

# ANNALES

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*Annali di Studi istriani e mediterraneei*  
*Annals for Istrian and Mediterranean Studies*  
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VSEBINA / *INDICE GENERALE* / *CONTENTS*

BIOTSKA GLOBALIZACIJA  
*GLOBALIZZAZIONE BIOTICA*  
*BIOTIC GLOBALIZATION*

**Alen SOLDO, Rigers BAKIU & Sherif DURMISHAJ**  
 The First Record of Bastard Grunt *Pomadasys incisus*  
 (Bowdich, 1825) in Albanian Waters (Adriatic Sea) ..... 1  
*Prvi zapis o pojavljanju neprave prašičevke Pomada-*  
*sys incisus (Bowdich, 1825) v albanskih vodah*  
*(Jadransko morje)*

**Pero UGARKOVIĆ, Ilija ČETKOVIĆ, Olivera MARKO-**  
**VIĆ, Aleksandar JOKSIMOVIĆ, Nikola ĐORĐEVIĆ**  
**& Jakov DULČIĆ** Additional Records of the Bastard  
 Grunt, *Pomadasys incisus* (Bowdich, 1825), from the  
 Eastern Adriatic Sea ..... 7  
*Dodatne najdbe neprave prašičevke, Pomadasys incisus*  
*(Bowdich, 1825), iz vzhodnega Jadranskega morja*

**Rüştü KIRMAN & Murat BİLECENOĞLU** Significant  
 Range Expansion of *Sepioteuthis lessoniana*  
 (Cephalopoda: Loliginidae) in the Aegean Sea  
 Based on Scuba and Photographic Observations ..... 15  
*Znatno razširjanje areala vrste Sepioteuthis*  
*lessoniana (Cephalopoda: Loliginidae),*  
*v Egejskem morju na podlagi podvodnih*  
*opazovanj in fotografiranja*

**Adrian BRAJKOVIĆ, Iris MATULJA & Neven IVEŠA**  
 Conquering the North: New Occurrence of the  
 Common Lionfish, *Pterois miles* (Bennett, 1828),  
 in the Adriatic Sea ..... 21  
*Osvajanje severa: novi zapis o pojavljanju*  
*navadne plamenke, Pterois miles (Bennett,*  
*1828), v Jadranskem morju*

**Alan DEIDUN, Bruno ZAVA, Maria CORSINI-FOKA,**  
**Arnold SCIBERRAS & Alessio MARRONE** First  
 Record of the Devil Firefish *Pterois miles* (Bennett,  
 1828) (Actinopterygii: Scorpaenidae)  
 from Maltese Coastal Waters ..... 29  
*Prvi zapis o pojavljanju plamenke Pterois miles*  
*(Bennett, 1828) (Actinopterygii: Scorpaenidae)*  
*v malteških obalnih vodah*

**Chirine HUSSEIN, Amir IBRAHIM, Firas ALSHAWY,**  
**Mouina BADRAN & Rahaf ABO ASA** First Medi-  
 terranean Record of the Diagonal Butterflyfish,  
*Chaetodon fasciatus* Forsskål, 1775,  
 Reported from Syrian Waters ..... 35  
*Prvi sredozemski zapis o pojavljanju poševnoprogame*  
*ščetinozobke, Chaetodon fasciatus Forsskål,*  
*1775, iz sirskih voda*

**Houssein ELBARAASI, Tarek SHOEIB, Mona SAID &**  
**Laith A. JAWAD** A Further Record of the Barred  
 Knifejaw, *Oplegnathus fasciatus* (Temminck &  
 Schlegel, 1844), a Pacific Species, from the  
 Mediterranean: A New Record from Benghazi, Libya ..... 41  
*Novi zapis o vrsti Oplegnathus fasciatus (Temminck &*  
*Schlegel, 1844), pacifiški vrsti, v Sredozemlju: nova*  
*najdba iz Bengazija v Libiji*

**Alen SOLDO & Rigers BAKIU** Rapid Increase in  
 Records of the Invasive Silver-cheeked Toadfish  
*Lagocephalus sceleratus* (Gmelin, 1789)  
 in the Adriatic Sea ..... 49  
*Hitro naraščanje pojavov invazivne srebrnoproge napi-*  
*havalke Lagocephalus sceleratus (Gmelin, 1789)*  
*v Jadranskem morju*

**Gerasimos KONDYLATOS, Konstantinos KALAENTZIS,**  
**Styliani MINOUDI & Maria CORSINI-FOKA** Further  
 Molecular Identification Confirms the Occurrence of  
*Lagocephalus guentheri* Miranda Ribeiro, 1915  
 in the Aegean Coastal Waters of Greece ..... 55  
*Nadaljnja molekularna identifikacija potrjuje prisotnost*  
*vrste Lagocephalus guentheri Miranda Ribeiro,*  
*1915 v egejskih obalnih vodah Grčije*

