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Collective Article A

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New Alien Mediterranean Biodiversity Records (November 2021)

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Abstract

This Collective Article includes records of 29 alien and cryptogenic species in the Mediterranean Sea, belonging to eight Phyla (Rhodophyta, Ochrophyta, Cnidaria, Annelida, Mollusca, Arthropoda, Echinodermata, and Chordata) and coming from 11 countries. Notes published here can be divided into three different categories: occupancy estimation for wide areas, new records for the Mediterranean Sea, and new records of species expanding within the Mediterranean Sea. The first category includes a visual survey held along the coastline of Peloponnese (Greece), which yielded records of 15 species. The second category includes the first Mediterranean records of the Coho salmon *Oncorhynchus kisutch* (Greece) and of the Arabian monocle bream *Scolopsis ghanam* (Tunisia). The third category includes new records for countries (*Ganonema farinosum* in Malta, *Cassiopea andromeda* in Libya, *Cingulina isseli* in Greece, *Okenia picoensis* in Italy, *Callinectes sapidus* in Slovenia, *Charybdis* cf. *hellerii* in Malta, *Urocaridella pulchella* in Cyprus, *Ablennes hians* and *Aluterus monoceros* in Lebanon, and *Fistularia petimba* in Greece and Lebanon), new records for MSFD areas or regional seas (*Septifer cumingii* in the Greek Ionian Sea and *F. petimba* in the Marmara Sea), and confirmation of old, doubtful, or spurious records/statements (*Branchiomma luctuosum* in Tunisia, *Thalamita poissonii* in the Saronikos Gulf, and *Pterois miles* in Albania). Noteworthy, the three new records of *F. petimba* suggest that it may soon spread further in the Mediterranean Sea, as already happened for its congeneric *Fistularia commersonii*. Distributional data reported here will help tracing colonization routes of alien species in the basin and may facilitate the development of mitigation measures.

Introduction

Alien species (non-native, non-indigenous, exotic) are species, subspecies or lower taxa introduced outside their natural past or present distribution, and include any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce (European Commission, 2008). The introduction and establishment of non-indigenous species (NIS) is a phenomenon widely recognized as one of the major elements of ongoing anthropogenic environmental changes, causing biodiversity loss and alterations to ecosystem structure and functions, and may also result in high socio-economic impacts (e.g., Wallentinus & Nyberg, 2007; Molnar *et al.*, 2008; Katsanevakis *et al.*, 2014; Ojaveer *et al.*, 2015). Such a phenomenon, moreover, seems to be particularly amplified in the Mediterranean Sea due to a high number of potential pathways acting synergistically, such as (among the others) escape from confinement, transport-contaminant, transport-stowaway, but also unaided spread and corridor spread (Lessepsian migration through the Suez Canal) (e.g., Zenetos *et al.*, 2017; Tsiamis *et al.*, 2018, 2020). As the semi-closed Mediterranean basin not only already hosts a wide number of NIS (more than 600 taxa already established) (Zenetos *et al.*, 2017; Zenetos & Galanidi, 2020), but also more than 17,000 reported species with a high endemism rate (Bianchi & Morri, 2000; Coll *et al.*, 2010), substantial effort was put in the last decades by marine scientists to increase the knowledge on alien species' spatio-temporal dynamics and impacts, often with the help of variegate taxonomic specialists (e.g., Katsanevakis *et al.*, 2015; Tsiamis *et al.*, 2016, 2020; González-Moreno *et al.*, 2019) or even citizen-scientists (e.g., Giovos *et al.*, 2019; Katsanevakis *et al.*, 2020; Tiralongo *et al.*, 2020). NIS monitoring, as well as periodic re-evaluation of earlier reports, has thus become a priority for local scientists, also considering that taxonomic inventories and faunal lists still constitute the most valid and efficient tool available for making long-term comparisons (e.g., Mikkelsen & Cracraft, 2001; Boero, 2013; Crocetta *et al.*, 2013, 2015).

The *Mediterranean Marine Science* journal acknowledges such importance and since 2011 constitutes a platform to facilitate the collection of new distributional data through Collective Articles. Originally including both alien and native species together (e.g., Eleftheriou *et al.*, 2011; Zenetos *et al.*, 2015; Kousteni *et al.*, 2019), Collective Articles were then split in two different series since 2020, one of which is devoted to NIS (series A) (e.g., Bariche *et al.*, 2020; Orfanidis *et al.*, 2021) and one to rare native species (series B) (e.g., Gerovasileiou *et al.*, 2020; Santín *et al.*, 2021).

The authors of the present Collective Article A report unpublished records of 29 NIS in the Mediterranean Sea, belonging to eight Phyla (Rhodophyta, Ochrophyta, Cnidaria, Annelida, Mollusca, Arthropoda, Echinodermata, and Chordata) and coming from 11 countries. In particular, one note deals with a visual survey held along the coastline of Peloponnese (Greece), which yielded records of 15 species and offers the most accurate baseline of the region so far. Two notes report the finding of two alien species new for the Mediterranean Sea, namely the Coho salmon *Oncorhynchus kisutch* and the Arabian monocle bream *Scolopsis ghanam*, respectively found in Greece and Tunisia, whereas a number of additional notes report first records *per* country or *per* sea of 11 additional species. Finally, sightings of three species (*Branchiomma luctuosum* in Tunisia, *Thalamita poissonii* in the Saronikos Gulf, and *Pterois miles* in Albania) confirm old, doubtful, or spurious records/statements. Noteworthy, the three new records of *Fistularia petimba* included here from Lebanon, Greece, and Turkey (Marmara Sea) suggest that this alien fish may soon spread further, as already happened for the congeneric taxon *Fistularia commersonii*. All data listed above are summarized and georeferenced in Table 1 and Figure 1. Present records will help tracing colonization routes of NIS in the Mediterranean basin and may facilitate the development of mitigation measures.

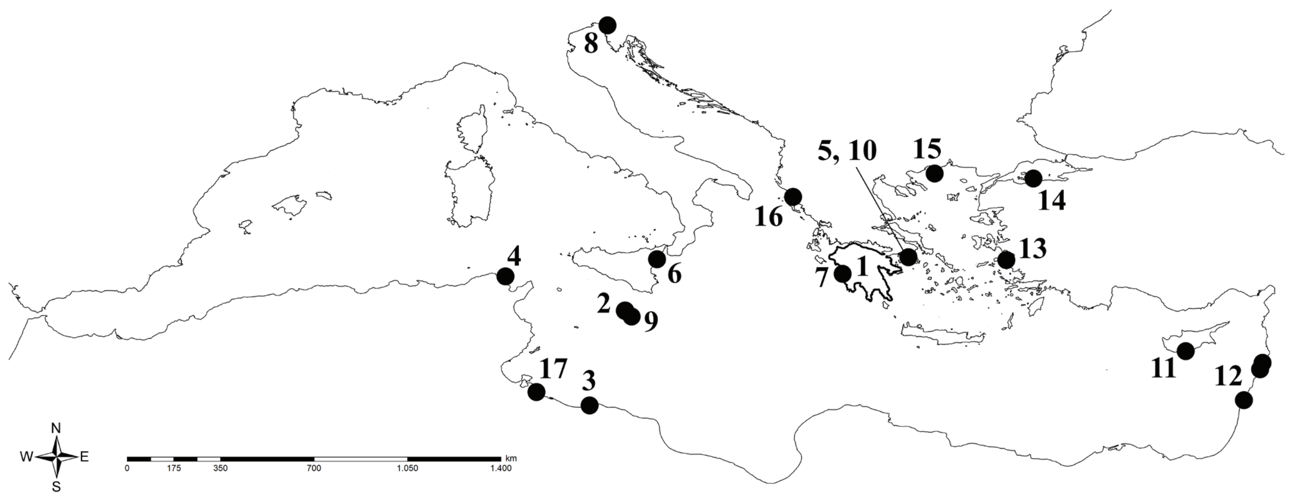

Fig. 1: Approximate locations of records published in "New Alien Mediterranean Biodiversity Records (November 2021)". Location numbers (LN) as in Table 1.

Table 1. Information about species records by phylum. Subchapters (SC), basin (ADRIA – Adriatic Sea, CMED – Central Mediterranean Sea, EMED – Eastern Mediterranean Sea, and MARM – Marmara Sea), location, country, and Location Number (LN) as in Figure 1.

Taxon	SC	Basin	Location	Country	LN
Phylum Rhodophyta					
Asparagopsis taxiformis	1.1	EMED	Peloponnese	Greece	1
Ganonema farinosum	1.2	CMED	Gozo	Malta	2
	1.1	EMED	Peloponnese	Greece	1
Phylum Ochrophyta					
Stypopodium schimperi	1.1	EMED	Peloponnese	Greece	1
Phylum Cnidaria					
Cassiopea andromeda	1.3	CMED	Janzour	Libya	3
Oculina patagonica	1.1	EMED	Peloponnese	Greece	1
Phylum Annelida					
Branchiomma luctuosum	1.4	CMED	Bizerte Lagoon	Tunisia	4
Phylum Mollusca					
Cingulina isseli	1.5	EMED	Glyfada	Greece	5
Conomurex persicus	1.1	EMED	Peloponnese	Greece	1
Okenia picoensis	1.6	CMED	Santa Tecla	Italy	6
Pinctada imbricata radiata	1.1	EMED	Peloponnese	Greece	1
Septifer cumingii	1.7	EMED	Kyparissia	Greece	7
Phylum Arthropoda					
Callinectes sapidus	1.8	ADRIA	entire coast	Slovenia	8
Charybdis cf. *hellerii*	1.9	CMED	Grand Harbour	Malta	9
Percnon gibbesi	1.1	EMED	Peloponnese	Greece	1
Thalamita poissonii	1.10	EMED	Glyfada	Greece	10
Urocaridella pulchella	1.11	EMED	Limassol	Cyprus	11
Phylum Echinodermata					
Diadema setosum	1.1	EMED	Peloponnese	Greece	1
Synaptula reciprocans	1.1	EMED	Peloponnese	Greece	1
Phylum Chordata					
Ablennes hians	1.12	EMED	Tyre	Lebanon	12
Aluterus monoceros	1.12	EMED	Chekka	Lebanon	12
Enchelycore anatina	1.1	EMED	Peloponnese	Greece	1
Fistularia commersonii	1.1	EMED	Peloponnese	Greece	1
Fistularia petimba	1.12	EMED	Tripoli	Lebanon	12
	1.13		Samos Island	Greece	13
	1.14	MARM	Bandirma Bay	Turkey	14
Oncorhynchus kisutch	1.15	EMED	Thasos Island	Greece	15
Pterois miles	1.16	EMED	Saranda	Albania	16
	1.1		Peloponnese	Greece	1
Scolopsis ghanam	1.17	CMED	Bahiret El Bibane	Tunisia	17
Siganus luridus	1.1	EMED	Peloponnese	Greece	1
Siganus rivulatus	1.1	EMED	Peloponnese	Greece	1
Stephanolepis diaspros	1.1	EMED	Peloponnese	Greece	1

