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New records of rare species in the Mediterranean Sea (October 2020)

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Collective Article B

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New records of rare species in the Mediterranean Sea (October 2020)

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Abstract

This Collective Article presents information about 21 taxa belonging to seven Phyla (one Ochrophyta, one Porifera, three Cnidaria, two Arthropoda, three Mollusca, one Echinodermata, and ten Chordata) and extending from the western Mediterranean Sea to the Levantine Sea. The new records were reported from nine countries as follows: **Spain:** first records of three deep-sea species from the Blanes Canyon along the Catalan margin, namely the gorgonian *Placogorgia coronata*, the bivalve *Acesta excavata*, and the Azores rockling *Gaidropsarus granti*; **Italy:** first record of the mesopsammic nudibranch *Embletonia pulchra* from Ligurian shallow-waters; first record of the deep-sea carnivorous sponge *Lycopodina hypogea* from the north-central Tyrrhenian Sea, living in dense clusters over dead black corals; new records of the Portuguese man o' war *Physalia physalis* from Sardinian and Sicilian waters; first Italian record of the large asteroid *Coronaster briareus* from the Ionian Sea; first record of the white grouper *Epinephelus aeneus* in the northernmost point of the Adriatic Sea; **Croatia:** first record of the gastropod *Haliotis mykonosensis* for the Adriatic Sea; **Malta:** new sightings of *Physalia physalis* from Maltese waters; **Libya:** first record of the sand crab *Albunea carabus* from two localities along the Libyan coast; **Greece:** first records of the deep-sea black coral *Parantipathes larix* from the eastern Mediterranean Sea; first verified record of the agujon needlefish *Tylosurus imperialis* in the Hellenic Ionian Sea; first confirmed record of the brown algae *Treptacantha squarrosa* in the eastern Mediterranean Sea; new records of three deep-sea fish

species from the Aegean Sea, namely the bluntnose sixgill shark *Hexanchus griseus*, the Atlantic pomfret *Brama brama*, and the rudderfish *Centrolophus niger*; new record of the tripletail *Lobotes surinamensis* from Lesvos Island; new record of the shrimp *Brachycarpus biunguiculatus* from the gut content of the non-indigenous lionfish *Pterois miles*; **Turkey:** new record of the imperial blackfish *Schedophilus ovalis* from Turkish waters; **Lebanon:** first record of the slender sunfish *Ranzania laevis*, stranded along the Lebanese coast; **Israel:** new record, after about 60 years from the last catch, of the spotted dragonet *Callionymus maculatus*.

Introduction

The Mediterranean Sea represents one of the best studied basins in the world, with some biological information available since historical times. Despite this, the biodiversity inventory, as well as the knowledge on the geographical and bathymetrical distribution of the organisms, and the functioning of its ecosystems is still incomplete (e.g. Coll *et al.*, 2010; Narayanaswamy *et al.*, 2013; Levin *et al.*, 2014; Gerovasileiou *et al.*, 2015). In addition, due to climate changes, the Mediterranean Sea is warming faster than any other region in the world with evident modifications in the community structure and taxa composition (e.g. Durrieu de Madron *et al.*, 2011; Cattaneo-Vietti, 2018; Bianchi *et al.*, 2019). Certainly, the stabilization of alien species represents one of the main effects of global warming (Galil & Zenetos, 2002; Raitsos *et al.*, 2010), but also autochthonous thermophilous species, favoured by the increasing water temperature, are extending northward their geographical areas of distribution, affecting the local communities (Cattaneo-Vietti, 2018; Bianchi *et al.*, 2019; Sbragaglia *et al.*, 2020).

Therefore, in this rapidly-changing scenario, the verified and georeferenced records of marine species, completed with up-to-date ecological information (e.g. depth, habitat, feeding, and functional traits), are of crucial importance to better understand the evolution of the ecosystems, to monitor and predict the effects of climate change on the benthic and pelagic domains, to evaluate the effects of direct and indirect anthropic impacts, and overall to support management plans aimed at the conservation of the marine environment (Bianchi & Morri, 2000; Narayanaswamy *et al.*, 2013; Levin *et al.*, 2014). Despite their importance, these sporadic records are only seldom reported in scientific literature, particularly for rare or rarely encountered species.

The present paper aims to fill gaps and collect unpublished records of rare organisms from the whole Mediterranean Sea. Records are presented by major geographical zones, from west to east, arranged in corresponding sub-chapters. The approximate location of species occurrence records is illustrated in Figure 1 and the corresponding information (i.e. Phylum, sub-chapter, country, location, and location number on map) is presented in Table 1. Overall, 21 species, belonging to seven different phyla are here reported. The species are recorded from the sea surface to bathyal depths (0-1094 m), and from latitudes ranging from 2.84° E to 35.10° E, thus covering a large portion of the Mediterranean basin.

While fishing activities still represent a good way to observe and record rare marine organisms, it is noteworthy that six contributions in this Collective Article come from investigations with Remotely Operated Vehicles (ROVs). This relatively new technology is getting more and more efficient and affordable, and is employed by an increasing number of expeditions targeting the mesophotic zone (approximatively 40-200 m depth) and the deep-sea (>200 m), which historically represent two

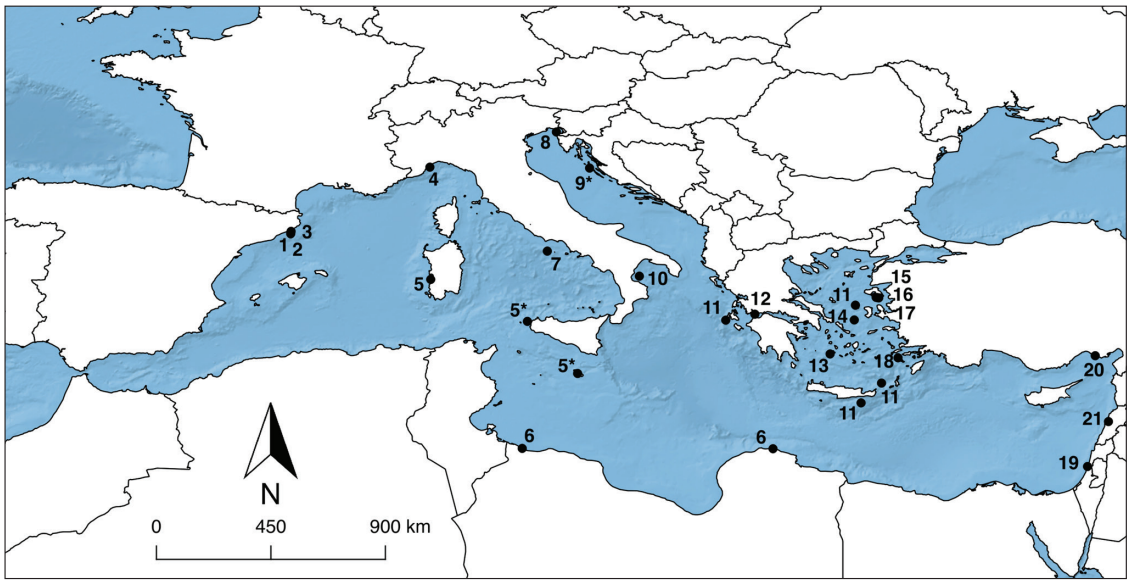

Fig. 1: Location of species records in the Mediterranean Sea presented in "New records of rare species in the Mediterranean Sea (October 2020)". Numbers of locations are given in Table 1. [* refers to multiple records of the species in the area]

Table 1. Information about species records by phylum. Sub-chapters (SC), basin (WMED – West Mediterranean Sea, CMED – Central Mediterranean Sea, ADRIA – Adriatic Sea, and EMED – Eastern Mediterranean Sea), location, country, and location number as in Figure 1 (LN). [* refers to multiple records of the species in the area].

Taxon	SC	Basin	Location	Country	LN
Phylum Ochrophyta					
Treptacantha squarrosa	4.3	EMED	Milos Island	Greece	13
Phylum Porifera					
Lycopodina hypogea	1.5	WMED	Pontine Archipelago	Italy	7
Phylum Cnidaria					
Physalia physalis	2.1	CMED/WMED	Malta, Aegadian Islands, West Sardinia	Malta, Italy	5*
Placogorgia coronata	1.2	WMED	Blanes Canyon	Spain	2
Parantipathes larix	4.1	EMED/CMED	From southwestern Chios Island to Kefalonia Island	Greece	11*
Phylum Arthropoda					
Brachycarpus biunguiculatus	4.5	EMED	Nisyros Island	Greece	18
Albunea carabus	2.2	CMED	Zuwarah, Ra's Al Hilal	Libya	6*
Phylum Mollusca					
Haliotis mykonosensis	3.2	ADRIA	Croatian islands	Croatia	9*
Embletonia pulchra	1.4	WMED	Noli Cape	Italy	4
Acesta excavata	1.1	WMED	Blanes Canyon	Spain	1
Phylum Echinodermata					
Coronaster briareus	2.3	CMED	Amendolara Bank	Italy	10
Phylum Chordata					
Hexanchus griseus	4.4	EMED	Psara Island	Greece	14
Brama brama	4.5	EMED	Lesvos Island	Greece	15
Callionymus maculatus	4.7	EMED	Central Israeli coast	Israel	19
Centrolophus niger	4.5	EMED	Lesvos Island	Greece	17
Epinephelus aeneus	3.1	ADRIA	Trieste Gulf	Italy	8
Gaidropsarus granti	1.3	WMED	Blanes Canyon	Spain	3
Lobotes surinamensis	4.5	EMED	Lesvos Island	Greece	16
Ranzania laevis	4.6	EMED	Tabarja	Lebanon	21
Schedophilus ovalis	4.6	EMED	Off Seyhan River	Turkey	20
Tylosurus imperialis	2.4	CMED	Patraikos Gulf	Greece	12

poorly known realms (Cerrano *et al.*, 2010; Danovaro *et al.*, 2010, 2014, 2017; Sinniger *et al.*, 2016; Gori *et al.*, 2017). ROVs allow the observation, via photographs and video-footages, of living organisms in their environment; these investigations are extremely valuable, because they may in some cases help the identification of otherwise difficult to preserve organisms, and allow observations of different ecological traits of the species, such as their habitat, habitus, coloration, behaviour, eventual relation with preys or predators, and so on (Chimienti *et al.*, 2019a). Observations made by SCUBA divers, and records obtained from citizen science programs, complete the list of new records of rare species from the Mediterranean Sea.

The westernmost records come from the Blanes Canyon, in front of the Catalan coast, where ROV explorations allowed the first sightings for the area of rare bathyal fauna, including the Azorean rockling, *Gaidropsarus granti* (Regan, 1903), obtaining *in vivo* pictures and important information about its habitat preferences, associated to deep coral communities. In the same area, several colonies of the rare gorgonian *Placogorgia coronata* Carpine & Grasshoff, 1975 were recorded and thanks to a collected sample it was possible to confirm the identification of this plexaurid alcyonacean. Finally, the bivalve *Acesta excavata* (Fabricius, 1779) was recorded at 1094 m depth, representing the deepest record of this species for the entire Mediterranean basin.