**Deniz ERGÜDEN & Cem ÇEVİK** Length–Weight and  
 Length–Length Relationships, and Condition Factor  
 of *Ambassis dussumieri* Cuvier, 1828, in the  
 Northeastern Mediterranean, Türkiye ..... 65  
*Dolžinsko-masni odnos med dolžino in kondicijskim*  
*faktorjem pri vrsti Ambassis dussumieri Cuvier, 1828,*  
*v severovzhodnem Sredozemskem morju, Turčija*

**Okan AKYOL & HALİL ŞEN** Unexpected Occurrence of  
 Prussian Carp *Carassius gibelio* (Cyprinidae) in Homa  
 Lagoon (Izmir Bay, Aegean Sea) ..... 73  
*Nepričakovani pojav srebrnega koreslja Carassius*  
*gibelio (Cyprinidae) v laguni Homa*  
*(Izmirski zaliv, Egejsko morje)*

SREDOZEMSKÉ HRUSTANČNICE  
 SQUALI E RAZZE MEDITERRANEE  
 MEDITERRANEAN SHARKS AND RAYS

**Terry CARBON, Emily GIGNON, Justine LALLAU-**  
**-VAZZOLER, Hugo MENARD, Claudio BARRIA,**  
**Ana I. COLMENERO & Nicolas ZIANI** Precopulatory  
 Behaviour of *Pteroplatytrygon violacea* (Myliobatiformes:  
 Dasyatidae) in the Northwestern Mediterranean ..... 81  
*Predkopulacijsko vedenje vijoličnega morskega biča*  
*(Pteroplatytrygon violacea) (Myliobatiformes:*  
*Dasyatidae) v severozahodnem Sredozemlju*

<b>Hakan KABASAKAL</b> Distribution of <i>Odontaspis ferox</i> in the Mediterranean Sea: Insights from Spatial and Temporal Analyses ..... 87 <i>Razširjenost vrste Odontaspis ferox v Sredozemskem morju: Spoznanja na podlagi prostorskih in časovnih analiz</i>	MORSKA FAVNA FAUNA MARINA MARINE FAUNA
<b>Hristina GELEVSKA, Borut MAVRIČ, Lovrenc LIPEJ &amp; Christian CAPAPÉ</b> Is the Gulf of Trieste a potential nursery area for some elasmobranch species? ..... 99 <i>Ali je Tržaški zaliv potencialno območje odraščanja (jaslice) za določene vrste hrustančnic?</i>	<b>Francesco TIRALONGO, Paola LEOTTA &amp; Riccardo MARTELLUCCI</b> <i>Physalia physalis</i> in the central Mediterranean Sea: Recent observations associated with mass strandings of <i>Velella velella</i> and surface circulation dynamics ..... 165 <i>Portugalska ladjica (Physalia physalis) v osrednjem Sredozemskem morju: nedavna opažanja v povezavi z masovnimi nasedanji morskega jadrčka (Velella velella) in dinamiko površinskega kroženja vode</i>
IHTIOFAVNA ITTIOFAUNA ICHTHYOFAUNA	
<b>Cem DALYAN, Yunus GÖNÜL, Mahmud Samed ŞAHİNOĞULLARI &amp; Hakan KABASAKAL</b> New data on the Occurrence and Morphology of the Armless Snake Eel, <i>Dalophis imberbis</i> (Ophichthidae), from the Northeastern Mediterranean Sea ..... 119 <i>Novi podatki o pojavljanju in morfologiji kačaste jegulje, Dalophis imberbis (Ophichthidae), iz severovzhodnega Sredozemskega morja</i>	<b>Andrea LOMBARDO, Juba CHABANE &amp; Rachida GHALMI</b> First Contribution to the Study of the "Sea Slug" Fauna (Gastropoda, Heterobranchia) of the Algerian coast ..... 177 <i>Prvi prispevek k proučevanju favne „goliš morskih polžev“ (Gastropoda, Heterobranchia) alžirske obale</i>
<b>Chirine HUSSEIN, Firas ALSHAWY &amp; Amir IBRAHIM</b> First Record of the Mediterranean Dealfish, <i>Trachipterus trachipterus</i> (Gmelin, 1789) (Trachipteridae), in Syrian Marine Waters ..... 127 <i>Prvi zapis o pojavljanju kosice, Trachipterus trachipterus (Gmelin, 1789) (Trachipteridae), v sirskih morskih vodah</i>	<b>Borut MAVRIČ, Tjaša PREMRL, Martin MAVRIČ, Tina MIRT, Neža LEBAN, Tihomir MAKOVEC &amp; Lovrenc LIPEJ</b> Assessing Soft-Bottom Epibenthic Communities: Methodological Insights into Dredging and Video Surveys ..... 203 <i>Ocenjevanje epibentoških združb mehkega dna: metodološki vpogledi v dredžanje in video pregleda</i>
<b>Igor AGOSTINI &amp; Okan AKYOL</b> On the Occurrence of the Currently Largest Recorded <i>Pagellus erythrinus</i> (Sparidae) in the Tyrrhenian Sea (Italy) ..... 133 <i>O pojavljanju trenutno največjega evidentiranega primerka vrste Pagellus erythrinus (Sparidae) v Tirenskem morju (Italija)</i>	FAVNA FAUNA FAUNA
<b>Ismail Burak DABAN &amp; Yusuf ŞEN</b> Substantiated Record and Preliminary Biological Insights of <i>Microlipophrys dalmatinus</i> (Steindachner & Kolombatović, 1883) from the Sea of Marmara, Türkiye ..... 141 <i>Potrjen zapis o pojavljanju in predhodna biološka spoznanja o vrsti Microlipophrys dalmatinus (Steindachner &amp; Kolombatović, 1883) iz Marmarskega morja, Turčija</i>	<b>Kim LEBAN, Iztok ŠKORNIK, Špela ČONČ, Mateja BREG VALJAVEC, Žan KURALT, Lenart ŠTAUT, Jure TIČAR, Katarina POLAJNAR HORVAT, Primož GAŠPERIČ, Aleš SMREKAR &amp; Melita VAMBERGER</b> Habitat Insights for the European Pond Turtle ( <i>Emys orbicularis</i> ) in the Coastal Wetland Area Sečovlje Salina Nature Park, Slovenia ..... 221 <i>Habitatne značilnosti močvirske sklednice (Emys orbicularis) v krajinskem parku Sečoveljske soline, Slovenija</i>
<b>Zeliha ERDOĞAN, Gülçin ULUNEHİR AYDIN, Hatice TORCU-KOÇ &amp; Tuğba ANBAROĞLU</b> Population Study of <i>Trachurus mediterraneus</i> Focused on Reproductive Biology in Edremit Bay, Northern Aegean Sea ..... 151 <i>Razmnoževalna biologija sredozemskega šura (Trachurus mediterraneus) v sklopu populacijske raziskave v Edremitnem zalivu (severno Egejsko morje)</i>	<b>Leon CIMERMAN &amp; Matija KRIŽNAR</b> Najdbe pleistocenske avifavne v kamnolomu Črni Kal (Primorska, Slovenija) ..... 243 <i>Pleistocene Avifauna Finds in the Črni Kal Quarry (Primorska Region, Slovenia)</i>
	Kazalo k slikam na ovitku ..... 255 <b>Index to images on the cover</b> ..... 255

