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New records of introduced species in the Mediterranean Sea (December 2025)

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Abstract

The current article reports 26 new records of introduced species from 34 locations across six ecoregions of the Mediterranean and the Black Sea, covering 11 countries: Lebanon, Syria, Türkiye, Cyprus, Greece, Montenegro, Croatia, Slovenia, Italy, Egypt, Libya. These records span five major taxonomic groups: two seaweeds (Chlorophyta and Rhodophyta), one annelid, five molluscs, five arthropods, and 14 bony fishes. In the **Levantine Sea**, we document the first Mediterranean record of the Northern Stargazer

(*Astroscopus cf. guttatus*), along with four additional fish species from Lebanon: *Acanthopagrus bifasciatus*, *Kyphosus* cf. *sectatrix*, *Lutjanus argentimaculatus*, and *Acanthurus monroviae*. We also report the first Mediterranean records of the lizardfish *Saurida gracilis* and the cuttlefish *Sepia dollfusi* and *Acanthosepion pharaonis*, the latter being the first documented record of this species in the Mediterranean Sea. From Cyprus, we report *Synodus randalli* and *Priacanthus sagittarius*. The cryptogenic mussel *Perna perna* is also recorded from Egypt. In the **Aegean Sea**, new records include the red alga *Galaxaura rugosa* and the Arrowfin Bigeye *Priacanthus sagittarius* from Türkiye, as well as the swimming crab *Portunus segnis* and the sweeper *Pempheris rhomboidea* from the Greek side of the **Ionian Sea**. In the **Adriatic Sea**, we report the grapsoid crab *Percnon gibbesi* (Montenegro), the salmon *Salmo salar* (Croatia), the amphipod *Jassa slatteryi* (Slovenia), and the calanoid copepod *Metacalanus acutioperculum* (Italy). In the **Tyrrhenian Sea**, new records include the green macroalga *Halimeda incrassata*, the oyster *Isognomon bicolor*, the Chinese Mitten Crab *Eriocheir sinensis*, the lionfish *Pterois miles*, and the Pomfret *Taractes rubescens* from Italian waters. From the **Tunisian Plateau/Gulf of Sidra**, we document the annelid worm *Branchiomma luctuosum* and the dragonet fish *Synchiropus sechellensis* from Libya. Additional records of the bivalve *Arcuatula senhousia* are reported from the Sea of Marmara and the Black Sea.

Introduction

The Mediterranean Sea is a unique and complex body of water, characterized by its semi-enclosed configuration and renowned for its rich biodiversity and remarkable variety of ecosystems. It is also recognized as a global hotspot for marine biological invasions (Bailey *et al.*, 2020). Over the past century, the region has experienced a significant influx of non-indigenous species (NIS), particularly of Indo-Pacific origin, primarily facilitated by the Suez Canal. Secondary vectors such as shipping, aquaculture and the aquarium trade contribute to additional introductions (Katsanevakis *et al.*, 2014). In recent decades, the rate and scale of NIS introductions have accelerated, driven by a combination of anthropogenic and environmental factors (e.g., Samaha *et al.*, 2016; Zenetos *et al.*, 2022). In the eastern Mediterranean, proximity to the Suez Canal, prevailing currents, and habitat conditions play a critical role in the initial stages of invasion (zu Dohna *et al.*, 2025). Global shipping activities, including ballast water discharge and hull fouling, facilitates long-distance dispersal (zu Dohna *et al.*, 2025). Climate change further amplifies this process by increasing sea surface temperatures and altering circulation patterns, creating favourable conditions for thermophilic species to establish and expand their ranges (Khalil *et al.*, 2025). The introduction of these organisms is leading to a dramatic restructuring of native biotic communities, posing threats to biodiversity and ecosystem functions that are increasingly viewed as comparable to other major stressors, such as pollution and climate change. The current state of the Mediterranean Sea underscores the profound and often unintended ecological impacts of human activities on marine ecosystems.

In response, Mediterranean Marine Science has been publishing its "Collective Article A'" series since 2011, aiming at filling regional gaps in the documentation of marine biological introductions. Adopting classification criteria from Gerovasileiou *et al*. (2022), this series categorizes introduced species as (i) non-indigenous (NIS), (ii) cryptogenic (unclear origin), (iii) crypto-expanding (uncertain whether expansion is natural or human-mediated), or (iv) species of questionable status.This collaborative article documents 26 new records of introduced species from 34 locations across 11 countries, spanning five phyla. The records are diverse and include one chlorophyte (*Halimeda incrassata*), one rhodophyte (*Galaxaura rugosa*), one annelid (*Branchiomma luctuosum*),

Fig. 1: Locations of records for the species presented in this article. Location numbers (LN) correspond to those listed in Table 1.

Table 1. Species records included in the present article, organized by phylum, basin (EMED: Eastern Mediterranean, CMED: Central Mediterranean, BLAC: Black Sea/Sea of Marmara), ecoregion, country and location. SC refers to the subsection in which the species record is discussed, LN indicates the location number(s) as shown in Figure 1.

Species	SC	Basin	Ecoregion	Country	Exact localities	LN
Phylum Chlorophyta						
Halimeda incrassata	9.6	CMED	Tyrrhenian Sea	Italy	Baia di Agumu	29
Phylum Rhodophyta						
Galaxaura rugosa	3.3	EMED	Aegean Sea	Türkiye	Marmaris	12
Phylum Annelida						
Branchiomma luctuosum	11.2	CMED	Tunisian Plateau/Gulf of Sidra	Libya	Tripoli, Tobruk	33-34
Phylum Mollusca						
Arcuatula senhousia	3.1	BLAC	Black Sea	Türkiye	Sea of Marmara, Black Sea	8-10
Isognomon bicolor	9.5	CMED	Tyrrhenian Sea	Italy	Nora Lagoon	28
Perna perna	10.1	EMED	Levantine Sea	Egypt	Alexandria	30-31
Acanthosepion pharaonis	2.1	EMED	Levantine Sea	Syria	Latakia	6
Sepia dollfusi	2.1	EMED	Levantine Sea	Syria	Latakia	6
Phylum Arthropoda						
Metacalanus acutioperculum	9.1	CMED	Adriatic Sea	Italy	Trieste	21-24
Jassa slatteryi	8.1	CMED	Adriatic Sea	Slovenia	Piran	20
Eriocheir sinensis	9.2	CMED	Tyrrhenian Sea	Italy	Arno River estuary	25
Percnon gibbesi	6.1	EMED	Adriatic Sea	Montenegro	Buljarica	17
Portunus segnis	5.1	EMED	Aegean Sea	Greece	Argolikos Gulf	15
Phylum Chordata						
Acanthopagrus bifasciatus	1.1	EMED	Levantine Sea	Lebanon	Sarafand	2
Acanthurus monroviae	1.1	EMED	Levantine Sea	Lebanon	Beirut	5
Astroscopus guttatus	1.1	EMED	Levantine Sea	Lebanon	Daoura	1
Kyphosus cf. sectatrix	1.1	EMED	Levantine Sea	Lebanon	Sarafand	3
Lutjanus argentimaculatus	1.1	EMED	Levantine Sea	Lebanon	Tripoli	4
Pempheris rhomboidea	5.2	EMED	Ionian Sea	Greece	Pilos	16
Priacanthus sagittarius	3.2	EMED	Aegean Sea	Türkiye	Fethiye Bay	11
Priacanthus sagittarius	4.1	EMED	Levantine Sea	Cyprus	Esenköy	13
Pterois miles	9.3	CMED	Tyrrhenian Sea	Italy	Palmi	26
Salmo salar	7.1	EMED	Adriatic Sea	Croatia	Vrsar, Porto Budava	18-19
Saurida gracilis	2.2	EMED	Levantine Sea	Syria	Latakia	7
Synchiropus sechellensis	11.1	CMED	Tunisian Plateau/Gulf of Sidra	Libya	Benghazi	32
Synodus randalli	4.2	EMED	Levantine Sea	Cyprus	Ayia Napa	14
Taractes rubescens	9.4	CMED	Tyrrhenian Sea	Italy	Calabria	27

three bivalves (*Arcuatula senhousia*, *Isognomon bicolor*, and *Perna perna*), two cephalopods (*Acanthosepion pharaonis* and *Sepia dollfusi*), one amphipod (*Jassa slatteryi*), one copepod (*Metacalanus acutioperculum*), three decapods (*Eriocher sinensis*, *Percnon gibbesi*, and *Portunus segnis*), and 13 species of bony fishes (*Astroscopus guttatus*, *Acanthopagrus bifasciatus*, *Kyphosus* cf. *sectatrix Lutjanus argentimaculatus*, *Acanthurus monroviae*, *Pempheris rhomboidea, Priacanthus sagittarius*, *Pterois miles*, *Saurida gracilis*, *Synodus randalli*, *Synchiropus sechellensis*, *Taractes rubescens* and *Salmo salar*). The records presented span from 2017 to 2025, covering a depth range from the surface to 480 metres. They include first occurrences, range expansions, and escapees from aquaculture facilities. All species had previously been reported from other regions of the Mediterranean, with the exception of *Astroscopus* cf. *guttatus* (a stargazer fish), *Acanthosepion pharaonis* (a cuttlefish), and *Salmo salar* (the Atlantic Salmon), which are documented here for the first time.

Specimens were collected using a wide array of methods, including spearfishing, traps, gillnets, trammel nets, bongo nets, longlines, hand collection, sediment grab samplers, snorkelling, scuba diving and even from the stomach content of a cephalopod. All identifications were based on morphological characteristics. Many records were contributed by fishers, citizen scientists, private WhatsApp groups, and personal contacts, highlighting the value of collaborative networks and citizen science in tracking marine biodiversity. All records originate from the eastern and central Mediterranean, as well as the Black Sea, and are organized by country in an east-to-west, anti-clockwise geographic sequence. Specific localities are shown in Figure 1 and detailed in Table 1. Author names are listed alphabetically.

1. LEBANON

1.1 Clearing the cabinets: First records of non-indigenous fishes and further records of range expanding species from Lebanon

Michel BARICHE

Lebanon's proximity to the Suez Canal, degraded habitats, maritime traffic and climate change have rendered its waters highly susceptible to colonization by non-indigenous marine species. While recent efforts, particularly using social networking, have improved early detection of newcomers, several records from Lebanon remained unpublished, gradually accumulating in personal archives. This study aims to clear the cabinets by formally reporting five fish records: specifically, the first Mediterranean record of a fish previously known only from the western Atlantic, and records of four expanding NIS from Lebanese coastal waters. By doing so, it provides an updated account of their presence and distribution, emphasizing the importance of timely publication to ensure accurate assessments of biodiversity shifts in this rapidly changing marine environment.

Astroscopus cf. *guttatus Abbott, 1860*

The Northern Stargazer, *Astroscopus guttatus* (Uranoscopidae), is native to the western Atlantic Ocean, ranging along the coast of North America from New York to North Carolina (Froese & Pauly, 2025). It typically inhabits shallow coastal waters, burying itself in sandy or muddy bottoms with only its upward-facing eyes and mouth exposed, acting as an ambush predator. This species is venomous, as it possesses cleithral spines associated with venom glands, and electric organs behind its eyes, used for defence (Florida Museum of Natural History, accessed on 16 July 2025).

This is first record of *Astroscopus* cf. *guttatus* from Lebanon and the entire Mediterranean Sea. On 21 February 2017, a single specimen was captured by a fisher from an unknown location near Beirut (approx. 33.9236°N, 35.5308°E) and brought to the Daoura fish market for display. Two photographs of the specimen were forwarded to the author after about a week from the capture for identification (Fig. 2). This unprecedented finding was initially met with scepticism and has not been formally reported until now, pending additional records to support the observation. The specimen was likely discarded.

Astroscopus guttatus is readily identifiable by its robust, flattened body, with eyes positioned on the dorsal surface of its large, square-shaped head. Its coloration is typically dark greyish-brown on the back, covered with numerous white spots on head and body. It can be distinguished from the similar Southern Stargazer, *Astroscopus ygraecum* (Cuvier, 1829), primarily by the pattern of spots and the stripe on the tail. *Astroscopus guttatus* has numerous, relatively uniform-sized white spots, and crucially, the middle dark stripe on its tail extends onto the rear portion of its body. In contrast, *A. ygraecum* tends to have fewer, larger white spots on its back that are more widely spaced, and the middle dark stripe on its tail does not extend past the caudal fin itself. The specimen captured in Lebanon, displays the white spots pattern similar to *A. guttatus* but not the middle dark stripe which does not extend past the caudal fin. Given these discrepancies and the absence of a physical specimen for detailed examination, this record awaits the capture of a new specimen on which proper morphological and molecular identification can be conducted.

Fig. 2: *Astroscopus* cf. *guttatus*, photographed on 21 February 2017 in the Daoura fish market, Beirut (specimen from Lebanon). Photo credit: by an unidentified individual.

Acanthopagrus bifasciatus (Forsskål, 1775)

The Twobar Seabream, *Acanthopagrus bifasciatus* (Sparidae), is native to the western Indian Ocean, ranging from the Red Sea to the Persian Gulf. It typically inhabits its shallow coastal waters, particularly around coral reefs (Froese & Pauly, 2025). The species has already been recorded at six locations in the Mediterranean Sea: Tunisia (Zembra Island, 2010), Türkiye (Izmir Bay, 2018), Spain (Barcelona harbor, 2019), Egypt (Alexandria, 2020) and Syria (Banias, 2022) (García-de-Vinuesa *et al.*, 2020; Saad *et al.*, 2022, and references therein). Here, we report the first record of the species from Lebanon and the seventh from the Mediterranean. On 5 February 2024, a single specimen, estimated at 25-30 cm total length, appeared at the fish market in Sarafand (33.45°N, 35.28°E) and was subsequently consumed. A video and a photograph of the specimen were posted on social media and shared with the author for identification (Fig. 3A). No additional information was available. The species is easily distinguishable from other members of the genus by two prominent black bars on the head: a wide bar across the posterior third of the head and a narrower one passing through the eye. It also features bright yellow pectoral, caudal and dorsal fins with a black margin on the dorsal fin; the pelvic and anal fins are black. The dorsal body scales are silvery with black centres (Iwatsuki & Heemstra, 2010; 2011).

Kyphosus cf. *sectatrix (Linnaeus, 1758)*

The Bermuda Sea Chub, *Kyphosus sectatrix* (Kyphosidae), is a schooling herbivore distributed in tropical and subtropical coastal waters, including the Red Sea (Knudsen, 2013). This is the first record from Lebanon and the eastern Mediterranean: a single 40-45 cm TL specimen speared off Sarafand (33.44°N, 35.27°E) on 5 December 2022. Identification was based on morphology and coloration, including the absence of golden lateral stripes distinguishing it from the congeneric *K. vaigiensis* (Fig. 3B) (Nota *et al.*, 2024). Although species identification based solely on photographic evidence is not definitive, particularly since the photograph is somewhat overexposed, the presence of a *Kyphosus* specimen in the eastern Mediterranean is noteworthy and merits documentation and contributes to the growing body of observations of *Kyphosus* species in the Mediterranean.

Lutjanus argentimaculatus (Forsskål, 1775)

The Mangrove Red Snapper, *Lutjanus argentimaculatus* (Lutjanidae), is widely distributed throughout the Indo-West Pacific, inhabiting coastal waters, estuaries, coral reefs and lagoons (Froese & Pauly, 2025). We report a third Lebanese record and the ninth in the Mediterranean: a single 50 cm TL individual speared off Tripoli (34.46°N, 35.77°E) on 15 July 2023 (Fig. 3C). Identification was based on body morphology, including a robust, moderately deep body, pointed snout; dorsal coloration greenish brown to reddish, lighter ventral surface, and an emarginated caudal fin (Allen, 1985). This observation adds to the expanding records of *L. argentimaculatus* records in Lebanese and eastern Mediterranean waters.

Acanthurus monroviae Steindachner, 1876

The Monrovia Surgeonfish, *Acanthurus monroviae* (Acanthuridae), is native to the tropical eastern Atlantic (Froese & Pauly, 2025). We report the second record of the species from Lebanon and the eleventh from the Mediterranean: a single specimen was speared off Beirut (33.91°N, 35.50°E) on 24 June 2021 at 5-7 m depth over a hard bottom (Fig. 3D). The species is identified by its ellipsoid, deep, and laterally compressed body, dark brown coloration with pale blue longitudinal lines, and a prominent, bright yellow-orange marking on the caudal peduncle, which encircles the retractable scalpel-like spine (Randall, 2001). This record contributes to documenting non-native surgeonfishes in the eastern Mediterranean.

The observations reported in this manuscript, compiled over years from direct captures, market sightings, and citizen science contributions via social media, highlight the ongoing arrival and establishment of non-indigenous marine animals in the Eastern Mediterranean Sea. The discovery of *Astroscopus* cf. *guttatus* in Lebanese waters is particularly significant. It is the first record of this Western Atlantic species in the Mediterranean Sea, showing just how far marine life can spread to new areas. The repeated sightings of the other species confirm their expanding distributions and potential establishment within the Mediterranean. For instance, finding *O. punctatus* close to marinas further supports the hypothesis of ship-mediated vectors, such as ballast water and hull fouling.

