

## Mediterranean Marine Science

Vol 20, No 3 (2019)



### New Mediterranean Biodiversity Records (December 2019)

*BRANCO DRAGIČEVIĆ, OLGA ANADOLI, DROR ANGEL, MOULOUD BENABDI, GHAZI BITAR, LUCA CASTRIOTA, FABIO CROSETTA, ALAN DEIDUN, JAKOV DULČIĆ, DOR EDELIST, VASILIS GEROVASILEIOU, SALVATORE GIACOBBE, ALENKA GORUPPI, TAMAR GUY-HAIM, EVANGELOS KONSTANTINIDIS, ZAFRIR KUPLIK, JOACHIM LANGENECK, ARMANDO MACALI, IOANNIS MANITARAS, NIKOLAS MICHAILIDIS, EVANGELIA MICHALOU DI, PANAYOTIS OVALIS, COSTAS PERDIKARIS, ROBERTO PILLON, STEFANO PIRAINO, WALTER RENDA, JAMILA RIZGALLA, ANDREA SPINELLI, JONATHAN TEMPESTI, FRANCESCO TIRALONGO, VALENTINA TIRELLI, KONSTANTINOS TSIAMIS, CEMAL TURAN, NECDET UYGUR, BRUNO ZAVA, ARGYRO ZENETOS*

doi: [10.12681/mms.20913](https://doi.org/10.12681/mms.20913)

### To cite this article:

DRAGIČEVIĆ, B., ANADOLI, O., ANGEL, D., BENABDI, M., BITAR, G., CASTRIOTA, L., CROSETTA, F., DEIDUN, A., DULČIĆ, J., EDELIST, D., GEROVASILEIOU, V., GIACOBBE, S., GORUPPI, A., GUY-HAIM, T., KONSTANTINIDIS, E., KUPLIK, Z., LANGENECK, J., MACALI, A., MANITARAS, I., MICHAILIDIS, N., MICHALOU DI, E., OVALIS, P., PERDIKARIS, C., PILLON, R., PIRAINO, S., RENDA, W., RIZGALLA, J., SPINELLI, A., TEMPESTI, J., TIRALONGO, F., TIRELLI, V., TSIAMIS, K., TURAN, C., UYGUR, N., ZAVA, B., & ZENETOS, A. (2019). New Mediterranean Biodiversity Records (December 2019). *Mediterranean Marine Science*, 20(3), 645–656.  
<https://doi.org/10.12681/mms.20913>



## New Mediterranean Biodiversity Records (December 2019)

Branko DRAGIČEVIĆ<sup>1</sup>, Olga ANADOLI<sup>2</sup>, Dror ANGEL<sup>3</sup>, Mouloud BENABDI<sup>4</sup>, Ghazi BITAR<sup>5</sup>, Luca CASTRIOTA<sup>6</sup>, Fabio CROCETTA<sup>7</sup>, Alan DEIDUN<sup>8</sup>, Jakov DULČIĆ<sup>1</sup>, Dor EDELIST<sup>3,9</sup>, Vasilis GEROVASILEIOU<sup>10</sup>, Salvatore GIACOBBE<sup>11</sup>, Alenka GORUPPI<sup>12</sup>, Tamar GUY-HAIM<sup>13</sup>, Evangelos KONSTANTINIDIS<sup>14</sup>, Zafir KUPLIK<sup>3,15</sup>, Joachim LANGENECK<sup>16</sup>, Armando MACALI<sup>17</sup>, Ioannis MANITARAS<sup>18</sup>, Nikolas MICHAILIDIS<sup>18,19</sup>, Evangelia MICHALOU<sup>2</sup>, Panayotis OVALIS<sup>20</sup>, Costas PERDIKARIS<sup>14</sup>, Roberto PILLON<sup>21</sup>, Stefano PIRAINO<sup>22</sup>, Walter RENDA<sup>23</sup>, Jamila RIZGALLA<sup>24</sup>, Andrea SPINELLI<sup>25</sup>, Jonathan TEMPESTI<sup>16</sup>, Francesco TIRALONGO<sup>21</sup>, Valentina TIRELLI<sup>12</sup>, Konstantinos TSIAMIS<sup>26</sup>, Cemal TURAN<sup>27</sup>, Necdet UYGUR<sup>27</sup>, Bruno ZAVA<sup>28</sup> and Argyro ZENETOS<sup>29</sup>

<sup>1</sup> Institute of Oceanography and Fisheries, Šetalište Ivana Meštrovića 63, 21000 Split, Croatia

<sup>2</sup> Department of Zoology, School of Biology, Aristotle University of Thessaloniki, Thessaloniki, Greece

<sup>3</sup> Leon Recanati Institute for Maritime Studies and the Department of Maritime Civilizations, Leon H. Charney School of Marine Science, University of Haifa, Israel

<sup>4</sup> Laboratory of Environmental Monitoring Network, Faculty of SNV, Oran1 University, Oran, Algeria

<sup>5</sup> Lebanese University, Faculty of Sciences, Hadath, Beirut, Lebanon

<sup>6</sup> Institute for Environmental Protection and Research, ISPRA, Lungomare Cristoforo Colombo n. 4521, Località Addaura, 90149 Palermo, Italy

<sup>7</sup> Department of Integrative Marine Ecology, Stazione Zoologica Anton Dohrn, Villa Comunale, I-80121 Napoli, Italy

<sup>8</sup> Department of Geosciences, University of Malta, Msida MSD 2080 Malta

<sup>9</sup> Israel Society of Ecology and Environmental Sciences

<sup>10</sup> Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research, Heraklion Kriti, Greece

<sup>11</sup> Department ChiBioFarAm, Messina University, Viale Stagno D'Alcontres, 98166 Messina, Italy

<sup>12</sup> Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS, Via A. Piccard 54, 34151, Trieste, Italy

<sup>13</sup> National Institute of Oceanography, Israel Oceanographic and Limnological Research

<sup>14</sup> Department of Fisheries, Regional Unit of Thesprotia, Region of Epirus, 46 100 Igoumenitsa, Greece

<sup>15</sup> Department of Biodiversity and Conservation Biology, University of the Western Cape, Cape Town, South Africa

<sup>16</sup> Department of Biology, University of Pisa, via Derna 1, 56126 Pisa, Italy

<sup>17</sup> Department of Ecological and Biological Sciences, Tuscia University, Ichthyogenic Experimental Marine Centre (CISMAR), Tarquinia (VT), Italy

<sup>18</sup> Department of Fisheries and Marine Research, 101 Vithleem Str., 1416 Strovolos, Nicosia, Cyprus

<sup>19</sup> Department of Biological Sciences, University of Cyprus, 1 Panepistimiou Str., 2109 Aglantzia, Nicosia, Cyprus

<sup>20</sup> Agisilaou 37-39, Tzitzifies/Kallithea, 17674 Athens, Greece

<sup>21</sup> Ente Fauna Marina Mediterranea, Via M. Rapisardi trav. VIII, 2, 96012 Avola (SR), Italy

<sup>22</sup> Dipartimento di Scienze e Tecnologie Biologiche ed Ambientali, Università del Salento - 73100 Lecce, Italy

<sup>23</sup> Via Bologna 18/A, 87032 Amantea (CS), Italy

<sup>24</sup> Department of Aquaculture, Faculty of Agriculture, University of Tripoli, Tripoli, Libya

<sup>25</sup> Oceanographic, City of Arts and Sciences, Department of Biology, Carrer d'Eduardo Primo Yúfera, 1B, 46013 Valencia, Spain

<sup>26</sup> European Commission, Joint Research Centre (JRC), Ispra, Italy

<sup>27</sup> Molecular Ecology and Fisheries Genetics Laboratory, Marine Science and Technology Faculty, Iskenderun Technical University, 31200 Iskenderun, Hatay, Turkey

<sup>28</sup> Wilderness Studi Ambientali, Via Cruillas, 27, 90146 Palermo, Italy

<sup>29</sup> Hellenic Centre for Marine Research, Institute of Marine Biological Resources & Inland Waters, Anavyssos, GR 19013, Attica, Greece

### Abstract

This paper is a collection of novel distributional records of 20 species belonging to 8 phyla (Chlorophyta, Rhodophyta, Cnidaria, Ctenophora, Annelida, Mollusca, Arthropoda and Chordata) from 11 Mediterranean countries, namely, **Spain**: an additional record of the Canary dentex *Dentex canariensis* is reported from Spain (Valencia), this is the northernmost record of this species in the Mediterranean; **Algeria**: the first documented record of *Caulerpa chemnitzia* is reported from the Algerian coast; **France**: the first record of the Spotted sea hare *Aplysia dactylomela* is reported from the eastern coast of Corsica; **Italy**: the first records

of the Lessepsian polychaete *Dorvillea similis* and the alien bivalve *Isognomon legumen* are reported from Italian waters while additional records of *Mnemiopsis leidy* in the south Adriatic are provided; **Libya**: the first record of an alien mollusc *Crepidula fornicata* is reported from Libyan waters; **Malta**: multiple sightings of gelatinous species *Apolemia uvaria*, *Phacellophora camtschatica* and *Physophora hydrostatica* are reported for the first time from Maltese waters, as well as the first tentative record of the Orange-spotted grouper *Epinephelus* cfr. *coioides*; **Greece**: an occurrence of a rare Bigeye thresher shark *Alopias superciliosus* is reported from Hellenic Ionian waters, while the first records of the alien Mertens' prawn-goby *Vanderhorstia mertensi*, the recently described cyclopoid copepod *Oithona davisae* and the alien red seaweed *Asparagopsis armata* are reported from the Aegean Sea. The presence of the micromollusc *Euthymella colzumensis* is confirmed for Greece; **Cyprus**: the first record of the red cometfish *Fistularia petimba* is reported from Cyprus; **Turkey**: the first record of the alien jellyfish *Marivagia stellata* is reported from south-eastern Turkey; **Israel**: the first records of the sea nettle *Chrysaora* sp. in the Levant are reported.

## Introduction

Although small compared to world's oceans, the Mediterranean Sea hosts an immensely rich and diverse biota and is considered a worldwide biodiversity hotspot. Being a semi-enclosed sea and due to its developed coastal areas and intense maritime traffic, it is threatened by a variety of anthropogenic pressures including the introduction of various marine organisms. In addition to this, the influx and expansion of alien biota through the Suez Channel is profoundly changing its biodiversity, most notably in the Eastern Mediterranean. These processes, together with the influx of Atlantic species through the Strait of Gibraltar and the redistribution of native biota have been intensified by climate change, are creating a new Mediterranean ecosystem, and reshaping the distribution of marine organisms on an unprecedented scale in recent history. Due to the rapid pace of change, timely communication of observed changes in biodiversity has become essential. Good spatio-temporal knowledge of biota is a key prerequisite for effective management of biological systems (Levin *et al.*, 2014). It has been suggested that, due to biased research efforts, relative species richness of different taxa in subsectors of the Mediterranean might be a better indicator of research efforts rather than of true species richness (Bellan-Santini, 1990; Coll *et al.*, 2010). In this sense, the collective article published

by Mediterranean Marine Science, owing to its scientifically robust but at the same time accessible concept of short reports, represents a unique platform to reduce this gap and to stimulate researchers to publish distributional, and otherwise significant records of marine biota, both timely and accurately.

In this issue, we report on the new distributional records of 20 species belonging to 8 Phyla (Chlorophyta, Rhodophyta, Cnidaria, Ctenophora, Annelida, Mollusca, Arthropoda and Chordata). The majority of records relate to fishes (6 species), followed by cnidarians (5 species) and molluscs (4 species); other groups are represented by single species. Regarding the origin of records, the majority of species (9) are of Indo-Pacific origin and can be considered as true alien species. Five species are considered cosmopolitan species due to their wide distribution. Among these, three species can be considered as native in the Mediterranean Sea, while *Phacellophora camtschatica* and *Fistularia petimba* can be considered cryptogenic and alien species, respectively. Among five species of Atlantic origin, *Mnemiopsis leidy*, *Aplysia dactylomela* and *Crepidula fornicata* can be considered as alien species. The presence of *Dentex canariensis* along the Spanish coast is most likely a result of natural expansion through the Strait of Gibraltar. In the case of *Gaidropsarus granti*, it is not clear whether its presence in the Mediterranean Sea is of recent origin or whether it represents a native,



**Fig. 1:** Locations of the new records presented in New Mediterranean Biodiversity Records (December 2019). The location numbers correspond to those in Table 1.

