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Michel BARICHE[1], Sara A. A. AL-MABRUK[2], Maria A. ATEŞ[3], Adnan BÜYÜK[4], Fabio CROCETTA[5], Michail DRITSAS[6], Diala EDDE[1], Ana FORTIČ[7], Elissavet GAVRIIL[8], Vasilis GEROVASILEIOU[9], Mehmet GÖKOĞLU[10], M. Fatih HUSEYINOGLU[11,12], Paraskevi K. KARACHLE[8], Periklis KLEITOU[13], Tuba TERBIYIK KURT[14], Joachim LANGENECK[15], Claudio LARDICCI[16], Lovrenc LIPEJ[7], Christina PAVLOUDI[9], Maurizio PINNA[17], Jamila RIZGALLA[18], Mehmet RÜŞTÜ ÖZEN[19], Francisco SEDANO[9,20], Ergun TAŞKIN[21], Gamze YILDIZ[22] and Francesco ZANGARO[17]

[1]Department of Biology, American University of Beirut, PO Box 11-0236, Beirut 1107 2020, Lebanon
[2]Zoology Department, Faculty of Science, Omar Al-Mokhtar University, El Bayda, Libya
[3]Russian State University for Humanities, Moscow, Russian Federation
[4]Tekirova Mah. 7005 sok. No 37 Kemer/Antalya, Turkey
[5]Department of Integrative Marine Ecology, Stazione Zoologica Anton Dohrn, Villa Comunale, I-80121 Napoli, Italy
[6]189 00 Salamina, Attica, Greece
[7]Marine Biology Station, National Institute of Biology, Fornače 41, 6300 Piran, Slovenia
[8]Institute of Marine Biological Resources and Inland waters, Hellenic Centre for Marine Research, P.O. Box 712, 19013, Anavissos, Greece
[9]Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research P.O. Box 2214, 71003 Heraklion, Greece
[10]Akdeniz University, Faculty of Fisheries, Antalya, Turkey
[11]Biosphere Research Center, Istanbul, Turkey
[12]University of Kyrenia, Girne, Cyprus
[13]Marine and Environmental Research (MER) Lab Ltd, 202 Amathountos Avenue, Marina Gardens, Block B, Offices 13-14, Limassol 4533, Cyprus
[14]Cukurova University, Faculty of Fisheries, Department of Marine Biology, 01130, Adana, Turkey
[15]Department of Biology, University of Pisa, via Derna 1, 56126 Pisa, Italy
[16]Department of Earth Sciences, University of Pisa, via Santa Maria 53, 56126 Pisa, Italy
[17]Department of Biological and Environmental Sciences and Technologies, University of Salento, S.P. Lecce-Monteroni – 73100 Lecce, Italy
[18]Department of Aquaculture, Faculty of Agriculture, University of Tripoli, Tripoli, Libya
[19] Isparta University of Applied Sciences, Fisheries Faculty, 32260, Isparta, Turkey
[20]Laboratorio de Biología Marina, Departamento de Zoología, Universidad de Sevilla, Spain
[21]Manisa Celal Bayar University, Faculty of Arts and Sciences, Department of Biology, Yunusemre, Manisa 45140, Turkey
[22]Bursa Uludağ University, Faculty of Arts and Sciences, Department of Biology, Nilüfer, Bursa, 16059, Turkey

Abstract

The current article presents 18 new records from seven Mediterranean countries. These records include one rhodophyte, four nudibranchs, two crustaceans, one stingray and 10 bony fishes. They are grouped by country as follows: **Lebanon -** first record of the Striped bass *Morone saxatilis*, the stingray *Himantura leoparda*, the Areolate grouper *Epinephelus areolatus* and the Spot-fin porcupinefish *Diodon hystrix* from various parts of the country; **Turkey -** first record of the invasive red alga *Grateloupia turuturu* from the sea of Marmara (region of Bandırma), the sea slug *Goniobranchus obsoletus* and the crab *Arcania brevifrons* from the Gulf of Antalya and the cladoceran *Pleopis schmackeri* from several locations along the Aegean Sea; **Cyprus -** first record of the alien sea slug *Berthellina citrina* from the region of Cape Greco and an observation of a butterflyfish *Heniochus* sp. from the north-eastern side of the island; **Greece -** first record of the alien sea slug *Anteaeolidiella lurana* from the region of Heraklion in Crete and the record of the Atlantic spadefish *Chaetodipterus faber* and the Black surgeonfish *Acanthurus* cfr *gahhm* from Salamina Island; **Slovenia -** first record of the alien sea slug *Thecacera pennigera* from Izola; **Italy -** first record of the hybrid Striped bass (*Morone saxatilis* × *Morone chrysops*) from the northern Tyrrhenian Sea and a first record of the goldfish *Carassius auratus* from the region of Apulia; **Libya -** first record of the Red Sea goatfish *Parupeneus forsskali* and the African surgeonfish *Acanthurus monroviae*, respectively from the eastern (Al-Tamimi area) and the western shore (Al-Khums area).

Introduction

The marine world is traditionally divided into major biogeographic regions with relatively vague boundaries. Biogeography reconstructs the influence of geological history on the distribution of organisms over long temporal and large spatial scales, as well as in terms of interaction of marine organisms with their physical and biotic environments, but over short temporal and small spatial scales (Mooi & Gill, 2002). Marine life of the present

Fig. 1: Locations of the records from the "New Mediterranean Biodiversity Records (March 2020)**.** The numbers of locations are given in Table 1.

Table 1. Species included in "New Alien Mediterranean Biodiversity Records (March 2020)", systematically ordered by phyla, detailed in subchapters (SC), with indications on origin of species (COS – Cosmopolitan, CIR – Circumtropical, IO – Indian Ocean, IP – Indo-Pacific, WA – West Atlantic, EA – East Atlantic, WP – West Pacific, SEA – Southeast Asia), basin of the reported incident (EM – East Mediterranean, CM – Central Mediterranean), and location number (LN) as in Figure 1.

Species	SC	Origin	Basin	Country	Exact localities	LN
Phylum Rhodophyta						
Grateloupia turuturu	2.1	WP	EM	Turkey	Bandırma	7
Phylum Mollusca						
Anteaeolidiella lurana	4.1	CIR	EM	Greece	Heraklion	14
Berthellina citrina	3.1	IP	EM	Cyprus	Cape Greco	12
Goniobranchus obsoletus	2.2	IO	EM	Turkey	Antalya	8
Thecacera pennigera	5.1	CIR	CM	Slovenia	Izola Marina	18
Phylum Arthropoda						
Arcania brevifrons	2.4	IP	EM	Turkey	Antalya Bay	8
Pleopis schmackeri	2.3	IP	EM	Turkey	Kuşadası, Güllük and Gökova Bays	9-11
Phylum Chordata						
Acanthurus cfr *gahhm*	4.2	IP	EM	Greece	Salamina Island	17
Acanthurus monroviae	7.1	EA	CM	Libya	Al-Khums	23
Carassius auratus	6.2	SEA	CM	Italy	Salento, Apulia	20-21
Chaetodipterus faber	4.2	WA	EM	Greece	Salamina Island	15-16
Diodon hystrix	1.1	CIR	EM	Lebanon	Tyre	6
Epinephelus areolatus	1.1	IP	EM	Lebanon	Sarafand and Beirut	4-5
Heniochus sp.	3.3	IP	EM	Cyprus	Northeast Cyprus	13
Himantura leoparda	1.1	IP	EM	Lebanon	Beirut	3
Morone saxatilis	1.1	WA	EM	Lebanon	Sarafand and Saida	1-2
Morone saxatilis × *Morone chrysops*	6.1	WA	CM	Italy	Gombo	19
Parupeneus forsskali	7.1	IP	CM	Libya	Al-Tamimi	22