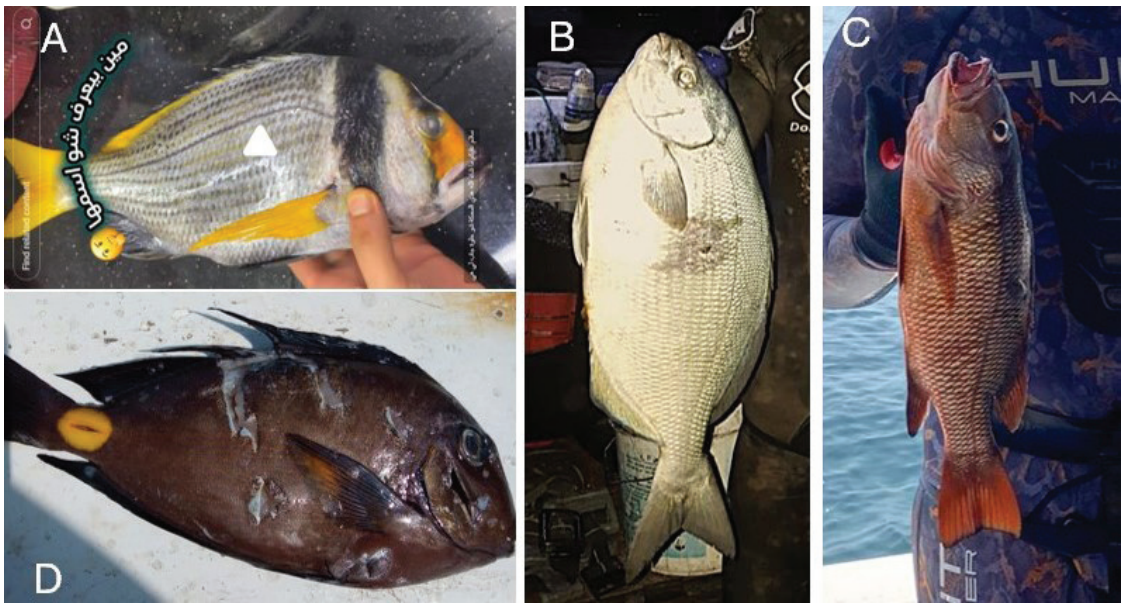

Fig. 3: *Acanthopagrus bifasciatus* (A: 5 February 2024, Sarafand (~33.45°N; 35.28°E), *Kyphosus* cf. *sectatrix* (B: 5 December 2022, Sarafand (~33.44°N, 35.27°E), *Lutjanus argentimaculatus* (C: 15 July 2023, Tripoli (~34.46°N, 35.77°E), and *Acanthurus monroviae* (D: 24 June 2021, Beirut (~ 33.91°N, 35.50°E) specimens from Lebanon. Photo credit: by unidentified individuals, shared by Georges Taza (A), Ziad Samaha (B, C) and Mohamad Ali Ibrahim (H).

2. SYRIA

2.1 First record of the Lessepsian cuttlefishes *Acanthosepion pharaonis* and *Sepia dollfusi* (Cephalopoda: Sepiidae) in Syrian waters (Levantine Sea)

Izdihar Ali AMMAR, Razan MAAROOF and Giambattista BELLO

Specimens of the non-indigenous species (NIS) *Acanthosepion pharaonis* (Ehrenberg, 1831) and *Sepia dollfusi* Adam, 1941 were captured in the Levantine Sea off the Marine Research Institute (35.5922°N, 35.7423°E), north of Latakia (Syria), using traps deployed at depths of 8-10 m. Sampling was carried out in August and September 2024. Both cuttlefishes are Lessepsian migrants. To our knowledge, this represents the first confirmed Mediterranean record of *A. pharaonis*. As for *S. dollfusi*, this is the second documented report for the Mediterranean Sea.

Acanthosepion pharaonis is a NIS whose native distribution includes the Indian and Pacific Oceans, the Red Sea and the Suez Canal (Reid *et al*., 2005). The only previous report (Mienis, 2004), also cited by Galanidi *et al.* (2023), was based solely on stranded cuttlebones and deemed questionable by Bello *et al.* (2020). A more recent eDNA detection in the northern Adriatic Sea was considered a likely case of contamination (Martino *et al.*, 2025). Therefore, the present discovery represents the first soundly documented Mediterranean record. *Sepia dollfusi* is another Indo-Pacific cephalopod widely distributed in the Red Sea and southern part of Suez Canal (Reid *et al*., 2005). It was reported in the Mediterranean for the first time in 2014 (Riad, 2015) with no further records.

Acanthosepion pharaonis

Four male individuals of *A. pharaonis* were collected. They were comparatively small-sized measuring 7.4 to 13.1 cm in mantle length, 13.1 to 27.2 cm in total length, 54.23 to 85.15 in weight; their tentacle length ranged from 23.5 to 25.2 cm. Body oval shaped, grayish-brown coloured dorsally and whitish ventrally. Fins long, running throughout the mantle length, their base with a longitudinal white band. Head slightly narrower than the

mantle. Arms suckers tetraserial (Fig. 4A, B). Hectocotylus (left ventral arm) with minute suckers in four longitudinal rows including its basal most part. Tentacular clubs distinctive, with eight transverse rows of suckers of varying sizes, ten of them enlarged, four very enlarged. Cuttlebone oval elongated in shape, anteriorly round and blunt, with short rostrum posteriorly, broad chitinous margins, wide groove in the middle of the striated zone, and unique long and dark ventral ledge formed by the inner cone (Fig. 4C, D). Distinctive characters differentiating this cuttlefish species from *Sepia officinalis*, the only native Mediterranean cuttlefish which might be mistaken for at first sight, include the longitudinal white band along the fin base, the distribution of suckers on the hectocotylus and the unique cuttlefish inner cone.

Sepia dollfusi

Three male individuals of *S. dollfusi* were collected, measuring 7.9 to 8.2 cm in mantle length, 2.7 to 3.4 cm in mantle width, and 24.4 to 25.5 cm in total length; with body weights ranging from 63.4 to 78.3 g; the tentacles length ranged from 17.3 to 17.6 cm. The arms were comparatively short and the head very close to the mantle. The body was beige-cream dorsally, whitish ventrally (Fig. 5A, B). The cuttlebones were oval, posteriorly round, with a prominent ventral bulging, which constitutes a main peculiarity of this species.

The discovery in Syrian waters of four individuals of *A. pharaonis* – which is its first documented Mediterranean record – and three individuals of *S. dollfusi*, a species recorded only once before in this basin, indicates

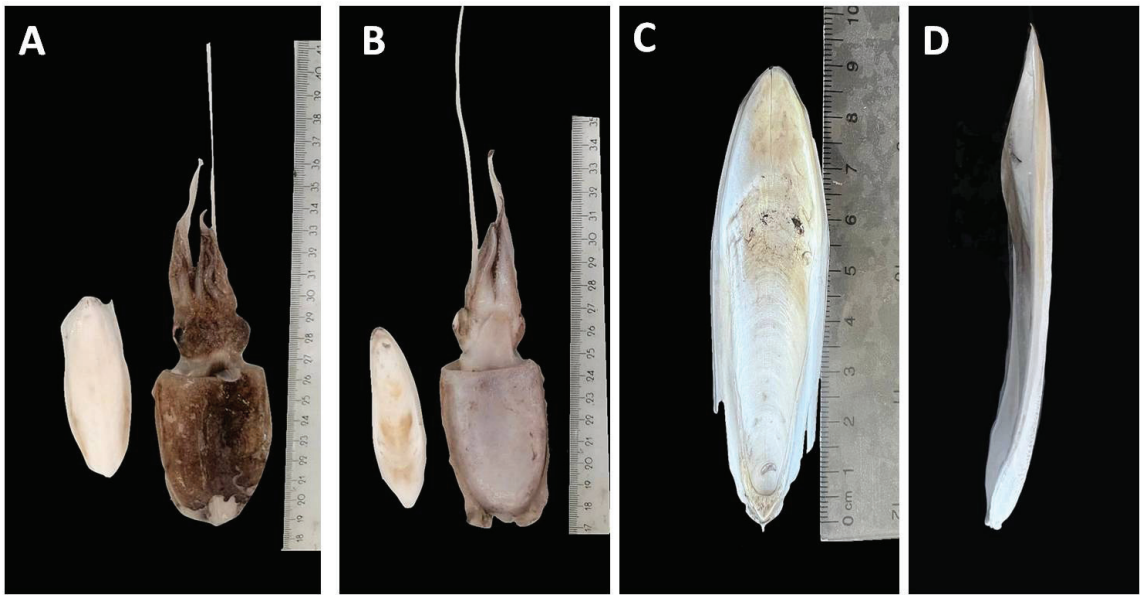

Fig. 4: *Acanthosepion pharaonis* from Syria; (A) dorsal view, (B) ventral view, (C) cuttlebone ventral view, (D) cuttlebone lateral view. Photo credit: Razan Maaroof.

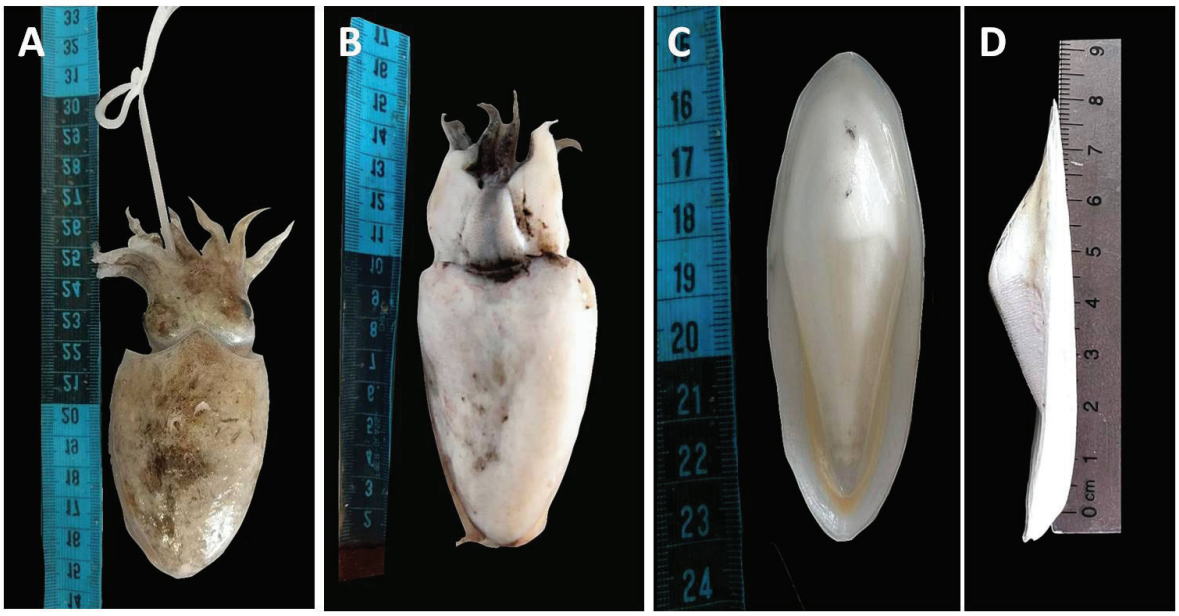

Fig. 5 *Sepia dollfusi* from Syria; (A) dorsal view, (B) ventral view, (C) cuttlebone ventral view, (D) cuttlebone lateral view. Photo credit: Razan Maaroof.

that these two cuttlefishes have probably settled in the Levantine Sea. Further research is needed to monitor the establishment of populations of these potentially valuable resources.

2.2 First record of the Gracile Lizardfish *Saurida gracilis* (Quoy & Gaimard, 1824) in the Syrian coast (Eastern Mediterranean)

Razan MAAROOF, Firas ALSHAWY and Izdihar Ali AMMAR

This note reports the first confirmed occurrence of the Lessepsian lizardfish *Saurida gracilis* (Quoy & Gaimard, 1824) along the Syrian coast, following previous records from Tunisia and Lebanon (Khamassi *et al.*, 2022; Fatfat *et al.*, 2025). It is originally distributed across the Indo-Pacific region, including the Red Sea, East African coasts, Hawaiian Islands, and the Great Barrier Reef (Fischer & Bianchi, 1984).

Three specimens of *S. gracilis* were caught during August 2025 using a speargun, at a depth of 5 m from a site opposite the sports city in Latakia (35.5632°N, 35.7326°E), where the bottom is mixed sandy and gravelly. Morphological and weight measurements were performed on the samples after they were photographed and preserved in formaldehyde in the Marine Biology Laboratory at the Higher Institute of Marine Research.

The specimens were identified according to Fischer & Bianchi (1984) based on their specific morphological properties (Fig. 6). The body is tubular and moderately long, head and caudal peduncle slightly depressed. Adipose fin behind dorsal fin. The back surface shows a brown colour, while in a white ventral side with yellow spots. All fins show dark, dotted bands. The dorsal side of the body is characterized by separate vertical pigmentation. When observed vertically, the snout presents a

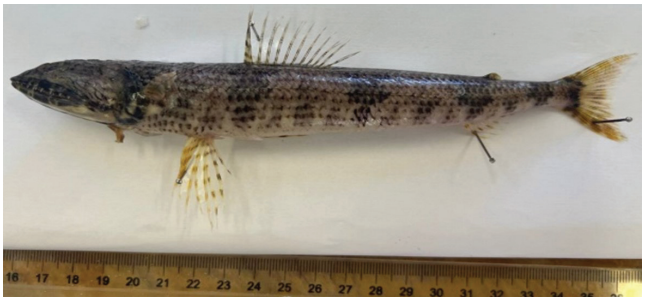

Fig. 6: *Saurida gracilis* from Latakia coast (Syria). Photo credit: Razan Maaroof.

Table 2. Morphological measurements (cm), and structural characters of the three specimens of *S. gracilis* from Syria.

Morphometric characters (mm)	S1	S2	S3
Total length (TL)	18.4	19.7	22.9
Standard length (SL)	16.6	18.2	20.1
Body depth	2.9	2.1	3.7
Head length (HL)	4.2	4.3	5.5
Head width(wL)	1.6	1.8	2.1
Snout length	1.1	0.6	1.6
Eye diameter	0.3	0.4	0.5
Interorbital width	0.7	0.5	0.9
Upper jaw length	2.8	3.1	3.7
lower jaw length	3	2.9	3.9
pre dorsal distance fin	6.7	7.2	8.1
post dorsal distance	13.7	14.6	16.5
pre pectoral distance	4.4	4.8	5.7
pre pelvic distance	5.6	6	6.9
pre anal distance	12.9	14.5	16.3
Pre dorsal base	2.4	2.5	2.9
Post dorsal base	0.2	0.3	0.3
Pectoral fin base	0.6	0.6	0.7
Pelvic fin base	0.5	0.6	0.9
Anal fin base	1.6	1.9	2.1
Meristic characters (counts)			
Dorsal fin rays			11
Pectoral fin rays			13
Pelvic fin rays			9
Anal fin rays			9
Caudal fin rays			19

less elliptical contour. The eye is partially enveloped by a fleshy adipose eyelid on both its anterior and posterior margins. All measurements and the fin formula for these specimens are shown in Table 2. These features of *Saurida gracilis* are in full agreement with those reported in Tunisian waters by Khamassi *et al*. (2022) and Lebanese water by Fatfat *et al*. (2025). This record marks the first for Syria and suggests a continued westward expansion of *S. gracilis* in the eastern Mediterranean.

3. TÜRKIYE

3.1 Is *Arcuatula senhousia* (W. H. Benson, 1842) expanding its range?

Senem ÇAĞLAR

Arcuatula senhousia (W.H. Benson, 1842) is an invasive, opportunistic bivalve and non-native species in the Mediterranean. Barash & Danin (1971) reported this species from the eastern Mediterranean in 1960 for the first time and has since expanded rapidly its distribution (Galanidi *et al*., 2023). Fortič *et al.* (2023) reported an established population of *A. senhousia* in the Gulf of İzmit, in the eastern part of the Sea of Marmara.

This study highlights the continued presence and expansion of *A. senhousia* in the Sea of Marmara and its spread towards the Black Sea (Fig. 7). An established population of *A. senhousia* was encountered in 2019 in the Golden Horn (41.03586°N, 28.94917°E), which is located on the southwestern coast of the Bosphorus, to the north of the Sea of Marmara. Sampling was carried out at a depth of 4 m, in a shelled muddy biotope, using a Van Veen grab (0.1 m²). This species, that has a short life cycle and high settlement success (Morton, 1974), has formed a dense population at Golden Horn station (737 individuals/m²). The Port of Haydarpaşa is another area in the Sea of Marmara where *A. senhousia* was found. In 2024, a single juvenile was encountered at this station (41.00206°N, 29.00639°E) using the Van Veen grab at a depth of 10 m. Additionally, this study reports the presence of *A. senhousia* on the Black Sea coast of Türkiye and in the southern Black Sea region for the first time. Sampling was conducted at Port of Samsun (41.30389°N, 36.3450°E) in 2024. A single juvenile was encountered at this station. Unlike the other records reported in this study, however, this individual was obtained from a hard substratum at a depth of 0.5-1 m. *Arcuatula senhousia* has been present in the Black Sea since 2002 and has rapidly expanded its distribution throughout the basin, as in the Mediterranean (Kovalev *et al*., 2017; Băncilă *et al.*, 2022). All records are associated with areas of intense shipping activity. Furthermore, these findings demonstrate that *A. senhousia* rapidly expands and forms established populations. In the Anthropocene era, it is becoming increasingly important to determine the changes that invasive species will create in the ecosystem. Therefore, monitoring new records and established populations of *A. senhousia* more carefully will provide more information about its current distribution and its potential impact on the ecosystem.

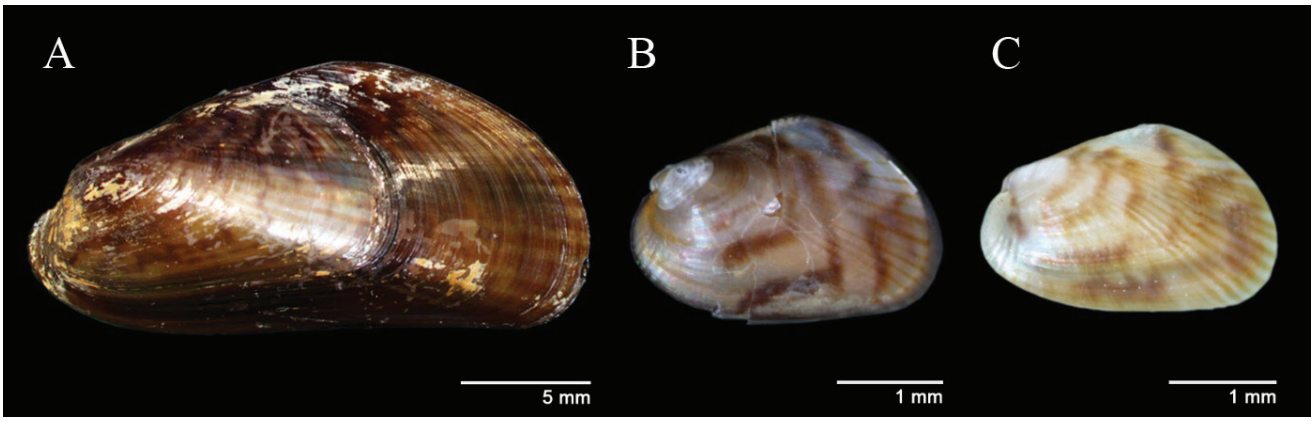

Fig. 7: *Arcuatula senhousia* specimens (A: Golden Horn, B: Port of Haydarpaşa, C: Port of Samsun). Photo credit: Senem Çağlar.

