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VSEBINA / *INDICE GENERALE* / *CONTENTS*SREDOZEMSKÉ HRUSTANČNICE
SQUALI E RAZZE MEDITERRANEE
*MEDITERRANEAN SHARKS AND RAYS***Christian CAPAPÉ, Christian REYNAUD & Farid HEMIDA**

The First Substantiated Records of Smoothback Angelshark *Squatina oculata* (Squatinae) from the Algerian Coast (Southwestern Mediterranean Sea) 143
Prvi utemeljeni zapis o pojavljanju pegastega sklata Squatina oculata (Squatinae) iz alžirske obale (jugozahodno Sredozemsko morje)

Tanguy CARPAYE-TAILAMEE & Mattéo MAUREL

Perspective on Great White Sharks (*Carcharodon carcharias*) in the Northwestern Mediterranean and Recommendations for Further Field Research 151
Pogled na velikega belega morskega volka (Carcharodon carcharias) v severozahodnem Sredozemlju in priporočila za nadaljnje terenske raziskave

Hakan KABASAKAL

A Preliminary Social Media Survey of Sharks and Batoids Captured in North Aegean Sea Commercial Fisheries 165
Preliminarna raziskava o morskih psih in skatih, ujetih v komercialnem ribištvu severnega Egejskega morja na osnovi podatkov iz socialnih medijev

Farid HEMIDA, Christian REYNAUD & Christian CAPAPÉ

On The Occurrence of Norwegian Skate, *Dipturus nidarosiensis* (Rajidae) on the Algerian Coast (Southwestern Mediterranean Sea) 187
O pojavljanju norveške raže, Dipturus nidarosiensis (Rajidae), ob alžirski obali (jugozahodno Sredozemsko morje)

Alen SOLDÓ

The First Record of Complete Albinism in Common Stingray *Dasyatis pastinaca* (Linnaeus, 1758) 193
Prvi zapis o najdbi popolnega albinističnega primerka navadnega morskega biča, Dasyatis pastinaca (Linnaeus, 1758)

Christian CAPAPÉ, Christian REYNAUD & Farid HEMIDA

Capture of a Giant Round Fantail Stingray *Taeniurops grabatus* (Dasyatidae) from the Algerian Coast (Southwestern Mediterranean Sea) 199
Ulov okroglega morskega biča (Taeniurops grabatus) (Dasyatidae) iz alžirske obale (jugozahodno Sredozemsko morje)

IHTIOFAUNA**ITTIOFAUNA****ICHTHYOFAUNA****Nicola BETTOSO & Diego BORME**

Recent Record of the Atlantic Pomfret *Brama brama* (Bonnaterre, 1788) (Scombriformes: Bramidae) in the Gulf of Trieste (Northern Adriatic Sea) 207
Recentni zapis o pojavljanju kostanjevke Brama brama (Bonnaterre, 1788) (Scombriformes: Bramidae) v Tržaškem zalivu (severno Jadransko morje)

Alan DEIDUN, Bruno ZAVA, Alessio MARRONE, Johann GALTIES, Arnold SCIBERRAS & Maria CORSINI-FOKA

The Confirmed Occurrence of *Schedophilus medusophagus* (Cocco, 1839) and *Petromyzon marinus* Linnaeus, 1758 in Maltese Waters, Central Mediterranean 213
Potrjeno pojavljanje meduzojedca, Schedophilus medusophagus (Cocco, 1839), in morskega piškurja, Petromyzon marinus Linnaeus, 1758, v malteških vodah, osrednje Sredozemsko morje

Gianni INSACCO, Gildo GAVANELLI, Bruno ZAVA & Maria CORSINI-FOKA

An Overlooked Finding of *Mola alexandrini* (Ranzani, 1839) in the Adriatic Sea 221
Sprejeto najdba vrste Mola alexandrini (Ranzani, 1839) v Jadranskem morju

Borut MAVRIČ, Lovrenc LIPEJ, Jelena BELAMARIĆ, Dule BULAJA, Matea ŠPIK & Petar KRUŽIĆ