## SUBSTANTIATED RECORD AND PRELIMINARY BIOLOGICAL INSIGHTS OF *MICROLIPOPHRYS DALMATINUS* (STEINDACHNER & KOLOMBATOVIĆ, 1883) FROM THE SEA OF MARMARA, TÜRKIYE

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### ABSTRACT

*This study reports the first evidence-based record of *Microlipophrys dalmatinus* in the Sea of Marmara, Türkiye. Six specimens were collected using a beach seine between June and October 2024, at Çardak Lagoon in the Çanakkale Strait. The total lengths of the specimens ranged from 19.84 to 37.97 mm (mean:  $29.8 \pm 3.1$  mm), and total weights ranged from 0.08 to 0.41 g (mean:  $0.26 \pm 0.05$  g). The sample consisted of three juveniles collected from the lagoon inlet in August and October, and three ripening females (Stage III) collected from the inner lagoon in June. The current detection of *M. dalmatinus* in the Sea of Marmara may be either attributed to the species' cryptobenthic nature and small size, which may have led to it being historically overlooked, or to a recent range expansion driven by the species' thermophilic nature and rising seawater temperatures.*

**Key words:** Blenniidae, beach seine, coastal habitat, lagoons, morphometric characteristics

## SEGNALAZIONE DOCUMENTATA E PRIME OSSERVAZIONI BIOLOGICHE SU *MICROLIPOPHRYS DALMATINUS* (FRANZ STEINDACHNER & JURAJ KOLOMBATOVIĆ, 1883) NEL MAR DI MARMARA, TURCHIA