**Table 1.** Species records included in “New Mediterranean Biodiversity Records (December 2019), ordered by phyla with indicated chapters (SC), origin (COS – Cosmopolitan, AM – Atlanto-Mediterranean, IP – Indo-Pacific, RS - Red Sea, A – Atlantic Ocean, WA – Western Atlantic, EA – Eastern Atlantic, UN – unknown due to lack of species ID, \* - based on tentatively assigned species ID), basin of reported records (WM – West Mediterranean, CM – Central Mediterranean, AS – Adriatic Sea, EM – Eastern Mediterranean) and location number (LN) as in Figure 1.

Species	SC	Origin	Basin	Country	Exact location	LN
<b>Phylum Chlorophyta</b>						
<i>Caulerpa chemnitzia</i>	1.2.	IP	WM	Algeria	La Madrague	2
<b>Phylum Rhodophyta</b>						
<i>Asparagopsis armata</i>	4.3.	IP	EM	Greece	Lesvos Island	17
<b>Phylum Ctenophora</b>						
<i>Mnemiopsis leidyi</i>	3.2.	WA	AS	Italy	Apulian coast	13
<b>Phylum Cnidaria</b>						
<i>Apolemia uvaria</i>	2.2.	COS	CM	Malta	Mgarr ix-Xini, Zurrieq, Xwejni, Cirkewwa,	6
<i>Chrysaora</i> sp.	4.6.	UN	EM	Israel	Palmachim, Caesarea	19
<i>Marivagia stellata</i>	4.7.	IP	EM	Turkey	Hatay coast	20
<i>Phacellophora camtschatica</i>	2.2.	COS	CM	Malta	Mgarr ix-Xini	8
<i>Physophora hydrostatica</i>	2.2.	COS	CM	Malta	Mgarr ix-Xini, Xwejni	7
<b>Phylum Annelida</b>						
<i>Dorvillea similis</i>	1.4.	IP	WM	Italy	Capraia Island	4
<b>Phylum Mollusca</b>						
<i>Aplysia dactylomela</i>	1.3.	A	WM	France	Tarcu, Corsica	3
<i>Crepidula fornicata</i>	2.1.	WA	CM	Libya	Tripoli harbour	5
<i>Isognomon legumen</i>	2.4.	IP	CM	Italy	Strait of Messina	10
<i>Euthymella colzumensis</i>	4.4	RS	EM	Greece	Saronikos Gulf	16
<b>Phylum Arthropoda</b>						
<i>Oithona davisae</i>	4.1.	IP	EM	Greece	Thermaikos Bay	15
<b>Phylum Chordata</b>						
<i>Alopias superciliosus</i>	2.5.	COS	CM	Greece	Ionian Sea	11
<i>Dentex canariensis</i>	1.1.	EA	WM	Spain	Sagunto (Valencia)	1
<i>Epinephelus</i> cfr. <i>coioides</i>	2.3.	IP*	CM	Malta	Valetta Harbour	9
<i>Fistularia petimba</i>	4.5.	COS	EM	Cyprus	Gialia	18
<i>Gaidropsarus granti</i>	3.1.	AM	AS	Croatia	Mažirina island	12
<i>Vanderhorstia mertensi</i>	4.2.	IP	EM	Greece	Aegean Sea	14

but overlooked species. It was not possible to define the origin of an undetermined species of *Chrysaora* genus recorded in Israel. Lastly, as regards the tentative record of *Epinephelus* cfr. *coioides* from Malta, an origin was assigned based on a tentative ID.

The benefit of the involvement and motivation of citizens and fishermen in providing sightings of unusual species is evidenced by the relatively high number of records originating from these sources (9 records – 45%) versus those provided by scientists. Given the nature of some re-

ords, i.e. photographic evidence, some species could not be identified to species level (*Chrysaora* sp.) or the species ID has been tentatively assigned (*Epinephelus* cfr. *coioides*). Nevertheless, these records represent valuable, novel information for their respective areas. The locations of the records are presented in Figure 1. All records originate from four distinct Mediterranean sub-areas and are arranged accordingly in the manuscript, from west to east. A list of species with additional data is presented in Table 1.



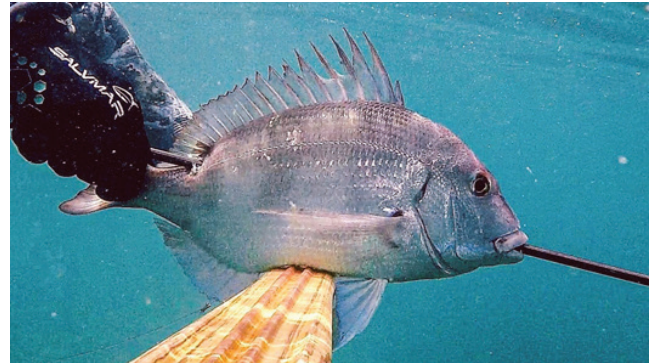
## 1. WESTERN MEDITERRANEAN

### 1.1. First record of *Dentex canariensis* Steindachner, 1881 in the Balearic Sea

Andrea SPINELLI and Luca CASTRIOTA

The Canary dentex, *Dentex canariensis* Steindachner, 1881 is a large demersal sparid species living over various substrates, usually on rocky grounds and sandy bottoms close to them (Otero *et al.*, 1998). It commonly occurs along the eastern Atlantic coast, from Morocco to Angola (Bonnet, 1969; Aloncle, 1967), and occasionally around some oceanic islands (i.e. La Gomera and Fuerteventura) (Otero *et al.*, 1998). It has also been recorded in the Gulf of Cádiz, southern Spain, where it does not seem to be accidental (Otero *et al.*, 1998). More recently, one specimen was caught in the proximity of Almuñécar in the Alboran Sea (south coast of Spain), which represents the first documented record of *D. canariensis* in the Mediterranean Sea (Peña-Rivas *et al.*, 2017).

On 10<sup>th</sup> July 2019, one specimen of *D. canariensis* was observed by one of the authors (A. Spinelli) during a free dive at Sagunto (Valencia) in the middle of the eastern coast of Spain (39.65018° N, 0.201547° E), swimming near rocky blocks on a sandy bottom at 12 m of depth. The surface water temperature was 23°C. The specimen was captured by one of the authors (A. Spinelli) by spearfishing and photographed immediately after capture. It measured 38 cm in total length and weighed 620 g (Fig. 2). The dark blotch at the base of its dorsal fin and the shorter filaments of the third and fourth dorsal hard rays agree with the description of *D. canariensis* summarized in Otero *et al.* (1998) and, according to Peña-Rivas *et*



**Fig. 2:** Specimen of *Dentex canariensis* speared at Sagunto (Spain) on 10<sup>th</sup> July 2019.

*al.* (2017), allow to distinguish this species most clearly from the other north-eastern Atlantic and Mediterranean *Dentex* species (*D. gibbosus*, *D. dentex*, *D. macrophthalmus* and *D. maroccanus*).

The present finding of *D. canariensis* in eastern Spanish waters represents the northernmost record for this species in the Atlantic-Mediterranean area, the second record in the Mediterranean and the first from the Balearic Sea. According to Peña-Rivas *et al.* (2017), climate change may contribute to favouring the success and further expansion of *D. canariensis* in the Mediterranean Sea.

### 1.2. First documented sighting of *Caulerpa chemnitzia* (Esper) J.V. Lamouroux (Caulerpaceae, Chlorophyta) in Algerian coastal waters

Mouloud BENABDI and Ghazi BITAR

The species of the genus *Caulerpa* (Caulerpaceae, Chlorophyta) occurring in the Mediterranean Sea include *Caulerpa chemnitzia* (Esper) J.V. Lamouroux described from India (Esper, 1800, as *Fucus chemnitzia*) and widespread in warm seas (Belton *et al.*, 2014). This species was first reported in the Mediterranean Sea from Tunisia (Hamel, 1926, misidentified as *Caulerpa racemosa*), and successively recorded as *C. racemosa* or *C. racemosa* var. *turbinata-uvifera* from Lebanon, Egypt, Syria, Cyprus, and the South Levantine coast (for details see Verlaque *et al.*, 2015). The species was first reported as *C. chemnitzia* from Algeria in 2015 based on S. Lamouti's personal communication (Verlaque *et al.*, 2015); from Tunisia in 2016 (Sghaier *et al.*, 2016) and Lebanon (Bitar *et al.*, 2017). *Caulerpa chemnitzia* is typically considered as a non-aggressive component of the Lessepsian flora (Verlaque *et al.*, 2000).

In Algeria, *C. chemnitzia* was found in 2015, at Algiers, in the area of La Madrague (36.7923° N, 2.8993° E) at 0.5 m depth on rocky bottom dotted with sand patches (Fig. 3).

The identification of the species was based on the morphological characters described by Verlaque *et al.*, 2015.



**Fig. 3:** *Caulerpa chemnitzia*, 0.5 m, Algiers, July 2015. Photo credit: Mouloud Benabdi.

### 1.3. New record of *Aplysia dactylomela* Rang, 1828 from the Mediterranean Sea: first record from the east coast of Corsica

Armando MACALI and Francesco TIRALONGO

*Aplysia dactylomela* Rang, 1828, commonly known as the spotted sea hare, is a marine cryptogenic species of Atlantic origin (Moles *et al.*, 2017). It is a voracious herbivore with generalist feeding habits and efficient chemical defence strategies. Recently, *A. dactylomela* has colonised the Mediterranean Sea, probably spreading from the Atlantic Ocean through the Strait of Gibraltar (Valdés *et al.*, 2013). One intriguing aspect of the colonization process is the apparently disjointed sequence of records with the first sighting from Lampedusa Island (Italy, Central Mediterranean Sea) in 2003 (Trainito *et al.*, 2003), followed by a rapid spread across the Mediterranean Sea, with records from Spain, Monaco, Italy, Croatia, Montenegro, Greece, Malta, Turkey, Cyprus, Syria, Lebanon, Israel, Tunis and Libya (Bernat & Molinari, 2016; Rizgalla *et al.*, 2019a; Mioni *et al.*, 2018). The success of this species in colonising the Mediterranean Sea is supposedly linked to a number of factors, such as its broad dispersal potential, fast growth, lack of natural predators, and feeding habits (Moles *et al.*, 2017).

On the 15<sup>th</sup> of June 2019, a specimen of *A. dactylomela* (Fig. 4) was found in a tidal pool along the coast of Tarcu (41.7830556° N, 9.39694444° E). The habitat was represented by a shallow water tidal pool with a granitic rocky bottom and poor algal coverage, mostly represented by *Padina pavonica* and ephemeral brown and green algae. The water temperature was significantly higher

compared to the near shore (27.1°C versus 23.8°C) as a result of the reduced exchange of water between the sea and the tidal pool. This record is part of an extended sur-



**Fig. 4:** The specimen of *Aplysia dactylomela* recorded along the coast of Tarcu (Corsica, France).

vey carried out along the entire coastline of Corsica and no further sighting of the species has been recorded in other areas. This record confirms the recent northward spreading of the species to the east coast of Corsica Island.

### 1.4. First record of the Lessepsian polychaete *Dorvillea similis* (Annelida, Dorvilleidae) in Italian waters

Joachim LANGENECK and Jonathan TEMPESTI

The dorvilleid *Dorvillea similis* (Crossland, 1924) was originally described from hard bottoms in the northern Red Sea, close to commercial docks (Crossland, 1924). Çinar (2009) recorded this species as an established alien species off the Turkish coasts in the Levant Sea, suggesting that it might represent a Lessepsian invader. The species was later reported from the eastern Aegean Sea (Corsini-Foka *et al.*, 2015), where it probably arrived through the natural dispersal mechanism from the Levant Sea. Here we report on the first occurrence of this species in the western Mediterranean Sea, with a brief discussion on possible spreading pathways.