Additional Data on the Bump-Head Sunfish, *Mola alexandrini* (Ranzani, 1839) in the Adriatic Sea 229
Dodatni podatki o pojavljanju grbastega morskega meseca, Mola alexandrini (Ranzani, 1839) v Jadranskem morju

Lana KHREMA, Amina ALNESSER, Adib SAAD & Christian CAPAPÉ

First Substantiated Record of Painted Eel
Echelus myrus (Ophichthidae) from the Syrian
 Marine Waters (Eastern Mediterranean Sea) 235
Prvi utemeljeni zapis o pojavljanju pisane
jegulje, Echelus myrus (Ophichthidae),
iz morskih voda Sirije (vzhodno
Sredozemsko morje)

BIOTSKA GLOBALIZACIJA
 GLOBALIZZAZIONE BIOTICA
 BIOTIC GLOBALIZATION

Deniz ERGUDEN, Deniz AYAS & Zafer KUŞATAN

The Presence of *Hippocampus fuscus* Rüppell,
 1838, in the Northeastern Mediterranean Sea 243
Pojavljanje morskega konjička vrste
Hippocampus fuscus Rüppell, 1838,
v severovzhodnem Sredozemskem morju

Christian CAPAPÉ & Adib SAAD

Confirmed Occurrence of Pharaoh
 Cardinal Fish *Apogonichthyoides*
pharaonis (Osteichthyes: Apogonidae)
 from the Syrian Coast
 (Eastern Mediterranean Sea) 249
Potrjeno pojavljanje faraonskega
kraljička Apogonichthyoides
pharaonis (Osteichthyes: Apogonidae)
iz sirske obale (vzhodno
Sredozemsko morje)

Deniz ERGUDEN, Deniz AYAS & Cemal TURAN

First Record of *Epinephelus areolatus*
 (Epinephelidae) from the South-Eastern
 Mediterranean, Turkey 255
Prvi zapis o pojavljanju rdečepikčaste
kirnje Epinephelus areolatus
(Epinephelidae) v jugovzhodnem
Sredozemskem morju (Turčija)

FAVNA
 FAUNA
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Andrea LOMBARDO & Giuliana MARLETTA

First Record of the Marine Heterobranch
Spinoaglaja wildpretii (Ortea, Bacallado &
 Moro, 2003) (Cephalaspidea: Aglajidae)
 in Sicily (Ionian Sea) with Notes on
 Its Biology and Ecology 263
Prvi zapis o pojavljanju morskega zaškrgarja
vrste Spinoaglaja wildpretii (Ortea,
Bacallado & Moro, 2003) (Cephalaspidea:
Aglajidae) na Siciliji (Jonsko morje) z
zapiski o njeni biologiji in ekologiji

Marco FANTIN, Saul CIRIACO, Lisa FARESI, Chiara SCRIGNER, Juri VECCHI, Domen TRKOV & Lovrenc LIPEJ

First Evidence of the Presence of *Okenia*
picoensis Paz-Sedano, Ortigosa & Pola,
 2017 (Gastropoda: Nudibranchia)
 in the Adriatic Sea 271
Prvi zapis o pojavljanju vrste gološkrgarja
Okenia picoensis Paz-Sedano, Ortigosa &
Pola, 2017 (Gastropoda: Nudibranchia)
iz Jadranskega morja

FLORA
 FLORA
 FLORA

Amelio PEZZETTA & MARCO PAOLUCCI

La flora di Lama dei Peligni (Abruzzo,
 Italia): aggiornamento sistematico e
 nuove segnalazioni 279
Flora občine Lama dei Peligni
(Abruci, Italija): sistematična
posodobitev in nove najdbe

MISCELLANEA**Al VREZEC**

Bird (Aves) Descriptions of Joannes
 Antonius Scopoli (1723-1788):
 General Overview 327
Opisi ptic (Aves) Joannesa Antoniusa Scopolija
(1723-1788): osnovni pregled