Mediterranean Sea originates from several major geological events, most notably its separation from the Indian Ocean after the formation of the Isthmus of Suez and the post-Messinian crisis period, which allowed Atlantic seawater and marine organisms to enter from the Strait of Gibraltar and colonize the Mediterranean basin. Today, this marine life is considered native to the Mediterranean, as opposed to other organisms that have more recently arrived, referred to as alien. The main source of their arrival is the Suez Canal, which is responsible for the presence of alien organisms of Indo-Pacific origin (Lessepsian migrants). Other pathways of introduction include aquaculture, ornamental pet trade, shipping, oil rigs and range expansion of marine biota from the tropical Atlantic (e.g. Galil, 2012; Zenetos *et al.*, 2012; Pajuelo *et al.*, 2016). As such, thousands of alien species are currently affecting the Mediterranean biodiversity and ecosystems (e.g. Streftaris & Zenetos, 2006; Katsanevakis *et al.*, 2014). Biological records are thus important to document the presence of both alien and native species that are rare or have arrived recently. This allows the improvement of knowledge on the distribution of marine species, range expansion and new alien species arrivals to the Mediterranean. While some records are traditionally made by scientific surveys, the use of social media and citizen science is a powerful modern approach that has also been used to rapidly detect new occurrences in the Mediterranean Sea (Bariche & Azzurro, 2016; Roy *et al.*, 2018).

This collective article presents 18 new records for the Mediterranean Sea, comprised of two rhodophyte, four taxa of nudibranchs, two crustaceans, one stingray and 10 bony fish taxa. Most of these records were previously re-ported from other regions in the Mediterranean, except for four species (*Morone saxatilis*, *Chaetodipterus faber*, *Acanthurus* cfr *gahhm*, *Heniochus* sp.) and the hybrid (*Morone saxatilis* × *Morone chrysops*). In this article, author names appear in alphabetical order and all re-cords are from the eastern and central Mediterranean Sea. These records were categorized by country and arranged from east to west. The exact localities are illustrated in Figure 1 and detailed systematically in Table 1.

1. LEBANON

1.1 First records of exotic marine fish species (*Morone saxatilis*, *Himantura leoparda*, *Epinephelus areolatus*, *Diodon hystrix*) from Lebanon

Michel BARICHE and Diala EDDE

The geographic location of Lebanon on the Levantine coast, its proximity to the Suez Canal, and probably its significant underwater degradation, make its marine environment susceptible to continuous colonization by non-indigenous species, mainly of Indo-Pacific origin (e.g. Zenetos *et al.*, 2017). In fact, a relatively large number of marine species of various origins have been reported from the Lebanese waters in the last few decades (e.g. Crocetta *et al.*, 2015), possibly as a result of various modes of introduction (e.g. Zenetos *et al.*, 2017). Social networking has proved to be a powerful tool to detect non-indigenous and rare species in the marine environment and many records could not have been detected at a very early stage otherwise (e.g. Crocetta *et al.*, 2015). This work updates the species number and distribution of non-indigenous fish species in the Mediterranean from the coastal waters of Lebanon.

Morone saxatilis (Walbaum, 1792)

The Striped bass *Morone saxatilis* (Actinopterygii: Moronidae) is a species native to the north-western Atlantic ocean (Froese & Pauly, 2019). It is relatively easily identified by its arched profile and seven or eight distinct and uninterrupted horizontal stripes on each side of the body (Hodson, 1989). In its native habitat, this opportunistic piscivore, lives in coastal waters and enters rivers to feed and reproduce. We hereby report the capture of two individuals of this species from the eastern Mediterranean Sea: On 7 February 2018, the first individual was caught while shore angling in Sarafand (approx. 33.447261° N, 35.275731° E) and on 13 June 2019, another individual was also captured by an angler off Saida (approx. 33.565969° N, 35.366533° E), on the southern coast of Lebanon (Fig. 2). The two fish were not retrieved as they were consumed; only pictures were shared on fishermen groups on social media. The continuous longitudinal stripes present along the sides of the body of *Morone saxatilis* make the species easily distinguishable from the native seabass *Dicentrarchus labrax* (Linnaeus, 1758), which lacks the characteristic stripes, and from *D. punctatus* (Bloch, 1792) which has small dark markings scattered over back and sides instead (Fischer *et al.*, 1987). These stripes also distinguish it from the commonly cultured hybrid striped bass (*Morone saxatilis* × *Morone chrysops*), which typically displays discontinuous stripes behind the pectoral fin and below the lateral line (Hodson, 1989). *Morone saxatilis* is probably an escapee from aquaculture facilities as the species and its hybrid are commercially produced by Israeli farmers (Fishery and Aquaculture Country Profiles, 2018). The presence of such cultured species in the eastern Mediterranean is alarming knowing that the likelihood of its establishment is relatively high. *Morone saxatilis* is a large predator that is highly tolerant to environmental variables and has previously established reproducing populations in the north-eastern Pacific and elsewhere (Hodson, 1989). Furthermore, the species has the possibility of interbreeding with native Mediterranean seabasses, which may produce fertile hybrids, as is the case of *Morone saxatilis* × *Morone chrysops* (Hodson, 1989).

Himantura leoparda Manjaji-Matsumoto & Last 2008

The family Dasyatidae is comprised of about a hundred species of stingrays found in the Atlantic, Indian and Pacific Oceans (Froese & Pauly, 2019). The Mediterranean and the Black Sea region hosts six species of stingrays, of which *Himantura uarnak* (Gmelin, 1789) is considered a Red Sea immigrant (Froese & Pauly, 2019). In fact, this fish has been shown to be a group of several cryptic species of similarly patterned tropical stingrays distributed throughout the Indian and Pacific oceans (e.g. Arlyza *et al.*, 2013). "*Himantura uarnak*" has been moderately recorded in the Mediterranean Sea since the 1950s in the eastern basin. A recent revision of the family showed the presence of four species within the genus *Himantura* (Last *et al.*, 2016), of which *H. leoparda* Manjaji-Matsumoto & Last, 2008 was also found along the Mediterranean coast of Turkey (Manjaji-Matsumoto & Last, 2008; Yucel *et al.*, 2017). Furthermore, *Himantura tutul* Borsa, Durand, Shen, Alyza, Solihin & Berrebi, 2013 has also been identified from the Indo-West Pacific as another cryptic stingray within the species complex (Borsa *et al.*, 2013). We hereby report the first record of *Himantura leoparda* (Fig. 2) for Lebanon and the second record for the Mediterranean, based on photographs taken by a scuba diver on 12 September 2018 at six meters depth off Beirut (33.904242° N, 35.482543° E). While all known *Himantura* species have a similar rhomboidal disc shape with an angular snout tip and a long, slender, whip-like tail, the individual photographed is similar to adults (>550 mm DW) of *H. leoparda* in having the unique leopard-like markings on the dorsal surface. Contrarily, the closely related *Himantura uarnak* has small black spots or fine reticulations in adults and *H. undulata* has striking reticulations and rings (Manjaji-Matsumoto & Last, 2008). The individual from Lebanon also differs from *H. tutul* (sensu Borsa *et al.*, 2013) by the degree of interruption in the contour of the spotting pattern, where the ocellae contours are mixed polygons (Fig. 2), while in *H. tutul* all ocellae have interrupted outlines and sometimes no defined shapes (Borsa *et al.*, 2013). Other differences, such as the arrangement of the midscapular denticles or distinctions at the molecular level, are not possible to detect based on photos (e.g. Manjaji-Matsumoto & Last, 2008; Last *et al.*, 2016). The leopard-like markings on the dorsal sides also constitute unique spotting patterns, which differentiate all *Himantura* species from the native stingrays present in the Mediterranean and the Black Sea region.

