Biodiversity of the Scombridae fishes in the Ras Albasit area in Syrian marine waters

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□ ABSTRACT □

This research was conducted during November 2021 to September 2023 to determine qualitative composition of the Scombridae fish species had caught from Syrian marine waters (Ras Albasit), using the local fishing gear (purse seine, gill nets, trammel nets, long-line and hand lines)

The Results showed that 11 species of scombrid namely, *Auxis thazard* (Lacepède, 1800), *Auxis rochei* (Risso, 1810), *Euthynnus alletteratus* (Rafinesque, 1810), *Katsuwonus pelamis (*Linnaeus, 1758), *Sarda sarda (Bloch, 1793), Thynnus thynnus* (Linnaeus, 1758), *Thynnus alalunga* (Bonnaterre, 1788), *Scomberomorus commerson* (Lacepède, 1800), *Scomber japonicus (Houttuyn, 1782), Scomber colias* (Gmelin, 1789) and *Scomber indicus* (Abdussamad, Sukumaran & Ratheesh, 2016) were recorded. Otolith and liver features of all collected species are presented in this study.

Key words: Fauna, fish species, Scombridae, Syrian marine waters, Biodiversity.

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التنوع البيولوجي لأسماك فصيلة Scombridae في منطقة رأس البسيط ضمن المياه البحرية السورية

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ملخّص

أُجري هذا البحث خلال الفترة الممتدة من شهر تشرين الأول 2021 إلى شهر أيلول 2023 بهدف تحديد التركيب النوعي للأنواع السمكية المنتمية لفصيلة Scombridae المصطادة من منطقة البسيط ضمن المياه البحرية السورية.

جُمعت العينات السمكية بوسائل الصيد المتبعة محلياً (شباك الشنشيلا، شباك الغلصمية، شباك البشلولة، شباك الشَرك والسنارة).

أظهرت النتائج وجود (11) نوعاً سمكياً: (البلميدا *Auxis thazard* (Lacepède, 1800)، البلميدا المبرومة *Auxis rochei* (Risso, 1810)، البلميدا العريضة *Euthynnus alletteratus* (Rafinesque, 1810) ، المشحترة *Katsuwonus pelamis* (Linnaeus, 1758)، أم سن *Sarda sarda* (Bloch, 1793)، أم قشر *Thynnus thynnus* (Linnaeus, 1758)، أم عين *Thynnus alalunga* (Bonnaterre, 1788)، غزال *Scomberomorus commerson (Lacepède, 1800)* ، سكمبري *Scomber japonicus* (Houttuyn, 1782) ، سكمبري *Scomber colias* (Gmelin, 1789)، سكمبري *Scomber indicus* (Abdussamad, Sukumaran & Ratheesh, 2016)

عُرضت خصائص حصى الأذن والكبد لجميع الأنواع التي جُمعت في هذه الدراسة.

الكلمات المفتاحية: فاونا، الأنواع السمكية، Scombridae، المياه البحرية السورية، التنوع البيولوجي.

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Introduction:

The family Scombridae (highly migratory fishes) is divisible into two subfamilies: the Gasterochismatinae, which contains only the peculiar Southern Ocean, *Gasterochisma melampus* and the Scombrinae (Collette and Nauen, 1983; Sayskan, 1988). Scombridae consider one of the largest and most economical important fish family comprising the most advanced scombroid fishes such as: mackerels (Scombrini), Spanish mackerels (Scomberomorini), bonitos (Sardini) and tunas (Thunnini) with at least 54 species belong to 15 genera worldwide (Collette *et al*., 2001; Eschmeyer and Fong, 2015) and 11 species in the Eastern Mediterranean (Golanii *et al.,* 2006).

Species belonging to this family are generally migratory marine fish (Collette *et al*., 2001) and of mostly are epipelagic marine fishes that live primarily in the upper 200 meters of the ocean and are widely distributed throughout the tropical, subtropical and temperate waters of the world's oceans (Collette and Nauen 1983; Nakamura 1985).

They feed chiefly on schooling fishes (clupeids, carangids, small scombrids, atherina *etc*.) and crustacean and squid (Poisson, 2006).

Family Scombridae is elongated body and fusiform, moderately compressed in some genera with pointed snout, bearing two dorsal fins, depressible into groove, finlets present behind dorsal and anal fins, caudal fin forked to lunate-shaped (Collette and Nauen 1983; Collette, 1986; Golani *et al.*, 2006).

This research aimed to study the qualitative composition of Scombridae in Al Basit area in the Syrian marine waters.

Materials and Methods:

Specimens were collected from November 2021 to September 2023 from Syrian marine waters (Ras albasit: 35º51'N, 35º48'E, (Fig:1)) using the local fishing gear (purse seine, fixed nets, long-line and hook-line) within the territorial waters. The Specimens were identified after transferred to laboratory according to the taxonomic keys: Collette and Nauen (1983); Collette (1986); Collette and Aadland (1996); Golani *et al.* (2006); Poisson (2006); Carpenter and Angelis (2016); Abdussamad *et al.* (2016) and Collette and Graves (2019) and study of otolith followed Joshi *et al.* (2012) Tuset *et al.* (2008). Subsequently, the specimen were photographed, measured, weighted and dissected at the Laboratory of Hydrobiology, Faculty of Sciences, Tishreen University, Lattakia, Syria.