OCENE IN POROČILA
 RECENSIONI E RELAZIONI
 REVIEWS AND REPORTS

Mitja KALIGARIČ

Recenzija knjige:
 Podobe iz modrine 365

IN MEMORIAM**Elide CATALFAMO**

Ricordo del professor Guido Bressan 369

Kazalo k slikam na ovitku 371

Index to images on the cover 371

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THE FIRST SUBSTANTIATED RECORDS OF SMOOTHBACK ANGELSHARK *SQUATINA OCLATA* (SQUATINIDAE) FROM THE ALGERIAN COAST (SOUTHWESTERN MEDITERRANEAN SEA)

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ABSTRACT

In this paper, the authors report the captures of three specimens of smoothback angelshark Squatina oculata Bonaparte, 1840 from the eastern region of the Algerian coast. Two of the specimens were males, measuring 1555 mm and 1520 mm in total length (TL) and weighing 25.5 and 21 kg in total body weight (TBW), respectively. The third specimen was a female, measuring 1600 mm in TL and weighing 27 kg. The female exhibited fully yolked oocytes ready to be released from both ovaries. The diameter of 10 of the oocytes was measured, ranging between 58 and 70 mm (mean = 63.2 mm $\pm$ 4.8 mm). These findings constitute the first substantiated records of S. oculata in the Algerian ichthyofauna. However, while the occurrence of a viable population in the area cannot be totally ruled out, the species needs a management plan to prevent its drastic decline.

Key words: *Squatina oculata*, distribution, viable populations, first record, ovarian fecundity

PRIME SEGNALAZIONI COMPROVATE DI SQUADRO PELLE ROSSA, *SQUATINA OCLATA* (SQUATINIDAE), LUNGO LA COSTA ALGERINA (MEDITERRANEO SUD-OCCIDENTALE)

SINTESI

In questo articolo gli autori riportano le catture di tre esemplari di squadro pelle rossa, Squatina oculata Bonaparte, 1840, provenienti dalla regione orientale della costa algerina. Due degli esemplari erano maschi, misuravano 1555 mm e 1520 mm di lunghezza totale (TL) e pesavano rispettivamente 25,5 e 21 kg di peso corporeo totale (TBW). Il terzo esemplare era una femmina, misurava 1600 mm in TL e pesava 27 kg. La femmina mostrava ovociti completamente maturi pronti per essere rilasciati da entrambe le ovaie. È stato misurato il diametro di 10 ovociti, compreso tra 58 e 70 mm (media = 63,2 mm $\pm$ 4,8 mm). Questi risultati costituiscono le prime testimonianze documentate di S. oculata nell'ittiofauna algerina. Tuttavia, anche se non si può confermare del tutto la presenza di una popolazione vitale nella zona, la specie necessita di un piano di gestione per prevenirne il drastico declino.

Parole chiave: *Squatina oculata*, distribuzione, popolazioni vitali, prima segnalazione, fecondità ovarica

INTRODUCTION

The smoothback angelshark *Squatina oculata* Bonaparte, 1840 is present along the eastern tropical Atlantic coast from Morocco (Lloris & Rucabado, 1998) to Angola (Roux, 1984). In some areas, such as the coast of Senegal, *S. oculata* holds an important economic interest and is targeted by craft fisheries (Diatla *et al.*, 2009). The relative abundance of the species has allowed researchers to gather some insights into its reproductive biology (Capapé *et al.*, 2002).

Squatina oculata occurs in the Mediterranean Sea together with two congeneric species: the sawback angelshark, *S. aculeata* Cuvier, 1829, and the common angelshark, *S. squatina* (Linnaeus, 1758). According to Roux (1984), *S. oculata* was previously unknown off the Mediterranean coast of France (Capapé *et al.*, 2000). Conversely, Tortonesi (1956) noted its presence in Italian waters, and Zava *et al.* (2016) collected 4 juvenile specimens from the Strait of Sicily. More recently, Zava *et al.* (2022) reported of 21 specimens observed off the Malta Islands and six specimens detected between 2005 and 2021, while Ounifi-Ben Amor *et al.* (2023) reported the capture of two additional specimens in Tunisian marine waters.