The *in-situ* observation by SCUBA diving of the rarely recorded mesopsammic nudibranch *Embletonia pulchra* (Alder & Hancock, 1844), for the first time reported from the Ligurian Sea, allowed to obtain putative information on its diet and its life cycle. In addition, the ROV

record of one of the densest populations known so far of the carnivorous sponge *Lycopodina hypogea* (Vacelet & Boury-Esnault, 1996) extended its known distribution to the north-central Tyrrhenian Sea, revealing information about its use of secondary substrata and sexual reproduction. Finally, the rarely observed Atlantic seastar *Coronaster briareus* (Verrill, 1882) was photographed by ROV in the Ionian Sea at 185 m depth, representing the first record of this deep species for the Italian coasts. This new record suggests a widespread southern distribution of this species in the Mediterranean Sea.

Two specimens of the sand crab *Albunea carabus* (Linnaeus, 1758) were recorded for the first time in Libyan waters, collected by trammel net and brought to attention by a citizen science program dedicated to the collection of information on indigenous and non-indigenous species in the region. Citizen science also helped in recording the pleustonic hydrozoan *Physalia physalis* (Linnaeus, 1758), well known because of its toxins and sporadically observed in the western Mediterranean Sea; a total of ten new records from Malta, Aegadian Archipelago and Sardinia, are reported here.

Two records come from the Adriatic Sea. The white grouper, *Epinephelus aeneus* (Geoffroy Saint-Hilaire, 1817), is a thermophilous species, which has now reached the northern portion of the Adriatic Sea, traditionally considered one of the coldest areas of the Mediterranean Sea. In fact, a specimen was captured by a spearfisher in front of Trieste. In addition, a large number of specimens of the gastropod *Haliotis mykonosensis* Owen, Hanavan & Hall, 2001 is here reported for the first time in the Adriatic Sea, and in particular along the coasts of six Croatian islands between 2 and 5 m depth.

Many contributions help in better defining the fauna living in Hellenic waters. For instance, the habitat-forming black coral *Parantipathes larix* (Esper, 1788), reported by means of ROV from four different localities, is here firstly recorded in the whole eastern basin at bathyal depths together with other deep benthic fauna, hence largely extending eastward its known distribution. In addition, four individuals of the agujon needlefish *Tylosurus imperialis* (Rafinesque, 1810) were collected during a scientific fishing campaign around the Patraikos Gulf, representing the first certain record of this pelagic species in the central Ionian Sea. The collection of the specimens allowed to obtain important morphometric measures and anatomical information. At the same time, direct observations and samples collection allowed to confirm the presence of the shallow-water brown algae *Treptacantha squarrosa* (De Notaris) Orellana & Sansón 2019 in the eastern Mediterranean Sea, as several individuals were found in the Kanavas port (Milos Island) in 2009, 2019 and 2020. Moreover, a mature male of the endangered bluntnose sixgill shark *Hexanchus griseus* (Bonnaterre, 1788) was captured by fishermen off Psara Island, in the northeastern Aegean Sea, representing a historical occurrence record from this area. Finally, the mesophotic fishes *Brama brama* (Bonnaterre, 1788) and *Centrolophus niger* (Gmelin, 1789), the tripletail *Lobotes surinamensis* (Bloch, 1790), and the shrimp *Brachycarpus biunguiculatus* (H. Lucas, 1846) were recorded from Lesvos and Nisyros islands, collected by fishermen.

Regarding the easternmost record, noteworthy is the collection of the small spotted dragonet *Callionymus maculatus* Rafinesque, 1810, recorded from the Israeli coasts about 60 years after its previous record, hence representing a very rare species in the area. Finally, the imperial blackfish *Schedophilus ovalis* (Cuvier, 1833) and the slender sunfish *Ranzania laevis* (Pennant, 1776), both rarely observed in the eastern Mediterranean Sea, were recorded off the coasts of Turkey, and close to Tabarja, in Lebanon, respectively. The first one was collected by fishermen, while the second one was found stranded, but still alive.

In conclusion, the above records represent an important contribution to our knowledge on the biodiversity of the Mediterranean basin, along both the geographical and bathymetrical gradients, and provide important information regarding the ecological habits and distribution ranges of several species.

1. WESTERN MEDITERRANEAN SEA

1.1 First record of *Acesta excavata* (Fabricius, 1779) in Blanes Canyon, Catalan margin

Pere PUIG and Meri BILAN

Acesta excavata (Fabricius, 1779) is a large-sized limid bivalve, often found associated with the reef-building cold-water corals (CWC) *Madrepora oculata* (Linnaeus, 1758) and *Lophelia pertusa* [now accepted as *Desmophyllum pertusum* (Linnaeus, 1758): see Addamo *et al.*, 2016] (Rueda *et al.*, 2019). Based on fossil records, this species was abundant during the Pleistocene, but today it is considered a rare species in the Mediterranean Sea (Taviani *et al.*, 2019a).

Living specimens have been recorded only a few times in the Mediterranean basin, in the Ligurian and Tyrrhenian seas, mostly between 430 and 570 m, with the exception of a finding in the Var Canyon (France) at unknown depth, shallower than 1548 m (López Correa *et al.*, 2005 and references therein; Taviani *et al.*, 2019b).

Several living individuals of *A. excavata* were pictured during the ABRIC ROV survey in the Blanes Canyon (Catalan margin) (see locations in Figure 2). The majority of the specimens were found on the western walls of the canyon (41.528°N, 2.840°E and 41.524°N, 2.842°E) at depths 1051-1094 m. This is the deepest confirmed record of *A. excavata* in the Mediterranean Sea. The specimens were attached to the vertical rocky substrate, in close vicinity of cold-water corals (CWCs) such as *M. oculata*, *D. pertusum*, *Desmophyllum dianthus* (Esper, 1794) and gorgonian *Muriceides lepida* (Carpine & Grasshoff, 1975) (Fig. 3A-B). The bivalves were gap-

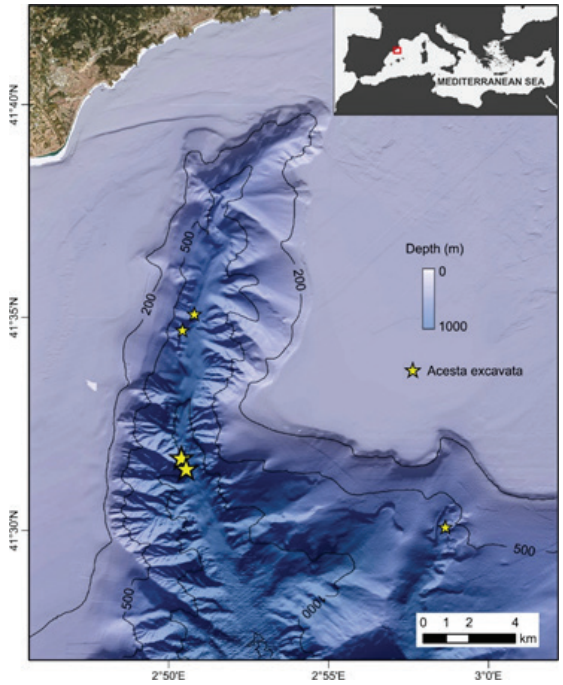

Fig. 2: Bathymetric map of the Blanes Canyon showing the locations where *Acesta excavata* was found during the ABRIC ROV survey. The larger stars denote the two deep sites where the specimens were more abundant.

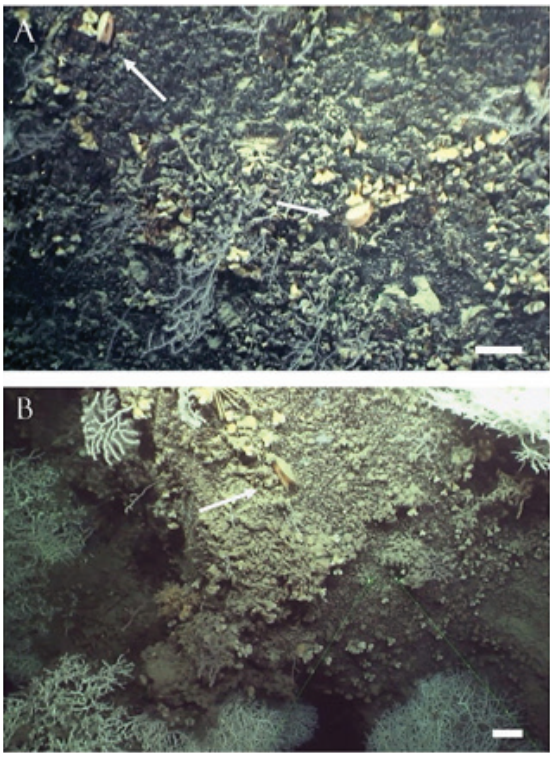

Fig. 3: *Acesta excavata* (pointed by white arrows) on vertical canyon walls surrounded by *Desmophyllum dianthus*, *Muriceides lepida* (A), and by *Desmophyllum pertusum* and *Madrepora oculata* (B). Scales are 10 cm apart in both images.

ing and the orange mantle visible, although no tentacles were observed.

Acesta excavata is a rare and localized species in the western and central Mediterranean Sea. During the Pleistocene, it was widespread, but due to temperature rise in the Holocene, the suitable habitat for these species was reduced (Taviani *et al.*, 2019a). Like *D. pertusum*, *A. excavata* is living at the edge of its ecological limits in the Mediterranean Sea and probably in the future these populations may reduce even more due to climate change (López Correa *et al.*, 2005). The only known site in the Mediterranean basin that supports a similar community, is the Dohrn Canyon in the Gulf of Naples (Italy) where *A. excavata* was found on canyon walls at 350-470 m depth (Taviani *et al.*, 2019b). Therefore, at present, submarine canyons prove to be the most suitable habitats for this species in the Mediterranean Sea.

1.2 New record of the gorgonian *Placogorgia coronata* Carpine & Grasshoff, 1975 in the Blanes Canyon (Catalan margin)

Jordi GRINYÓ and Meri BILAN

Placogorgia coronata Carpine & Grasshoff, 1975 is a gorgonian species of the family Plexauridae with an Atlanto-Mediterranean distribution. In Mediterranean waters this species is considered very rare, it has only been found in the Cassidaigne Canyon (Gulf of Lion) and in the Terra le Rame Canyon (Ligurian Sea), where it occurs on bathyal environments between 470 and 1000 m depth (Carpine & Grasshoff, 1975; Enrichetti *et al.*, 2018).

During the ABRIC ROV cruise (February 2020), several colonies of *P. coronata* were observed on a vertical wall in the Blanes Canyon at 695 m depth (Fig. 4A), being the first time that this species has been found on the Catalan margin. Colonies were associated with both scleractinians and thanatocoenoses of the bivalve *Neopycnodonte zibrowii* Gofas, Salas & Taviani, 2009 (Fig. 4A-B) agreeing with previous observations in other Mediterranean bathyal environments (Enrichetti *et al.*, 2018; Sartoretto & Zibrowius, 2018). The observed colonies were dark yellow, presented a slender fan-shaped morphology, sparsely distributed branches (Fig. 4A-C) and measured between 13 to 24 cm height.