### SINTESI

*Lo studio riporta la prima segnalazione documentata di *Microlipophrys dalmatinus* nel Mar di Marmara, in Turchia. Sei esemplari sono stati catturati mediante sciabica da spiaggia tra giugno e ottobre 2024, presso la laguna di Çardak nello stretto dei Dardanelli. Le lunghezze totali degli esemplari variavano da 19,84 a 37,97 mm (media:  $29,8 \pm 3,1$  mm), mentre i pesi totali variavano da 0,08 a 0,41 g (media:  $0,26 \pm 0,05$  g). Il campione era composto da tre individui giovanili raccolti all'ingresso della laguna in agosto e ottobre, e tre femmine in maturazione (stadio III) raccolte nella laguna interna in giugno. L'attuale rilevamento di *M. dalmatinus* nel Mar di Marmara potrebbe essere attribuito sia alla natura criptobentonica e alle piccole dimensioni della specie, sia a una recente espansione dell'areale, favorita dal carattere termofilo della specie e dall'aumento delle temperature delle acque marine.*

**Parole chiave:** Blenniidae, sciabica da spiaggia, habitat costieri, lagune, caratteristiche morfometriche

## INTRODUCTION

The family Blenniidae, commonly known as combtooth blennies, is one of the most diverse families of marine bony fishes currently comprising 59 genera and about 413 valid species worldwide (Fricke *et al.*, 2025). Despite their small size, these benthic fish play important ecological and biological roles in coastal marine environments, contributing to biodiversity and supporting coastal food webs (Patzner *et al.*, 2009). Combtooth blennies are primarily tropical and subtropical marine species, but they also occur rarely in freshwater and occasionally in brackish waters of the Atlantic, Indian, and Pacific Oceans (Patzner *et al.*, 2009; Nelson *et al.*, 2016).

In the Mediterranean Sea, direct research focusing specifically on combtooth blennies remains relatively limited. However, a few notable studies have provided valuable insights into their habitat preferences, ecological roles, and distribution patterns (e.g., Orlando-Bonaca & Lipej, 2006; Tiralongo *et al.*, 2016; Ergüden *et al.*, 2024). Due to their small body size, specialized morphological and behavioral adaptations, and occurrence in habitats largely untargeted by commercial fishing gear, this group is considered ‘cryptobenthic.’ As specialized bottom-dwellers, combtooth blennies exhibit distinct morphological and ethological adaptations – such as specialized dentition and cryptic behavior – that enable them to occupy diverse ecological niches within the upper meters of Mediterranean rocky shores (Zander, 1972; Tiralongo *et al.*, 2016). Despite their lack of commercial value, these species play a fundamental role in the functioning of coastal ecosystems, acting as both abundant predators and prey within the shallow infralittoral zone (Golani *et al.*, 2014). Their distribution is often governed by fine-scale habitat requirements, including the availability of endolithic bivalve holes or photophilic algal covers, which provide essential shelter for their small bodies (Kotschal, 1988; Lipej & Orlando-Bonaca, 2006).

Given the interspecies similarity in external morphology, the taxonomy of the family has undergone extensive revisions and reclassifications (Almada *et al.*, 2005). Consequently, over the past decade, researchers have increasingly relied on phylogenetic and biogeographic data to determine the distributional ranges of these species (Almada *et al.*, 2005; Levy *et al.*, 2011).

The genus *Microlipophrys* was first established by Almada *et al.* (2005) based on mitochondrial DNA and morphology of north-eastern Atlantic and Mediterranean blenniids, encompassing a total of seven species. Three species only occur in the tropical Atlantic (*Microlipophrys bauchotae*, *M. caboverdensis*,

*M. velifer*), two are endemic to the Mediterranean Sea (*M. adriaticus*, *M. nigriceps*), and the remaining two (*M. canevae*, *M. dalmatinus*) have an Atlanto-Mediterranean distribution (Levy *et al.*, 2011).

*Microlipophrys dalmatinus* is one of four species of the genus recorded in Turkish waters, with occurrences reported from the northern Levant and Aegean Sea shores (Bilecenoğlu *et al.*, 2014; Bilecenoğlu, 2024). Due to its small size and peculiar habitat, this species is not captured by any commercial fishing gear and is seldom encountered during visual census surveys or snorkeling observation (Patzner *et al.*, 2009; Williams *et al.*, 2014). Consequently, available occurrence information might not reflect the actual distribution of the species. Until now, the presence of *M. dalmatinus* in the Sea of Marmara has been disputed, as previous records lacked essential taxonomic data needed to verify species identity (Bilecenoğlu, 2020). The only evidence suggesting its possible occurrence in the region comes from Kara and Yüsek (2023), who barcoded a single larva using 16S rRNA, but failed to obtain a COI sequence.

The present study provides the first substantiated record of *M. dalmatinus* in the Sea of Marmara, along with some of the biological data (including morphometric measurements and observations on reproductive biology) that are currently lacking for the species reported from the Mediterranean Sea.