In the eastern Mediterranean, *S. oculata* was first reported in the Levant Basin, off the Syrian coast, by Ali (2003, 2018), and later confirmed off the Lebanese coast by Bariche & Fricke (2020). Ergüden *et al.* (2019) and Akyol *et al.* (2023) have reported all instances of *S. oculata* in Turkish waters, where it is sporadically caught and considered a rare species.

With regard to the Algerian coast in particular, *S. squatina* is the single squatinid species reported by Dieuzeide *et al.* (1953), whereas Refes *et al.* (2010) noted the occurrence of *S. oculata*, but no specimen was available for confirmation. Scientific investigations regularly conducted in this area have allowed us to collect some specimens of *S. oculata*, which are described herein along with comments on the distribution of the species.

MATERIAL AND METHODS

The present specimens of *S. oculata* were sampled at the main fish market of Algiers, where fish caught from areas along the Algerian coast, between the Moroccan and Tunisian borders, are landed. During the sampling period, which extended from 2010 to 2020, only these three specimens were observed. They were captured by commercial trawl at a depth of 100 m, on sandy-muddy bottoms off Annaba, in the eastern region, at 35°42'35"N and 1°22'17"W (Fig. 1). They were carefully examined and identified using field guides and ichthyological fauna. They were also photographed and measured for total length (TL) to the nearest millimetre, while the total body weight (TBW) to the nearest kilogram was provided by fishermen and/or sellers. In general, obtaining morphometric measurements proved challenging since the specimens were sold rapidly, mainly in large quantities, for local consumption.

RESULTS AND DISCUSSION

The first specimen was captured on 27 March 2012. It was a male measuring 1555 mm TL and

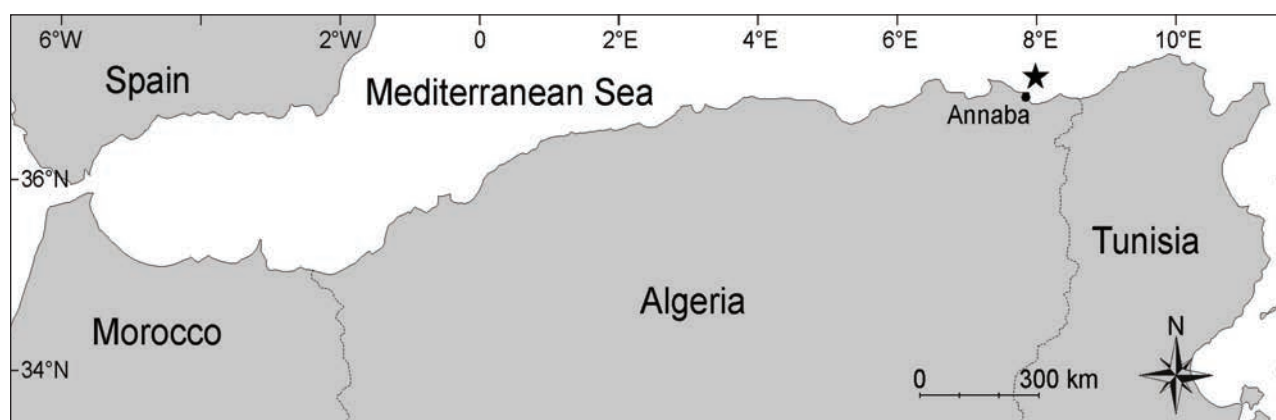


Fig. 1: Map of the Algerian coast, with the black star indicating the capture site of the specimens of *Squatina oculata* (redrawn from Capapé *et al.*, 2023).

Sl. 1: Zemljevid alžirske obale z označenim območjem ulova primerkov vrste *Squatina oculata* (prirejeno po Capapé in sod., 2023).