1.1 Occupancy estimation of alien, cryptogenic, and neonative species in Peloponnese (Greece)

Stelios KATSANEVAKIS

Presence-only records of alien/cryptogenic/neonative species are useful to evaluate changes in distribution range and establishment success in new regions, although they are often insufficient to assess population status. Occupancy, defined as the probability of presence in a sampling unit, is a low-cost state variable that can allow it. When based on repetitive sampling and the application of a maximum-likelihood framework that accounts for imperfect detectability, unbiased occupancy values can be estimated (MacKenzie *et al.*, 2006). Occupancy is easier to estimate than population density or abundance and is adequate for large-scale monitoring, in particular in studies of biological invasions (Issaris *et al.*, 2012). In the present study, the occupancy of 18 targeted species was investigated in August 2020 through a snorkelling visual survey held in the upper infralittoral zone (0–5 m) of rocky reefs along the coastline of Peloponnese (Greece), applying the field protocol proposed by Issaris *et al.* (2012). Specifically, 35 sites were surveyed, although disproportionally less sites were surveyed in the western and northern coasts due to the scarcity of reefs (Fig. 2; Supplementary Table 1); at each site, three 15-min snorkelling surveys were conducted by the same observer, recording presence/absence of targeted species. Photographic and video footages were also taken to document the records. The resulting presence/absence data for each site and survey were used to jointly estimate the occupancy and detectability of each species by applying the single-season occupancy model of MacKenzie *et al.* (2006); the software PRESENCE v10.7 (Hines, 2006) was used for all estimations (except for *Stephanolepis diaspros*, *Fistularia commersonii*, *Enchelycore anatina*, and *Synaptula reciprocans* due to insufficient data; in this case the naïve estimate of occupancy is given, i.e. the number of sites with detection divided by the total number of sites). Fifteen of the target species were detected in at least one site, i.e. the alien fishes *F. commersonii*, *Pterois miles*, *Siganus luridus*, *Siganus rivulatus*, and *S. diaspros*, the alien invertebrates *Conomurex persicus*, *Diadema setosum*, *Percnon gibbesi*, *Pinctada imbricata radiata*, and *S. reciprocans*, the alien macroalgae *Asparagopsis taxiformis* and *Stypopodium schimperi*, the neonative fish *E. anatina*, the cryptogenic invertebrate *Oculina patagonica*, and the cryptogenic macroalga *Ganonema farinosum*. The other target species (i.e., the alien fishes *Lagocephalus sceleratus* and *Sargocentron rubrum* and the alien macroalga *Caulerpa cylindracea*) were not detected at any station, although they have been reported before in Peloponnese according to the Ellenic Network on Aquatic Invasive Species (ELNAIS; Zenetos *et al.,* 2015). This is indicative of their very low occupancy in the upper infralittoral zone of reef habitats in the region. *Siganus rivulatus* had the highest occupancy (~85.6%), followed by *P. gibbesi* (~78.8%), *S. luridus* (~77.4%), and *G. farinosum* (~67.1%) (Table 2). All four species were very abundant, exhibiting invasive character at many sites and dominating local communities. In particular, the high occupancy and abundance of the two siganids is worrying as they may have severe impacts on rocky reefs due to overgrazing (Katsanevakis *et al.*, 2014). Among the detected species, *F. commersonii*, *E. anatina*, and *S. reciprocans* had the lowest occupancy as they were observed at one site each. Remarkable is the complete absence of *C. cylindracea*, despite being considered among the most invasive alien species in the Mediterranean (Katsanevakis *et al.*, 2014) and being recorded at high densities in the region in the past. The present study first offers a baseline for future assessments of the temporal dynamics of the surveyed species in the region.

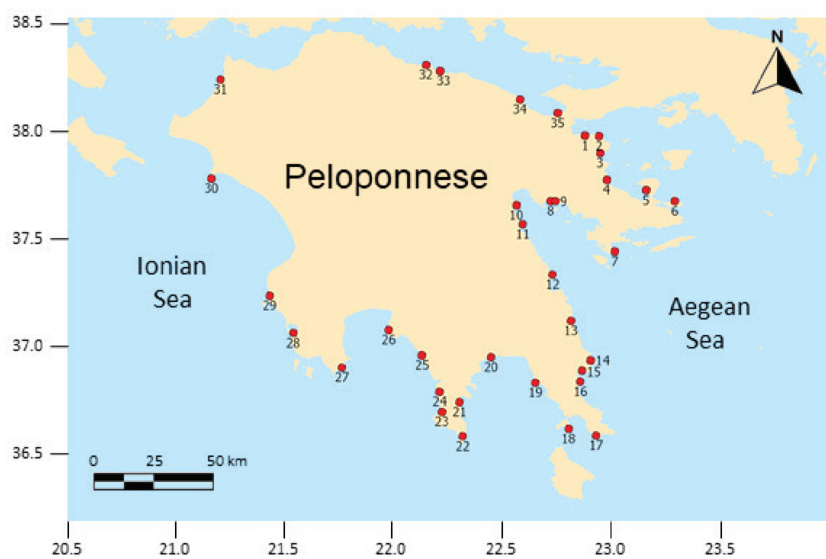

Fig. 2: Sampling sites of the occupancy survey in Peloponnese (numbers corresponding to localities reported in Suppl. Table 1).

Table 2. Records of the detected target species and estimated occupancy (ψ ± standard error) in the study area (species ranked by occupancy). †naïve estimate of occupancy (number of sites with detection divided by the total number of sites).

Species	Sites	Occupancy
S. rivulatus Forsskål & Niebuhr, 1775	1–30	0.857 ± 0.059
P. gibbesi (H. Milne Edwards, 1853)	1, 3–8, 11–30	0.788 ± 0.073
S. luridus (Rüppell, 1829)	2, 4–6, 8–30	0.774 ± 0.071
G. farinosum (J.V. Lamouroux) K.C. Fan & Yung C. Wang	5, 7, 8, 10–14, 16, 18, 20, 21, 23–30, 33–35	0.671 ± 0.083
P. imbricata radiata (Leach, 1814)	1, 2, 4, 5, 9, 10, 18, 19, 24, 28, 31	0.574 ± 0.248
C. persicus (Swainson, 1821)	1–9, 15, 18, 19, 21, 24, 25	0.451 ± 0.089
D. setosum (Leske, 1778)	12, 14, 19, 22–24, 26	0.355 ± 0.191
S. schimperi (Kützing) Verlaque & Boudouresque	1–3, 6, 8, 9, 35	0.200 ± 0.068
P. miles (Bennett, 1828)	19, 21–24	0.150 ± 0.063
O. patagonica de Angelis D'Ossat, 1908	1–4	0.114 ± 0.054
A. taxiformis (Delile) Trevisan de Saint-Léon	2, 21, 23	0.090 ± 0.050
S. diaspros Fraser-Brunner, 1940	1, 3, 5	0.086†
F. commersonii Rüppell, 1838	24	0.029†
E. anatina (Lowe, 1838)	18	0.029†
S. reciprocans (Forsskål, 1775)	8	0.029†

1.2 First record of *Ganonema farinosum* in Malta

Justin CAUCHI and Julian EVANS

Ganonema farinosum (J.V.Lamouroux) K.-C.Fan & Y.-C.Wang (Florideophyceae: Nemaliales: Liagoraceae) is a red alga with an erect gametophytic stage that occurs on well-illuminated, upper infralittoral, rocky substrata in tropical and warm temperate seas circumglobally. Within the Mediterranean Sea, *G. farinosum* is regarded as a cryptogenic species due to its unclear origin. In fact, it was first recorded as *Liagora farinosa* from Alexandria (Egypt) in 1808, which is prior to the opening of the Suez Canal (Hamel, 1931). However, most records from the Mediterranean Sea are far more recent (1960s onwards) and the chronology of these later records combined with a higher frequency in the Eastern Mediterranean may be indicative of a more recent introduction of *G. farinosum*, or possibly the co-occurrence of native and alien populations (Verlaque *et al.*, 2015).

Two fronds of a red alga morphologically resembling *G. farinosum* (Fig. 3A) were encountered on the 16th July 2021 during surveys of plunging cliff shores at Ta' Ċenċ (36.020875° N, 14.230576° E) on the southern coast of the island of Gozo (Maltese Islands). The identity of the species was subsequently confirmed through microscopic examination of a specimen, which exhibited a flexible multiaxial thallus with terete axes (Fig. 3B), globose-ovoid spermatangia, and outer cells of assimilatory filaments having a cylindrical shape, such that no indentations are present at the joints between adjacent cells making up the filaments (Fig. 3C), which are diagnostic for this species (Huisman *et al.*, 2004; Verlaque *et al.*, 2015; Huisman, 2018). Further surveys during held in summer 2021 around the coasts of Gozo located dense aggregations at Żewwieqa (36.027135° N, 14.303800° E; Fig. 3D) and Ħondoq ir-Rummien (36.027932° N, 14.323611° E). *Ganonema farinosum* was always found growing on rocky bottoms at the upper limits of the infralittoral (ca. 1–3 m depth). At Ta' Ċenċ, the species grew directly on the sublittoral cliff face, while at Żewwieqa and Ħondoq ir-Rummien it was present on large infralittoral boulders.

This accounts for the first record of *G. farinosum* from Malta. Given the high intensity of snorkelling and SCUBA activities between spring and autumn, when the conspicuous gametophyte occurs, it is improbable that this species occurred in the area for a long time and remained undetected. Intensive surveys of infralittoral macroalgae

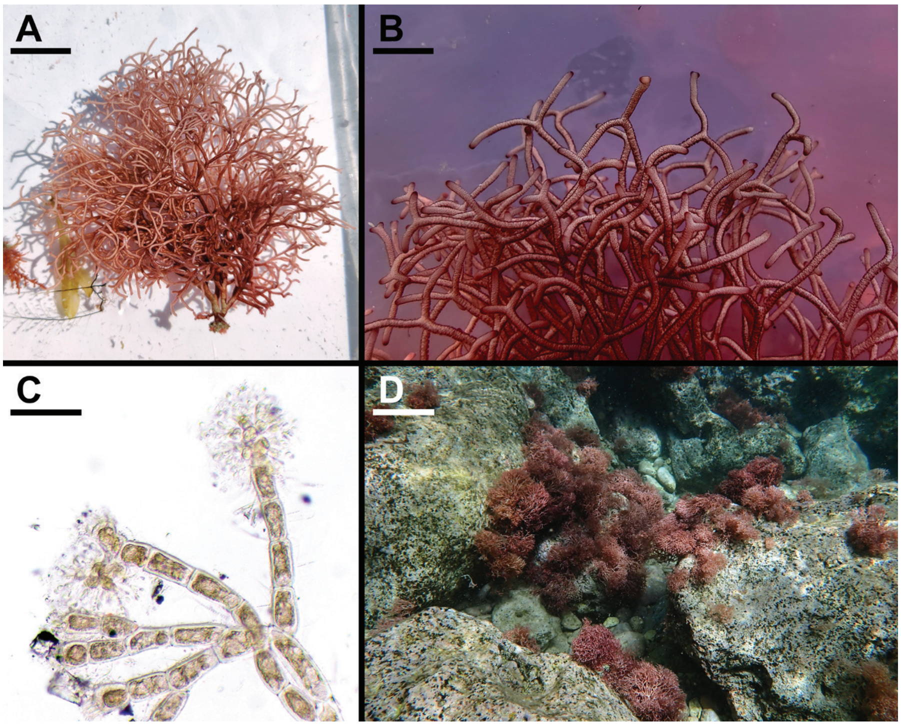

Fig. 3: *Ganonema farinosum* from Malta. A. Whole specimen from Ta' Ċenċ cliffs. Scale bar: 3 cm. B. Detail of axes. Scale bar: 1 cm. C. Microphotograph of outer cells of assimilatory filaments and spermatangia. Scale bar: 50 µm. D. *In situ* photograph of dense aggregation at Żewwieqa. Scale bar: 15 cm.

in the Maltese Islands by Cormaci *et al*. (1997) also failed to record *G. farinosum*, again suggesting a more recent introduction. Considering the vicinity of the detected individuals to Mġarr Harbour, its arrival could be linked to translocation via marine vessels, although autonomous secondary dispersal from elsewhere in the Mediterranean cannot be excluded.

