the separation line is circular in under dorsal fin and operculum; semi straight in under pectoral fin and caudal peduncle area and the granulation area is triangular in all regions except operculum is circular (Plate I).

***Cheilinus abudjube*:**

The scales of *C. abudjube* are mainly of cycloid type and found on operculum region. The scale shape is triangular in under dorsal fin, circular in operculum and obliquely quadrate in operculum and trapezium in both of under pectoral fin and caudal peduncle area and large in size with margin circular in under dorsal fin, blunt in operculum; and biconcave in both of under pectoral fin and caudal peduncle regions. The focus is caudal area in position and the rounded with rough surface in all regions. In the caudal area, the separation line is reversed V shaped (^) in under dorsal fin and operculum; semi straight in under pectoral fin and caudal peduncle area and the granulation area is triangular in all regions except operculum is circular (Plate I).

***Cheilinus lunulatus*:**

The scales of *C. lunulatus* are mainly of cycloid type and found on operculum region. The scale shape is triangular in under dorsal fin, circular in operculum and trapezium in both of under pectoral fin and caudal peduncle area and large in size with margin triangular in under dorsal fin, circular in operculum; and biconcave in both of under pectoral fin and caudal peduncle regions. The focus is central in position and the shape is rounded with rough surface in all regions. In the caudal area, the separation line is reversed V shaped (^) in under dorsal fin and operculum; semi straight in under pectoral fin and caudal peduncle area and the granulation area is triangular in all regions except operculum is circular (Plate I).

***Cheilio intermis*:**

The scales of *C. intermis* are mainly of cycloid type and don't found on operculum region. The scale shape is hexagonal and moderate in size with margin shape is triangular with smooth surface in all regions. The focus is central in position and the shape is oval with rough surface in all regions. In the caudal area, the separation line is somewhat straight, and the granulation area is triangular in shape (Plate I).

***Epibulus insidiator*:**

The scales of *E. insidiator* are mainly of cycloid type and found on operculum region. The scale shape is rhombic in under dorsal fin, irregular in operculum and trapezium in both of under pectoral fin and caudal peduncle areas; moderate in size with margin shape is irregular in under pectoral fin, circular in operculum region, and biconcave in under pectoral fin and caudal peduncle regions; with serrated surface in all regions. The focus is caudal area in position and the shape is oval in all regions except in operculum is rounded, with rough surface in all regions. In the caudal area, the separation line is somewhat straight in all regions except in under dorsal fin is reversed V shaped (^) and the granulation area is triangular in all regions except operculum is circular (Plate II).

***Gomphosus coeruleus*:**

The scales of *G. coeruleus* are mainly of cycloid type and don't found on operculum region. The scale shape is rhombic in under dorsal fin, hexagonal in under pectoral fin and trapezium in caudal peduncle area; shape and moderated in size with margin shape is circular in under dorsal fin, triangle in under pectoral fin and blunt in caudal peduncle areas, with smooth surface in all regions. The focus is central in position and the shape is oval, with smooth surface in all regions. In the caudal area, the separation line is semi straight, and the granulation area is triangle in all regions (Plate II).

***Halichoeres hortulanus*:**

The scales of *H. hortulanus* are mainly of cycloid type and found on operculum region. The scale shape is trapezium in all regions except in under dorsal fin is rhombic shape and moderate in size with margin shape is triangle in under dorsal fin, irregular in operculum and circular in both of under pectoral fin and caudal peduncle area, with smooth surface in all regions. The focus is central in position and the shape is rounded with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) in all regions except operculum is semi straight and the granulation area is triangular in all regions except operculum is circular (Plate II).

***Hologymnosus annulatus*:**

The scales of *H. annulatus* are mainly of cycloid type and don't found on operculum region. The scale shape is trapezium in and tiny in size with margin shape is blunt, with serrated surface in all regions. The focus is central in position and the shape is oval, with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) in all regions except caudal peduncle area is semi straight and the granulation area is triangular in all regions and depressed than rostral field (PLATE II).

***Thalassoma lunare*:**

The scales of *T. lunare* are mainly of cycloid type and found on operculum region. The scale shape is triangular in under dorsal fin, trapezium in both of operculum and under pectoral fin regions and hexagonal in caudal peduncle; with

small in size and margin shape is circular in under dorsal fin, blunt in both of operculum and under pectoral fin regions and triangle in caudal peduncle region. The focus is central in position and the shape is oval in all regions, with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) in all regions and the granulation area is triangular (Plate II).