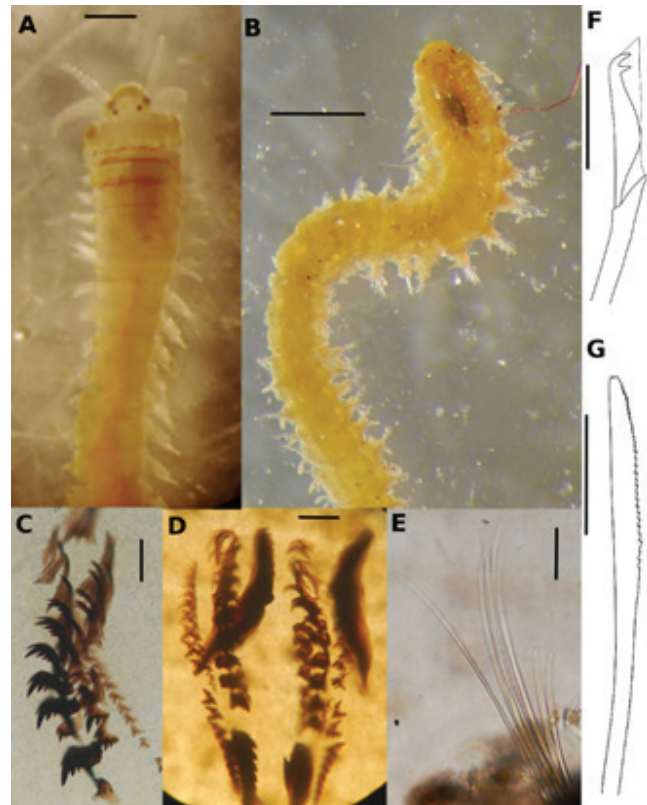
Specimens of *D. similis* were collected in fouling assemblages sampled with a scraping net at 1m depth on concrete docks in the marina of Capraia Island, Tyrrhenian Sea (43.0513° N, 9.8367° E) on 14<sup>th</sup> May 2019. In three out of ten samples (0.25 m<sup>2</sup>) six individuals of *D. similis* were found, with an average density of  $8 \pm 4$  individuals/m<sup>2</sup>. The examined specimens are currently deposited in the polychaete collection of the Museo di Storia Naturale di Pisa (MSNP: accession numbers P/4560; P/4561; P/0294/V). The specimens (Fig. 5 A, C, E, F, G)

clearly correspond to the original description (Crossland, 1924) and to the re-description based on Mediterranean specimens (Çinar, 2009). Moreover, they were compared with specimens obtained from fouling samples of marinas in the northern Red Sea (MSNP: P/3951; P/3967; P/3974; P/3982; P/4168; P/0295/V) (Fig. 5 B, D). The species can be assigned to *Dorvillea* Parfitt, 1866, based on the presence of notoaciculæ and the absence of furcate chaetae. *Dorvillea similis* is mainly characterised by having unarticulated palps, antennae clearly moniliform, almost as long as palps (clearly shorter than palps, indistinctly articulated in the native *Dorvillea rubrovittata* (Grube, 1855)) and an anterior pair of eyes on the dorsal side of the prostomium (the anterior pair of eyes is usually displaced slightly laterally on the prostomium in *D. rubrovittata*). The live colour, hitherto unknown for this species, also appears to differ from that of *D. rubrovittata*, being yellowish, with a single red stripe on the dorsal side of some anterior segments (Fig. 5 A). Each parapodium includes 2-6 capillary chaetae with serrated cutting edge, 2-3 geniculate chaetae, slightly shorter than capillaries and somewhat flattened (Fig. 5 E, G), and



9-20 compound chaetae, with strongly bidentate blade and a thin, hyaline hood protruding above the tip of the blade, forming an acute extension (Fig. 5 F). The Red Sea specimens are, on average, smaller than the Mediterranean specimens, and thus have fewer chaetae. In order to examine the maxillary apparatus, permanent slide mounts were obtained by dissolving the soft tissue with a 6M NaOH solution, and using Faure's mounting solution. Also, the maxillary features of the Mediterranean material (Fig. 5 C) clearly correspond to the available descriptions (Crossland, 1924; Çinar, 2009) and to the Red Sea specimens (Fig. 5 D), showing the occurrence of multi-dentate pieces with up to 9 relatively short teeth, slightly more elongated in the anterior part of the pharynx, but clearly different from those of *D. rubrovittata*, where the majority of pieces show the occurrence of an extremely elongated, almost threadlike tooth. As the mandible pieces are almost identical in the two species, and the chaetal features are very similar between them, examination of the maxillary apparatus is the only reliable way to distinguish between *D. similis* and *D. rubrovittata*, especially in the case of fixed material.

While the occurrence of *D. similis* in the eastern Mediterranean Sea can be easily explained by natural dispersal through the Suez Canal (Çinar, 2009), this record for the western Mediterranean Sea appears puzzling, as the species is currently known only in the Levant Sea and the eastern Aegean Sea, without any record from the western Aegean, Ionian and Adriatic Seas. A possible explanation could be the superficial similarity with the native *D. rubrovittata*, which could have hindered its detection in previous surveys. However, the most likely explanation for the occurrence of this species off Capraia Island is secondary dispersal from Levantine populations through shipping. As the port of Livorno is the only stable connection between Capraia Island and the mainland, it is possible that *D. similis* also occurs there; even though current surveys have not detected its presence. A possible alternative introduction pathway of this species in Italian waters is recreational boating that is known to contribute



**Fig. 5:** *Dorvillea similis*. A: anterior end of a live specimen from Capraia Island. B: anterior end of a preserved specimen from Hurghada, Red Sea. C: anterior part of a teeth row of a specimen from Capraia Island. D: complete maxillary apparatus of a specimen from Hurghada. E: upper bundle of capillary and geniculate chaetae in a midbody parapodium of a specimen from Capraia Island. F: compound chaeta. G: geniculate chaeta. Scale-bars: A-B: 0.5 mm; C-E: 50 µm; F-G: 25 µm.

to marine bioinvasions in the Mediterranean Sea, especially dealing with secondary spreading (Ulman *et al.*, 2017). This hypothesis is supported by the occurrence of *D. similis* in fouling assemblages associated with marinas in its native range.

## 2. CENTRAL MEDITERRANEAN

### 2.1. *Crepidula fornicata* (Linnaeus, 1758) reaches Libya

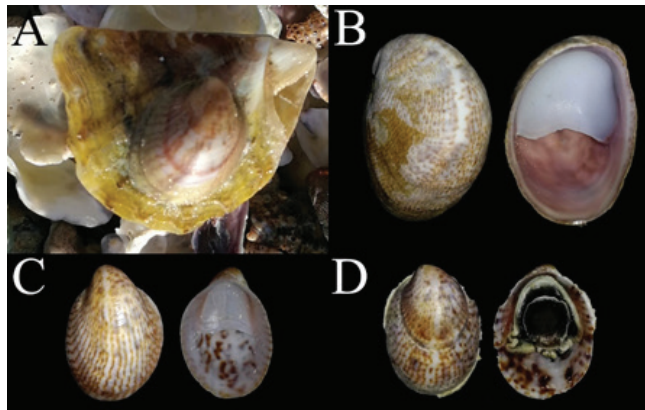
Jamila RIZGALLA and Fabio CROCETTA

*Crepidula fornicata* (Linnaeus, 1758) (Mollusca: Gastropoda: Calyptraeidae) is an alien mollusc, native to the Atlantic coast of America, and present in the Mediterranean Sea since at least 1957 (Zenetos *et al.*, 2017). This gastropod is so far known from several Mediterranean countries on the basis of multiple sightings, the majority of which are related to shipping and aquaculture (e.g. Macali *et al.*, 2013; Crocetta *et al.*, 2017). However, records from Libya are still lacking.

From 22<sup>nd</sup> November 2018 to 28<sup>th</sup> January 2019, the molluscan fauna of Tripoli Harbour (sandy shoreline) (32.901140° N, 13.212579° E) was investigated by qual-

itatively analysing the material washed ashore, as well as by observing the molluscan taxa living locally in shallow waters (see also Rizgalla *et al.*, 2019b). Among hundreds of washed seashells, eight shells and six specimens of a newly encountered calyptraeid taxon (Fig. 6) were found since the beginning of the survey. One specimen was found attached to a *Pinctada imbricata radiata* (Leach, 1814), a cluster of three specimens was found attached to rocks, while a cluster of two specimens was found detached. After a comparison with current literature, they were subsequently identified as *C. fornicata*. The shells were preserved dried, whilst the six living specimens





**Fig. 6:** *Crepidula fornicata* from Tripoli Harbour (Libya). A: The specimen attached to *Pinctada imbricata radiata*. B–D: shells/specimens not to scale (dorsal and ventral views): B: 3.6×2.4 cm; C: 1.6×1 cm; D: 2.1×1.6 cm.

were soon transferred in 90% ethanol. The collected material is archived in the first author’s private collection.

Thus, here we report on the first record of *C. fornicata* in Libya. Its presence in a harbour, as well as the absence of aquaculture facilities nearby, suggests shipping traffic as a plausible pathway for its arrival. Future field research might confirm its status as either established and/or spread, or rank the present record as an ephemeral introduction.

## 2.2. Notes on infrequent gelatinous visitors to the central Mediterranean – records of *Apolemia uvaria* (Lesueur, 1815), *Physophora hydrostatica* Forskaal, 1775 and *Phacellophora camtschatica* Brandt, 1835 from Maltese waters

Alan DEIDUN and Stefano PIRAINO

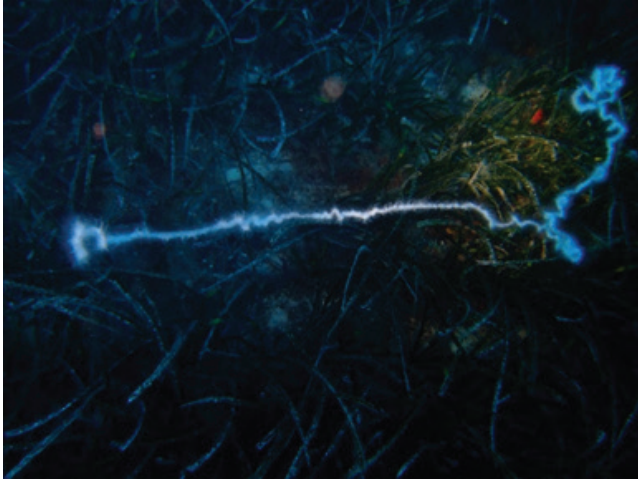
The potency of citizen science campaigns in recording the arrival of new species or the occurrence of infrequent species is increasingly being recognised. The “Spot the Jellyfish” citizen-science campaign has been conducted by the Physical Oceanography Research Group at the University of Malta since June 2010 through a dedicated web portal (<http://www.ioikids.net/jellyfish>), yielding multi-annual abundance data about previously-recorded jellyfish species and new species records for Maltese wa-

ters (e.g. *Rhopilema nomadica* – Deidun *et al.*, 2011).

Originally discovered by Lesueur in 1809 off the coasts of Nice (as *Stephanomia uviformis*) and later recorded throughout the Western Mediterranean and the NE Atlantic European coasts, the epipelagic siphonophore *Apolemia uvaria* is commonly known as the barbed wire (or string) jellyfish. So far, it is the only representative of the family Apolemiidae in the Mediterranean Sea, distinguished from other physonect siphonophores by the pres-

**Table 2.** Sightings of *A. uvaria*, *P. hydrostatica* and *P. camtschatica* in Maltese waters submitted to the “Spot the Jellyfish” database over the 2014-2017 period.

Species	Date	Location	Coordinates	Evidence type	Depth and seabed type
<i>Apolemia uvaria</i>	09.06.15	Mgarr ix-Xini	36.017258°N, 14.273034°E	Photographic	12 m; <i>Posidonia oceanica</i>
	26.05.16	Zurrieq	36.010057°N, 14.328105°E	Photographic	20m; sand
	29.06.16	Cirkewwa	35.989050°N, 14.329684°E	Photographic (photo reproduced as Fig. 7)	20 m; <i>Posidonia oceanica</i>
	06.05.17	Xwejni	36.079652°N, 14.247842°E	Photographic	8 m; rocky reef
	09.05.17	Mgarr ix-Xini	36.017258°N, 14.273034°E	Photographic	8 m; rocky reef
<i>Physophora hydrostatica</i>	20.04.14	Xwejni	36.079652°N, 14.247842°E	Photographic (photo reproduced as Fig. 8)	10 m; sand
	22.05.15	Mgarr ix-Xini	36.017258°N, 14.273034°E	Photographic	10 m; sand
<i>Phacellophora camtschatica</i>	03.04.17	Mgarr ix-Xini	36.017258°N, 14.273034°E	Photographic (photo reproduced as Fig. 9)	12 m; <i>Posidonia oceanica</i>



**Fig. 7:** The *Apolemia uvaria* individual observed on 29.06.16 (refer to Table 2). Photo credit: Alexander Ferrante.

ence of tentacles between the nectophores (*nectosomal tentacles*). It can reach more than 30m in length, but it frequently undergoes autotomy (Mapstone, 2014). Mass occurrence of *A.uvaria* has been detected only in North European cold waters (Scotland, Sweden, Norway) and it has been implicated in fish kills at cage aquaculture facilities (Båmstedt *et al.*, 1998).

Similarly, the cosmopolitan and epi-mesopelagic physonect *Physophora hydrostatica* (hula skirt siphonophore) is so far the only representative of the Physophoridae family recorded in the Mediterranean. It has a long, narrow pneumatophore and typical nectophores on an elongated nectosome, with a reduced corm-like siphosome, surrounded by a ring of prominent enlarged palpons. Along with *A. uvaria*, it is considered as a rare siphonophore (Mapstone, 2014).