1.3 Filling gaps: the upside-down jellyfish *Cassiopea andromeda* in Libya

Sara A.A. AL MABRUK and Fabio CROCETTA

About ten alien or cryptogenic scyphozoan species have been recorded in the Mediterranean Sea to date (Langeneck *et al.*, 2019). Among them, the upside-down jellyfish *Cassiopea andromeda* (Forskål, 1775) (Scyphozoa: Rhizostomeae: Cassiopeidae) is a semi-sessile species native from the Indo-Pacific and the tropical Atlantic and widely distributed in warm coastal regions worldwide (Karachle *et al.*, 2017). In the Mediterranean Sea, it is typically found in shallow lagoons or intertidal sand or mud flats and has been already recorded from several localities of the eastern and the central parts of the basin (Karachle *et al.*, 2017).

During recent underwater activities held on the 14th March 2021 in Janzour (Tripoli, Libya) (~32.8394N, 12.9532E), a single specimen of *C. andromeda* was found at 3–4 m depth, on a hard artificial substrate covered by mud, by a local commercial diver (Mahmoud M. Khalaf). In particular, an underwater video of the specimen was taken and subsequently forwarded to the authors of the present note for identification, a frame of which is included here (Fig. 4). The video is available at the following webpage: https://www.youtube.com/watch?v=wIMw79_gbpg.

The present sighting constitutes the first record of this species in Libya and fills an expected gap in the invaded range of this taxon in the Mediterranean Sea. At present, no certainties occur regarding a possible pathway of arrival in the country. Rizgalla & Crocetta (2020a) recently suggested natural dispersal (alien spreading) or shipping as possible introduction pathways for the scyphozoan *Phyllorhiza punctata* von Lendenfeld, 1884 in Libya, and similar statements also holds true here. In fact, this taxon

Fig. 4: *Cassiopea andromeda* from Janzour (Tripoli, Libya). Frame from a video. Credits: M.M. Khalaf.

entered the Mediterranean Sea via the Suez Canal prior to 1900, and thus the species may be present in Libya since years, but lack of funding and virtual impossibility for undertaking extensive survey programs presumably hindered its records until now. Alternatively, Janzour lies nearby the Tripoli harbour, which in turn is a well-known hub for alien species arrival through shipping (e.g., Dragičević *et al.*, 2019; Rizgalla & Crocetta, 2020b).

1.4 First confirmed record of the invasive fan worm *Branchiomma luctuosum* in Tunisia

Tarek BEJAOUI and Lotfi RABAOUI

The fan worm *Branchiomma luctuosum* (Grube, 1870) (Polychaeta: Sabellida: Sabellidae), originally described from the Red Sea (see Licciano & Giangrande, 2008), is a non-indigenous species (NIS) reported in several Mediterranean countries so far (Tanduo *et al.*, 2020; Mabrouki *et al.*, 2021). However, most of the Mediterranean records of this species are limited to the northern coasts of the basin. In fact, the single and only confirmed record of *B. luctuosum* in the southern Mediterranean coast comes from Morocco (Mabrouki *et al.*, 2021), whereas Hattour & Ben Mustapha (2015) reported its presence from the Zarzis harbour, Gulf of Gabès (Tunisia), but this sighting needs confirmation as the figure attached to the report is blurry and most likely represents *Branchiomma boholense* (Grube, 1878) or *Branchiomma bairdi* (McIntosh, 1885). In this paper, we report on the first confirmed record of *B. luctuosum* in northern Tunisia and the second in the southern Mediterranean coast and provide some information on its distribution and ecology in the Bizerte Lagoon.

During a snorkeling survey conducted in October 2020 in the eastern coastal area of the Bizerte Lagoon, the presence of an unidentified *Branchiomma* species was noticed by one of the authors (TB) in a sandy coastal area located in front of the town of Azib (37.2023167N, 9.9307361E). Few specimens were immediately collected, preserved, and transported to the laboratory where they were identified as *B. luctuosum* (Fig. 5A–D). Following this first observation, additional prospective surveys were conducted in order to delimit the distribution of this species. *Branchiomma luctuosum* was found to occur in the entire coastal area extending between the towns of Azib and Jouaouda (Fig. 5E), where it is dwelling in sandy substrata covered with a vegetation consisting of the seagrass *Cymodocea nodosa* (Ucria) Ascherson and other algal species. Our field observations indicate that

Fig. 5: *Branchiomma luctuosum* from the Bizerte Lagoon (Tunisia). A-D. Specimens observed in the field. E. A map delimiting its distribution area in the eastern coast of the lagoon.

the density of the fan worm is approximately ranging between 4 and 10 individuals m^{-1}, and that its abundance is higher in soft substrata (sandy areas) compared to hard ones (rocky areas). The population density/abundance is likely to increase in Spring and Summer, compared to the other seasons (Autumn and Winter). Finally, it is worth noting that many individuals can be encountered as epibionts of the Lessepsian pearl oyster *Pinctada imbricata radiata* (Leach, 1814), and that the area of occurrence of *B. luctuosum* hosts another annelid species (*Nereis* sp.) which is being extensively collected by local fishermen who use it as a bait, but that the fan worm is not being used for the same purpose.

Since its first observation in October 2020, *B. luctuosum* was repeatedly encountered in the same area proving therefore that the species is well established in Tunisia and in particular in the Bizerte Lagoon. Within this context, it is worth mentioning that the lagoon was already reported to host several established NIS species, leading to deduce that the ecological/environmental conditions of this semi-closed system are favorable for the reproduction and establishment of the non-native biota (Shaiek & Ben Haj, 2019). In the present case, *B. luctuosum* seems to have been locally introduced through shipping. In fact, the major port of Bizerte lies in the channel connecting the lagoon to the Mediterranean Sea, and it is known to receive many ships coming from northern Mediterranean countries, where this taxon already shows invasive behavior (e.g., Italy and Spain). It is highly probable that the ballast waters of these ships transport larvae of the fan warm from these countries and leave them along the Tunisian coasts. Alternatively, the species may have arrived through recreational boating, living in the fouling communities. Notwithstanding these speculations, further studies are needed to better understand the factors behind the establishment of *B. lactuosum* in the Bizerte Lagoon and determine the potential impacts of this species on the local biodiversity.

1.5 *Cingulina isseli* expanding its distribution to the Aegean Sea and Greece

Panayotis OVALIS and Argyro ZENETOS

Cingulina isseli (Tryon, 1886) (Gastropoda: Pyramidelloidea: Pyramidellidae) is an heterobranch species originally described from the Red Sea and introduced in the eastern Mediterranean since 1980 (Van Aartsen & Carrozza, 1983), where it appears to be widespread in Israel, Lebanon, Cyprus, and southern Turkey (Zenetos *et al*., 2004). We here widen its distribution in its alien range by first reporting its presence in the Aegean Sea and in Greece. In particular, three empty shells (Fig. 6) were found in a shell grit collected on the 20th June 2021 in Glyfada, Saronikos Gulf (37.861956N, 23.737953E). This taxon can be easily identified among Mediterranean taxa, as it is only superficially similar to two other non-indigenous pyramidellids, namely *Oscilla virginiae* Peñas, Rolán & Sabelli, 2020 and *Miralda* sp. (see Albano *et al*., 2021). However, it differs from them in size (*C. isseli* reaches a height of 3.7 mm, whereas *O. virginiae* and *Miralda* sp. are shorter), shape (*C. isseli* is thinner, whereas *O. virginiae* and *Miralda* sp. have a more conical shell), and sculpture (*C. isseli* has a more pronounced axial sculpture between spiral cords with respect to the two other taxa). This is the third micromollusc reported recently in the Saronikos Gulf (Zenetos *et al*., 2020), thus adding to the alien molluscan diversity of Greek waters (Crocetta *et al*., 2017). This work therefore documents the expansion of *C. isseli* eastwards in the Mediterranean Sea, and we suspect that it may have been most likely introduced in the Saronikos Gulf via shipping.

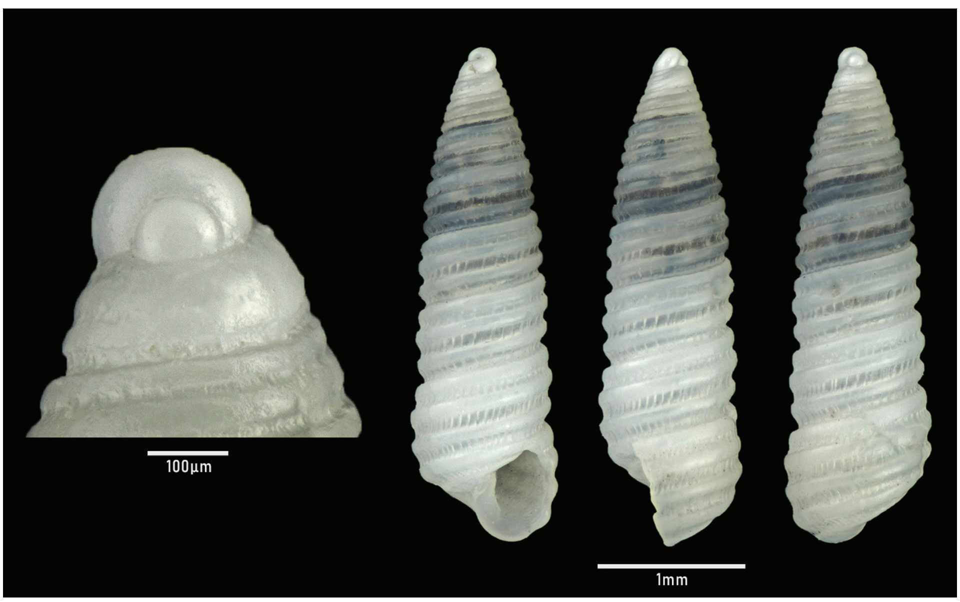

Fig. 6: *Cingulina isseli* from the Saronikos Gulf (Greece). Photo credits: C. Kontadakis.