One colony was sampled (41.583°N, 2.844°E) with the ROV Liropus 2000 and kept alive at the experimental aquarium facilities of the Institut de Ciències del Mar (ICM-CSIC) (Fig. 4C). A small fragment of an apical branch was dissected to examine its sclerites morphology and verify the taxonomic identification. At the base of the anthocodium, large and robust thornscales with a wide base and few projections (2-4) were observed (Fig. 4D), being consistent with previous records of this species (Enrichetti *et al.*, 2018). Moreover, this thornscale robustness has been suggested to be a differential feature between *P. coronata* and *Placogorgia massiliensis*

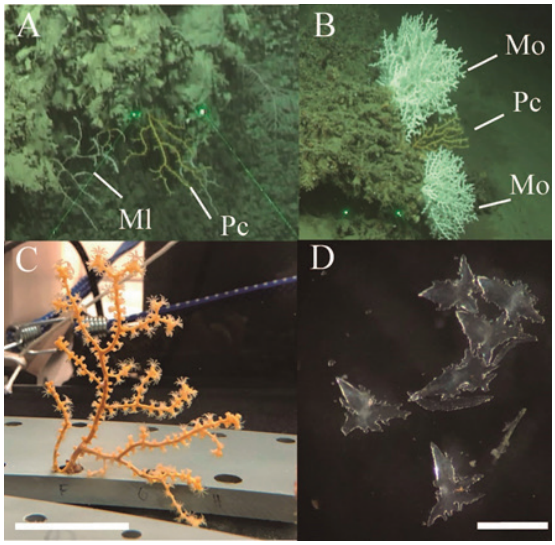

Fig. 4: *Placogorgia coronata* (Pc) colonies on A-B) *Neopycnodonte zibrowii* and scleractinian thanatocoenoses with other CWCs (Mo = *Madrepora oculata*, Ml: *Muriceides lepida*) (lasers = 10 cm). C) *P. coronata* colony in an experimental aquarium (scale = 10 cm). D) *P. coronata* thornscales (scale = 0.5 mm).

Carpine & Grasshoff, 1975, the other Mediterranean congeneric species. Thornscales in *P. massiliensis* are long and thin with a wide short base that generally ends up in two narrow transverse projections (Carpine & Grasshoff, 1975). This thornscale morphology was never observed while examining our sample.

1.3 First record of *Gaidropsarus granti* (Regan, 1903) in the Blanes Canyon, Catalan margin

Meri BILAN and Jordi GRINYÓ

The Azorean rockling, *Gaidropsarus granti* (Regan, 1903) (Osteichthyes: Lotidae), is considered a rare species, originally described as from the Atlantic Ocean. The first record for the Mediterranean Sea occurred in 1989 in the Ligurian Sea; afterwards this species was observed in several sub-basins, namely in the Adriatic Sea, Tyrrhenian Sea, Ionian Sea and the Sardinia Channel (Bello, 2018 and references therein).This species was mostly observed as part of bycatch of trawling, longlining and traps, with few *in vivo* ROV sightings (Angeletti *et al.*, 2014; Bello, 2018 and references therein; Spinelli & Castriota, 2019). This species seems to be associated to rocky substrates and Vulnerable Marine Ecosystems (VMEs) (FAO, 2009) such as sponge grounds and/or coral forests, as highlighted in previous records.

The present study is the first record of *G. granti* for the Catalan margin and one of the few sightings of this species in its natural habitat (Fig. 5). It was sighted during the ABRIC cruise on 19 February 2020 in the Blanes Canyon (41.626°N, 2.855°E) at 470 m depth at the can-

Fig. 5: *Gaidropsarus granti* on rocky substrate in Blanes Canyon. Scale is 10 cm (distance between green lasers).

yon head (Fig. 5). The species was identified using FishBase (Froese & Pauly, 2019) based on the specific colour and shape patterns on its lateral side (Bello, 2018).

The individual was approximately 25 cm long. It was found on a vertical wall in close vicinity to cold-water corals (CWCs), such as *Madrepora oculata* and *Desmophyllum dianthus* (Esper, 1794). When spotted by the ROV, the individual tried to find refuge in the rocky substrate instead of fleeing to the water column. This corroborates the demersal nature of this species. Besides, reported stomach content (Bello, 2018) includes small benthic decapod crustaceans, such as *Munida* spp., which are associated with CWCs and sponge habitats.

There is an ongoing debate whether this species is native to the Mediterranean Sea or a colonizer from the Atlantic Ocean (Bello, 2018). Low number of records in the Mediterranean basin may be due to species habitat preferences, which include topographically complex deep-sea features with potential presence of VMEs. These areas are not suitable for bottom trawling and have been poorly explored with image-based technologies. This study shows the advantages of ROV exploration as it enables observations in the natural remote habitat, ultimately filling knowledge gaps on species ecology.

1.4 First record of the mesopsammic nudibranch *Embletonia pulchra* from the Ligurian Sea

Federico BETTI and Riccardo CATTANEO-VIETTI

Embletonia pulchra (Alder & Hancock, 1844) (Gastropoda: Heterobranchia) is an enigmatic mesopsammic nudibranch, whose phylogenetic position within the Cladobranchia is still debated today (Edmunds, 2015). Despite the fact that this species is easily recognizable thanks to its peculiar shape, and it is known from northern Europe to the Mediterranean Sea, it suffers from a general paucity of published records, presumably due to small sizes (up to 7 mm) and burrowing habits (Schmekel

Fig. 6: *Embletonia pulchra* from the Ligurian Sea. a) a specimen close to one of its probable egg masses; b) close-up of the same specimen; c) a second specimen crawling on the eggs probably laid by the nearby polyclad *Eurylepta cornuta*.

& Portmann, 1982; Edmunds, 2015). In fact, with regards to the Mediterranean Sea, sightings are so far limited mainly to the Spanish coastline (Cervera *et al*., 2004) and to Italy, where it is only known from the Gulf of Naples (Schmekel & Portmann, 1982) and Ustica Island (Castriota *et al*., 2005).

During a biological survey conducted by SCUBA diving on June 1st 2020 along the Noli Cape coast (44.19918°N, 008.41996°E) (Savona, Liguria), two *E. pulchra* were observed (Fig. 6a-c). The specimens were crawling under small pebbles on a coarse-sandy bottom, at approximately 6 m depth. The first specimen was ca. 6 mm in total length and was surrounded by four egg masses, glued to the lower surface of the pebble (Fig. 6a, b). Egg masses consisted of thin ribbons containing two rows of pearly white eggs, coiled in anticlockwise spirals (see for comparison Schmekel & Portmann, 1982; Edmunds, 2015) constituted by more than three turns (Fig. 6a). The second specimen was found ca. 40 m away from the first one, was approximately 4 mm in total length and was crawling on unidentified eggs [presumably belonging to the close-by polyclad *Eurylepta cornuta* (Müller, 1776)] (Fig. 6c). As very similar eggs were also found few centimetres away from the first specimen, on the lower side of the same pebble, these observations could suggest a feeding activity on the above-mentioned eggs.

The Noli Cape is regularly monitored by SCUBA diving and is already known to host a rich heterobranch fauna (Betti *et al*., 2017); despite that, the presence of *E. pulchra* in the area has passed unnoticed until now. The present record extends the distribution of this species to the Ligurian Sea and suggests that this mesopsammic species crawls underneath large pebbles to lay its egg masses.

1.5 Occurrence of the carnivorous sponge *Lycopodina hypogea* in the north-central Tyrrhenian Sea

Marzia BO, Simonepietro CANESE and Federico BETTI

The carnivorous sponge *Lycopodina hypogea* (Vacelet & Boury-Esnault, 1996) (Demospongiae; Cladorhizidae) was originally described from a shallow-water marine cave found along the Provençal coast (Gulf of Lion) with stable low-temperature conditions closely resembling those of the deep-sea (Vacelet & Boury-Esnault, 1996). Successively, the increasing number of ROV surveys corresponded to a growing amount of records in the Atlantic-Mediterranean region, up to bathyal depths (Chevaldonné *et al.*, 2015). Despite this, many ecological and biological traits of *L. hypogea* remain unknown, probably due to the patchy distribution of the populations and the difficulties in spotting and sampling specimens at great depths.

During an extensive ROV survey conducted in 2014 in the Pontine Archipelago (Italy), two dense clusters of *L. hypogea* were observed at 188 m depth on skeletons of the black coral *Antipathella subpinnata* (Ellis & Solander, 1786) (Anthozoa; Antipatharia) (Fig. 7A-B), representing the first record of *L. hypogea* (Fig. 7C) for the north-central Tyrrhenian Sea (40.83392°N, 13.12963°E). Clusters account each for hundreds of specimens, forming one of the densest populations of this species known

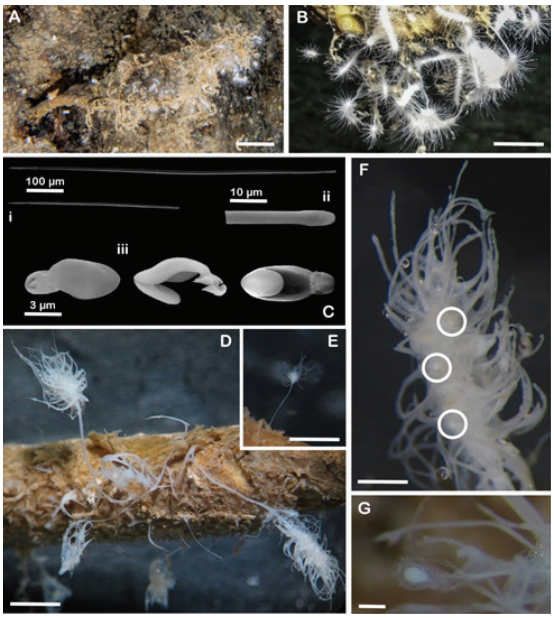

Fig. 7: A) Dead basal stem of *Antipathella subpinnata* covered by hydroids, sea anemones, serpulids, and a cluster of *Lycopodina hypogea*; B) close-up view of the carnivorous sponges; C) SEM images of spicules including i-ii) mycalostyles and subtylostyles, and iii) anisochelae; D) monopodial and branched peduncles; E) juvenile; F) incubating embryos (white circles); G) larva-like structure. Scale bars: A: 5 cm; B, D: 2 cm; E, F: 0.5 cm; G: 0.1 cm.

so far (up to one individual cm^{-2}) (Fig. 7B), comparable only to the one originally described in cave conditions (Vacelet & Boury-Esnault, 1996). The elevated position, here offered by the black corals, gives a better access to currents and favours high densities of *L. hypogea* as previously suggested for this species in other conditions (Bakran-Petricioli *et al.*, 2007). Coral skeletons are here indicated for the first time as a possible secondary substrate for this species so far reported only on rocks and wrecks (Chevaldonné *et al.*, 2015). The genus *Lycopodina* is no stranger to secondary substrates, with *Lycopodina occidentalis* (Lambe, 1893) known to live also on dead glass sponges (Riesgo *et al.*, 2007).