*Phacellophora camtschatica* is a large scyphozoan jellyfish mostly abundant in the north-east Pacific region but also known from many other regions. It has been recorded in the Mediterranean Sea (Tyrrhenian Sea, Strait of Messina, Gulf of Naples) too, between the end of the nineteenth and the beginning of the twentieth century. Since then, very few sightings of *P. camtschatica* have been reported. A taxonomic survey integrating morphological and molecular genetic data would be appropriate to establish whether *P. camtschatica* represents a cryptic species complex, as recently demonstrated for other Mediterranean jellyfish that were supposed to have a cosmopolitan distribution (Scorrano *et al.*, 2017). It is known to prey on other jellyfish species, notably on moon jellies *Aurelia* spp., and to provide shelter to the juveniles of a number of carangid and gadid fish species. Straehler-Pohl *et al.* (2011) recently assigned it to a new monotypic family, the Phacellophoridae.

The sightings of *A. uvaria*, *P. hydrostatica* and *P. camtschatica* in Maltese waters submitted to the “Spot the Jellyfish” database over the 2014-2017 period are summarised in Table 2, along with salient collection information. Prior to 2014, these three gelatinous species had not been recorded in Maltese waters and only infrequently in the central Mediterranean region at large. In fact, *A. uvaria* is known mainly from the Straits of Mes-



**Fig. 8:** The *Physophora hydrostatica* individual observed on 15.04.17 (refer to Table 2). Photo credit: Pere Bullen.



**Fig. 9:** Individual of *Phacellophora camtschatica* observed on 03.04.17 (refer to Table 2). Photo credit: Pete Bullen.

sina in Sicily (Kölliker, 1853) and from Villefranche-sur-Mer (France) in the north-west Mediterranean (Mapstone,



2003), whilst published Mediterranean records of *P. hydrostatica* and *P. camtschatica* are few and staggered, although large numbers of *P. hydrostatica* have been observed in 2012 in the Gulf of Otranto (southern Adriatic).

The fact that all the records of the three gelatinous species were made along the western coastline of the Maltese Islands is consistent with the fact that the same species are mainly known from the western half of the Mediterranean Basin, being largely of North Atlantic origin (as in the case of *A. uvaria*), or cosmopolitan (as in

the case of *P. hydrostatica* and *P. camtschatica*) species (Mapstone, 2014).

The regular sighting of *A. uvaria* over the 2015-2017 period also suggests that this siphonophore species is not as infrequent in the region as previously thought. With the exception of a single sighting, the three gelatinous species in question were sighted in early spring, suggesting a possible exploitation of the Mediterranean seasonal plankton pulses normally starting in late winter.

### 2.3. The first tentative record of the orange-spotted grouper *Epinephelus coioides* (Hamilton, 1822) from Maltese waters

Alan DEIDUN and Bruno ZAVA

Besides four native *Epinephelus* species (*E. aeneus*, *E. caninus*, *E. costae* and *E. marginatus*), the Mediterranean Basin also hosts four non-native *Epinephelus* species – *E. malabaricus*, *E. areolatus*, *E. geoffroyi* and the orange-spotted grouper (*Epinephelus coioides* [Hamilton, 1822]). The latter species, native to the Red Sea and the Indo-Pacific region up to the central Pacific, is of considerable commercial importance (Froese & Pauly, 2019) and was first recorded from the Basin off the coast of Israel. This record was originally misidentified as *E. tauvina* and later assigned to *E. coioides* (Heemstra & Golani, 1993). Since then, the species has been recorded from a number of locations in the Mediterranean, mainly in the Levantine, including the port of Antalya in Turkey (Gokoglu & Ozvarol, 2015). A single record of the species exists for the northern Adriatic, from the Gulf of Trieste (Parenti & Bressi, 2001). Whilst *E. malabaricus* has been previously recorded from Maltese waters (Schembri & Tonna, 2011), *E. coioides* has not and, thus, the current record represents the first Maltese and the fifth Mediterranean record for *E. coioides*.

On the 3<sup>rd</sup> of August 2019, a single *E. coioides* individual was landed by an angler fishing from a quay located in the Senglea flank of Valletta Grand Harbour, Maltese Islands, westernmost Ionian Sea (35.884880° N; 14.515246° E), in close proximity to a semi-submersible oil rig stationed in the Grand Harbour for maintenance work. The bait used on the date of capture consisted of chub mackerel (*Scomber colias*), with the site in question being characterised by an approximate water depth of 15-20m, and water temperature and salinity of 26.9°C and 35.9, respectively.

A photo of the caught individual was uploaded by the angler on social media (Facebook), prompting the authors to establish contact with him. The angler claimed that the fish was no longer available but he duly provided the authors with all the information relating to its capture as well as a high-resolution photo of the individual (Fig. 10). Given the absence of the caught individual, morphometric and meristic counts could not be taken, but it was tentatively assigned to *Epinephelus coioides* by virtue of the evident bright orange and reddish-brown spots, especially abundant on the head and on body areas below



**Fig. 10:** The single *Epinephelus* cfr. *coioides* individual caught from Maltese waters

the lateral line (e.g. pectoral, pelvic and anal fin regions). This colouring, along with the absence of any white spots on the body, is a diagnostic feature of *E. coioides* and distinguishes the species from the closely-related *E. malabaricus*, which features spots of a darker colour (Heemstra & Golani, 1993). The individual was estimated to have a total length of 20cm, which is consistent with the length of an immature individual, given that the typical total length range for mature individuals of the species is 25-30 cm.

The sight of capture of the *E. coioides* individual reported in this study is situated in Valletta Grand Harbour, a Mediterranean shipping hub that has repeatedly yielded marine Non-Indigenous Species (NIS) records through collaboration established between marine scientists and anglers. Such first records of marine fish NIS from Grand Harbour reported by anglers include the species *E. malabaricus*, *Abudefduf saxatilis*, *Oplegnathus fasciatus* and *Scatophagus argus* (as summarised in Evans & Schembri, 2015). This phenomenon further underlines the importance of monitoring waters in shipping hubs for early detection of marine non-indigenous species, as well as the importance of social media as a non-conventional and informal means of communication between marine scientists and fishermen.

A word of caution. Given (i) the lack of the actual specimen (that did not allow meristic and morphometric

counts and measurements); (ii) the close similarity in livery between *E. coioides*, *E. spilotoceps* (a western Pacific species unrecorded to date from the Mediterranean) and *Cephalopholis niger* (a western Atlantic species) and that (iii) the dorsal fin (whose pigmentation and livery is a key element in distinguishing between the three species

in question) is only partially visible in the photo ( Figure 1), the taxonomic identity ascribed in this study should be considered tentative. Conclusive morphological and genetic identification should be conducted in future on any additional fish individuals belonging to the three species in question.

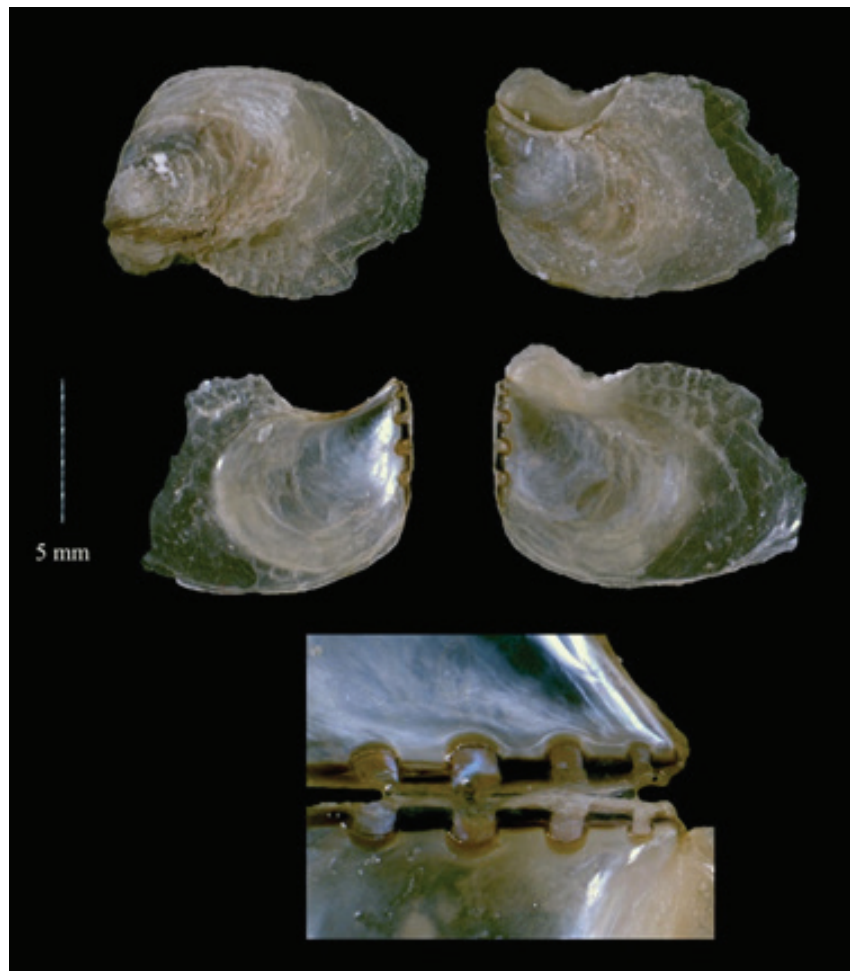
#### 2.4. First record of *Isognomon legumen* (Gmelin, 1791) in Italian seas

Salvatore GIACOBBE and Walter RENDA

The occurrence of *Isognomon legumen* (Gmelin, 1791) (Mollusca: Bivalvia: Pteriidae) in the Mediterranean Sea has been ascertained only recently (Mienis, 2016), although Crocetta (2018) possibly backdated its presence in the basin till at least 1996, due to misidentifications with *Malleus regula* (Forsskål in Niebuhr, 1775). This alien species has recently been spreading in the area, with confirmed records from Israel, Greece, and Turkey (Mienis, 2016; Stamouli *et al.*, 2017). However, records from the central Mediterranean Sea, including Italy, are still lacking (see Servello *et al.*, 2019).

Here we report on the presence of six *I. legumen* specimens from the Strait of Messina (38.259819° N, 15.628871° E), collected on the 9<sup>th</sup> of September 2019

from a scraping of about 0.25m<sup>2</sup> of vegetated rocky surface dominated by *Lithophyllum* algae at 1m depth. The collected material was deposited in the Benthic Ecology Laboratory, University of Messina (code repository: BEL134KOBOLD1-6); total length of the specimens was 13.9mm (Fig. 11), 7.0mm, 6.0mm, 5.5mm, 5.6mm, and 5.8mm, respectively. The current finding is the first record of this taxon from Italian seas and the westernmost locality in the Mediterranean Sea. Although uncertain, we suggest colonization of the area through natural larval dispersal, in agreement with surface currents flowing from the Levantine basin.



**Fig. 11:** Internal and external views of *Isognomon legumen* (specimen code BEL138KOBOLD1) from the Strait of Messina (Italy).



## 2.5. New record of the Bigeye thresher *Alopias superciliosus* in Hellenic Ionian waters

Costas PERDIKARIS and Evangelos KONSTANTINIDIS

Despite its circumglobal distribution in tropical, subtropical and temperate seas, the Bigeye thresher *Alopias superciliosus* Lowe, 1841 is listed as vulnerable by the IUCN due to susceptibility to overexploitation, confusion with the congeneric *Alopias vulpinus* (Bonnaterre, 1788) and low fecundity and growth rate. Historical records across the Mediterranean Sea are limited, but recent published records suggest that the species is increasingly reported (Farrag, 2017 and references therein). Most specimens have been reported from the Adriatic Sea (e.g. Madiraca & Davidov, 2015) and the Aegean Sea. On the contrary, the occurrence of the species in the Ionian region is rather uncommon (Gruber & Compagno, 1981; Giovos & Cakalli, 2017).

On 23 July 2019, a male *A. superciliosus* was caught close to the bay of Plataria (NW Greece) with gill-nets by professional fisherman at a depth of 30 meters (39.468333° N, 20.235833° E) and was landed at the nearby fishing port (Fig. 12). The total length was 295cm and total weight 35kg. The current record represents the second documented catch of the species in the Hellenic territorial waters of the Ionian Sea, following the specimen that was caught in the straits of Ithaki-Kefalonia islands in 2014 (Pollerspöck & Straube, 2019).



