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## ATYPICAL COLORATION IN SMALL-SPOTTED CATSHARK *SCYLIORHINUS CANICULA* (CHONDRICHTHYES: SCYLIORHINIDAE) CAUGHT OFF NORTHERN TUNISIAN COAST (CENTRAL MEDITERRANEAN)

NÉJIA MNASRI, OLFA EL KAMEL & MONCEF BOUMAÏZA

Laboratoire d'Hydrobiologie Littorale et Limnique, Université du 07 novembre à Carthage, Faculté des Sciences, Zarzouna,  
7021 Bizerte, Tunisia  
E-mail: nejiamnasri@yahoo.com

CHRISTIAN CAPAPÉ

Laboratoire d'Ichtyologie, case 104, Université Montpellier II, Sciences et Techniques du Languedoc, F-34095 Montpellier cedex 5, France

### ABSTRACT

*Two small-spotted catsharks *Scyliorhinus canicula* captured off the northern Tunisian coast presented abnormal pigmentation. The first specimen presented overpigmentation of the anterior part of ventral surface. The second specimen showed large darkish areas with white spots on dorsal surface, while the tail and both sides were completely unpigmented. The second specimen constitutes the first well documented case of partial albinism in *S. canicula*.*

**Key words:** Chondrichthyes, Scyliorhinidae, *Scyliorhinus canicula*, chromatic abnormalities, northern Tunisian coast

## COLORAZIONE ATIPICA DI GATTUCCIO *SCYLIORHINUS CANICULA* (CHONDRICHTHYES: SCYLIORHINIDAE) PESCATO AL LARGO DELLA COSTA SETTENTRIONALE DELLA TUNISIA (MEDITERRANEO CENTRALE)

### SINTESI

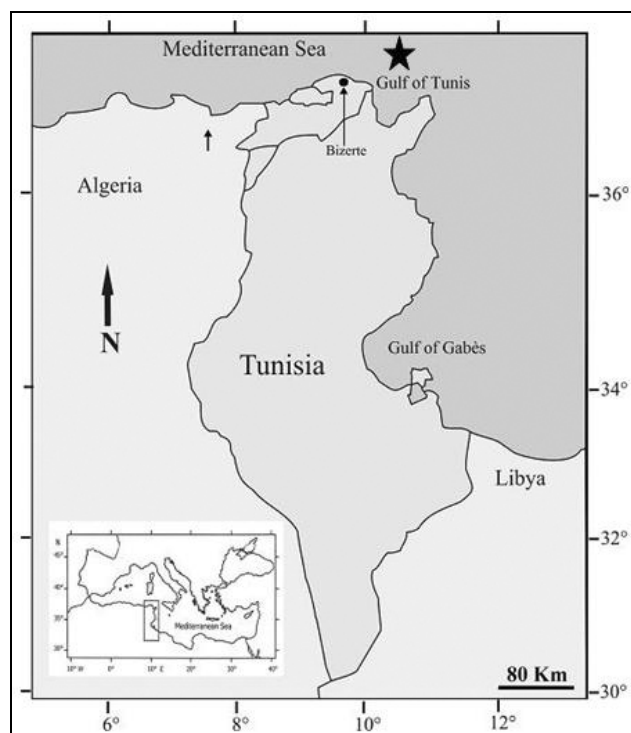
*Due esemplari di gattuccio, *Scyliorhinus canicula*, catturati al largo della costa settentrionale della Tunisia presentavano pigmentazione anomala. Il primo esemplare era iperpigmentato nella parte anteriore della superficie ventrale. Il secondo esemplare esponeva larghe aree scure con punti bianchi sulla superficie dorsale, mentre la coda era completamente priva di pigmento a entrambi i lati. Il secondo esemplare rappresenta il primo caso documentato nel dettaglio di albinismo parziale in *S. canicula*.*

**Parole chiave:** Chondrichthyes, Scyliorhinidae, *Scyliorhinus canicula*, anomalie cromatiche, costa settentrionale della Tunisia

## INTRODUCTION

Chromatic abnormalities, namely total albinism and partial albinism, are rarely reported in chondrichthyan species (*sensu* Bottaro *et al.*, 2005). Total albinism involves lack of pigmentation of the entire body, while partial albinism only affects a part of the body (Boncinelli, 1998). Such phenomena were recorded in sharks (Bottaro *et al.*, 2005; Saïdi *et al.*, 2006), rays (Ben Brahim *et al.*, 1998; Ben Souissi *et al.*, 2007) and a single instance in chimeras (Reum *et al.*, 2008). By contrast, pigmentation of body areas that are normally unpigmented has, to our knowledge, never been reported in chondrichthyan species.