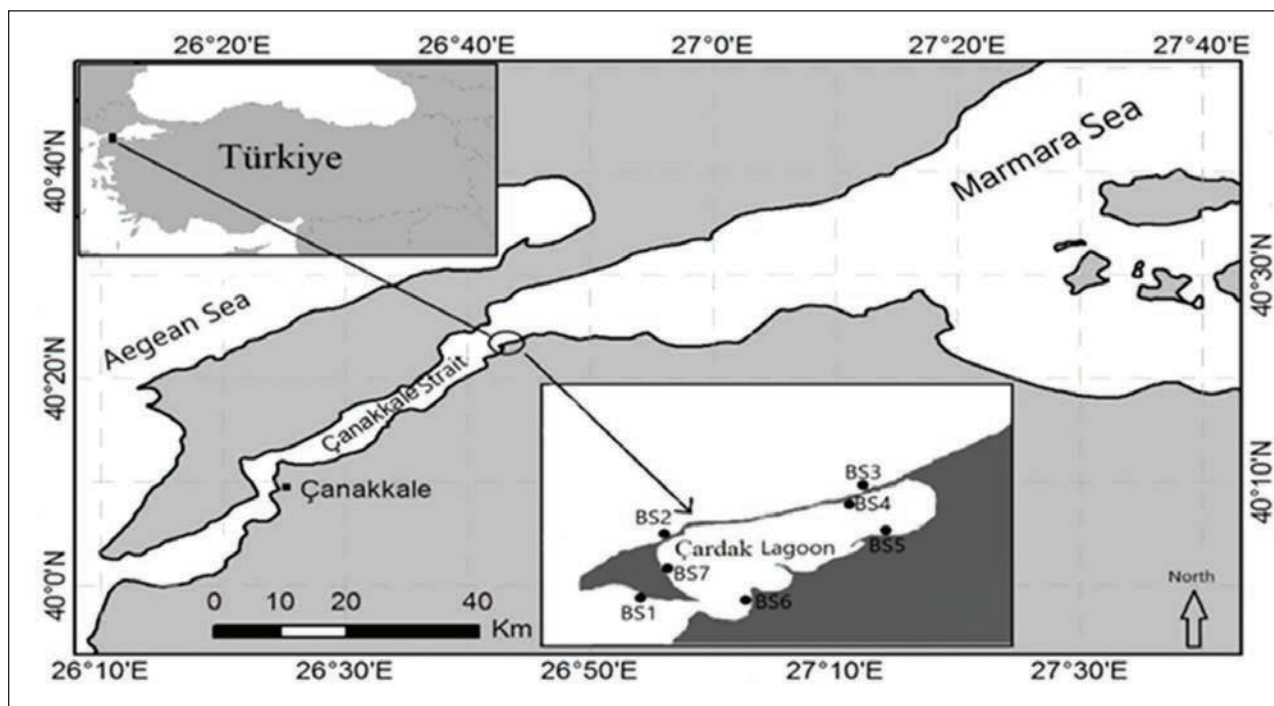
## MATERIAL AND METHODS

Sampling was conducted at seven coastal stations: at the lagoon inlet (BS1), outside the lagoon (BS2, BS3), and inside the lagoon (BS4, BS5, BS6, BS7) (Fig. 1). At each station, two hauls were performed using a beach seine deployed from a boat. Monthly sampling was carried out from May 2024 to April 2025, resulting in a total of 168 hauls.

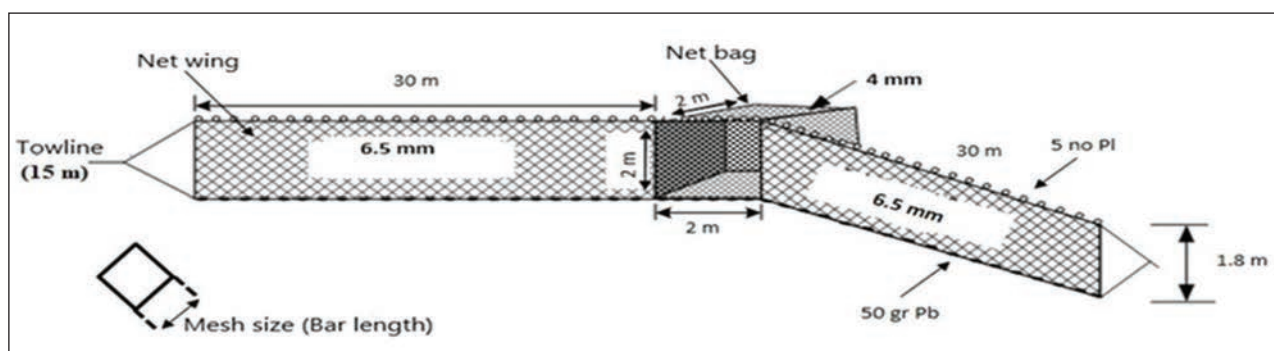
The beach seine used in this study consisted of two 30 m-long wings, each 1.8 m in height and attached to a 15 m hauling rope. The net included a cod end (bag) measuring 2 × 2 × 2 m with a 4 mm mesh size, while the wings had larger, 6.5 mm meshes (Fig. 2). To ensure comprehensive ecological representation, the sampling gear was designed to be non-selective across all size cohorts.