**Fig. 12:** Male specimen of *Alopias superciliosus* caught at the entry of Plataria bay (NW Greece, Ionian Sea). Whole specimen (a) with arrows pointing to the big eye and the lateral groove on the head area and dotted line highlighting the distant position of the dorsal fin in relation to the pectoral fins. The long snout and the presence of a pair of claspers are shown on (b) and (c), respectively.

## 3. ADRIATIC SEA

### 3.1. First record of *Gaidropsarus granti* (Regan 1903) from the eastern Adriatic Sea (Croatia)

Branko DRAGIČEVIĆ and Jakov DULČIĆ

Azores rockling, *Gaidropsarus granti* (Regan 1903), is a relatively rarely encountered benthic fish species present in the Eastern Atlantic (Madeira, Azores and Canary island) and Mediterranean Sea inhabiting depths from 120 to 823 meters (Garcia, 2015). Little is known about its distribution in the Mediterranean and the origin of its presence in the area is debated, with possibilities of it being a native but overlooked species or a recent Atlantic immigrant (Orsi Relini & Relini, 2014). Following its first records from the Ligurian Sea in the period from 1989 to 1990, it has been subsequently reported from other Mediterranean areas such as the Maltese Islands, the Channel of Sardinia and the South-Eastern Aegean, Ligurian, Tyrrhenian, North Ionian and Alboran Seas (Orsi Relini & Relini, 2014; Bello, 2018; Spinelli & Castriota, 2019). It has also been recorded from the south-western Adriatic Sea where, in the period from 1997 to 2017, eight specimens have been recorded (Bello, 2018). Up to now, no records of *G. granti* have been documented from the eastern Adriatic Sea or any other area in the Adriatic Sea apart from its south-western part (off Mola di Bari).

On 23<sup>rd</sup> December 2017, a specimen of *Gaidropsarus granti* (Fig. 13) was caught by the trawl 5.5 Nm south



**Fig. 13:** A specimen of *Gaidropsarus granti* (Regan 1903) collected in the eastern Adriatic Sea near Mažirina Island (Croatia). Photo credit: Nikola Cvitan.

of Mažirina Island in the eastern Adriatic Sea (approx. 43.53666° N, 15.781388° E). The depth of the trawled transect was between 140 and 160 meters. The specimen was collected in the close vicinity of the sea mount that rises to a depth of about 50m. The length of the specimen was approximated by the fisherman at 25cm. No data on the weight was available. The specimen was released after a series of photographs and videos were obtained.

The unique pattern of body coloration (brown blotches that form asymmetrical patterns on the upper part of the body) makes this species easily identifiable and sets it

apart from other congeneric species present in the Mediterranean Sea (Orsi Relini & Relini, 2014; Bello, 2018). Trawling has a long tradition in the eastern Adriatic Sea and it seems unlikely that the presence of such species would go unnoticed for such a long period of time, even given the fact that this species inhabits greater depths. Therefore, it is reasonable to conclude that its presence in the eastern Adriatic Sea (Croatian coast) is the result of its recent expansion from southern areas. In any event, this record represents a significant extension of the previously known distribution in the Adriatic Sea.

### 3.2. New records of the invasive alien species *Mnemiopsis leidyi* along the Apulian coast (Italy, southern Adriatic Sea) collected by crowdsourcing

Valentina TIRELLI and Alenka GORUPPI

The invasive comb jellyfish, *Mnemiopsis leidyi* A. Agassiz, 1865, is listed among the “100 of the World’s Worst Invasive Alien Species”. In October 2005, this ctenophore was recorded for the first time in the northern Adriatic Sea (Gulf of Trieste; Shiganova & Malej, 2009) but the introduction appeared to be unsuccessful. For more than 10 years, *M. leidyi* was not registered in this basin. But starting in 2016, *M. leidyi* has been present in the northern-central Adriatic Sea (up to Ancona), typically blooming in summer (Malej *et al.*, 2017; unpublished data). It was observed southward only in the Lesina and Varano lagoons (Cilenti & Scirocco in Mytilineou *et al.*, 2016). In summer 2019, we developed a new smartphone application, avvistAPP, in order to collect sightings of *Mnemiopsis* by crowdsourcing. The app is free and runs on iOS and Android devices. avvistAPP empowers citizen scientists to provide information about the presence, the location and the abundance of this invasive species simply by sending a picture. Thanks to this new tool, sightings of *Mnemiopsis* were collected for several locations along the Italian coasts. For the first time, it was also observed along the Apulian coast (southern Adriatic) (Fig. 14). In particular, *M. leidyi* (Fig. 15) was reported by 8 citizen scientists: on July 25th off the Varano Lagoon (41.92 N, 15.75 E), from August 12nd to 21st along the Gargano coast from Vieste to Mattinata (41.81N 16.19 E; 41.70 N 16.07E; 41.71 N, 16.07 E) and southward near Bisceglie (41.24 N, 16.06) and Molfetta (41.19N, 16.65 E), and on September 17th at a location (41.09 N, 16.99 E) south of Bari. All citizen scientists usually reported high abundance of ctenophores (1-10 individuals m<sup>-2</sup>). These observations highlight the southward spreading of *M. leidyi* in the Adriatic Sea and might foretell the next expansion of this species to the whole Mediterranean basin.



Fig. 14: Sighting localities of *Mnemiopsis leidyi* along the Apulian coast in summer 2019.



Fig. 15: Photos of *Mnemiopsis leidyi* taken from Apulian locations (Italy) by citizen scientists using avvistAPP.



## 4. EASTERN MEDITERRANEAN

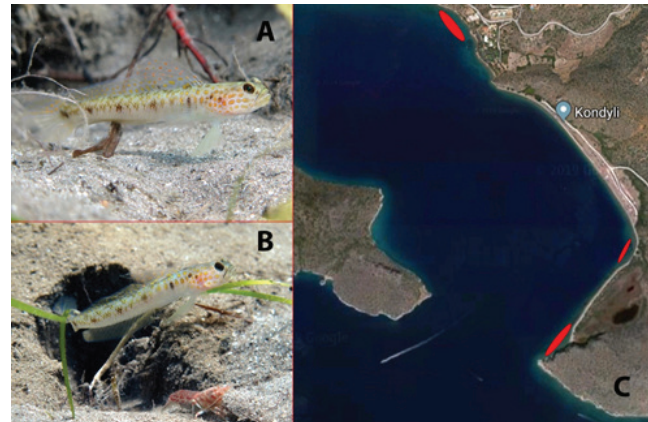
### 4.1. First record of *Vanderhorstia mertensi* Klausewitz, 1974 from Greek waters: the westernmost record from the Mediterranean Sea

Francesco TIRALONGO and Roberto PILLON

The Mertens' prawn-goby, *Vanderhorstia mertensi* Klausewitz, 1974, is a small fish of Indo-Pacific origin belonging to the family Gobiidae. Its maximum total length is reported as 11cm. It is a shallow waters species, usually observed between 2 and 10 m depth (Froese & Pauly, 2019), although in the Mediterranean Sea it was observed up to 52 m depth, on sandy/muddy bottoms or among seagrasses (Bilecenoglu *et al.*, 2008). The body of this small goby is elongated and the first dorsal fin is higher than body depth. The caudal fin is pointed and elongated. The upper half of the body is dotted with irregular yellow spots, well visible only on the head, the dorsal fins and the anterior part of the body. Irregular dark spots on sides.

*V. mertensi* was first recorded in the Mediterranean Sea in 2008 (Bilecenoglu *et al.*, 2008), in Turkey. Subsequently, the species was recorded in other areas of Turkey and in 2012 it was observed along the Israeli coast (Goren *et al.*, 2013).

Several dozens of specimens of *V. mertensi* were observed during snorkelling on 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> July 2019 at Kondyli (Greece, Aegean Sea) at three locations, with coordinates: 37.52358° N, 22.93566° E; 37.52622° N, 22.93853° E and 37.53384° N, 22.93073° E (Fig. 16). The specimens were observed starting from 2 m depth, and were markedly more abundant at 4 m depth. The bottom was sandy and partially covered by *Cymodocea nodosa*. The specimens live inside burrows in sand or mud, in association with burrowing alpheid shrimps (Karplus, 1987): the burrow is created by the shrimps and guarded by the fish. One to 3 specimens were recorded near each burrow opening, with a mean density of about 1-2 burrows per meter square. When they felt threatened, they hid inside the burrow. Several specimens of the in-



**Fig. 16:** Specimens of *Vanderhorstia mertensi* (A and B) from the study areas (in red) in Greek waters (Aegean Sea) (C). In B, *V. mertensi* and the alpheid shrimp (*Alpheus* sp.) near the burrow opening.

roduced non-indigenous species *Conomurex persicus* (Swainson, 1821) were observed during the survey.

Considering the number of specimens observed, we can confirm the presence of a well-established population of *V. mertensi* in the study area. Furthermore, although the species was observed down to a depth of about 6m, it is most likely distributed in a wider bathymetric range than that investigated by snorkelling during this study. These records confirm, for the first time, the presence of this species in Greek waters (Aegean Sea) and represent the westernmost record of this non-indigenous fish in the Mediterranean Sea. We also underline the importance of underwater photography for the detection of small and cryptobenthic fish species, such as gobies (Tiralongo & Pagano, 2015).

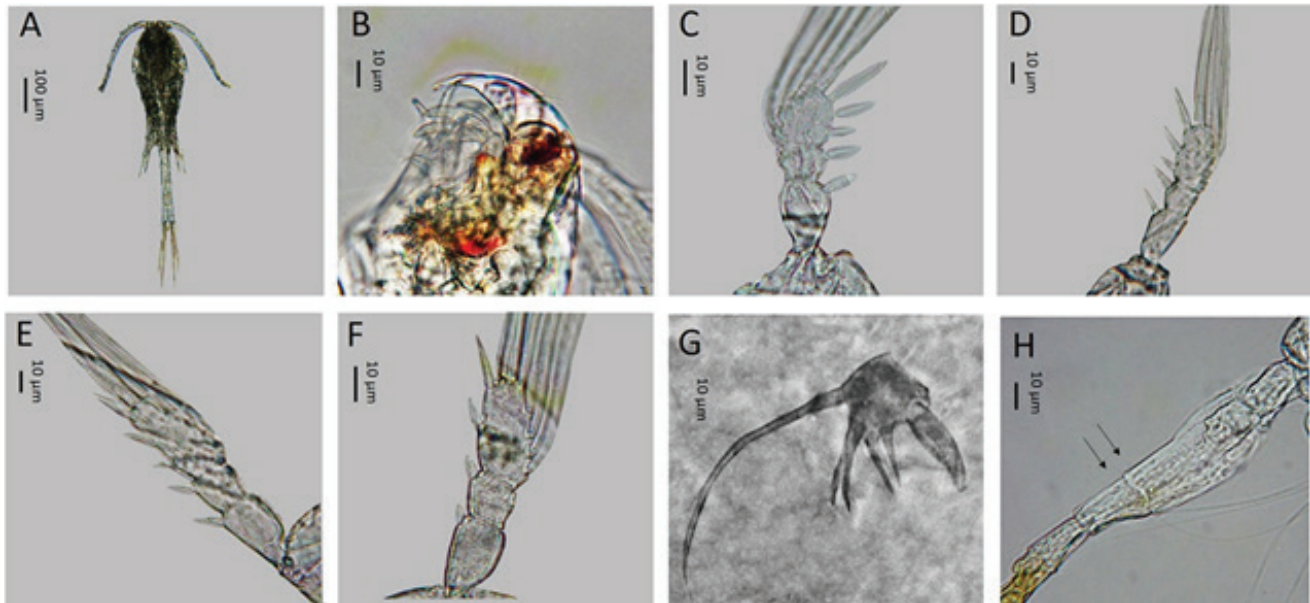
### 4.2. *Oithona davisae* Ferrari & Orsi, 1984 (Copepoda: Cyclopoida: Oithonidae): A newly recorded species in the North Aegean Sea

Olga ANADOLI and Evangelia MICHALOUDI

Female individuals of *Oithona davisae* (Fig. 17 A) have been found in Thermaikos Bay (40.5967° N, 22.9473° E), a eutrophic coastal basin of Thermaikos Gulf. This is the first record of this species from the North Aegean Sea. *Oithona davisae* is a recently described cyclopoid copepod, firstly reported from the coastal waters of Japan erroneously as *O. brevicornis* f. *minor* (Temnykh & Nishida, 2012). It was first described from Sacramento-Saint Joaquin estuary, California, suspected to have arrived in ballast waters from Asia (Ferrari & Orsi, 1984). Progressively, it has been introduced to many sites around the globe and is known as an invasive spe-

cies in the north-western and central Mediterranean, the Black Sea, the Sea of Marmara and the Turkish coast of the Aegean Sea (Zagami *et al.*, 2018; Terbiyik-Kurt & Beşiktepe, 2019). Further expansion of its distribution is expected (Karachle *et al.*, 2017).