***Thalassoma rueppellii*:**

The scales of *T. rueppellii* are mainly of cycloid type and found on operculum region. The scale shape is triangular in under dorsal fin, trapezium in both of operculum and under pectoral fin regions and hexagonal in caudal peduncle; with small in size and margin shape is circular in under dorsal fin, blunt in both of operculum and under pectoral fin regions and triangle in caudal peduncle region. The focus is central in position and the shape is oval in all regions, with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) in all regions and the granulation area is triangular (Plate III).

***Coris aygula*:**

The scales of *C. aygula* are mainly of cycloid type and don't found on operculum region. The scale shape is trapezium and moderate in size with margin shape is blunt in all regions except in under pectoral fin is irregular, with smooth surface in all regions. The focus is caudal area in position and the shape is rounded, with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) and the granulation area is triangular in all regions except in under pectoral fin is circular (Plate III).

***Coris cuvieri*:**

The scales of *C. cuvieri* are mainly of cycloid type and don't found on operculum region. The scale shape is trapezium in all regions except caudal peduncle region is hexagonal and small in size with margin shape is blunt in under dorsal fin, biconcave in under pectoral fin and triangle in caudal peduncle region, with smooth surface in all regions. The focus is caudal area in position and the shape is rounded with rough surface in all regions. In the caudal area, the separation line is semi straight in all regions except in caudal peduncle regions is reversed V shape (^) and the granulation area is circular (Plate III).

***Coris gaimard*:**

The scales of *C. gaimard* are mainly of cycloid type and don't found on operculum region. The scale shape is trapezium and small in size with margin shape is blunt in all regions except under dorsal fin is circular, with smooth surface in all regions. The focus is caudal area in position and the shape is oval in all regions except in under dorsal fin is rounded, with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) in all regions except in caudal peduncle region is circular and the granulation area is triangular (Plate III).

***Coris variegate*:**

The scales of *C. variegate* are mainly of cycloid type and don't found on operculum region. The scale shape is hexagonal in all region except in under dorsal fin is trapezium and small in size with margin shape is triangle in all regions except under dorsal fin is circular, with smooth surface in all regions. The focus is caudal area in position and the shape is rounded, with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) in all regions except under dorsal fin is Type 3 (T3) semi straight in under dorsal fin, and the granulation area is semicircular in all regions except in under dorsal fin is triangle shape (Plate III).

***Hemigymnus fasciatus*:**

Scales of *H. fasciatus* are mainly of cycloid type. Scales aren't found on operculum region. The scale shape is triangular in shape and moderate in size with irregular margin and its surface is smooth in all regions. The position of focus is in caudal area and it has oval shape, with smooth surface in all regions. In the caudal area, the separation line has reversed V shape (^); and the granulation area has a crescent shape in all areas, except in the caudal peduncle area, in which it has triangle shape (Plate IV).

***Hemigymnus melapterus*:**

The scales of *H. melapterus* are mainly of cycloid type and they aren't found on operculum region. The scale shape is triangular in shape and moderate in size with margin shape is irregular in all regions, except in under pectoral fins is convex; and its surface is smooth in all regions. The position of focus is in caudal area and it has elongated oval shape with irregular surface in all regions. In the caudal area, the separation line has a reversed V shape (^) in all regions, except in the caudal peduncle area, in which it has a semi-striated shape and the granulation area has a triangle shape (Plate IV).

***Novaculichthys taeniaurus*:**

The scales of *N. taeniaurus* are mainly of cycloid type and don't found on operculum region. The scale shape is circular in all regions except in caudal peduncle region is hexagonal and small in size with margin shape is circular except in under dorsal fin is triangle, with smooth surface in all regions. The focus is central in position and the shape is rounded in all regions, with rough surface in all regions. In the caudal area, the separation line is reversed V shape (^) and the granulation area is triangular (Plate IV).

***Iniistius pentadactylus*:**

The scales of *I. pentadactylus* are mainly of cycloid type and don't found on operculum region. The scale shape is obliquely quadrate in under dorsal fin, circular in under pectoral fin and hexagonal in caudal peduncle region, and moderate in size with margin shape is circular in both of under dorsal fin and under pectoral fin and triangle in caudal peduncle region, with smooth surface in all regions. The focus is central in position and the shape is oval in all regions, with rough surface in all regions. In the caudal area, the separation line is somewhat straight, and the granulation area is semicircular in shape (Plate IV).

