

## Mediterranean Marine Science

Vol 18, No 1 (2017)



### “New Mediterranean Biodiversity Records” (March 2017)

L. LIPEJ, I. ACEVEDO, E.H.K. AKEL, A. ANASTASOPOULOU, A. ANGELIDIS, E. AZZURRO, L. CASTRIOTA, M. ÇELIK, L. CILENTI, F. CROCETTA, A. DEIDUN, A. DOGRAMMATZI, M. FALAUTANO, F.Á. FERNÁNDEZ-ÁLVAREZ, R. GENNAIO, G. INSACCO, S. KATSANEVAKIS, J. LANGENECK, B.M. LOMBARDO, G. MANCINELLI, CH. MYTILINEOU, L. PAPA, V. PITACCO, M. PONTES, D. POURSANIDIS, E. PRATO, S.I. RIZKALLA, P.C. RODRÍGUEZ-FLORES, C. STAMOULI, J. TEMPESTI, F. TIRALONGO, S. TIRNETTA, K. TSIRINTANIS, C. TURAN, D. YAGLIOGLU, G. ZAMINOS, B. ZAVA

doi: [10.12681/mms.2068](https://doi.org/10.12681/mms.2068)

### To cite this article:

LIPEJ, L., ACEVEDO, I., AKEL, E., ANASTASOPOULOU, A., ANGELIDIS, A., AZZURRO, E., CASTRIOTA, L., ÇELIK, M., CILENTI, L., CROCETTA, F., DEIDUN, A., DOGRAMMATZI, A., FALAUTANO, M., FERNÁNDEZ-ÁLVAREZ, F., GENNAIO, R., INSACCO, G., KATSANEVAKIS, S., LANGENECK, J., LOMBARDO, B., MANCINELLI, G., MYTILINEOU, C., PAPA, L., PITACCO, V., PONTES, M., POURSANIDIS, D., PRATO, E., RIZKALLA, S., RODRÍGUEZ-FLORES, P., STAMOULI, C., TEMPESTI, J., TIRALONGO, F., TIRNETTA, S., TSIRINTANIS, K., TURAN, C., YAGLIOGLU, D., ZAMINOS, G., & ZAVA, B. (2018). “New Mediterranean Biodiversity Records” (March 2017). *Mediterranean Marine Science*, 18(1), 179–201. <https://doi.org/10.12681/mms.2068>

## New Mediterranean Biodiversity Records (March 2017)

L. LIPEJ<sup>1</sup>, I. ACEVEDO<sup>2</sup>, E. H. K. AKEL<sup>3</sup>, A. ANASTASOPOULOU<sup>4</sup>, A. ANGELIDIS<sup>5</sup>, E. AZZURRO<sup>6</sup>,  
L. CASTRIOTA<sup>7</sup>, M. ÇELİK<sup>8</sup>, L. CILENTI<sup>9</sup>, F. CROCCETTA<sup>4</sup>, A. DEIDUN<sup>10</sup>, A. DOGRAMMATZI<sup>4</sup>  
M. FALAUTANO<sup>7</sup>, F. Á. FERNÁNDEZ-ÁLVAREZ<sup>11</sup>, R. GENNAIO<sup>12</sup>, G. INSACCO<sup>13</sup>, S. KATSANEVAKIS<sup>14</sup>,  
J. LANGENECK<sup>15</sup>, B. M. LOMBARDO<sup>16</sup>, G. MANCINELLI<sup>17</sup>, CH. MYTILINEOU<sup>4</sup>, L. PAPA<sup>18</sup>, V. PITACCO<sup>1</sup>,  
M. PONTES<sup>19</sup>, D. POURSANIDIS<sup>20</sup>, E. PRATO<sup>18</sup>, S. I. RIZKALLA<sup>3</sup>, P. C. RODRÍGUEZ-FLORES<sup>2</sup>,  
C. STAMOULI<sup>4</sup>, J. TEMPESTI<sup>15</sup>, F. TIRALONGO<sup>21</sup>, S. TIRNETTA<sup>22</sup>, K. TSIRINTANIS<sup>14</sup>, C. TURAN<sup>23</sup>,  
D. YAGLIOGLU<sup>24</sup>, G. ZAMINOS<sup>25</sup>, B. ZAVA<sup>26</sup>

<sup>1</sup>Marine Biology Station, National Institute of Biology, Fornače 61, 6630 Piran, Slovenia

<sup>2</sup>Museo Nacional de Ciencias Naturales (MNCN-CSIC), José Gutiérrez Abascal, 2, 28006 Madrid, Spain

<sup>3</sup>Fishery Biology Lab, National Institute of Oceanography and Fisheries Kait-Bey, Alexandria, Egypt

<sup>4</sup>Hellenic Center of Marine Research, 46.7 km Athens Sounio ave., P.O. Box 712, 19013 Anavyssos, Greece

<sup>5</sup>Kapetan Vangeli 5, 54646 Thessaloniki, Greece

<sup>6</sup>Institute for Environmental Protection and Research (ISPRA), STS Livorno, Piazzale dei Marmi 2, 57123, Livorno, Italy

<sup>7</sup>Institute for Environmental Protection and Research, ISPRA, Via S. Puglisi 9, STS-Palermo, 90143 Palermo, Italy

<sup>8</sup>Faculty of Fisheries, Muğla Sıtkı Koçman University, 48000, Kötekli, Muğla, Turkey

<sup>9</sup>C.N.R. – ISMAR, UOS Lesina, Via Pola, 4 – 71010 Lesina (FG), Italy

<sup>10</sup>Department of Geosciences, University of Malta, Msida MSD 2080 Malta

<sup>11</sup>Institut de Ciències del Mar (CSIC), Passeig Marítim 37–49, 08003 Barcelona, Spain

<sup>12</sup>Regional Agency for Environmental Protection (ARPA) Puglia, Lecce Department,  
Via Miglietta 1, 73100, Lecce, Italy

<sup>13</sup>Museo Civico di Storia Naturale, via degli Studi 9, 97013 Comiso (RG), Italy

<sup>14</sup>University of the Aegean, Department of Marine Sciences, 81100 Mytilene, Greece

<sup>15</sup>Department of Biology, University of Pisa, via Derna 1, 56126 Pisa, Italy

<sup>16</sup>Dipartimento di Scienze Biologiche, Geologiche ed Ambientali, Università degli Studi di Catania, Italy

<sup>17</sup>Department of Biological and Environmental Sciences and Technologies, University of Salento, Lecce, Italy

<sup>18</sup>CNR-IAMC, Istituto per l'Ambiente Marino Costiero, UOS di Taranto, Via Roma, 3 74123 Taranto, Italy

<sup>19</sup>Vida Marina (VIMAR), <http://opistobranquis.info/vimar>

<sup>20</sup>Foundation for Research and Technology - Hellas (FORTH), Institute of Applied and Computational Mathematics,  
N. Plastira 100, Vassilika Vouton, 70013 Heraklion, Greece

<sup>21</sup>Ente Fauna Marina Mediterranea, Avola 96012, Siracusa, Italy

<sup>22</sup>Sciaccia Full Immersion, Sciaccia 92019, Agrigento, Italy

<sup>23</sup>Faculty of Marine Science and Technology, Iskenderun Technical University, Iskenderun, Hatay, Turkey

<sup>24</sup>Department of Biology, Faculty of Arts and Science, Duzce University, Duzce, Turkey

<sup>25</sup>Idomeneos 3, Athens, P.O. 11853

<sup>26</sup>Wilderness studi ambientali, via Cruillas 27, 90146 Palermo, Italy.

Handling Editor: Argyro Zenetos

### Abstract

This Collective Article presents information on 22 species belonging to 5 Phyla, arranged geographically from west to east. The new records were found in 8 countries as follows: **Spain**: first record of the two scarcely known nemertean *Baseodiscus delineatus* and *Notospermus geniculatus* in Formentera; **Malta**: second record of the alien fish *Lagocephalus sceleratus*; **Italy**: the alien polychaete *Syllis pectinans* and the isopod *Paranthura japonica*, as well as the cryptogenic opisthobranch *Anteaeolidiella lurana*, were found in the fouling assemblages along the docks of the port of Livorno. New decapod records are reported from Sicily (the alien *Callinectes sapidus* and the native *Pachygrapsus maurus*) and Apulia (*Percnon gibbesi* and *Procambarus clarkii*); the lesser amberjack *Seriola fasciata* extended its geographical range to the Egadi Islands and *Siganus luridus* was documented for the first time along the Ionian coasts of Apulia and Calabria. **Slovenia**: the first record of the alien bivalve *Brachidontes pharaonis* is reported, together with a survey of up to date Adriatic records. **Greece**: the first record of the gastropod *Rhinoclavis kochi* is reported from Gavdos island. In addition, two records of endangered and rare cartilaginous fish were reported, namely, the shark *Hexanchus griseus* and the ray *Leucoraja fullonica*, as well as additional records of *Siganus luridus* for Lesbos and *Malleus regula* and *Fulvia fragilis* from Astypalaia. **Turkey**: the black wing flyingfish *Hirundichthys rondeletii* is reported for the very first time from the Black Sea. **Egypt**: the Indo-Pacific crab *Halimede ochtodes* is reported as established in Port Said. In addition, biometric parameters and meristic counts are reported for *Anthias anthias* in Damietta. **Cyprus**: the alien opisthobranch gastropod *Bursatella leachii* is reported for first time.

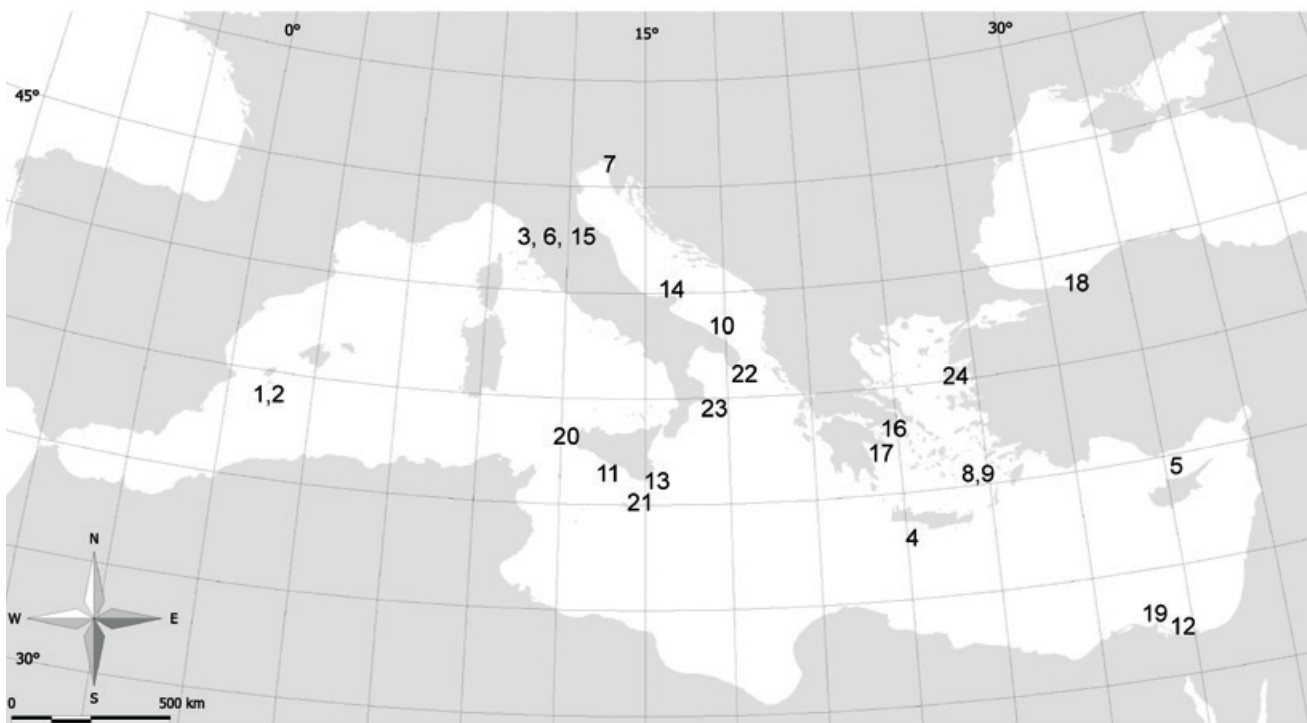
## Introduction

During the last decades, many new species have been discovered in the Mediterranean Sea. The main reasons are mostly related to Lessepsian migration, Atlantic influx, anthropogenic introduction of non indigenous species, and also better investigation of marine biodiversity. The collective paper (Series A, on “New Mediterranean Biodiversity Records”) included in *Mediterranean Marine Science* offers the opportunity to publish such new records rapidly, and contributes to fast dissemination. This is also the case for the current paper, which deals with the discovery of many non-native species, new records of rare or less known species, and reports on certain endangered taxonomic groups such as sharks and rays.

The new records are arranged from west to east and shown in Table 1 and Figure 1. The faunistic list follows

the nomenclature proposed by the World Register of Marine Species (WoRMS). In total, 22 taxa belonging to 5 Phyla are presented in this work (Table 1). Thirteen species are alien species, one is considered as cryptogenic, one is related to the Atlantic influx. Among the seven native Mediterranean species, one is critically endangered in the Mediterranean, while others are considered as rare or less known species.

Some new species were recorded for certain countries or geographic areas. Among the first records, one is reported for Italy, one for Slovenia and one for Greece, whereas one first record was reported for the Black Sea and one for the Central Mediterranean Sea. Three subchapters deal with the alien herbivorous fish *Siganus luridus*, one of the most successful Mediterranean invaders, which further extended its known distribution in the Mediterranean Sea.



**Fig. 1:** The Mediterranean Sea and the sampling sites of the records included in “New Mediterranean Biodiversity Records (March 2017)”. The numbers correspond to localities reported in Table 1.

**Table 1.** Species included in “New Mediterranean Biodiversity Records (March 2017)” (systematical order per phyla, species authorities as in single subchapters), with SS - species status (N - native, A - alien; C - cryptogenic; R - range expansion), subchapter, location/area and country of records. N - numbers as in Figure 1.