Epinephelus areolatus (Forsskål, 1775)

The Areolate grouper *Epinephelus areolatus* (Actinopterygii: Serranidae) is a common serranid species in the Indo-West Pacific region. It has a broad distribution from the Red Sea and the eastern coast of Africa to southern Japan and as far as New Caledonia (Froese & Pauly, 2019). *Epinephelus areolatus* lives usually in the vicinity of seagrass meadows or over silty sand bottoms near rocks or dead corals and can grow up to 40 cm. The species has been previously recorded from the Mediterranean based on one specimen collected by an angler at a depth of about 37 m on 30 August 2015 off Haifa (Rothman *et al.*, 2016). We hereby report the capture of two additional individuals of this species, constituting the second and third records from the eastern Mediterranean: On 20 November 2019, an individual of an unusually spotted grouper was caught in the region of Sarafand (approx. 33.460097° N, 35.286547° E), off the southern coast of Lebanon. The individual was speared by a diver at about 30 m depth (Fig. 3). On 6 December 2019,

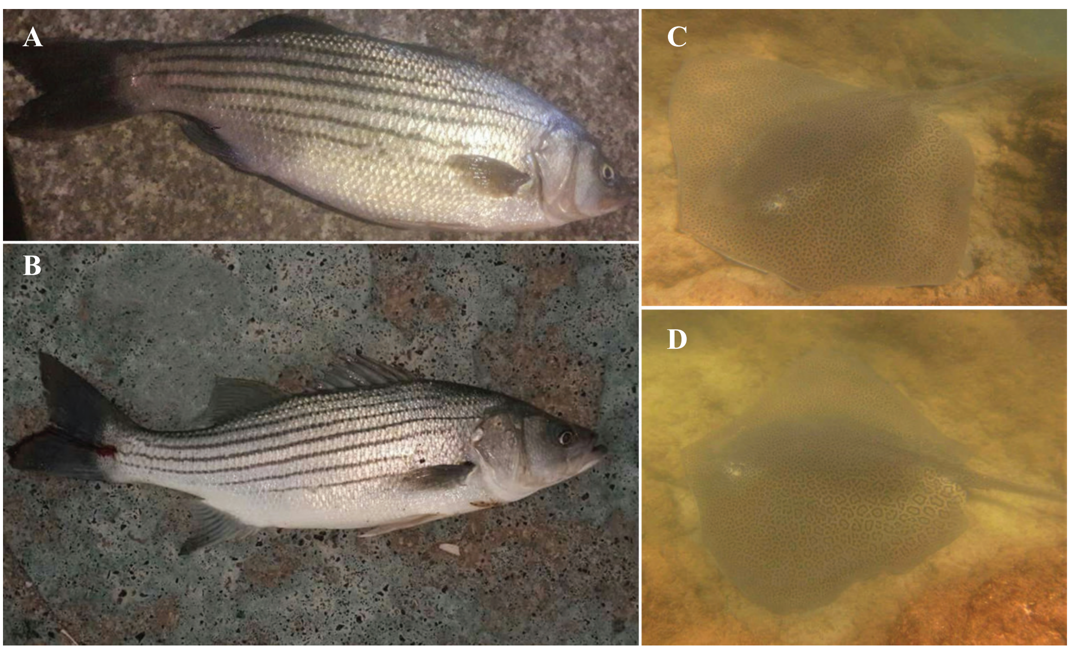

Fig. 2: *Morone saxatilis* and *Himantura leoparda* recorded from the coast of Lebanon. (A) Sarafand (33.447261° N, 35.275731° E), 7 February 2018; (B) Saida (33.565969° N, 35.366533° E), 13 June 2019; (C; D) Beirut (33.904242° N, 35.482543° E), 12 September 2018.

Fig. 3: *Epinephelus areolatus* and *Diodon hystrix* recorded from the coast of Lebanon. (A) Beirut (33.833911° N, 35.458081° E), 6 December 2019; (B) Sarafand (33.460097° N, 35.286547° E), 20 November 2019; (C) Tyre (33.267164° N, 35.190972° E), 9 December 2019.

another *E. areolatus* was captured with hook and line by an angler off Beirut (approx. 33.833911° N, 35.458081° E), at about 40 m depth (Fig. 3). The pictures of the two individuals were shared with the authors through social media (Facebook™ and Facebook Messenger). Both specimens were not retrieved as they were consumed and only pictures are available.

Diodon hystrix Linnaeus, 1758

The Spot-fin porcupinefish *Diodon hystrix* (Actinopterygii: Diodontidae) is a circumglobal species found in tropical and sub-tropical marine areas in the Atlantic and Indo-Pacific regions (Froese & Pauly, 2019). In its native habitat, the species live in lagoons and on reef slopes down to about 50 m depth feeding on benthic invertebrates. *Diodon hystrix* has been sporadically recorded in several parts of the eastern central Atlantic, such as in Madeira, the Azores, the Atlantic coast of Morocco and the Iberian Peninsula (reviewed in Ordines *et al.*, 2018). The only valid records from the Mediterranean are from the Gulf of Taranto in Italy, the Balearic Islands and Cyprus (Ordines *et al.*, 2018; Kleitou *et al.*, 2020). We hereby report the capture of one individual of this species, constituting the fourth record from the Mediterranean: On 9 December 2019, an individual of *D. hystrix* was caught in the region of Tyre (approx. 33.267164° N, 35.190972° E), in the south of Lebanon. The individual was captured with hook and line by an angler fishing from the shore (Fig. 3). The fish was discarded assuming it has toxic spines.

The continuous reports of recent arrivals of non-indigenous marine species is of key importance to document the occurrence and spread of these species in the Mediterranean, especially since introduction rates seem to have increased in the Mediterranean at an alarming rate. The Striped bass *Morone saxatilis* recorded herein is a first record, while both *Himantura leoparda* and *Epinephelus areolatus* are second records and *Diodon hystrix* is the fourth from the entire Mediterranean Sea. Furthermore, all four species are considered first records for Lebanon.

Some scientists may still be uncertain about the importance of data collected over social media platforms, as opposed to the collection of the organism and its handling in a laboratory. It is certain that errors in identification may occur, particularly in inconspicuous species that may require meristic, morphometric, and also genetic characters to identify species such as *Himantura leoparda*. However, not reporting an occurrence pending the capture of another individual often means waiting for the species to establish a larger population, which may take years and increases the already existing bias between the date of first sighting and the real date of arrival of the species in the new area. This may result in a less precise estimation of the early stages of introduction and the dynamics of colonisation in the region.

2.1 Occurrence of the invasive red alga *Grateloupia turuturu* in Turkey

Ergun TAŞKIN and Gamze YILDIZ

The alien red macroalga *Grateloupia turuturu* Yamada (Florideophyceae: Halymeniales: Halymeniaceae) was originally described from Hokkaido, Japan by Yamada (1941), and this species is known from Australia, New Zealand, China, Korea, Russia, France, Britain, Italy, Netherlands, Spain, Portugal, Canary Islands, Western and Eastern Atlantic, North America, Brazil, and South Africa (Guiry & Guiry, 2019). Recently, *G. turuturu* has been reported from Israel by Katsanevakis *et al.* (2014). In this study, *G. turuturu* is reported for the first time in Turkey.