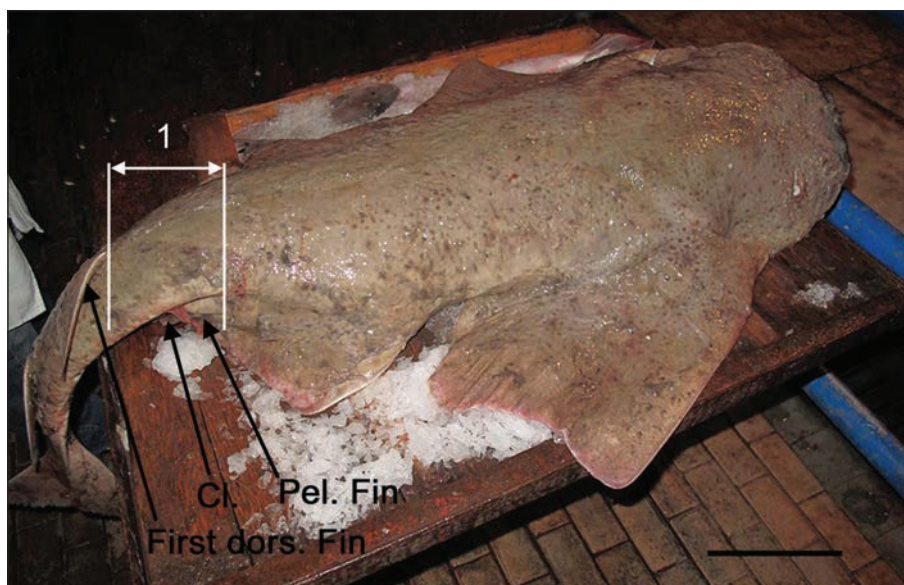


Fig. 2: Male specimen of *Squatina oculata*. 1. Space showing that the hind tip of the pelvic fin (Pel. Fin) does not reach the level of the first dorsal fin origin (First Dors. Fin). Cl = clasper. Scale bar = 200 mm (Photo: F. Hemida).

Sl. 2: Samec vrste *Squatina oculata*. 1. Presledek kaže, da zadnja konica trebušne plavuti (Pel. Fin) ne doseže začetka korena prve hrbtne plavuti (First Dors. Fin). Cl = klasper. Merilo = 200 mm (Foto: F. Hemida).

weighing 25.5 kg TBW (Fig. 2). The second specimen, caught on 26 December 2016, was also a male. It measured 1520 mm TL and weighed 21 kg. The third specimen, a female measuring 1600 mm in TL and weighing 27 kg, was caught on 16 December 2020. All three specimens were identified as *S. oculata* based on the combination of main morphological characters: external nasal flap with two barbels bordering a fringed median lobe (Fig. 3, 1); dermal folds on sides of head slightly undulate (Fig. 3, 2); pectoral fins very high and broad with rounded rear tips; hind tips of pelvic fins not reaching level of first dorsal fin origin; dorsal surface rough with a median line of small spines on front margin of pectoral and pelvic fins; teeth pointed, slightly curved at the distal end and with triangular base; colour greyish-brown with several white spots, belly beige. The description and coloration of the three specimens were in complete accordance with those provided by Roux (1984), Capapé & Roux (1980), Compagno (1984), Kabasakal and Kabasakal (2014), Ergüden *et al.* (2019), Rafrafi-Nouira *et al.* (2022), and Akyol *et al.* (2023). Based on these findings alone, it would not be unreasonable to consider *S. oculata* as present in Algerian marine waters and include it in the local ichthyofauna.