<b>Phylum NEMERTEA Schultze, 1851</b>					
<i>Baseodiscus delineatus</i>	N	1.1	Formentera	Spain	1
<i>Notospermus geniculatus</i>	N	1.1	Formentera	Spain	2
<b>Phylum ANNELLIDA Lamarck, 1809</b>					
<i>Syllis pectinans</i>	A	3.1	Livorno	Italy	3
<b>Phylum MOLLUSCA Linnaeus, 1758</b>					
<i>Rhinoclavis kochi</i>	A	5.1	Gavdos Island	Greece	4
<i>Bursatella leachii</i>	A	8.1	Kyrenia	Cyprus	5
<i>Anteaeolidiella lurana</i>	C	3.1	Livorno	Italy	6
<i>Brachidontes pharaonis</i>	A	4.1	Cape Strunjan	Slovenia	7
<i>Malleus regula</i>	A	5.5	Astypalaia	Greece	8
<i>Fulvia fragilis</i>	A	5.5	Astypalaia	Greece	9
<b>Phylum ARTHROPODA Brünnich, 1772</b>					
<i>Percnon gibbesi</i>	A	3.2	Apulian coast	Italy	10
<i>Callinectes sapidus</i>	A	3.3	Agrigento	Italy	11
<i>Halimede ochtodes</i>	A	7.1	Port Said	Egypt	12
<i>Pachygrapsus maurus</i>	N	3.4	Avola	Italy	13
<i>Procambarus clarkii</i>	A	3.5	Varano lagoon	Italy	14
<i>Paranthurus japonica</i>	A	3.1	Livorno	Italy	15
<b>Phylum CHORDATA Haeckel, 1874</b>					
<i>Hexanchus griseus</i>	N	5.2	Saronikos Gulf	Greece	16
<i>Leucoraja fullonica</i>	N	5.3	Argolikos Gulf	Greece	17
<i>Hirundichthys rondeletii</i>	N	6.1	Akakoca	Turkey	18
<i>Anthias anthias</i>	N	7.2	Damietta	Egypt	19
<i>Seriola fasciata</i>	R	3.6	Egadi Islands	Italy	20
<i>Lagocephalus sceleratus</i>	A	2.1	NE coast	Malta	21
<i>Siganus luridus</i>	A	3.7	Ugento	Italy	22
<i>Siganus luridus</i>	A	3.8	Capo Rizzuto	Italy	23
<i>Siganus luridus</i>	A	5.4	Lesvos	Greece	24

## 1. SPAIN

### 1.1 On the presence of *Baseodiscus delineatus* and *Notospermus geniculatus* in Formentera Island

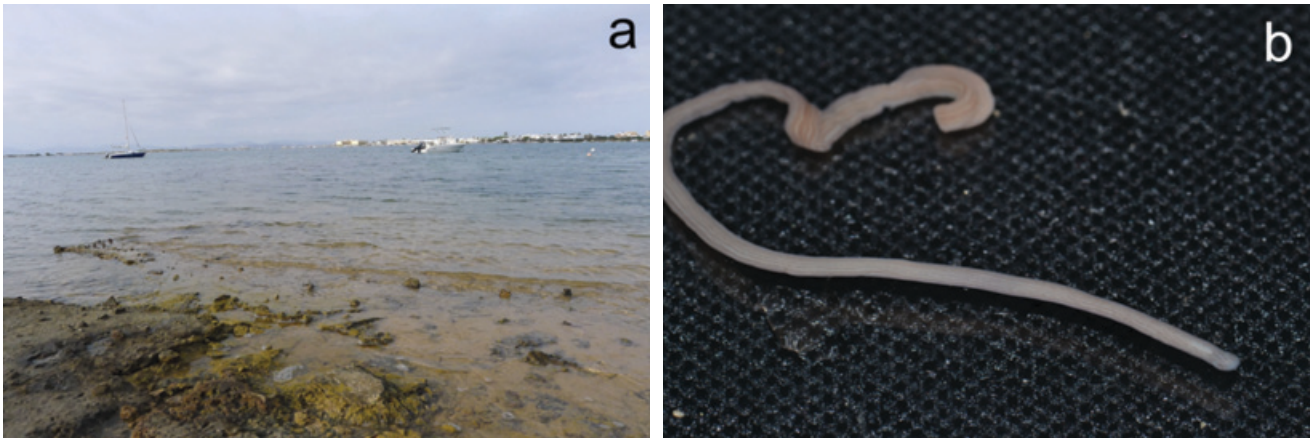
F. Á. Fernández-Álvarez, I. Acevedo & P. C. Rodríguez-Flores

Since its description in the area of Naples, *Baseodiscus delineatus* (Delle Chiaje, 1825) has been documented worldwide, becoming one of the most widespread nemerteans known to date (Gibson, 1995). However, it is mostly known from tropical and subtropical localities; along the Atlantic coast of Europe, its northern limit is located south of the British Isles; along the Spanish coastline, the species has been recorded previously, in the intertidal zone, at Gijón (Bay of Biscay) (Vernet & Anadón, 1991), at Cerro Gordo, Granada as *Baseodiscus curtus*

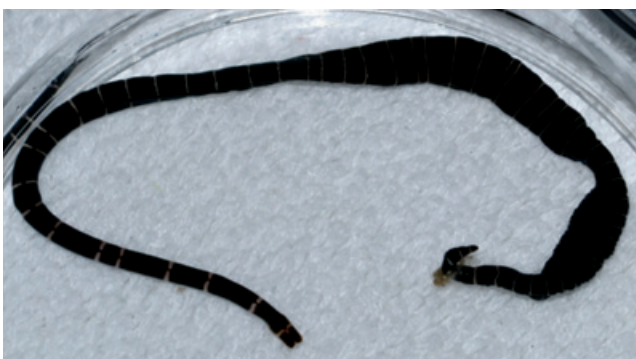
(Ocaña Martín *et al.*, 2000) and, more recently, at other additional localities: Gijón, the Canary Islands; Almería, Alicante, Murcia, the Strait of Gibraltar, Ceuta and La Coruña (Herrera Bachiller *et al.*, 2015).

*Notospermus geniculatus* (Delle Chiaje, 1828) is one of the largest nemerteans present in Mediterranean waters, reaching 1 m in length and 15 mm in width. This species was originally described from Naples and is also widely distributed (Kajihara, 2007).





**Fig. 2:** **a.** Habitat of *Baseodiscus delineatus* in the Estany des Peix, Formentera, Spain. **b.** Ventral view of *Baseodiscus delineatus* from Formentera Island, Spain.



**Fig. 3:** Dorsal view of *Notospermus geniculatus* from Formentera Island, Spain.

Here, we provide a report on one specimen of *B. delineatus* found at Estany des Peix (Formentera Island, Balearic Sea, 38.721556° N, 1.415100° E) on the afternoon of October 17<sup>th</sup>, 2016, under a rock along the shoreline of the southernmost part of the lagoon (Fig. 2a), and a specimen of *N. geniculatus* (Fig. 3) found under a rock located on a muddy bottom covered with *Caulerpa prolifera* (Forsskål) J.V. Lamouroux at 1 m depth in the same lagoon (38.729594°N, 1.410836°E). After capture, the specimens were placed in a 7.5% MgCl<sub>2</sub> solution, photographed alive and then fixed in absolute ethanol. The anaesthetized *B. delineatus* measured 108 mm in length

and 2 mm in width, although most of the posterior portion was lost (Fig. 2b). The *N. geniculatus* specimen measured 110 mm in length and was 6.5 mm wide (Fig. 3). A small caudal cirrus was present at the end of the body. Although nemerteans are commonly found in marine benthic environments, publications on this topic are scarce in the literature, perhaps due to difficulties in collection, preservation and identification to species level (Fernández-Álvarez *et al.*, 2015). However, recent efforts to better understand the Iberian nemertean fauna have led to a compilation of 86 species (Herrera-Bachiller *et al.*, 2015; Herrera-Bachiller, 2016).

The two records represent the first ones for these species in Formentera. *Baseodiscus delineatus* is also present in the Tyrrhenian and Adriatic Seas (Kajihara, 2007). Despite its size and conspicuity, *N. geniculatus* is not a widely reported species in taxonomic lists. For instance, for the Mediterranean Iberian waters, only four records were known between 1985 and 2014 (Herrera-Bachiller *et al.*, 2015). However, more comprehensive work showed more records across this area (Herrera-Bachiller, 2016), suggesting that it is a common species in these waters. This underlines the importance of surveys aiming to increase our knowledge on nemertean distribution and biology and their interactions with the surrounding fauna (Fernández-Álvarez & Machordom, 2013).

## 2. MALTA

### 2.1 Second record of *Lagocephalus sceleratus* from Maltese waters

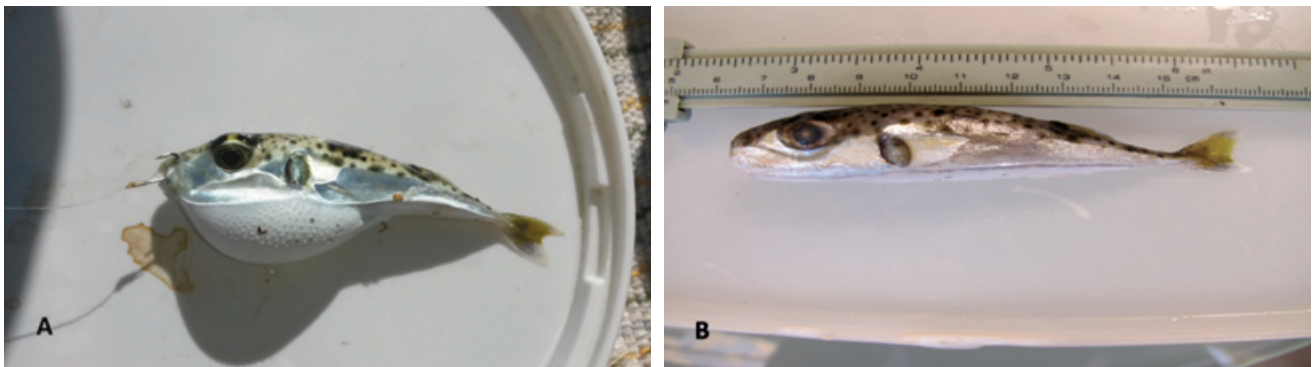
A. Deidun & M. Çelik

With the exception of *Lagocephalus lagocephalus*, *Lagocephalus* representatives in the Mediterranean are considered to be Lessepsian due to their Indo-Pacific origin, constituting part of the almost 100 Lessepsian fish species documented from the Mediterranean to date (109

Lessepsian fish species: Golani *et al.*, 2017). The silver-cheeked toadfish *Lagocephalus sceleratus* (Gmelin, 1789), has spread to most regions of the Mediterranean, reaching as far west as the Spanish coasts (Karachle *et al.*, 2016). The species, known as one of the ‘worst’ invad-

ers of the Mediterranean Sea (Streftaris & Zenetos, 2006), was first recorded as a single individual from Maltese waters in August 2014 (Deidun *et al.*, 2015).

On the 3<sup>rd</sup> of November, 2016, a second individual of *L. sceleratus* was caught through rod-fishing (using artificial bait/lure) from a location situated along the north-eastern coast of the island of Malta (coordinates: 35.958067° N, 14.393400° E). Since the rod in question was equipped for benthic fishing, it was possible to estimate the water depth at the site of capture (10-12 m), with the seabed being largely characterised by dense *Posidonia oceanica* (L.) Delile meadows. At the time of capture, the individual was in a bloated state, with the swelling gradually fading away during cold preservation.



**Fig. 4:** Different aspects (bloated state on top, at the time of capture [A, and un-bloated state at the bottom after cold preservation [B]) *L. sceleratus* individual caught in Maltese waters.

### 3. ITALY

#### 3.1 New records of alien species from fouling assemblages of Livorno port

J. Tempesti & J. Langeneck

Regular sampling surveys of fouling assemblages along the docks of the port of Livorno (43.54871°N, 10.29763°E) revealed the occurrence of three previously overlooked alien or cryptogenic species. On December 13<sup>th</sup> 2013 two individuals of *Syllis pectinans* Haswell, 1920 (Fig. 5A, B, C) were sampled in fouling communities dominated by *Mytilus galloprovincialis* Lamarck, 1819. This species can be distinguished easily from the other congeneric polychaetes occurring in the Mediterranean Sea because of its *i*) compound chaetae with unidentate blade (Fig. 5C); *ii*) backward position of the pharyngeal tooth (Fig. 5B); and *iii*) peculiar colour pattern, with a thin, black bar on the posterior edge of the anterior chaetigers (Fig. 5A) (San Martín, 2003). Additionally, on November 10<sup>th</sup> 2015, two individuals of the isopod *Paranthura japonica* (Richardson, 1909) (Fig. 5D) and five individuals of the nudibranch *Anteaeolidiella lurana* (Ev. Marcus & Er. Marcus, 1967) were collected (Fig. 5E). *Paranthura japonica* can be distinguished from the native and often co-occurring *Paranthura nigropunctata* (Lucas, 1846) by the following morphological features: *i*)

Figure 4 gives two different aspects of the specimen, which had the following attributes: W = 15.5 g, TL = 107 mm, FL = 101 mm, and SL = 87 mm. This specimen, which was substantially smaller than the first one caught from Maltese waters (TL = 568 mm), was identified as belonging to *L. sceleratus* due to the regularly-sized dorsal black spots and its relatively small eye diameter: head length ratio equivalent to 0.315. This second confirmed record of *L. sceleratus* from Maltese waters is hardly surprising given the steady establishment of the species in the Central Mediterranean. In fact, the species has previously been recorded from the entire Tunisian coast (Ben Souissi *et al.*, 2014).

pleonites 1-5 fused medially but not laterally; *ii*) uropod exopods with distal concavity on mesial margin; and *iii*) pleotelson not exceeding the tip of uropod endopods. *Anteaeolidiella lurana* can be identified among congeneric species because of its *i*) whitish background colour with bright orange drawings; *ii*) orange rhinophores with white tip; and *iii*) pale orange cerata with pale tip and a bright white ring approximately in the middle (Carmona *et al.*, 2014). All material was fixed and preserved in 70% ethanol and deposited in the collection of the Department of Biology, University of Pisa.

*Syllis pectinans* was described from the Pacific Ocean, and subsequently reported from the western (San Martín, 2003) and eastern Mediterranean Sea (Çinar *et al.*, 2008); our record represents the first one for this species from the Central Mediterranean Sea, as well as the first occurrence in Italian waters.