3.2 *Priacanthus sagittarius* (Priacanthidae) reached the Aegean Sea (Fethiye, Türkiye)

Okan AKYOL and Zafer TOSUNOĞLU

The genus *Priacanthus* comprises 48 species worldwide, four of which occur in the Mediterranean, namely the Atlantic Bigeye, *Priacanthus arenatus* Cuvier, 1829, the Moontail Bullseye, *P. hamrur* (Forsskål, 1775), the Elongate Bulleye, *P. prolixus* Starnes, 1988 and the Arrowfin Bigeye, *P. sagittarius* Starnes, 1988 (Froese & Pauly, 2025). The members of the family are characterized by notably large eyes, deep bodies, rough scales, and primarily bright red colouration (Starnes, 1988). Arrowfin Bigeye, *Priacanthus sagittarius* Starnes, 1988, is a nocturnal solitary fish found in sheltered reefs, typically in caves or under coral plates. It may also be found in rocky habitats and open areas, as well as near soft substrate (Golani *et al*., 2021; Froese & Pauly, 2025). They feed primarily on small fishes, small cephalopods, crustaceans and polychaetes (Starnes, 1988). The maximum recorded size is 35 cm SL (Froese & Pauly, 2025). Since the first record in 2009 (Goren *et al.*, 2010), there have been sporadic observations of the species in the eastern Mediterranean Sea, most likely entering via the Suez Canal. This study provides further documentation of *P. sagittarius* captured from Fethiye at the border of the Aegean Sea, thereby expanding the knowledge of this rare species' new extension range.

On 22 January 2025, a *P. sagittarius* specimen (Fig. 8) was captured off Tersane Islet, in proximity to Göcek, Fethiye Bay, Muğla (36.67883°N, 28.92128°E) at a depth of 40 metres during a fishing expedition targeting Atlantic bonito, employing gillnet techniques. The specimen was preserved in 6% buffered formalin and deposited in the Ichthyological Collection of the Fisheries Faculty, Ege University, under the ESFM-PIS/2025-001 catalogue number.

Fig. 8: *Priacanthus sagittarius* specimen, captured from Tersane Islet, Fethiye Bay, NE Mediterranean Sea (catalogue number: ESFM-PIS/2025-001). Scale bar: 50 mm. Photo credit: Okan Akyol.

The morphological and colour analysis, combined with morphometric and meristic measurements reported in Table 3 agree with those previously reported by Starnes (1988), Golani *et al.* (2021), Ergüden *et al*. (2023) and Froese & Pauly (2025).

Short description: Body is ovate, deep and strongly compressed. The specimen under consideration possesses a notably large head, accompanied by a strongly oblique mouth and a notably projected lower jaw. The ocular organ is of considerable size, with an approximate diameter equivalent to 40% of the head's length. The dorsal fin is continuous, and the spines increase in size. The body and head are both covered with small scales. The body is characterised by a predominance of pinkish-red hues. The presence of orange-brown dots on the dorsal and anal fins, in conjunction with a black mark at the pectoral fin base, has been observed.

The specimen under consideration in the present study appears to be the largest documented to date for

Table 3. Morphometric measurements, ratios and meristic counts of *Priacanhus sagittarius*, captured from Tersane Islet, Fethiye, NE Mediterranean Sea.

Measurements	Size (mm)	Proportion (TL%)
Total length (TL)	272	
Standard length (SL)	228	83.8
Pre-dorsal fin length	60	22.1
Pre-anal fin length	118	43.4
Pre-pectoral length	72	26.5
Maximum body depth	88	32.4
Head length	76	27.9
Eye diameter	29	10.7
Interorbital length	19	7.0
Preorbital length	17	6.3
Meristic counts		
Dorsal fin rays	X + 13	
Anal fin rays	III + 14	
Pectoral fin rays	16	
Ventral fin rays	I + 5	
Weight (g)	350	

the Mediterranean Sea, with a length of 228 mm (SL), a total length of 272 mm, and a weight of 350 grams. This is particularly noteworthy given that the length range of the eight previous records from Israel, Syria, Egypt, and the Bays of Mersin and Iskenderun, including Arsuz, in Türkiye, ranged from 102 to 200 millimetres SL (see Ergüden *et al*., 2023).

Priacanthus sagittarius has probably established population in the Levant basin since 2009 (Goren *et al*., 2010), and continues to expand westernwards into the Mediterranean Sea. However, the number of records of this Lessepsian fish in the Mediterranean Sea is still limited. After all, this ichthyological note reveals not only the ninth Mediterranean record but also the westernmost.

3.3 First record of alien red alga *Galaxaura rugosa* from the Aegean coast of Türkiye

Öznur YAZILAN and Ergün TAŞKIN

A total of 691 marine macrofloral taxa at specific and infraspecific levels have been recorded along the coasts of Türkiye, including 385 red algae (Rhodophyta), which account for approximately 56% of the total macroalgal diversity (Taşkın *et al.*, 2019).

The red alga *Galaxaura rugosa* (J.V.Lamouroux) J.Agardh is frequently found in tropical to warm temperate marine environments across the Atlantic, Indian, and Pacific Oceans (Verlaque *et al*., 2015). It was introduced into the Mediterranean via the Suez Canal and it is known on the coasts of Israel, Lebanon, and Syria (Verlaque *et al.*, 2015). In Türkiye it was reported from Samandağ, Hatay, Eastern Mediterranean (Taşkın *et al.*, 2017). Recently, Zenetos *et al*. (2024) listed 36 alien macrofloral taxa (7 Chlorophyta, 11 Ochrophyta, 17 Rhodophyta, and 1 Spermatophyta) from the Aegean Sea, but the list did not include *G. rugosa*.

The alien red alga *G. rugosa* (Galaxauraceae, Rhodophyta) is reported for the first time from the Aegean coasts of Türkiye. The specimen was collected in March 2025 from the coast of Marmaris, Muğla (36.72653°N, 28.13003°E) at approximately 0.5 m depth, growing on rocks. The algal material was collected by snorkeling and fixed in 4% formalin-seawater solution. Laboratory examination and morphological identification were conducted at the Department of Biology, Manisa Celal Bayar University (MCBU, Türkiye), using a light microscope (Nikon SE, Tokyo, Japan) and photographic equipment (Leica DM750). Taxonomical identification followed the morphological descriptions by Norris (2014) and Verlaque *et al*. (2015). The voucher specimen is deposited in the Department of Biology, MCBU (Türkiye).

The thalli were erect, cartilaginous, and calcareous, measuring 3.5 - 6 cm in height (Fig. 9A, B). They exhibited cylindrical axes with subdichotomous branching and

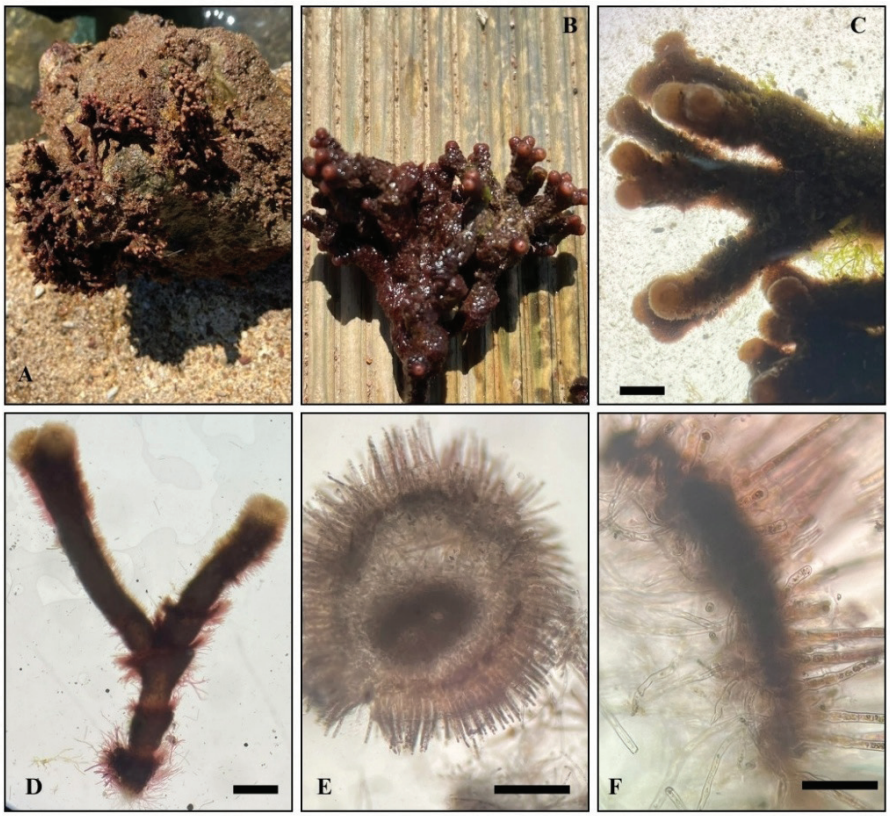

Fig. 9: Morphological features of *Galaxaura rugosa.* A. Thallus attached to rocky substrate in its natural habitat. B. Fresh sample showing irregularly branched and calcified surface. C. Apical portions and branching pattern under stereomicroscope of tetrasporaphyte. D. Y-shaped branching of thallus and hirsute assimilatory filaments of tetrasporaphyte. E. Surface view of calcified cortex cells. F. Detail of cortex and medulla structure. Scale bars: C,D: 5mm E-F: 50 µm. Photo credit: Öznur Yazılan.

blunt apices, forming dense, tufted aggregations (Fig. 9C). Gametophytes appeared yellowish, while tetrasporophytes were dark reddish in colour (Fig. 9D). Internally, the thalli consisted of a central medulla composed of thick-walled cells, surrounded by a cortex of small, pigmented peripheral cells. Short and long assimilatory filaments were commonly observed at the basal parts of gametophytes, whereas in tetrasporophytes these filaments extended across the entire surface of the thalli (Fig. 9E, F). These morphological features align with previous descriptions of the species (Norris, 2014; Verlaque *et al*., 2015).

4. CYPRUS

4.1 First record of the Arrowfin Bigeye *Priacanthus sagittarius* Starnes, 1988 from Cyprus

Damla BETON and Mehmet Fatih HUSEYINOGLU

The Arrowfin Bigeye *Priacanthus sagittarius* Starnes, 1988 is an Indo-West Pacific tropical demersal marine fish, inhabiting moderate depths in sheltered areas, with a distribution from the Red Sea and Reunion to Japan, northern Australia and Samoa (Kuiter & Tonozuka, 2001), and recently the Mediterranean Sea (Goren *et al*., 2010). It has an oval body with a continuous dorsal fin with 10 spines and 13-14 soft rays, three anal spines and 13-15 anal soft rays. Its eyes are very large, with a large and oblique mouth and a short preopercular spine. Its colour is silvery reddish, or pale yellowish with gray mottling. All fins are pink with reddish-brown spots in the membranes, or yellowish with dusky spots. This species resembles *P. blochii*, but differs from it by having pointed soft dorsal and anal fins, and black membrane between the first and the second dorsal spine (Starnes, 1988).

Since the first record of *P. sagittarius* in the Mediterranean (Goren *et al*., 2010), further records followed from Egypt, Türkiye and Syria (Farrag *et al*., 2016; Gökoğlu & Teker, 2018; Alshawy *et al*., 2019). Six specimens were caught together on 9 June 2025, in the Esenköy area (35.51964°N, 34.13776°E) on the north coast of Cyprus, at 38 m depth, in a 28 mm mesh (bar length) 1200 m long monofilament gill net, which was set at 04:00 and hauled at 06:30 by fisherman Lokman Kahveci. The fisher retained one individual as a specimen (Fig. 10) and discarded the rest. The identification was done according to Starnes (1988), Farrag *et al*. (2016) and all counts, measurements and morphological characterizations were in accordance. *Priacanthus sagittarius* is distinguished from its three possible congeners, *P. arenatus*, *P. blochii* and *P. hamrur*, by the black blotch at the base of the pelvic fin and by the long tenth dorsal spine, which is almost double the length of the second spine (Fig.10, 11) (Starnes, 1988). The specimen is stored in 95% ethanol solution and was deposited in the Archives of SPOT.

Priacanthus sagittarius is a large-mouthed ambush predator using dark crevices and sheltered sites and may exert pressure on the fauna near deep water coralligenous communities in the eastern Mediterranean. Competition for shelter with the native fauna may also lead to biodiversity loss. Continuous monitoring for further records and abundance is suggested.

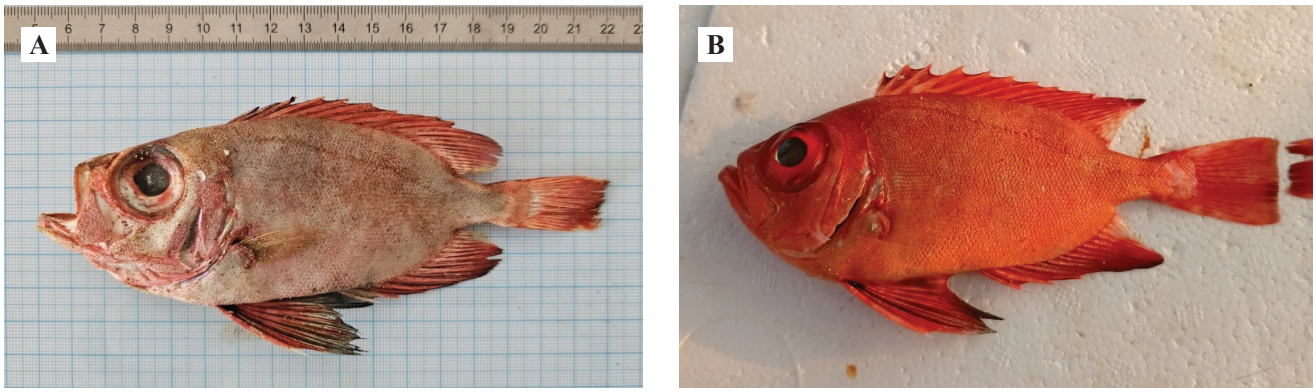

Fig. 10: *Priacanthus sagittarius* caught in monofilament gill nets. Photo credit: Damla Beton (A) and Lokman Kahveci (B).

Fig. 11: Pelvic fin with the black blotch at its base. Photo credit: Damla Beton.

4.2 First record of the non-indigenous Randall's Lizardfish *Synodus randalli* Cressey, 1981 in Cyprus

Eleni PASCHALI and Constantinos GEORGIADES

Synodus randalli Cressey, 1981 (Aulopiformes: Synodontidae), commonly known as Randall's Lizardfish, is a non-indigenous species native to the Red Sea and the western Indian Ocean (Golani & Fricke, 2018). Its presence in the Mediterranean Sea has been recently documented, indicating a potential range expansion facilitated by the Suez Canal and environmental changes (Langeneck *et al*., 2023; Christidis *et al*., 2024; Golani, 2025).

The first documented occurrence of *S. randalli* in the Mediterranean was on 23 June 2023, when a specimen was captured in Iskenderun Bay, Türkiye. Due to the absence of *S. randalli* records between the Suez Canal and Türkiye it was suggested that the species could have been transported to the Mediterranean via ballast waters (Langeneck *et al.*, 2023). Following this initial record, *S. randalli* spread westward, with specimens caught off the southeastern coast of Crete, Greece, on November17 2023, and in Mersin Bay, Türkiye, on January 20, 2024 (Christidis *et al.*, 2024; Erguden *et al.*, 2024). The specimen from Greece was a mature female, indicating the species' potential for reproduction in Mediterranean waters (Christidis *et al*., 2024).

The present study is the first record of *S. randalli* in the waters of Cyprus (Fig. 12A). Four samples were collected on 6 June, 2025, at 20 m depth off Ayia Napa (34.97656°N, 33.95590°E). The collected specimens measured between 182 and 295 mm in total length and weighed between 49 and 207 g. Two were mature females and two were males.