DISCUSSION

Scale morphology provides new and useful information for systematics. Scales have numerous hidden details in their structures that contribute effectively to fish identification and classification (Ganzon *et al.*, 2012; Ansari *et al.*, 2016 and Mahmoud *et al*., 2017). In the present study, scales in labrid fish were mainly of cycloid type and covered the whole body regions (below the anterior part of dorsal fin, on operculum, under pectoral fin and caudal peduncle area) in *Cheilinus digramus*, *Cheilinus abudjubbe*, *Cheilinus lunulatus*, *Epibulus insidiator*, *Thalassoma lunare*, *Thalassomma rueppellii* and absent on operculum (OOP) region in *Anampses caeruleopunctatus*, *Cheilio intermis*, *Gomphosus coeruleus*, *Halichoeres hortulanus*, *Hologymnosus annulatus*, *Coris aygula*, *Coris cuvieri*, *Coris gaimard*, *Coris variegate*, *Hemigymnus fasciatus*, *Hemigymnus melapterus*, *Novaculichthys taeniaurus*, *Iniistius pentadactylus*. Similar observations were detected by Randall (1983) and Lieske & Myers (1994).

The traditional identification of scale structures revealed the presence of focus, circuli, lateral line canals, radii, lateral fields, posterior fields, anterior field, and shapes of scales (Matondo *et al*., 2010 and Mahmoud *et al*., 2017). In the present study, shape, margin, focus position and shape, radii, separation line and granulation area of scales in different regions of the fish body may constitute as criteria for differentiating between labrid fish species studied.

In the present study, the scale shapes of studied species is trapezium in all regions of *Anampses caeruleopunctatus, Hologymnosus annulatus, Halichoeres hortulanus Coris aygula, Coris cuvieri* except under dorsal fin; under pectoral fin and caudal peduncle in *Cheilinus digramus*, *Cheilinus abudjubbe, Cheilinus lunulatus, Epibulus insidiator, Thalassoma lunare, Thalassomma rueppellii*, caudal peduncale of *Gomphosus coeruleus*, except caudal peduncle, *Coris gaimard* and *Coris variegate*.

Scale shape was triangle in all regions of *Hemigymnus fasciatus, Hemigymnus melapterus*, and under dorsal fin in *Cheilinus digramus, Cheilinus abudjubbe*, *Cheilinus lunulatus, Thalassoma lunare* and *Thalassomma rueppellii* and circular at operculum in both *Cheilinus digramus* and *Cheilinus lunulatus,* all regions except caudal peduncle of *Novaculichthys taeniaurus* and operculum of *Iniistius pentadactylus* and hexagounal at caudal peduncale in *Thalassoma lunare, Thalassomma rueppellii, Coris cuvieri* and *Coris variegate*, under pectoral fin of *Gomphosus coeruleus* and in all rgions of *Cheilio intermis*.

The scale shape was obliquely quadrate in both of operculum of *Cheilinus abudjubbe* and under dorsal fin of *Iniistius pentadactylus*; rhombic at under dorsal fin in *Epibulus insidiator* and *Gomphosus coeruleus* and irregular in operculum of *Epibulus insidiator.* These results were agreement with Randall *et al*. (2002), who concluded that scale shape in *Iniistius pentadactylus* is obliquely. Jawad (2005) mentioned that the considerable variation in scale shape on various parts of the body makes it difficult to nominate a typical scale for species to be used in taxonomic studies.

The margin of scale in species studied is different in shapes (emarginated, crescent, circular, biconcave, blunt, triangle, irregular) at all regions of body fish. The considerable variation in scale margin shape on various parts of the body can be used as taxonomic criteria to differentiate between species.

In the present study, the focus position of scale in species studied is central area in all regions of *Anampses caeruleopunctatus*, *Cheilinus lunulatus*, *Cheilio intermis*, *Gomphosus coeruleus*, *Halichoeres hortulanus*, *Hologymnosus annulatus*, *Thalassoma lunare*, *Thalassomma rueppellii*, *Novaculichthys taeniaurus* and caudal area in *Cheilinus digramus*, *Cheilinus abudjubbe*, *Epibulus insidiator*, *Coris aygula*, *Coris cuvieri*, *Coris gaimard*, *Coris variegate*, *Hemigymnus fasciatus, Hemigymnus melapterus* and *Iniistius pentadactylus*. Jawad (2005) mentioned that the character states of the inter-radial denticles, ctenii, and the focus area appear to be good taxonomic criteria.