Individuals (up to 4 cm high) are monopodial or may show branched peduncles, often displaying a stolonal habitus (Fig. 7D). Solitary, newly settled individuals less than 1 cm high (Fig. 7E) provide evidence of sexual reproduction. Oval structures, about 1 mm long, are found within the pinacoderm and inside senescent filaments and may be related to spawning larvae (Fig. 7F-G). This mechanism for larval dispersal, in fact, is known in other carnivorous sponges (Riesgo *et al.*, 2007; Chu & Reiswig, 2014) and, combined to frequent asexual reproductive events, would support the reported densities.

2. CENTRAL MEDITERRANEAN SEA

2.1 Spreading further east: documenting the further penetration of the Portuguese man o' war *Physalia physalis* (Linnaeus, 1758) within the central Mediterranean

Alan DEIDUN, Paolo BALISTRERI and Bruno ZAVA

Physalia physalis (Linnaeus, 1758), a pleustonic colony of polypoid and medusoid organisms known as the Portuguese man o' war, is equipped with a particularly potent toxin that is potentially deadly to humans, and is not native to the Mediterranean Sea, being known from tropical and sub-tropical latitudes of the Indian, Pacific and Atlantic oceans (Prieto *et al*., 2015). The most recent records of this species from Maltese waters dates back to June 2010 (Deidun, 2010), with Castriota *et al*. (2017) reporting two colony strandings from the Strait of Messina (south Tyrrhenian Sea) in March 2009 and in March 2014 as well as one colony stranding from the island of Lampedusa (Pelagian Islands, western Strait of Sicily) in April 2009. This note documents a total of seven, two and one unpublished records of *P. physalis* respectively from the coastal areas of the Maltese and Aegadian archipelagoes and the island of Sardinia. The reported sightings were made over the 2011-2020 period (Table 2) through citizen science campaigns (Spot the Jellyfish, Aliens in the Sea) conducted by the authors within the area of interest. Figure 8 illustrates some of the *P. physalis* colonies listed in Table 2.

It is interesting to note that all the Aegadian and the majority of the Maltese *P. physalis* records were made along coastal areas having a western or northwestern aspect, in support of the Atlantic origin of the species. This hypothesis is further supported by two observations inherent to the *P. physalis* records documented in this study. Firstly, with the exception of one record, all records were made during the late winter and early spring (March-May) period, which is consistent with the timing (January-February) of the first seasonal sighting of the colonies along the Atlantic and Alboran Sea coastline of Spain. It is feasible to consider the two-month interval between the first seasonal appearance of the colonies along the Spanish coasts and the timing of their appearance in the central Mediterranean to suffice for the approximately 2000 km-long voyage between the two locations. Secondly, whilst the majority of *P. physalis* colonies recorded within the Prieto *et al*. (2015) study belonged to the <15 cm-pneumatophore categories, nine out of the colonies recorded in the current study had pneumatophores which exceeded 15 cm, suggesting a temporal permanence and corresponding increase in size of the colonies within the Mediterranean Basin following their entry from the Atlantic Ocean.

This hypothesis is further supported by the fact that the only recorded colony in the current study displaying a pneumatophore length inferior to 15 cm was the one beached in Sardinia, which corresponds to our western-

Table 2. List of unpublished *Physalia physalis* records from the Maltese and Aegadian islands for the 2011-2019 period. All records were single, isolated colonies.

Archipelago	Date	Locality	Coordinates	Collected
Maltese	08.03.11	Sa Maison	35.8948°N - 14.4995°E	Specimen
Maltese	05.03.12	Ghajn Tuffieha	35.9280°N - 14.3434°E	Photography
Maltese	07.04.14	Xlendi	36.0294°N - 14.2154°E	Photography
Maltese	19.05.18	Ghasri valley (Gozo)	36.0788°N - 14.2285°E	Photography
Maltese	23.05.18	Valletta Grand Harbour	35.9013°N - 14.5200°E	Specimen
Maltese	12.01.19	Ghajn Tuffieha	35.9280°N - 14.3434°E	Photography
Maltese	17.04.19	North Comino Channel	36.0252°N - 14.3255°E	Specimen
Aegadian	11.04.14	West coast of Levanzo	38.0154°N - 12.3312°E	Photography
Aegadian	25.05.18	West coast of Favignana	37.9372°N - 12.2709°E	Photography
Sardinia	18.05.20	West coast of Sardinia	39.6992°N –8.45404°E	Photography

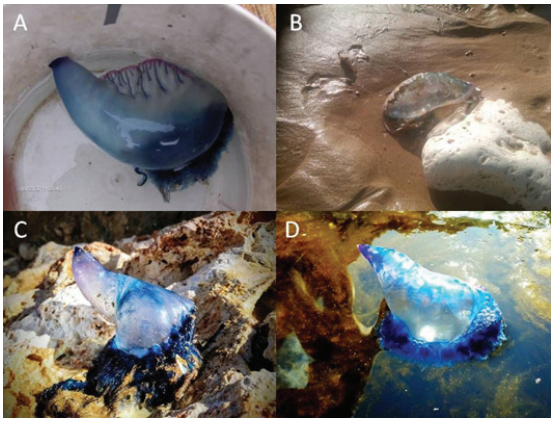

Fig. 8: A) *Physalia physalis* colony collected at Sa Maison (Malta) in March 2011; B) *P. physalis* colony beached at Ghajn Tuffieha (Malta) in March 2012; C) *P. physalis* colony beached at Ghajn Tuffieha (Malta) in January 2019; D) *P. physalis* colony beached along the west coast of the island of Levanzo (Aegadian islands) in April 2014.

most record of the species. Where possible (i.e. when colonies were collected and not just photographed), a broad-brush morphological examination was made. All the examined colonies (three out of the 10 colonies) displayed more than one long tentacle, leading us to ascribe the same colonies to *P. physalis*.

Whilst the majority of the species' records within Prieto *et al*. (2015) for the Spanish Alboran coastline consisted of swarms of colonies, all the records within the current study, as well as those reported in Castriota *et al*. (2017), consisted of single, isolated colonies, suggesting that the colonies observed within the central Mediterranean represented outlying, vagrant ones which emancipated from the main population.

Within the Ionian, there are no published records for *P. physalis* east of the Maltese Islands, suggesting that the colonies do not make landfall once they reach this part of the basin. There are also no records of the species from southern regions of the Tyrrhenian Sea, with the exception of the single record from the Strait of Messina (Castriota *et al*., 2017), with the Aegadian Island records from the current study suggesting that Strait of Sicily is occasionally a gateway for colonies of the species to venture further west within the basin.

2.2 First records of the sand crab *Albunea carabus* (Linnaeus, 1758) in Libyan waters (Decapoda, Anomura, Hippoidea)

Sara A.A. AL MABRUK, Bruno ZAVA
and Maria CORSINI-FOKA

The first study on the marine decapod crustacean fauna of Libya was conducted in Cirenaica by Colosi (1923), who found 15 species. Later, Maccagno (1939) described 25 decapods species, on the base of material collected by Enrico Tortonese from the littoral zone of Tripoli. Information on the decapod fauna diversity of Libya is prevalently related to commercial species (see for example Holthuis, 1987) and alien species too (Shakman *et al*., 2019), but various studies performed in the last decade allowed to accumulate knowledge on decapod variety and abundance in different coastal areas of the country (for example Abushaala *et al*., 2014). Taking into account related literature, at least 80 marine decapods are known from the coastal waters of Libya, including four alien crabs.

The sand crab *Albunea carabus* (Linnaeus, 1758) is the single species of the family Albuneidae living in the Mediterranean Sea. It is known from the eastern Atlantic and appears widely distributed in the Mediterranean basin, but up to date, its occurrence has not been reported from several regions, such as the Libyan coasts, the Adriatic and the Ionian seas (Zava *et al*., 2019). It lives on sandy environments where the water is prevalently turbid, often with high hydrodynamism.

From 2014, the creation of an online citizen science web site called "Marine Biology in Libya" (http://marinebiology.ly) gave us the opportunity to collect useful citizen-generated data on the distribution of indigenous and non-indigenous marine species in the Libyan region.

On August 6th 2018, a specimen of *Albunea carabus* was caught using a trammel net for cuttlefish, called locally "Badi" net, in the waters off the city of Zuwarah, west Libya (approximate coordinates 32.924°N, 12.123°E), at about 5 m of depth, on a rocky bottom with seagrass meadows and scattered sandy areas. In the same net, the fishes *Umbrina cirrosa* (Linnaeus, 1758) and *Sphyraena flavicauda* Rüppell, 1838 and the cephalopod *Sepia officinalis* Linnaeus, 1758 were collected. A second specimen (Fig. 9A-B) was fished on November 7th 2019 off the city of Ra's Al Hilal, East Libya (approximate coordinates 32.911°N, 22.177°E), with a trammel net, at 20 m

Fig. 9: Dorsal (A) and ventral (B) view of *Albunea carabus* observed at Ra's Al Hilal, Libya (photo by Khalifa M. Abdulghader).

of depth. The specimens were identified from photos uploaded in the above-mentioned site, following literature cited in Zava *et al*. (2019). The crabs were released by the fishing operators, consequently no information on their size and sex is available.

This note documents the first two records of *A. carabus* for the Libyan waters and fills a significant knowledge gap regarding the distribution of the species along the Mediterranean coasts. Its occurrence in the Libyan waters was expected since the species occurs in Tunisia and Sicily at west and in Egypt at east.

2.3 Record of the rare sea star *Coronaster briareus* in the Taranto Gulf (Ionian Sea)

Margherita TOMA and Simonepietro CANESE

The genus *Coronaster* (Echinodermata, Forcipulatida, Asteriidae) comprehends eight species, six of them occurring only in the Pacific Ocean and two, namely *Coronaster volsellatus* (Sladen, 1889) and *Coronaster briareus* (Verrill, 1882), known also from the Atlantic Ocean (Clark & Downey, 1992; Mah, 2020).

Coronaster briareus is mainly present in the western Atlantic Ocean, from New Jersey to Venezuela, but it has also been recorded from the Cape Verde Islands and the Great Meteor and Irving seamounts (Clark & Downey, 1992). In the Mediterranean Sea, this species has been recently reported from Maltese waters (Sicily Channel) (Evans *et al.*, 2016), where 26 individuals were sighted during an ROV survey at 240-562 m depth. One specimen was collected for morphological examination, which confirmed the identification. Other specimens of *Coronaster*, some of which with a different coloration (light brown to creamy), were reported also from the Alboran Sea (Hebbeln *et al.*, 2009), as well as from areas nearby the Gibraltar Strait (Evans *et al.*, 2016).