Key identification characters matched the species description by Cressey (1981). The specimens' meristic counts include 13 dorsal fin rays, 12 pectoral fin rays, 8 pelvic fin rays, 8 anal fin rays, and 14 peritoneal spots. There are 3.5 scale rows above the lateral line and 4 below it. The anterior palatine teeth are longer and form a distinct group compared to the posterior palatine teeth (Fig. 12B). Teeth are also present on the free end of the tongue (Fig. 12C). The pectoral fin extends beyond a line drawn from the origin of the dorsal fin to that of the pelvic fin (Fig. 12E). No conspicuous pigmented area is present on the operculum. The nasal flap of the anterior nares is long and triangular. The body displays reddish-brown,

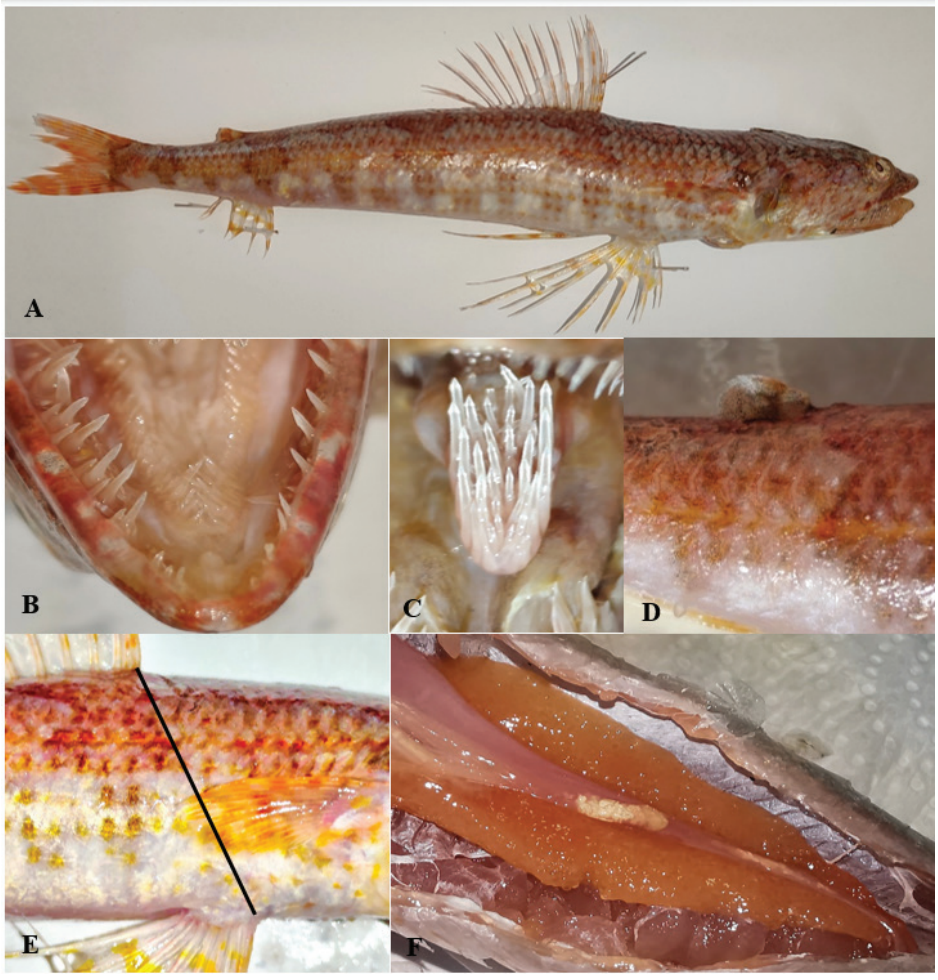

Fig. 12: A) Lateral view of one of the *S. randalli* specimen (total length 220 mm); B) oral cavity view showing the anterior palatine teeth that are longer and arranged in a discrete group compared to the posterior teeth; C) Teeth on the free end of the tongue; D) Spot on the adipose fin; E) Side view showing that the pectoral fin extends beyond a line from the origin of dorsal fin to the origin of pelvic fin; F) Ovaries of one of the specimens (images from multiple specimens). Photo credit: Eleni Paschali.

saddle-like bands, with the dorsal fin marked by 3 to 4 similarly colored bars (Fig. 12A). A conspicuous spot is also present on the adipose fin (Fig. 12D). Fresh samples present a series of reddish-brown saddle-like bands.

As for the pectoral fin in 100% of the samples, it extended beyond a line from the origin of the pelvic to the origin of the dorsal fin. The study of Christidis *et al*. (2024) did not report that characteristic and this was attributed to the size of their specimen.

The present record provides further evidence of the potential establishment of *S. randalli* in the eastern Mediterranean. Additionally, the fact that mature female (Fig. 12F) and male specimens were caught, suggests the presence of a reproducing population in Cyprus.

5. GREECE

5.1 *Portunus segnis* in the Argolikos Gulf, Greece

Georgios GASTOUNIOTIS and Panagiotis GASTOUNIOTIS

The portunid crab *Portunus segnis* (Forskål, 1775) (Malacostraca: Decapoda: Portunidae) is a species native to the western Indian Ocean and the Red Sea (Lai *et al.*, 2010). It entered the Mediterranean Sea via the Suez Canal in the late 19th century and has since expanded its range across the eastern and central Mediterranean (Galil *et al*., 2024). In Greek waters, *P. segnis* was first recorded in Rhodes in 1991 and later in eastern Crete in 2018 (Corsini-Foka *et al*., 2004; Katsanevakis *et al*., 2020).

On December 20, 2024, remains of *P. segnis* were found washed ashore on a beach in Nea Kios, Argolikos Gulf (37.58586°N, 22.75044°E to 37.58725°N, 22.75464°E). The remains of six individuals, primarily chelipeds (Fig. 13A) and fragments of carapaces were found across 400 m of shoreline. A follow-up survey on January 5, 2025, expanded the area to 770 m (37.58728°N, 22.75461°E to 37.58953°N, 22.76286°E), where remains from 42 individuals, including a molt of a female (Fig. 13B) and a whole male (Fig. 13C), were collected. Five additional specimens (Fig. 13D) were acquired on January 10 from local fishermen operating in shallow waters between Nafplio and Mili. They were captured using gillnets deployed overnight. The waters of the Argolikos Gulf (between Nafplio and Mili) are shallow with the bottom consisting of sandy substrates interspersed with seagrass beds of *Cymodocea nodosa* (Ucria) Asch. (1870). The collected specimens were identified based on morphology following Lai *et al*. (2010). The male chela lengths varied from 62.5 to 145 mm, while female chelae measured between 56 to 85 mm. Carapace widths from whole individuals

Fig. 13: Specimens of *Portunus segnis* (Forskål, 1775) washed up on the beach between Nafplio and Nea Kios: A: right male chela. B: exoskeleton of a female. C male. D: male and female individuals obtained from fishermen. Photo credit: A, D Gastouniotis Georgios, B, C Gastouniotis Panagiotis.

ranged from 104 to 159 mm, indicating sexually mature individuals (Giraldes *et al*., 2016). According to the fishermen, *P. segnis* was first observed in the area in 2023, initially in small numbers. By December 2024, it had become the most common shallow-water crab species caught in gillnets

The present records confirm the presence of *P. segnis* in the Argolikos Gulf, extending its known range northward in Greek waters. Despite the closest population being approximately 370 km away in Elounda Gulf, the species has established a disjointed population, suggesting that *P. segnis* will probably continue to spread unpredictably across the Aegean.

5.2 *Pempheris rhomboidea* Kossmann & Räuber, 1877 (Actinopterygii: Pempheridae) in the Ionian Sea

Gerasimos KONDYLATOS and Konstantinos TENEKETZIS

Pempheris rhomboidea Kossmann & Räuber, 1877 is a nocturnal marine species, that forms aggregations in underwater caves and hard substrate canopies (Golani *et al.*, 2006). In the Mediterranean Sea, it is the only species of the family Pempheridae Bleeker, 1859, and can be easily distinguished by the laterally compressed and rhomboid shaped body and the large eye with diameter over-exceeding the snout. The species exhibits a confined natural distribution range within the western Indian Ocean including the Gulf of Aqaba and the Red Sea (Froese & Pauly, 2025). In the basin, *P. rhomboidea* was first reported off the coast of Lebanon in 1978 (Mouneimné, 1979 as *Pempheris moluca* Cuvier, 1831), whilst shortly after, it was reported off the Israeli coast (Ben Tuvia, 1985). In the Hellenic seas, the species was first recorded at Kastellorizo, in 1986 (Papaconstantinou & Caragitsou, 1987 as *P. vanicolensis*). Although the species is currently known in the southern central Mediterranean (Galanidi *et al*., 2023), it does not appear to have spread in the Ionian Sea.

On 18 June 2025, an individual of the species (Fig. 14), was collected with trammel nets (total length 1.000 m, height 2.0 m, mess eye 34 mm), deployed over a local professional fishing vessel (TL 4.91 m, GT 0.86, HP-0.6), in the coastal waters off Romanos Beach, Pylos, Messinia, South Ionian Sea, Greece (36.983689°N, 21.649007°E). Deployment of the nets was initiated at 18:30 hours on the 17th and retrieval was initiated at 07:20 hours on the 18th. The depth at the collection point was approximately 10.0 m and the substrate was sandy with patches of *Posidonia oceanica*. According to the estimations of the fisherman, the individual had and approximate total length of 17.0 cm and weighted ≈70.0 g. This work reports the presence *P. rhomboidea* in the Ionian Sea based on a single specimen and constitutes its first record in the region and its westernmost known boundaries in the Hellenic marine waters.

Fig. 14: *Pempheris rhomboidea* from the coastal waters off Romanos Beach, Pylos, Messinia, South Ionian Sea, Greece. Photo credit: Theodoros Mylonas.

6. MONTENEGRO

6.1 First record of the crab *Percnon gibbesi* (H. Milne Edwards, 1853) (Malacostraca: Percnidae) from the Montenegrin waters (southeastern Adriatic Sea)

Olivera MARKOVIĆ and David MARĐOKIĆ

A single male specimen of the invasive grapsoid crab, *Percnon gibbesi* (H. Milne Edwards, 1853) was observed in the southern Adriatic Sea (Montenegrin territorial waters) at the beginning of September 2025. It was observed in Buljarica on a pebble bottom at a depth of approximately 1.5 m (42.17651°, 18.96621°E). The specimen had a carapace length (CL) of 230 mm and carapace width (CW) of 215 mm (Fig. 15A, B). According to the author (D. Marđokić) this species appeared in the Montenegro waters a few years back (in 2019) not only in Buljarica area but also in other areas along the Montenegro coast such as Čanj and Platamuni. This is the first documented record of this species in Montenegro waters. The reason why this species was only recently recorded in Montenegro waters lies in the fact that it was very difficult to catch this species because it moves quickly and lives in crevices and under boulders. The first occurrence of this species in Adriatic Sea was in 2011 in Albanian waters,

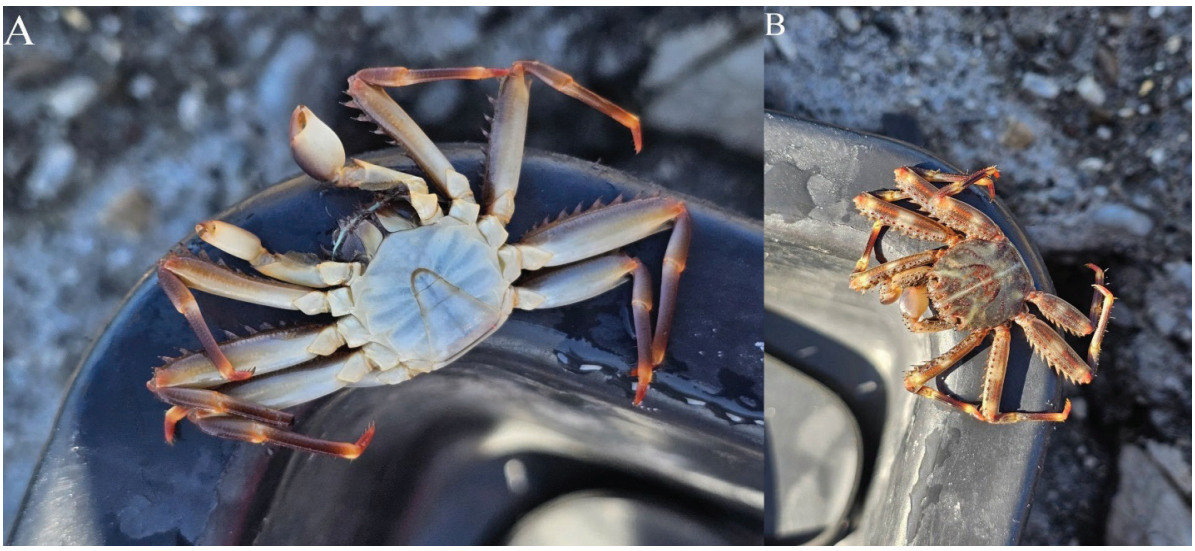

Fig. 15: A) Ventral view on male *Percnon gibbesi* from Montenegrin waters. Photo credit: David Marđokić. B) Male *Percnon gibbesi* from Montenegrin waters. Photo credit: David Marđokić.

on Sazani Island (Zenetos *et al*., 2010; Katsanevakis *et al*., 2011). Three years later, it was recorded in Molunat bay in Croatia (Dulčić & Dragičević, 2015), very close to the border with Montenegro. After that, it spread further north, across Palagruža archipelago (Dulčić *et al*., 2019) to Cape Kamenjak in North Adriatic Sea (Iveša *et al*., 2024). Since it is considered as invasive alien species which establish its population in nearby countries, future observations will show whether this grapsoid crab will establish its population in the Montenegro waters.

7. CROATIA

7.1 On the occurrence of Atlantic Salmon *Salmo salar* Linnaeus, 1758 in the Adriatic Sea

Jakov DULČIĆ and Neven IVEŠA

To date only two confirmed species from the family Salmonidae have been recorded in the Adriatic Sea: the Sea Trout *Salmo trutta* Linnaeus, 1758 and the Marble Trout *Salmo marmoratus* Cuvier, 1829 (Kovačić *et al*., 2020). In contrast, the Atlantic Salmon *Salmo salar* Linnaeus, 1758, an amphihaline species that primarily inhabits freshwater, has not previously been reported in this region. This species is widely distributed across the

Fig. 16: Specimens of *Salmo salar* caught in Istrian waters, Croatia (A - Vrsar, B - Porto Budava). Photo credit: Matija Pisak (A), Boris Strmotić (B).

North Atlantic Ocean – from northern Quebec to New York in the west, and from the White and Barents Seas to the Baltic and North Seas, including Iceland, in the east. Landlocked populations occur in North America, and it has also been introduced to New Zealand, Chile, southern Argentina, and Australia (Page & Burr, 2011). In this study, the presence of *S. salar* in the Adriatic sea is reported for the first time. To minimize the potential for misidentification with closely related taxa, meristic counts were recorded during laboratory analysis, and species identification was conducted following the morphological characters described by Kottelat & Freyhof (2007). A specimen (♀), 53 cm TL and 2100 g, was caught on January 16 2025 at a depth of 5 meters near Vrsar on the western Istrian coast (45.158°N, 13.587°E) (Fig. 16A). A second specimen (♀), 52 cm in total length (TL) and weighing 2000 g, was collected on January 19 2025 at a depth of 3 meters near Porto Budava on the eastern Istrian coast (44.890°N, 13.994°E) (Fig. 16B). Both specimens were deposited in the ichthyological collection of the Faculty of Natural Sciences, Juraj Dobrila University of Pula, Croatia, and assigned corresponding catalogue numbers. These findings represent the first documented occurrence of *S. salar* in both the Adriatic Sea and the broader Mediterranean region.

The most plausible explanation is that these individuals escaped from aquaculture facilities, where *S. salar* is known to be reared in Croatia (Bavčević, pers. comm.). The escape most likely occurred in 2024 as a result of severe storm damage (hurricane-force bora winds), which caused significant structural failures at the aquaculture facility. However, while escape has occurred, based on current knowledge the long-term establishment of *S. salar* in the Adriatic Sea appears unlikely due to thermal barriers.

While *S. salar* exhibits high invasion risk under current climate models, its thermal sensitivity and the general lack of self-sustaining populations in introduced regions indicate that long-term establishment in the Adriatic is unlikely (Crozier *et al.*, 2008; Marić *et al*., 2022). Nevertheless, the possibility of hybridization between *S. salar* and *S. trutta* should not be overlooked (Kottelat & Freyhof, 2007). These findings emphasize the importance of monitoring native salmonid populations for hybrid detection and adopting precautionary measures regarding future introductions of allopatric salmonid species.

8. SLOVENIA

8.1 First record of the non-indigenous amphipod *Jassa slatteryi* Conlan, 1990 from Slovenia

Urška Urška KAJTNA and Borut MAVRIČ

The cosmopolitan amphipod *Jassa slatteryi* Conlan, 1990, has been known to occur in the Mediterranean Sea since its original description. The species had been considered cryptogenic in the region until new molecular evidence by Beermann *et al.* (2020) highlited the North Pacific as the likeliest native range of *J. slatteryi*, updating its status to alien in the Mediterranean Sea. Following the first report for the Mediterranean Sea comming from Croatia (Rovinj), the species was confirmed also in Spain, Malta and Italy. Actual distribution of *J. slatteryi* may have been underestimated throughout the Mediterranean, due to misdiscrimination from other species of the genus *Jassa* (Bonifazi *et al.*, 2018).

On April 28 2022, multiple colonies of the cryptogenic bryozoan *Bugula neritina* (Linnaeus, 1758) were collected manually from the port of Piran (coast of Slovenia, Gulf of Trieste, Northern Adriatic Sea) (45.5259°N, 13.5674°E). Samples were collected from submerged boats, ropes and buoys up to 1 m deep and preserved in 70% ethanol for lab analysis. Multiple specimens belonging to the genus *Jassa* were isolated from the samples, eight of which were later identified as *J. slatteryi* (Fig. 17) following the descriptions by Conlan *et al*. (2021), while the majority belonged to *J. marmorata* Holmes, 1905. The presence of *Jassa* species in such environment should not be considered surprising, as they seem to be closely associated with bryozoans, especially those growing on artificial structures, where they leave in self-constructed muddy tubes as hemisessile filter feeders and detritivores (Fernandez-Gonzalez & Sanchez-Jerez, 2017).

In addition to the two *Jassa* species, four other non-indigenous crustacean species were found in the bryozoan colonies from the same port: the amphipods *Caprella scaura* Templeton, 1836, and *Stenothoe georgiana* Bynum & Fox, 1977, and the isopods *Paracerceis sculpta* (Holmes, 1904) and *Paranthura japonica* Richardson, 1909. These species have all been detected in the area before and are considered established. By contrast, the specimens of *J. slatteryi* are the first record from the Slovenian Sea and the Gulf of Trieste. While most alien peracarids are restricted to marinas and harbours, *J. slatteryi* seems to thrive in natural habitats and protected marine areas as well (Navarro-Barranco *et al*., 2023, Supplementary Material). Special attention should therefore be given to the spread of this species and its potential impact in natural environments.