Fig. 1. Sampling location (by Google Earth 2024)

Results and discussion:

The appearance of Scombridae in the harvest of Syrian commercial marine fishing in large quantities, with a catch rate during the research (2021 - 2023) of 47.1 tons, which caught commonly with purse seine, fixed net, hook and long-line.

Eleven species of seven genera belong to the family Scombridae were reported in this study, listed out and compared with previous studies from Syrian marine waters (Table 1). Out of which two species, *Auxis thazard* and *Scomber indicus* were appeared from Syrian waters for the first time during period this study. They are migratory species from Atlantic Ocean and Arabian sea, respectively.

While two species, *Orcynopsis unicolor* and *Scomber scomber* were not collected during the current study may due to seversl factores such as, the climatic changes, overfishing or using illegal fishing methods.

Table 1: List of scombrid fishes species reported from Syrian marine waters previously and into the current study

Genus	Species	Sbaihi, 1994	Mtawej, 2012	Ali, 2018	Current study
Auxis	*Auxis rochei*	+	+	+	+
	Auxis thazard	-	-	-	+
Euthynnus	*Euthynnus alletteratus*	+	+	+	+
Katsuwonus	*Katsuwonus pelamis*	+	-	+	+
Orcynopsis	*Orcynopsis unicolor*	-	-	+	-
Sarda	*Sarda sarda*	+	+	+	+
Scomber	*Scomber colias*	-	-	+	+
	Scomber indicus	-	-	-	+
	Scomber japonicus	+	+	-	+
	Scomber scombrus	+	-	+	-
Scomberomorus	*Scomberomorus commerson*	+	-	+	+
Thunnus	*Thunnus thynnus*	-	-	-	+
	Thunnus alalunga	-	-	-	+

Description of recorded species are follow:

All species belonging to Scombridae have a pseudobranch (Fig:2) and have inter-pelvic process bifid and short (Fig: 2), except *Auxis* genus have inter-pelvic process single and long (Fig: 3) and *Scomber* genus have inter-pelvic process single and short (Fig: 4) which is agree with Collette (1986) and Bariche (2012).

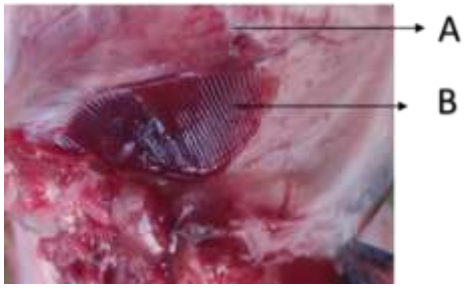

Fig. 2: pseudobranch in Scombridae that was caught from Al Bassit area in Syrian marine waters. (A - gill cover. B- Pseudobranch)

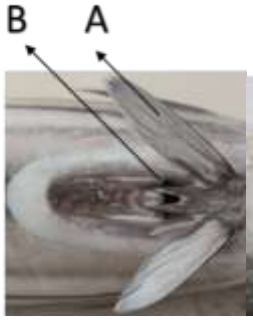

Fig. 3: inter-pelvic process bifid and short

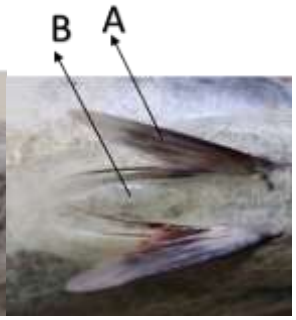

Fig. 4: inter-pelvic process single and long

Fig. 5: inter-pelvic process single and short

(A - pelvic fin; B - inter-pelvic process)

1-Genus *Auxis* (Cuvier, 1829)

Body robust, elongate and rounded, belly white, without stripes or spots, first and second dorsal fins widely separated, pectoral fins short, inter-pelvic process single and long corselet (Fig. 4), at least as long as longest pelvic fin ray. Right lobe of liver much longer than left and middle lobes (Fig. 6) (Collette, 1986; Golani *et al.,* 2006; Carpenter and Angelis, 2016); two species of genus *Auxis* collected and conformed by meristic measurements (Table. 2) but can distinguish by the width of the corselet below the origin of the second dorsal fin and the anterior extension of the dorsal scaleless area above the pectoral fin, as well as the orientation of dark bars or lines situated dorsally above the lateral line**.**

Fig 6: of the liver of *Auxis* sp.