During an ROV survey made in 2009 along the Ionian coasts of Calabria (Italy), an individual of *C. briareus* was reported on the Amendolara Bank at 185 m depth (39.83°N, 16.82°E). It represents the first record of this species along the Italian coasts, increasing to 28 the number of asteroids of the Italian fauna (Matarrese, 2010).

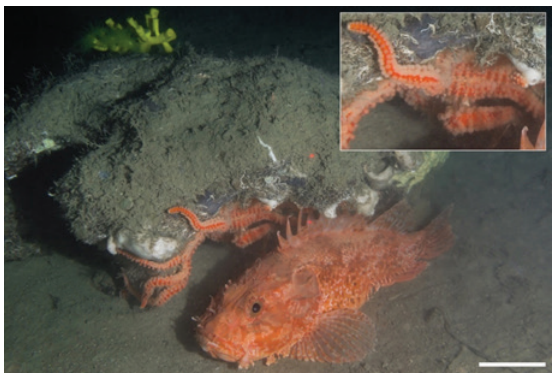

Fig. 10: ROV image of *Coronaster briareus* in the study site. The specimen is hidden in a crevice nearby a large scorpionfish *Scorpaena elongata* Cadenat, 1943. On the top of the boulder, a colony of the cold-water coral *Dendrophyllia cornigera* (Lamarck, 1816) is visible. Inset: close-up view of the sea star, with the five rows of white spines being clearly visible. Scale bar: 10 cm.

The specimen was found in a crevice of a small rocky boulder surrounded by muddy bottom, in agreement with the known habitat preferences and depth range distribution of this species (Fig. 10) (Evans *et al.*, 2016). The number of arms (10), the size (30 cm diameter), the colour of the body (bright red) and the characteristics of the spines (white, slender, encircled by a dense wreath of pedicellariae, well organized in five radial rows) were used as main visual taxonomic characters for the identification.

The presence of numerous individuals of *C. briareus* in several localities close to the Strait of Gibraltar, in Maltese waters and in the Ionian Sea possibly indicates a widespread southern distribution of this species in the Mediterranean basin.

2.4 Confirmed occurrence of the agujon needlefish *Tylosurus imperialis* (Rafinesque, 1810) in the Hellenic Ionian Sea

Vlasis KETSILIS-RINIS and Martha KOUTSIDI

According to the World Register for Marine Species, the genus *Tylosurus* (family Belonidae) comprises eight species among which *Tylosurus imperialis* (Rafinesque, 1810) and *Tylosurus choram* (Rüppell, 1837) inhabit the Mediterranean Sea. The subtropical *T. imperialis* [previously reported as *Tylosurus acus imperialis*] has been recorded from the Tyrrhenian and Ligurian seas, the Tunisian waters, the east and west Ionian and Adriatic seas, the Aegean Sea and the Levantine Sea (Bauchot, 1987; Chaari *et al*., 2014; Imsiridou *et al*., 2016 and references therein; Zorica *et al*., 2016). The species is epipelagic, inhabits offshore and coastal waters and can reach 140 cm of standard length (Chaari *et al*., 2014).

Although the east Ionian waters are included in the range of the species (cf Bauchot, 1987), precise locations, depths of occurrences, morphometrics and/or other biological features of this uncommon fish are not found in the literature. In this work, the presence of *T. imperialis* is ascertained for the first time in the central Ionian Sea, Greece, and biological data are reported.

Four individuals were collected during onboard sampling trips from the application of the European Union Data Collection Framework (EC 199/2018) in the eastern Ionian Sea (GFCM area: GSA20). One of the individuals (Fig. 11a), was captured by gillnet along the north coast of Patraikos Gulf (38.303344°N, 21.451815°E) on 18 July 2018, at a depth of 15 m, while the remaining three individuals were captured at 0.5-2 m of depth along the north coast of Patraikos Gulf (38.342796°N, 21.589079°E) on 10 June 2019, using spear.

Morphometric measurements, taken as in Imsiridou *et al*. (2016), and meristics, total weight (TW), gonad

weight, sex and gonadal maturity stage according to Nikolsky (1976), were recorded (Table 3). Otoliths were collected, stored dry, burned and then read under stereoscope in water, using reflecting light against a black background at a magnification of 10×. Specimens were identified following Bauchot (1987).

The total length-upper caudal fin lobe, total length-lower caudal fin lobe and TW, were respectively 929.5±91.8 mm, 952±93.3 mm and 1166.82±472.67 g (Table 3). All individuals were females and sexually mature, at stage 4 and 5 (Table 3, Fig. 11b). Fin rays counts and main proportions (Table 3) agreed with Imsiridou *et al*. (2016). The age of the four females, read from eight otoliths, ranged from three to four years (Fig. 11c), in agreement with Chaari *et al*. (2014), where the age of females spanned up to six years.

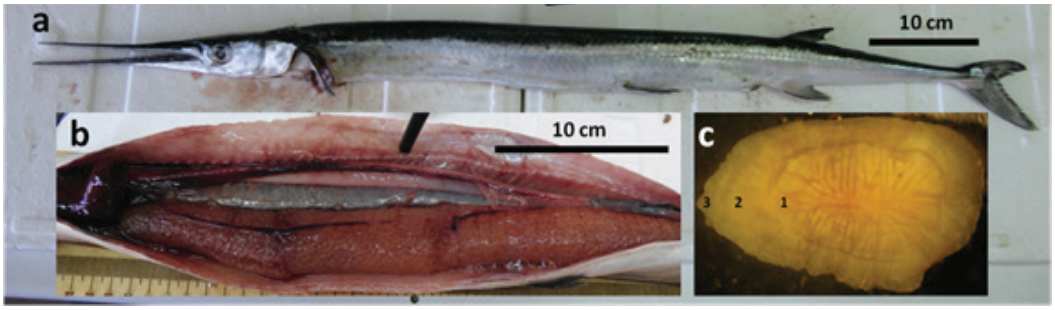

Fig. 11: (a) Specimen of *Tylosurus imperialis* from Patraikos Gulf, Ionian Sea, Greece, July 2018 (Individual 1, Table 3), (b): Female gonads at maturity stage 5 according to the macroscopic maturity scale of teleost fish (Nikolsky, 1976), (c): Individual's otolith in which the annual rings, indicating the age of three years old, are highlighted.

Table 3. Morphometric measurements (mm), meristic counts and weights (g) of four *Tylosurus imperialis* individuals from Patraikos Gulf, Greece. (BL: distance from the posterior margin of the opercula to the base of the caudal fin)

Parameters	1 ♀	2 ♀	3 ♀	4 ♀
Total length (lower lobe)	873	1087	917	931
Total length (upper lobe)	857	1064	893	904
Standard length	805	993	835	844
Fork length	833	1028	866	876
Body length (BL)	569	712	591	612
Head length (HL)	236	281	244	232
Preanal length	601	737	848	631
Preanal fin length	624	770	861	654
Predorsal length	631	789	865	662
Prepectoral length	242	293	246	236
Preventral length	493	592	514	511
Pectoral fin length (left-right) (P)	63.2-62.2	78.69-78.78	62.05-67.22	64.69-62.36
Ventral fin length (left-right) (V)	44.8-37.9	55.75-52.56	51.21-54.52	48.74-43.98
Dorsal fin length (height) (D)	49.2	53.19	44.09	44.04
Anal fin length (height) (A)	52.3	60.42	55.55	53.01
Dorsal fin base length	145.9	171.24	148.18	157.17
Anal fin base length	123.8	155.27	131	141.32
Pectoral fin base length (left-right)	16.9-16.8	24.65-23.27	18.5-18.19	18-17.59
Ventral fin base length (left-right)	9.2-9	12.69-12.57	10.77-11.55	9.9-11.41
Upper jaw length	149	175.53	152.44	141.43
Lower jaw length	151.9	178.23	155.74	144.5
Maximum body depth	56.8	80.23	55.22	58.74
Minimum body depth	10.8	17.05	12.55	13.9
Eye diameter (left-right)	21.6-17.4	23.85-24.77	20.95-20.11	20.775-19.83

continued

Table 3 continued

Parameters	1 ♀	2 ♀	3 ♀	4 ♀
Interorbital width	28.8	36.86	31.2	29.39
Dorsal fin rays	24	24	25	25
Anal fin rays	23	22	23	24
Pectoral fin rays (left-right)	13-14	13-13	14-14	13-13
Ventral fin rays (left-right)	6-6	6-6	6-6	6-6
BL/HL	2.4	2.5	2.4	2.6
BL/P	9.0-9.1	9.0-9.0	9.5-8.8	9.5-9.8
BL/V	12.7-15	12.8-13.5	11.5-10.8	12.6-13.9
BL/D	11.6	13.4	13.2	13.9
BL/A	10.9	11.8	10.6	11.5
Maturity stage of gonads	5	5	4	4
Gonad length	336	397	262	298
Gonad weight	157.1	283.5	65.9	85.18
Total weight	842.3	1865	918	1042
Net weight	615	1413	757	832

3. ADRIATIC SEA

3.1 The white grouper, *Epinephelus aeneus* (Geoffroy Saint-Hilaire, 1817), reached the northernmost point in the colonization of the Adriatic Sea

Jakov DULČIĆ and Valerio SBRAGAGLIA

Climate change is rapidly affecting marine biodiversity redistribution of the Mediterranean Sea, which is warming faster than any other region in the world (Lejeusne *et al.*, 2010). In particular, the warming of the Mediterranean Sea in response to climate change is triggering a northward expansion of species, which has been especially documented in teleost fish due to their high dispersal potential. Such changes were also recorded in the northernmost part of the Adriatic Sea (Lipej *et al.*, 2009), which represents one of the coldest sectors of the Mediterranean Sea.

The white grouper, *Epinephelus aeneus* (Geoffroy Saint-Hilaire, 1817), is considered very rare in the Adriatic Sea and biological information on this species are very scarce. On 13th May 2020, an adult specimen of the white grouper (Fig. 12) was caught by a spearfisher at a depth of 24 m off Trieste (45.6093°N, 13.4939°E; Fig. 13). The identification was based on the main characteristics for distinguishing *E. aeneus* from other species of the genus *Epinephelus*, which is the presence of 3 or 4 pale blue (or white) lines across the operculum. The total length of specimen was approximately 70 cm and its weight was 4.8 kg. The first records of this species in the Adriatic Sea dates to 22nd February and September 1999, when two specimens were caught off Dubrovnik (southern Adriatic; Glamuzina *et al.*, 2000; Fig. 13). The second report was on the record from 5th March 2006 of the island of Dugi Otok (middle Adriatic: (Dulčić *et al.*, 2006; Fig. 13)

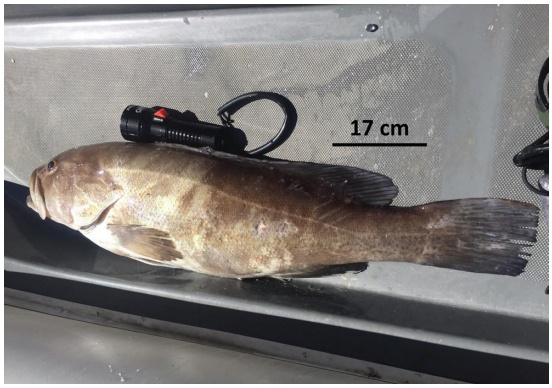

Fig. 12: Photo of the white grouper, *Epinephelus aeneus*, caught by a spearfisher on 13th May 2020 near Trieste.