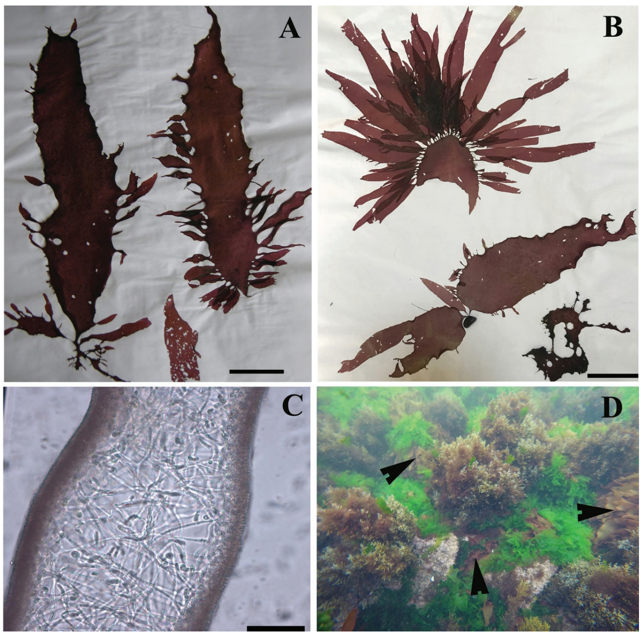

Fig. 4: The invasive red alga *Grateloupia turuturu* from Turkey. (A-B) polymorphisms of the habit of *Grateloupia turuturu* in Turkey; (C) the transverse section of the thallus; (D) habitat of underwater (Arrowheads: *Grateloupia turuturu*). Scale bars: A-B: 5 cm. C: 100 µm.

Samples were collected on May 2015 by snorkeling at 1 m depth in Bandırma (Marmara Sea, Turkey) (40.3620° N, 27.9819° E), where the species was epilithic, at a temperature of 21ºC, salinity of 21.6. The material was preserved in 4% formaldehyde in seawater for later examination at the Department of Biology, Celal Bayar University (Turkey). Using a light microscope (Nikon SE) with photographic equipment (Nikon P5100), the identification of this alga was made on the basis of both Bárbara & Cremades (2004), and Cecere *et al.*'s (2011) accounts. Thallus mucilagenous, up to 50 cm long, 1-8 cm broad (Fig. 4A-B), attached to the substratum by the encrusting base, blade elliptical to lanceolate, simple or branched, sometimes proliferations on the margin, it was epilithic or epizoic on *Mytilus* sp., and abundant on the stony substratum at 1 m depth. In the transverse section, blades 300-500 µm thick, 4-6 layer of cortical cells, medullary cells filamentous (Fig. 4C). Other species present at the collection site were: *Cystoseira* spp., *Ellisolandia elongata*, *Ulva rigida*, *Polysiphonia elongata*, *Ceramium virgatum* (Fig. 4D). The Marmara Sea is an inland sea which separates Europe and Asia. It connects to the Black Sea through the Bosphorus Strait, and to the Aegean Sea through the Dardanelles Strait. It has intense maritime traffic. *Grateloupia turuturu* may have reached Turkey through ballast water.

2.2 An alien Chromodorid nudibranch (*Goniobranchus obsoletus* Rüppell & Leuckart, 1830) in the Gulf of Antalya

Mehmet GÖKOĞLU and Adnan BÜYÜK

The Levantine Sea, situated in the eastern part of the Mediterranean Sea, is under the influence of immigration from the Indo-Pacific through the Suez Canal (Zenetos, 2017). Many lessepsian organisms have been recorded by in the coasts of Turkey (Çinar *et al.*, 2011).

Fig. 5: *Goniobranchus obsoletus* in the Gulf of Antalya

One of the species that has recently entered the Mediterranean via the Suez Canal is *Goniobranchus obsoletus* (Rüppell & Leuckart, 1830). This species was first identified along the coast of Israel by Halevy *et al.* (2015). Subsequently, the species was reported from the coast of Cyprus (Kleitou *et al.*, 2019).

On 24 June 2019, during scuba diving in a submerged cave located at the depth of 5 m on the Antalya Falez (36.849133° N, 30.778211° E), a sea slug was seen on the cave wall (Fig. 5). This sea slug was photographed and identified as *Goniobranchus obsoletus* (Rüppell & Leuckart, 1830) according to Rudman (2004) and Kleitou *et al.* (2019). This is the first record of *G. obsoletus* from Turkey and the third from the Mediterranean Sea within 5 years, which indicates that the species is already established in the Levantine Sea.

2.3 The alien cladoceran *Pleopis schmackeri* (Poppe, 1889) in the Aegean Sea

Tuba TERBIYIK KURT

Pleopis schmackeri is a euryhaline species that prefers warm waters (Rocha, 1985). It was originally described from the Hong Kong coast (Kim & Onbe, 1989) and its distribution was restricted to the coasts of the western Pacific region (south coast of Vietnam to northern coastal waters close to Japan) for a long time. Subsequently, it was observed along the Brazilian coasts (Rocha, 1985), Madagascar (Onbe, 1999), the Red Sea and Suez Canal (Gurney, 1927). *Pleopis schmackeri* has been recently reported as an alien species in the Mediterranean Sea (İskenderun Bay, Turkey), where it became a permanent member in the cladoceran community in the following years in this bay (Terbıyık Kurt & Polat, 2018).

Zooplankton studies were conducted along the Turkish coast of the Aegean Sea in August 2017 in the framework 'Integrated Marine Pollution Monitoring 2017-2019 Programme' by the Ministry of Environment and Urbanization and TUBITAK-MRC. Zooplankton samples were collected by vertical hauls of a WP-2 net with 200 µm mesh size (Table 2) and were counted under the SZX16 Olympus microscope.

Pleopis schmackeri is distinguished from other marine cladoceran species by having a hemispherical body appearance (Fig. 6A), four setae on exopods of thoracic limbs 1-3 (Fig. 6B) and a sharply pointed slender furca with spinules (Fig. 6C). The apperance of *P. schmackeri* is very close to *Pleopis polyphemoides* and sometimes these two species cannot be distinguished on small magnification. *P. polyphemoides* is separated from *P. schmackeri* by having only three setae on exopods of thoracic limbs 1-3 and short triangular shaped without spinules of caudal furca. *P. schmackeri* was first observed at three locations (Kuşadası, Güllük and Gökova Bays) in the southern coast of Aegean Sea and its abundance was measured as 29.6, 3.9 and 14.2 ind. m^{-3}, respectively. This species has been known since 2012 in İskenderun

Table 2: The information of sampling sites.