Its presence was recorded in zooplankton samples collected during the autumn of 2018 (water temperature 21.3°C). Adult female *O. davisae* individuals were isolated and identified under a microscope based on the morphological features of the rostrum (lateral view: sharp and pointed) (Fig. 17 B), the number of exopod spines on swimming legs P1-P4 (1, 1, 3; 1, 1, 3; 1, 1, 3; 1, 1, 2)



**Fig. 17:** Microphotographs of the morphological traits of *Oithona davisae* collected from the North Aegean Sea: A) female individual, dorsal view; B) rostrum, lateral view; C) exopod P1; D) exopod P2; E) exopod P3; F) exopod P4; G) maxillule; H) urosome, lateral view.

(Fig. 17 C, D, E, F), the presence of a long seta in the first inner lobe of the maxillule (Fig. 17 G) and the absence of dorsal hair-rows on the urosome (Fig. 17 H).

Even though *O. davisae* has been successfully imported in a wide range of environments, due to its high tolerance to temperature and salinity variations, its distribution range could be underestimated, as it has frequently been confused with other *Oithona* species. Such a misidentification has currently occurred in the near-shore waters of the Black Sea, where *O. brevicornis* was reported as a newly invasive species in the early 2000s. Neverthe-

less, the specimens were re-examined and proved to be *O. davisae* (Temnykh & Nishida, 2012). The confusion between these two species is due to their high morphological similarity in body size, pointed rostrum and exopod spine pattern on the swimming legs.

Our results indicate that *O. davisae* is present in the North Aegean. Furthermore, we highlight the importance of proper species identification concerning the genus *Oithona*; especially in the case of *O. davisae* where proper identification should be based on the presence of the long setae in the maxillule.

#### 4.3. Confirmation of the occurrence of the alien red seaweed *Asparagopsis armata* in the Aegean Sea

Konstantinos TSIAMIS and Vasilis GEROVASILEIOU

*Asparagopsis armata* Harvey is an alien seaweed in the Mediterranean Sea, originating from Australia. It was first found in Algeria in the early 20<sup>th</sup> century and it is now widely spread in the Western basin (Verlaque *et al.*, 2015). It is listed among the 100 “Worst Invasives in the Mediterranean Sea” (Streftaris & Zenetos, 2006). It includes a heteromorphic diplo-haplontic life cycle; a large gametophytic phase and a microscopic diploid tetrasporophyte that is known as the ‘*Falkenbergia*’ stage [*Falkenbergia rufolanosa* (Harvey) F. Schmitz].

In the Aegean Sea (Eastern Mediterranean Sea), there are several records of *A. armata*, but all of them refer to the tetrasporophytic ‘*Falkenbergia*’ stage (see Tsiamis, 2012 and references therein). However, the tetrasporophyte of *A. armata* is indistinguishable from the tetrasporophyte of its sister species *Asparagopsis taxiformis* (Delile) Trevisan, which is widely spread in the Aegean Sea (Tsiamis, 2012). As a result, past Aegean Sea records of *A. armata* may well correspond to *A. taxiformis*.

In July 2010, several gametophytes of *A. armata* were



**Fig. 18:** Gametophytes of *Asparagopsis armata* in Lesvos Island (North Aegean Sea, Eastern Mediterranean Sea) with their characteristic harpoon-like branches. Photo credit: V. Gerovasileiou.



detected in the upper rocky sublittoral zone of Fara Bay in south-eastern Lesvos Island (38.97072° N, 26.477249° E), North Aegean Sea (Fig. 18). The observed harpoon-like branches on the gametophyte thallus allow accurate distinction of the species from the gametophytes of *A. taxiformis*. Associated flora included *Amphiroa rigida* Lamouroux, *Jania rubens* (Linnaeus) Lamouroux and

*Dictyota* sp. Our record, although unreported for several years, confirms for the first time the occurrence of this alien seaweed in the Aegean Sea. Moreover, it represents the second confirmed record of the species in Greece, after the gametophytes found in the Eastern Ionian Sea, Southern Peloponnesos (Catra & Alongi in Nikolaidou *et al.*, 2012).

#### 4.4. Second finding of *Euthymella colzumensis* in Greek Waters

Panayotis OVALIS and Argyro ZENETOS

*Euthymella colzumensis* (Jousseaume, 1898) is a micromollusc belonging to the family Triphoridae Gray, 1847, originally described from the Red Sea and recently invading the Mediterranean Sea. Although it has some distinctive characters, its distribution is poorly documented both in the native area and in the invaded one. In the Mediterranean Sea, only Angelidis & Polyzoulis (2018) have reported on one freshly dead specimen together with *Viriola* cf. *bayani* specimens from coralligenous material trawled at 35-50m depth in south-eastern Astypalaia (south Aegean, Greece). However, according to ‘material and methods used’ in Crocetta *et al.* (2017) and Zenetos *et al.* (2018), its presence in Greece was disputed until new Mediterranean and/or Greek findings were reported.

We hereby report on the finding of an additional *Euthymella colzumensis* in material caught by a fishing boat operating at a depth of about 45m near Fleves (37.778386° N, 23.753667° E), Saronikos Gulf, on 17/9/2019 (Fig. 19). The current record confirms that Saronikos Gulf is a hot spot area for alien species (Simboura *et al.*, 2012; Crocetta *et al.*, 2017) and contributes to re-instating *Euthymella colzumensis* as an accepted alien species in Greek waters.



**Fig. 19:** *Euthymella colzumensis* from Saronikos Gulf. Height= 6.65 mm. Photo credit: Panayotis Ovalis.

Its presence could be attributed to either unaided expansion of its distribution or to ship transfer, as already speculated for many other species in the area (Polychronidis *et al.* in Siokou *et al.*, 2013).

#### 4.5. First record of the red cornetfish *Fistularia petimba* from Cyprus

Nikolas MICHAILEDIS and Ioannis MANITARAS

The red cornetfish *Fistularia petimba* Lacepède, 1803 (Syngnathiformes, Fistulariidae) is a cosmopolitan fish species, found throughout the tropical Atlantic and the Indo-West Pacific Ocean, including the Red Sea (Froese and Pauly, 2019). It was first recorded in the Mediterranean Sea off Cadiz, Spain in June 1996 and the single specimen was assumed to originate from the West African coast populations of the species (Cardenas and Berastegui, 1997). It was seen again in the Mediterranean 20 years later, when specimens were collected from Antalya Bay, Turkey (28/10/2016 - Ünlüoğlu *et al.*, 2018) and off the coast of Ashdod, Israel (11/12/2016 - Stern *et al.*, 2018). Additional specimens were later collected from Iskenderun Bay, Turkey (21/5/2017 - Ünlüoğlu *et al.*, 2018), the southern coast of Israel (26/11/2017 - Stern *et al.*, 2018) and Mersin Bay (10/5/2018 - Çiftçi *et al.*, 2018). Genetic analyses conducted on the first Israeli specimens indicate that the Suez Canal is the most likely pathway of introduction for the Eastern Mediterranean

records (Stern *et al.*, 2018).

On 26<sup>th</sup> September 2019, an *F. petimba* specimen of 602 mm total length (including the tail filament) and 67 g total wet-weight was caught off Gialia, Cyprus (35.11° N, 32.49° E) in a gillnet set over mixed bottom at a depth of 55 meters. The specimen is brownish-orange in colour (*F. commersoni*: greenish-brown), with sharp retrorse spines along the posterior lateral line ossifications (blunt in *F. commersonii*) and elongated bony plates embedded in the skin along the midline of its back (absent in *F. commersonii*) (Fig. 20), all in agreement with the species’ diagnostics (Fritzsche, 1976). It has 13 dorsal fin rays, 14 anal fin rays, 15 pectoral fin rays, 6 pelvic fin rays and no gill rakers (meristic formula: D13; A14; P6; V6; GR0). Morphometric measurements are as follows: 602 mm total length including tail filament, 491 mm total length excluding tail filament, 401 mm standard length, 377 mm preanal length, 389 mm predorsal length, 241 mm pre-pelvic length, 181 mm prepectoral length, 177 mm head



**Fig. 20:** The *Fistularia petimba* specimen from Cyprus.

length, 138 mm preorbital length, 6-14 mm eye diameter, 25 mm postorbital length, 28 mm dorsal fin length and 25 mm anal fin length.

The morphological, biological and ecological similarities of this species with its congeneric *F. commersonii*

are strong (Froese and Pauly, 2019) and whether the recent records indicate the initial stages of the population expansion of yet another invasive species in the region remains to be seen.

### 5.6. First records of the sea nettle *Chrysaora* sp. (Cnidaria: Scyphozoa: Semaestomeae: Pelagiidae) in the Levant

Dor EDELIST, Zafrir KUPLIK, Tamar GUY-HAIM and Dror ANGEL

The genus *Chrysaora*, commonly known as sea nettles, consists of 13 species that inhabit warm and temperate waters in all major marine regions (Morandini & Marques, 2010). On 6<sup>th</sup> July 2019, two jellyfish were observed by an underwater photographer, Mr. Dror Gilat, off the southern coast of Israel (Palmachim - 31.92388° N, 34.69194° E) at 5 m depth. The largest of the two was recorded by still (Fig. 21) and video photography (footage available at <https://www.youtube.com/watch?v=wS-b08vrXHFA>). Radiating markings on the bell suggest it is a member of the Pelagiidae family, genus *Chrysaora*, yet several morphological features distinguish it from

other species of the genus, e.g. very distinct eyespots, 48 long tentacles, reduced oral arms and unique shape of gonads. The photograph was published via *Meduzot Ba'am* - a citizen science project for documenting public jellyfish observations via a website ([www.meduzot.co.il](http://www.meduzot.co.il)) and Facebook group. While discussing this record online, another SCUBA diver (Ms. Inbar Margulis) recalled photographing a similar jellyfish in Caesarea (32.50250° N, 34.88805° E) at a similar depth on 5<sup>th</sup> July 2015 and shared the photos (Fig. 22).

A total of nine species of Scyphomedusae have been reported in the Israeli Mediterranean by the *Meduzot*



**Fig. 21:** *Chrysaora* sp. recorded on 6<sup>th</sup> July 2019 in Palmachim at 5 m depth. Flattened bell shape, ~120 mm in diameter. Four reduced oral arms, 48 tentacles ~300 mm long (six tentacles per octant observed in the video). Colour translucent-white, with 16 radiating brown markings on the exumbrella and eight distinct eyespots just above marginal lappets. Photo credit: Dror Gilat.

Ba'am project thus far. *Rhopilema nomadica* Galil, 1990 is the most prominent species, and its summer swarms are occasionally intermixed with *Rhizostoma pulmo* (Macri, 1778), *Phyllorhiza punctata* Lendenfeld, 1884, *Aurelia aurita* (Linnaeus, 1758), *Cotylorhiza erythrea* Stiasny, 1920, *C. tuberculata* (Macri, 1778), *Cassiopea andromeda* (Forsskål, 1775) and *Marivagia stellata* Galil & Gershwin, 2010. An additional species, *Pelagia noctiluca* (Forsskål, 1775), is sometimes swept ashore by winter storms. The main Pelagiid species known from the Mediterranean is *Chrysaora hysoscella* (Linnaeus, 1767). It is common in the Adriatic Sea and reaches as far east as Cyprus (Mariottini & Pane, 2010); but has not been described in the Levant to date and lacks the conspicuous eyespots. *Chrysaora* cf. *achlyos* Martin, Gershwin, Burnett, Cargo and Bloom, 1997 was recently recorded for the first time in the Mediterranean (Langeneck *et al.*, 2019); however, its coloration, shape of marginal lappets and tentacle number differ markedly from the present specimens. Tentacles do develop ontogenetically in some *Chrysaora* species (Morandini & Marques, 2010) and this by itself may not be a defining feature. The only species known to present eyespots is *Chrysaora gilberti* (Morandini and Marques, 2010), but it has fewer tentacles and more developed oral arms. Several unique features suggest that the observed specimens may be a new *Chrysaora* species that has never been described before. This, however, can only be determined after a thorough morphological and molecular analysis of a specimen in hand. This small population could have been cryptogenic and gone unnoticed among other, more conspicuous



**Fig. 22:** *Chrysaora* sp. recorded on 5<sup>th</sup> July 2015 in Caesarea at 5 m depth. A smaller specimen (~50 mm bell diameter) resembles the new record in bell shape, radiating markings on the exumbrella and eyespots above marginal lappets, with a smaller number of tentacles (16). Photo credit: Inbar Margulis.

species. Nevertheless, the presence of several mature specimens detected four years and 80 km apart may also indicate the existence of an established population in the Eastern Mediterranean.