The captured individuals were fixed in 4% formaldehyde and immediately transferred to the laboratory for species identification (Fig. 3). They were photographed and identified taxonomically based on morphological characteristics following Zander (1972) and Whitehead *et al.* (1984–1986).

Morphometric measurements were taken in millimeters (mm) using a digital caliper, and meristic characteristics were counted and recorded. Total weight and gonad weight were measured to the



**Fig. 1: Sampling locations of *M. dalmatinus* in the Çardak Lagoon, Sea of Marmara.**  
**Sl. 1: Lokacije vzorčenja vrste *M. dalmatinus* v laguni Çardak v Marmarskem morju.**



**Fig. 2: Design and technical specifications of the beach seine net.**  
**Sl. 2: Zasnova in tehnične specifikacije obmorske potegalke.**

nearest 0.01 g. Specimens were subsequently dissected to determine sex and gonadal maturity stages through macroscopic examination of the gonads, with sexual maturity stages classified following Holden and Raitt (1974). Oocyte diameters were measured using a stereomicroscope in combination with the Q-Capture digital imaging program.

## RESULTS

The sampled individuals were identified based on a combination of features: absence of supra-orbital tentacles, presence of a notch between spiny and

soft part of dorsal fin, tip of pectorals not reaching level of the anus, and meristic counts of dorsal fin rays XII+16, anal fin rays II+18, pectoral fin rays 12, and pelvic fins I+3. All these traits perfectly match the descriptions of *M. dalmatinus*. Detailed morphometric measurements are presented in Table 1.

During the course of our study, a total of 164 individuals belonging to six Blenniidae species were sampled. In addition to *M. dalmatinus*, the species included *Salaria pavo*, *Parablennius gattorugine*, *P. sanguinolentus*, *P. tentacularis*, and *Lipophrys trigloides*, all of which have previously validated occurrences in the Sea of Marmara.

**Tab. 1: Morphometric measurements and meristic counts of the six individuals of *Microlipophrys dalmatinus* sampled in this study. Each column represents a single specimen (n=6).****Tab. 1: Morfometrične meritve in meristična štetja šestih primerkov vrste *Microlipophrys dalmatinus*, vzorčenih v tej raziskavi. Vsak stolpec predstavlja en primerek (n=6).**

Sampling time (2024)	August	October	October	June	June	June	
Location	BS1	BS1	BS1	BS7	BS7	BS7	
Specimen No.	1	2	3	4	5	6	Mean ± SE
<b>Measurements (mm)</b>							
Total length	19.89	28.53	19.84	37.97	36.37	35.96	29.8 ± 3.1
Standard length	16.96	24.49	16.15	32.93	31.88	31.4	25.6 ± 2.8
Body depth	5.63	5.45	4.51	8.74	7.94	7.73	6.7 ± 0.6
Eye diameter	1.25	1.64	1.41	1.5	1.38	1.27	1.4 ± 0.1
Preorbital length	1.05	1.79	1.29	2.47	2.18	2.15	1.8 ± 0.2
Interorbital length	1.37	1.06	1.05	1.2	1.02	1.01	1.1 ± 0.1
Head length	4.42	5.58	4.93	6.94	6.71	6.32	5.8 ± 0.4
Head width	2.62	3.16	3.07	4.72	3.88	3.73	3.5 ± 0.3
Mouth width	1.22	1.35	1.29	1.89	1.82	1.85	1.6 ± 0.1
Prepelvic length	4.07	4.53	4.43	5.69	5.53	6.42	5.1 ± 0.3
Predorsal length	3.92	6.21	4.62	7.2	6.95	6.82	6.0 ± 0.5
Preanal length	8.35	11.3	8.92	16.93	16.09	14.93	12.8 ± 1.4
Prepectoral length	4.47	5.62	4.84	8.7	6.82	6.73	6.2 ± 0.6
Postpelvic length	14.33	22.57	15.68	31.02	28.67	29.92	23.7 ± 2.7
Postdorsal length	3.5	5.13	3.95	7.39	6.79	6.9	5.6 ± 0.6
Postanal length	2.71	4.63	4.19	7.73	7.08	6.79	5.5 ± 0.7
Postpectoral length	11.67	16.58	11.84	21.19	20.41	18.71	16.7 ± 1.6
Dorsal fin base	11.81	17.2	11.94	23.07	21.1	21.02	17.7 ± 1.8
Anal fin base	3.9	11.8	7.92	14.67	14.11	12.82	10.9 ± 1.6
Pelvic fin length	2.12	4.45	2.52	4.73	3.91	4.55	3.7 ± 0.5
Pectoral fin length	4.55	5.91	5.11	8.02	7.25	7.12	6.3 ± 0.5
Caudal peduncle length	3.16	4.15	3.35	6.6	5.17	5.61	4.7 ± 0.5
Caudal peduncle height	2.41	2.98	2.57	4.17	3.53	5.24	3.5 ± 0.4
Total weight (g)	0.08	0.22	0.11	0.41	0.37	0.35	0.26 ± 0.05