The dissection of the female specimen revealed the presence of 24 fully yolked oocytes ready to

be released (Fig. 3), with 18 in the left uterus and 6 in the right uterus (Fig. 4). The value of ovarian fecundity in this specimen was slightly higher than that found in specimens from the Tunisian and Senegalese coasts, where it ranged between 6 and 10 oocytes (Capapé *et al.*, 1990) and between 8 and 20 oocytes (Capapé *et al.*, 2002), respectively. This difference is likely due to the larger size of the Algerian specimen. In fact, as noted by Melling (1989), both ovarian and uterine fecundity consistently increase with size in elasmobranch viviparous species. In contrast, the diameter of the fully yolked oocytes in the present specimen was similar to those recorded in other regions and ranged between 58 and 70 mm ($n = 10$; mean = 63.2 mm; ± 4.8 mm). Each fully yolked oocyte appeared to be enveloped by a fine diaphanous membrane (Fig. 5, 1), and together, they were enclosed within a single membranous capsule (Fig. 5, 2). Similar structures were previously described in a pregnant female bluntnose sixgill shark *Hexanchus griseus* (Bonnaterre, 1788) from the Tunisian coast (Ounifi-Ben Amor *et al.*, 2017; Oddone & Capapé, 2022). Unfortunately, we were unable to extract the eggs from the ovaries and weigh them.

Initially, Roux (1984) reported that the maximum TL for *S. oculata* is 1500 mm; subsequently, Ergüden *et al.* (2019) suggested that the species can reach up to 1600 mm TL, with a common TL of 1200 mm. Large

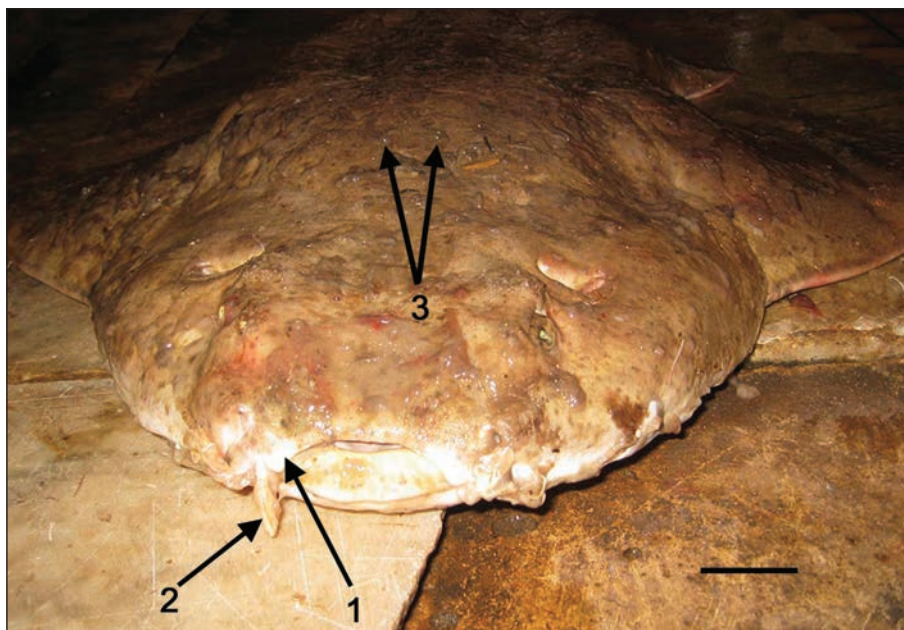


Fig. 3: Male specimen of *Squatina oculata* with front of head showing: 1. Dermal folds on the sides of the head slightly undulate. 2. Barbels bordering a fringed median lobe. 3. White spots. Scale bar = 50 mm (Photo: F. Hemida).

Fig. 3: Samec vrste *Squatina oculata* s sprednjim delom glave, ki kaže: 1. Kožni gubi sta na straneh glave rahlo valoviti. 2. Mesnati izrastki mejijo na resasti sredinski reženj. 3. Bele pege. Merilo = 50 mm (Foto: F. Hemida).