1.6 First record of *Okenia picoensis* in Italy

Andrea LOMBARDO and Giuliana MARLETTA

Until recently, the genus *Okenia* Menke, 1830 (Gastropoda: Nudibranchia: Goniodorididae) was represented by six species in the Mediterranean Sea: *O. aspersa* (Alder & Hancock, 1845), *O. elegans* (Leuckart, 1828), O. *hispanica* Valdés & Ortea, 1995, *O. mediterranea* (Ihering, 1886), *O. longiductis* Pola, Paz-Sedano, Macali, Minchin, Marchini, Vitale, Licchelli & Crocetta, 2019, and *O. problematica* Pola, Paz-Sedano, Macali, Minchin, Marchini, Vitale, Licchelli & Crocetta, 2019 (Pola *et al.*, 2019). This number was later enriched by *O. picoensis* Paz-Sedano, Ortigosa & Pola, 2017, first recorded in the basin on the basis of specimens sighted in Spain and Malta (Orfanidis *et al.*, 2021).

On the 6th March 2021, a specimen of *O. picoensis* was found in the site of "Acque Fredde" (Santa Tecla, Italy: 37.6375N, 15.1811E), at a depth of 21.9 m on a small rocky wall covered by a turf of red algae, bryozoans, and sponges (Fig. 7). The specimen perfectly matched the morphological characters known for the species, and in particular the papillae that flank the gills do not surpass the tail during movement, a character that allows the distinction of this species from the very similar *O. miramarae* Ortea & Espinosa, 2000 (Ortea & Espinosa, 2000; Moro *et al.*, 2016; Paz-Sedano *et al.*, 2017). Orfanidis *et al.* (2021) suggested further studies to clarify if Mediterranean records were based on a natural expansion of the species or were related to human activities. In agreement with previous authors, this species is included here among cryptogenic species. However, the multiple records held more or less contemporarily in several localities of the Mediterranean Sea suggest that this species is more likely a newcomer and has spread in the basin from the Atlantic Ocean via natural dispersal, or even that it was already present but went overlooked so far and is blooming till 2020 due to changing environmental conditions.

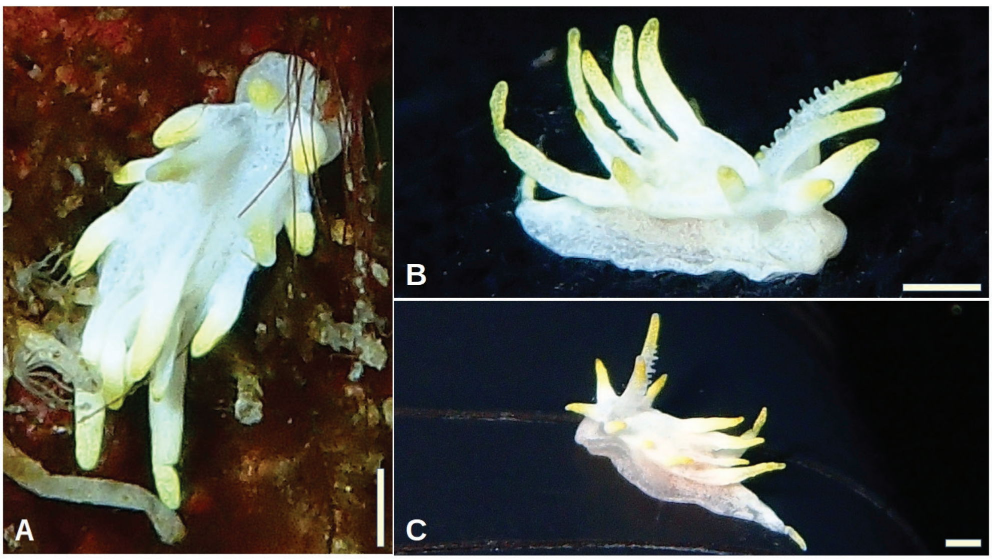

Fig. 7: *Okenia picoensis* from Acque Fredde (Santa Tecla, Italy). A. The specimen in dorsal view. B. The specimen in right lateral view. C. The specimen in left dorso-lateral view. Scale bars: 1 mm.

1.7 The Indo-Pacific bivalve *Septifer cumingii* arrives in the Ionian Sea

Michail RAGKOUSIS and Stelios KATSANEVAKIS

The subfamily Septiferinae Scarlato & Starobogatov, 1979 contains four genera and includes species characterized by an internal anterior shell septum (Huber, 2010; WoRMS, 2021). Among them, the genus *Septifer* Récluz, 1848 (Bivalvia: Mytilida: Mytilidae) accounts for most of the species, and is now composed by seven accepted taxa and two *nomina dubia*, all native in the Indo-Pacific region (Huber, 2010; WoRMS, 2021). One of them, *Septifer cumingii* Récluz, 1849, has also invaded the Mediterranean Sea, being first reported from the Levantine coasts of Turkey as *Septifer bilocularis* (Linnaeus, 1758) (see Albayrak & Çeviker, 2001; Bitlis *et al.*, 2017) and subsequently spreading along the Aegean and Levantine coasts (e.g., Bitlis *et al.*, 2017; Karachle *et al.*, 2016), as also confirmed by our field observations — large populations were recently observed along the Islands of Crete, Karpathos, and Rhodes, as well as along the eastern coast of the Peloponnese peninsula.

On the 19th July 2020, a single specimen of *Septifer cumingii* (Fig. 8) was collected alive at the gulf of Kyparissia, Ionian Sea, at 3 meters depth (37.2895N, 21.6842E), found byssed on the rhizomes of the sea grass *Posidonia oceanica* (Linnaeus) Delile. It had a shell length of 12.3 mm, and the shell was solid, with a strong cancellate structure and a variegate coloration, exhibiting shades of green, red, blue, and brown. It also had an internal septum, which allowed its distinction from the morphologically similar *Brachidontes pharaonis* (P. Fischer, 1870). These characters are in agreement with the description of the species reported by Huber (2010), and its general shape also allowed to exclude the other congeneric species of the same size, with respect to which *S. cumingii* is narrower, with higher and broader umbones, smaller septum, and stronger and more nodulose ribs.

No certainties occur regarding the pathway of arrival of *S. cumingii* in the Ionian Sea. However, considering its wide range expansion in the Mediterranean Sea, it has been most probably expanding through larval dispersion from nearby populations of the Peloponnese peninsula. Alternatively, the species may have arrived by shipping. Further field work in the area is necessary to evaluate its status in the central Mediterranean region.

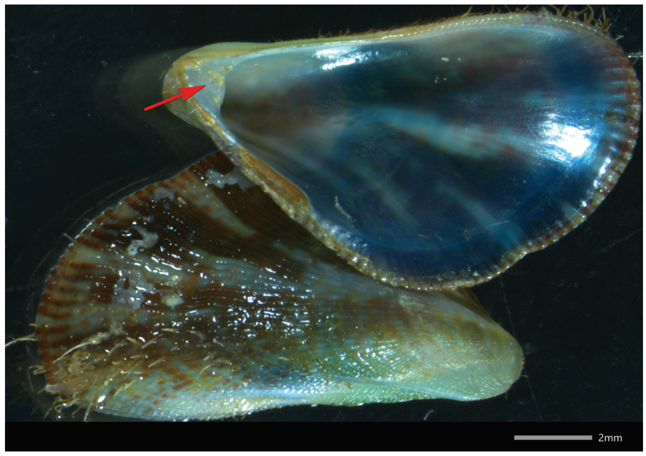

Fig. 8: *Septifer cumingii* from the Gulf of Kyparissia (Greece). Septum pointed by a red arrow.

1.8 The blue crab *Callinectes sapidus* reaches Slovenia

Lovrenc LIPEJ and Manja ROGELJA

The blue crab *Callinectes sapidus* Rathbun, 1896 (Malacostraca: Decapoda: Portunidae) is native along the American Atlantic coasts from Canada (Nova Scotia) to Argentina and is among the most invasive crab species worldwide. It mainly inhabits lagoons and other eurythermal and euryhaline habitats and is able to withstand wide fluctuations in ecological conditions with high oscillations of temperature and salinity (Galil *et al.*, 2002). Due to its reproductive characteristics such as high fecundity, strong swimming capacity, and aggressive behaviour, it is considered as a successful colonizer in the Mediterranean Sea, where it was listed since decades among the 100 worst invasive species due to multiple records spanning all over the basin (Streftaris & Zenetos, 2006; Shaiek *et al.*, 2021). In the Adriatic Sea, the species is widespread along all its coastal areas (e.g., Manfrin *et al.*, 2015; Cerri *et al.*, 2020; Shaiek *et al.*, 2021), although formal records from Slovenia are still lacking.

We hereby first fill this gap by reporting the sighting of 11 specimens from several Slovenian localities. In particular, a female specimen with carapace width 18.4 cm was first caught at 6 m depth on the 15th March 2019 at the entrance of the Jernej Channell, Bay of Piran (45.50055556° N, 13.58416667° E) (Fig. 9A). Four more crabs were then caught by local fishermen on the following dates: 16th October 2019 (Strunjan: 45.535630° N, 13.601313° E), 9th April 2020 (Portorož: 45.48138889° N, 13.58777778° E) (Fig. 9B), 13th September 2021 (Fiesa: 45.52750000° N, 13.57888889° E), and 3rd October 2021 (Piran: 45.52555556° N, 13.56694444° E). They were all adult females with carapace width ranging from 15.9 to 18.7 cm, one of which produced fertilised eggs three months after being kept in captivity in the Aquarium Piran. Finally, six more specimens were photographed in shallow waters (<1 m) close to the defensive dykes of the Sečovlje salinas (45.48472222° N, 13.59388889° E), on the 28th July 2020.

Taking into account the invasive characteristics of the species listed above, as well as its wide distribution in the Adriatic basin, the arrival of *C. sapidus* in Slovenia was strongly expected. Although only few records have been reported to us so far, the local occurrence and the further dispersion of this species deserve to be cautiously monitored, especially in order to gain data on the functional role that this taxon could play within benthic food webs in Mediterranean coastal habitats.