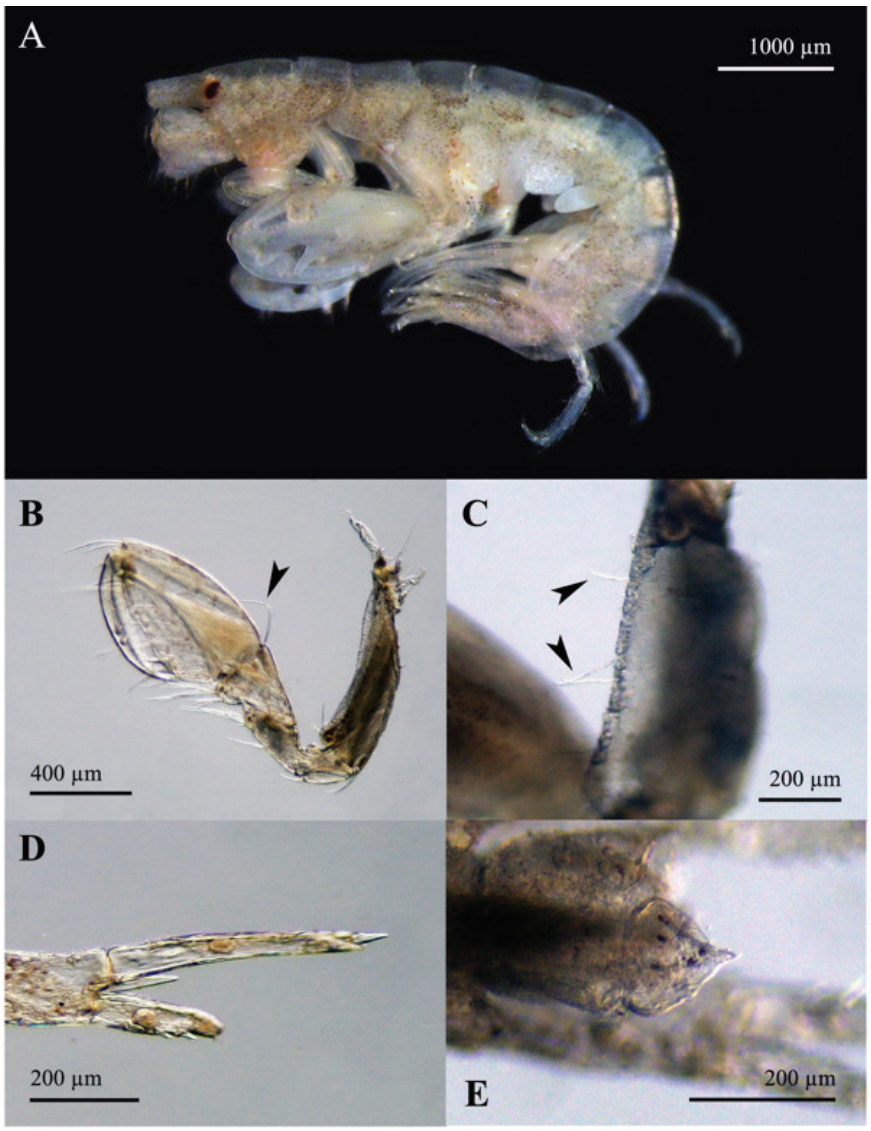

Fig. 17: (A) *Jassa slatteryi*, adult thumbed male with diagnostic characters: (B) gnathopod I, basis without a row of short setae on the anterolateral margin, carpus with a single long seta at the anterodistal junction of the propodus, which reaches ≥50 % of the length of the anterior margin (indicated by black arrow); (C) basis of gnathopod II with a row of setae along the anterolateral margin, with the length of most setae <40 % of the basis width (indicated by black arrows); (D) ventral peduncular spinous process of uropod I underlying about ¼ of the longest ramus and (E) a lack of apical setae on the telson (uropods 3 removed). Photo credit: Urška Kajtna.

9. ITALY

9.1 First record of *Metacalanus acutioperculum* Ohtsuka, 1984 (Copepoda, Calanoida, Arietellidae) in the northern Adriatic Sea: the Marano and Grado Lagoon and the Gulf of Trieste

Érica Caroline BECKER and Alenka GORUPPI

The calanoid *Metacalanus acutioperculum* Ohtsuka, 1984 is a hyperbenthic copepod originally described from coastal waters of Tanabe Bay, Japan. This species belongs to the family Arietellidae and typically inhabits the sediment-water interface, often exhibiting diel vertical migration (Ohtsuka, 1984). In the Mediterranean Sea, *M. acutioperculum* is considered an alien species of northwestern Pacific origin (Ohtsuka, 1984; Galanidi *et al.*, 2023). To date, it has been recorded only twice in the basin: first in the southern Tyrrhenian Sea, near the Marsala Lagoon, where it was collected at night in shallow coastal waters (0.5-6 m) with a 125 µm mesh net (Campolmi *et al*., 1999), and in later in the South Adriatic Sea (Capo di Leuca) in 2002 using horizontally towed plankton nets (Moscatello & Belmonte, 2007).

We report the first records of *M. acutioperculum* in the northern Adriatic Sea. The species was first observed in the Marano and Grado Lagoon (Italy; average depth < 1 m)

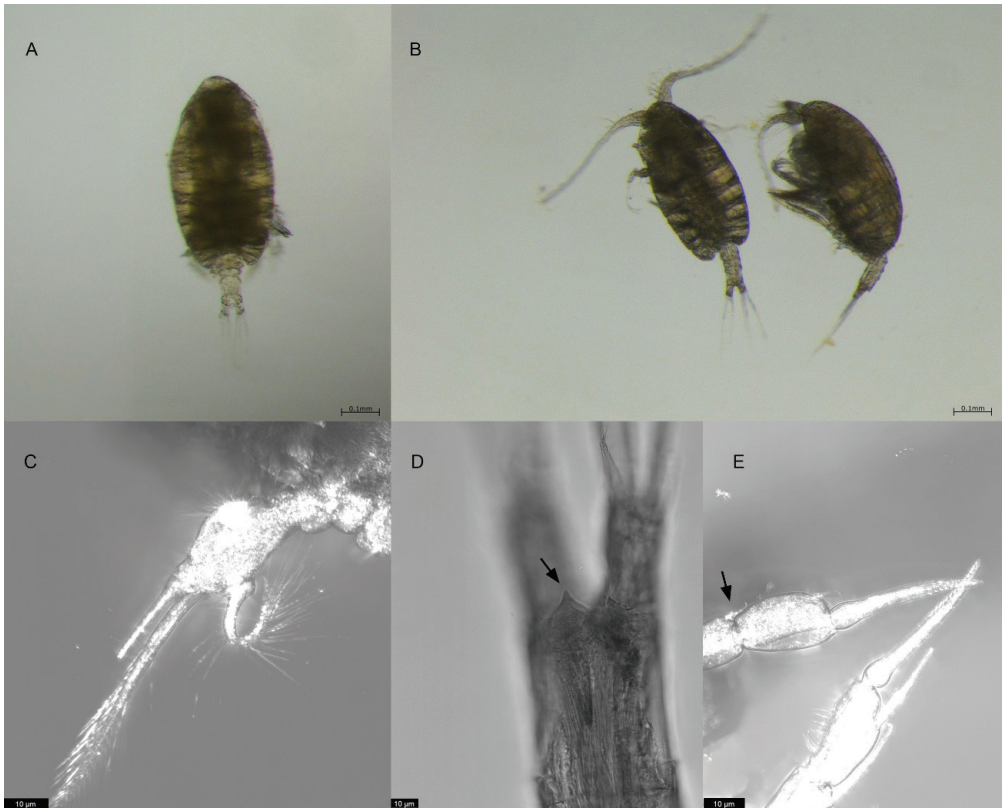

Fig. 18: *Metacalanus acutioperculum* Ohtsuka, 1984. A. female habitus (dorsal view); B. male habitus (dorsal and lateral view); C. female leg 5; D. female urosome; E. male leg 5. Black arrows indicate diagnostic species characters. Images C-E were obtained using confocal microscopy. Photo credit: Angela Pelusi and Noemi Tomasi.

on 24 October 2019, where sampling was conducted using a 200 µm Bongo net horizontally towed. Specimens were found at four stations: 2 females at TPO201 (45.73°N, 13.03°E; temperature 19.27°C; salinity 25.64), 2 males at TEU201 (45.70°N, 13.33°E; temperature 19.51°C; salinity 30.76), 6 males and 2 females at TEU301 (45.73°N, 13.25°E; temperature 19.58°C; salinity 30.14) and 1 male at TME301 (45.742°N, 13.125°E; temperature 18.51°C; salinity 12.7). Five years later, a male was recorded at the LTER Gulf of Trieste coastal station (www.deims.org/96969205-cfdf-41d8-979f-ff881ea8dc8b, 45.70°N, 13.71°E; depth 18 m) at night on 14 October 2024 (temperature 18.35°C; salinity 35.28) using a 200 µm WP2 net vertically towed from near bottom to surface.

Adult specimens of *M. acutioperculum* were sorted and measured, comprising 4 females (average body length 0.65±0.02 mm) and 9 males (average body length 0.55±0.02 mm) (Fig. 18A, B). Identification was carried out following the diagnostic criteria described by Ohtsuka (1984), Shih *et al*. (2022), and Razouls *et al*. (2005-2025). The species can be recognized by a combination of key morphological features: in females, leg 5 segment 2 bearing two setae (one inner seta near the distal end and one terminal seta) (Fig. 18C) and an acutely triangular anal operculum (Fig. 18D); in males, leg 5 with the outer seta of exopod segment 2 shorter than the segment, and exopod segment 3 terminating in a spine with margins slightly serrated (Fig. 18E).

The detection of *M. acutioperculum* both in transitional lagoonal areas and at sea suggests that, even if rare, this species could be considered established in this area. Given its hyperbenthic behavior and relatively small size, further sampling using finer mesh nets is recommended to monitor its distribution and establishment.

9.2 First record of the Chinese Mitten Crab *Eriocheir sinensis* H. Milne Edwards, 1853 (Crustacea, Decapoda, Varunidae) in transitional waters of Tyrrhenian Sea (western Mediterranean)

Jonathan TEMPESTI and Claudio LARDICCI

Eriocheir sinensis H. Milne Edwards, 1853 is a varunid decapod native of the northwest Pacific coasts, from Hong Kong to the northern part of North Korea (Cohen & Carlton, 1997). This crab, characterized by distinctive furry claws, is an omnivorous and opportunistic catadromous species that colonize brackish environments (estuaries/lagoons) and coastal areas during its reproductive season (Veilleux & de Lafontaine, 2007). It is a semelparous species able to produce 250.000-1.000.000 eggs, which planktonic larvae metamorphose and settle in brackish/coastal environments after 1-2 months (Cohen & Carlton, 1997). During this life stage, it has been observed that this species is capable of demographic explosion, impacting on the other local brackish/marine

species through predation and competition (Veilleux & de Lafontaine, 2007). Moreover, this crab damages embankments/drainage systems through burrowing, impacts fisheries by net damaging and bait consuming (Veilleux & de Lafontaine, 2007), and hosts zoonotic trematodes (genus *Paragonium*) infecting humans and other mammals (Cohen, 2003).

In the Mediterranean, *E. sinensis* was firstly recorded in 1959, in the coastal lagoon of Bages-Sigean (western Gulf of Lyon, France), whose population became extinct about ten years later (Crocetta *et al*., 2020 and references therein). Subsequently, some specimens of *E. sinensis* were collected in the lagoons of Venice (2005 and 2013) and Grado e Marano (2014) (northern Adriatic Sea) (Crocetta *et al*., 2020 and references therein). Then, its latest record was a female collected in the Sacca di Goro in 2020 (Crocetta *et al*., 2020), a coastal lagoon at the Po River estuary (northern Adriatic).

On 26 February 2025, an adult male of mitten crab (Fig. 19) was caught by local fishers (S. Bernardeschi and N. Romboni) at 4 m depth in the Arno River estuary (northern Tyrrhenian Sea, Italy; 43.6799°N, 10.2967°E). The crab matched the main morphological characteristics of *E. sinensis*: carapace frontal margin with four distinct teeth; strong, high and sharp epi-/protogastric crests; anterolateral margins with four teeth (exorbital tooth included), with the fourth tooth pronounced and spine-like (Sakai, 2013). Moreover, the site's sandy-muddy bottoms and variable marine to brackish conditions match the euryoecious nature of *E. sinensis*, which tolerates polluted waters, wide temperature (4-32°C) and salinity ranges (0-35 PSU) (Veilleux & de Lafontaine, 2007). The collected specimen is preserved at -20°C at the Department of Biology of the University of Pisa (Italy) (code P/Art-Cru-Deca_0001). Globally, ten intentional/unintentional pathways have been identified (Cohen & Carlton, 1997). However, the introduction vector of *E. sinensis* in the Arno estuary remains uncertain, with ballast water release and deliberate upstream introduction for consumption being the most plausible hypotheses. Due to limited and scattered records, the distribution of this species in the Mediterranean basin remains unclear, requiring further research to assess its actual range.

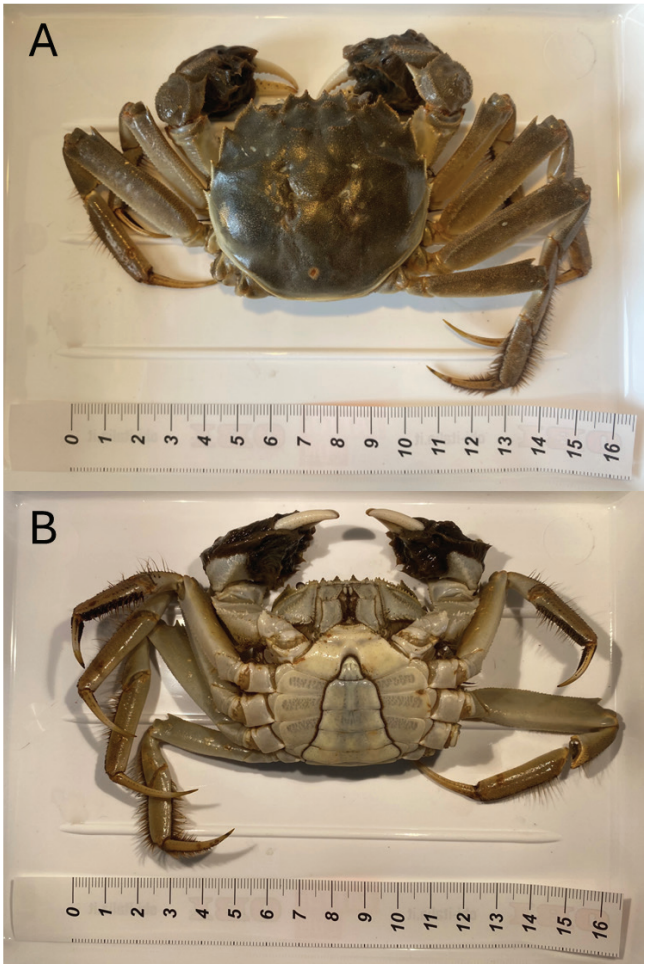

Fig. 19: Dorsal (A) and ventral (B) view of the male specimen of *Eriocheir sinensis* collected in the estuary of Arno River (scale bar is in centimeters). Photo credit: Jonathan Tempesti.

9.3 Lionfish on the western front: *Pterois miles* enters the Tyrrhenian Sea

Francesco TIRALONGO and Alessandro NOTA

Pterois miles (Bennett, 1828) is a Lessepsian species, entering the Mediterranean Sea from the Red Sea through the Suez Canal. It was first recorded in Israel in 1991 (Golani & Sonin, 1992) but remained unobserved for over two decades. A rapid east-to-west expansion began in 2012, with the species gradually colonizing several regions of the eastern and central Mediterranean (Dimitriadis *et al*., 2020; Azzurro *et al*., 2025). On 22 June 2025, a specimen of *P. miles* was observed at 11:30 am and captured along the Tyrrhenian coast of southern Italy, marking the first confirmed record of this invasive fish in the Tyrrhenian Sea. The individual was spotted by a recreational fisher at a depth of 4 meters inside a rocky crevice at Marinella beach, Palmi (Calabria, Italy; 38.35294˚N, 15.83447˚E). After filming the fish (link to the original video: https://archive.org/details/video-2025-06-22-22-52-04), the diver removed it using a speargun (Fig. 20). The specimen, approximately 20 cm in total length, was easily identified by the diver thanks to its distinctive morpho-chromatic features and to the collaborator's participation to the AlienFish project (Tiralongo *et al*., 2020). Moreover, it is important to note that the species has recently become the subject of widespread media attention in Italy, following the recent work of Azzurro *et al*. (2025). In Italian waters, *P. miles* was first recorded in 2016 off southeastern Sicily in the southern Ionian Sea. After this isolated occurrence, a new colonization phase began in the summer of 2023, with multiple sightings and captures in both the Ionian and southern Adriatic Seas (Azzurro *et al*., 2025). This expansion aligns with projections by Schickele *et*

Fig. 20: The specimen of *Pterois miles* observed in Palmi on 22 June 2025, immediately after being captured with a speargun. Photo credit: Luigi Nizzari.

al. (2021), who predicted a significant increase in habitat suitability for *P. miles* along the Ionian and Tyrrhenian coasts by the decade 2030-2039. The present record suggests that such forecasts are materializing sooner than expected. The presence of *P. miles* in the Tyrrhenian Sea (also the first record in western Italy) raises concerns about the future dynamics of this invasion and its potential impacts on native biodiversity and fisheries. This event further underscores the importance of early detection and rapid response, especially through citizen science and collaboration with the diving community. This finding also contributes to the growing body of evidence that *P. miles* is continuing its westward expansion in the Mediterranean Sea and highlights the Tyrrhenian Sea as the newest front of its invasion.