*Paranthura japonica*, firstly described from Hokkaido Island (Japan), was recently discovered in the southern Bay of Biscay and, subsequently, it was reported from several Mediterranean areas, such as Venice and

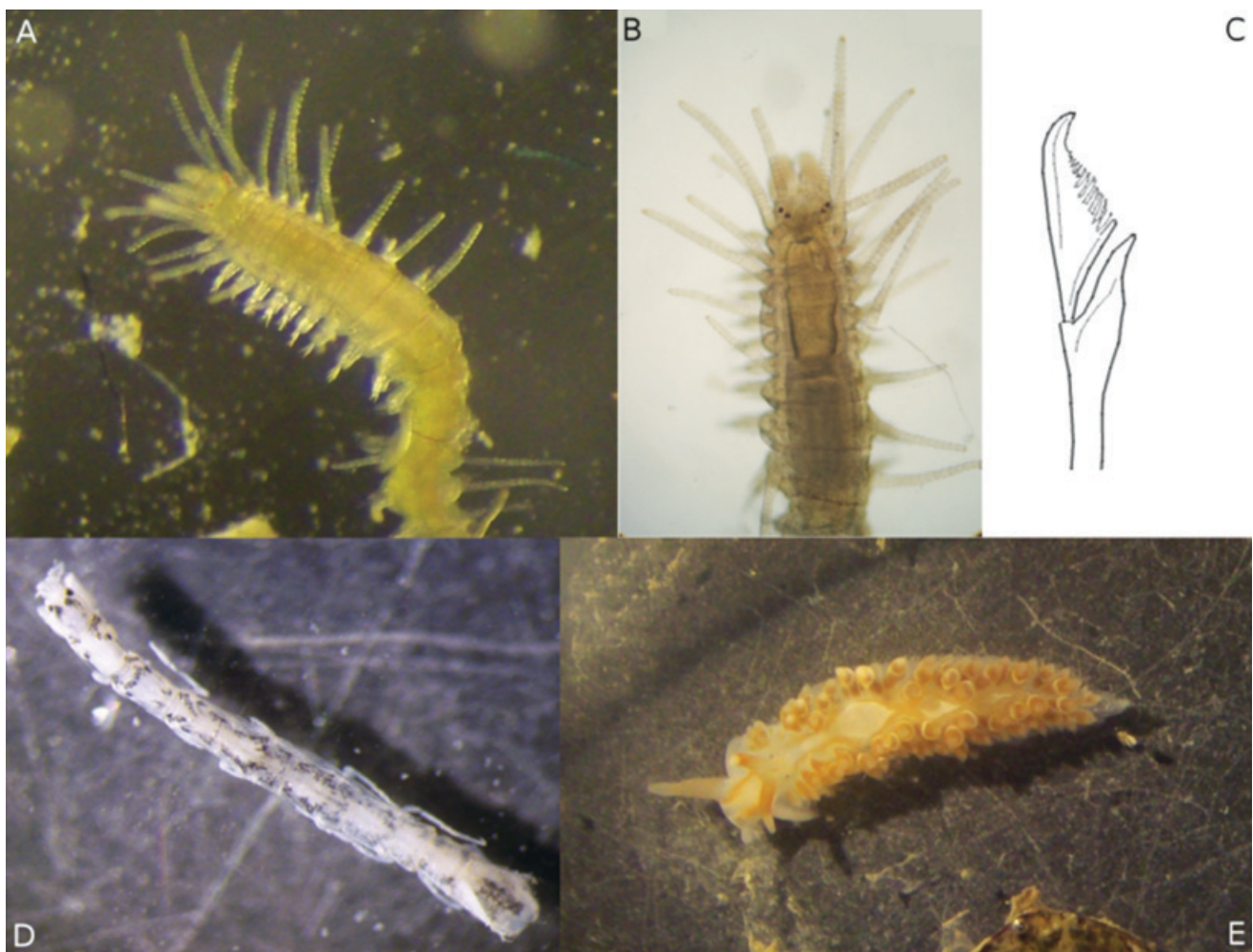


Mar Piccolo Lagoons, La Spezia, Olbia and Ortona harbours (Italy), La Grande Motte marina (France) and, finally, Heraklion (Kriti, Greece) and El Kantaoui (Tunisia) harbours (Dailianis *et al.*, 2016; Tempesti *et al.*, 2016). Its introduction is reputedly related to oyster and mussel farming; however, there are no shellfish farms in proximity of the sampling area and, therefore, shipping is the most likely way of introduction as regards the port of Livorno.

*Anteaeolidiella lurana* is an amphiatlantic species with tropical affinity, and it has been reported from the Mediterranean Sea, as well as from a few localities in the western and eastern Pacific Ocean (Carmona *et al.*, 2014). On the basis of molecular data reported by Carmona *et al.* (2014) it is impossible to reconstruct the actual origin of this species, and therefore we precautionarily consider it as cryptogenic in the Mediterranean Sea. Present records confirm the occurrence of this species in the Tyrrhenian Sea, where the species has already been reported from the

Miseno and Sabaudia Lakes (Crocetta *et al.*, 2013) and from Tavolara Island (Trainito & Doneddu, 2015). The distribution of *A. lurana* appears patchy and scattered, locally reaching high abundances, and related mainly to organically enriched environments. Since this species has been observed several years after the beginning of regular monitoring of fouling assemblages in the port of Livorno, we assume that it is a recent arrival. For all species, shipping is the most likely introduction way (ballast water discharges), although, at least for *P. japonica*, ship fouling might be an introduction way.

These records confirm the importance of the port of Livorno as an alien species hotspot, raising the number of reported alien and cryptogenic benthic invertebrates from 21 (Langeneck *et al.*, 2015) to 24. At least two of the newly recorded species, namely *P. japonica* and *A. lurana*, show signals of fast range expansion in the Mediterranean Sea (Tempesti *et al.*, 2016).



**Fig. 5:** Alien and cryptogenic species newly reported from the port of Livorno. A, B, C: *Syllis pectinans*. D: *Paranthura japonica*. E: *Anteaeolidiella lurana*.

### 3.2 Spreading of the invasive crab *Percnon gibbesi* along the Apulian coast

E. Prato & L. Papa



**Fig. 6:** Specimens of *Percnon gibbesi* from Taranto Gulf (Apulia, Ionian sea, Italy).

*Percnon gibbesi* (H. Milne Edwards, 1853) is an invasive crab native of the Atlantic Ocean, which has spread to the Mediterranean Sea through the Strait of Gibraltar by shipping and larval drift (Galil *et al.*, 2002) or because of accidental releases from the aquarium trade.

The species was recorded for the first time in the central Mediterranean at Linosa, Pelagie Islands, and Porto

Palo di Capo Passero, Sicily-Italy (Relini *et al.*, 2000); subsequently, it spread rapidly to the western and eastern Mediterranean (Thesalou-Legaki *et al.*, 2006). Regarding Italian waters, after the report from Sicily (Relini *et al.*, 2000), the species spread rapidly along the Tyrrhenian coast and along the Ionian coast, Calabria and the Apulia shores of Italy (Gennaio, 2014).

During SCUBA diving activities along Mar Grande of Taranto (Apulia, Ionian sea), in the 2013-14 summer season, five specimens of *P. gibbesi* were collected, together with another seven observed in July 2014 (Tab. 2). Mar Grande of Taranto houses the shipyard of the Italian Navy, the largest Italian mussel farms, as well as an expanding trade port and is particularly exposed to the introduction of non-indigenous species.

The five specimens captured were photographed, measured and deposited in the collection of the CNR-IAMC of Taranto (Fig. 6). The first specimen was collected in June 2013. All specimens were recorded along the shallow subtidal rocky shoreline (< 1 m), among boulders and algae. This is the common habitat of *P. gibbesi* as reported in previous observations).

This record fills a gap in the Mediterranean distribution of *P. gibbesi* and particularly in the Ionian Sea. Our records together with those reported by Gennaio (2014) from the Salentine shores suggest that populations are already established along the Apulian coastline. According to Crocetta and Colamonaco (2008), the presence of a few specimens suggests that this species has expanded its distribution range recently. Since the presence of this species in other surveyed areas is not confirmed, we can conclude that further studies are necessary to monitor the new populations that could settle, since the Taranto area seems to be conducive to the establishment of non-indigenous species and deserves greater attention, being a hotspot of alien biodiversity.

**Table 2:** Date, sampling site, geographic coordinates, number of *Percnon gibbesi* caught and observed along the coastline of Taranto Gulf. Gender and morphometric measurements (width and length mm) are reported for the 5 captured specimens only.

Date	Sampling site	Geographic coordinates		N individuals		substrate	gender	Carapace (mm)	
		Latitude	Longitude	caught	observed			width	length
Jun 2013	Saturo	40.3689778 N	17.3062133 E	1		rocky	m	14	16.5
Sep 2013	Torricella	40.3134195 N	17.4713730 E	2		rocky	m	29	32.5
						rocky	f	28	30
Jul 2014	Marina di Pulsano	40.3509431 N	17.3661446 E	1	4	rocky	m	25	27
Jul 2014	Baia d'Argento	40.3616227 N	17.3372492 E	1	3	rocky	m	25	28



### 3.3 First record of the Blue Crab *Callinectes sapidus* in Sicily

G. Insacco & B. Zava

The blue crab *Callinectes sapidus* Rathbun, 1896 is a coastal and estuarine species, native to the western Atlantic coasts; it ranges from Nova Scotia in Canada down to northern Argentina, including Bermuda and the Antilles (Williams, 1974). It has been introduced in the Eastern Atlantic (in the North Sea, and SW France), in the northern and eastern Mediterranean (recently in Spain), and also in Japan. *C. sapidus* was transported to the Mediterranean in ballast tanks. The exact date of arrival in the Mediterranean Sea cannot be established because in the past it was often misidentified with the Lessepsian crab *Portunus segnis* (Forskål, 1775). Regarding Sicily, this is the case for the reports by Cavaliere & Berdar (1975) and Franceschini *et al.* (1993). This species has also been reported from Malta in 1984, but recently Crocetta *et al.* (2015) ascribed the Maltese record to *P. segnis*. This note actually documents the first record of *C. sapidus* from Sicilian waters and in particular the Strait of Sicily.

On October 17<sup>th</sup> 2016, a mature male specimen of *C. sapidus* (weight 446 g) was caught by a local fisherman using a nylon trammel net off the harbour of Licata (Agrigento, Sicily, Italy). The net was placed in front of the mouth of River Salso, also known as Imera Meridionale, with approximate coordinates 37.101367° N, 13.952483° E, on a sandy-muddy bottom, at about 1-10 m depth. This river is a torrential stream characterised by brief and violent floods during the rainy season from November to February and long periods of drought during spring and summer. The specimen was collected together with the following species: *Mullus barbatus*, *Lithognath-*

*us mormyrus*, *Dentex dentex*, *Spondyliosoma cantharus*, *Citharus linguatula*, *Squilla mantis* and *Octopus vulgaris*. The crab specimen was identified according to Williams (1974), measured with a calliper to the lowest millimetre, weighed (accuracy 0.1 g), and photographed (Fig. 7a). The sample was prepared in fluid and stored in the Zoological collection of Museo di Storia Naturale di Comiso (Province of Ragusa), with catalogue number MSNC 4539. Two more individuals of *C. sapidus* were found ten days later, in the same area but, unfortunately, the crabs were cooked and eaten by the fisherman (Fig. 7b).

The morphometric data of the *C. sapidus* specimen collected off the mouth of Salso River are: carapace length, 81 mm; carapace width to base of lateral spines, 148 mm; length of right lateral spines, 25 mm; total span, 480 mm. Dimensions of metagastric area: anterior width, 33 mm, length, 13 mm; posterior width, 16 mm. Our fresh specimen displayed the following colours: greyish, bluish to brownish green dorsally. Diverse coloured tints present dorsally on the carapace ornamentation (spines or tubercles) and legs.

The blue crab has been included among the 100 worst IAS in the Mediterranean Sea (Strefaris & Zenetos, 2006); however, with the exception of the eastern sectors of the basin, the actual spatial-temporal characteristics of blue crab populations in non-native environments have been poorly investigated, while their functional importance and ecological impact on autochthonous communities are to date virtually unexplored.



**Fig. 7:** A. *Callinectes sapidus*. Preserved specimen, mature male, from off Licata (Agrigento, Sicily, Italy), MSNC 4539 (photo G. Insacco); B. a freshly caught mature male (Photo: A. Bonfissuto).

### 3.4 New Mediterranean records of *Pachygrapsus maurus*

F. Tiralongo & B. M. Lombardo

Three species of the genus *Pachygrapsus* Randall, 1840 have been recorded in the Mediterranean Sea: *P. marmoratus* (Fabricius, 1787), *P. maurus* (Lucas, 1846)

and *P. transversus* (Gibbes, 1850). *P. marmoratus* is a northeastern Atlanto-Mediterranean species, recorded also in the Sea of Marmara and in the Black Sea. *P. trans-*



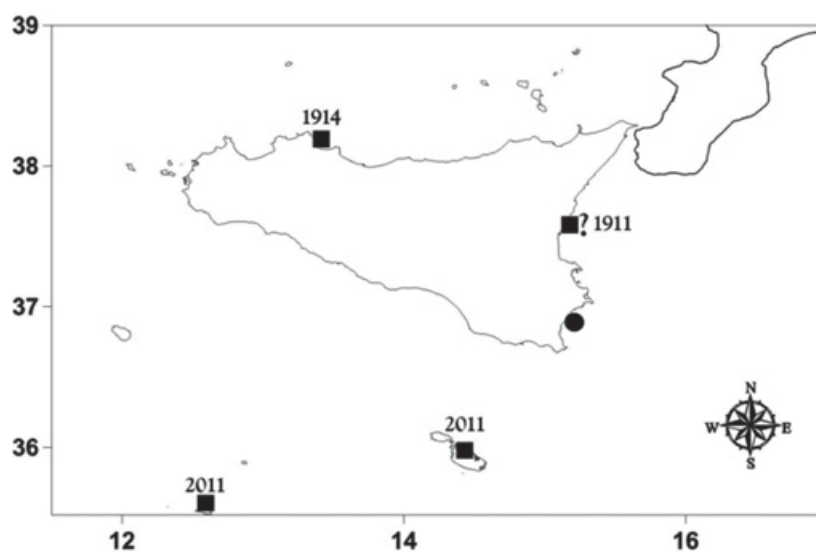
**Fig. 8:** A. male specimen of *P. maurus* sampled in Avola (preserved in alcohol), B. post-orbital spines C) lack of apical spines in the posterior border of the meropodite of the fifth pereopod.