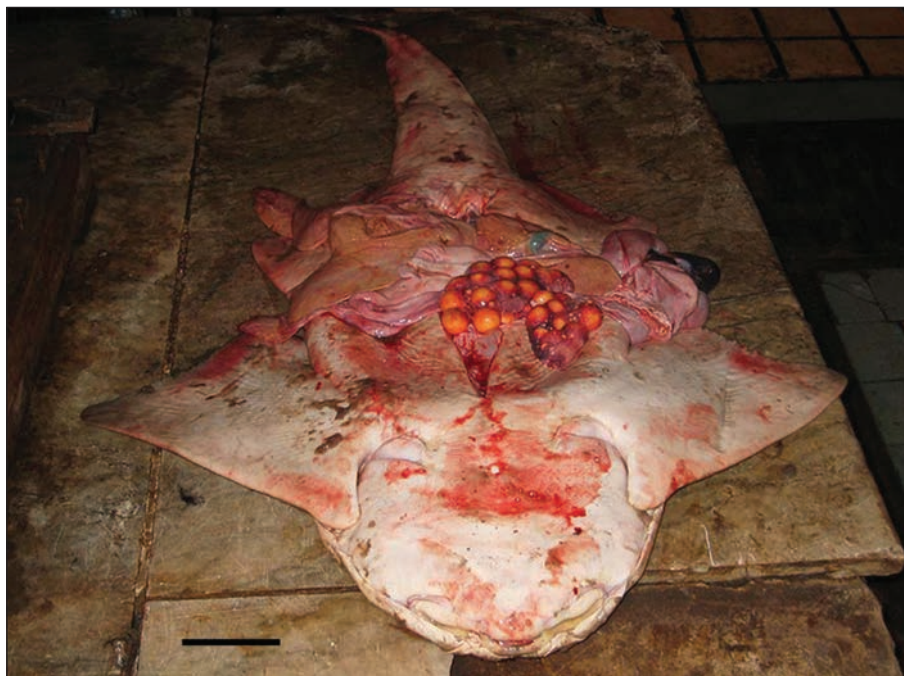


Fig 4: Ventral surface of specimen female of *Squatina oculata* exhibiting fully yolked oocytes, scale bar = 100 mm (Photo: F. Hemida).

Sl. 4: Trebušna površina samice vrste *Squatina oculata* z oocitami z razvitim rumenjkom.

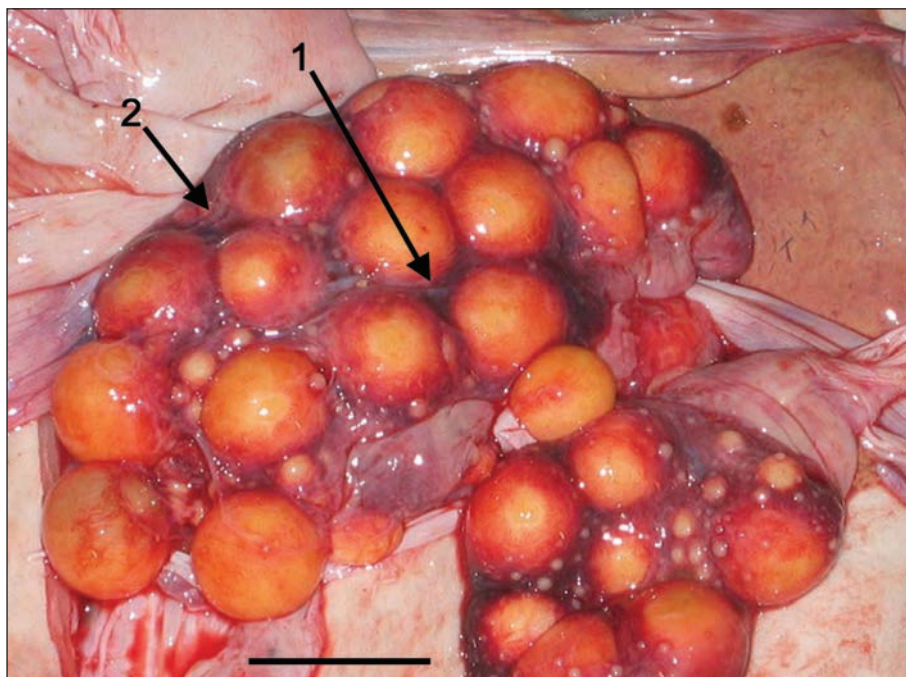


Fig. 5: Fully yolked oocytes from the female of *Squatina oculata*. 1. Oocytes, each enveloped by a fine diaphanous membrane. 2. All oocytes together enclosed in one single membranous capsule. Scale bar = 100 mm (Photo: F. Hemida).