#### 4.7. First record of the alien jellyfish *Marivagia stellata* Galil and Gershwin, 2010 off south-eastern Turkey

Cemal TURAN and Necdet UYGUR

The alien jellyfish *Marivagia stellata* Galil and Gershwin, 2010 (Scyphozoa: Rhizostomeae: Cepheidae) was recorded off Turkey along the southern Hatay coast (35.94913889° N, 35.92000000° E) on July 27<sup>th</sup>, 2019. Several specimens of *M. stellata* were observed at the sea surface (sea surface temperature 29°C), and photographed *in situ* while scuba diving (Fig. 23). A single specimen (umbrella diameter 15.6 cm, wet weight 171 g) was transported to the Laboratory of Molecular Ecology and Fisheries Genetics at Iskenderun Technical University. The species, known from the Arabian Sea and Indian Ocean (Galil *et al.*, 2013; Gul *et al.*, 2014), is considered to have entered the Mediterranean through the Suez Canal, and has been recorded off Israel, Lebanon and Syria (Galil *et al.*, 2010; Mamish *et al.*, 2016; Bitar & Badreddine, 2019). This is the first record from Turkey, potentially triggered by climate change, one of the reasons of spreading of lessepsian species in the Mediterranean (Turan *et al.*, 2016).



**Fig. 23:** Underwater photo of *Marivagia stellata* in the Antakya bay. Photo credit: Cemal Turan.



## Acknowledgements

Langeneck J. and Tempesti J. are grateful to M. El-Metwally and J. Ferrario for providing Red Sea specimens of *D. similis*, and to M. Lezzi for his support in the preparation of permanent slides. Deidun A. and Piraino S. wish to thank Mr. Pete Bullen (www.oceanfoto.co.uk), Roy Davidson, Hans Messler, Alexander Ferrante and Lyndsey Bee for making their photographs of the three gelatinous species in caption available to the authors, as well as to the International Ocean Institute (IOI) for sponsoring the Spot the Jellyfish campaign since 2010. Thanks are also due to André C. Morandini (Brasil) for supporting advice on *P. camtschatica* identification. Deidun A. and Zava B. are indebted to the angler Romario Pace for donating the photo of the fish individual reported hereunder. Dragičević B. and Dulčić J. are thankful to Mr. Nikola Cvitan who provided photographs and videos of the specimen as well as additional information. Their work was partly supported by the Croatian Science Foundation (HRZZ) under project IP-2016-06-5251. Tirelli V. and Goruppi A. wish to thank the citizen scientists for providing sightings and photographic material through avvistAPP (Michele Cravati, V. D., Vincenzo Frezza, S. I., R. M., S. M., I. T. and C. V.) and the Regione Autonoma Friuli Venezia Giulia for funding the NOCE di MARE project. Michailidis N. and Manitaras I. thank fishmonger George Karamanos and fisher Christos Efrem for providing the specimen and information on its catch. Edelist D., Kuplik Z., Guy-Haim T. and Angel D. thank Dror Gilat and Inbar Margulis for recording and sharing their observations, and Mark J Gibbons, Andre C Morandini and Stefano Piraino for their useful taxonomic contributions. “Medusot Baam” is funded by the Israel Society of Ecology and Environmental Sciences, as well as the GoJelly project - EU Horizon 2020 grant No 774499.

## References

- Aloncle, H., 1967. Remarques sur deux Dentés: *Dentex filusus* Valenciennes 1836 et *Dentex canariensis* Steindachner 1881. *Bulletin de l'Institut des Pêches Maritimes du Maroc*, 15, 101-103.
- Angelidis A, Polyzoulis G., 2018. New distributional records of four Indo-Pacific species from Astypalaia Island, South Aegean Sea, Greece. *Xenophora Taxonomy* 21, 3-10.
- Båmstedt, U., Fosså, J.H., Martinussen, M.B., Fosshagen, A., 1998. Mass occurrence of the physonect siphonophore *Apo-lemia uvaria* (Lesueur) in Norwegian waters. *Sarsia*, 83 (1), 79-85.
- Bellan-Santini, D., 1990. Mediterranean deep-sea amphipods: composition, structure and affinities of the fauna. *Progress in Oceanography*, 24 (1-4), 275-287.
- Bello, G., 2018. Documented records of *Gaidropsarus granti* (Osteichthyes: Lotidae) in the Adriatic Sea and review of its Mediterranean occurrences: is it a native fish or a newly established one? *Acta Adriatica*, 59 (1), 111-122.
- Belton, G.S., Prud'homme van Reine, W.F., Huisman, J.M., Draisma, S.G.A. et al., 2014. Resolving phenotypic plasticity and species designation in the morphology challenging *Caulerpa racemosa-peltata* complex (Caulerpaceae, Chlorophyta). *Journal of Phycology*, 50 (1), 32-54.
- Bernat, P., Molinari, A., 2016. Northernmost record of the alien sea hare *Aplysia dactylomela* Rang, 1828 (opisthobranchia, Aplysiidae) in the Mediterranean Sea. p. 199-200. In: *47° Congresso Società Italiana di Biologia Marina*, Torino.
- Bilecenoglu, M., Yokeş, M.B., Eryigit, A., 2008. First record of *Vanderhorstia mertensi* Klausewitz, 1974 (Pisces, Gobiidae) in the Mediterranean Sea. *Aquatic Invasions*, 3 (4), 475-478.
- Bitar, G., Badreddine, A., 2019. First record of *Marivagia stellata* Galil and Gershwin, 2010 (Scyphozoa: Rhizostomeae: Cepheidae) from the Lebanese waters in the eastern Mediterranean Sea. *Journal of the Black Sea/Mediterranean Environment*, 25 (2), 172-177.
- Bitar, G., Ramos-Esplá, A., Ocaña, O., Sghaier, Y.R., Forcada A. et al., 2017. The introduced marine macroflora of Lebanon and its distribution on the Levantine coast. *Mediterranean Marine Science* 18 (1), 138-155.
- Bonnet, M., 1969. Les sparidés des côtes nord-ouest africaines. *Revue des Travaux de l'Institut des Pêches maritimes*, 33 (1), 97-116.
- Cardenas, S., Berastegui, D., 1997. First record of *Fistularia petimba* Lacepède, 1803 (Pisces, Fistulariidae) off the coast of Cadiz (southern Iberian Peninsula). *Boletín del Instituto Español de Oceanografía*, 13, 83-86.
- Çiftçi, N., Ayas, D., Doğangün, M., 2018. New locality record for *Fistularia petimba* Lacepède, 1803 from the Northeastern Mediterranean Sea (Mersin Bay). *Mediterranean Fisheries and Aquaculture Research*, 2, 42-48.
- Cilenti, L., Scirocco, T., 2016. First record of *Mnemiopsis leidyi* (Ctenophora; Lobata; Mnemiidae) in Lesina and Varano lagoons along the northern coast of Apulia (central Adriatic Sea). In: Mytilineou et al., 2016, New Mediterranean Biodiversity Records (November, 2016). *Mediterranean Marine Science*, 17 (3), 794-821.
- Çinar, M.E., 2009. Alien polychaete species (Annelida: Polychaeta) on the southern coast of Turkey (Levantine Sea, eastern Mediterranean), with 13 new records for the Mediterranean Sea. *Journal of Natural History*, 43 (37-38), 2283-2328.
- Coll, M., Piroddi, C., Steenbeek, J., Kaschner, K., Ben Rais Lasram, F. et al., 2010. The biodiversity of the Mediterranean Sea: estimates, patterns, and threats. *PLoS One*, 5 (8):e11842.
- Corsini-Foka, M., Zenetos, A., Crocetta, F., Çinar, M.E., Kocak, F. et al., 2015. Inventory of alien and cryptogenic species of the Dodecanese (Aegean Sea, Greece): collaboration through COST action training school. *Management of Biological Invasions*, 6, 351-366.
- Crocetta, F., 2018. *Malleus regula* in Libya: another case of misidentification for *Isognomon legumen*. *Triton*, 37, 4-5.
- Crocetta, F., Gofas, S., Salas, C., Tringali, L.P., Zenetos, A., 2017. Local ecological knowledge versus published literature: a review of non-indigenous Mollusca in Greek marine waters. *Aquatic Invasions*, 12, 415-434.
- Crossland, C., 1924. Polychaeta of tropical East Africa, the Red Sea, and Cape Verde Islands collected by Cyril Crossland, and of the Maldivé Archipelago collected by Professor



- Stanley, M.A., F.R.S. *Proceedings of the Zoological Society of London*, 94, 1-106.
- Deidun, A., Arrigo, S., Piraino, S., 2011. The westernmost record of *Rhopilema nomadica* (Galil, 1990) in the Mediterranean - off the Maltese Islands. *Aquatic Invasions*, 6 (Suppl. 1), S99-S103.
- Evans, J., Barbara, J., Schembri, P.J., 2015. Updated review of marine alien species and other 'newcomers' recorded from the Maltese Islands (Central Mediterranean). *Mediterranean Marine Science*, 16 (1), 225-244.
- Farrag, M.M.S., 2017. New record of the bigeye thresher shark, *Alopias superciliosus* Lowe, 1841 (Family: Alopiidae) from the eastern Mediterranean Sea, Egypt. *International Journal of Fisheries and Aquatic Studies*, 5 (2), 316-318.
- Ferrari, F.D., Orsi, J., 1984. *Oithona davisae*, new species, and *Limnooithona sinensis* (Burckhardt, 1912) (Copepoda: Cyclopoida: Oithonidae) from the Sacramento-San Joaquin Estuary, California. *Journal of Crustacean Biology*, 4, 106-126.
- Fritzsche, R.A., 1976. A review of the cornetfishes, genus *Fistularia* (Fistulariidae), with a discussion of intrageneric relationships and zoogeography. *Bulletin of Marine Science*, 26, 196-204.
- Froese, R., Pauly, D., 2019. FishBase. World Wide Web electronic publication. www.fishbase.org, version (04/2019).
- Galil, B.S., Gershwin, L.A., Douek, J., Rinkevich, B., 2010. *Marivagia stellata* gen. et sp. nov. (Scyphozoa: Rhizostomeae: Cepheidae), another alien jellyfish from the Mediterranean coast of Israel. *Aquatic Invasions*, 5, 331-340.
- Galil, B.S., Kumar, B.A., Riyas, A.J., 2013. *Marivagia stellata* Galil and Gershwin, 2010 (Scyphozoa: Rhizostomeae: Cepheidae), found off the coast of Kerala, India. *Bio Invasions Records*, 2 (4), 317-318.
- Garcia, S., 2015. *Gaidropsarus granti*. *The IUCN Red List of Threatened Species* 2015. e.T198589A18984376. Accessed on 23 August 2019.
- Giovos, I., Cakalli, M., 2017. First record of the Bigeye Thresher *Alopias superciliosus* in Albanian waters. p. 541-542. In: Stamouli *et al.*, New Mediterranean Biodiversity Records (December 2017), *Mediterranean Marine Science*, 18 (3), 534-556.
- Gökoğlu, M., Özvarol, Y., 2015. *Epinephelus coioides* (Actinopterygii: Perciformes: Serranidae) – A new Lessepsian migrant in the Mediterranean coast of Turkey. *Acta Ichthyologica et Piscatoria*, 45 (3), 307-309.
- Goren, M., Stern, N., Galil, B.S., 2013. Bridging the gap: first record of Mertens' prawn-goby *Vanderhorstia mertensi* in Israel. *Marine Biodiversity Records*, 6, e63.
- Gruber, S.H., Compagno, L.J.V., 1981. Taxonomic status and biology of the bigeye thresher, *Alopias superciliosus* (Lowe, 1839). *Fishery Bulletin, National Marine Fisheries Service*, 79, 617-640.
- Gul, S., Moazzama, M., Galil, B., 2014. Occurrence of *Marivagia stellata* (Scyphozoa: Rhizostomeae: Cepheidae) along the coast of Pakistan, northern Arabian Sea. *Marine Biodiversity Records*, 7, 112-113.
- Hamel, G., 1926. Quelques algues rares ou nouvelles pour la flore Méditerranéenne. *Bulletin du Museum National d'Histoires Naturelles*, Paris, 32, 420.
- Heemstra, P.C., Golani, D., 1993. Clarification of the Indo-Pacific groupers (Pisces: Serranidae) in the Mediterranean Sea. *Israel Journal of Zoology*, 39, 381-390.
- Karachle, P., Corsini-Foka, M., Crocetta, F., Dulčić, J., Dzhebekova, N. *et al.*, 2017. Setting-up a billboard of marine invasive species in the ESENIAS area: current situation and future expectancies. *Acta Adriatica*, 58 (3), 429-458.
- Karplus, I., 1987. The association between gobiid fishes and burrowing alpheid shrimps. *Oceanography and Marine Biology: An Annual Review*, 25, 507-562.
- Kölliker, A., 1853. Die Schwimmpolypen oder Siphonophoren von Messina. Wilhelm Engelmann, Leipzig, 96 pp.
- Langeneck, J., Crocetta, F., Doumpas, N., Giovos, I., Piraino, S. *et al.*, 2019. First record of the non-native jellyfish *Chrysaora cf. achlyos* (Cnidaria: Pelagiidae) in the Mediterranean Sea. *BioInvasions Records*, 8 (in press).
- Levin, N., Coll, M., Frascchetti, S., Gal, G., Giakoumi, S. *et al.*, 2014. Biodiversity data requirements for systematic conservation planning in the Mediterranean Sea. *Marine Ecology Progress Series*, 508: 261-281.
- Macali, A., Conde, A., Smriglio, C., Mariottini, P., Crocetta, F., 2013. The evolution of the Molluscan biota of the Sabaudia Lake: a matter of human history. *Scientia Marina*, 77, 649-662.
- Madiraca, F., Davidov, B., 2015. The first record of the bigeye thresher shark, *Alopias superciliosus* (Elasmobranchii: Lamniformes: Alopiidae) in the Adriatic Sea. In: Tsiamis *et al.*, New Mediterranean Biodiversity Records (July 2015), *Mediterranean Marine Science*, 16 (2), 472-488.
- Malej, A., Tirelli, V., Lučić, D., Paliaga, P., Vodopivec, M. *et al.*, 2017. *Mnemiopsis leidyi* in the northern Adriatic: here to stay?, *Journal of Sea Research*, 124, 10-16.
- Mamish, S., Durgham, H., AL-Masr, M.S., 2016. First record of the new alien sea jelly species *Marivagia stellata* Galil and Gershwin, 2010 off the Syrian coast. *Marine Biodiversity Records*, 9 (1), 23.
- Mapstone, G.M., 2003. Redescriptions of two physonect siphonophores, *Apolemia uvaria* (Lesueur, 1815) and *Tottonia contorta* Margulis, 1976, with comments on a third species *Ramosia vitiazi* Stepanjants, 1967 (Cnidaria: Hydrozoa: Apolemiidae). *Systematics and Biodiversity*, 1 (2), 181-212.
- Mapstone, G.M., 2014. Global diversity and review of Siphonophorae (Cnidaria: Hydrozoa). *PLoS One*, 9 (2), e87737.
- Mariottini, G.L., Pane, L., 2010. Mediterranean jellyfish venoms: a review on Scyphomedusae. *Marine Drugs*, 8, 1122-1152.
- Mienis, H.K., Rittner, O., Shefer, S., Feldstein, T., Yahel, R., 2016. First record of the Indo-Pacific *Isognomon legumen* from the Mediterranean coast of Israel (Mollusca, Bivalvia, Isognomonidae). *Triton* 33, 9-11.
- Mioni, E., Mannino, A.M., Merlino, S., 2018. First record of *Aplysia dactylomela* Rang, 1828 (Opisthobranchia, Aplysiidae) from Pianosa Island (Northern Tyrrhenian Sea). p. 6-7. In: 49° *Congresso Società Italiana di Biologia Marina*.
- Moles, J., Mas, G., Figueroa, I., Fernández-Vilert, R., Salvador, X. *et al.*, 2017. As fast as a hare: colonization of the heterobranch *Aplysia dactylomela* (Mollusca: Gastropoda: Anaspidea) into the western Mediterranean Sea. *Cahier de Biologie Marine*, 58, 341-345.
- Morandini, A.C., Marques, A.C., 2010. Revision of the genus *Chrysaora* Péron & Lesueur, 1810 (Cnidaria: Scyphozoa). *Zootaxa*, 2464, 1-97.
- Nicolaidou, A., Alongi, G., Aydogan, O., Catra, M., Cavas, L. *et al.*, 2012. New Mediterranean biodiversity records (June