**Fig. 3: Sampled individuals of *M. dalmatinus* from Çardak Lagoon.**  
**Sl. 3: Vzorčeni osebki vrste *M. dalmatinus* iz lagune Çardak.**

Regarding *M. dalmatinus*, a total of three juvenile specimens were collected from the lagoon inlet: one in August 2024 and two in October 2024. An additional three specimens were collected from inside the lagoon in June 2024. Specimens ranged from 19.84 mm to 37.97 mm in total length, with a mean of  $29.8 \pm 3.1$  mm (mean  $\pm$  standard error). Individual weights ranged from 0.08 g to 0.41 g, with a mean of  $0.26 \pm 0.05$  g (Tab. 1).

The gonadal development of females was classified as Stage III (ripening), based on the observation of ovaries occupying about two thirds of the body cavity. Their gonad weights were 0.0197 g, 0.0183 g, and 0.0073 g, respectively.

The number of mature oocytes was 88, 167, and 34 (Tab. 1). Diameters were measured for a total of 54 oocytes from these gonads. The minimum, maximum, and mean  $\pm$  se of oocyte diameters were 0.39 mm, 0.69 mm, and  $0.57 \pm 0.009$  mm, respectively (Fig. 4).

### DISCUSSION

The documentation of *M. dalmatinus* in the Sea of Marmara addresses a long-standing ambiguity in the

region's ichthyofauna (Bilecenoğlu, 2020). However, a critical question remains: does this occurrence reflect a recent range expansion or a historical presence that has been systematically overlooked? We argue that the latter is more likely, primarily due to the cryptobenthic nature of the species and the historical lack of specialized scientific monitoring in the region's littoral zones. In the Sea of Marmara, *M. dalmatinus* likely escapes capture by conventional commercial fishing gear, such as gillnets, trammel nets, purse seines, and beam trawls, which are not designed to sample such small benthic specimens. Furthermore, our study area – Çardak Lagoon – provides an ideal refuge, with a muddy substrate and dense algal cover, that may serve as a nursery for this species. As this is the first scientific study specifically focusing on the fish fauna of Çardak Lagoon and its surrounding waters, the confirmation of the occurrence of *M. dalmatinus* in the region may be attributed to the detailed coastal sampling methodology employed. Therefore, the perceived absence of this species in previous records may have resulted from the lack of scientific coastal sampling



**Fig. 4: Oocyte maturation of *Microlipophrys dalmatinus*: Representation of Stage III (Ripening phase.)**

**Sl. 4: Zorenje jajčnih celic vrste *Microlipophrys dalmatinus*: predstavitev III. stopnje (faza zorenja).**

surveys using non-selective beach seine nets and non-destructive visual census methods. While non-destructive visual censuses aided by SCUBA diving have become standard for monitoring Mediterranean blennies (Koppel, 1988; Lipej & Orlando-Bonaca, 2006), these techniques have significant limitations in lagoon environments such as Çardak. The high turbidity and sedimentation levels often observed in these areas can severely reduce visibility, making the detection of small, cryptobenthic species like *M. dalmatinus* extremely challenging for divers. Furthermore, the secretive behavior of this species – often burrowing or hiding within dense algal mats – necessitates more direct sampling approaches. In this regard, the use of specifically designed, non-selective sampling gear provided a more reliable alternative to visual methods, allowing the capture of individuals that would otherwise have remained inconspicuous in turbid lagoon waters.

While the secretive ecology of the species likely played a major role in its delayed detection, the potential influence of changing environmental conditions on its northward distribution should also be considered. The northward extension of several thermophilic native species in the Mediterranean Sea, primarily as a result of seawater warming, is

an ongoing trend (Bianchi *et al.*, 2018), and *M. dalmatinus* is known for its affinity for warm-temperate conditions (Levy *et al.*, 2011). Mean surface water temperatures in the Sea of Marmara have increased by approximately 1.4 °C since the early 1970s (Bilecenoğlu & Öztürk 2019), which may have facilitated the penetration of this species from the Aegean Sea along the prevailing bottom flow layer.