*versus* is an anfiatlantic species of tropical and subtropical waters, also present in the Mediterranean Sea with scattered records. *P. maurus* is essentially confined to the northeast Atlantic (Macaronesian islands) and to the Mediterranean Sea with scattered records in its eastern and central parts. These species can be distinguished easily by their morphological characteristics. The number of post-orbital spines allows immediate identification of *P. marmoratus*: 3 in this species versus 2 in *P. maurus* and *P. transversus*. Finally, the presence (*P. transversus*) or the absence (*P. maurus*) of 2-3 apical spines on the posterior

edge of the meropodite of the fifth pereopod allows discriminating between these two latter species (Crocetta *et al.*, 2011).

On July 12<sup>th</sup> 2016, six *P. maurus* specimens (including an ovigerous female, Fig. 8) were collected by scraping a surface of less than 0.5 m<sup>2</sup> among algae (*Cystoseira* sp. and *Caulerpa* sp.), in the intertidal rocky zone of Avola, southeastern Sicily (Fig. 9) (36.92177° N, 15.16823° E). The area is characterized by the presence of few small tidal pools exposed to wave action. The associated invertebrate community was dominated by amphipods of the genus *Hyale* and polychaetes of the family Nereididae. All specimens were deposited in the collection of Ente Fauna Marina Mediterranea (cod.#1207163 and cod.#1207164).

This is the first record of *P. maurus* from the southeastern coast of Sicily and adds new data about its habitat in the Mediterranean Sea. Furthermore, with the exception of the doubtful record by Magri (1911) (see Crocetta *et al.*, 2011), we can consider our record as the first well-documented finding of the species along the Ionian coast of Sicily. Pipitone & Arculeo (2003) and Froggia (2010) did not include the presence of the species in eastern Sicily, while it was previously recorded from the northwestern coast of the island (Misuri, 1914). We agree with Crocetta *et al.* (2011) that both *P. maurus* and *P. transversus* are very likely more widespread and common than reported, and that small specimens may be misidentified without accurate observations due to similar morphological traits and colour pattern with *P. marmoratus*. Systematic explorations will probably add several other new records from other areas of the Mediterranean Sea. However, concerning the presence of *P. maurus* along the coast of Avola, we had never found the species during previous surveys in neighboring areas before summer 2016, and therefore we are prone to consider this as a recent finding based on natural range expansion.



**Fig. 9:** Records of *P. maurus* in Sicily, Malta and Lampedusa. Square: past records. Circle: new record. Years refer to year of publication.

### 3.5 A new record of *Procambarus clarkii* in Varano lagoon

L. Cilenti & G. Mancinelli

The Red swamp crayfish, *Procambarus clarkii*, native to northeastern Mexico and south-central U.S.A, has been widely introduced in several countries of the world because of its commercial value in aquaculture (Hobbs *et al.*, 1989). In Europe, the species was first introduced in 1973 in southern Spain (Gutiérrez-Yurrita *et al.*, 1999). In Italy, it was found in the wild in 1989 in the Piedmont region, having probably escaped from an experimental farm that operated between 1977 and 1985 (Delmastro, 1992). In the Apulia region, the records to date are limited to Lesina lagoon (Florio *et al.*, 2008).

Here we report on a new record of the red swamp crayfish in Varano lagoon (41.51°N; 15.47°E), located in Gargano National Park (Apulia-Italy) (Figs. 10 & 11). Several individuals of this species were observed in the drainage ditches of the surrounding pastures and agricultural land immediately after the flood event of 2014 and 2015. In September 2016, two individuals were captured, a male and a female, in a drainage canal that flows into the lagoon. The specimens were sexed and measured; total length (TL): 70 and 77 mm; carapace length (CL): 32 and 37 mm; wet weight (WW): 9.55 and 13.49 g for the male and female, respectively.

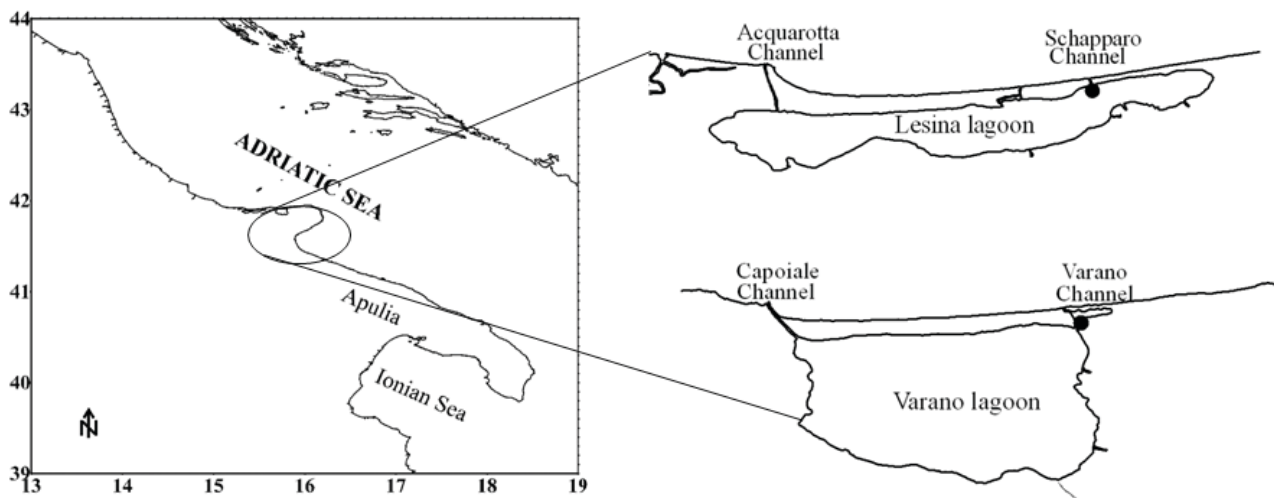


Fig. 10: Red swamp crayfish reported in Puglia Region: 1. “Lesina lagoon” (Florio *et al.*, 2008); 2. “Drainage water Varano”.



Fig. 11: *Procambarus clarkii* (Girard, 1852), collected in a drainage channel of the Varano lagoon, in September 2016.

The rapid growth, high fecundity, resistance to diseases, pollution, drought periods, low oxygen concentrations, and other extreme environmental conditions, together with relatively wide salinity (5-30) and temperature (5-38° C) ranges that can be tolerated make it an invasive species already acknowledged as threatening the lentic and lotic habitats of Northern and Central Italy, with negative effects on autochthonous biodiversity (Aquiloni *et al.*, 2010).

This new records stresses the need for implementing a monitoring plan for this species in all the sensitive areas of the Apulia region and in particular Gargano National Park, since the crayfish is able to move overland and thereby increase its range (Aquiloni *et al.*, 2005).



### 3.6 First record of *Seriola fasciata* from the Egadi Islands Marine Protected Area

L. Castriota & M. Falautano



**Fig.12:** Specimen of *Seriola fasciata* fished at Marettimo island (Sicily) on 30 October 2016.

The lesser amberjack *Seriola fasciata* (Bloch, 1793) is a subtropical Atlantic carangid, which has extended its natural geographic range, entering the Mediterranean Sea through the Strait of Gibraltar. After its first record in 1989 in the Balearic Islands (Massuti & Stefanescu, 1993), it has been repeatedly recorded in the Mediterranean, mostly in its epipelagic juvenile stage. In the central Mediterranean, this species has been recorded from several locations but never from the Egadi Islands (Tyrrhenian Sea). On October 30<sup>th</sup> 2016, one specimen of *S. fasciata* (Fig. 12) was caught by trammel net on a hard bottom with *Posidonia oceanica* (Linnaeus) Delile at about 35 m of depth, NW of Marettimo Island (37.991939° N, 12.021647° E), within the Egadi Islands Marine Protected Area. The specimen, photographed immediately after

capture, measured about 28 cm total length. The narrow supramaxilla and the typical well-defined colour pattern - consisting of a dark nuchal bar from eye to nape, seven irregular and broken dark body bars, and an 8<sup>th</sup> small dark bar at the end of the caudal peduncle - agree with the description of *S. fasciata* at the juvenile stage (Fischer *et al.*, 1981). Another similar specimen was caught by trammel net SW of Marettimo Island in September 2016, but no documentation was provided. In Sicilian waters, juveniles measuring up to about 20 cm TL are relatively frequent beneath fish aggregating devices (FADs) used for the dolphin fishery (Andaloro *et al.*, 2005; Andaloro *et al.*, 2007), or occasionally recorded under drifting objects (Castriota & Spinelli in Karachle *et al.*, 2016), showing positive thigmotropism towards floating objects. On the contrary, larger juveniles (of sizes comparable to that of the present record) are caught by purse seine as by-catch of the greater amberjack *Seriola dumerili* Risso (1810) fishery or, more rarely, by trolling line and trammel net (Andaloro *et al.*, 2005), thus confirming that they abandon floating objects, passing from epipelagic to benthopelagic habits. Scanty information is available on the adult stage of *S. fasciata*; it reaches maturity at 43-47 cm FL and grows to 67.5 cm FL (Fischer *et al.*, 1981). In the Mediterranean, adults of this species are unreported, since the largest specimen recorded was a juvenile measuring 36.5 cm TL from the Sicily Straits (Andaloro *et al.*, 2005). The record of *S. fasciata* in the Egadi Islands provides a stimulus to monitor the expansion of this species in the new environment, and to preserve the integrity of the marine protected area.

### 3.7 First record of *Siganus luridus* in Apulia, a further sign of geographic expansion

R. Gennaio & E. Azzurro

The dusky rabbitfish *Siganus luridus* has historically invaded the eastern Mediterranean after its first sighting in 1955. Nevertheless, since the 70s, the species underwent a prolonged lag in geographic spread (*sensu* Azzurro *et al.*, 2016) with no signs of expansion until 2003, when an established population was found at the Island of Linosa (Strait of Sicily).

On December 12<sup>th</sup> 2016, two *S. luridus* specimens (Fig. 13) were captured along the Ionian coasts of Apulia, 800 meters off 'Posto Rosso', Marina di Alliste, Ugento (LE) (39.90101° N, 18.06881° E). Both specimens were caught by local fishermen operating with trammel nets deployed at a depth of 18-19 m on a seagrass bottom. The first specimen measured 10.5 cm total length (TL) and weighed 20 g total weight (TW); the second specimen measured 10.2 cm TL and weighed 18g TW.

This capture constitutes a further indication of geographic expansion for this species. This reinforces the observations of other authors, who reported multiple sightings of *S. luridus* in the eastern Adriatic Sea (e.g. Djurović *et al.*, 2014) and increasing abundances of this species in the Strait of Sicily (Azzurro *et al.*, 2016).

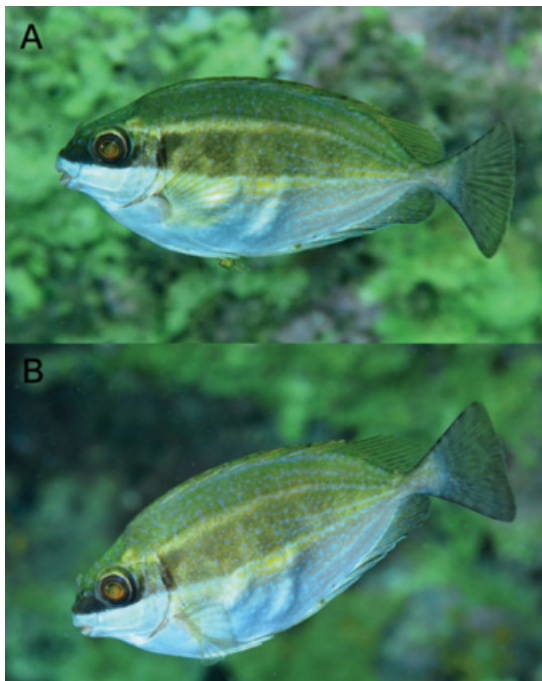
News about the capture of a new species in Apulia circulated in the internet ([http://www.ansa.it/puglia/notizie/2016/12/13/catturati-in-salento-2-pesci-coniglio\\_33f6937c-b282-48f6-9c6f-fc9a21e0d347.html](http://www.ansa.it/puglia/notizie/2016/12/13/catturati-in-salento-2-pesci-coniglio_33f6937c-b282-48f6-9c6f-fc9a21e0d347.html)) through the social networks (<https://www.facebook.com/groups/1714585748824288/>), generating a great interest in the general public. Noteworthy, similar observations are timely published (e.g. Vimeo <https://vimeo.com/194574917>) thus constituting spontaneous and concrete contributions to the early detection of these invaders in the marine environment.



**Fig. 13:** The dusky rabbitfish *S. luridus* caught on December 12th 2016, out off the coasts of Ugento, southern Apulia, Italy, Ionian Sea (Photo: R. Gennaio).

### 3.8 First documented record of *Siganus luridus* in the Calabrian Ionian Sea

F. Tiralongo & S. Tirnetta



**Fig. 14:** A and B, the two specimens of *Siganus luridus* observed in Calabria (northern Ionian Sea).

*Siganus luridus*, commonly known as dusky spine-foot, is native of the western Indian Ocean. It is a relative-

ly small-sized fish (maximum total length about 30 cm), and feeds mainly on benthic algae. In southern Italy, the species is successfully established in the Strait of Sicily (Azzurro & Andaloro, 2004); a single specimen was recorded in the southern Tyrrhenian Sea in 2004 (Castriota & Andaloro, 2008) and another specimen in the Strait of Messina in 2015 (Cavallaro *et al.*, 2016).

On November 5<sup>th</sup> 2016, two specimens of *S. luridus* of similar size (about 15 cm) (Fig. 14) were observed at a depth of 5 m during SCUBA dives in the marine protected area of Capo Rizzuto, northern Ionian Sea (Italy, Calabria, Crotona) (38.98302° N, 17.16161° E), on a mixed bottom (sand and rocks) partially covered by scattered patches of *Posidonia oceanica* (Linnaeus) Delile. The most abundant fishes in the area were *Sarpa salpa* (Linnaeus, 1758) and *Sparisoma cretense* (Linnaeus, 1758), both known to share similar behavioural and ecological characteristics with *S. luridus* (Azzurro *et al.*, 2007 and references therein).