1. 1- Species Frigate tuna, *Auxis thazard* (Lacepède, 1800)

Identified by a narrow corselet, with a width of less than five scales below the origin of the pectoral fin (Fig. 7, A), the pectoral fin extending posterior to the vertical at the anterior margin of the scaleless area above the corselet (Fig. 7, B). Dark wavy lines in the dorsal scaleless area oblique (Fig. 7, C). This species was recorded for the first time from Syrian marine waters by Othman *et al*. (2023b).

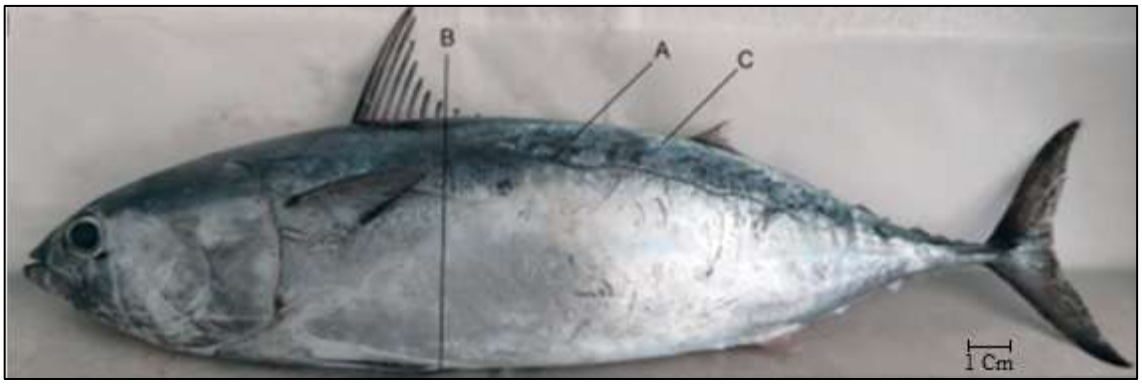

Fig 7*: Auxis thazard*: Tw: 1350 g; Tl: 42.1 cm was caught from Ras Albasit in 21/3/2022.

(A, corselet; B, vertical line indicating where the tip of the pectoral fin reaches; C, dark wavy lines in the dorsal scaleless area).

1. 2- Species Bullet tuna, *Auxis rochei* (Risso, 1810)

This species is the smallest one among all tuna species in the world (Relini *et al.*, 2008 ; Jasmine *et al.*, 2013), bearing wider corselet, with a width about 10-15 scales below base of second dorsal fin (Fig. 8, A), the pectoral fin does not reach a vertical at the anterior margin of the scaleless area (Fig. 8, B), dark wavy lines in the dorsal scaleless area nearly vertical (Fig. 8, C).

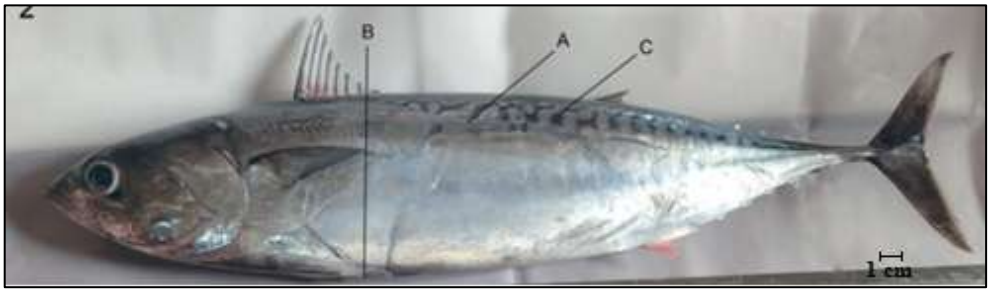

Fig 8: *Auxis rochei:* Tw: 880 g ; Tl: 37.7 cm was caught from Ras Albasit in 21/3/2022.

(A, corselet; B, vertical line indicating where the tip of the pectoral fin reaches; C, dark wavy lines in the dorsal scaleless area).

Otolith had broad postrostrom and a medium rostrum. Dorsal edge was flattened and rectangular in shape. Ventral edge was also flattened with a small curve in the lower portion. Nucleus was in the middle of the otolith at equal distance from rostrum and postrostrum (Fig .9).

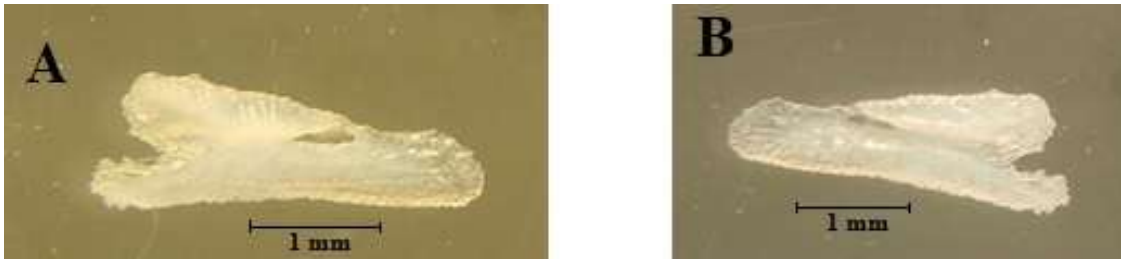

Fig 9: General view of otolith (length: 3mm) in *Auxis rochei*.