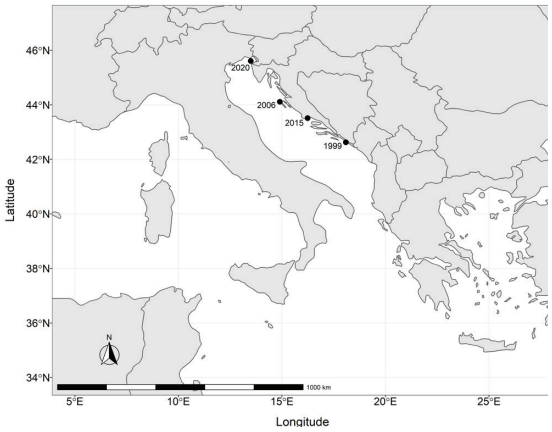

Fig. 13: The records of the white grouper, *Epinephelus aeneus*, in the Adriatic Sea according to their year of occurrence.

and the last (third) was on 2015 near the Island of Čiovo (middle Adriatic: Đođo *et al.*, 2016; Fig. 13). Therefore, the capture reported here represents the northernmost-evidenced record of the species in the Adriatic Sea.

The colonization of new areas by different grouper species could lead to significant changes in their ichthyofauna composition. As top carnivorous species and since they are among the largest coastal fish species, groupers could influence marine ecosystems and affect fishery dynamics (Đođo *et al*., 2016). The record reported here also highlights the importance of recreational fishers in detecting changes in the marine ecosystem such as the northward expansion of species (Sbragaglia *et al.*, 2020). Indeed, recreational fishers represent a widespread network of observers that – if properly integrated in research monitoring programs – can provide an unprecedented contribution to scientific knowledge.

3.2 *Haliotis mykonosensis* Owen, Hanavan & Hall, 2001 (Mollusca: Gastropoda) in the Adriatic Sea

Alan PETANI and Fabio CROCETTA

The family Haliotidae Rafinesque, 1815 is monogeneric and includes herbivorous sea snails widely distributed worldwide and commonly known as abalones (Geiger & Owen, 2012). Three native species live in the Mediterranean Sea, namely *Haliotis tuberculata* Linnaeus, 1758, *Haliotis stomatiaeformis* Reeve, 1846, and *Haliotis mykonosensis* Owen, Hanavan & Hall, 2001, whereas few occurrences of a fourth species, namely *Haliotis rugosa pustulata* Reeve, 1846, have been reported from the Mediterranean Sea (see Crocetta & Rismondo, 2009; Owen, 2013). This latter species is native from the western Indian Ocean, and thus may have arrived in the Mediterranean via shipping or Lessepsian migration, although additional confirmed records are necessary before considering this species as a permanent Mediterranean inhabitant. Among native species, *H. mykonosensis* has recently raised the attention of the scientific community, with Appolloni *et al.* (2018) suggesting it to be a junior synonym of *Haliotis secernenda* Monterosato, 1877, a change that was not implemented in MolluscaBase (2020). Although the lack of implementation was done with no explanation, we agree with it as *H. secernenda* better fits the status of *nomen dubium* (ICZN glossary: a name of unknown or doubtful application) rather than of a senior synonym of *H. mykonosensis*. Notwithstanding such a nomenclatural issue, differences between the three native species, and mostly between *H. tuberculata* and *H. mykonosensis*, were recently summarized by Crocetta & Rismondo (2009), who stressed the necessity to couple shell morphology with the analysis of soft parts (epipodia) as to obtain certain identifications. In addition, the three native species also possess different distributions, only partially overlapping. In fact, *H. tuberculata* possesses the widest one among them, living in the entire Mediterranean Sea, *H. stomatiaeformis* only lives in Malta and Italy (Lampedusa and Catania area, Sicily) and *H. mykonosensis* was originally described from Greece and subsequently recorded from Italy (mostly Tyrrhenian Sea) and France (Corse) (Crocetta & Rismondo, 2009; Geiger & Owen, 2012; Appolloni *et al.*, 2018).

During periodic research conducted by one of us (AP) on the eastern Adriatic malacofauna, the presence of *H. mykonosensis* was noticed in Croatia since 2008, and in particular 153 living specimens were found in 11 different localities, namely Luka Krijal (44.3347°N, 14.5944°E) and Uvala Premuda (44.3261°N, 14.6172°E) at Premuda Island, Punta Lopata (44.1244°N, 14.8769°E), Uvala Telašćica (43.8647°N, 15.2008°E), and Punta Pan-

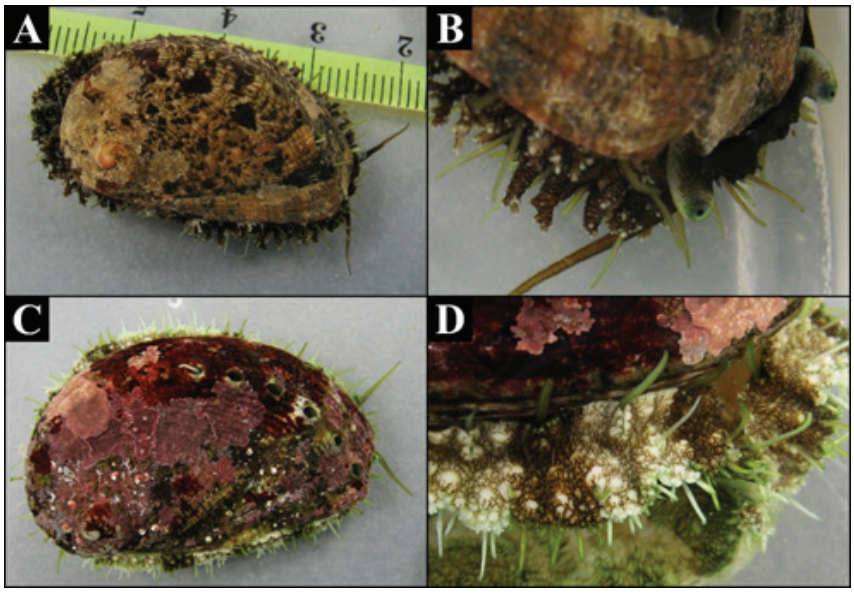

Fig. 14: *Haliotis* species found in sympatry at Telašćica (Croatia). A-B. *Haliotis mykonosensis*: entire specimen and its epipodia. C-D. *Haliotis tuberculata*: entire specimen and its epipodia.

tera (44.1627°N, 14.8233°E) at Dugi Otok Island, Uvala Tužbine (43.7955°N, 15.6013°E) at Murter Island, two different localities (44.3258°N, 15.0172°E; 44.2919°N, 15.0383°E) at Vir Island, Uvala Lojena (43.8202°N, 15.2494°E) and Mana Island-Balun Island (43.8030°N, 15.2569°E) at Kornati Island, and Punta Bonastar (44.1986°N, 14.8394°E) at Molat Island. In agreement with published literature, all the specimens were found between 2 and 5 meters depth nearby *Posidonia oceanica* (Linnaeus) Delile meadows, often in sympatry with *H. tuberculata*, although the latter species was always found more commonly in shallower waters (Fig. 14). The present paper contributes to the knowledge of the distribution of *H. mykonosensis* in the Mediterranean Sea and first extends it to the Adriatic Sea.

4. EASTERN MEDITERRANEAN

4.1 First records of the black coral *Parantipathes larix* (Esper, 1788) from the deep eastern Mediterranean Sea

Vasilis GEROVASILEIOU, Christopher J. SMITH and Chryssi MYTILINEOU

The black coral *Parantipathes larix* (Esper, 1788) (Anthozoa: Antipatharia) is among the cold-water corals which can form "animal forests", either mono-specific or mixed with other species, from the shelf edge to the bathyal depths of the Mediterranean Sea (Bo *et al*., 2014; Chimienti *et al*., 2019b). This antipatharian is characterized by single-stem or sparsely branched colonies, with a bottlebrush morphology, and can reach up to 2 m in height. It is known from several locations in the western Mediterranean Sea, occurring mostly at a depth range of 90 to 460 m, while it is occasionally found in deeper waters (Chimienti *et al*., 2019b). *Parantipathes larix* has been included in Annex II (List of Endangered and Threatened Species) of the Barcelona Convention and was recently assessed as "Near Threatened" in the IUCN Red List of Endangered Species due to an inferred population reduction of about 20%, being vulnerable to existing fishing pressure on deep hard grounds (Otero *et al*., 2017; 2019).

This study presents the first observations of *P. larix* in Hellenic waters and the eastern Mediterranean Sea, recorded with the ROV "Max Rover" of the Hellenic Centre for Marine Research (HCMR), from four distinct locations in the Aegean, Libyan and eastern Ionian seas: (1) 12 colonies were observed in 2003 on low outcropping reefs with mixed assemblages of tetractinellid sponges and the anthozoan *Callogorgia verticillata* (Pallas, 1766) at 473 m depth (Fig. 15A), off southwestern Chios Island, Central Aegean Sea (approximate coordinates: 38.073°N, 25.437°E); (2) one colony was observed in 2008 on an amphora at 597 m depth (Fig. 15B) off Chryssi Island, off south Crete, Libyan Sea (approximate coordinates: 34.749°N, 25.709°E); (3) one colony was observed in 2009 on a stone on fine sedimentary seabed with scat-

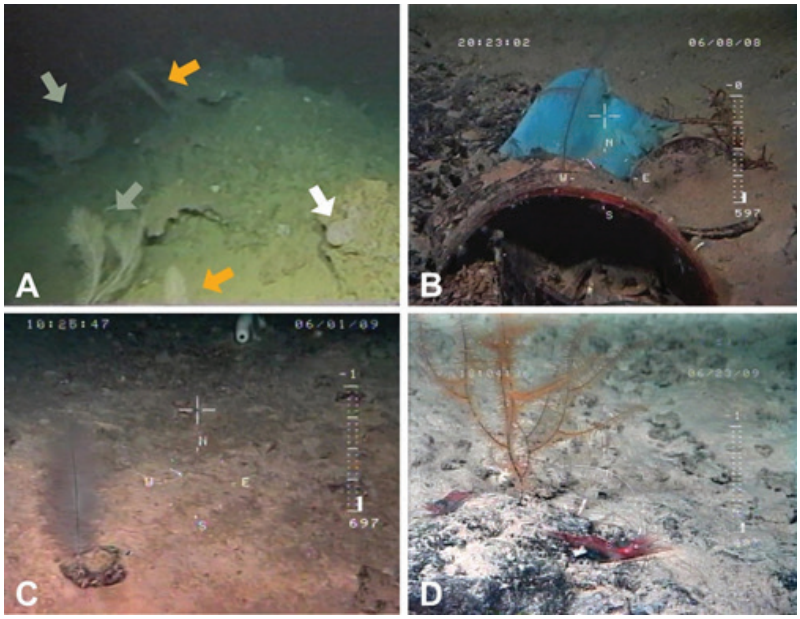

Fig. 15: ROV video images of *Parantipathes larix* from the eastern Mediterranean Sea. A) Deep outcropping rocky reefs with mixed assemblages of the anthozoans *P. larix* (orange arrows) and *Callogorgia verticillata* (grey arrows) and tetractinellid sponges (white arrow); B) *P. larix* on an amphora and a piece of plastic litter; C) *P.* cf. *larix* on a stone and a white unidentified sponge; D) *P.* cf. *larix* colony on hard substrate, covered with a thin sediment layer, and the associated pandalid shrimp *Plesionika gigliolii*. Date (top right) and depth (down right) are noted in images B, C, and D. Images are unscalable due to zoom lens.