This study represents the first documented record of *S. luridus* in the Calabrian Ionian Sea, being already reported from the area in the grey literature (Rocca, 2007). Based on the recent records from nearby locations of the southern Tyrrhenian Sea and the Strait of Messina, and considering the invasive behaviour of this species, we can expect a further spread and establishment of *S. luridus* in nearby areas.



## 4. SLOVENIA

### 4.1 *Brachidontes pharaonis* in the Adriatic Sea - a distributional review with the first record from Slovenia

F. Crocetta, V. Pitacco & L. Lipej

*Brachidontes pharaonis* (Fischer, 1870) (Mollusca: Bivalvia: Mytilidae) is a small-sized mussel native to the Indo-Pacific that since 1876 has spread to the Mediterranean Sea. Originally confined to the eastern Mediterranean, it soon invaded the central part of the basin, with stable populations in Malta and Italy (Sicily and Calabria) and there are records from Corsica and the Adriatic Sea.

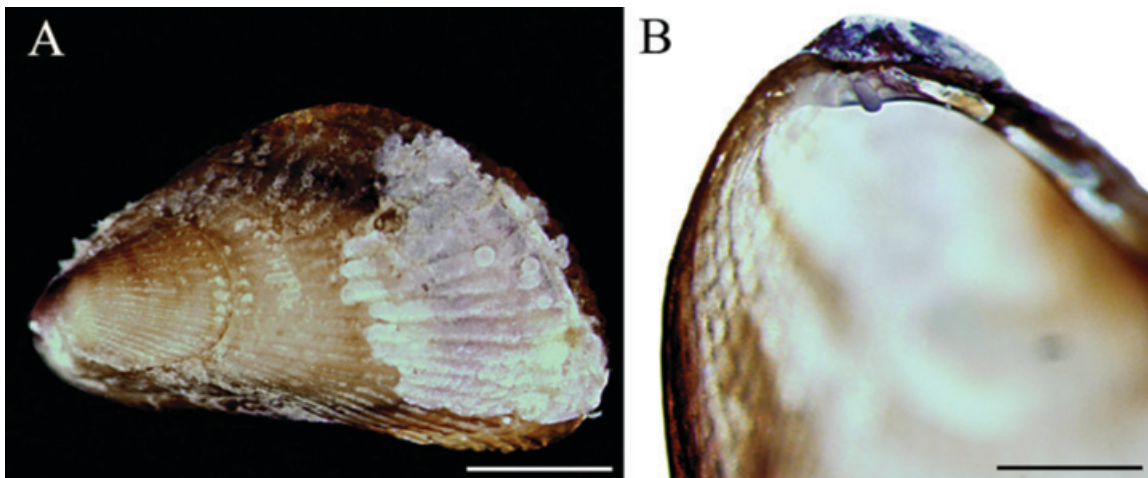
During benthic studies on Adriatic molluscan communities, a single specimen of *B. pharaonis* was found at 5 m depth in Cape Strunjan (Slovenia, northern Adriatic Sea) (45.5347222° N, 13.6027777° E) (Fig. 15), in association with a colony of *Cladocora caespitosa* (Linnaeus, 1767). With the aim to first record it from Slovenia, we analyzed the published literature on this taxon, and noticed that statements on its Adriatic distribution are quite confused and often conflicting, and may easily cause uncertainties for non-specialists. This also led us to carry out a brief review of its local distribution.

The first record from the Adriatic basin dates back to <1998, when De Min & Vio (1998) recorded this species from its northern areas, namely from Savudrija (Croatia). The above cited record has been considered the only one from the Adriatic Sea until very recently, when two articles practically simultaneously potentially broadened its distribution in the area: i) Sarà *et al.* (2013) stated a wide but punctual Adriatic distribution, with records from both Venice and Bari (Italy), and Split (Croatia); ii) Galil & Goren (2014) considered it as widespread from the Istrian Peninsula to Split (Croatia), but did not take into account the records listed by Sarà *et al.* (2013).

These two statements left us astonished, as the Mediterranean Sea, with its long-lasting tradition of malacological research, is daily explored by a large number of malacologists and marine biologists, and such a wide distribution of a targeted alien species cannot have gone un-

noticed for local researchers. Unfortunately, both papers do not display the putative specimens, or provide additional details or the repository holding the sampled material (if existing), and therefore we are prone to consider these records as incorrect or based on mere misidentifications for other mytilid species. This also seems to be confirmed by both additional incorrect distributional data presented in Sarà *et al.* (2013) [e.g. presence of *B. pharaonis* in Naples (Italy) and Taranto (Italy) as based on Crocetta *et al.* (2009), where no traces of such distributional data are present, and absence in Messina (Italy), from where this taxon is known since at least 1977 (Di Natale, 1982)]. In turn, while carrying out our bibliographic review, we also noticed opposite contrasting event: Rinaldi (2012) presented some *Mytilaster lineatus* (Gmelin, 1791) sampled in 2009 in Pialassa Baiona (Italy) (E. Rinaldi & G. Servello, *pers. comm.*), which in reality are *B. pharaonis*.

Taking into account the present finding and the bibliographic review, only three confirmed records exist from the Adriatic Sea so far: one from Croatia (<1998: De Min & Vio, 1998), one from Italy (2009: Rinaldi, 2012 as *M. lineatus*) and one from Slovenia (August 2012: this paper). All these records are linked by the finding of one or a small number of specimens, and despite additional research at the three sites, no follow-up exists from Croatia (F. Crocetta & E. Vio, unpublished data), Italy (E. Rinaldi & G. Servello, unpublished data) or Slovenia (L. Lipej & V. Pitacco, unpublished data). In the light of these results and despite the repetitive findings listed above, *B. pharaonis* must be considered as casual in the Adriatic Sea. In addition, the three records do not seem to be related, and are only presumably based on casual introduction events by ship transportation through ballast waters or as a fouler of ship keels.



**Fig. 15:** A-B. *Brachidontes pharaonis* (Fischer, 1870) from Slovenia. A. The entire specimen. Scale bar: 1 mm. B. A magnification of the hinge teeth of the right valve. Scale bar: 0.5 mm.



## 5. GREECE

### 5.1 First record of the Indo-Pacific gastropod *Rhinoclavis kochi* from Greece

D. Poursanidis & G. Zaminos

*Rhinoclavis kochi* (Philippi, 1848) has been recorded from the coast of Israel, the north part of Cyprus and southern Turkey (Zenetos *et al.*, 2004 and references therein). A record from Kefallonia Island, Katavothres area, Ionian Sea (De Smit & Baba, 2001) has been judged as doubtful, and has not been included in the Hellenic Network on Aquatic Invasive Species list (Zenetos *et al.*, 2015). During summer 2016, six empty shells of the gastropod *Rhinoclavis kochi* (Philippi, 1848) (Fig. 16) were found in the north of Gavdos Island, at Agios Ioannis beach (34.868156 N, 24.084003 E), during snorkeling activity on soft bottoms at 5 m depth. The material is stored in the second author's personal collection.

This finding constitutes the first record of the species from Greece, extending its distribution to the East Mediterranean. Careful research in the same area may lead to the finding of living specimens.



**Fig. 16:** The biggest shell of the collected gastropod *Rhinoclavis kochi* (Philippi, 1848) with a total length of 3 cm.

### 5.2 First record of *Hexanchus griseus* from Saronikos Gulf (Aegean Sea)

Ch. Mytilineou & A. Anastasopoulou



**Fig. 17:** *Hexanchus griseus* released into the sea.

The bluntnose sixgill shark (*Hexanchus griseus*) occurs in all oceans ([www.fishbase.org](http://www.fishbase.org)). This shark thrives in the most widespread distribution of all known sharks, with the possible exception of the white shark. It lives in deeper and cooler waters (100 -2000 m), close to the bottom, possibly rising to the surface at night (Boesman, 1989). The young are often found closer inshore; the adults often in deeper waters (Cook & Compagno, 2005). The Bluntnose Sixgill Shark is caught as bycatch in several fisheries and appears vulnerable to overfishing. In the Mediterranean, the species has been assessed as being of Least Concern (Soldo *et al.*, 2016). However, despite the lack of specific data, the Bluntnose Sixgill Shark population can be assumed as being stable in the area (Soldo *et al.*, 2016).

On June 5<sup>th</sup> 2015, during experimental bottom trawl fishing carried out within the framework of the EPILEXIS project in Saronikos Gulf (Southern Aegean Sea), a specimen of *H. griseus* was trapped in the codend of the gear (Fig. 17). It was caught off Aigina and Poros Islands (between 37.5691°N, 23.49702°E and 37.58445°N, 23.4716°E), at a depth of around 250 m. The specimen was 3.6 m long and weighed almost 270 kg. It was alive and was successfully released into the sea as soon as it was possible. It was characterized by a blunt rounded snout and six long gill slits on either side of its head. Other distinguishing features included its fluorescent green eyes and the single dorsal fin located close to the caudal fin. Based on

its external characteristics, it was identified as female and considered as immature, since according to the literature, mature females are more than 4 m long (Cook & Compagno, 2005). In the area, abundant young hake (*Merluccius merluccius*) and rose shrimp (*Parapenaeus longirostris*) catches are known (unpublished data). According to Kabasakal (2006), hake and shrimps are among the main preys of the species. *H. griseus* is recorded for first time in the Saronikos Gulf, although it has been reported in the Greek Seas and more particularly in the Kyklades, Kriti and Dodecanisa Islands, Thermaikos Gulf and the North

Aegean, Thracian, and Ionian Seas (Papaconstantinou, 2014 and references therein).

One more 2.5 m long specimen of *H. griseus* was reported on the web by WWF; it was caught by a fishermen in Saronikos Gulf, off Hydra Island (without reference coordinates), on January 9<sup>th</sup> 2016 (<http://www.wwf.gr/news/1747-2016-01-11-12-05-15>). The size of the latter indicates a young specimen. The results of this work may indicate that Saronikos Gulf is a trophic ground for young *H. griseus*.

### 5.3 Occurrence of *Leucoraja fullonica* in Argolikos Gulf (Aegean Sea)

A. Dogrammatzi & C. Stamouli

The Shagreen skate of fuller's ray, *Leucoraja fullonica*, is an offshore species, usually occurring at depths of 200-550 m. It is generally distributed in the Atlantic Ocean from Iceland to Madeira and Northern Morocco, while in the Mediterranean Sea the species is known to exist in the western and central region, the southern Adriatic Sea (Zupa *et al.*, 2010) and the western coasts of Greece (Stehmann & Bürkel, 1984).

According to the IUCN Red List of Threatened Species, *L. fullonica* is considered as Vulnerable on a global level and as Critically Endangered in the Mediterranean basin. It has also been suggested that the rate of decline in

the Mediterranean Sea is higher than that in the Northeast Atlantic (30-50% decline over 29 years) (McCully, 2016).

On July 1<sup>st</sup> 2016, one individual of *L. fullonica* (Fig. 18) was caught during the Mediterranean Trawl Survey (MEDITS) (cod end mesh size 20 mm, net shape: square) in Argolikos Gulf, SE Peloponnisos (37.37194° N, 22.97611° E), at a depth of 540 m. The individual measured 816 mm TL and weighed 2417 g TW, and it was a female at the sexual maturity stage 4a (MEDITS, 2016), whose ovary walls were transparent, with oocytes of different sizes, white or yellow, and the oviducts appeared quite enlarged, collapsed and empty.



**Fig. 18:** *Leucoraja fullonica* caught in Argolikos Gulf (TL=816 mm). July 2016 (Aegean Sea).



#### 5.4. Additional records of *Siganus luridus* from Lesvos, the northern limit of its range in the Aegean Sea

K. Tsirintanis & S. Katsanevakis



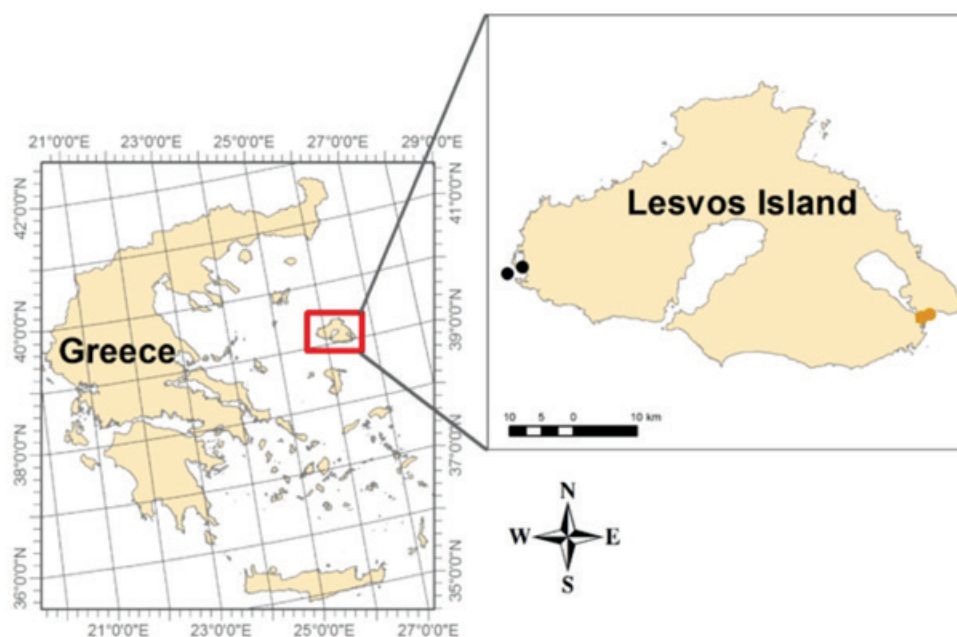
**Fig. 19:** *Siganus luridus* individual grazing on brown algal turf, photographed at southeastern Lesvos.