During the research conducted off northern Tunisian coast since June 2006, several chondrichthyan species have been caught, especially small-spotted catsharks, *Scyliorhinus canicula*, known for already several decades to be very abundant in the area (Bourgois & Farina, 1961; Capapé, 1977, 1987; Mnasri, 2008). Among the latter, two specimens presenting atypical characteristics in coloration were collected. In this article, both specimens are described and the observed abnormalities are herein commented.



**Fig. 1:** Map of the Mediterranean showing the Tunisian coast and pointing out the capture site of *Scyliorhinus canicula* off Bizerte (black star).

**Sl. 1:** Zemljevid Sredozemlja s tunizijsko obalo in označeno točko ulova *Scyliorhinus canicula* pri kraju Bizerte (črna zvezdica).

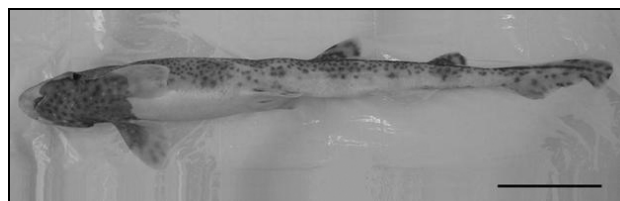
## MATERIAL AND METHODS

Both specimens were caught by commercial trawler, at 150–200 m depths on sandy-muddy bottoms, off Bizerte (northern Tunisia, central Mediterranean; Fig. 1). The first specimen was captured on 04 May 2009 and the second one on 30 September 2009; both were females. Soon after landing, they were determined following Springer (1979), photographed and frozen.

They were later examined for total length (TL) to the nearest millimetre and total mass (TM) to the nearest gram. Morphometric measurements to the nearest millimetre and meristic counts were recorded following Compagno (1984) and compared with two other normal specimens of the same sex, having similar size and mass, and caught in the same area. They are summarized in Table 1. All specimens, two abnormal and two normal, were preserved in 5% buffered formalin, deposited in the Ichthyological Collection of the Faculté des Sciences de Bizerte (Tunisia), receiving catalogue numbers as follows, FSB-Scy-can 01, 02, 03 and 04.

## RESULTS

The first specimen, 423 mm TL and 322.4 g TM, was normally brown on dorsal surface and both sides, covered with several lenticular dark spots, belly uniformly beige, without dark spots (Fig. 2). The anterior region of the ventral surface, located between the lower jaw and the posterior base of the pectoral was brownish with characteristic spots and covered by dermal denticles. Similar patterns were observed on the third anterior part of both pectoral fins (Fig. 3). Additionally, the atypical ventral areas were less rough than other regions of the body, especially the dorsal surface, due to the fact that in dorsal areas, dermal denticles were more elongated and sharper than in coloured ventral areas (Fig. 4).



**Fig. 2:** Adult female of *S. canicula* (ref. FSB -Scy - can 01), captured on 04 May 2009, off Bizerte, scale bar = 50 mm.

**Sl. 2:** Odrasla samica *S. canicula* (ref. FSB -Scy - can 01), ujeta 4. maja 2009 pri kraju Bizerte, merilo = 50 mm.

**Tab. 1: Weights and main morphometric measurements recorded in four female *Scyliorhinus canicula* caught off northern Tunisian coast.****Tab. 1: Teža in glavne morfometrične meritve štirih samic *Scyliorhinus canicula*, ujetih ob severni tunizijski obali.**