Date	Local area	Coordinates	Depth (m)	Sampling depth (m)
19.08.2017	Enez coast	40.7053° N, 26.0238° E	17	0-13.5
18.08.2017	Saros Bay	40.6049° N, 26.8000° E	44	0-44
19.08.2017	Ezine coast	39.9540° N, 26.1503° E	18	0-16
20.08.2017	Ayvacık offshore	39.4132° N, 25.9950° E	308	0-246
20.08.2017	Edremit Bay	39.4040° N, 26.4808° E	99	0-95
21.08.2017	Çandarlı Bay	38.8213° N, 26.9513° E	20	0-15
22.08.2017	İzmir Bay	38.4363° N, 27.1265° E	10	0-7
22.08.2017	Karaburun offshore	38.7638° N, 26.3190° E	220	0-216
22.08.2017	Ildır Körfezi	38.4178° N, 26.4417° E	66	0-65
22.08.2017	Alaçatı offshore	38.0855° N, 26.3308° E	366	0-210
23.08.2017	Kuşadası Bay	37.9440° N, 27.2557° E	32	0-30
23.08.2017	Didim coast	37.4179° N, 27.2027° E	32	0-28
24.08.2017	Güllük Bay	37.2417° N, 27.4882° E	37	0-32
24.08.2017	Gökova Bay	37.0022° N, 28.1527° E	67	0-62

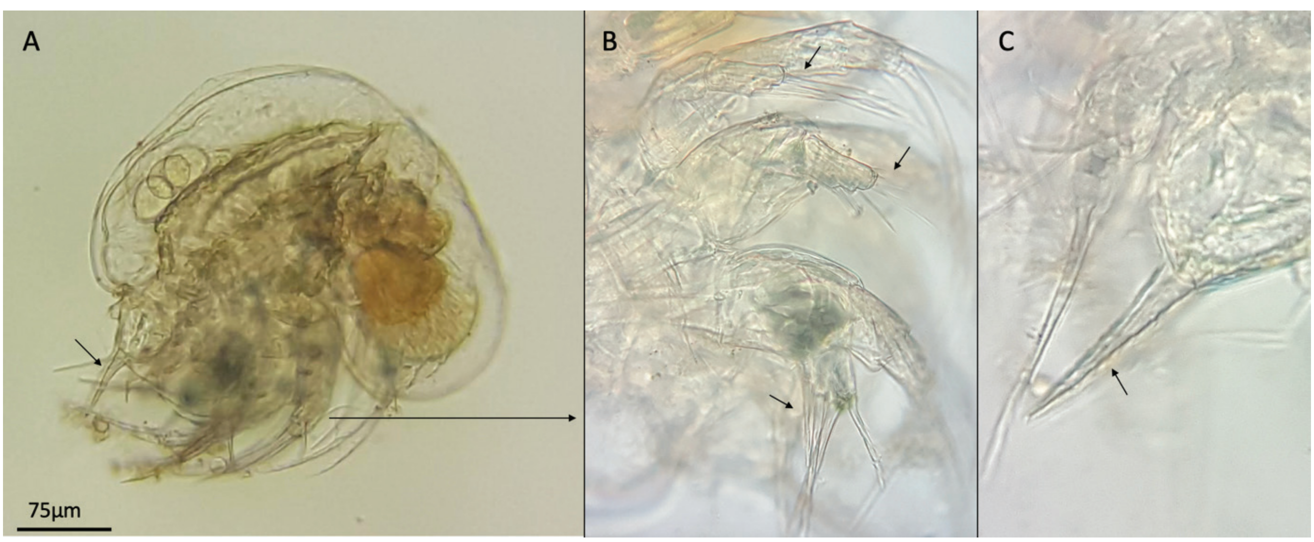

Fig. 6: (A) Body apperance of *Pleopis schmackeri*; (B) Thoracic limbs; (C) Caudal furca.

Bay and observed only in the summer (July) of 2012 – 2015 period. Low abundance of this species (0.78 to 25.1 ind.m^{-3}) was reported in İskenderun Bay (Terbıyık Kurt & Polat, 2018). Similarly, abundance values were low and almost similar in the present study with reported values from İskenderun Bay (Terbıyık Kurt & Polat, 2018). The presence of this species in İskenderun Bay was attributed either to Lessepsian migration or ballast waters (Terbıyık Kurt & Polat, 2018). This species was encountered in the Suez Canal approximately more than 90 years ago (Gurney, 1927). It may have entered the Levantine Sea via the Suez Canal, and then spread by alongshore currents towards Anatolia following the Israeli, Lebanese and Syrian coasts. This clockwise current turns westernly and then flows along the southern coast of Turkey. The branches of the Asia minor current entering in the Aegean Sea would transfer this species into the Southern Aegean Sea. Indeed, most of the alien species are distributed in the South Aegean Sea due to its proximity with the Levantine Basin and with the effect of currents from this basin (Pancucci-Papadopoulou *et al.*, 2005). Moreover, there are several ports in these bays and surrounding areas, where maritime traffic increases especially in the summer due to tourism. Alternatively, this species could have entered in this region by ballast waters of commercial ships.

Fig. 7: *Arcania brevifrons*, Chen 1989, (Male) caught in the Gulf of Antalya. A: Dorsal View; B: Ventral View.

Fig. 8: *Arcania brevifrons*, Chen 1989, (Male) caught in the Gulf of Antalya. A: Carapace length; B: Carapace width.

2.4 Second record of an alien species *Arcania brevifrons*, Chen,1989, (Crustacea; Decapoda; Leucosiidae) from the Mediterranean Sea (Coast of Turkey)

Mehmet RÜŞTÜ ÖZEN and Mehmet GÖKOĞLU

In recent years the Levantine Sea has been increasingly influenced by the migration of species of Indo-Pacific origin. *Arcania brevifrons*, Chen, 1989, one of the 5 species belonging to the genus *Arcania*, was reported by Galil *et al.* (2017) from the coasts of the South Israel. Natural distribution areas are the coasts of the Philippines, Red Sea, Seychelles, Madagascar, Mozambique Channel, Pakistan, India, Indonesia, and Fiji (Galil, 2001).

An unknown crab was caught near the Sican adasi (36.79125° N, 30.586981° E) (Antalya Bay, Turkey) at about 30 meters depth by trammel net (24 mm mesh size) on 20 November 2019. The specimen was identified as a male of *Arcania brevifrons* following Galil *et al.* (2017). The color of the samples was pale orange (Figs 7, 8). Total weight, shell length and shell width were measured to be 5.13 g, 2.5 cm and 2.0 cm respectively (Fig. 8 A, B). Its carapace was 11 spines. Other morphological features of our specimen are similar to those reported by Galil *et al.* (2017) from the coasts of South Israel. This specimen was labelled and preserved at the Mediterranean University Fisheries Faculty Museum.

This is the first record of *Arcania brevifrons* from Turkey and the second from the Mediterranean Sea.

3. CYPRUS

3.1 First record of *Berthellina citrina* (Rüppell & Leuckart, 1828) (Mollusca: Heterobranchia: Pleurobranchidae) from Cyprus

Periklis KLEITOU and Fabio CROCETTA

The sea slug *Berthellina citrina* (Rüppell & Leuckart, 1828) (Mollusca: Gastropoda: Pleurobranchidae) is a pleurobranchid species native and widely distributed in the Indo-Pacific, including the Red Sea (Moustafa *et al.*, 2018). Records of this species from the Mediterranean were confuted as misidentifications of two native taxa, namely *Berthellina edwardsii* (Vayssière, 1897) and *Berthella aurantiaca* (Risso, 1818) (see Zenetos *et al.*, 2004). Only recently, Yokeş *et al.* (2018) convincingly recorded the presence of *B. citrina* for the first time in the Mediterranean after morphological and genetic analyses of three specimens collected off Turkey, thus re-opening the question about previous Mediterranean records.

The confusion between species of *Berthella* genus is due to the fact that some share similar colour forms and an identification based on an external appearance may be problematic if not impossible. However, *B. citrina* may sometimes have white spots on the mantle, a diagnostic character that unambiguously distinguishes this taxon from the uniformly coloured native Mediterranean species (Yokeş *et al.*, 2018). Here, we first report the presence of *B. citrina* from Cyprus based on a single specimen which showed such a diagnostic character. The specimen was recorded by citizen-divers at the marine

Fig. 9: *Berthellina citrina* from Cape Greco (Cyprus). Photograph was captured from Sakis Lazarides (Cyprus).

protected area of Cape Greco (34.95992° N, 34.08825° E) on 19 July 2019. The specimen was found crawling at hard substratum at 12 m depth when water temperature was 25 °C (Fig. 9). No certainties occur regarding its possible way of arrival in Cyprus; however dispersal from adjacent populations seems to be the most probable way.