(A – Internal surface B – External surface)

1- Genus *Euthynnus* (Lütken, 1882)

2. 1- Species Little tunny, *Euthynnus alletteratus* (Rafinesque, 1810)

Large fish, body robust and fusiform. First and second dorsal fins separated by a narrow space, anterior spines of first much higher than those mid-way, giving the fin a strongly concave outline; 15 spines in first dorsal fin; second dorsal fin with 12 rays, much lower than first, followed by 8 finlets (Table. 2). Pectoral fins short never reaching the interspace between the dorsal fins, several black spots present between pectoral and pelvic fin bases but not dark, longitudinal stripes on belly (Fig. 10). Inter-pelvic process bifid and short (Fig. 3). Teeth small and conical in a single series, vomerine teeth absent but palatine teeth present. Right lobe of liver much longer than left and middle lobes (Fig. 11). One of three species of the genus *Euthynnus* found in tropical and subtropical waters of the world (Manooch *et al.*, 1985) but *E. alletteratus* is the only species of the genus *Euthynnus* distributed in Atlantic and Mediterranean waters (Collette and Nauen, 1983; El-Haweet *et al*., 2013).

Fig 10*: E. alletteratus:* Tw: 580 g; Tl: 36.4 cm was caught from Ras albasit in 5/ 11/ 2022.

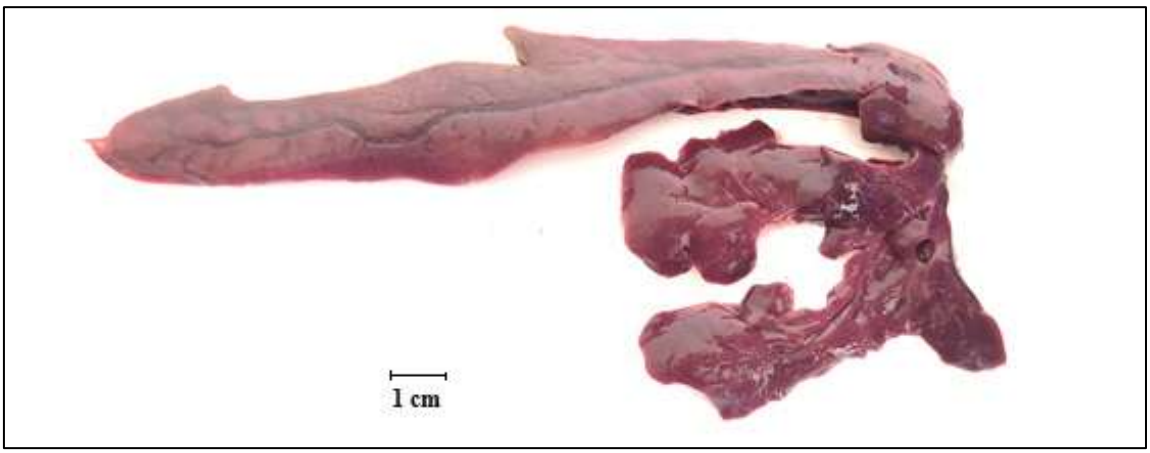

Fig 11: of the liver of *E. alletteratus*

Otolith of *E. alletteratus* oblong, ventral margin was serrate to irregular. Ostium was funnel-like, shorter than the cauda. Cauda was elliptic, ending close to the posterior margin. Anterior region was peaked to irregular; rostrum long, broad and irregular; antirostrum was short, narrow and round; excisura wide without a notch. Posterior region was angled (Fig .12).

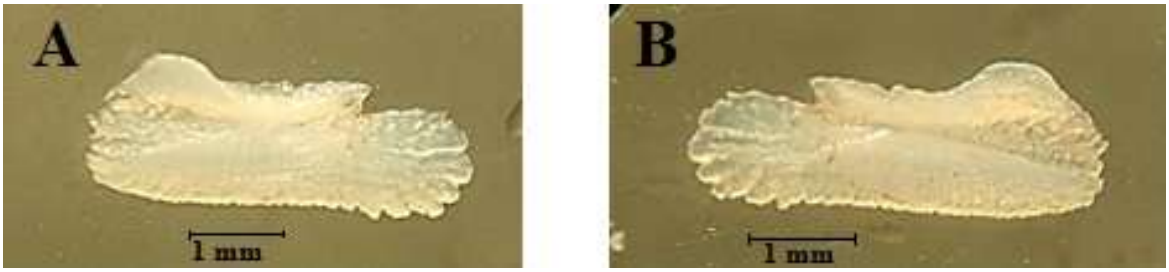

Fig 12: General view of otolith (length: 4mm) *E. alletteratus*
(A – Internal surface B – External surface)

3- Genus *Katsuwonus* (Kishinouye, 1923)

3. 1- Species skipjack tuna, *Katsuwonus pelamis (*Linnaeus, 1758)

Body fusiform, elongate and rounded. Teeth small and conical in a single series; gillrakers numerous, 53 on first gill arch (Table. 2). The distance between dorsal fins (2.1cm) less than eye diameter (2.4cm); first dorsal fin much higher than the second; first dorsal fin base very long. Body color was back dark purplish blue and belly silvery with 4 longitudinal dark bands below lateral line (Fig. 13). interpelvic process bifid and short (Fig. 3). Right lobe of liver somewhat longer than left and central lobes (Fig. 14).