	FSB-Scy-can 01		FSB-Scy-can 02		FSB-Scy-can 03		FSB-Scy-can 04	
	mm	%TL	mm	%TL	mm	%TL	mm	%TL
Total weights	322.40		210.60		426.00		271.00	
Total length	470.00	100.00	392.00	100.00	516.00	100.00	423.00	100.00
Precaudal length	372.00	79.15	310.00	79.08	410.00	79.46	335.00	79.20
Fork length	420.00	89.36	347.00	88.52	450.00	87.21	382.00	90.31
Pre-first dorsal length	238.00	50.64	192.00	48.98	251.00	48.64	209.00	49.41
Pre-second dorsal length	320.00	68.09	263.00	67.09	350.00	67.83	290.00	68.56
Prepectoral length	618.00	131.49	59.00	15.05	82.00	15.89	78.00	18.44
Head length	82.00	17.45	61.43	15.67	90.00	17.44	82.00	19.39
Prebranchial space	58.48	12.44	46.73	11.92	69.00	13.37	54.77	12.95
Prespiracle length	37.96	8.08	33.77	8.61	40.75	7.90	36.55	8.64
Preoral length	17.95	3.82	14.21	3.63	18.58	3.60	16.75	3.96
Interdorsal space	57.86	12.31	50.18	12.80	66.66	12.92	51.53	12.18
Pelvic fin length	50.56	10.76	46.51	11.86	52.83	10.24	48.45	11.45
Second dorsal-caudal length	24.47	5.21	27.77	7.08	27.23	5.28	18.98	4.49
Prepelvic length	182.00	38.72	155.00	39.54	205.00	39.73	162.00	38.30
Preanal length	280.00	59.57	222.00	56.63	300.00	58.14	237.00	56.03
Pelvic-anal length	100.00	21.28	70.00	17.86	97.00	18.80	78.00	18.44
Pelvic-caudal length	190.00	40.43	146.00	37.24	195.00	37.79	162.00	38.30
Anal-caudal length	51.00	10.85	35.00	8.93	45.00	8.72	40.00	9.46
Snout-vent length	192.00	40.85	165.00	42.09	216.00	41.86	171.00	40.43
Vent-caudal length	182.00	38.72	140.00	35.71	185.00	35.85	150.00	35.46
Prenasal length	9.89	2.10	9.40	2.40	12.62	2.45	11.90	2.81
Intergill length	5.80	1.23	4.98	1.27	8.98	1.74	5.35	1.26
Eye width	14.43	3.07	13.29	3.39	15.25	2.96	14.22	3.36
Eye height	8.63	1.84	10.05	2.56	14.75	2.86	10.70	2.53
Internasal length	19.11	4.07	17.12	4.37	21.66	4.20	18.30	4.33
Mouth width	30.69	6.53	25.98	6.63	31.96	6.19	27.69	6.55
First dorsal height	24.48	5.21	15.69	4.00	23.76	4.60	18.48	4.37
First dorsal base	25.78	5.49	22.41	5.72	30.30	5.87	25.88	6.12
First dorsal inner margin	10.72	2.28	10.82	2.76	14.06	2.72	10.66	2.52
First dorsal anterior margin	38.41	8.17	36.00	9.18	43.74	8.48	38.49	9.10
Second dorsal height	15.39	3.27	11.29	2.88	15.86	3.07	14.51	3.43
Second dorsal base	20.81	4.43	19.03	4.85	27.19	5.27	22.57	5.34
Second dorsal inner margin	10.15	2.16	10.80	2.76	12.20	2.36	10.27	2.43
Second dorsal anterior margin	34.33	7.30	28.78	7.34	36.46	7.07	31.61	7.47
Pectoral height	37.45	7.97	32.47	8.28	40.64	7.88	39.87	9.43
Pectoral inner margin	29.30	6.23	25.44	6.49	28.32	5.49	27.64	6.53
Pectoral anterior margin	65.57	13.95	49.31	12.58	56.67	10.98	56.34	13.32
Caudal anterior margin	99.45	21.16	79.90	20.38	106.05	20.55	90.70	21.44
Caudal terminal lobe	23.30	4.96	19.60	5.00	26.09	5.06	20.54	4.86
Seconde dorsal insertion-anal insertion	23.94	5.09	16.90	4.31	20.60	3.99	16.46	3.89
Seconde dorsal origin-anal origin	44.19	9.40	39.87	10.17	50.57	9.80	46.03	10.88
Trunk height	44.04	9.37	36.23	9.24	45.88	8.89	38.16	9.02
Caudal peduncle height	14.95	3.18	12.95	3.30	16.36	3.17	14.31	3.38
Counts								
Tooth rows upper jaw	46		47		47		46	
Tooth rows lower jaw	42		39		41		42	



**Fig. 3:** *S. canicula*. **A** – abnormal specimen, **B** – normal specimen.

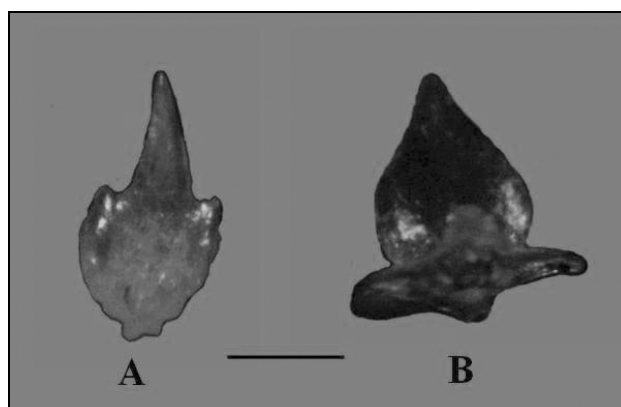
**Sl. 3:** *S. canicula*. **A** – abnormalen primerek, **B** – normalen primerek.