In the present study, the focus shape in scale of species studied is rounded in *Anampses caeruleopunctatus, Cheilinus digramus, Cheilinus abudjubbe Cheilinus lunulatus, Halichoeres hortulanus*, *Coris aygula*, *Coris cuvieri*, *Coris variegate* and *Novaculichthys taeniaurus*; oval in *Cheilio intermis*, *Epibulus insidiator*, *Gomphosus coeruleus*, *Hologymnosus annulatus*, *Thalassoma lunare*, *Thalassomma rueppellii*, *Coris gaimard*, *Hemigymnus fasciatus, Hemigymnus melapterus* and *Iniistius pentadactylus*.

Esmaeili *et al.* (2014) mentioned that, the scale surface morphology and microstructure may help in distinguishing the species. In the present study, separation line shape in scales of species studied is reversed V shape (^) in all regions of *Anampses caeruleopunctatus, Thalassoma lunare, Thalassomma rueppellii, Coris aygula, Hemigymnus fasciatus, Novaculichthys taeniaurus, Halichoeres hortulanus* (except operculum), *Hologymnosus annulatus, Coris cuvieri, Coris gaimard* and *Hemigymnus melapterus* (except caudal peduncle in last four species); in under dorsal fin and operculum of *Cheilinus abudjubbe* and *Cheilinus lunulatus*; under dorsal fin of *Epibulus insidiator*; somewhat straight in *Cheilio intermis, Gomphosus coeruleus* and *Iniistius pentadactylus;* semi straight in all regions of *Cheilio intermis, Gomphosus coeruleus* and *Iniistius pentadactylus;* under pectoral fin and caudal peduncle area of *Cheilinus lunulatus*; in operculum of *Halichoeres hortulanus*; in caudal peduncle of *Hologymnosus annulatus*; in all regions except dorsal of *Epibulus insidiator*; circular in under dorsal and operculum of *Cheilinus digramus* and caudal peduncle of *Coris gaimard.*

In the present study, in the caudal field, the shape of granulation area in scales of species studied is triangular in all regions of *Cheilio intermis, Gomphosus coeruleus, Hologymnosus annulatus, Thalassoma lunare, Thalassomma rueppellii, Coris gaimard, Hemigymnus melapterus, Novaculichthys taeniaurus*; circular in *Anampses caeruleopunctatus, Coris cuvieri*; semicircular in *Iniistius pentadactylus*; and triangular in all regions except operculum is circular in *Cheilinus digramus, Cheilinus abudjubbe, Cheilinus lunulatus, Epibulus insidiator, Halichoeres* hortulanus and triangular in all regions except in under pectoral fin is circular in *Coris aygula*; semicircular in all regions except in under dorsal fin is triangle in *Coris variegate*. Finally, is crescent shape in all regions, except in the caudal peduncle area, in which it has triangle in *Hemigymnus fasciatus*.

CONCLUSION

The differences in morphology of scales can be used as diagnostic character in identification of fish species in family: Labridae inhabiting coral reef in Hurghada, Red Sea, Egypt.

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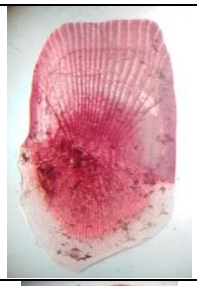
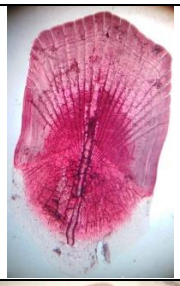
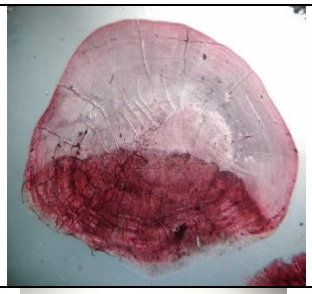
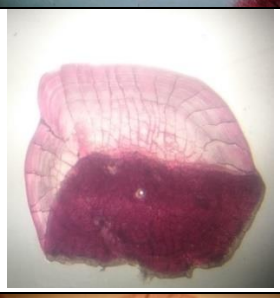
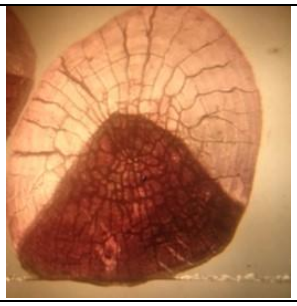
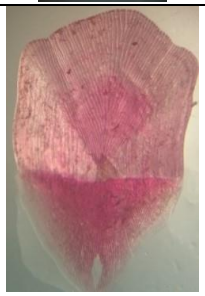
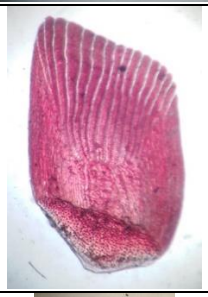
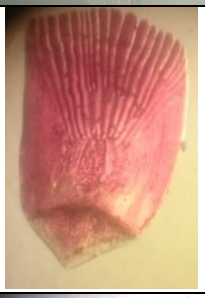
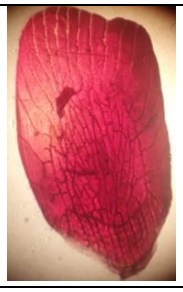
	Under dorsal fin	On operculum	Under pectoral fin	Caudal peduncle
Anampses caeruleopunctatus				
Cheilinus digramus				
Cheilinus abudjube				
Cheilinus lunulatus				
Cheilio intermis				