Fig 13*: K. pelamis* : Tw: 5476g ; Tl: 68.3 cm was caught from Ras albasit in 23/ 10/ 2023.

Fig 14: of the liver of *K. pelamis*

Otolith (Sagitta) of *K. pelamis* (Fig .15) rectangular, ventral and anterior margins sharply serrate, ostial may appear ostio-caudal as the posterior wall erodes with growth, median, dorsal ridge well developed. Ostium was funnel-like, as long as the cauda. Cauda was elliptic, ending very close to the posterior margin. Anterior region was round to irregular; rostrum long, broad and round; antirostrum short, narrow and pointed; excisura wide with an indentation-shaped notch. Posterior region irregular to oblique.

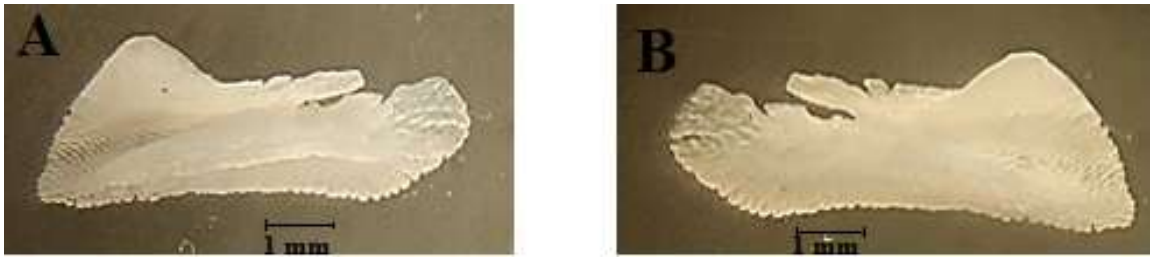

Fig 15: General view of otolith (length: 0.7 mm) *K. pelamis*
(A – Internal surface B – External surface)

4- Genus *Sarda* (Cuvier, 1829)

4.1- Species atlantic bonito, *Sarda sarda* (Bloch, 1793)

Body elongate and slightly compressed, mouth moderately large, dorsal fins close together, the first (spiny) very long, with 22 spines (Table. 2). Pectoral fins short, inter-pelvic process small and bifid (Fig. 3). Lateral line single. Dorsal stripes oblique, with a greater angle than in other species of *Sarda*. Eight dark blue to dark grey, slightly oblique longitudinal stripes on the back (Fig 16), Right and left lobes of liver much longer than middle lobe (Fig. 17).

Fig 16*: Sarda sarda* Tw: 960 g ; Tl: 46.4 cm was caught from Ras Albasit in 29/ 10/ 2023.

Fig 17: of the liver of *S. sarda*

Otolith (Sagitta) of *S. sarda* (Fig .18) triangular, margins crenate to dentate. Ostium was funnel-like, longer than the cauda. Cauda was elliptic, ending very close to the posterior margin. Anterior region was lanceo-lated; rostrum long, narrow and sharply pointed; antirostrum was short, narrow and pointed; excisura wide with or without an acute notch. Posterior region oblique to irregular.

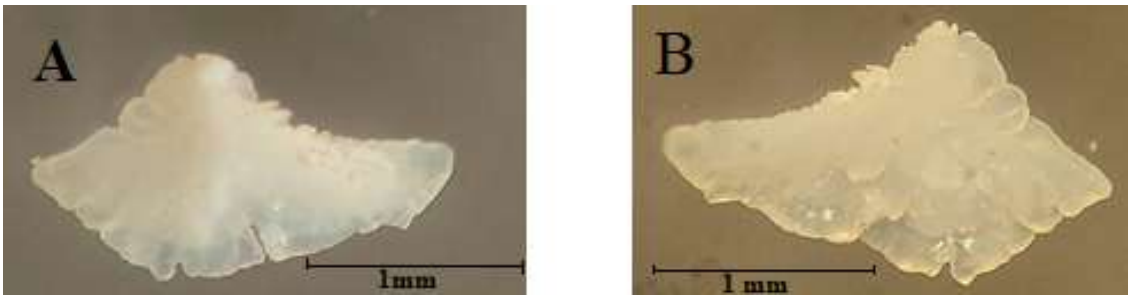

Fig 18: General view of otolith (length: 2mm) *S. sarda*
(A – Internal surface B – External surface)

5- Genus *Thunnus* (South, 1845)

A large species with an elongate, fusiform body and slightly compressed. Teeth small and conical. Body covered with very small scales behind corselet and no black spots on body; back dark blue without any striped pattern; two dorsal fins, separated only by a narrow interspace, inter-pelvic process small and bifid (Fig. 3). Caudal peduncle very slender, bearing on each side a strong lateral keel between 2 smaller keels. Ventral surface of liver covered with striations, central lobe longest (Fig. 19). Two species under this genus were collected in this study.