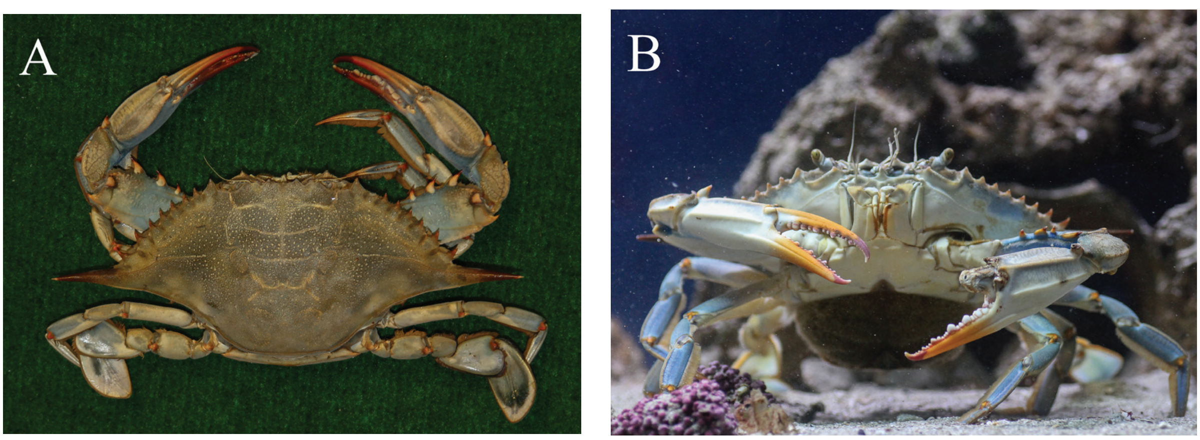

Fig. 9: *Callinectes sapidus* from Slovenia. Carapace width: A. 18.4 cm. B. 18 cm.

1.9 First record of *Charybdis* cf. *hellerii* in Malta

Alan DEIDUN and Johann GALDIES

The Indo-Pacific swimming crab *Charybdis hellerii* (A. Milne-Edwards, 1867) (Malacostraca: Decapoda: Portunidae) is native to the Indian-West Pacific region and has a circumglobal distribution in warm waters, living in rocky, sandy and muddy shores and coral reefs from the intertidal zone to depths beyond 30 m (Apel & Spiridonov, 1998). This species has also been reported from the eastern Mediterranean, where it probably arrived via the Suez Canal as a Lessepsian migrant (Galil *et al.*, 2002).

On the 22nd August 2021, the "Spot the Alien" citizen science campaign (www.aliensmalta.eu) was alerted about the capture of an unfamiliar crab specimen. The catch was made within the Vittoriosa yacht marina, situated within the Grand Harbour along the east coast of the island of Malta (35.888529N, 14.520038E). The crab was caught after sunset by means of a hand net, as it was attracted to the surface by artificial lights deployed by recreational fishers. The sea depth on site was 11.2 m.

The specimen was frozen at the University of Malta and examined the day after. It was identified as a male specimen of *Charybdis* cf. *hellerii* following Wee & Ng (1995) and Apel & Spiridonov (1998). In particular, the specimen showed a posterior spine on the carpus of the fifth leg and a smooth lower surface of the chela (Fig. 10). However, given the high degree of morphological similarity between different *Charybdis* species (Wee & Ng, 1995; Apel & Spiridonov, 1998), molecular analyses are recommended to further confirm the morphological identification of the Maltese specimen. Total weight (76 grams) and morphometric parameters reported in Table 3 suggested that the specimen is a juvenile/sub-adult.

Charybdis cf. *hellerii* is the third non-indigenous portunid species recorded from Maltese waters to date, following the previous records of *Portunus segnis* (Forskal, 1775) and of *Callinectes sapidus* Rathbun (1896) (Deidun & Sciberras, 2016). The most probable introduction pathway into Maltese waters is shipping or recreational boating, given the location where the crab was recorded. This is also supported by other records of portunid species in harbours or marinas of the Mediterranean Sea (e.g., Crocetta, 2006; Ulman *et al.*, 2017).

Table 3. Morphometric measurements (in millimetres) of *Charybdis* cf. *hellerii* from Malta.

Morphometric measurements	
Carapace width	72.27
Carapace length	47.78
Anterolateral border length	26.13
Posterolateral border length	33.29
Chela length	29.97
Chela width	6.20
Chela height	10.00
Body height	24.39
Abdomen length	23.07
Abdomen width	8.30
Frontal length	24.90
Orbital length	7.78

Fig. 10: *Charybdis* cf. *hellerii* from Malta. Morphometric measurements as in Table 2.

1.10 *Thalamita poissonii* re-appears in the Saronikos Gulf (Greece)

Panayotis OVALIS and Maria CORSINI-FOKA

The portunid crab *Thalamita poissonii* (Audouin, 1826) (Malacostraca: Decapoda: Portunidae) is a species native to the western Indian Ocean, including the Red Sea (Apel & Spiridonov, 1998). It has been introduced in the Mediterranean Sea via the Suez Canal since 1952, and has already spread along its entire eastern coastline

(Israel, Cyprus, Lebanon, Syria, Turkey, Greece) (Galil *et al*., 2020). In the Aegean Hellenic waters, *T. poissonii* has been first recorded in 1983 in the Saronikos Gulf (as *T. admete* Herbst), and then between 1983–1987 in northwestern Crete and south Peloponnese (d'Udekem d'Acoz, 1999; Zenetos *et al*., 2020), whereas its occurrence in Rhodes Island has been ascertained since 2007 (Kondylatos *et al*., 2020).

Two male specimens of *T. poissonii* were recently collected by hand picking at 3 m of depth at Glyfada, Saronikos Gulf (37.861652N, 23.745147E). In particular, a first specimen (A) was collected on the 15th July 2021, whereas a second specimen (B: Fig. 11) on the 21st July 2021. Both samples were hidden under small stones sparse on a sandy-muddy bottom. Many other specimens were noted during samplings, but were not collected. Their morphological features match the description provided by Apel and Spiridonov (1998): carapace smooth with sparse hairs, front of about the same width as posterior border, bilobed (although the small incision in the middle is not evident in Fig. 11A); five anterolateral teeth, the first broadest, the fourth smallest, the fifth longest and curved; penultimate segment of male abdomen with lateral edges convex in proximal part, converging distally (Fig. 11B); gonopods 1 showing a characteristic recurved tip, bearing a few rather long terminal spines (Fig. 11C); propodus of natatory leg with 6 spinules visible on posterior border of specimen A (Fig. 11D). The ratio between carapace width (CW) and carapace length (CL) was 1.5, being CL×CW respectively 25.35×37.74 mm (A) and 20.70×30.80 mm (B), in agreement with ratio and size range of the species reported in the literature. The colour was reddish-brown in both specimens after preservation in alcohol, while it was green olive with bluish shadows in freshly caught specimens (Fig. 11).

The present record therefore reports the occurrence of *T. poissonii* in the waters of the Saronikos Gulf after approximately 40 years since its first sighting and suggests that the species is now common in the area. The occurrence of this alien species is presumably more widen than what reported in the literature, and thus additional records are expected from other Aegean locations.

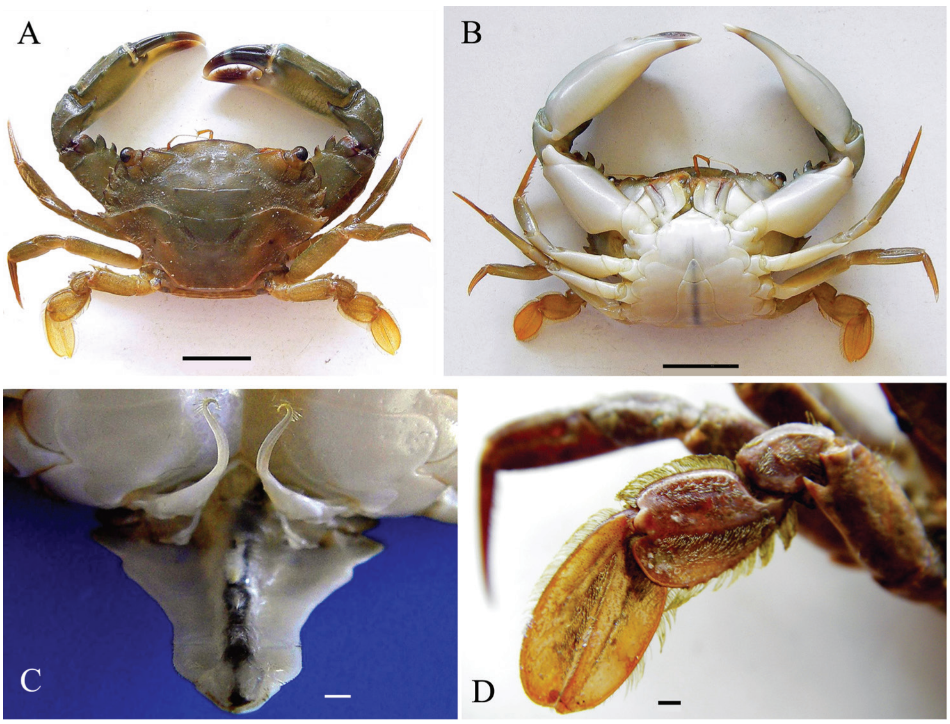

Fig. 11: *Thalamita poissonii* from the Saronikos Gulf (Greece). A-B. Dorsal and ventral view of the specimen B. C. Gonopods of the specimen B (freshly collected). D. Left natatory leg of the specimen A (after preservation). Scale bars: A-B. 10 mm. C-D. 1 mm.

1.11 First record of *Urocaridella pulchella* in Cyprus

Valentina TANDUO and Ioannis SAVVA

Urocaridella pulchella Yokeş & Galil, 2006 (Malacostraca: Decapoda: Palaemonidae) is a cleaner-shrimp originally described from the southwestern coasts of Turkey (eastern Mediterranean Sea) but native to the Indo-Pacific (Yokeş & Galil, 2006). The species is so far known on the basis of few records from its native area (Saudi Arabia and Jordan, Red Sea: Ďuriš, 2017; Horká *et al*., 2018) and scattered records from the eastern Mediterranean Sea (Turkey, Israel, and Greece: Yokeş & Galil, 2006; Katsanevakis *et al*., 2020; Digenis *et al*., 2021). This species is easily identified in the Mediterranean Sea by a laterally compressed, transparent, and smooth carapace with red and white spots, stripes, and blotches distributed all over its body, a character not shared with any other native or alien shrimp species (Yokeş & Galil, 2006; Digenis *et al*., 2021). In particular, its rostrum is white, slender, as long as the carapace, and prominently up curved. The third abdominal segment has a red bar and is bearing a prominent medial rounded ridge, and is sub rectangular in profile. The uropodal exopods are red and white, with a subterminal red band. The pereopods are red and white striped, although the first two have bright-red palms and carpo-propodal joints, whereas the last three have red carpi and propodi (Yokeş & Galil, 2006; Digenis *et al*., 2021).

During recreational night dives carried out between September 2020 and March 2021, an unknown shrimp species was observed in the Dasoudi Marine Protected Area (Limassol, Cyprus) (~34.6888889N, 33.0858333E) on an artificial substrate (amphorae) at 23 meters of depth (Fig. 12A). Careful inspection of the area led to the sighting of a maximum of 4 different individuals (total lenght ~5 cm) (Fig. 12B). They were subsequently ascribed to *U. pulchella* based on the characters listed above. Moreover, during the spring dive, a video was made, available at the following webpage: https://www.youtube.com/watch?v=GVX1LnUY7Q8.