3.2 First observation of a *Heniochus* sp. from Cyprus

M. Fatih HUSEYINOGLU and Maria A. ATES

Heniochus is a genus of Chaetodontid fishes consisting of 8 species, with distributions spread into tropical and subtropical oceans (Froese & Pauly, 2020). There are confirmed records of *H. intermedius* from South (Gokoglu *et al.*, 2003) and Southeastern Turkey (Ergüden *et al.*, 2016), Lebanon (Bariche, 2012) and Malta (Evans *et al.*, 2015). A *Heniochus* sp. of 10-15 cm in TL (Fig. 10), was spotted on 19 May 2018, at a depth of 28 meters at the recreational diving spot, Amphora Wall (35.17558° N, 34.01762° E) on the northeastern side of Cyprus. The specimen belongs to the genus of *Heniochus* due to its characteristic coloration and morphology, however a complete identification was not possible due to inability of capture. Although this encounter was likely possible through Lessepsian migration, *Heniochus* spp. are very popular fishes in the aquarium trade, so an intentional release from a home aquarium might be the source, since similar occurrences have happened before in the region (Kousteni *et al.*, 2019).

Fig. 10: *Heniochus* sp. on Amphora Wall, Northeast Cyprus.

4. GREECE

4.1 First record of the nudibranch *Anteaeolidiella lurana* (Ev. Marcus & Er. Marcus, 1967) in Greek waters

Vasilis GEROVASILEIOU, Christina PAVLOUDI and Francisco SEDANO

The nudibranch *Anteaeolidiella lurana* (Ev. Marcus & Er. Marcus, 1967) was originally described from Brazil, and has been subsequently recorded from the Caribbean, Bermuda, the Canary Islands, the Straits of Gibraltar, the Mediterranean Sea, and Queensland in Australia (Carmona *et al.*, 2014 and references therein). In the Mediterranean Sea, the species has been reported under different names and synonyms only from the western and central sectors of the basin, i.e. Iberian coasts, Balearic Islands, Sardinia, Ligurian and Tyrrhenian coasts of mainland Italy and Malta (Carmona *et al.*, 2014; Lipej *et al.*, 2017). We first record *A. lurana* from Crete, representing the easternmost finding of the species in the Mediterranean Sea and the first in Greek waters, suggesting a possible range expansion. The nudibranch was found twice on the fouling communities that developed on Autonomous Reef Monitoring Structures (ARMS) which were deployed in the marina of the Old Venetian Harbour of Heraklion, Greece (35.343153° N, 25.136605° E) for two successive periods of four months (deployment-retrieval: 28/9/2018-28/1/2019 and 12/6/2019-11/10/2019, respectively). Both ARMS were deployed at a depth of 3-4 m, on the muddy bottom of the marina.

The first record of *A. lurana* in the study site was only based on molecular evidence (eDNA) from the first ARMS deployment, which therefore leaves uncertainties on whether an unnoticed specimen or putative egg-masses were sequenced. The sessile fraction of the benthic community that developed on the ARMS was scraped and preserved in dimethyl sulfoxide (DMSO). eDNA was extracted and further processed through COI metabarcoding. Specifically, a fragment of the COI gene was amplified with the primers mlCOIintF (Leray *et al.*, 2013) and jgHCO2198 (Geller *et al.*, 2013) and sequenced using a MiSeq Reagent Kit v3 (2 × 300-cycles) at the IMBBC-HCMR. All the raw sequence files of this study were submitted to the European Nucleotide Archive (ENA) with the study accession number PRJEB33796 (available at http://www.ebi.ac.uk/ena/data/view/PRJEB33796) and analyzed with PEMA (Zafeiropoulos *et al.*, 2020). The

Fig. 11: *Anteaeolidiella lurana* on an ARMS plate. The specimen was ca. 7 mm long.

sequence derived from eDNA and identified as *A. lurana* was also submitted to ENA with the accession number LR760212 (available at https://www.ebi.ac.uk/ena/browser/view/LR760212). The similarity percentages with the COI sequences of the voucher *A. lurana* specimens were 98.32%-98.80%. The similarity percentages with other species were 91.62% for *A. saldanhensis* and 88.20% for *Lymnaea stagnalis* and *Galba mweruensis*. Only three of the eleven accepted *Anteaeolidiella* species (*A. indica*, *A. ireneae*, and *A. orientalis*) do not have sequence data associated with them; therefore, the degree of certainty for the identification based on the eDNA is high. The second record of *A. lurana* was based on photographic documentation of the ARMS plates from the second deployment period (Fig. 11) and was specifically found on the second plate below the top one (top surface of plate No. 8). The photographed specimen was approximately 7 mm long, had an elongate and slender body, and bore the typical dorsal colour patterns of *A. lurana* as described by Carmona *et al*. (2014). It had a translucent white background colour. A bracket-shaped orange mark extended from the rhinophores to the base of the oral tentacles. Just behind the rhinophores appeared an opaque white area surrounded by orange pigment in the shape of an elongate diamond, followed by an orange diamond outlining the pericardium and filled with white pigmentation. The cerata extended from the rear of the rhinophores to the tail and were characterized by an orange pigment.

The alien status of this nudibranch species in the Mediterranean Sea remains data deficient but its finding in ports points to shipping transport as a possible vector of introduction and range expansion in the basin (Carmona *et al*., 2014 and references therein; Lipej *et al.*, 2017).

4.2 First record of two alien fishes from Saronikos Gulf: *Chaetodipterus faber* (Broussonet, 1782) and *Acanthurus* cfr *gahhm* (Forsskål, 1775)

Paraskevi K. KARACHLE, Elissavet GAVRIIL, and Michail DRITSAS

Aquatic invasions are a well-known threat to biodiversity and in the Mediterranean four major pathways of introduction have been identified (Zenetos *et al*., 2012). Among these pathways, an increasing rate of introductions attributed to aquarium releases has been documented in the Mediterranean (Zenetos *et al*., 2016). In Greece, three aquarium released fishes have been recorded to date, with two of them just recently, in 2018 (Zenetos *et al*., 2018).