Fig 19: of the liver in *Thunnus* sp.

5 .1- Species northern bluefin tuna, *Thunnus thynnus* (Linnaeus, 1758)

Eye small (4.2 cm) constitutes (13.25%) of head length (31.7 cm), two dorsal fins separated only by a narrow interspace, the second higher than the first and followed by 8 finlets (Table. 2). Short pectoral fin (22.1 cm) constitutes (19.43%) of fork length (113.7 cm) and not reaching the posterior edge of first dorsal fins; yellow finlets. First dorsal fin bluish; the second reddish-brown while anal and dorsal finlets dusky yellow (Fig.20).

Fig.20: *Th. thynnus*: Tw: 19952 g ; Tl: 121.6 cm was caught from Ras albasit in 25/ 6/2023

Otolith (Sagitta) of *Thunnus thynnus* (Fig .21) approximately lanceolated, serrate margins, especially the ventral margin. Ostium funnel-like, shorter than the cauda. Cauda tubular, straight and ending close to the posterior margin. Anterior region peaked; rostrum lanceolated, narrow, pointed and flexed dorsally; antirostrum was narrow, short and pointed; excisura very wide without a notch. Posterior region oblique.

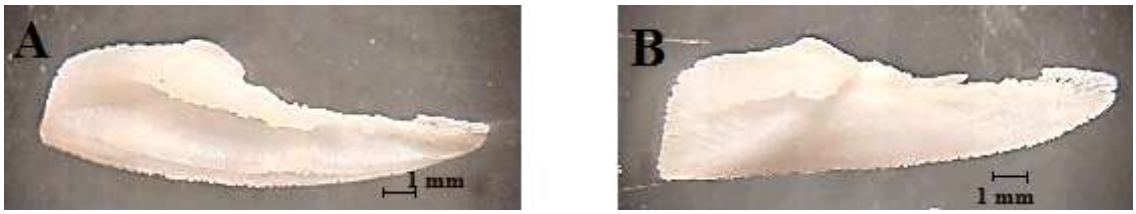

Fig 21: General view of otolith (length: 15 mm) *Th. thynnus*
(A – Internal surface B – External surface)

5. 2 species Albacore, *Thunnus alalunga* (Bonnaterre, 1788)

Eye large (4.7 cm) constitutes (19.20%) of head length (24.1 cm). Two dorsal fins separated only by a narrow interspace, the second clearly lower than the first and followed by 8 finlets (Table. 2). Pectoral fins remarkably long (23.2 cm) constitutes (29.47%) of fork length (78.7 cm), reaching well beyond origin of second dorsal fin, anal finlets dark; posterior margin of caudal fin white (Fig. 22).

Fig. 22: *Th. alalunga*: Tw: 9550 g ; Tl: 83.1 cm was caught from Ras Albasit in 25/ 6/ 2023.

Otolith (Sagitta) of *Th. alalunga* (Fig .23) approximately lanceolated, serrate margins, especially the ventral margin. Ostium was funnel-like, shorter than or similar to the cauda in size. Cauda was tubular, straight, wider posteriorly and ending close to the posterior margin. Anterior region was peaked; rostrum elongated, narrow, pointed and dorsally flexed; antirostrum was short, narrow, pointed and dorsally flexed; excisura very wide with a dentate notch. Posterior region oblique.

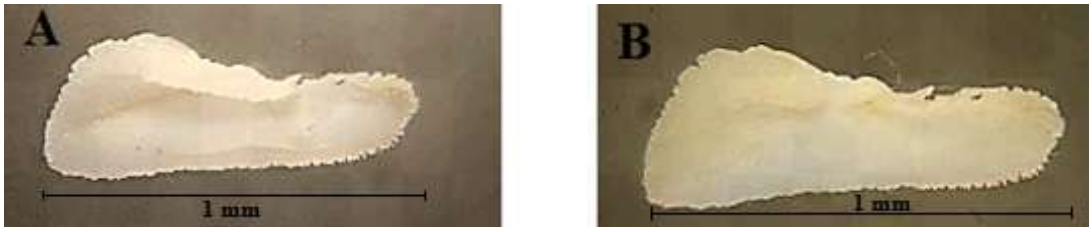

Fig 23: General view of otolith (length: 1 mm) *Th. alalunga*
(A – Internal surface B – External surface)

6- Genus *Scomberomorus* (Lacepède, 1801)

6. 1- Species Narrow-barred Spanish mackerel, *Scomberomorus commerson* (Lacepède, 1800)