Plate I

	Under dorsal fin	On operculum	Under pectoral fin	Caudal peduncle
Epibulus insidiator				
Gomphosus coeruleus				
Halichoeres hortulanus				
Hologymnosus annulatus				
Thalassoma lunare				
Plate II				

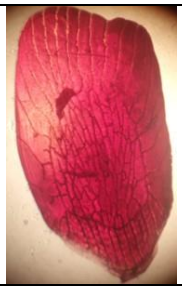
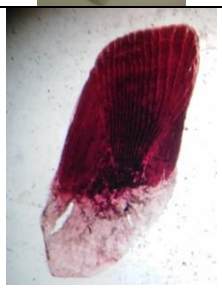
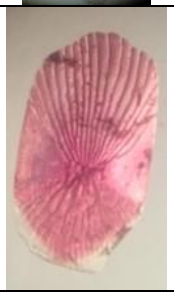
	Under dorsal fin	On operculum	Under pectoral fin	Caudal peduncle
Thalassomma rueppellii				
Coris aygula				
Coris cuvieri				
Coris gaimard				
Coris variegate				

Plate III

	Under dorsal fin	On operculum	Under pectoral fin	Caudal peduncle
Hemigymnus fasciatus				
Hemigymnus melapterus				
Novaculichthys taeniaurus				
Iniistius pentadactylus				
Plate IV				

ARABIC SUMMARY

مفتاح التعرف بواسطة تمايز القشور لبعض أسماك الملاص، البحر الأحمر، مصر

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هدفت الدراسة الحالية إلى تعريف أنواع أسماك الملاص (العائلة: لابريدي) التي تعيش في الشعاب المرجانية في الغردقة ، البحر الأحمر ، مصر، بناءً على الاختلافات في السمات المورفولوجية للقشور، وكذلك بناء مفتاح لتعريف الأنواع. جمعت الأسماك من منطقة الإنزال فى الغردقة بالساحل المصري للبحر الأحمر، خلال الفترة من أبريل 2016 إلى مايو 2017 م . تم إزالة القشور من مناطق مختلفه بالجسم من الأنواع التي تمت دراستها وصبغها وفحصها.

أوضحت الدراسة أن القشور في أسماك الملاص دائرية وتغطي مناطق الجسم بأكملها في معظم الأنواع وتغيب عن منطقة غطاء الخياشيم في بعض الأنواع. يعتبر شكل القشرة، حافة القشرة، البؤرة، وخط الفصل ومنطقة التحبيب للقشور في مناطق مختلفة من جسم الأسماك معايير للتمييز بين أنواع الأسماك التي تمت دراستها. كانت أشكال القشور عبارة عن شبه منحرف، مثلثى، دائري، سداسي، مربعى بشكل غير مباشر، معيني وغير منتظم. أخذت حافة القشرة أشكالا متعددة منها مشطوفة، هلالية، دائرية، ثنائية التقعر، كليلة، مثلثية اوغير منتظمة الحافة. كان موضع البؤرة إما مركزياً أوذيلياً وشكل البؤرة اما دائرى أو بيضاوى. أخذ الخط الفاصل فى المنطقة الذيلية للقشرة أشكالاً متعددة منها شكل معكوس لحرف V (^)، أو مستقيم إلى حد ما، أوشبه مستقيم أو دائري. وأخيرا كانت منطقة التحبيب في القشور دائرية، أو نصف دائرية، أو مثلثية أوهلالية الشكل.

في الختام: يمكن إستخدام هذه الاختلافات المورفولوجية للقشور كمفتاح تصنيفى في تمييز هذه الأنواع من أسماك عائلة الملاص التي تعيش في الشعاب المرجانية بالغردقة، البحر الأحمر ، مصر.