The dusky spinefoot *Siganus luridus*, a herbivore Lessepsian fish, has become dominant in many coastal areas of the eastern Mediterranean Sea, and has a high impact on biodiversity and ecosystem services (Katsanevakis *et al.*, 2014). This is due to overgrazing that leads to the transformation of the ecosystem from one dominated by lush and diverse brown algal forests to another dominated by bare rock (Sala *et al.*, 2011). The species

is quite abundant in the southern Aegean Sea (Giakoumi, 2014) but, as it is a thermophilic species, the lower temperatures of the northern Aegean limit its northwards distribution. The northernmost records of the species in the Aegean Sea are from Sigri Bay in western Lesvos Island (Evangelopoulos *et al.*, 2015).

Herein, we report additional records of three *S. luridus* individuals from southeastern Lesvos (Figs. 19 & 20), where the species had not been reported before. The individuals were recorded during SCUBA diving surveys on three different occasions (12/9/2016, 5/10/2016, 6/10/2016). The first two observations were made in the small bay of Agios Ermogenis (39.012694° N, 26.542933° E and 39.013258° N, 26.543022° E), and consisted of isolated individuals grazing on brown algal assemblages over rocky reefs. The two individuals had an estimated length of 7-9 cm and were encountered at 1.5 and 2.5 m depth; water temperature during the two observations was 24° C and 22° C, respectively. The distance between the locations of the two observations was approximately 60 m, and the time gap was 3 weeks. The third observation was made south of Charamida beach (39.014653° N, 26.557419° E), again over rocky reefs. An individual of 14-15 cm in length was observed at a depth of 4 m, when ambient seawater temperature was 22° C.

Due to the high impact of this species, its potential range expansion northwards and westwards in the Mediterranean due to its warming is of high interest. The current records in addition to those by Evangelopoulos *et al.* (2015) indicate the probable establishment of the species in Lesvos Island.



**Fig. 20:** Locations of previous records (black points) of *Siganus luridus* on western Lesvos (Evangelopoulos *et al.*, 2015) and new records (orange points) on the southeastern part of the island.



## 5.5 New records of two alien molluscan species from Astypalaia Island in the southern Aegean Sea

### A. Angelidis

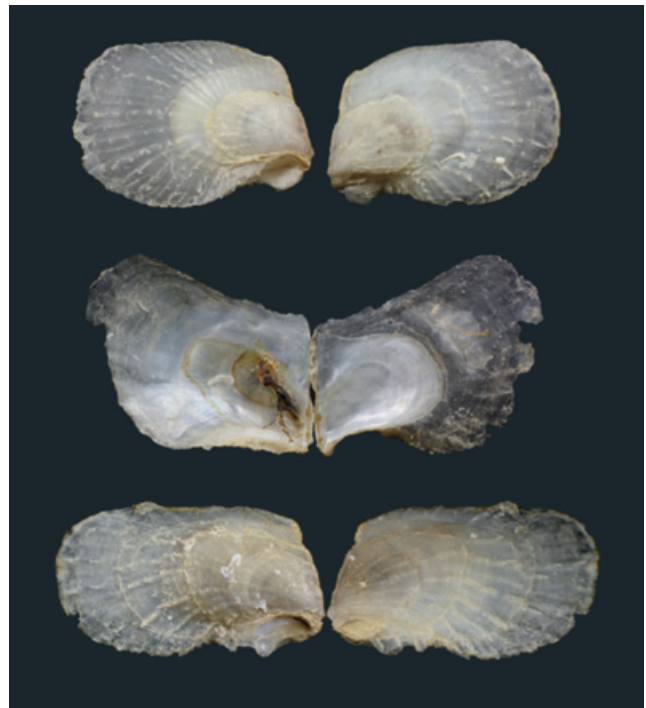
During a visit to Astypalaia Island in July 2016, two hitherto unreported bivalves. Namely, *Malleus regula* (Forsskål in Niebuhr, 1775) and *Fulvia fragilis* (Forsskål in Niebuhr, 1775), were discovered.

*Malleus regula* is an epibyssal pteriid with high tongue shape, widely distributed in the tropical Indo-Pacific region including the Persian Gulf and the Red Sea. It was recorded in the Suez Canal as early as 1905, while the first Mediterranean record is from Israel and Lebanon in 1929 (Pallary, 1938). Successive records from the coasts of almost all the east Mediterranean countries, from Lybia to Turkey, attest successful establishment (Zenetos *et al.*, 2004). The first Greek record is from Simi, Greece (Gianuzzi-Savelli *et al.*, 2001).

Five live specimens of *M. regula* were collected at Kounoupoi islet (36.531408° N, 26.469313° E) at a depth of 2 m, under stones (Fig. 21). All specimens were juveniles ranging from 15 mm to 17 mm in size. The specimens had fragile semitransparent shells, whitish in colour, and a nacreous interior. They were attached by their byssuses to the stones forming a small group. The age and arrangement of the examined material suggests the beginning of establishment. Lack of harbor, fishing refuges and fisheries in vicinity, indicates transportation via natural ways following the relative pattern of Lessepsian migration.

The bivalve *Fulvia fragilis* is native in the Western Indian Ocean, Persian Gulf and Red Sea. It was first recorded in the Mediterranean in 1955 as *Papyridea papyracea* from Egypt (Moazzo, 1939). Successive records from southern Turkey, Tunisia, Malta, Italy and Spain verify its establishment in the Mediterranean (Zenetos *et al.*, 2004). The first Greek record is from Saronic Gulf, (Vardala-Theodorou, 1999) and successively from Thermaicos Gulf (Angelidis, 2012), where it is well-established today.

The precise locality of this new *F. fragilis* occurrence is in Astypalaia (36.619077° N, 26.393020° E), in Vathi bay which is a small bay in the north of the main island with a very narrow channel-like opening facing SW. The



**Fig. 21:** Live Juvenile specimens of *M. regula* from Kounoupoi isl., Astypalaia.

main island's harbour and a fishery harbour are located close to the gulf's opening. Vathi bay presents estuarine features like the gulf of Thessaloniki and the gulf of Kalloni in Lesvos where *F. fragilis* is also present. It has muddy bottom with *Zostera sp.* and it is also used as a secondary harbor. Three specimens were hand-collected in shallow water by snorkeling. Two of them were living (Fig. 22) and one was freshly dead. The disposition age and number of examined specimens suggests that the species is established in the area. Although shipping cannot be excluded as a potential vector of introduction in the area, transportation via natural ways (unaided dispersal) following the pattern of Lessepsian migration seems to be the most probable way of introduction.



**Fig. 22:** Live specimens of *F. fragilis* from Vathi Bay, Astypalaia. Sizes 30-40 mm.

## 6. TURKEY

### 6.1 First record of *Hirundichthys rondeletii* from the Black Sea

D. Yaglioglu & C. Turan

One male specimen of the black wing flyingfish *Hirundichthys rondeletii* (Valenciennes, 1847) (Exocoetidae) was captured by commercial bottom trawl fishery along Duzce coast (Akcakoca; 41.36027° N, 31.133056° E), southwestern Black Sea on January 14<sup>th</sup> 2014, at about 32 m of depth (Fig. 23). Macroscopic observations of gonad structure were used for sex identification of *H. rondeletii* (Oliveira *et al.*, 2015). The weight of the specimen was 52.85 g, with total length being 209.42 mm, pectoral fin length 127.32 mm, pelvic fin length 49.89 mm, anal fin length 13.73 mm, dorsal fin length 21.17 mm, head length 34.02 mm, and eye diameter 10.39 mm. The meristic characters of the individual were: dorsal fin rays 11; anal fin rays 11; pectoral fin rays 16; pelvic fin rays 6. Taxonomic identification of the individual was based on taxonomic characters (size, shape, colour and positions of the fins) provided by Parin (1999) and Turan *et al.* (2007).



Fig. 23: *H. rondeletii* caught in Black sea.

The specimen of *H. rondeletii* was preserved in 4% formaldehyde solution, photographed and deposited in the Fish Collection of the Marine Biology Laboratory, Department of Biology, Faculty of Arts and Science, Duzce University (catalogue number: DUFC/2014-001). This is the first record of *H. rondeletii* from the Black Sea.

## 7. EGYPT

### 7.1 On the established population of *Halimede ochtodes* in Egyptian waters

E. H. Kh. Akel

The Mediterranean Sea is considered as one of the main hotspots of marine bioinvasions on Earth. Until December 2014, more than 1000 alien marine species were introduced in the Mediterranean (Armon & Zenetos, 2015). Egyptian Mediterranean biodiversity is changing rapidly due to climate changes and the spectacular biotic exchanges between the Mediterranean and Red Sea via the Suez Canal, and this leads to ecologic and economic impacts (Akel & Allam, 2016).

Galil (2000) published a review on three xanthoid species including *Halimede ochtodes* (Herbst, 1983). In this work we report on the establishment of the brachyuran decapod *H. ochtodes* in Egypt. Naruse *et al.* (2014) mentioned that *H. ochtodes* was previously reported from northern Australia, Pakistan, India, Thailand (Gulf of Thailand), Singapore, China (Guangx, Hainan), Hong Kong, The Philippines, and the Red Sea. Five specimens of *H. ochtodes* (3 males and 2 females) were collected by bottom trawl net off Port Said (31.37269° N, 32.25995° E) on November 10<sup>th</sup> 2016, at a depth of 15-20 m (Fig. 24).

The following measurements were obtained from a specimen collected: weight 14 g; carapace length 2.5 cm;

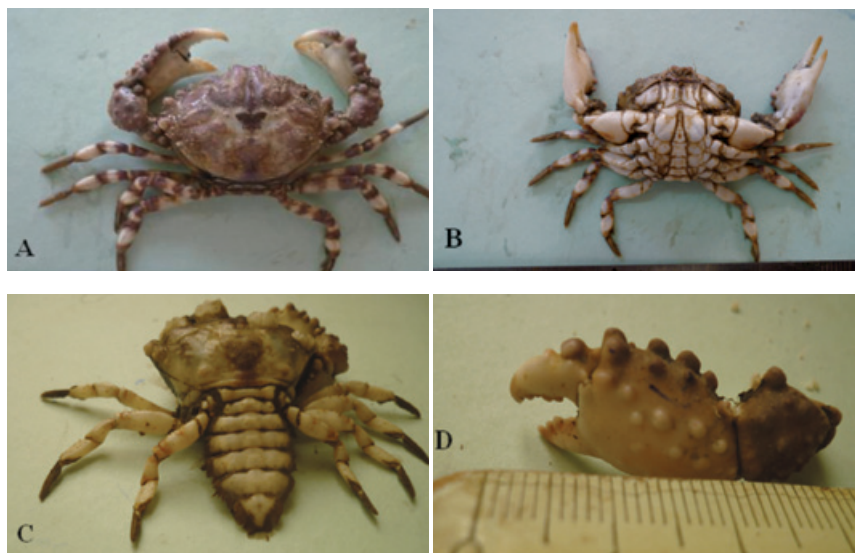


Fig. 24: A - Dorsal view, B- male ventral view, C- female ventral view, D- cheliped external view

carapace width 3.2 cm; length of cheliped 3.6 cm; the three first legs are equal in length (3 cm), while the fourth leg is shorter (2.4 cm).

Moussa *et al.* (2016) collected one specimen only in September 2013, while this work reports on five more specimens collected in the same area (Port Said). This suggests that *H. ochtodes* is established in the area.

## 7.2. Biometric characteristics of *Anthias anthias* from off Damietta

E. H. Kh. Akel, S. I. Rizkalla



**Fig. 25:** *Anthias anthias* (Linnaeus, 1758) caught off Damietta (Egypt) on 23/8/2016 at depth 15- 20 m.

The family Serranidae (sea basses) consists of three subfamilies. Of these subfamilies, Anthiinae includes 20 genera with about 170 species (Nelson, 1994). *Anthias anthias* (Linnaeus, 1758), commonly known as the Swallowtail sea perch, is a tropical fish distributed in the Mediterranean Sea and the eastern Atlantic, from mainland Portugal and the Azores south to Namibia (Tortonese, 1986). In the eastern Mediterranean, it is recorded in Egypt (El-Sayed, 1994; Rizkalla *et al.*, 2016) and Turkey (Tuncer *et al.*, 2011). This species is characterised by hermaphroditism.

Two specimens of *Anthias anthias* (Family: Serranidae) were found as bycatch obtained by bottom trawler operating off Damietta (Egypt) (31°33'39.39 N, 31°51'43.25 E) on August 23<sup>rd</sup> 2016. The trawling depth ranged between 15-20 m. The fish measured 12.8 and 13.5 cm in length. Its description, as regards biometric data, is poor (Rizkalla *et al.*, 2016). The aim of this study, therefore, was to provide the first biometric description for this species in Egypt (Fig. 25).

The description was carried out according to Tortonese (1986). Morphometric and meristic characters are given in Table 3.

**Diagnosis:** *Morphometric characters:* dorsal fin with 10 spines (third one is elongated) and 15 rays; pectoral fin with 17 rays; anal fin with three spines followed by seven rays; ventral fin with one spine and 5 rays. Table 3 shows that the dorsal fin is situated on the same vertical line with the pectoral fin; that body depth is three times that of the

caudal peduncle; standard length is three times that of body depth; the rays of the pelvic fins are longer than the anal fin base; the lateral line ends at the base of the caudal fin and the caudal fin is lunatic. Operculum with 3 flat spines. *Meristic counts:* dorsal fin X+15; pectoral fin 17; anal fin III+7; and ventral fin I + 5. *Colour:* body pinkish; three yellow lines on the sides of the head; tips of dorsal spines and rays yellow and caudal fin yellow. Comparing these results with those obtained by Tuncer *et al.* (2011) in Turkish waters for the same species, it was found that the meristic counts in both areas are the same.

**Table 3:** Morphometric characters and meristic counts of *Anthias anthias* (Linnaeus, 1758) collected by bottom trawler off Damietta (Egyptian Mediterranean waters) on 23/8/2016 at 15 - 20 m depth.