Citizen science networks, such as the Ellenic Network for Aquatic Invasive Species (ELNAIS; www.elnais.gr), have proven a powerful tool in recording alien species (Giovos *et al*., 2019) and through the ELNAIS activities and network, photos and specimens of alien species are availalble to the experts of the network. Such being the case, on 24 August 2019 a specimen was caught and photographed by a professional small-scale fisher in the area of Agios Georgios, Salamina Island (37.960282° N, 23.539949° E) using trammel nets set over a muddy bottom at a depth of approximately 11 m. Based on the photo, the species was identified as *Chaetodipterus faber* (Broussonet, 1782) (Fig. 12a). Consequently, on 26 October 2019, two individuals of the same species (Fig. 12b) were spear-gunned in Salamina Island (approximately, 37.962627° N, 23.547720° E), at a depth of 1.5-2 m over a sandy bottom, close to a shipwreck located in the area. The fish were frozen and transferred to the laboratory of the Institute of Marine Biological Resources and Inland Waters of the Hellenic Centre for Marine Research for identification and further examination. Both individuals were also identified as *C. faber*, one being male and the other female, each having a total length of 263 mm. In addition, on 7 October, a different fish species was caught by the same fisher, in the same general area

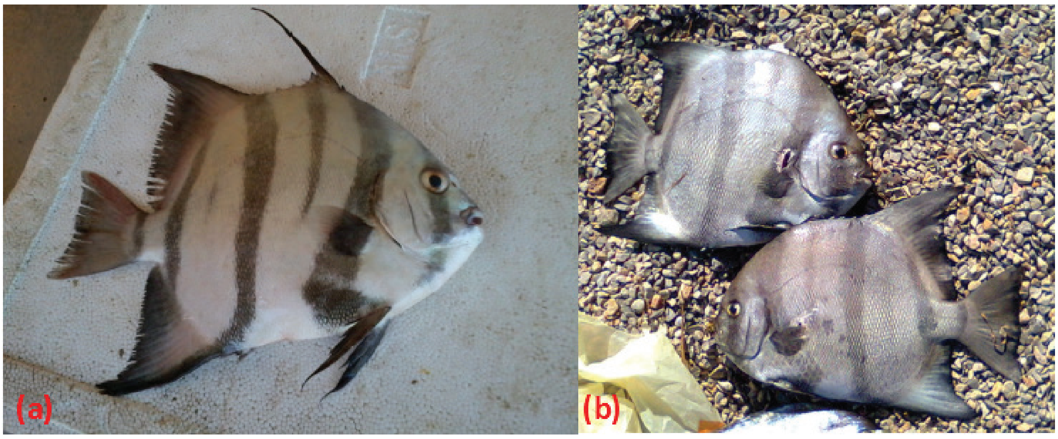

Fig. 12: Individuals of *Chaetodipterus faber* (Broussonet, 1782), caught in Salamina, on (a) 24 August 2019, and (b) October 26th 2019.

(Agios Georgios Salamina) at a depth of approximately 16.5 m. Based on the photo provided (Fig. 13) it was very difficult to identify the species with absolute certainty. Yet, according to the general characteristics and overall appearance, the fish was assumed to be *Acanthurus* cfr *gahhm* (Forsskål, 1775). Nevertheless, the presence of the species should be further verified by the examination of a specimen, and its inclusion in the list of alien species in the Mediterranean should be done with caution. The inadequacy of a photograph to identify a species that has been fished beyond any doubt strongly indicates the need for citizen science networks to explain the importance of a specimen, rather than a photo, to collaborators. Efforts are being made to bring scientists and citizen scientists together, to explore additional ways of collaboration and exchange of information (e.g. Roy *et al*., 2018).

Fig. 13: *Acanthurus* cfr *gahhm* (Forsskål, 1775) caught in Salamina, 7 October 2019.

Both species are reported for the first time in the Mediterranean and are considered to be aquarium releases based on the following facts (Froese & Pauly, 2019): (a) both species are aquarium trade species; (b) *C. faber* was spotted very far away from its natural distribution (Western Atlantic: Massachusetts, USA to Rio Grande do Sul, Brazil); and (c) *A. gahhm* is endemic to its native distribution (endemic to the Red Sea and the Gulf of Aden) and this record is too far from the Suez canal to be considered as introduced through corridors.

5. SLOVENIA

5.1 The alien nudibranch *Thecacera pennigera* in Slovenia

Ana FORTIČ and Lovrenc LIPEJ

Thecacera pennigera (Montagu, 1813) is a nudibranch with a worldwide distribution, being recorded from both sides of the Atlantic Ocean, in the Indian Ocean and in Korea, Japan, Australia, and New Zealand (see Doneddu & Trainito, 2015). Records of this species from the Mediterranean Sea were recently reviewed by Doneddu & Trainito (2015), who only confirmed its occurrence from Israel (Barchana, 2008) and Italy (Tiralongo & Baldacconi in Kapiris *et al*., 2014; Doneddu & Trainito, 2015). Moreover, the species was absent from the Adriatic Sea until recently (Zenetos *et al*., 2016). Since 2017, its presence was noticed in Montenegro (Petović & Lipej in Gerovasileou *et al*., 2017). Subsequently, while studying the benthic communities of Slovenia, two specimens were found on 9 January 2020 together with their egg masses at Izola Marina (45.53433° N, 13.64993° E), feeding on the bryozoan *Crisularia plumosa* (Pallas, 1766) (family Bugulidae) on the surface of a plastic cylindrical mesh placed at 2 m depth (Fig. 14). The specimens were easily determined thanks to the characteristic colour pattern of irregularly scattered yellow, orange and black dots on a white translucent background, with black spots smaller than orange ones.

There are no certainties about a possible way of arrival of *T. pennigera* in Slovenia and generally in the Adriatic Sea. However, its recent spread may be easily assisted by shipping. This seems to be confirmed based on localities in which records were held in the Mediterranean, namely marinas, ports and lagoons, considered as hot spots for alien species introductions.

Fig. 14: (a) A specimen of *Thecacera pennigera* from Izola Marina (Slovenia); (b) its egg mass; (c) the bryozoan *Crisularia plumosa*, on which the two specimens were feeding.

6. ITALY

6.1 First record of a hybrid striped bass (*Morone saxatilis* × *Morone chrysops*) in the Mediterranean Sea

Joachim LANGENECK and Claudio LARDICCI

The hybrid striped bass is a commercially reared hybrid between two American Moronidae, namely the euryhaline species *Morone saxatilis* (Walbaum, 1792) and the brackish water species with high tolerance to freshwater *Morone chrysops* (Rafinesque, 1820). Artificial hybrids between these two species have been produced for aquaculture purposes since the 1960s (Hodson, 1989), and they are nowadays commercially reared in several countries, including Italy (Skorić *et al.*, 2013). Moreover, the Hybrid striped bass has also become popular as a gamefish in recreational fishing ponds (Fortini, 2016).

Fig. 15: Hybrid striped seabass (*Morone saxatilis* x *Morone chrysops*) caught by gillnets off Gombo shore, northern Tyrrhenian Sea.

The possible impact of the Hybrid striped bass on natural assemblages has been debated. On one hand, the observed low fertility of artificial ones, suggests that hybrids are unlikely to establish natural populations (Hodson, 1989). On the other hand, the species has been sporadically reported from European open waters (Skorić *et al.*, 2013), and reproduction of hybrids in the wild has been recorded from inland waters in Turkey (Kizak & Güner, 2014). Although Fortini (2016) refers to anecdotic observations of the Hybrid striped bass in Italian open waters, to our knowledge there is no published record, and this species is currently considered not established.

On 30 December 2019, a single individuals of hybrid striped bass (Fig. 15) was caught using a gillnet at a depth of approximately 1 m in the northern Tyrrhenian Sea, off Gombo shore (43.7269° N, 10.2734° E). The specimen was an adult female, with well developed, mature ovaries, measuring approximately 50 cm TL for a total weight of approximately 2700 g; it was alive and in apparent good condition when it was caught. Although the specimen was not preserved, morphological features agreed with those of the hybrid *Morone saxatilis* × *Morone chrysops*. In particular, the body pattern, showing broken, well defined longitudinal stripes, is typical of the hybrid, and allows to distinguish it from both *M. saxatilis* (with well defined, entire longitudinal stripes in the adults) and *M.*

chrysops (with thin, scarcely defined longitudinal stripes in the adult) (Hodson, 1989).

