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Occurrence of juveniles *Squatina oculata* Bonaparte, 1840 (Elasmobranchii: Squatinidae) in the Strait of Sicily (Central Mediterranean)

by

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Résumé. – Présence de juvéniles de *Squatina oculata* Bonaparte, 1840 (Élasmobranches: Squatinidae) dans le détroit de Sicile (Méditerranée centrale).

Quatre juvéniles de *Squatina oculata*, de longueur totale comprise entre 291 et 564 mm, ont été capturés en septembre 2007 par un chalut de fond dans les eaux côtières du détroit de Sicile. En raison de la rareté de cette espèce, les principales caractéristiques biométriques sont rapportées. Compte tenu de leur taille, et dans un cas très proche de la taille à la naissance, les spécimens collectés ont été enregistrés comme des juvéniles. Cette présence de juvéniles suggère que cette espèce “en danger critique” est encore capable de se reproduire au large de la côte sud de la Sicile.

Keywords. – Squatinidae - *Squatina oculata* - Mediterranean - Strait of Sicily - Juveniles - Critically endangered species.

Squatina oculata Bonaparte, 1840 is an elasmobranch belonging to the family Squatinidae (Order: Squatiniformes) living on sandy or muddy bottoms, between 50-400 m of depth, preferably at temperate waters (Compagno, 1984; Serena, 2005; Ebert *et al.*, 2013). Smoothback angelshark (*S. oculata*) is distributed in the eastern Atlantic from the Iberian Peninsula to Angola, until Namibia coasts, and in the Mediterranean Sea excluding the Black

Sea (Serena, 2005; Ebert *et al.*, 2013). Due to the increase in fishing effort throughout the Mediterranean in the last decades, especially in the north western Mediterranean waters, and considering the total absence or rarity of this species in the commercial catches and experimental surveys (Ragonese *et al.*, 2013), *S. oculata* is considered “Critically Endangered” for the European seas and also for the Mediterranean (Nieto *et al.*, 2015). The species seems to have experienced a dramatic decline in most of its range of distribution, becoming extremely rare in the northern part of the Mediterranean (Ferretti *et al.*, 2005); this fact is also confirmed through interviews with fishers made within the European Data Collection Framework aimed at monitoring commercial catch.

Taking into account the rarity of *S. oculata* in the Mediterranean basin, we consider the recording of juvenile specimens in the Sicilian waters an important information that can contribute to update the conservation status of this species in the Mediterranean Sea.

MATERIAL AND METHODS

The four specimens (3 males and 1 female) were caught early in the morning on 13th September 2007 by a local trawler operating in coastal waters. The haul was carried just off Punta Braccetto, on a muddy bottom at about 50 m of depth (approximate coordinates 36°49'85"N-14°23'21"E (Fig. 1).

The specimens were photographed (Fig. 2), measured and identified according to Compagno (1984), Serena (2005) and Ebert *et al.* (2013) keys.

Fresh specimens were measured as total length (TL in mm) and weighed as total weight (TW in g) and frozen. After thawing, other biometric data were recorded in laboratory according to Serena *et al.* (2014). Furthermore, stomach contents were analyzed. The specimens were prepared (freeze-dry taxidermy) and stored with labels So1-So4 in the Wilderness Environmental Studies collection in Palermo.

RESULTS

The collected specimens were classified as *Squatina oculata* Bonaparte, 1840 based on the following diagnostic characteristics: strong concavity between eyes, origin of 1st dorsal fin positioned behind the free rear tips of pelvic fin, pectoral fins low and angular, rear tips of pectoral fins broadly subangular, pectoral and pelvic fin margin dusky, anterior nasal barbels feebly bifurcated, large spines

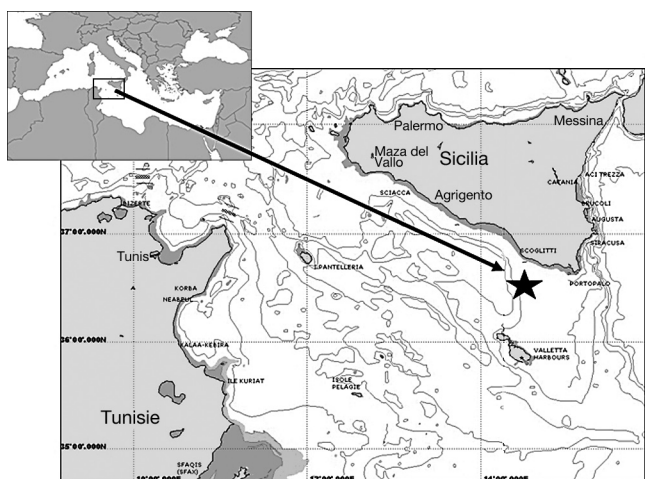


Figure 1. – Map of the Mediterranean Sea with the approximate position where the four specimens of *Squatina oculata* were caught.

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Figure 2. – The four specimens of *Squatina oculata* caught in the Strait of Sicily and photographed at landing.

present on the snout and above eyes but absent from midback.

Colour in all fresh specimens was similar to that reported in literature: dorsal surface grey-brown with white spots uniformly distributed on the back, four pairs of white spots on each side of the back. Three dark black ocelli on both side of caudal peduncle, sometimes symmetrical. Two large pseudo-ocelli on pectoral fins and various smaller (about 8 on each fin). Dorsal and caudal fins with white margins. Ventral surface white (Fig. 2).