Only six specimens of *M. dalmatinus* were obtained from 168 beach seine samplings, revealing the species' conspicuous rarity and low abundance. Despite the limited sample size, which is a direct consequence of the species' elusive nature, these specimens allow preliminary observations regarding the biological characteristics of *M. dalmatinus* in the Sea of Marmara. While these findings should be interpreted with caution due to the small number of individuals, they provide initial insights into life-history traits of the species that have remained largely undocumented in this region. Specifically, the presence of both mature females and juveniles across different months suggests a potential reproductive cycle, although further extensive sampling is necessary to fully characterize the species population dynamics and spawning phenology in the area. The occurrence of mature female *M. dalmatinus* in June suggests that Çardak Lagoon may

serve as a potential spawning ground for the species. Furthermore, the occurrence of juveniles at the lagoon inlet just two months after the presumed spawning period (between August and October) indicates that the area may also function as a nursery habitat. These observations are consistent with Zander (1986), who reported a reproductive period extending from May to July. Similarly, Verdiell-Cubedo *et al.* (2006) recorded 68 individuals of *M. dalmatinus* in the Mar Menor lagoon, Spain. Furthermore, our observations align with Patzner *et al.* (2009) and Nelson *et al.* (2016) regarding the species' preference for brackish-water habitats. Thus, the lagoon and its adjacent waters may provide a vital environment for Blenniidae species.

Returning to the species' characteristics, *M. dalmatinus* is relatively small-bodied (Patzner *et al.*, 2009). While Zander (1986) reported a maximum total length (TL) of 41 mm, subsequent studies documented variations, including a TL of 32 mm in Malta (Falzon, 2009) and a wider range of 16–58 mm in the Mar Menor coastal lagoon, Spain (Verdiell-Cubedo *et al.*, 2006). The total lengths recorded in the present study (19.9–37.9 mm) are consistent with these established size ranges. Notably, morphometric measurements for this species had not been documented in the literature prior to this study. Our meristic counts align with Zander (1986), further confirming the clear morphological differentiation of *M. dalmatinus* from its congeners within the genus *Microlipophrys*. Furthermore, this study provides the first formal data on sexual maturity and oocyte development, including detailed measurements of oocyte diameter.

## CONCLUSIONS

Water pollution, eutrophication, and the deterioration of water quality can negatively affect the survival rates and habitat of Blenniidae species (Vinyoles & De Sostoa, 2007; Laporte *et al.*, 2014). Reports show that Çardak Lagoon has been affected by similar adverse impacts (Ateş *et al.*, 2023; Işcan *et al.*, 2025). Our findings demonstrate that the use of a specifically designed, non-selective beach seine is an effective and advantageous method for documenting cryptobenthic assemblages in turbid lagoon environments where visual censuses and conventional sampling gear may fail.

This study provides the first material-based record of *M. dalmatinus* in the Sea of Marmara, highlighting the critical role of Çardak Lagoon as a potential spawning habitat, and establishing an important baseline for conservation and monitoring of this ecologically significant species in the face of anthropogenic threats.

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POTRJEN ZAPIS O POJAVLJANJU IN PREDHODNA BIOLOŠKA SPOZNAJJA O VRSTI  
*MICROLIPOPHRYS DALMATINUS* (STEINDACHNER & KOLOMBATOVIĆ, 1883) IZ  
MARMARKEGA MORJA, TURČIJA

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POVZETEK

Avtorja poročata o prvem z dokazi podprtem zapisu o pojavljanju dalmatinske babice (*Microlipophrys dalmatinus*) v Marmarskem morju v Turčiji. Z obmorsko potegalko so med junijem in oktobrom 2024 ujeli šest primerkov v laguni Çardak v ožini Çanakkale. Totalne dolžine primerkov so bile med 19,84 in 37,97 mm (povprečno  $29,8 \pm 3,1$  mm), celokupne mase pa med 0,08 in to 0,41 g (povprečno  $0,26 \pm 0,05$  g). Tri primerki, odvzeti iz vhoda v laguno avgusta in oktobra, so bili mladostni, drugi trije so bile dozorevajoče samice (III. faza), vzorčene v notranji laguni junija. Trenutno najdbo vrste *M. dalmatinus* v Marmarskem morju je mogoče pripisati bodisi kriptobentoški naravi in majhnosti vrste, zaradi česar je bila morda v preteklosti spregledana, bodisi nedavni širitvi območja razširjenosti, ki sta jo sprožili termofilna narava vrste in naraščajoče temperature morske vode.

**Ključne besede:** Blenniidae, obmorska potegalka, obrežni habitat, lagune, morfometrični znaki

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