Although the Hybrid striped bass is typically reared in freshwater and brackish environments, usually thriving in waters with 0 to 25 ppt, it is known to be able to survive also in full seawater (Hodson, 1989), as confirmed by the present record. Considering its relatively large size, this individual likely comes from a recreational fishing pond; recent flooding events (the last one on the 23 December 2019) might have caused the escape of a certain number of gamefish to the Arno River, that flows into the sea few kilometres south of the Gombo shore. The number of Hybrid striped bass individuals currently occurring in the Arno River is however unknown, and the good conditions of the fish suggests that this species may locally use short stretches of sea as corridors to move from one freshwater or brackish environment to the other. Despite the presence of strict biosecurity rules and protocols in the European Union, aquaculture still remains a possible source of bioinvasions, and several commercially reared species represent large predators, with a potential strong impact on native assemblages (Langeneck *et al.*, 2017). Although the likelihood of establishment in the wild has been traditionally considered low for the Hybrid striped bass (Hodson, 1989), recent data suggest that this possibility is not so remote, especially in the case of multiple introductions (Skorić *et al.*, 2013; Kizak & Güner, 2014). The tolerance of this species for brackish and even marine environments supports the need to monitor further records and its possible spreading.

6.2 First record of *Carassius auratus* Linnaeus, 1758 from the Salento peninsula (Apulia Region, Italy)

Francesco ZANGARO and Maurizio PINNA

The goldfish, *Carassius auratus* Linnaeus, 1758, is a small to moderately-sized fish native to East Asia (Huckstorf & Freyhof, 2013) belonging to the Cyprinidae family. It may grow up to 41 cm in length, 2 kg in weight and live for 30 years in captivity (FishBase, 2004). The species populates coastal lagoons and ditches with cold, slow-flowing water with aquatic vegetation (FishBase, 2004). It is able to withstand prolonged exposure to salinities above 15 PSU (FishBase, 2004) and can tolerate low levels of dissolved oxygen (McDowall, 2000). The body shows a large head and eyes with a small mouth and a forked tail. Scales are large and the single dorsal fin has 3-4 stout spines at the leading edge. Colour ranges from olive-bronze to deep golden along dorsal surface, fading to silvery-white along the belly (McDowall, 2000). Many different varieties of goldfish have been produced through selective breeding for a wide variety of colours and fin shapes. These fish usually revert to olive-bronze wild colouration and normal fin shapes if released from captivity (McDowall, 2000).

It was domesticated in China more than 1,000 years ago, introduced to Japan in the 16th century and from Japan, imported to European countries as follow: Portugal 1611, England 1691 and France 1755. From then it was introduced throughout Europe and most of the world (McDowall, 2000).

Goldfish have been introduced worldwide due to their popularity as pond and aquarium fish. Releases, both intentional and unintentional, have meant that this species has formed wild populations in many new locations. Concerns have been raised about the impacts that goldfish have on the aquatic community, including increasing turbidity, predation upon native fish, and facilitating algal blooms (Huckstorf & Freyhof, 2013).

Here we highlight that several specimens of *C. auratus* were observed for the first time along the Ionian Sea during the last week of November 2019. Consequently to the last great wave of bad weather that hit the Salento Penisula and in particular the Ionian coast, thousands of *C. auratus* specimens have been found poured in the countryside from the Ugento Basins system (39.854439° N, 18.170494° E) in the Ugento littoral Regional Natural Park after the overflows due to the sirocco storm and intense rains that allowed us to look at the specimens and take pictures. The presence of living specimens has been

Fig. 16: Picture showing living specimens in Ugento Basins (left) and a dead specimen found on the ground after the sirocco storm (right).

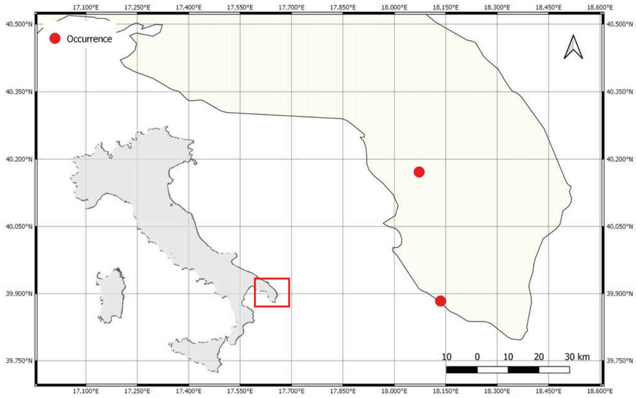

Fig. 17: Map showing the two sites.

recorded afterwards (Fig. 16).

Moreover, a mass mortality event that occurred during the first days of January 2020 has shown the presence of thousands of *C. auratus* specimens also in Canale Asso (40.160859° N, 18.105897° E) between the municipalities of Nardò and Copertino (LE).

Considering the large number of specimens observed, we can confirm the presence of well-established populations of *C. auratus* in the two areas. These records confirm, for the first time, the presence of the NIS *C. auratus* in the southern Apulian region and along the Ionian coast of Italy.

Through the open-source software QGIS, we were able to draw a map of the Salento Peninsula showing the two study areas with relative coordinates (Fig. 17).

7. LIBYA

7.1 First record of *Parupeneus forsskali* (Fourmanoir & Guézé, 1976) and *Acanthurus monroviae* Steindachner, 1876 in Libyan waters

Jamila RIZGALLA and Sara. A. A. AL-MABRUK

The commercially important Red Sea goatfish *Parupeneus forsskali* (Fourmanoir & Guézé, 1976) is a tropical fish endemic to the Red Sea and Gulf of Aden and is readily identified by the black spot present on the upper side of the caudal peduncle and the black stripe, extending from the tip of its snout, through the eye, along the lateral line, ending under the rear of the second dorsal fin (Randall, 2004). It has, from its first recording in Turkey (Çinar *et al.*, 2006), successfully invaded wide parts of the eastern Mediterranean Sea, becoming one of the most common invasive species along the Levantine coast (Ergüden *et al.*, 2018).

The African surgeonfish *Acanthurus monroviae* Steindachner, 1876, a tropical eastern Atlantic Ocean, is found along the African coast from Morocco to Angola, Sao Tomè, Cape Verde and the Canary archipelagos. Its range expanded to include the southwestern Atlantic Ocean, the southwestern Portuguese waters (Horta e Costa & Gonçalves, 2013), and the Mediterranean Sea (Ben Souissi *et al.*, 2011).

Fig. 18: A: *Parupeneus forsskali* caught from Al-Tamimi area (East of Libya) and B: *Acanthurus monroviae* cought from Al-Khums area (West of Libya).

On 5 December 2018, one specimen of *P. forsskali* measuring ~20 cm total length (TL) was captured in Al-Tamimi, an area of mixed sandy and rocky substrate (east of Libya), with a trammel net at 17 m depth (32.376472° N, 23.175250° E; Fig.18A). On 6 June 2019, one specimen of *A. monroviae* measuring ~30 cm TL was captured in Al-Khums in an area of mixed sandy and rocky substrate (west of Libya) by spearfishing at 10 m depth (32.652861° N, 14.275333° E; Fig. 18B). Both fishermen sent pictures to the second author.

The geographical locations of both recordings of *P. forsskali* in the east and *A. monroviae* in the west of Libya might suggest natural dispersal from nearby established populations, especially with the above mentioned widespread occurrence of *P. forsskali* and the presence of *A. monroviae* in neighboring Tunisia (Ben Souissi *et al.*, 2011) as possible sources. Increase in sea water temperatures due to climate change might have also facilitated the invasive process (Ben Rais Lasram *et al.*, 2008). Future field surveys are required to assess their invasive status in Libyan waters.

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