Main biometric data are reported in table I. The stomachs of the two larger males contained fish, *Lepidotrigla cavillone* (Lacepède, 1801) and *Trachurus* sp., whereas the stomachs of the two other specimens were empty.

DISCUSSION

According to Doderlein (1878-1879), *Squatina* spp. were frequent in the coastal waters off Sicily at the end of 19th century. In Sicilian coastal waters, as frequently occurred in the Mediterranean Sea, angelsharks became rare in the last decades of 20th century (Baino *et al.*, 2001; Giusto and Ragonese, 2014; Fortibuoni *et al.*, 2016). On the basis of trawl surveys carried out yearly in the Strait of Sicily since 1994, Ragonese *et al.* (2013) reported rare catches of *S. oculata* in offshore waters in the middle of the Strait of Sicily and around Malta. Bradai *et al.* (2006) reported that the species was observed in the Gulf of Gabès. According to Ghmati and Turki (2015), *S. oculata* was rare along the Libyan coast whereas *S. squatina* is so common that it is still targeted by a specific set net fishery, called Getatia, mainly in summer.

S. oculata reaches a maximum size of 145 and 160 cm in total length for males and females, respectively (Ebert, 2013). The size at first maturity was estimated as 100 and 71 cm TL for females and males, respectively, in the Gulf of Tunis (Capapé *et al.*, 1990), and 89 and 82 cm for females and males in the North Sea (Ebert *et al.*, 2013). The growth rate and longevity of *S. oculata* is not well known. The species has a lecithotrophic-yolk-sac viviparity reproduction strategy (Hamlett, 2005) with a probable reproductive cycle of two years (Miller, 2015). A long gestation period (about one year) with production of a few puppies, from five to eight, has also been reported for this species (Miller, 2015). A birth period from February to April for *S. oculata* has been observed (Capapé *et al.*, 1990; Ebert *et al.*, 2013). A size at birth between 226 and 270 mm TL and 129 and 159 g TW has also been reported for *S. oculata*.

The finding of four juveniles (TL < 570 mm), along with the lack of a larval dispersal phase in elasmobranchs, suggests the persistence of reproduction in the Sicilian coastal waters. The size of

the smallest examined male (291 mm TL and 173 g TW; Tab. I) is close to the size at birth reported by Capapé *et al.* (2002) and Ebert *et al.* (2013). Moreover, given the birth period (Capapé *et al.*, 1990; Ebert *et al.*, 2013), the size of the smallest observed individual suggests a birth in the summer time, whereas the other three specimens could be born at the beginning of spring season-end of winter.

Data on parturition or nurseries of *S. oculata* in the Mediterranean is poor. Capapé *et al.* (1990) have observed juveniles of the species in the Gulf of Tunis and Corsini and Zava (2007) off the northwest coast of Rhodes in the Southeast Aegean Sea. Although scattered in time, the available informations indicate that the species is still able to reproduce in some areas of the Central and Eastern Mediterranean Sea.

S. oculata is classified as “Critically Endangered” at global scale by the IUCN (Morey *et al.*, 2013) and confirmed in the last IUCN assessment (Nieto *et al.*, 2015). Effort should be done to adopt specific measures for angelsharks conservation in the Mediterranean Sea. These measures are urged to ensure the survival of this species in its natural habitat. In particular, considering that the species has a high survival at catch, fishers should be involved in best practices to release specimens at sea immediately after catch, thus limiting the probability of death after the discarding (Fortibuoni *et al.*, 2016).

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Table I. – Sex (M: male; F: female) and measures of the four *Squatina oculata* individuals (So1-So4) caught in the Strait of Sicily. Length (L) and height (H) in mm, weight in g.

Measure	So1	So2	So3	So4
Sex	M	M	M	F
Total length	291	442	432	564
Total weight	173	625	630	1480
Preorbital L	10	19	17	20
Prespiracular L	21	35	35	41
Prebranchial L	42	59	60	78
Head L	52	74	69	87
Pre-1 st dorsal L	179	280	265	347
Pre-2 nd dorsal L	215	330	316	415
Pre-caudal L	247	380	362	478
Pre-pectoral L	57	89	95	85
Pre-pelvic L	117	169	170	220
Pectoral – pelvic space	36	51	54	70
Pelvic-caudal space	95	157	145	200
Pectoral anterior margin	65	96	102	136
Pectoral inner margin	50	71	72	101
Pectoral H	52	78	73	106
Eye L	7	10	11	12
Eye height	5	6	7	8
Inter gill L	12	12	16	20
1 st gill slit H	18	32	27	40
5 th gill slit H	19	28	30	41
1 st dorsal L	18	29	29	38
1 st dorsal H	16	28	29	42
1 st dorsal base	12	17	18	24
2 nd dorsal L	19	27	27	35
2 nd dorsal H	12	23	25	37
2 nd dorsal base	13	16	16	22
Pelvic L	58	93	92	134
Pelvic base	37	50	54	80
Pelvic L	58	93	92	134
Pelvic base	37	50	54	80
Dorsal caudal margin	37	50	54	67
Caudal peduncle H	7	8	10	11
Clasper outer L	3	5	11	not used
Clasper inner L	41	61	60	not used
Caudal Length	47	68	67	80
Pectoral anterior tip-fin insertion L	30	34	34	40
Pectoral anterior tip L	77	110	116	150

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