9.4 New record of *Taractes rubescens* (Jordan & Evermann, 1887) in the Mediterranean Sea: A new record from the Tyrrhenian Sea

Lorenzo ZACCHETTI and Giovanni CANDUCI

Taractes rubescens (Jordan & Evermann, 1887) (Scombriformes, Bramidae) is a large pelagic fish distinguished by its compressed body and dark coloration. It has a tropical and subtropical distribution spanning the Atlantic and Indo-Pacific Oceans (Froese & Pauly, 2024). The diet of *T. rubescens* is diverse, including marine invertebrates such as decapods and cephalopods, and presumably small fishes (Carvalho-Filho *et al*., 2009). In

Fig. 21: *Taractes rubescens* specimen collected in the Tyrrhenian Sea: whole body (A); dorsal fin (B); caudal fin (C). Photo credit: Giulio Cosentino.

2016, it was recorded for the first time in the Mediterranean Sea, off the coast of Sicily (Karachle *et al*., 2016). On 13 February 2025, a single specimen was captured in the Tyrrhenian Sea, off the Calabrian coast (38.76941°N, 15.94150°E), at a depth of 480 m with a deep-sea longline (Fig. 21A). The examined specimen measured 75 cm in total length (TL) and the total weight (TW) was approximately 9 kg. The morphological characteristics for identification were consistent with Haedrich *et al.* (1986) and Carvalho-Filho *et al*. (2009). The body was elongated; the snout pointed and the pelvic fins well developed. The pectoral fin extended to the anterior anal fin rays (Fig. 21B). The coloration varied from almost black to dark brown with a bronze sheen; all fins shared the same dark colour as the body, with a silvery sheen. The caudal fin was dark with a posterior white margin. A strong, rather high, and well-developed lateral keel on the caudal peduncle (Fig. 21C) distinguishes this species from all other known members of the family. Compared to the specimen described by Karachle *et al*. (2016), this individual is slightly larger in size both in terms of TL and TW, captured at a bathymetry very similar to the previous one which reported a range between 435 and 460 m of depth. The increase of seawater temperature in the Mediterranean Sea may lead to a higher presence of species with temperate and tropical thermal affinity (Karachle *et al*., 2016). In particular, this is the second capture of *T. rubescens* in the Tyrrhenian Sea, in the last two years, in the same fishing ground, (Giulio Cosentino, pers. comm., 2025), since the first observation 10 years ago. This may suggest that Tyrrhenian Sea could present favourable condition for this species, even though it is found rarely.

9.5 First record of the Bicolor Purse-oyster *Isognomon bicolor* for Sardinia (Italy), a new potential invader

Daniele GRECH and Serge GOFAS

Bivalves of the genus *Isognomon* are distributed worldwide in tropical shore environments, with 15 currently accepted species. In external view, species of *Isognomon* can be easily confused with those of the genus *Malleus*, but they are immediately diagnosed by the discontinuous ligament in their hinge. The first mention of an *Isognomon* species in the Mediterranean was in Ashqelon, Israel, by Mienis (2004, as *I. ephippium*) but from an offshore drilling platform, but this was "detected in invasion pathway" without follow-up. Mediterranean records of *Isognomon* species in the wild are relatively recent (Angelidis & Polyzoulis, 2018, and references therein) and were presumed of Indo-Pacific origin until Garzia *et al.* (2022) suggested that probably all the Mediterranean *Isognomon* belong to the Caribbean *I. bicolor* (C. B. Adams, 1845). The latest report (Antit & Gofas, 2025) was from neighboring Tunisia.

On 15 April 2025, one live specimen of *Isognomon* (Fig. 22 A, B) was found on an experimental plastic mesh basket from about six months deployed in Nora Lagoon (South Sardinia, Italy) in the framework of an activity for National Biodiversity Future Centre (*Ostrea edulis* restoration). The sampling spot (38.98894°N, 9.01202°E) was in a sandy area of 1 meter depth (T = 16°C, S = 45 psu), dominated by pleustophitic macroalgae. The bivalve was apparently the unique specimen occurring in the sampling. This lagoon was recently selected for a pilot restoration study of the native oyster *Ostrea edulis* Linnaeus, 1758. In the framework of the project ALIEM VIGIL - Actions de limitation, de gestion et de vigilance liées à l'introduction d'espèces exotiques envahissantes dans les zones de transports en Méditerranée", project financed under Axis 2 of Interreg Italia - France Maritime 2021 - 2027 (https://www.aliem-network.eu/), devoted to monitor alien species, testing and proposing early warning tools and protocols, we collected the specimen alive and preserved in alcohol until the dissection of the adductor muscle and valve opening (Fig. 22A, B). The inner part in Fig. 22 (C, D, E), revealed the identification as *Isognomon bicolor*, with a hinge line straight with numerous and separated ligamental blocks, following Garzia *et al.* (2022) and references therein.

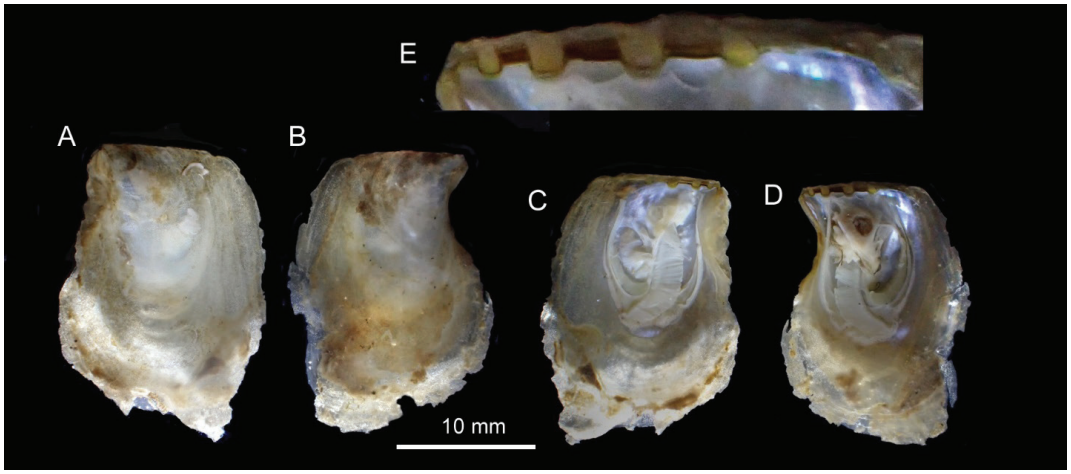

Fig. 22: *Isognomon bicolor*, specimen collected in Nora Lagoon (South Sardinia, Italy). A, B: outer views; C, D: inner views; left valve to the left, right valve to the right. E: detail of the hinge of the right valve. Photo credit: Daniele Grech and Serge Gofas.

In Italy, there are no other records than from Sicily and Calabria (Gatì *et al.*, 2024), so this is the westernmost record of the entire Mediterranean Sea and the first for Sardinia. Despite some areas having been reported to be invaded by this species (Gatì *et al*., 2024), in the Sardinian lagoon it seems not abundant, but needs monitoring for its progress. This result testifies the importance of collaboration among researchers with different backgrounds and the pairing of alien species monitoring with the aquaculture sector and fishing cooperatives.

9.6 First record of *Halimeda incrassata* in the Tyrrhenian Sea

Andrea ALVITO and Davide MOCCIA

Halimeda incrassata (J. Ellis) J.V. Lamouroux is a tropical calcified green macroalga of the family Halimedaceae, native to the tropical Western Atlantic (Verbruggen *et al*., 2006; van Tussenbroek *et al*., 2011). Its first record in the Mediterranean dates to 2011, when it was detected in Mallorca (Spain), where it exhibited invasive behaviour due to rapid population growth within a few years (Alós *et al*., 2016). Successively, new observations were documented in Rhodes (Greece), in the eastern Mediterranean basin (Kondylatos *et al*., 2023). Several introduction pathways have been proposed for this species, including accidental release from private or public aquaria and transport via shipping from the Atlantic through the Strait of Gibraltar, with the latter considered the most probable pathway, based on current knowledge of *Halimeda* taxonomy and phylogeny (Verbruggen & Ballesteros, 2024). In contrast, the hypothesis of Lessepsian migration through the Suez Canal from the Red Sea or Indian Ocean is considered highly unlikely, given the historical biogeographical insights (Verbruggen & Ballesteros, 2024).

In this study, we report the presence of *H. incrassata* at a site along the southern coast of Sardinia (Tyrrhenian Sea, Italy): Baia di Agumu (38.98166°N, 8.99495°E). In early September 2025, a field of individuals was recorded on a patch of flat muddy-sandy substrate surrounded by dead *Posidonia oceanica* matte at a depth between 1.4 and 1.6 m. The patch also showed the sporadic presence of *Cymodocea nodosa* shoots. Individuals of *H. incrassata* colonized the whole patch, which measured approximately 50 m² (Fig. 23A). Environmental parameters were measured with multiprobe YSI EXO3, which recorded the following values: temperature of 24.6 ± 0.1°C, salinity of 39.75 ± 0.01 PSU, conductivity of 58960 ± 1 µS/cm, turbidity of 0.03 ± 0.01 NTU, pH 8.15 ± 0.02 and oxygen saturation 99.6 ± 1 %. Several samples were collected, some of which have been preserved in 95% ethanol for morphological analysis. The algae exhibited an erect growth form, with specimens reaching up to ~10.9 cm in height and composed of green segments (Fig. 23B). Cylindrical and larger trilobed segments were observed near the base of the plants.

This finding represents the first record of *H. incrassata* in Sardinia and provides information on the local environmental parameters of the invaded site, contributing to a better understanding of the conditions that may facilitate its establishment and spread in the Mediterranean Sea. The record documents an extensive field that represents an intermediate point in the species' distribution across the Mediterranean Sea, between previously reported records in the western and eastern basins. These results suggest that the expansion of this invasive macroalgae is more widespread than previously anticipated. Moreover, the waters off the discovery site are frequently used as an anchorage for merchant and trading vessels, supporting the hypothesis that maritime traffic may serve as a vector facilitating the eastward dispersal of *H. incrassata* (Verbruggen & Ballesteros, 2024). Invasive alien species such as *H. incrassata* pose a significant threat to the structure and functioning of native ecosystems, and documenting their spread is essential for informing effective management strategies and policies aimed at mitigating the expansion of alien species in the Mediterranean Sea.

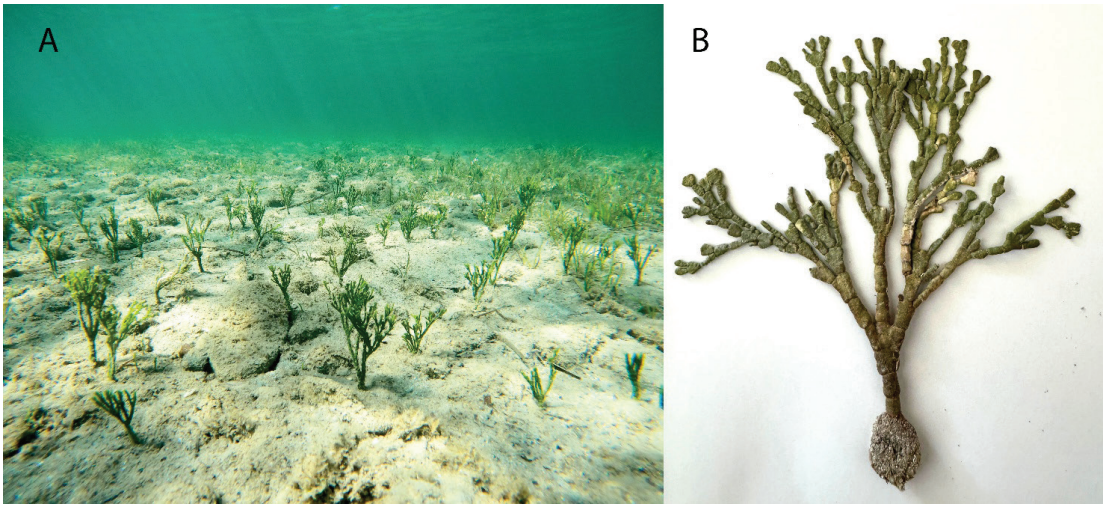

Fig. 23: *Halimeda incrassata* in southern Sardinia: A) Field of individuals on muddy bottom. B) Sample of *H. incrassata* showing cylindrical segments. Photo credit: Andrea Alvito (A, B).

10. EGYPT

10.1 First record of the invasive mussel *Perna perna* (Linnaeus, 1758) (Bivalvia: Mytilidae) from Egypt

Shahenaz M. ABD ELLAH

The mytilid mussel *Perna perna* (Linnaeus, 1758) was collected during a surveillance study focused on rocky shore mussels at Abu Qir Bay, Alexandria, Egypt, eastern Mediterranean Sea (31.2667°N to 31.4667°N and 30.0500°E to 30.3667°E). This record represents the first occurrence of the species in Egypt and a new record for the eastern Mediterranean Sea. *Perna perna* was first recorded in Haifa Bay, eastern Mediterranean Sea (Douek *et al.*, 2021), and more recently observed in Zikim, Israel (Ragkousis *et al*., 2023). Recent reports indicate its presence along the Syrian coast (Christidis *et al.*, 2024).

Over the last 20 years, marine mussels from the genus *Perna* have invaded many parts of the world. According to Wood *et al.* (2007), *Perna viridis* and other *Perna* species were first reported in 1967 in central Japan. In 1990, *P. viridis* appeared in Trinidad, and by 1992, it was living alongside *P. perna* in the Gulf of Paria, Venezuela. *Perna perna* reached the Texas coast in 1990. Later, *P. viridis* was reported in Tampa Bay, Florida in 1999, and in Georgia, USA by 2004.

The Brown Mussel or the Mexilhao Mussel *P. perna* is native to the west coast of Africa and the western Indian Ocean, indigenous to the southern Red Sea (Wood *et al*., 2007). It is considered cryptogenic in the western Mediterranean; however, it was recently recorded in Israel (Douek *et al.*, 2021). The wide temperature tolerance of *P. perna* emphasizes its adaptability across various marine environments. It is most likely introduced into the eastern Mediterranean Sea and can develop dense populations.

Seven and four specimens of *Perna perna* were collected on January 11 and 15 2024. All the collected specimens are held in a private archive maintained by the author and are available upon request. They were found attached to hard substrates in the shallow subtidal zone at a depth of 0.4 to 0.6 m, close to dense clusters of the mytilid mussel *Brachidontes pharaonis* (P. Fischer, 1870). Specimens were identified based on morphological characteristics of the shell according to Hicks & Tunnell (1993) (Fig. 24).

Perna perna shells exhibit a classic mussel shape with a straight ventral margin and a rounded posterior end (Hicks & Tunnell, 1993). Externally, the shell varies in color from brown to light brown and has a delicate pattern of reddish V-shaped marks on the outer surface. It often displays concentric yellow bands near the ventral margin. The periostracum is flaky, and the shell surface is smooth, adorned only with concentric fine growth lines. Internally, the shell is purple and nacreous. The anterior retractor muscle is absent, and the posterior one leaves the distinctive three-part scar. This comprehensive description underscores the distinctive morphological characteristics of *P. perna*, setting it apart from closely related species of the genus *Mytilus*, where the posterior retractor scars are fused to each other (Hicks & Tunnell, 1993).

***Fig. 24*:** *Perna perna*. (A) External view of the right valve, showing the concentric fine growth lines and flaky periostracum. (B) Internal view of the left valve, showing the nacreous purple color and the three retractor muscle scars. (31 mm shell length). Photo credit: Adhei.

11. LIBYA

11.1 New record of *Synchiropus sechellensis* Regan, 1908 (Callionymidae) from the Libyan coast of the Mediterranean Sea

Eman Salem ALFERGANI

The Seychelles Dragonet, *Synchiropus sechellensis* (Regan, 1908), is widely distributed, including the Red Sea, the western Indian Ocean, and the southwestern Pacific Ocean and was first recorded in the Mediterranean Sea in the Gulf of Antalya, Türkiye (Gökoğlu *et al*., 2014), Cyprus (Michailidis & Chartosia, 2016), Greece (Kondylatos *et al*., 2016), and Egypt (Gerovasileiou *et al*., 2017).

In September 2025, a single specimen of *S. sechellensis* was obtained from local fishers at the port of Benghazi (32.1059°N, 20.0539°E), eastern Libya. The species was identified according to Fricke (1981). This record represents the first occurrence of the *S. sechellensis* species in Libyan waters (Fig. 25). The body is elongated and slightly depressed, with a total length of 112.7 mm and a standard length of 82.9 mm, while the maximum body height and width are 14.0 mm and 20.2 mm, respectively. The head is slightly depressed, measuring 27.01 mm in length. The snout is short, measuring 10.01 mm in length. The eye diameter is 4.1 mm, and the interorbital distance is approximately 2.7 mm. The first dorsal fin has IV spines (the first spine is 48.4 mm long, and the fourth spine is 27.9 mm long); the interspinous membrane has several blotches with black edges, small at the base of the fin and larger at the distal end. The second dorsal fin has eight rays (18.01 mm long). The pectoral fin is reddish-orange with 19 rays. The pelvic fin is reddish with numerous small brown blotches, the fin margins are black, and it has five rays. The anal fin has seven rays, and the base is red with black margins (Table 4). The caudal fin has nine rays, with two dark grey vertical bars. The results of the morphology description and meristic count are consistent with previous literature (Fricke, 1981; Gökoğlu *et al*., 2014; Kondylatos *et al*., 2016).

In Libya, there is one species of *Synchiropus* recorded, *Synchiropus phaeton* (Gunther, 1861), which inhabits the muddy bottom at depths of 100-650 m. *Synchiropus phaeton* differs from *S. sechellensis* in that it lacks a membrane after the last dorsal spine and has a single black spot on the first dorsal fin located between the third and fourth spines. The preopercular spine of *S. phaeton* features two dorsal pointed tips (Golani *et al*., 2006). In *S. sechellensis*, the preopercular spine has a small upward-curved main tip, accompanied by two slightly backward-curved projections on its dorsal margin. Finally, the occurrence of *S. sechellensis* on the Libyan Mediterranean coast represents a new addition to the list of invasive fishes in the region, emphasizing the importance of continued surveillance of non-indigenous species.