Morphometric characters	Length (mm)	%
Total length (TL)	128	-
Standard length (StL)	83	64.84 (TL)
Head length (HL)	26	20.31 (TL)
Eye diameter (ED)	9	34.61(HL)
Inter orbital distance (IO)	6	23.08 (HL)
Pre Dorsal fin length (PreD)	28	21.87 (TL)
Pre Anal fin length (PreA)	30	23.44 (TL)
Pre Pectoral fin length (PreP)	28	21.87 (TL)
Pre Ventral fin length (PreV)	29	22.66 (TL)
Dorsal fin length (DL)	47	36.72 (TL)
Anal fin length (AL)	15	11.72 (TL)
Pectoral fin length (PL)	25	19.53 (TL)
Ventral fin length (VL)	45	35.16 (TL)
Body depth (BD)	28	21.87 (TL)
Caudal peduncle depth (CdD)	10	7.81 (TL)
Upper jaw length (UJ)	13	50.00 (HL)
Lower jaw length (LJ)	13	50.00 (HL)
Meristic	Number (Spines+rays)	
Dorsal fin	X + 15	
Anal fin	III +7	
Pectoral fin	17	
Ventral fin	I + 5	



## 8. CYPRUS

### 8.1 *Bursatella leachii* in Cyprus

F. Crocetta & M. Pontes

*Bursatella leachii* Blainville, 1817 (Mollusca: Gastropoda: Aplysiidae) is a conspicuous shallow-water circumtropical opisthobranch, that since the last century has colonized the entire Mediterranean Sea, with multiple records from the eastern to the western Mediterranean, including the Adriatic Sea (see Ibáñez-Yuste *et al.*, 2012; Zenetos *et al.*, 2016). Despite the fact that the species is commonly considered as a Lessepsian invader, records from the easternmost part of the Mediterranean Sea are scarce, and consist of some old records from Egypt and Israel (review in Barash & Danin, 1992) and mostly recent ones from Turkey (review in Özvarol, 2014) and Lebanon (review in Crocetta *et al.*, 2013).

On August 16<sup>th</sup> 2016, two specimens of *B. leachii* were found at Kyrenia, Cyprus (35.347526° N, 33.235070° E), while crawling on an unvegetated muddy bottom (Fig. 26). A video of the individuals can be visualized at the following webpage: <https://www.youtube.com/watch?v=qUIQnwlEt6U>. This taxon is well-known for thriving in various habitats and localities around the Mediterranean, where it is considered as temporary invasive during some periods of the year, although it subsequently disappears. Unfortunately, the author did not give particular importance to the finding, and did not carry out additional observations. Therefore, the presence of further specimens cannot be excluded at the present stage.

### Acknowledgements

The study coauthored by Valentina Pitacco, Lovrenc Lipej and Fabio Crocetta is part of Valentina's PhD study funded by the Slovenian Research Agency (ARRS), and was supported by the Ministry of the Environment and Spatial Planning of Slovenia. The study of alien species from Slovenia involving Fabio Crocetta was partially funded by the East and South European Network for Invasive Alien Species - a tool to support the management of alien species in Bulgaria (ESENIAS-TOOLS) (EEA funded - Contract No. Д-33-51/30.06.2015). Fabio Crocetta and Miquel Pontes are grateful to Alper Karabacak (Kyrenia, Cyprus) for sharing data on *Bursatella leachii*. Authors Gianni Insacco and Bruno Zava are grateful to the professional fisherman Mr Alessandro Bonfissuti, owner of "Erika", for providing the *C. sapidus* specimen studied. The authors warmly thank Maria Corsini-Foka (Hellenic Centre for Marine Research) for useful comments, which improved a previous draft of their note. Authors Aikaterini Dogrammatzi and Caterina Stamouli would like to thank Dr E. Leukaditou, J. Dokos, G. Christidis, I. Fytilakos and

So far, the species was unknown from Cyprus, and the present accidental finding fills a gap in its known Mediterranean invaded range, although we consider this species as casual in the country. Further field research may confirm this statement or reject it by providing concrete evidences of its establishment. On the other hand, the first finding of an apparently easy to spot taxon in 2016 only, clearly confirms that some areas of the Mediterranean still remain largely unexplored, and that further field work is necessary to increase general benthic knowledge on Levantine biota.



Fig. 26: *Bursatella leachii* from Cyprus.

N. Fotiadis, members of the MEDITS scientific team, for their valuable help during samplings and also the captain and the crew of the fishing boat "TAKIS-MIMIS". Fernando Ángel Fernández-Álvarez was supported by a predoctoral fellowship of the Spanish Ministry of Economy and Competitiveness (BES-2013-063551). His co-authors, Iván Acevedo and Paula C. Rodríguez-Flores, were funded under the Spanish Ministry of Economy and Competitiveness project CTM2014-57949-R. Ch. Mytilineou and A. Anastasopoulou would like to thank the onboard team of the EPILEXIS project (C.J. Smith, E. Lefkaditou, K. Papadopoulou, C. Stamouli, J. Dokos, G. Oikonomidis, E. Kypraiou); C.J. Smith, in particular, for the photographic material, as well as the captain and the crew of F/V 'Takis-Mimis' for supporting the survival of the Bluntnose Sixgill Shark specimen. The study of D. Yaglioglu and C. Turan was financially supported by Duzce University Research Fund, Project Number: 2013.5.1.189 and coordinated by DY. For Malta, Alan Deidun and Murat Celik are grateful to the Maltese angler -David Agius- who caught the *L. sceleratus* specimen reported in this study.

## References

- Akel, E.H. Kh., Allam, S. M., 2016. Marine Bottom trawl exploration along the Egyptian Mediterranean waters during 2008-2009. *Advances in Biology, Biotechnology and Genetics*, 3 (3), 1-12.
- Andaloro, F., Campo, D., Castriota, L., Sinopoli, M., 2007. Annual trend of fish assemblages associated with FADs in the southern Tyrrhenian Sea. *Journal of Applied Ichthyology*, 23, 258-263.
- Andaloro, F., Falautano, M., Sinopoli, M., Passarelli, F.M., Pipitone, C. *et al.*, 2005. The lesser amberjack *Seriola fasciata* (Perciformes: Carangidae) in the Mediterranean: a recent colonist? *Cybium*, 29, 141-145.
- Angelidis, A., 2013. *Fulvia fragilis* (Forsskål in Niebuhr, 1775) (Bivalvia: Cardiidae), first record of an alien mollusk in the Gulf of Thessaloniki (inner Thermaikos gulf, North Aegean Sea, Greece). *Journal of Biological Research-Thessaloniki*, 20, 228-232.
- Armon, R.H., Zenetos, A., 2015. Invasive alien species and their indicators. In: *Environmental Indicators* (R.H. R. Armon & O. Hanninen Eds.), pp. 147-173. Springer: Netherlands. 1060 pp.
- Aquiloni, L., Ilhéu, M., Gherardi, F., 2005. Habitat use and dispersal of the invasive crayfish *Procambarus clarkii* in ephemeral water bodies of Portugal. *Marine and Freshwater Behaviour and Physiology* 38, 225-236.
- Aquiloni, L., Tricarico, E., Gherardi, F., 2010. Crayfish in Italy: distribution, threats and management. *International Aquatic Resource* 2, 1-14 ISSN 2008-4935
- Azzurro, E., Andaloro, F. 2004. A new settled population of the Lessepsian migrant *Siganus luridus* (Pisces: Siganidae) in Linosa Island-Sicily Strait. *Journal of the Marine Biological Association of the United Kingdom*. 84, 819-821.
- Azzurro, E., Fanelli, E., Mostarda, E., Catra, M., Andaloro, F., 2007. Resource partitioning among early colonizing *Siganus luridus* and native herbivorous fish in the Mediterranean: an integrated study based on gut-content analysis and stable isotope signatures. *Journal of the Marine Biological Association of the United Kingdom*, 87, 991-998.
- Azzurro, E., Maynou, F., Belmaker, J., Golani, D., Crooks, J.A., 2016. Lag times in Lessepsian fish invasion. *Biological Invasions*, 18, 2761-2772.
- Azzurro, E., Franzitta, G., Milazzo, M., Bariche, M., Fanelli, E., 2016. Abundance patterns at the invasion front: The case of *Siganus luridus* in Linosa (Sicily-Strait, Central Mediterranean Sea). *Marine and Freshwater Research*, pp 1-6 (online early)
- Barash, A., Danin, Z., 1992. *Fauna Palaestina: Mollusca I. Annotated list of Mediterranean molluscs of Israel and Sinai*. The Israel Academy of Sciences and Humanities, Jerusalem.
- Ben Souissi, J., Rifi, M., Ghanem, R., Ghazzi, L., Boughedir, W. *et al.*, 2014. *Lagocephalus sceleratus* (Gmelin, 1789) expands through the African coasts towards the Western Mediterranean Sea: a call for awareness. *Management of Biological Invasions*, 5(4), 357-362.
- Boesman, M., 1989. Hexanchidae. 72-75. In: *Fishes in the North-Eastern Atlantic and the Mediterranean*. Whitehead P. J. P., Bauchot M.-L., Hureau J.-C., Nielsen J. & Tortonese E. (Eds), UNESCO, Paris.
- Carmona, L., Bhawe, V., Salunkhe, R., Pola, M., Gosliner, T.M. *et al.*, 2014. Systematic review of *Anteaeolidiella* (Mollusca, Nudibranchia, Aeolidiidae) based on morphological and molecular data, with a description of three new species. *Zoological Journal of the Linnean Society*, 171, 108-132.
- Castriota L., Andaloro F., 2008. First record of the Lessepsian fish *Siganus luridus* (Osteichthyes: Siganidae) in the Tyrrhenian Sea. *Marine Biodiversity Records*, 1, 1-2.
- Cavallaro, M., Marino, G., Ammendolia, G., 2016. First record of a Lessepsian migrant, the dusky spinefoot, *Siganus luridus* (Rüppell, 1829) in the Strait of Messina (Central Mediterranean Sea). *Annales Series Historia Naturalis*, 26, 19-24.
- Cavaliere, A., Berdar, A., 1975. Presenza di *Callinectes sapidus* Rathbun (Decapoda, Brachyura) nello Stretto di Messina. *Bollettino di pesca, piscicoltura e idrobiologia*, 30, 315-322.
- Çinar, M.E., Katağan, T., Koçak, F., Öztürk, B., Ergen, Z. *et al.*, 2008. Faunal assemblages of the mussel *Mytilus galloprovincialis* in and around Alsancak Harbour (Izmir Bay, eastern Mediterranean) with special emphasis on alien species. *Journal of Marine Systems*, 71, 1-17.
- Cook, S.F., Compagno, L. J. V., 2005. *Hexanchus griseus*. The IUCN Red List of Threatened Species 2005: <http://dx.doi.org/10.2305/IUCN.UK.2005.RLTS.T10030A3155348.en>.
- Crocetta, F., Colamonaco, G., 2008. *Percnon gibbesi* (Crustacea: Decapoda) and *Aphysia dactylomela* (Mollusca: Gastropoda) in the Taranto Gulf (Italy, Ionian Sea): new populations incoming. *Journal of the Marine Biological Association 2 – Biodiversity Records*: 6465.
- Crocetta, F., Renda, W., Colamonaco, G., 2009. New distributional and ecological data of some marine alien molluscs along the southern Italian coasts. *Marine Biodiversity Records*, 2, e23.
- Crocetta, F., Mifsud, S., Paolini, P., Piscopo, J., Schembri, P. J., 2011. New records of the genus *Pachygrapsus* (Crustacea: Decapoda) from the central Mediterranean Sea with a review of its Mediterranean zoogeography. *Mediterranean Marine Science*, 12 (1), 75-93.
- Crocetta, F., Zibrowius, H., Bitar, G., Templado, J., Oliverio, M., 2013. Biogeographical homogeneity in the eastern Mediterranean Sea - I: the opisthobranchs (Mollusca: Gastropoda) from Lebanon. *Mediterranean Marine Science*, 14 (2), 403-408.
- Crocetta, F., Macali, A., Furfaro, G., Cooke, S., Villani, G. *et al.*, 2013. Alien molluscan species established along the Italian shores: an update, with discussions on some Mediterranean alien species categories. *ZooKeys*, 277, 91-108.
- Crocetta F., Agius D., Balistreri P., Bariche M., Bayhan Y.K. *et al.*, 2015. New Mediterranean Biodiversity Records (October 2015). *Mediterranean Marine Science*, 16 (3), 682-702.
- Dailianis, T., Akyol, O., Babali, N., Bariche, M., Crocetta, F. *et al.*, 2016. New Mediterranean biodiversity records (July 2016). *Mediterranean Marine Science*, 17, 608-626.
- Deidun, A., Fenech-Farrugia, A., Castriota, L., Falautano, M., Azzurro, E. *et al.*, 2015. First record of the silver-cheeked toadfish *Lagocephalus sceleratus* (Gmelin, 1789) from Malta. *BioInvasions Records*, 4 (2), 139-142.
- Delmastro, G. B., 1992. Sull'acclimatazione del gambero della Louisiana *Procambarus clarkii* (Girard, 1852) nelle acque dolci italiane. *Pianura - Supplemento di Provincia Nuova* 4, 5-10.