The present sighting constitutes the first record of *U. pulchella* in Cyprus, and fills a gap in the distributional range of this taxon in the eastern Mediterranean Sea. Cyprus lies along the natural pathway of Indo-Pacific taxa spreading in the Mediterranean Sea via the prevailing currents and is in the middle of all previous records. Therefore, the presence of this species in the country was strongly awaited, although absence of regular field work and transparent colour and cryptic behaviour (as it generally lives in caves and crevices) could have hindered the presence of the species in the area so far. Alternatively, its presence in Cyprus could be related to a ship-mediated transport, but this seems to be a remote possibility. Regardless of its origin, further fieldwork is necessary in order to assess the current status of *U. pulchella* in Cyprus and its ecological role and potential impacts on the local benthic communities.

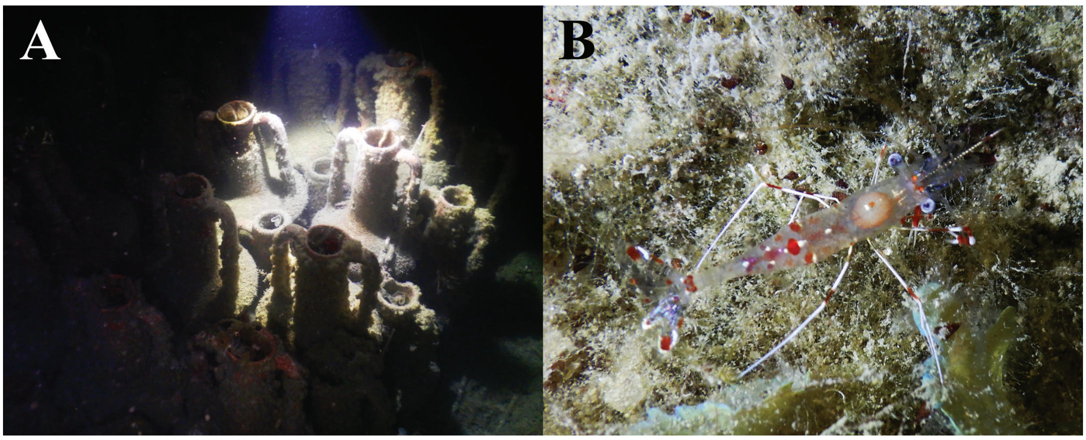

Fig. 12: Urocaridella pulchella from Limassol (Cyprus). A. The artificial habitat where the specimens were found. B. One of the specimens sighted in September 2020 (total lenght ~5 cm).

1.12 First records of alien fishes (*Ablennes hians*, *Aluterus monoceros*, and *Fistularia petimba*) in Lebanon

Joelle SAKR and Michel BARICHE

The Levant coast is subject to the continuous arrival of non-indigenous species from the Indo-Pacific and Atlantic oceans. Various modes of introduction (e.g., Lessepsian migration, aquaculture, ornamental pet trade), as well as range expansion of marine biota from the tropical Atlantic, result in the increasing encounter of new species in the coastal waters of Lebanon. In this article we record three new alien fish species in Lebanon, and provide information on the chronology of their first records in the Mediterranean.

Ablennes hians (Valenciennes, 1846)

The Flat needlefish *Ablennes hians* (Actinopteri: Beloniformes: Belonidae) is a littoral surface-oriented marine fish with a circumglobal distribution, including the Red Sea. In its native range, it lives in estuaries and coastal rivers in both tropical and warm temperate waters (Froese & Pauly, 2021). Three individuals of this taxon (Fig. 13A-B) were caught by fishermen in the Tyre area and purchased on the 11th March (one specimen) and the 13th April 2021 (two specimens) from the local fish market (33.27N, 35.20E). The specimens were recognized by the following characteristics: laterally compressed body and anterior parts of dorsal and anal fins falcate; no keels on caudal peduncle, with lower lobe of caudal fin longer than upper one; upper body blueish green with dark vertical bars on sides (Froese & Pauly, 2021). They were stored in the marine collection of the American University of Beirut (AUBM OS4010; OS4019). *Ablennes hians* has already been recorded twice in the Levant region, from the coasts of Netanya in 2018 and Banyas in 2019 (Alshawi *et al.*, 2019). The present records constitute the first for Lebanon and the third for the entire Mediterranean Sea.

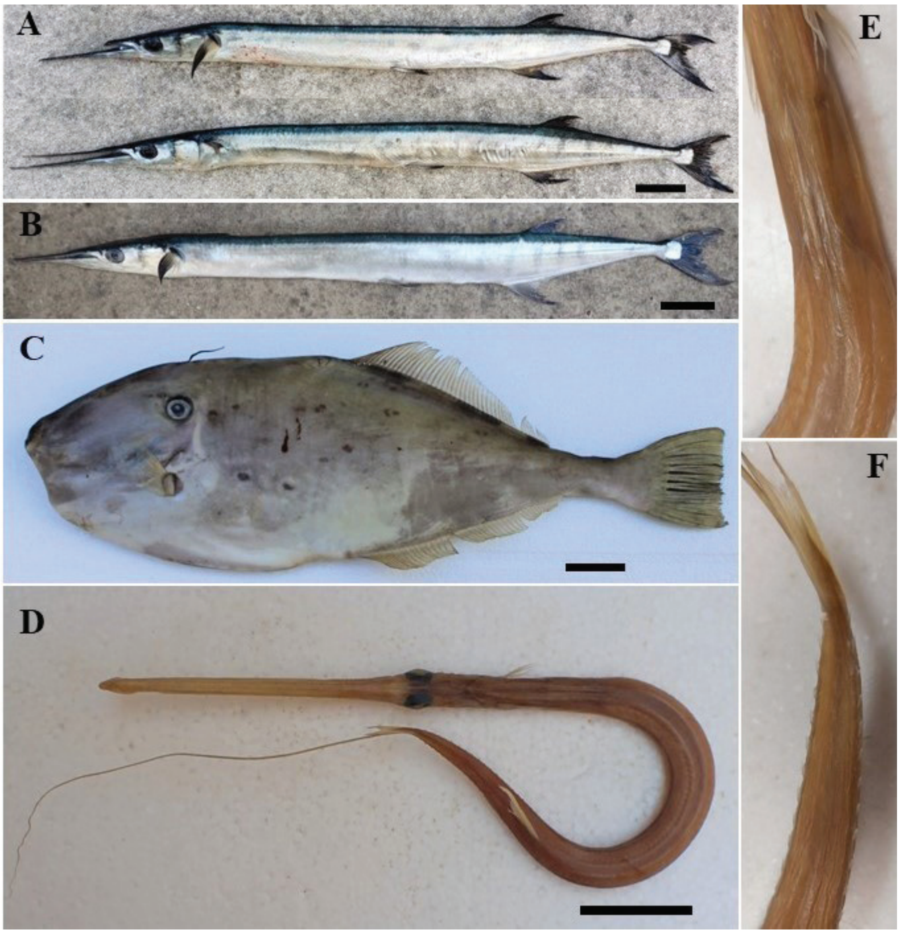

Fig. 13: Species newly recorded from Lebanon. A-B. *Ablennes hians*. C. *Aluterus monoceros*. D-F. *Fistularia petimba* and highlights of sharp spines on lateral line and elongated dorsal bony plates. Scale bars: 5 cm.

Aluterus monoceros (Linnaeus, 1758)

The Unicorn leatherjacket filefish *Aluterus monoceros* (Actinopteri: Tetraodontiformes: Monacanthidae) is a littoral fish with a circumtropical and subtropical distribution, occurring in the Atlantic, western Indian Ocean, and eastern Pacific (Froese & Pauly, 2021). In its native range, it inhabits reefs down to 80 m depth and is occasionally found in shallow water. On the 23rd October 2018, a single specimen of this taxon was captured with hook and line off Chekka (34.33° N, 35.70° E), at a depth of about 50 m over a soft bottom (Fig. 13C). The specimen was recognized by the following characteristics: body with smooth leathery skin; upper head profile slightly convex, lower concave anteriorly and convex posteriorly; first dorsal fin with two spines, the anterior one being long and feeble; second dorsal and anal fins of similar shape and opposite to each other. Morphometric measurements and meristic counts are in line with those available in the literature for the species (Berry & Vogele, 1961). It was stored in the marine collection of the American University of Beirut (AUBM OS3982). *Aluterus monoceros* was first reported in 2000 from the Chafarinas Islands (Spain) and thereafter in 2010 from off the Tunisian coast (Ben Souissi *et al.,* 2011). The present record constitutes the first for Lebanon and the third record for the entire Mediterranean Sea.

Fistularia petimba (Lacepède, 1803)

The Red cornetfish *Fistularia petimba* (Actinopteri: Syngnathiformes: Fistulariidae) is a predatory fish found in tropical waters of the Atlantic Ocean and in the Indo-Pacific, including the Red Sea. In its native range, it is mainly found in coastal areas over soft bottoms (Froese & Pauly, 2021). On the 15th November 2017, a single specimen of *F. petimba* (49.5 cm TL) was captured in Tripoli (34.41° N, 35.77° E), using gill nets. The specimen was recognized by the following characteristics: sharp retrorse spines along posterior lateral line ossifications; elongated bony plates embedded in the skin along midline of back (Fig. 13D-F). These features distinguish *F. petimba* from the congeneric species *F. commersonii* Rüppell, 1838, which has invaded most of the Mediterranean Sea during the last two decades (Stern *et al.*, 2017). It was stored in the marine collection of the American University of Beirut (AUBM OS3955). *Fistularia petimba* has been recorded since 2016 in several countries of the eastern Mediterranean Sea (see below: Kondylatos & Nikolidakis, subchapter 1.13). The present record constitutes the first for Lebanon and confirms the spread of this species in the eastern Mediterranean.

The route and mode of entry to the eastern Mediterranean for the three abovementioned species is somewhat difficult to verify. This is because these species have a wide distribution that includes both the Indo-Pacific and the eastern Atlantic oceans. In addition, the species *A. hians* seems to be constituted by several cryptic taxa present around its distribution range (Tadmor-Levi *et al*., 2020). However, since all previous records of the Flat needlefish are in the Levant, the hypothesis of an arrival of individuals from the Red Sea through the Suez Canal is the most likely. The presence of records of *A. monoceros* and *F. petimba* from both the western and eastern Mediterranean suggest two possible scenarios. The first being a spread from the western Mediterranean and thus an Atlantic origin and the second being an Indo-Pacific origin of the individuals of the two species recorded in the Levant coast. This is particularly relevant for *F. petimba* since genetic similarities with Indian oceans population were already detected (Stern *et al*., 2017). Investigating the genetics of individuals from various part of the Mediterranean may shed more light on the arrival of these new comers to the new environment.