Body elongate, strongly compressed. Snout (6.7 cm) much shorter than rest of head (15.9 cm). Second dorsal higher than first dorsal interspace them are narrow. posterior part of maxilla exposed, reaching to a vertical from hind margin of eye; inter-pelvic process small and bifid (Fig.3). Bars narrow and slightly wavy and breaking up into spots ventrally. Jaws with compressed teeth; lateral line abruptly bent downward beyond second dorsal and anal fins (Fig. 24). Gillrakers on first arch few: 0 to 2 on upper limb, 1 to 8 on lower limb; 4 to 7 total after examining several individuals (Table. 2). Color was sides silvery grey marked with transverse vertical bars of a darker grey, bars narrow and slightly wavy. Liver trilobed, left and right lobes longer than middle lobe (Fig. 25).

Fig .24*: S. commerson:* Tw: 5420 g ; Tl: 93.3 cm. was caught from Ras Albasit in 25/ 7/ 2022.

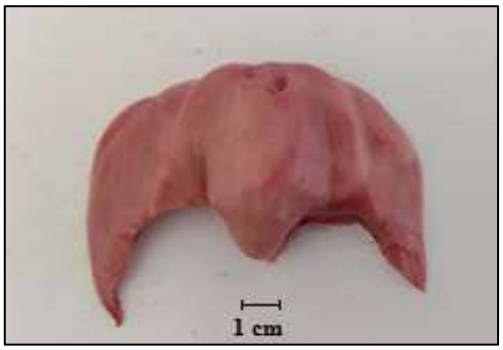

Fig. 25: of the liver of *S. commerson*

Otolith (Sagitta) of *S. commerson* (Fig .26) lanceolated, serrate margins, especially the margin. Ostium funnel-like, longer than the cauda. Cauda elliptic, ending close to the posterior margin. Anterior region peaked; rostrum long, narrow and pointed; antirostrum was long, broad and pointed; excisura wide, with an acute notch. Posterior region oblique.

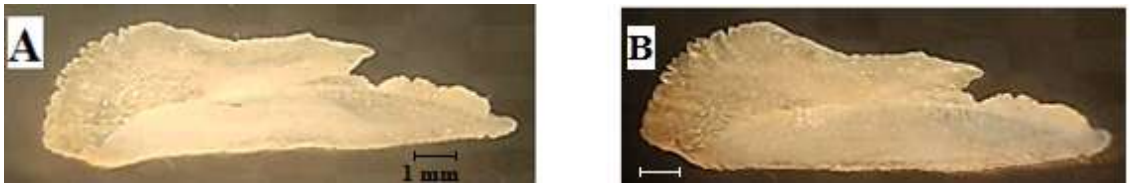

Fig 26: General view of otolith (length: 12 mm) *S. commerson*
(A – Internal surface B – External surface)

7- Genus *Scomber* (Linnaeus, 1758)

Fusiform body, elongated and rounded, a pointed snout, and a well-developed adipose eyelid. Teeth in upper and lower jaws small and conical; teeth also present on vomer and palatine bones. Gillrakers shorter than gill filaments. Two widely separated dorsal fins, pectoral fin short, inter-pelvic process small and single (Fig. 5). Entire body covered with rather small scales, scales behind head and around pectoral fins larger and more conspicuous than those covering rest of body, but no well-developed corselet. Two small keels on each side of caudal peduncle. Liver simple and single-lobed (Fig. 27). This genus represented by three species in this study.

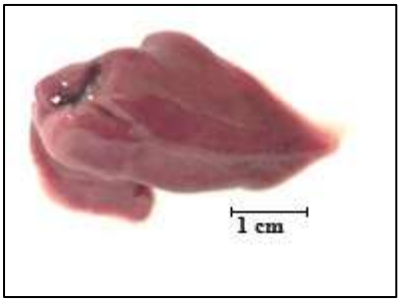

Fig. 27: of the liver of *Scomber* sp.

7. 1 - Species Chub mackerel, *Scomber japonicus* Houttuyn, 1782

The space between the first dorsal fin groove and the second dorsal fin (3.8 cm) are slightly greater than the length of the groove (3.1 cm). Gill rackers on the first gill arch 41 (Table. 2) and back with oblique lines (zigzag and undulating); belly unmarked (Fig. 28).

Fig .28*: S. japonicus:* Tw: 145 g ; Tl : 24.7 cm was caught from Ras Albasit in 23/ 6/ 2022

Otolith (Sagitta) of *S. japonicus* (Fig .29) rectangular with a blunt rostrum ventrally with a downward curve and a pointed antirostrum.