tered rocks and bedrock outcrops at 697 m (Fig. 15C), in Kasos Strait, south Aegean Sea (approximate coordinates: 35.542°N, 26.530°E); and (4) one colony was observed in 2009 on a boulder covered with a thin layer of sediment, at 487 m depth (Fig. 15D) off Kefalonia Island, eastern Ionian Sea (approximate coordinates: 38.065°N, 20.285°E). The pandalid shrimp *Plesionika gigliolii* (Senna, 1902) was found associated with the coral. The latter two records show a reddish phenotype with a more planar arrangement of the lateral pinnules, which are considered unusual features for *P. larix*.

The bathymetric range of *P. larix* in the study area (473-704 m) was deeper than in the western Mediterranean Sea (Chimienti *et al*., 2019b). The closest record of *P. larix* is from the Sea of Marmara (Çinar *et al*., 2014 and references therein) while all other published records are from the western Mediterranean Sea (Chimienti *et al*., 2019b). However, given the limitations of taxonomic identification based only on photographic material, future examination of collected specimens is considered necessary. This will help also clarify the taxonomic position of the two observed phenotypes.

Further surveys are required in order to fill existing distribution gaps and develop conservation actions for protected taxa and vulnerable assemblages in the deep eastern Mediterranean Sea, in the light of current activities (deep-water fisheries) and future plans for offshore oil and gas exploration.

4.3 Confirmation of the rare brown alga *Treptacantha squarrosa* occurrence in the eastern Mediterranean Sea

Konstantinos TSIAMIS and Maria SALOMIDI

Treptacantha squarrosa (De Notaris) Orellana & Sansón, previously known as *Cystoseira squarrosa* De Notaris, is a Mediterranean endemic and one of the rarest species of the *Treptacantha/Cystoseira/Carpodesmia* complex (Orellana *et al*., 2019). Based on Alongi *et al*. (2002), it has disappeared in the original type locality (Nice, France) and its presence has been confirmed only to few localities of the western Mediterranean Sea (e.g. Genova, Dalmatia, and Palermo), while other Mediterranean records were proved to be misidentifications. When it comes to the eastern basin, the species has been reported only from Turkey (Taskin *et al*., 2008) lacking description and confirmation, and from various locations in Greece (see Tsiamis *et al*., 2013 and references therein). However, the Hellenic records lack sufficient documentation as well, and they were treated as debatable by Tsiamis *et al*. (2013) and Alongi *et al*. (2002) pending new information. The latter authors also mentioned that the only herbarium specimens from Greece (Attica), located at the Riksherbarium in Stockholm and labelled as *Cystoseira squarrosa*, actually belonged to *Cystoseira corniculata* (Turner) Zanardini.

In the present study, the occurrence of *Treptacantha squarrosa* is confirmed for the first time in the eastern Mediterranean Sea. Several individuals were detected

Fig. 16: *Treptacantha squarrosa* in the field (photo by Yiannis Issaris/HCMR).

Fig. 17: Habit of *Treptacantha squarrosa*; scale bar = 1 cm.

at 0-20 cm depth on natural and semi-natural sheltered rocks in Milos Island, south Aegean Sea (Kanavas port; 36.709763°N, 24.466918°E) in 2009, and subsequently in 2019 and 2020 (Fig. 16). Associated flora included *Amphiroa rigida* Lamouroux and *Jania* spp. Herbarium voucher specimens are deposited in the ATHU Herbarium (University of Athens) as well as in the herbarium base of the Hellenic Centre for Marine Research.

Habit bush-like, non-caespitose, brown to yellow, rigid, up to 20 cm high (Fig. 17); one erect primary axis, short, up to 4 cm high, usually branched at right angles, attached to substratum by a robust discoid base of 1 cm in diameter; axis apex slightly prominent and smooth; tophules numerous, oblong and warty; primary branches terete, densely ramified to secondary terete branches; spinose appendages (leaves) present, robust, rigid, densely

located in the upper parts; leaves' apices bifid or trifid, occasionally multifid; aerocysts absent; conceptacles at swollen bases of the spinose appendages in the upper parts.

Treptacantha squarrosa is a canopy-forming and habitat-creating keystone species. As all *Treptacantha/Cystoseira/Carpodesmia* species, it is highly sensitive to natural and human disturbance. To be mentioned that the species is listed in the Annex II (List of Endangered and Threatened Species) of the Protocol of the Barcelona Convention concerning Specially Protected Areas and Biological Diversity in the Mediterranean (UNEP-PAM-RAC/SPA, 2012).

4.4 Historical occurrence of the endangered bluntnose sixgill shark *Hexanchus griseus* (Bonnaterre, 1788) in the northeastern Aegean Sea

Vasiliki KOUSTENI

The bluntnose sixgill shark *Hexanchus griseus* (Bonnaterre, 1788) is a large shark, globally distributed in subarctic, tropical and temperate waters (Compagno, 1984). Although it is mostly considered as a deep-water shark, it exhibits diurnal vertical movements from the surface to 2490 m, corresponding to a versatile life mode useful to live in a variety of habitats, where it plays the important role of top predator (Ebert, 1986). *H. griseus* is a generalist predator feeding on a variety of marine organisms, including other chondrichthyans (Compagno, 1984; Ebert, 1986), and reproduces through viviparity with litter size reaching 74 cm in total length (Ebert, 1986). The species matures at a smaller size in the Mediterranean than other seas, while females mature at larger size than males in all areas (Capapé *et al*., 2003 and references therein). *H. griseus* is widely distributed in the Mediterranean Sea; most of its records are sporadic and is usually neglected from data collection due its rareness and low economic value (Vella & Vella, 2017 and references therein). It is worth noting that a scientific survey of the historical records of *H. griseus* in the Mediterranean Sea since 1892 showed that the species has been captured in restricted areas, more commonly in the western than in the eastern basin (Capapé *et al*., 2003), which is also depicted in a recent study (Mancusi *et al*., 2020 and references therein). The biology of the species in the Mediterranean is also poorly known (Capapé *et al*., 2003). With special regard to the Hellenic waters, sporadic references of the species have been reported at irregular intervals in the Aegean and Ionian Seas (Papaconstantinou, 2014) and there is significant lack of knowledge regarding its biological features.

On 8th October of 2008, a mature male *H. griseus* individual was captured incidentally by a commercial bottom trawler in the northeastern Aegean Sea, near Psara Island, at depths between 330-476 m. The trawl route included the following geographical positions: 38.665°N, 25.483°E; 38.549°N, 25.425°E; 38.550°N, 25.390°E; and 38.663°N, 25.391°E. A photographic collection of some morphological and reproductive features of the specimen is presented in Figure 18. The specimen reached 290 cm in total length and weighed 100 kg. Its claspers were rigid and sperm flow was observed from the cloaca. The main diagnostic features of the species were recognized and included a stout body with long tail, head broad with six gills, mouth ventral, lower jaw with 6 rows of large comb-shaped teeth on each side, upper jaw with smaller teeth, one dorsal fin, and caudal peduncle short and stout (Compagno, 1984).

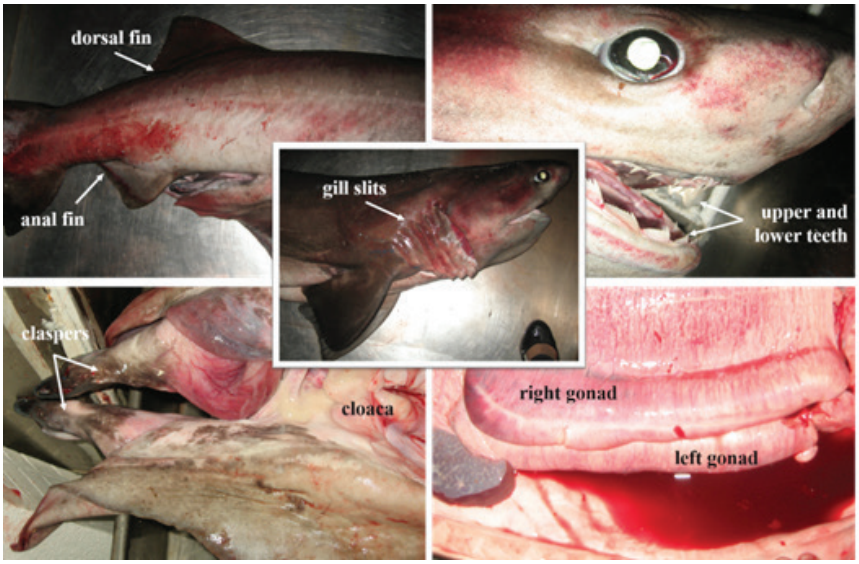

Fig. 18: Some morphological and reproductive features of a mature male *Hexanchus griseus* specimen caught incidentally in the northeastern Aegean Sea on 8th October of 2008 (photos by V. Kousteni).

4.5 New records of rare fish and decapod species from the Aegean Sea (Lesvos and Nisyros Islands)

Ioannis E. BATJAKAS and Thodoros E. KAMPOURIS

The present note reports on the finding of three rare fish species in the northeastern Aegean Sea (off Lesvos Island) and a cryptobiotic decapod from the southeastern Aegean Sea (Nisyros Island, Dodecanese area).

The tripletail, *Lobotes surinamensis* (Bloch, 1790), is a cosmopolitan, migratory, benthopelagic species inhabiting tropical and temperate marine waters. Despite various records in other areas (Ligurian Sea, southern Tyrrhenian Sea, and Central Mediterranean Sea) (Tiralongo *et al.*, 2018; Gerovasileiou *et al.*, 2020), in the eastern Mediterranean Sea there are only sporadic records and it is considered rare (Golani *et al.*, 2006; Minasidis *et al.*, 2020). Two specimens of *L. surinamensis* were caught by longline in 2015 off Plomari, Lesvos Island (approximate coordinates 38.9701°N, 26.3569°E) (Fig. 19A), representing the second record of the tripletail from Lesvos Island after 2009 (Minasidis *et al.*, 2020).