- De Min, R., Vio, E., 1998. Molluschi esotici nell'Alto Adriatico. *Annals for Istrian and Mediterranean Studies*, 13, 43-54.
- De Smit, E., Baba, K., 2001. Data to the malacofauna of Kata-vothres (Kefallinia, Greece). *Malacological Newsletter*, 19, 95-101.
- Di Natale, A., 1982. Extra Mediterranean species of Mollusca along the southern Italian coast. *Malacologia*, 22, 571-580.
- Djurović, M., Pešić, A., Joksimović, A., Dulčić, J., 2014. Additional record of a Lessepsian migrant-the dusky spinefoot, *Siganus luridus* (Rüppell, 1829) in the Eastern Adriatic (Montenegrin coast). *Annales Series Historia Naturalis*, 24 (2), 87.
- El Sayed, R.S., 1994. *Check-list of Egyptian Mediterranean Fishes*, Institute of Oceanography & Fisheries, ENODC Publications, 1, 1-77.
- Evagelopoulos, A., Poursanidis, D., Papazisi, E., Gerovasileiou, V., Katsiaras, N. *et al.*, 2015. Records of alien marine species of Indo-Pacific origin at Sigri Bay (Lesvos Island, north-eastern Aegean Sea). *Marine Biodiversity Records*, 8, e35.
- Fernández-Álvarez, F.Á., García-Jiménez, R., Machordom, A., 2015. *Carinina ochracea* (Palaeonemertea: Tubulanidae) reaches its southernmost distribution: new morphological and molecular data. *Zoological Science*, 32, 590-595.
- Fernández-Álvarez, F.Á., Machordom, A., 2013. DNA barcoding reveals a cryptic nemertean invasion in Atlantic and Mediterranean waters. *Helgoland Marine Research*, 67, 599-605.
- Fischer, W., Bianchi, G., Scott, W.B., (Eds), 1981. *FAO Species Identification Sheets for Fishery Purposes*. Eastern Central Atlantic; Fishing Areas 34, 47, Vol. 1 (in part). Ottawa, Canada: Canada Funds-in-Trust.
- Florio, M., Breber, P., Scirocco, T., Specchiulli, A., Cilenti, L. *et al.*, 2008. Exotic species in Lesina and Varano lakes: Gargano National Park (Italy). *Transitional Waters Bulletin* 2, 69-79.
- Franceschini, G., Andaloro, F., Diviacco, G., 1993. La macrofauna dei fondi strascicabili della Sicilia orientale. *Naturalista Siciliano* S. IV, 311-324.
- Frogliola C., 2010. Crustacea, Malacostraca, Decapoda. *Biologia Marina Mediterranea*, 17, 519-534.
- Galil, B. S., 2000. *Halimede tyche* (Herbst, 1801) (Decapoda: Xanthoidea; Halimedinae) from the Mediterranean coast of Israel, with a review of the genus. *Journal of Crustacean Biology*, 20, 325-331.
- Galil, B., Frogliola, C., Noel, P.Y., 2002. *CIESM Atlas of exotic species in the Mediterranean. Volume 2 Crustaceans: decapods and stomatopods*. CIESM Publishers, Monaco, 192pp
- Galil, B.S., Goren, M., 2014. Metamorphoses: Bioinvasions in the Mediterranean Sea. pp. 463-478. In: *The Mediterranean Sea*. Goffredo, S., Dubinsky, Z. (Eds). Springer, Netherlands.
- Gennaio, R., 2014. Diffusion of *Percnon gibbesi* (H. Milne Edwards, 1853) (Crustacea, Decapoda, Grapsidae) along the South Salento, Italy. *Thalassia Salentina* 36, 85-90.
- Giakoumi, S., 2014. Distribution patterns of the invasive herbivore *Siganus luridus* (Rüppell, 1829) and its relation to native benthic communities in the central Aegean Sea, Northeastern Mediterranean. *Marine Ecology*, 35, 96-105.
- Giannuzzi-Savelli, R., Pusateri, P., Palmeri, A., Ebreo, C., Coppini, M. *et al.*, 2001. *Atlante delle conchiglie marine del Mediterraneo*. Vol. 7: Bivalvia Protobranchia-Pteromorphia. Evolver, Roma, 246 pp.
- Gibson, R., 1995. Nemertean genera and species of the world: an annotated checklist of original names and description citations, synonyms, current taxonomic status, habitats and recorded zoogeographic distribution. *Journal of Natural History*, 29, 271-562.
- Golani, D., Orsi-Relini, L., Massuti, E., Quignard, J. P., 2017. *Updated CIESM Atlas of exotic species in the Mediterranean: Vol 1: Fishes*. CIESM Publishers, Monaco, 256pp.
- Gutiérrez-Yurrita, P. J., Montes, C., 1999. Bioenergetics and phenology of reproduction of the introduced red swamp crayfish, *Procambarus clarkii*, in Doñana National Park, Spain, and implications for species management. *Freshwater Biology*, 42 (3), 561-574.
- Herrera-Bachiller, A., 2016. *Los nemertinos de España y Portugal*. PhD. Thesis, University of Alcalá, Spain, 441 pp.
- Herrera-Bachiller, A., Fernández-Álvarez, F.Á., Junoy, J., 2015. A taxonomic catalogue of the nemerteans (Phylum Nemertea) from Spain and Portugal. *Zoological Science*, 32, 507-522.
- Hobbs, H., Jass, J. P., Huner, J.V., 1989. A review of global crayfish introductions with particular emphasis on two North American species (Decapoda, Cambaridae). *Crustaceana* 56, 299-316.
- Ibáñez-Yuste, A.J., Garrido-Díaz, A., Espinosa-Torre, F., Terón-Sigler, A., 2012. Primera cita del molusco exótico *Bursatella leachii* de Blainville, 1817 (Mollusca: Opisthobranchia) en el litoral mediterráneo andaluz. *Chronica naturae*, 2, 25-31.
- Kabasakal, H., 2006. Distribution and biology of the blunt-nose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788) (Chondrichthyes: Hexanchidae), from Turkish waters. *Annales Series Historia Naturalis*, 16, 29-36.
- Kajihara, H., 2007. A Taxonomic Catalogue of Japanese Nemerteans (Phylum Nemertea). *Zoological Science*, 24 (4), 287-326.
- Karachle, P.K., Angelidis, A., Apostolopoulos, G., Ayas, D., Ballesteros, M. *et al.*, 2016. New Mediterranean Biodiversity Records (March 2016). *Mediterranean Marine Science*, 17 (1), 230-252.
- Katsanevakis, S., Wallentinus, I., Zenetos, A., Leppäkoski, E., Çinar, M.E. *et al.*, 2014. Impacts of marine invasive alien species on ecosystem services and biodiversity: a pan-European review. *Aquatic Invasions*, 9 (4), 391-423.
- Langeneck, J., Barbieri, M., Maltagliati, F., Castelli, A., 2015. The low basin of the Arno River (Tuscany, Italy) as alien species hotspot: first data about *Rhithropanopeus harrisi* (Crustacea, Panopeidae). *Transitional Waters Bulletin*, 9, 1-10.
- Magri F., 1911. I Crostacei decapodi del compartimento marittimo di Catania. *Atti dell'Accademia Gioenia di Scienze Naturali di Catania*, 5, 1-46.
- Massuti, E., Stefanescu, C., 1993. First record of *Seriola fasciata* (Bloch, 1793) (Osteichthyes: Carangidae) in the Mediterranean. *Journal of Fish Biology*, 42, 143-144.
- McCully, S., 2016. *Leucoraja fullonica*. The IUCN Red List of Threatened Species 2016: e.T161461A16527953. Downloaded on 14 November 2016.
- MEDITS, 2016. *MEDITS-Handbook*. Version n. 8, 2016, MEDITS Working Group : 177 pp.
- Misuri, A., 1914. Contributo alla conoscenza della fauna carcinologica siciliana. I crostacei podofthalmi del Golfo di Palermo. Nota I. Brachiuri. *Giornale di Scienze Naturali ed Economiche di Palermo*, 30, 231-264.



- Moazzo, P.G., 1939. Mollusques testaces marins du Canal de Suez. *Memoires de l'Institut d'Egypte*, 38, 1-283, Cairo
- Moussa, R., Kapiris, K., Zenetos, A., 2016. Brachyuran diversity along Mediterranean Egypt, with the addition of a new introduced species. *Cahiers de Biologie Marine*, 57, 43-49.
- Naruse, T., Yeo, D.C.J., Osawa, M., 2014. Notes on a collection of stomatopod and decapod crustacean from Cambodia. *Cambodian Journal of Natural History*, 1, 24-36.
- Nelson, J.S., 1994. *Fishes of the World*, 3<sup>rd</sup> edition, John Wiley and Sons, Inc. New York, 600 pp.
- Ocaña Martín, A., Sánchez-Tocino, L., López-González, S., Viciano, J.F., 2000. *Guía Submarina de Invertebrados no Artropodos*. Editorial Comares, Granada, 471 pp.
- Oliveira, M.R., Carvalho, M.M., Silva, N.B., Yamamoto, M.E., Chellappa, S., 2015. Reproductive aspects of the flyingfish, *Hirundichthys affinis* from the Northeastern coastal waters of Brazil. *Brazilian Journal of Biology* 75 (1), 198-207.
- Özvarol, Y., 2014. The distribution of the Lessepsian ragged sea hare, *Bursatella leachii* Blainville, 1817 (Aplysiidae) in the Mediterranean coast of Turkey. *Journal of Fisheries Sciences*, 8(4), 298-302.
- Pallary, P., 1938. Les mollusques marins de la Syrie. *Journal de Conchyliologie*, 82, 5-57.
- Papaconstantinou, C., 2014. *Fauna Graeciae. An updated checklist of the fishes in the Hellenic Seas. Monographs on Marine Species*, 7. HCMR publications, Athens, Greece, 340pp.
- Parin, N.V., 1999. *Exocoetidae. Flyingfishes*. p. 2162-2179. In K.E. Carpenter and V.H. Niem (eds.) FAO species identification guide for fishery purposes. The living marine resources of the WCP. Vol. 4. Bony fishes part 2 (Mugilidae to Carangidae). FAO, Rome.
- Pipitone, C., Arculeo, M., 2003. The marine Crustacea Decapoda of Sicily (central Mediterranean Sea): a checklist with remarks on their distribution. *Italian Journal of Zoology*, 70, 69-78.
- Relini, M., Orsi, L., Puccio, V., Azzurro, E., 2000. The exotic crab *Percnon gibbesi* (H. Milne Edwards, 1853) (Decapoda, Grapsidae) in the central Mediterranean. *Scientia Marina* 64(3), 337-340.
- Rinaldi, A., 2012. *Atlante della fauna e flora marina dell'Adriatico nord-occidentale*. La Mandragora Editrice, Imola, 639 pp.
- Rizkalla, S. I.; Akel, E. H. Kh., E. Ragheb, 2016. Biodiversity and fisheries of the non-target catch from bottom trawl, off Alexandria, Mediterranean Sea, Egypt. *Regional Studies in Marine Science* 3, 194- 204.
- Rocca, D. (Coord.), 2007. Progetto Nazionale di censimento delle Specie non endemiche del Mediterraneo. <http://www.naturaitalia.it/pdf>
- Sala, E., Kizilkaya, Z., Yildirim, D., Ballesteros, E., 2011. Alien marine fishes deplete algal biomass in the eastern Mediterranean. *PLoS ONE*, 6(2), e17356.
- San Martín, G., 2003. *Annelida, Polychaeta II: Syllidae*. Museo Nacional de Ciencias Naturales, CSIC, Madrid, 554 pp.
- Sarà, G., Palmeri, V., Rinaldi, A., Montalto, V., Helmuth, B., 2013. Predicting biological invasions in marine habitats through eco-physiological mechanistic models: a case study with the bivalve *Brachidontes pharaonis*. *Diversity and Distributions*, 19, 1235-1247.
- Soldo, A., Bariche, M., Buscher, E., Cook, S. F., Compagno, L. J. V., 2016. *Hexanchus griseus*. The IUCN Red List of Threatened Species 2016: e.T10030A16527980.
- Stehman, M., Burkel, D.L., 1984. *Rajidae*. In Whitehead P.J.P., Bauchot M.L., Hureau J.C., Nielsen J., Tortonese E. (eds.), *Fishes of the north- eastern Atlantic and Mediterranean*. UNESCO, Paris, 1, 163-196.
- Streftaris, N., Zenetos, A., 2006. Alien marine species in the Mediterranean the 100 'worst invasives' and their impact. *Mediterranean Marine Science*, 7, 87-118.
- Tempesti, J., Rossano, C., Gambineri, S., Plaiti, W., Scapini, F., 2016. New records in the Mediterranean for the non-indigenous species *Paranthura japonica* (Richardson, 1909) (Anthuridea, Isopoda). *Biologia Marina Mediterranea*, 23, 249-250.
- Thessalou-Legaki, M., Zenetos, A., Kambouroglou, V., Corsini-Foka, M., Kouraklis, P. et al., 2006. The establishment of the invasive crab *Percnon gibbesi* (H. Milne-Edwards, 1853) (Crustacea: Decapoda: Grapsidae) in Greek waters. *Aquatic Invasions* 1, 133-136.
- Tortonese, E., 1986. *Serranidae*. In: P.J.P. Whitehead, M.-L. Bauchot, J.C. Hureau, J. Nielsen and E. Tortonese (Eds), *Fishes of the North-Eastern Atlantic and the Mediterranean*. UNESCO, 2, 780-792.
- Trainito, E., Doneddu, M., 2015. Contribution to the knowledge of the molluscan fauna in the Marine Protected Area Tavolara-Punta Coda Cavallo: Ordo Nudibranchia. *Bollettino Malacologico*, 51, 54-70.
- Tuncer, S., Bilgin, S., Eryilmaz, L., 2011. About the record of *Anthias anthias* (Linnaeus, 1758), (Pisces: Serranidae) in the Canakkale Strait, Turkey. *Turkish Journal of Fisheries and Aquatic Sciences*, 11, 165-166.
- Turan, C., Ozturk, B., Erguden, D., Gurlek, M., Yaglioglu, Det al., 2007. *Atlas of marine bony fishes of Turkey*. In: Turan C (Ed). Atlas and systematic of marine bony fishes of Turkey. Nobel Publishing House, Adana. Turkey, pp. 83-485.
- Vardala-Theodorou, G. E., 1999. The occurrence of the Indo-Pacific molluscan species *Fulvia fragilis* (Forsskål, 1775) and *Bulla ampulla* L., 1758 in Elefsis Bay. *Newsletter of the Hellenic Zoological Society*, 31, 10-11.
- Vernet, G., Anadón, N., 1991. Continental shelf and littoral nemerteans from the North and North-West Spanish Atlantic coasts. *Cahiers de Biologie Marine*, 32, 45-56.
- Williams, A. B., 1974. The swimming crabs of the genus *Calinectes* (Decapoda: Portunidae). *Fisheries Bulletin*, 72: 685-798.
- Zenetos, A., Gofas, S., Russo, G Templado, J., 2004. *CIESM atlas of exotic species in the Mediterranean*. Vol. 3. Molluscs. CIESM Publishers, Monaco, 376pp.
- Zenetos, A., Arianoutsou, M., Bazos, I., Balopoulou, S., Corsini-Foka, M. et al., 2015. ELNAIS: A collaborative network on Aquatic Alien Species in Hellas (Greece). *Management of Biological Invasions*, 6, 2, 185-196.
- Zenetos, A., Mačić, V., Jaklin, A., Lipej, L., Poursanidis, D., et al., 2016. Adriatic 'opisthobranchs' (Gastropoda, Heterobranchia): shedding light on biodiversity issues. *Marine Ecology - An evolutionary perspective*, 37 (6), 1239-1255.
- Zupa, W., Donnaloia, M., Gaudio, P., Intini, S. Carbonara, P., 2010. Occurrence of *Leucoraja fullonica* (Linnaeus, 1758) in the South Adriatic Sea. *Biologia Marina Mediterranea*, 17, 260-261.