Sl. 5: Oocite z razvitim rumenjkom pri samici vrste *Squatina oculata*. 1. Oocite, zavite v fino prosojno membrano. 2. Vse oocite so skupaj zaprte v eno membran-sko kapsulo. Merilo = 100 mm (Foto: F. Hemida).

specimens have recently been recorded in the Tunisian coast, measuring between 1350 and 1700 mm (Rafrafi-Nouira *et al.*, 2022; Ounifi-Ben Amor *et al.*, 2023), and this is consistent with the present specimens, which measured between 1450 and 1555 mm TL. Captures of *S. oculata* are considered rare in the study area, as only 3 specimens were observed over two decades and also the information provided by fishermen suggests that squatinid species are captured only sporadically and sometimes discarded at sea.

S. oculata has been reported in various regions of the Mediterranean Sea. For instance, Ergüden *et al.* (2019) and Akyol *et al.* (2023) documented the captures of specimens from the eastern Mediterranean indicating a continuous presence of the species in the region despite the infrequency of captures. Zava *et al.* (2022) and Ounifi-Ben Amor *et al.* (2023) have observed a relative abundance of the species in the central Mediterranean. However, the unexpected discovery of the three Algerian specimens described herein raises some

questions. Their presence could suggest that, locally, the elasmobranch species has not been thoroughly investigated. It is also possible that the species is entirely absent in the region, and the observed specimens migrated from nearby areas, likely the Tunisian coast, as they were captured in the proximity of the Tunisian border. Similar patterns have been reported by Capapé *et al.* (2022) for the marbled stingray, *Dasyatis marmorata* (Steindachner, 1892), and by Capapé *et al.* (2023) for the round fantail stingray *Taeniurops grabatus* (Geoffroy Saint-Hilaire, 1817).

Regardless, as noted by Kabasakal (2021), Zava *et al.* (2022), Akyol *et al.* (2023), and Ounifi-Ben Amor *et al.* (2023), due to its *k*-selected reproductive characteristics, the species requires preservation to prevent a drastic population decline and potential extinction in the short term. Therefore, it is essential to implement a management plan within local fisheries and engage fishermen in efforts to preserve a viable population of *S. oculata* in the area.

PRVI UTEMELJENI ZAPIS O POJAVLJANJU PEGASTEGA SKLATA *SQUATINA OCULATA* (SQUATINIDAE) IZ ALŽIRSKE OBALE (JUGOZAHODNO SREDOZEMSKO MORJE)

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POVZETEK

Avtorji v pričujočem prispevku poročajo o ulovih treh primerkov pegastega sklata *Squatina oculata* Bonaparte, 1840 iz vzhodnega dela alžirske obale. Dva primerka sta bila samca, ki sta merila 1555 mm in 1520 mm v totalno dolžino (TL) in tehtala 25,5 in 21 kg celokupne telesne mase (TBW). Tretji primerek je bila samica, ki je merila 1600 mm v dolžino in tehtala 27 kg. Samica je imela oocite z razvitim rumenjkom, pripravljene na sprostitve iz obeh jajčnikov. Izmerili so premer 10 oocit, ki so merile med 58 in 70 mm (v povprečju $63,2 \text{ mm} \pm 4,8 \text{ mm}$). Te ugotovitve predstavljajo prve utemeljene zapise o pojavljanju vrste *S. oculata* v alžirski ihtiofavni. Čeprav ne izključujejo dejstva, da bi se na tem območju lahko pojavljala populacija sposobna preživetja, avtorji menijo, da ta vrsta potrebuje načrt upravljanja, da bi s tem preprečili njen drastični upad.

Ključne besede: *Squatina oculata*, razširjenost, viabilna populacija, prvi zapis o pojavljanju, plodnost jajčnikov

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