Fig. 25: Specimen of *Synchiropus sechellensis*, Benghazi coast, Libya; (A) lateral view, (B) dorsal view, and (C) ventral view. Photo credit: Eman Alfergani.

Table 4. Morphometric characters and meristic count of *Synchiropus sechellensis* collected from eastern coast of Libya.

Parameters	
Morphometric measurements	
Total Length	112.7 mm
Total Weight	16.01 g
Standard Length	82.9 mm
Maximum Body Height	14.0 mm
Maximum Body Width	20.2 mm
Caudal Peduncle Height	6.1 mm
Caudal Peduncle Width	2.6 mm
Interorbital width	2.7 mm
Predorsal length	20.9mm
Head Length	27.01 mm
Head Height	13.7 mm
Head Width	20.7 mm
Length Of Snout	10.01 mm
Left Preopercular Spine Length	4.8 mm
Eye Height	8.3 mm
Snout Length	10.01 mm
Eye Diameter	4.1 mm
Mouth Height	5.8 mm
Mouth Width	5.5 mm
1st Dorsal Spine Length	48.4 mm
4th Dorsal Spine Length	27.9 mm
Second dorsal fin length	18.01 mm
Caudal Fin Length	27.7 mm
Caudal Fin Height	27.7 mm
1st Anal Ray Length	9.6 mm
Last Anal Ray Lenght	18.5 mm
Pectoral Fin Length	22.2 mm
Pelvic Fin Length	21.6 mm
Meristic counts	
First Dorsal Fine	IV
Second Dorsal Fine	8
Pectoral Fin	19
Pelvic Fin	5
Anal Fin	7
Caudal Fine	9

11.2 First record of *Branchiomma luctuosum* (Grube, 1870) from the Libyan coast

Jamila RIZGALLA and Amani FITORI

The sabellid fan worm *Branchiomma luctuosum* (Grube, 1870) is a tube-building, filter-feeding species that originates from the Red Sea (Licciano & Giangrande, 2008). It was first reported in the Mediterranean Sea in Italy in the late 1970s (Giangrande, 1989) and has since been found in the Eastern, Northern, and Western Mediterranean Sea (Mabrouki *et al*., 2021). Recently, it was also reported from the Mediterranean Moroccan coast in 2021 (Mabrouki *et al*., 2021). Here we report the presence of *B. luctuosum* in two harbours in Libya: Tripoli Harbour and Tobruk Harbour. These findings were part of a project aimed at assessing marine biodiversity in Libyan waters (*see* Rizgalla *et al*., 2019). The survey of Tripoli Harbour took place in 2019, while the snorkelling survey of Tobruk Harbour was carried out in June 2022. Pictures were taken using an Olympus (Tough TG6) underwater camera. On April 4, 2019, a specimen of *B. luctuosum* was collected from the dock wall of Tripoli Harbour (32.90275°N, 3.17941°E; Fig. 26) which was intertwined with various tunicates which belonged to the genus *Botryllus* and the sponge *Paraleucilla magna* Klautau, Monteiro & Borojevic, 2004. They were also found attached to partially submerged wheel tires fastened alongside the dock wall. On June 3, 2022, *B. luctuosum* was observed attached to the wall of a rock crevasse, covered by various algae in Tobruk Harbour (32.07387°N; 32.99985°E; Fig. 26C). Morphological identification was consistent with the descriptions provided by El Haddad *et al*. (2008) and Fernández-Romero *et al*. (2021). This included a membranous, brownish tube and a violet branchia crown, with orange bands (Fig. 26A-C).

This is the first recorded sighting of *B. luctuosum* in Libyan waters. The record comes as no surprise given the invasive success of this species in the Mediterranean Sea

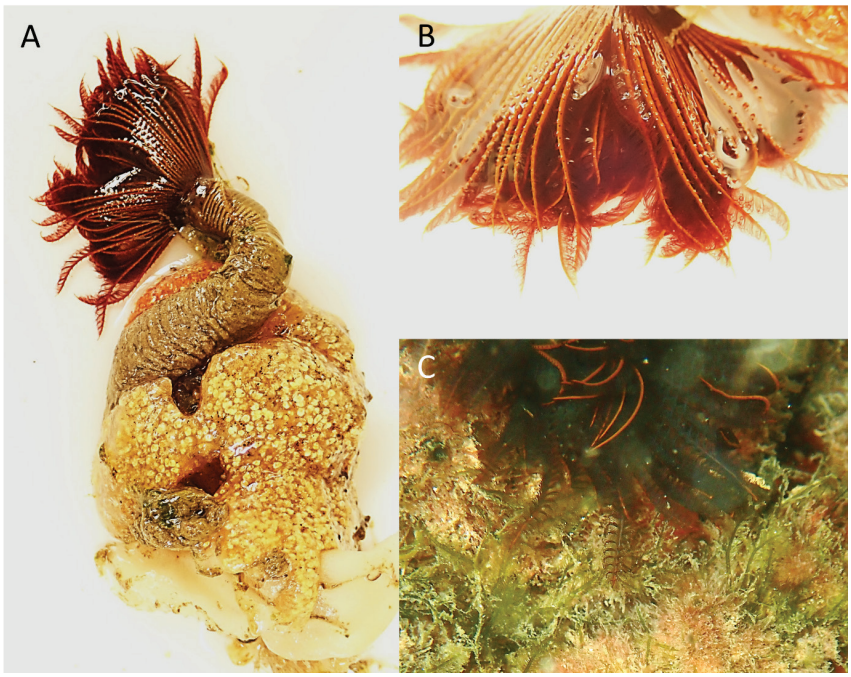

Fig. 26: (A, B) *Branchiomma luctuosum* in the Tripoli Harbour intertwined with ascidians of the genus *Botryllus* and the sponge *Paraleucilla magna*. (C) *B. luctuosum* at 30 cm depth, in Tobruk Harbour basin. Photo credit: Jamila Rizgalla.

(Mabrouki *et al*., 2021). The fact that both records were in commercial harbours suggests that shipping traffic and the ballast water of commercial ships may be the method of introduction for this highly invasive species. Furthermore, hull fouling of boats and small fishing boats could have facilitated their transport (Fernández-Romero *et al*., 2021). While *B. luctuosum* was not seen in several coastal shallow waters during field surveys along the western, and eastern Libyan coast (authors' personal observations), further monitoring is necessary to assess to which degree this species has spread along Libya's extended coast.

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References

Allen, G.R., 1985. FAO Species Catalogue. Vol. 6. Snappers of the world. An annotated and illustrated catalogue of lutjanid species known to date. *FAO Fisheries Synopsis*, 125 (6), 208 pp.

Alós, J., Tomas, F., Terrados, J., Verbruggen, H., Ballesteros, E., 2016. Fast-spreading green beds of recently introduced *Halimeda incrassata* invade Mallorca Island (NW Mediterranean Sea). *Marine Ecology Progress Series*, 558, 153-158.

Alshawy, F.A., Ibrahim, A., Hussein, C., Lahlah, M., 2019. First record of arrow bulleye, *Priacanthus sagittarius* Starnes, 1988 from the Syrian marine waters (Eastern Mediterranean). *FishTaxa*, 4 (2), 21-24.

Angelidis, A., Polyzoulis, G., 2018. New distributional records of four Indo-Pacific species from Astypalaia Island, South Aegean Sea, Greece. *Xenophora Taxonomy*, 21, 3-10.

Antit, M., Gofas, S., 2025. Here they come: multiple new records of Indo-Pacific alien Mollusca in Tunisia. *Biological Invasions*, 27 (8), 181.

Azzurro, E., Falautano, M., Castriota, L., Chiappi, M., D'Amen, M. *et al*., 2025. Tracking the lionfish (*Pterois miles*) invasion through public engagement: new records and implications for species distribution models in the Mediterranean Sea. *Mediterranean Marine Science*, 26 (3), 484-490.

Bailey, S.A., Brown, L., Campbell, M.L., Canning-Clode, J., Carlton, J.T. *et al.*, 2020. Trends in the detection of aquatic non-indigenous species across global marine, estuarine and freshwater ecosystems: A 50-year perspective. *Diversity and Distributions*, 26 (12), 1780-1797.

Băncilă, R.I, Skolka, M., Ivanova, P., Surugiu, V., Stefanova, K. *et al*., 2022. Alien species of the Romanian and Bulgarian Black Sea coast: state of knowledge, uncertainties, and needs for future research. *Aquatic Invasions*, 17 (3), 353-373.

Barash, A., Danin, Z., 1971. Mollusca from the stomach of *Sparus auratus* fished in the lagoon of Bardawil, *Argamon: Israel Journal of Malacology*, 2 (3-4), 97-104.

Beermann, J., Hall-Mullen, A.K., Havermans, C., Coolen, J.W., Crooijmans, R.P. *et al.*, 2020. Ancient globetrotters–connectivity and putative native ranges of two cosmopolitan biofouling amphipods. *PeerJ*, 8, e9613.

Bello, G., Andaloro, F., Battaglia, P., 2020. Non-indigenous cephalopods in the Mediterranean Sea: a review. *Acta Adriatica*, 61, 113-134.

Ben Tuvia A., 1985. The impact of the Lessepsian (Suez Canal) fish migration on the eastern Mediterranean Ecosystem. p. 367-375. In: *Mediterranean Marine Ecosystems*. Moraitou-Apostolopoulou, M., Kiortsis, V. (Eds.), Plenum Press.

Bonifazi, A., Mancini, E., Ventura, D., 2018. First record of the invasive and cryptogenic species *Jassa slatteryi* Conlan, 1990 (Crustacea: Amphipoda) in Italian coastal waters. *Journal of Sea Research*, 136, 37-41.

Campolmi, M., Costanzo, G., Crescenti, N., Zagami, G., 1999. Checklist of copepods from Sicilian waters with new records and distributional remarks. *Biologia Marina Mediterranea*, 6 (1), 416-420.

Carvalho-Filho, A., Marcovaldi, G., Sampaio, C.L.S., Paiva, M.I.G., Duarte, L.A.G., 2009. First report of rare pomfrets (Teleostei: Bramidae) from Brazilian waters, with a key to Western Atlantic species. *Zootaxa*, 2290, 1-26.

Christidis, G., Ammar, I.A., Antit, M., Barhoum, Y.M. *et al*., 2024. New records of introduced species in the Mediterranean (August 2024). *Mediterranean Marine Science*, 25 (2), 453-479.

Cohen, A.N., 2003. On mitten crabs and lung flukes. *IEP Newsletter*, 16 (2), 48-51.

Cohen, A.N., Carlton, J.T., 1997. Transoceanic transport mechanisms: introduction of the Chinese mitten crab, *Eriocheir sinensis*, to California. *Pacific Science*, 51 (1), 1-11.

Conlan, K.E., Desiderato, A., Beermann, J., 2021. *Jassa* (Crustacea: Amphipoda): a new morphological and molecular assessment of the genus. *Zootaxa*, 4939 (1), 1-191.

Corsini-Foka, M., Kondilatos, G., Economidis, P.S., 2004. Occurrence of the Lessepsian species *Portunus pelagicus* (Crustacea) and *Apogon pharaonis* (Pisces) in the marine area of Rhodes Island. *Mediterranean Marine Science*, 5, 83-90.

Crocetta, F., Tanduo, V., Osca, D., Turolla, E., 2020. The Chinese mitten crab *Eriocheir sinensis* H. Milne Edwards, 1853 (Crustacea: Decapoda: Varunidae) reappears in the northern Adriatic Sea: Another intrusion attempt or the trace of an overlooked population? *Marine Pollution Bulletin*, 156, 111221.

Crozier, L.G., Hendry, A.P., Lawson, P.W., Quinn, T.P., Mantua, N.J. *et al.*, 2008. Potential responses to climate change in organisms with complex life histories: evolution and plasticity in Pacific salmon. *Evolutionary Applications*, 1 (2), 252-270.

Dimitriadis, C., Galanidi, M., Zenetos, A., Corsini-Foka, M., Giovos, I. *et al*., 2020. Updating the occurrences of *Pterois miles* in the Mediterranean Sea, with considerations on thermal boundaries and future range expansion. *Mediterranean Marine Science*, 21 (1), 62-69.

Douek, J., Paz, G., Gayer, K., Mendelson, M., Rinkevich, B. *et al.*, 2021. An outbreak of *Perna perna* (Linnaeus, 1758) (Mollusca, Bivalvia, Mytilidae) in the Eastern Mediterranean. *BioInvasions Records*, 10 (1), 136-148.

Dulčić, J., Dragičević, B., 2015. *Percnon gibbesi* (H. Milne Edwards, 1853) (Decapoda, Percnidae): first substantiated record from the Adriatic Sea. *Crustaceana*, 88, 733-740.

Dulčić, J., Dragičević, B., Gašparević, D., 2019. New record of the non-indigenous crab *Percnon gibbesi* (H. Milne Edwards, 1853) from Palagruža archipelago (Adriatic Sea). *Acta Adriatica*, 60, 193-198.

El Haddad, M., Azzati, R.C., García-Carrascosa, A.M., 2008. *Branchiomma luctuosum* (Polychaeta: Sabellidae): A non-indigenous species at Valencia Port (western Mediterranean Sea, Spain). *Marine Biodiversity Records*, 1, e61.

Ergüden, D., Ayas, D., Ergüden, S.A., 2023. Additional record of *Priacanthus sagittarius* Starnes, 1988 from the Northeastern Mediterranean coast of Turkey. *Advanced Underwater Sciences*, 3 (1), 15-18.

Erguden, D., Ayas, D., Erguden, S.A., 2024. Range Expansion of *Synodus randalii* Cressey 1981 in the Notheastern Mediterranean. *Annales: Series Historia Naturalis*, 34 (1), 119-124.

Farrag, M.M.S., Jawad, L.A., Elhaweet, A.E.A.K., 2016. Occurrence of the arrow Bulleye *Priacanthus sagittarius* (Teleostei: Priacanthidae) in the Egyptian coast of the Mediterranean Sea. *Marine Biodiversity Records.* 9, 6.

Fatfat, S., Badreddine, A., Fricke, R., 2025. Breaking Boundaries: First Record of *Saurida gracilis* (Quoy and Gaimard, 1824) (Teleostei: Synodontidae) in Lebanese Waters Highlights a New Lessepsian Expansion. *Journal of Fisheries & Livestock Production*, 13 (1), 611.

Fernandez-Gonzalez, V., Sanchez-Jerez, P., 2017. Fouling assemblages associated with off-coast aquaculture facilities: an overall assessment of the Mediterranean Sea. *Mediterranean Marine Science*, 18 (1), 87-96.

Fernández-Romero, A., Navarro-Barranco, C., Ros, M., Arias, A., Moreira, J. *et al.*, 2021. To the Mediterranean and beyond: an integrative approach to evaluate the spreading of *Branchiomma luctuosum* (Annelida: Sabellidae). *Estuarine, Coastal and Shelf Science*, 254, 107357.

Fischer, W., Bianchi, G. (Eds), 1984. *FAO Species Identification Sheets for Fishery Purposes: Western Indian Ocean (Fishing Area 51), vols. 1–6*. Rome, Food and Agriculture Organization of the United Nations.

Florida Museum of Natural History, https://www.floridamuseum.ufl.edu/discover-fish/species-profiles/northern-stargazer/ (Accessed 16 July 2025).

Fortič, A., Al-Sheikh Rasheed, R., Almajid, Z., Badreddine, A., Báez, J.C. *et al*., 2023. New records of introduced species in the Mediterranean Sea (April 2023), *Mediterranean Marine Science*, 24 (1), 182-202.

Fricke, R., 1981. *Revision of the genus* Synchiropus *(Teleostei: Callionymidae)*. Braunschweig: J. Cramer.

Froese, R., Pauly, D. (Eds.), 2025. *FishBase*. World Wide Web electronic publication. www.fishbase.org (Accessed 28 July 2025).

Galanidi, M., Aissi, M., Ali, M., Bakalem, A., Bariche, M. *et al.*, 2023. Validated inventories of non-indigenous species (NIS) for the Mediterranean Sea as tools for regional policy and patterns of NIS spread. *Diversity*, 15 (9), 962.

Galil, B.S., Tagar, A., Zirler, R., Bronstein, O., Feldstein-Farkash, T., 2024. First record of *Thalamita oculea* Alcock, 1899 (Crustacea: Decapoda: Portunidae) in the Mediterranean Sea. *BioInvasions Records*, 13 (1), 97-107.

García-de-Vinuesa, A., Lombarte, A., Azzurro, E., 2020. The twobar seabream, *Acanthopagrus bifasciatus* (Teleostei: Sparidae), in the western Mediterranean Sea: a likely shipborne introduction. *BioInvasions Records*, 9 (3), 570-573.

Garzia, M., Furfaro, G., Renda, W., Rosati, A.M., Mariottini, P. *et al.*, 2022. Mediterranean spreading of the bicolor purse oyster, *Isognomon bicolor*, and the chicken trigger, *Malleus* sp., vs. the Lessepsian prejudice. *Mediterranean Marine Science*, 23 (4), 777-788.

Gatì, I.A., Ragusa, M., D'Alessandro, M., Giacobbe, S., Esposito, V., 2024. Massive settlements of the alien oyster *Isognomon bicolor*, rapidly spreading in Mediterranean. *Biologia Marina Mediterranea*, 28 (1), 156-159.

Gerovasileiou, V., Akel, E., Akyol, O., Alongi, G., Azevedo, F. *et al*., 2017. New Mediterranean Biodiversity Records (July, 2017). *Mediterranean Marine Science*, 18 (2), 355-384.