- 2012). *Mediterranean Marine Science*, 13, 162-174.
- Orsi Relini, L., Relini, G., 2014. *Gaidropsarus granti* from a Ligurian seamount: a Mediterranean native species? *Marine Ecology*, 35 (Suppl. 1), 35-40.
- Otero, J.G., Galeote, M.D., Arias, A., 1998. First record for the European ichthyofauna of *Dentex (Cheimerius) canariensis* Steindachner, 1881. *Journal of Fish Biology*, 52 (6), 1305-1308.
- Parenti, P., Bressi N., 2001. First record of the orange-spotted grouper, *Epinephelus coioides* (Perciformes – Serranidae), in the Northern Adriatic Sea. *Cybium*, 25 (3), 281-284.
- Peña-Rivas, L., Langeneck, J., Azzurro, E., 2017. First record of *Dentex canariensis* Steindachner, 1881 (Perciformes: Sparidae) in the Mediterranean Sea. *Journal of Applied Ichthyology*, 34 (3), 669-671.
- Pollerspöck, J., Straube, N., 2019. www.shark-references.com, World Wide Web electronic publication, Version 2019, accessed on July 24, 2019.
- Rizgalla, J., Bron, J.E., Crocetta, F., Shinn, A.P., Almabruk, S.A., 2019a. First record of *Aplysia dactylomela* Rang, 1828 (Mollusca: Gastropoda) in Libyan coastal waters. *Bio-Invasions Records*, 8 (1), 80-86.
- Rizgalla, J., Shinn, A.P., Crocetta, F., 2019b. First documented record of the invasive cockle *Fulvia fragilis* (Forsskål in Niebuhr, 1775) (Mollusca: Bivalvia: Cardiidae) in Libya. *BioInvasions Records*, 8 (2), 314-319.
- Schembri, P.J., Tonna, R., 2011. Occurrence of the Malabar grouper *Epinephelus malabaricus* (Bloch & Schneider, 1801) (Actinopterygii, Perciformes, Serranidae), in the Maltese Islands. *Aquatic Invasions*, 6 (1), S129-S132.
- Scorrano, S., Aglieri, G., Boero, F., Dawson, M.N., Piraino, S., 2017. Unmasking Aurelia species in the Mediterranean Sea: an integrative morphometric and molecular approach. *Zoological Journal Linnean Society*, 180, 243-267.
- Servello, G., Andaloro, F., Azzurro, E., Castriota, L., Catra, M., et al., 2019. Marine alien species in Italy: a contribution to the implementarion of descriptor D2 of the Marine Strategy Framework Directive. *Mediterranean Marine Science*, 20 (1), 1-48.
- Sghaier, Y.R., Zakhama-Sraieb, R., Mouelhi, S., Vazquez, M., Valle, C. et al., 2016. Review of alien marine macrophytes in Tunisia. *Mediterranean Marine Science*, 17 (1), 109-123.
- Shiganova, T.A., Malej, A., 2009 Native and non-native ctenophores in the Gulf of Trieste, Northern Adriatic Sea. *Journal of Plankton Research*, 31, 61-71.
- Simboura, N., Zenetos, A., Pancucci-Papadopoulou, M. A., Reizopoulou, S., Streftaris, N., 2012. Indicators for the Sea-floor Integrity of the Hellenic Seas under the European Marine Strategy Framework Directive: establishing the thresholds and standards for Good Environmental Status. *Mediterranean Marine Science*, 13(1), 140-152.
- Siokou I, Ateş S, Ayas D, Ben Souissi J, Chatterjee T. et al., 2013. New Mediterranean marine biodiversity records (June 2013). *Mediterranean Marine Science*, 14 (1), 238–249.
- Spinelli, A., Castriota, L., 2019. Additional records of the Grant's rockling, *Gaidropsarus granti* (Actinopterygii: Gadiformes: Lotidae), from the Ionian Sea. *Acta Adriatica*, 60 (1), 87-90.
- Stamouli, C., Akel, E.H.Kh., Azzurro, E., Bakiu, R., Bas, A.A., et al., 2017. New Mediterranean Biodiversity Records (December 2017). *Mediterranean Marine Science*, 18 (3), 534-556.
- Stern, N., Paz, G., Yudkovsky, Y., Lubinevsky, H., Rinkevich, B., 2018. The arrival of a second 'Lessepsian sprinter'? A first record of the red cornetfish *Fistularia petimba* in the Eastern Mediterranean. *Mediterranean Marine Science*, 18 (3), 524-528.
- Straehler-Pohl, I., Widmer, C.L., Morandini, A.C., 2011. Characterizations of juvenile stages of some sennaeostome Scyphozoa (Cnidaria), with recognition of a new family (Phacellophoridae). *Zootaxa*, 2741 (1), 1-37.
- Streftaris, N., Zenetos, A., 2006. Alien Marine Species in the Mediterranean - the 100 "Worst Invasives" and their Impact. *Mediterranean Marine Science*, 7 (1), 87-118.
- Temnykh, A., Nishida, S. 2012. New record of the planktonic copepod *Oithona davisae* Ferrari and Orsi in the Black Sea with notes on the identity of "*Oithona brevicornis*". *Aquatic Invasions*, 7 (3), 425-431.
- Terbiyyık-Kurt, T., Beşiktepe, Ş., 2019. First distribution record of the invasive copepod *Oithona davisae* Ferrari and Orsi, 1984, in the coastal waters of the Aegean Sea. *Marine Ecology*, 40 (3), e12548.
- Tiralongo, F., Pagano, A., 2015. On the presence of *Gobius kolombatovici* in the Ionian Sea. p. 682-702. In: New Mediterranean Marine Biodiversity Records (October, 2015), Crocetta, F., Agius, D., Balistreri, P., Bariche, M., Bayhan, Y. et al., *Mediterranean Marine Science*, 16 (3).
- Trainito, E., 2003. Mediterranean Harlequins. *A Field Guide to Mediterranean Sea Slugs*. Taphros, Olbia, Italy, 58 pp.
- Tsiamis, K., 2012. *Alien macroalgae of the sublittoral zone of the Greek coasts*. PhD Thesis. Department of Biology, Athens University, 336 pp. + 32 pp. annex.
- Turan, C., Erguden, D., Gürlek, M., 2016. Climate Change and Biodiversity Effects in Turkish Seas. *NEsciences*, 1 (2), 15-24.
- Ulman, A., Ferrario, J., Occhipinti-Ambrogi, A., Arvanitidis, C., Bandi, A. et al., 2017. A massive update of non-indigenous species records in Mediterranean marinas. *PeerJ* 5, e3954.
- Ünlüoğlu, A., Akalın, S., Dal, İ., Tıraşın, E.M., Aydın, C.M., 2018. First record of red cornetfish *Fistularia petimba* (Synbranchiformes: Fistulariidae) from Antalya and Iskenderun Bays along Turkish Coasts of the Mediterranean Sea. *Journal of Applied Ichthyology*, 34 (4), 977-980.
- Valdés, A., Alexander, J., Crocetta F., Yokeş, B.M., Giacobbe, S. et al., 2013. The origin and dispersal pathway of the spotted sea hare *Aplysia dactylomela* (Mollusca: Opisthobranchia) in the Mediterranean Sea. *Aquatic Invasions*, 8 (4), 427-436.
- Verlaque, M., Boudouresque, C.F., Meinesz, A., Gravez, V., 2000. The *Caulerpa racemosa* complex (Caulerpales, Ulvophyceae) in the Mediterranean Sea. *Botanica marina*, 43, 49-68.
- Verlaque, M., Ruitton, S., Mineur, F., Boudouresque, C.F., 2015. CIESM atlas of exotic species of the Mediterranean. Macrophytes. CIESM Publishers, Monaco, 362 pp.
- Zagami, G., Brugnano, C., Granata, A., Guglielmo, L., Minutoli, R. et al., 2018. Biogeographical distribution and ecology of the planktonic copepod *Oithona davisae*: Rapid invasion in Lakes Faro and Ganzirri (Central Mediterranean Sea). p. 59-82. Trends in Copepod Studies-Distribution, Biology and Ecology, 59-82.

Zenetos, A., Çinar, M.E., Crocetta, F., Golani, D., Rosso, A. *et al.*, 2017. Uncertainties and validation of alien species catalogues: The Mediterranean as an example. *Estuarine, Coastal and Shelf Science*, 191, 171-187.

Zenetos, A., Corsini-Foka, M., Crocetta, F., Gerovasileiou, V., Karachle, P.K. *et al.*, 2018. Deep cleaning of alien species records in the Greek Seas (2018 update). *Management of Biological Invasions*, 9 (3), 209-226.