1.13 First record of *Fistularia petimba* Lacepède, 1803 in Greece

Gerasimos KONDYLATOS and Savvas NIKOLIDAKIS

Fistularia petimba Lacepède, 1803 (Actinopteri: Syngnathiformes: Fistulariidae) is a carnivorous fish species of the coastal zone, mainly occurring in soft bottoms at depths greater than 10 m and exhibiting a wide distribution range which includes the Western Atlantic (from Massachusetts to Argentina), the eastern Atlantic (from Spain to Namibia), and the Indo-Pacific (Red Sea, East Africa, Hawaii, southern Japan and as south as southern Australia) (Froese & Pauly, 2021). The species also entered the Mediterranean Sea, with a single record in the western Mediterranean (off Gibraltar) in 1996 (Cárdenas *et al.*, 1997) and subsequent records in the eastern Mediterranean from Antalya Bay (Turkey) in October 2016 (Ünlüoğlu *et al*., 2018), from off the coast of Ashdod (Israel) in December 2016 (Stern *et al*., 2017), from Iskenderun and Mersin Bays (Turkey), respectively in May 2017 and May 2018 (Ünlüoğlu *et al*., 2018; Ciftci *et al*., 2019), from off Lattakia (Syria) in July 2019 (Hussein *et al*., 2019), and from the Gökova and Güllük Bays (Turkey), respectively in October and November 2019 (Cerim *et al*., 2021). The last two records also represented its first reports in the Aegean Sea.

On the 11th June 2021, during a field survey held with the use of 1 km trammel nets (mesh eye 34 mm) fishing over a sandy substrate at a depth of about 20 m (from 37.706583N, 26.708783E to 37.7055N, 26.698383E), one specimen of *F. petimba* (Fig. 14) was collected in the coastal waters of Marathokampos Bay (southern Samos Island, Aegean Sea) by the 12.1 m professional fishing vessel "Charalabos RS 761". The specimen measured 34.2 cm TL (total length, excluding tail filament), 32.5 cm SL (standard length), and weighed 17.3 grams. Description and coloration were in agreement with Stern *et al*. (2017). This taxon differentiates from its congeneric species *Fistularia commersonii* Rüppell 1838 by the sharp retrorse spines along its posterior lateral line ossifications and the reddish coloration (brown green dorsally with blue strips or spots on the back in *F. commersonii*). Water temperature ranged from 18°C to 19°C and salinity was approximately 39.3 PSU.

The present finding constitutes the first record of this species in Hellenic waters and testifies a rapid northward expansion, as this species reached the Aegean Sea from the Levantine Sea in less than 5 years.

Fig. 14: *Fistularia petimba* from the Marathokampos Bay (Samos Island, Greece).

1.14 *Fistularia petimba* Lacepède, 1803 spread northern in the Marmara Sea

Ali UYAN and Cemal TURAN

The genus *Fistularia* Linnaeus, 1758 (Actinopteri: Syngnathiformes: Fistulariidae) includes four species worldwide, namely *Fistularia commersonii* Rüppell, 1838, *Fistularia petimba* Lacepède, 1803, *Fistularia corneta* Gilbert & Starks, 1904, and *Fistularia tabacaria* Linnaeus, 1758, two of which (the former ones) were also recorded as alien species in the Mediterranean Sea (e.g. Mannino *et al.*, 2017; Stern *et al.*, 2017). Despite morphological differences, the taxonomic validity of the two species was debated until Stern *et al*. (2017) and Karan *et al*. (2019) demonstrated that *F. commersonii* and *F. petimba* are also genetically different from each other based on COI and Cyt b mitochondrial genes. Moreover, these two species also differ in the spread pattern in the Mediterranean Sea, with *F. commersonii* that has already colonized the entire basin and *F. petimba* that is so far known from few scattered records (see above: Kondylatos & Nikolidakis, subchapter 1.13).

We hereby first report a record of the red cornetfish *F. petimba* from the Marmara Sea. In particular, a single specimen (total length 346 mm, standard length 264 mm) was captured with trammel net at the depth of 32 m, on the 6th October 2021, in the Bandirma Bay (40.25017° N, 28.0504° E). The general morphological characters of the specimen agreed with Fritzsche (1976), showing elongated and slightly compressed body with elongated snout and small mouth, dorsal fin located almost at end of caudal fin, bifurcated caudal fin with long filament emerging from its middle, bony plates extending all way from dorsal side of body, retroverted spines located on either side of back of body (Fig. 15A-B).

The present record constitutes the northernmost occurrence of *F. petimba* in the Mediterranean area. However, a single captured specimen may not necessarily reflect the presence of a settled population, as the specimen found most probably entered the Marmara Sea via the Dardanelles, after a northward migration from the Aegean Sea. Despite of that, further monitoring of the species is necessary, as it may establish in the Marmara Sea and further spread in the Black Sea.

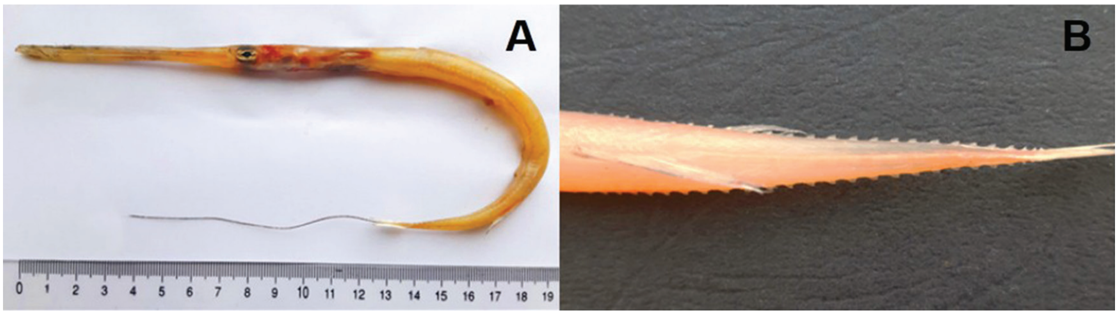

Fig. 15: *Fistularia petimba* from the Bandirma Bay (Marmara Sea). A. Entire specimen. B. Magnification of the tail.

1.15 First record of *Oncorhynchus kisutch* in the Mediterranean Sea

Thodoros E. KAMPOURIS and Ioannis E. BATJAKAS

Salmonid species of genus *Oncorhynchus* Suckley, 1861 (Actinopteri: Salmoniformes: Salmonidae) have been introduced worldwide for farming purposes since 1870, one of which is the Coho salmon *Oncorhynchus kisutch* (Walbaum 1792) (Crawford & Muir, 2008). The native distribution of the species is wide, covering the whole Pacific coast of north America from Point Hope (Alaska) to the Sacramento drainage system (California). Also, it is present in the Anadyr River (Russia) extending southwards and eastwards to Hokkaido (Japan) (Crawford & Muir, 2008; Froese & Pauly, 2021). The Coho salmon is an anadromous migratory fish occurring in fresh, brackish, and marine environments and adults exhibit the typical migration pattern of most salmonids, meaning that they return to the rivers to spawn (Froese & Pauly, 2021). The species' smolts, in North America, seem to have a long and non-predictable migration patterns in lower latitudes (Spence & Hall, 2010) and Coho smolts tend to spend only a few days in estuaries, moving quickly into neritic waters (Magnusson & Hilborn, 2003). In Europe, the Coho salmon was introduced in several countries including the former Yugoslavia, Sweden, Estonia, Germany, France (considered as established), Belgium, the Netherlands, Spain, Italy, and Cyprus. Furthermore, the species seems to be established in Japan and the Kerguelen islands (Indian Ocean) (Froese & Pauly, 2021).

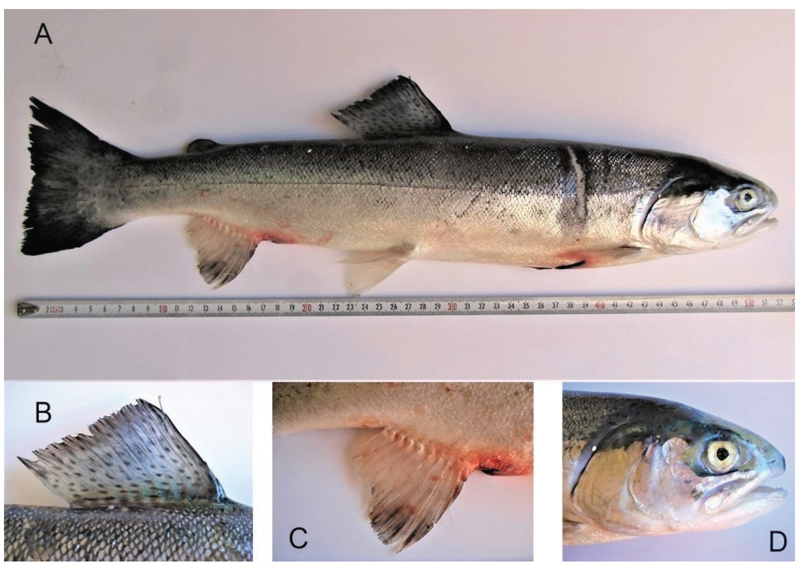

Fig. 16: *Oncorhynchus kisutch* from the Kinira Bay (Thasos Island, Greece). A. Entire specimen. B. Dorsal fin rays. C. Anal fin rays. D. Head colouration.

The current study reports the first record of the Coho salmon in Mediterranean waters. Also, it discusses the potential vectors of introduction and the potential impacts if the species establishes itself in the region. One Coho salmon individual (Fig. 16) was caught by a professional fisherman on 13 May 2021 at the east coast of Thasos Island, at Kinira Bay (~40.66516667° N, 24.76416667° E) over a sandy and pebbly bottom during night-time at about 2-3 m depth. The individual was caught with a harpoon and delivered frozen at the first author. The species' identification was carried out following Froese & Pauly (2021). The basic criteria were: (a) lack of spines at the dorsal and anal fins; (b) lack of dark coloration the gum line of the lower jaw; (c) lateral line almost straight; and (d) overall coloration of the species' marine form (Froese & Pauly 2021). The specimen's total length was 51.5 cm and the wet weight was 1025 g.

The species was introduced in Greece for farming purposes in the 80s, along with the rainbow trout *Oncorhynchus mykiss* (Walbaum, 1792), at the wide area of the artificial Plastira Lake, in proximity to the village Mpelokomitis (~39.25527778° N, 21.73333333° E) (T.E. Kampouris, unpublished data). Also, escaped or released individuals have been reported from Greek freshwater systems but a very recent study excluded the occurrence of feral populations (Koutsikos *et al.*, 2021). In 2015, the Greek pertinent authorities issued an introduction licence, regarding a freshwater farm unit at the wide area of Dipotama, Rodopi (north Greece). However, this farm initially requested the exclusion of the Coho salmon as a farming species and later never actually operated (T.E. Kampouris, unpublished data). The most likely introduction vector, thus, could be an accidental release from aquaculture facilities, since at least one Coho salmon farming unit is operating in Bulgaria. Other potential vectors, such as introduction through ballast water, or the case of a stray individual of Black Sea origin, cannot be excluded. In contrast, an introduction through the pet industry should be considered as improbable.