Gerovasileiou, V., Bancila, R.I., Katsanevakis, S., Zenetos, A., 2022. Introduced species in Mediterranean marine caves: an increasing but neglected threat. *Mediterranean Marine Science*, 23 (4), 995-1005.

Giangrande, A., 1989. Censimento dei policheti dei mari italiani: Sabellidae Malmgren, 1867. *Atti della Società Toscana di Scienze Naturali, Memorie (Serie B)*, 96, 153-189.

Giraldes, B.W., Al-Maslamani, I., Al-Ashwel, A., Chatting, M., Smyth, D., 2016. Basic assessment of *Portunus segnis* (Forskal, 1775) - A baseline for stock management in the Western Arabian Gulf. *The Egyptian Journal of Aquatic Research*, 42 (1), 111-119.

Gökoğlu, M., Teker, S., 2018. Spread of the arrow bulleye *Priacanthus sagittarius* Starnes, 1988 in the Mediterranean Sea. *Acta Aquatica: Aquatic Sciences Journal*, 5 (1), 1-3.

Gökoğlu, M., Özvarol, Y., Fricke R., 2014. *Synchiropus sechellensis* Regan, 1908 (Teleostei: Callionymidae), a new Lessepsian migrant in the Mediterranean Sea. *Mediterranean Marine Science*, 15, 440-442.

Golani, D., 2025. Update of Red Sea (Lessepsian) fish species in the Mediterranean Sea since the 2nd CIESM Atlas of Exotic Fish. *Mediterranean Marine Science*, 26 (1), 149-155.

Golani, D., Fricke, R., 2018. Checklist of the Red Sea fishes with delineation of the Gulf of Suez, Gulf of Aqaba, endemism and Lessepsian migrants. *Zootaxa*, 4509, 1-215.

Golani, D., Öztürk, B., Başusta, N., 2006. *Fishes of the Eastern Mediterranean*. Turkish Marine Research Foundation, Publication no. 24, Istanbul, Turkey, 259 pp.

Golani, D., Sonin, O., 1992. New records of the Red Sea fishes *Pterois miles* (Scorpaenidae) and *Pteragogus pelycus* (Labridae) from the eastern Mediterranean Sea. *Japanese Journal of Ichthyology*, 39 (2), 167-169.

Golani D., Azzuro E., Dulcic J., Massuti E., Orsi-Relini, L., 2021. *Atlas of Exotic Fishes in the Mediterranean Sea*. Second edition, Briand, F. (Ed.), 365 pp. IESM Publishers, Paris, Monaco.

Goren, M., Stern, N., Galil, B.S., Diamant, A., 2010. First record of the Indo-Pacific arrow bulleye *Priacanthus sagittarius* Starnes, 1988 in the Mediterranean Sea. *Aquatic Invasions*, 5 (1), 45-47.

Haedrich, R.L., 1986. Bramidae. p. 847-853. In: *Fishes of the North-eastern Atlantic and the Mediterranean, Volume II*. Whitehead, P.J.P., Bauchot, M.-L., Hureau, J.-C., Nielsen,

J. & Tortonese, E. (Eds.). UNESCO, Paris.

Hicks, D.W., Tunnell, J.W.,1993. Invasion of the south Texas coast by the edible brown mussel *Perna perna* (Linnaeus 1758). *The Veliger,* 36 (1), 92-94.

Iveša, N., Brajković, A., Piria, M., Buršić, M., 2024. The northernmost record of *Percnon gibbesi* (H. Milne Edwards, 1853) in the Mediterranean Sea. *BioInvasions Records*, 13 (3), 767-776.

Iwatsuki, Y., Heemstra, P.C., 2010. Taxonomic review of the western Indian Ocean species of the genus *Acanthopagrus* Peters, 1855 (Perciformes: Sparidae), with description of a new species from Oman. *Copeia*, 1, 123-136.

Iwatsuki, Y., Heemstra, P.C., 2011. A review of the *Acanthopagrus bifasciatus* species complex (Pisces: Sparidae) from the Indian Ocean, with redescriptions of *A. bifasciatus* (Forsskål 1775) and *A. catenula* (Lacepède 1801). *Zootaxa*, 3025, 38-50.

Karachle, P.K., Angelidis, A., Apostolopoulos, G., Ayas, D., Ballesteros, M. *et al*., 2016. New mediterranean biodiversity records (March 2016). *Mediterranean Marine Science*, 17 (1), 230-252.

Katsanevakis, S., Poursanidis, D., Yokes, M.B., Mačić, V., Beqiraj, S. *et al*., 2011. Twelve years after the first report of the crab *Percnon gibbesi* (H. Milne Edwards, 1853) in the Mediterranean: current distribution and invasion rates. *Journal of Biological Research-Thessaloniki*, 16, 224-236.

Katsanevakis, S., Coll, M., Piroddi, C., Steenbeek, J., Ben Rais Lasram, F. *et al.*, 2014. Invading the Mediterranean Sea: biodiversity patterns shaped by human activities. *Frontiers in Marine Science*, 1 (32), 1-11.

Katsanevakis, S., Poursanidis, D., Hoffman, R., Rizgalla, J., Rothman, S.B. *et al*., 2020. Unpublished Mediterranean records of marine alien and cryptogenic species. *BioInvasions Records*, 9 (2), 165-182.

Khalil, M.T., Mostafa, A.B., El-Naggar, M.M., 2025. Climate Change and Lessepsian Migration to the Mediterranean Sea p. 85-118. In: *Climate Changes Impacts on Aquatic Environment. Earth and Environmental Sciences Library.* Khalil, M.T., Emam, W.W.M., Negm, A. (Eds). Springer, Cham.

Khamassi, F., Ghanem, R., Hassan, B., Karray, S., El Bour, M. *et al.*, 2022. First record of the Gracile lizardfish *Saurida gracilis* (Quoy & Gaimard, 1824) in Mediterranean waters. *Mediterranean Marine Science*, 23 (1), 25-29.

Knudsen, S., 2013. Revision of the fish family Kyphosidae (Teleostei: Perciformes). *Zootaxa*, 3751, 1-101.

Kondylatos, G., Corsini-Foka, M., Apostolopoulos, G., Zenetos, A., 2016. *Synchiropus sechellensis* (Actinopterygii: Perciformes: Callionymidae), a new alien in the Aegean Sea and Hellenic waters. *Acta Adriatica*, 57 (1), 187-191.

Kondylatos, G., Kalaentzis, K., Gratsia, E., Mavrouleas, D., Kasapidis, P. *et al.*, 2023. *Halimeda incrassata* (Bryopsidales, Chlorophyta) in Rhodes, Greece, Eastern Mediterranean. *Mediterranean Marine Science*, 24, 633-638.

Kottelat, M., Freyhof, J., 2007. *Handbook of European freshwater fishes*. Publications Kottelat, Cornol and Freyhof, Berlin, 646 pp.

Kovačić, M., Lipej, L., Dulčić, J., 2020. Evidence approach to checklists: critical revision of the checklist of the Adriatic Sea fishes. *Zootaxa*, 4767 (1), 1-55.

Kovalev, E.A., Zhivoglyadova, L.A., Revkov, N.K., Frolenko, L.N., Afanasyev, D.F., 2017. First Record of the Bivalve *Arcuatula senhousia* (Benson, 1842) in the Russian Part of the the Azov-Black Sea Basin, *Russian Journal of Biological Invasions*, 8 (4), 316-320.

Kuiter, R.H., T. Tonozuka, 2001. *Pictorial guide to Indonesian reef fishes. Part 1. Eels- Snappers, Muraenidae - Lutjanidae*. Zoonetics, Australia, 302 pp.

Lai, J.C.Y., Ng, P.K.L., Davie, P.J.F., 2010. A revision of the *Portunus pelagicus* (Linnaeus, 1758) species complex (Crustacea: Brachyura: Portunidae), with the recognition of four species. *Raffles Bulletin of Zoology*, 58, 199-237.

Langeneck, J., Bakiu, R., Chalari, N., Chatzigeorgiou, G., Crocetta, F. *et al*., 2023. New records of introduced species in the Mediterranean Sea (November 2023). *Mediterranean Marine Science*, 24, 610-632.

Licciano, M., Giangrande, A., 2008. The genus *Branchiomma* (Polychaeta: Sabellidae) in the Mediterranean Sea, with the description of *B. maerli* n. sp. *Scientia Marina*, 72, 383-391.

Mabrouki, Y., Crocetta, F., Taybi, A.F., 2021. First record of *Branchiomma luctuosum* (Grube,1870) (Annelida: Polychaeta: Sabellidae) in Morocco. *Thalassas: an International Journal of Marine Sciences*, 37, 717-720.

Marić, A., Špelić, I., Radočaj, T., Vidović, Z., Kanjuh, T. *et al.*, 2022. Changing climate may mitigate the invasiveness risk of non-native salmonids in the Danube and Adriatic basins of the Balkan Peninsula (south-eastern Europe). *NeoBiota*, 76, 135-161.

Martino, F., Cananzi, G., Gregori, I., Li, T., Benvenuto, A. *et al.*, 2025. Linking water to the bottom: eDNA study of benthic invertebrates and invasive species in the Venice Lagoon. *Environmental DNA*, 7 (2), e70093.

Michailidis, N., Chartosia, N., 2016. New record of the Seychelles dragonet *Synchiropus sechellensis* Regan, 1908 from the Mediterranean: accidental entrance or Lessepsian immigration? *BioInvasions Records*, 5 (4), 291-294.

Mienis, H.K., 2004. New data concerning the presence of Lessepsian and other Indo-Pacific migrants among the molluscs in the Mediterranean Sea with emphasis on the situation in Israel. *Turkish Journal of Aquatic Life*, 2 (2), 117-131.

Morton, B., 1974. Some aspects of the biology, population dynamics, and functional morphology of *Musculista senhausia* Benson (Bivalvia, Mytilidae). *Pacific Science*, 28, 19-33.

Moscatello, S., Belmonte, G., 2007. The plankton of a shallow submarine cave ('Grotta di Ciolo', Salento Peninsula, SE Italy). *Marine Ecology*, 28 (Suppl. 1), 47-59.

Mouneimné, N., 1979. Poissons nouveaux pour les cotes libanaises. *Cybium*, 6, 105-110.

Navarro-Barranco, C., Lanza-Arroyo, P., Gutiérrez-Serrano, J., Moreira, J., 2023. Amphipod assemblages associated with native habitat-forming seaweeds of the Alboran Sea: influence by environmental protection and biogeographical patterns. *Marine and Freshwater Research*, 74, 50-64.

Norris, J.N., 2014. *Marine Algae of the Northern Gulf of California, II: Rhodophyta.* Smithsonian Institution Scholarly Press, Washington, D.C. Smithsonian Contributions to Botany, no. 96, 555 pp.

Nota, A., Tiralongo, F., Santovito, A., Torroni, A., Olivieri, A., 2024. Chronicles of *Kyphosus* in the Mediterranean Sea:

new records and complete mitogenomes support the scenario of one expanding fish species. *Frontiers in Marine Science*, 11, 1411111.

Ohtsuka, S., 1984. A new species of *Metacalanus* (Copepoda: Calanoida) from Tanabe Bay, Kii Peninsula, Japan. *Publications of the Seto Marine Biological Laboratory*, 29 (1/3), 99-107.

Page, L. M., Burr, B.M., 2011. *A field guide to freshwater fishes of North America north of Mexico*. Houghton Mifflin Harcourt, Boston, 663 pp.

Papaconstantinou C., Caragitsou E., 1987. The first occurrence of the lessepsian fish immigrant *Pempheris vanicolensis* in territorial Greek waters. *Thalassographica*, 9, 78-79.

Ragkousis, M., Zenetos, A., Ben Souissi, J., Hoffman, R., Ghanem, R. *et al*., 2023. Unpublished Mediterranean and Black Sea records of marine alien, cryptogenic, and neonative species. *BioInvasions Records*, 12 (2), 339-369.

Randall, J.E., 2001. *Surgeonfishes of the world*. Mutual Publishing and Bishop Museum Press, Hawaii, Honolulu, Hawaii, 123 pp.

Razouls, C., Desreumaux, N., Kouwenberg, J., de Bovée, F., 2005-2025. *Biodiversity of Marine Planktonic Copepods (morphology, geographical distribution and biological data)*. Sorbonne University, CNRS. Available at http://copepodes.obs-banyuls.fr/en [Accessed July 29, 2025].

Reid, A., Jereb, P., Roper, C.F.E., 2005. Sepiidae. In: P. Jereb and C.F.E. Roper (Eds.). Cephalopods of the world. An annotated and illustrated catalogue of species known to date. *FAO Species Catalogue for Fishery Purposes*, 4 (1), 57-152.

Riad, R., 2015. First Record of the Cuttlefish *Sepia dollfusi* (Cephalopoda: Sepioidea) from the Egyptian Mediterranean Waters. *Egyptian Journal of Aquatic Biology and Fisheries*, 19, 1-7.

Rizgalla, J., Shinn, A.P., Crocetta, F., 2019. New records of alien and cryptogenic marine bryozoan, mollusc, and tunicate species in Libya. *BioInvasions Records*, 8 (3), 590-597.

Saad, A., Masri, M., Tufahha, A., 2022. First substantiated record of the Twobar Seabream, *Acanthopagrus bifasciatus* (Teleostei: Sparidae), in the Syrian Marine Waters (Eastern Mediterranean Sea). *Asian Journal of Advances in Agricultural Research*, 17, 14-18.

Sakai, K., 2013. A review of the genus *Eriocheir* De Haan, 1835 and related genera, with the description of a new genus and a new species (Brachyura, Grapsoidea, Varunidae). *Crustaceana*, 86 (9), 1103-1138.

Samaha, C., Zu Dohna, H., Bariche, M., 2016. Analysis of Red Sea fish species' introductions into the Mediterranean reveals shifts in introduction patterns. *Journal of Biogeography*, 43 (9), 1797-1807.

Schickele, A., Guidetti, P., Giakoumi, S., Zenetos, A., Francour, P. *et al*., 2021. Improving predictions of invasive fish ranges combining functional and ecological traits with environmental suitability under climate change scenarios. *Global Change Biology*, 27 (23), 6086-6102.

Shih, C.T., Chen, Q.C., Lan, Y.C., Hsiao, S.H., Weng, C.Y., 2022. Key to the species of Arietellidae *Metacalanus* occurring in the China Seas. *Journal of Marine Science and Technology-Taiwan*, 30 (5), 267-270.

Starnes, W.C., 1988. Revision, phylogeny and biogeographic comments on the circumtropical marine percoid fish family Priacanthidae. *Bulletin of Marine Science*, 43 (2), 117-203.

Taşkın, E., Çakır, M., Akçalı, B., 2017. Occurrence of the alien marine red alga *Galaxaura rugosa* in Turkey. *J. Black Sea/Mediterranean Environment*, 23 (2), 156-161.

Taşkın, E. (Ed.), Akbulut, A., Yıldız, A., Şahin, B., Şen, B. *et al.*, 2019. *Türkiye Suyosunları Listesi*. Ali Nihat Gökyiğit Vakfı Yayını, İstanbul, 802 pp.

Tiralongo, F., Crocetta, F., Riginella, E., Lillo, A.O., Tondo, E. *et al*., 2020. Snapshot of rare, exotic and overlooked fish species in the Italian seas: a citizen science survey. *Journal of Sea Research*, 164, 101930.

van Tussenbroek, B.I., Barba Santos, M.G., 2011. Demography of *Halimeda incrassata* (Bryopsidales, Chlorophyta) in a Caribbean reef lagoon. *Marine Biology*, 158, 1461-1471.

Veilleux, É., de Lafontaine, Y., 2007. Biological synopsis of the Chinese mitten crab (*Eriocheir sinensis*). *Canadian Manuscript Report of Fisheries and Aquatic Sciences*, 2812, 1-45.

Verbruggen, H., Ballesteros, E., 2024. An Atlantic origin for the introduced species *Halimeda incrassata* (Bryopsidales, Chlorophyta). *Mediterranean Marine Science*, 25 (1), 55-57.

Verbruggen, H., De Clerck, O., N'yeurt, A.D.R., Spalding, H., Vroom, P.S., 2006. Phylogeny and taxonomy of *Halimeda incrassata*, including descriptions of *H. kanaloana* and *H. heteromorpha* spp. nov. (Bryopsidales, Chlorophyta). *European Journal of Phycology*, 41 (3), 337-362.

Verlaque, M., Ruitton, S., Mineur, F., Boudouresque, C.F., 2015. *CIESM Atlas of Exotic Species of the Mediterranean*, *Macrophytes*. CIESM Publishers, Monaco, 362 pp.

Wood, A.R., Apte, S., MacAvoy, E.S., Gardner, J.P.A., 2007. A molecular phylogeny of the marine mussel genus *Perna* (Bivalvia: Mytilidae) based on nuclear (ITS1&2) and mitochondrial (COI) DNA sequences. *Molecular Phylogenetics and Evolution*, 44 (2), 685-698.

Zenetos, A., Albano, P.G., Garcia, E.L., Stern, N., Tsiamis, K., *et al.*, 2022. Established non-indigenous species increased by 40% in 11 years in the Mediterranean Sea. *Mediterranean Marine Science*, 23 (1), 196-212.

Zenetos, A., Doğan, A., Bakir, A.K., Chatzigeorgiou, G., Corsini-Foka, M. *et al*., 2024. Non-indigenous species (NIS) know no geopolitical borders - an update of NIS in the Aegean Sea. *Diversity*, 16 (1), 12.

Zenetos, A., Katsanevakis, S., Beqiraj, S., Macic, V., Poursanidis, D. *et al.*, 2010. *Rapid assessment survey of marine alien species in the Albanian and Montenegrin coast*. Technical report. RAC/SPA N° 37/38/39/2010, 54 pp.

Zu Dohna, H., Lakkis, I., Bariche, M., 2025. The spread of Indo-Pacific origin fish species in the Mediterranean Sea is influenced by sea currents, habitat factors, and increasingly by shipping. *NeoBiota*, 101, 73-89.