The Atlantic pomfret, *Brama brama* (Bonnaterre, 1788), is a cosmopolitan species that performs vertical and seasonal migrations in tropical and temperate waters of the world (Quinzán *et al.*, 2016). In Greece, it is only known by a few of records (Papaconstantinou, 2014), excluding Lesvos Island. A specimen (Fig. 19B) was caught off Plomari, Lesvos Island, by longline targeting swordfish in 2017 (approximate coordinates 38.9761°N, 26.3163°E).

The Rudderfish, *Centrolophus niger* (Gmelin, 1789), is a species rarely observed in the Mediterranean waters. It is a pelagic species dwelling over the continental shelf, commonly found at 200-400 m, forming small groups (Golani *et al.*, 2006). Though that is widely distributed in Aegean and Ionian seas, it is unreported from Lesvos Island (Papaconstantinou, 2014). A specimen of *C. niger* (Fig. 19C) was caught by longline, off Plomari (approximate coordinates 38.9573°N, 26.4175°E).

Brachycarpus biunguiculatus (Lucas, 1846) is a circumtropical species of the Palaemonidae family. It has a wide distribution in Mediterranean Sea, yet it is rarely recorded (Kampouris *et al.*, 2018; Kondylatos *et al.*, 2020). It is the only species of genus *Brachycarpus* occurring in Mediterranean waters and till very recently was unknown from the Aegean Sea. The only published records are from Santorini Island and Legrena, Saronikos Gulf (Kampouris *et al.*, 2018). Very recently, the species was recorded from Rhodes Island (Kondylatos *et al.*, 2020) Here we present further records of *B. biunguiculatus* from Nisyros Island (approximate coordinates 36.5570°N, 27.1916°E), Dodecanese (Fig. 19D). All specimens (four in total) were found in the stomach content of the non-indigenous lionfish *Pterois miles* (Bennett, 1828). The identification was based on the visible criteria according to Okuno & Osawa (1994).

4.6 Records of *Schedophilus ovalis* from Turkey and *Ranzania laevis* from Lebanon

Sinan MAVRUK and Michel BARICHE

Four species of medusafishes (Actinopterygii, Centrolophidae) inhabit the Mediterranean Sea: *Centrolophus niger* (Gmelin, 1789), *Hyperoglyphe perciformis* (Mitchill, 1818), *Schedophilus medusophagus* (Cocco, 1839) and *Schedophilus ovalis* (Cuvier, 1833). Of these, *C. niger* and *S. ovalis* are known in the eastern basin (Golani *et al.*, 2006). The imperial blackfish *S. ovalis* is rarely observed along the Mediterranean coast of Turkey, where it was firstly recorded in 2010 from Iskenderun Bay (Ergüden *et al.*, 2013) and collected afterwards from Antalya Bay, in 2013 (Filiz & Güzelaydın, 2014). Here we report a new occurrence of *S. ovalis* from the Mersin Bay, northeastern Mediterranean Sea.

On 16 April 2020, a young specimen was captured by a fisher using shrimp trammel nets at 13 m depth off Seyhan River (36.64°N, 35.10°E) and transferred to the

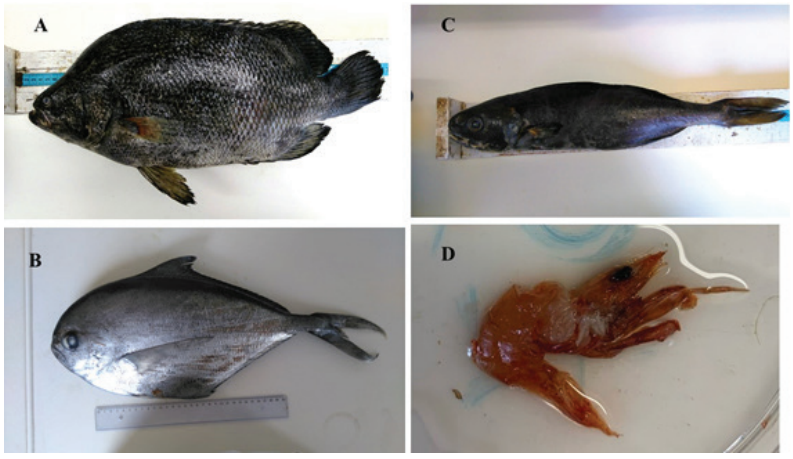

Fig. 19: Specimens of *Lobotes surinamensis* (A), *Brama brama* (B) and *Centrolophus niger* (C) caught off Plomari, Lesvos Island, northeastern Aegean Sea; (D) one of the four specimens of *Brachycarpus biunguiculatus* found in the stomach content of *Pterois miles* from Nisyros Island, Dodecanese Islands, southeastern Aegean Sea.

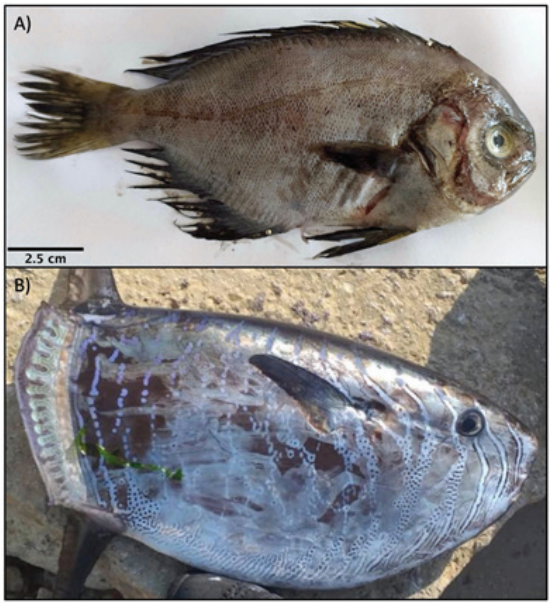

Fig. 20: A) *Schedophilus ovalis* from off Seyhan River, Mersin Bay, Turkey. B) *Ranzania laevis* from Tabarja, Beirut, Lebanon.

Cukurova University, Fisheries Faculty (CUSO001-20). The specimen was 17.5 cm in total length (TL), had a standard length (SL) of 14.5 cm and weight of 95.2 g (Fig. 20A). Description: coloration dark greenish without a specific pattern; body deep with a maximum body depth of 45 % SL; small spines on the preopercular margin; a single dorsal fin aligned before the insertion of pectoral fin, with easily distinguishable spines; length of dorsal spines gradually increased reaching the rayed portion; fin meristics were D VIII+31, A III+21, V I+5. The species *S. ovalis* can be separated from other Atlantic and Indo-Pacific centrolophid genera, *Centrolophus* and *Icichthys* by having a body depth higher than 35% SL, and from *Hyperoglyphe* and *Psenopsis* by having longer spines in the dorsal fin. The number of dorsal and anal spines and rays are characteristic of *S. ovalis* among other congeners (Haedrich, 1981; 1983). All descriptive characters of the specimen under study are in accordance with those given in previous records in the Mediterranean coast of Turkey (Ergüden *et al.*, 2013; Filiz & Güzelaydın, 2014).

Ocean sunfishes (Actinopterygii, Molidae) is a family that consists of three genera and five species, most of which have a circumglobal distribution in the tropical and temperate seas. In the Mediterranean, two species are known: the ocean sunfish *Mola mola* (Linnaeus, 1758) and the slender sunfish, *Ranzania laevis* (Pennant, 1776), this last being rarely recorded from the Levant Basin (Golani *et al*., 2006). It is only very recently that *R. laevis* was recorded again from the area, more specifically from the Iskenderun Bay, Turkey, in 2016 and 2018 (Yapıcı, 2019; Ergüden *et al*., 2020). Here we provide an additional record for the Levant Basin and the first record of this species for Lebanon.

On 15 April 2020, an individual of slender sunfish was found stranded on rocks in the vicinity of Tabarja, north of Beirut (approximate coordinates 34.00°N, 35.63°E). The individual was photographed and was released back to sea. Its photograph was sent to one of the authors (MB) (Fig. 20B). The TL was estimated to be approximately 90 cm. *Ranzania laevis* is the only species of its genus and can easily be distinguished from genus *Mola* by its more elongated body shape and from genus *Masturus* by a wider clavus, the caudal fin-like structure characteristic of Molidae. This oceanic epipelagic fish feeds on planktonic crustaceans, small fishes, jellyfishes and squids. Based on the previous, above mentioned, consecutive records within the last three years (Ergüden *et al.*, 2020; Yapıcı, 2019) and the present one, the slender sunfish occurrence could be increasing in the Levant Basin.

4.7 Genetic identification of the rare spotted dragonet *Callionymus maculatus* Rafinesque, 1810 from the eastern Mediterranean Basin

Nir STERN and Hadas LUBINEVSKY

Fishes of the family Callionymidae, with about 200 valid species worldwide (Fricke, 2002), are small-sized benthic species. In the Mediterranean Sea, these fish are represented by ten species, of which seven belong to the genus *Callionymus* (Seyhan *et al.*, 2017). According to the last checklist made by Golani (2005), four species of *Callionymus* inhabit the Mediterranean coast of Israel, though only the alien invasive *Callionymus filamentosus* can be found in significant numbers, as bycatch of the local bottom trawl industry. The remaining three species, *C. maculatus, C. pusillus*, and *C. risso*, are extremely rare along the Israeli coast and absent from the neighbouring Lebanese coast, according to the recent checklist of Bariche & Fricke (2020). During the Israeli National Mediterranean monitoring project held on the 3rd of December 2017, two specimens of *Callionymus* with a total length (TL) of 50 and 54 mm, were obtained from a 140 m deep beam trawl sample in central Israeli coast (32.19833333°N, 34.79027778°E; Fig. 21).

After preservation in 80% ethanol, a muscle tissue was taken from one individual for genetic examinations. Following the extraction of total genomic DNA, the 'barcoding gene' COI mtDNA was amplified for taxonomic identification and comparisons. The final sequence was then uploaded to the online depository of BoLD system at www.v4.boldsystems.org under the BIM project (Biota of the Israeli Mediterranean) as BoLD Sample ID: BIM751-19. Genetic result identified it as *C. maculatus*, clustering within the Barcode Index Number (BIN BOLD: AAI6958) and displaying a range of 0.0-0.9% genetic divergence between 13 individuals that were previously collected from the North Sea and Atlantic Portuguese coasts. Unfortunately, the two specimens from this study were mistakenly discarded, thus no further morphological examinations were available for this report. Nevertheless, its genetic signature provided solid taxonomic confirmation for the existence of *C. macula-*

Fig. 21: *C. maculatus*, genetically identified and vouchered in online BoLD System as BIM751-19.

tus along the Israeli Mediterranean coast. The fact that the last specimen was collected from the Israeli coasts in 1960 (vouchered at the Hebrew University under voucher HUJF 8081) demonstrates its unique rarity and emphasizes the need for continuous monitoring, either by morphological and genetic tools, in order to authenticate and augment local species checklists.

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