In other regions, the introduction of salmonid species is considered as one of the main threats that impact the native freshwater fish species (De Leaniz *et al.*, 2010). The area of capture is in proximity with the Nestos River Delta, a regional biodiversity hotspot that requires systematic monitoring for the detection of non-indigenous flora and fauna.

1.16 First confirmed record of the lionfish *Pterois miles* in Albania

Rigers BAKIU and Eneid MEJDANI

The lionfish *Pterois miles* (Bennett, 1828) (Actinopteri: Perciformes: Scorpaenidae) is one of the most dangerous invasive species in Mediterranean marine ecosystems due to its feeding behaviours and high reproductive rates (Kleitou *et al.*, 2021a). After its first records in the easternmost part of the Mediterranean Sea, the species quickly became established in the Levantine, with subsequent records even from the central Mediterranean Sea (Dimitriadis *et al.*, 2021). The most recent observations in this area were provided by Di Martino & Stancanelli (2021), who highlighted the presence of two individuals in Santa Cesarea Terme (Italy, Ionian Sea) on the 20th July 2019, two in Dhermi (Albania, Adriatic Sea) on the 28th July 2019, and a single specimen in Torre Canne – Fasano (Italy, Adriatic Sea) on the 9th August 2020. However, no photos were ever provided by the authors showing the Albanian specimens.

On the 27th July 2021, an individual of *P. miles* was captured with the use of a spear gun by a member of the Facebook group "Speciet Invazive në Bregdetin Shqipëtar/ Invasive Species in Albanian Coast" in a rocky beach (Teqeja Sarande) close to Saranda (South Albania), at a depth of 1 m and a distance of about 70 meters from the coast (39.876667° N, 19.974972° E) (Fig. 17). The specimen measured 14 cm in total length and the sea temperature was 28°C. The present sighting constitutes the first confirmed record of *P. miles* in Albania and suggests that established populations might be present along the Albanian coasts very soon. Protection of native top predators and targeted removals are considered as the most effective actions at early stages of lionfish invasions (Crocetta *et al.*, 2021; Kleitou *et al.*, 2021b), and thus Albanian authorities and in general the marine communities should soon act toward these suggestions.

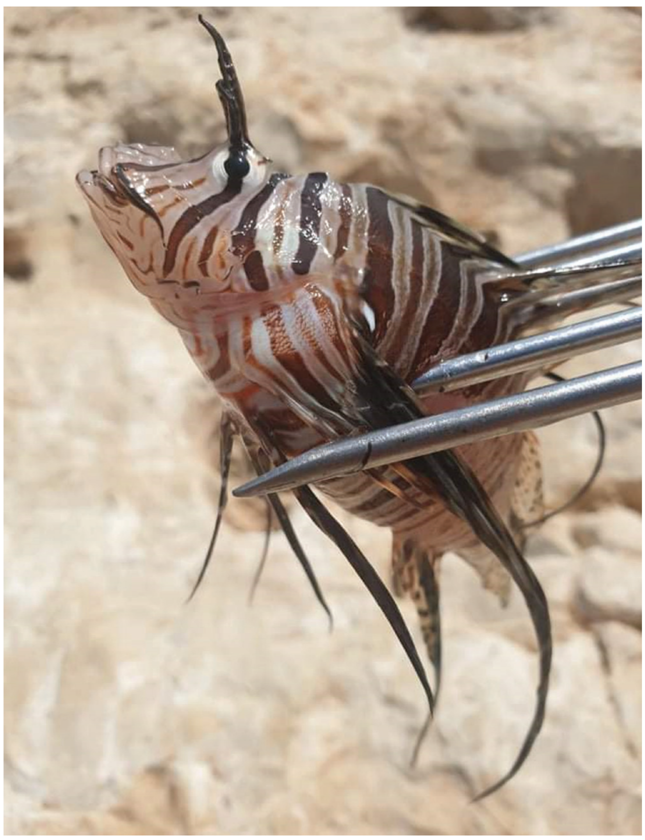

Fig. 17: *Pterois miles* from Saranda (Albania).

1.17 First record of *Scolopsis ghanam* in the Mediterranean Sea

Jamila BEN SOUISSI, Raouia GHANEM, and Ernesto AZZURRO

The genus *Scolopsis* Cuvier, 1814 (Actinopteri: Eupercaria: Nemipteridae) accounts for 20 species of small, bottom-dwelling fishes usually distributed throughout shallow waters up to 60 m depth, mostly living on reefs or on sandy or muddy bottoms close to reefs of the Indo-Pacific region, including the Red Sea (Russell, 1990; Nakamura *et al*., 2019; Froese & Pauly, 2021). On the 5th August 2020, a single individual of the genus *Scolopsis* was caught with gillnets in the Bahiret El Bibane lagoon (southern Tunisia) (33.1255° N, 11.1320° E), on a sandy bottom covered by macroalgae with patches of *Posidonia oceanica* (Linnaeus) Delile, at about 2 m depth. The specimen was photographed (Fig. 18A), measured (to the nearest mm, 217 mm TL), weighted (to the nearest gram, 138.8 g TW), and frozen for subsequent study. Morphometric and meristic analyses were performed in the laboratory on the defrosted individual, following the taxonomic keys provided by Russel (1990). Finally, the specimen was preserved in 95% alcohol and deposited at the National Agronomic Institute of Tunisia under the catalogue numbers: INAT-NEM-SC- gha01.

The Bahiret El Bibane specimen is described as

Table 4. Morphometric (in mm) and meristic characters of *Scolopsis ghanam*.

Morphometric characters	mm	Meristic characters	N
TL - Total length	217	Dorsal-fin rays	9
SL - Standard length	173	Anal-fin rays	7
Body depth	56.9	Pectoral fin rays	15
Body depth at dorsal fin origin	54.7	Pelvic-fin rays	5
Body depth at pelvic fin origin	57.15	Pelvic fin spines	1
Body depth at anal fin origin	46.48	Anal fin spines	3
Head length	47.3	Dorsal-fin spines	10
Snout length	13.72	Scale rows above lateral line	4
Suborbital depth	8.22	Scale rows below lateral line	11
Orbit diameter	17.24	Total gill rakers on first gill arch	10
Interorbital width	14.44	Lateral-line scales	47
Caudal-peduncle length	21.56	Scales below lateral line	39
Dorsal-fin base length	90.74	Scales above lateral line	39
1st dorsal-fin spine lengt	12.23	Preopercular scale rows (behind eye)	2
2nd dorsal-fin spine length	17.41	Preopercular scale rows (below eye)	4
3rd dorsal-fin spine length	20.16	Vertebrae	23
4th dorsal-fin spine length	20.51		
5th dorsal-fin spine length	20.15		
6th dorsal-fin spine length	18.42		
7th dorsal-fin spine length	18.62		
8th dorsal-fin spine length	17.76		
9th dorsal-fin spine length	17.45		
10th dorsal-fin spine length	17.26		
Longest dorsal-fin soft ray length	24.99		
1st anal-fin spine length	9.04		
2nd anal-fin spine length	16.61		
3rd anal-fin spine length	17.88		
Anal-fin base length	25.53		
Pectoral-fin length	41.54		
Pelvic-fin spine length	27.26		
Longest pelvic-fin soft ray length	34.58		

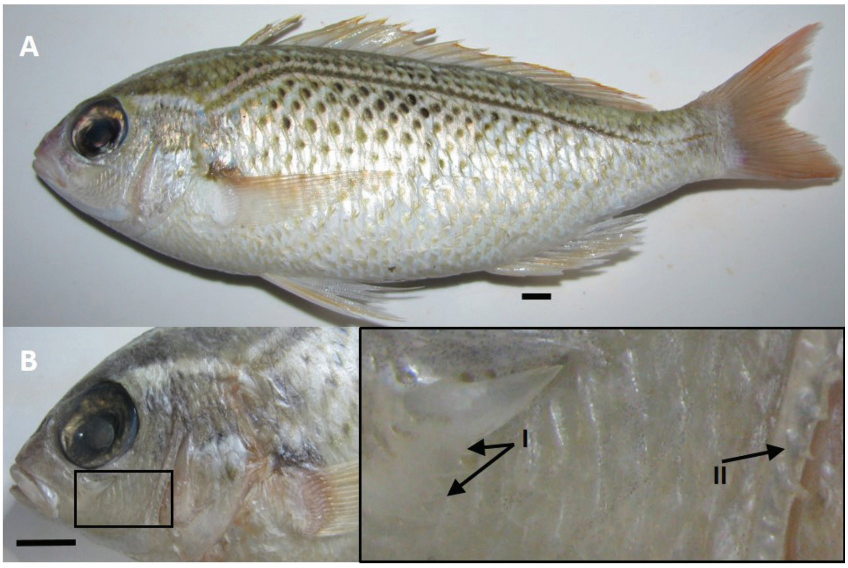

Fig. 18: *Scolopsis ghanam* from the Bahiret El Bibane lagoon (Tunisia). A. Entire specimen. B. Head, with arrows pointing to the naked suborbital with a large backwardly pointing spine and a series of smaller spines on its posterior margin (I), and to the posterior margin of preopercle coarsely denticulate (II). Scale bars: 1 cm.

follows: body deep with large eye, head and back light olive, suborbital naked, with a large backwardly pointing spine and a series of smaller spines or serrations on its posterior margin; posterior margin of preopercle coarsely denticulate (Fig. 18B), canine teeth absent. Morphometric and meristic characters are reported in Table 4. Following the dichotomous key provided by Russel (1990), the naked suborbital area, with a large backwardly pointing spine and a series of smaller spines or serrations on its posterior margin are distinctive characters to the genus *Scolopsis*. Other characters, such as the narrow black stripes above the lateral line, the head scales reaching forward to level of mid-pupil only and the number of lateral line scales can be considered as distinctive of the Arabian monocle bream *Scolopsis ghanam* (Forsskål, 1775) (see Nakamura *et al.*, 2019). This species has many meristic characters in common with the three-lined monocle bream *Scolopsis trilineata* Kner, 1868, but this latter species has a different colour pattern and less lateral line scales (41 *vs* 43) (Russell, 1990). Our findings document the occurrence of a novel non-indigenous species in Mediterranean waters, confirming the importance of Tunisian lagoons for monitoring these arrivals (Dragičević *et al.*, 2021). Taking into account that the Arabian monocle bream is widespread in the Red Sea, the Mediterranean introduction of *S. ghanam* could be attributed to Lessepsian immigration as already speculated for the Randall's threadfin bream *Nemipterus randalli* Russell, 1986 (see Lelli *et al.*, 2008), although ship mediated transport also represents a likely vector.

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Supplementary data

The following supplementary information is available online for the article:

Table S1. Sampling sites (as in Figure 2), their geographical coordinates (in decimal degrees) and sampling dates.