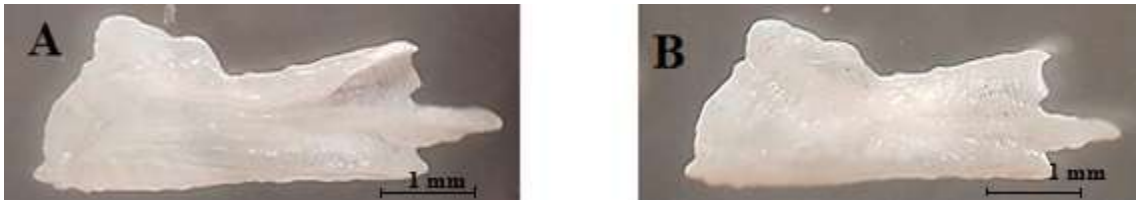

Fig. 29: General view of otolith (length: 5 mm) *S. japonicus*
(A – Internal surface B – External surface)

7. 2 Species atlantic chub mackerel, *Scomber colias* Gmelin, 1789

The space between the first dorsal fin groove and the second dorsal fin (2.6 cm) are slightly greater than the length of the groove (3 cm). Gill rackers on the first gill arch 34 (Table. 2) and back with oblique zigzagging lines while the belly is paler and spotted or marked with broken wavy lines (Fig. 30).

Fig. 30: *S. Colias:* Tw: 85 g ; Tl: 21.2 cm was caught from Ras Albasit in 5/ 11/ 2023

O**tolith (Sagitta) of *S. colias*** (Fig .31) rectangular with a ventral stout rostrum and pointed antirostrum.

Fig. 31: General view of otolith (length: 5 mm) *S. colias*
(A – Internal surface B – External surface)

7. 3 Lessepsian migrant mackerel, *Scomber indicus* Abdussamad, Sukumaran & Ratheesh, 2016

The space between the first dorsal fin groove and the second dorsal fin (3.5 cm) are slightly greater than the length of the groove (2.9 cm). Gill rackers on the first gill arch 43 (Table. 2). Color: dark bluish on the dorsal side with greenish wavy bands, pectorals black, small back spots on pectorals below the lateral line (Fig. 32).

Fig. 32*: S. indicus:* Tw: 120 g ; Tl: 23.6 cm was caught from Ras Albasit in 26/ 10/ 2023

O**tolith (Sagitta) of *S. indicus*** (Fig .33) rectangular with pointed rostrum positioned medially without a prominent anti rostrum and oblique posterior.

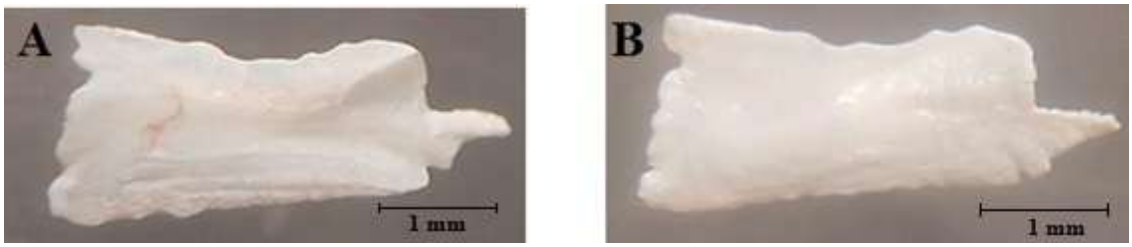

Fig. 33: General view of otolith (length: 4 mm) *S. indicus*
(A – Internal surface B – External surface)

Table 2: Meristic measurements for Scombridae species caught from Syrian marine waters (Ras Albasit) during 2021- 2023.

Meristic measurements / Species	Dorsal fin (D)		Finlets on dorsal space	Pectoral fin (p)	Ventral fin (V)	Anal fin (A)	Finlets on anal space	Number of gill rakers
	D_1	D2						
Auxis thazard	XI	12	8	24	I+5	12	7	42
Auxis rochei	X	12	8	23	I+5	13	7	42
Euthynnus alletteratus	XV	12	8	26	I+5	12	7	37
Katsuwonus pelamis	XV	15	9	27	I+5	14	8	53
Sarda sarda	XXII	14	9	24	I+5	II+13	7	20
Scomber colias	IX	12	5	21	I+5	I+12	5	34
Scomber japonicus	IX	12	5	21	I+5	I+12	5	41
Scomber indicus	IX	12	5	21	I+5	I+12	5	43
Scomberomorus commerson	XV	17	10	23	I+5	II+18	9	4-7
Thunnus thynnus	XIV	I+13	9	34	I + 5	II+12	8	39
Thunnus alalunga	XIV	12	9	33-34	I+5	II+12	8	29

Conclusions:

1. The Biodiversity of fish Scombridae family in Al Bassit area in Syrian marine waters is represented by a few number of species compared to the global fauna, 11 species belong to 7 genera have been recorded and this may be due to environmental and geographical reasons.
2. Two species, *Auxis thazard* and *Scomber indicus* were appeared for the first time in the Syrian marine waters - Ras Albasit area.
3. The taxonomic features of the 11 species of the Scombridae recorded in Syrian marine waters - Ras Albasit area during this study are consistent with what was stated in international scientific references.

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