The second specimen, 392 mm TL and 210.6 g (Fig. 5), presented in its anterior part of the dorsal surface large darkish areas, rather rectangular, similar to those generally described in the blackmouth catshark *Galeus melastomus* Rafinesque, 1810. No dark spots were observed in this area; they were replaced by white spots. Additionally, the tail and both lateral sides presented the total lack of pigmentation, while eyes exhibited normal pigmentation. More than 60% of the body remained unpigmented.

## DISCUSSION

Aberrant colorations play no role in the development of *S. canicula*, morphometric measurements and percent to total length are very similar in all specimens presented in Table 1. Such observations were also given in ichthyological literature (Taniuchi & Yanagisawa, 1987; Bottaro *et al.*, 2005; Reum *et al.*, 2008).

Occurrence of additional pigmentation observed in the first specimen had no pathological origin; however it appears difficult to explain: a genetic origin could be a suitable hypothesis, but needs to be confirmed even if such phenomenon remains extremely rare. Namely, we have documented a single case to date in *S. canicula* and probably among chondrichthyan species.

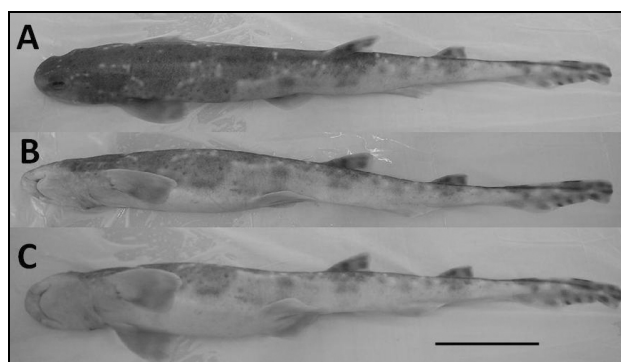


**Fig. 4:** Dermal denticle of abnormal *S. canicula*. **A** – dorsal surface, **B** – ventral surface, scale bar = 0.5 mm.

**Sl. 4:** Kožnat zobec abnormalnega primerka *S. canicula*. **A** – zgornji del, **B** – spodnji del, merilo = 0,5 mm.

The second specimen is a new case of partial albinism in agreement with Bottaro *et al.* (2005), who considered this definition more accurate than leucism applied by Bechtel (1995) to specimens having partial depigmentation of the body surface and normal retinal pigmentation. Additionally, it is the first case of partial albinism recorded among thousands of small-spotted catsharks observed for several decades, confirming the rarity of this phenomenon in chondrichthyan species.

Formerly, Vilter (1937) noted that lack of pigmentation represented a disadvantage for sharks and rays, as predators or preys, with such phenomenon advertising their presence in biological environment. However, the size of the observed specimens in this paper as in other papers shows that total or partial albinism or more generally aberrant colorations did not compromise normal development of species presenting such phenomenon.



**Fig. 5:** Partial albinism of *S. canicula* (ref. FSB -Scy -can 02). **A** – dorsal view, **B** – lateral view, **C** – ventral view, scale bar = 50 mm.

**Sl. 5:** Delni albinizem pri *S. canicula* (ref. FSB -Scy -can 02). **A** – dorzalni pogled, **B** – lateralni pogled, **C** – ventralni pogled, merilo = 50 mm.

ATIPIČNA OBARVANOST NAVADNE MORSKE MAČKE *SCYLIORHINUS CANICULA* (CHONDRICHTHYES: SCYLIORHINIDAE),  
UJETE OB TUNIZIJSKI OBALI (OSREDNJE SREDOZEMLJE)

NÉJIA MNASRI, OLFA EL KAMEL & MONCEF BOUMAÏZA

Laboratoire d'Hydrobiologie Littorale et Limnique, Université du 07 novembre à Carthage, Faculté des Sciences,  
Zarzouna, 7021 Bizerte, Tunisia  
E-mail: nejiamnasri@yahoo.com

CHRISTIAN CAPAPÉ

Laboratoire d'Ichtyologie, case 104, Université Montpellier II, Sciences et Techniques du Languedoc, F-34095 Montpellier cedex 5, France

POVZETEK

Pri dveh navadnih morskih mačkah *Scyliorhinus canicula*, ujetih ob severni tunizijski obali, je bila opažena atipična pigmentacija. Pri prvem primerku smo zabeležili prekomerno pigmentacijo prednje strani spodnjega dela telesa. Zgornji del telesa drugega primerka je bil pokrit z velikimi temnimi lisami in belimi pikami, medtem ko so bili rep in obe strani telesa popolnoma brez pigmenta. Drugi primerek tako predstavlja prvi podrobneje dokumentirani primer delnega albinizma pri *S. canicula*.

**Ključne besede:** Chondrichthyes, Scyliorhinidae, *Scyliorhinus canicula*, barvne nepravilnosti, severna tunizijska obala

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