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New Mediterranean Marine biodiversity records (June 2013)

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Abstract

This paper concerns records of species that have extended their distribution in the Mediterranean Sea. The finding of the rare brackish angiosperm *Althenia filiformis* in the island of Cyprus is interesting since its insertion in the Red Data Book of the Flora of Cyprus is suggested. The following species enriched the flora or fauna lists of the relevant countries: the red alga *Sebdenia dichotoma* (Greece), the hydrachnid mite *Pontarachna adriatica* (Slovenia), and the thalassinid *Gebiacantha talismani* (Turkey). Several alien species were recorded in new Mediterranean localities. The record of the burrowing goby *Trypauchen vagina* in the North Levantine Sea (Turkish coast), suggests the start of spreading of this Lessepsian immigrant in the Mediterranean Sea. The findings of the following species indicate the extension of their occurrence in the Mediterranean Sea: the foraminifer *Amphistegina lobifera* (island of Zakynthos, Greece), the medusa *Cassiopea andromeda* (Syria), the copepod *Centropages furcatus* (Aegean Sea), the decapod shrimp *Melicertus hathor* (island of Kastellorizo, Greece), the crab *Menoethius monoceros* (Gulf of Tunis), the barnacles *Balanus trigonus, Megabalanus tintinnabulum*, *Megabalanus coccopoma* and the bivalves *Chama asperella*, *Cucurbitula cymbium* (Saronikos Gulf, Greece).

Introduction

As part of its policy, Mediterranean Marine Science publishes a collective article, twice a year, with new records of marine species in the Mediterranean Sea and/or information on the spatial distribution of already known species of particular interest. The contributors are co-authors in this collective article, their names appearing in alphabetical order. Reports of plant and animal species are presented in each section according to the order of submission. The contributing authors are cited at the beginning of each record.

1. Plants

1.1. A rare euryhaline macrophyte *Althenia filiformis* Petit in Cyprus

By I. Tziortzis, K. Kadis and E. Papastergiadou

The rare brackish angiosperm *Althenia filiformis* Petit (Zannichelliaceae) is reported for the first time from the island of Cyprus (Fig. 1). The genus *Althenia* is generally found in typical brackish-water close to the sea and continental saline and even fresh waters (Cook *et al*., 1974; Den Hartog, 1981). Although *A. filiformis* has a wide

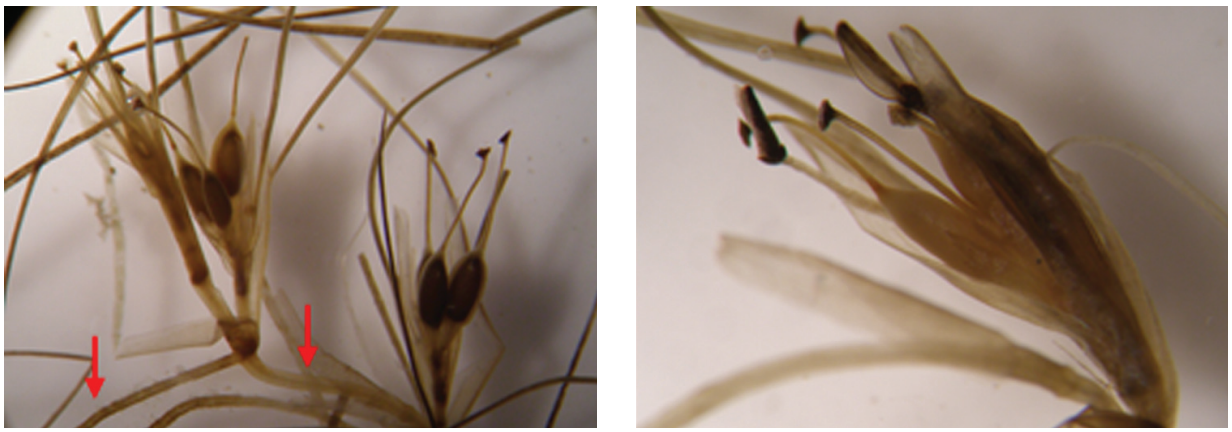

Fig. 1: *Althenia filiformis* Petit individuals showing: a. the 'runner-like' axes (arrows) and mature female flowers, b. detailed shoot with male flowers consisting of one sessile anther and female consisting of three oni-ovulate carpels, each with a style, bearing a characteristic peltate stigma.

distribution, from the Mediterranean coastal lagoons of Spain, France and Italy (Onis, 1964; Talavera *et al.,*1984; Jeanmonod, 2000), Greece (Koumpli-Sovantzi, 1995) Turkey (Den Hartog, 1975), but also Russia (Tsvelev, 1975; Klinkova & Shantser, 1992), South Africa and Iran (Dandy, 1971), the complete distribution of the species in still unknown. There is only scarce information about *A. filiformis* and very little has been published about this species. According to Cook & Guo (1990), this is due to several reasons: the small hair-like leaves and the greenish-brown colour that simulates the substrate in which the species grows, often makes it invisible from the banks. Also, the frequently mobile and rather sticky and stinking substrate makes direct observations in the field rather difficult. Finally, *Althenia* is somewhat sporadic in occurrence and does not always appear at the same locality each year. Its sporadic occurrence and the scarce recordings of this species has led to its classification as threatened in the Balearic islands (Fraga*,* 2009), Çurkuva Deltas in Turkey (Çakan *et al.,* 2005), and it is also included in the National Red List of Italy (Zeno, 2009).

A. filiformis was found in the most important natural coastal wetlands of the Larnaca salt lakes complex and Akrotiri, on the southern coasts of Cyprus. The Larnaca complex is included in the NATURA 2000 network and both wetlands have been designated as RAMSAR sites. The species was recorded during monthly sampling surveys in 2007 and 2008, in these warm shallow salt lakes, characterized by seasonal availability of water and high salinity (Tziortzis, 2008). *Althenia* was recorded in several locations, and in relatively high abundances in both study areas. In the Larnaca salt lakes complex, the species was recorded in all lakes (Orphani, Soros, Spyros), except for the main lake (Alyki) in which extreme salinity values were recorded. It was found forming extensive patches in shallow waters up to 40 cm in depth, but was mostly recorded at depths of less than 20 cm, with salinity values ranging from 19 to 56‰. In the Akrotiri wetland, *Althenia* was found in three locations (Alyki, the lakes close to Ladies mile beach, Phasouri), in depths of up to 50 cm, but mostly in less than 15 cm deep waters with a salinity ranging between 22 and 47‰.

The plants have scale bearing runners that grow horizontally. However, these shoots are not rhizomes such as those commonly found in perennial species. *Althenia* seems to be a monoecious, annual species, with male and female flowers developing within a sheathing leaf base that holds them together on foliaceous shoots (Fig. 1).

Althenia filiformis, in Cyprus was associated with the angiosperm *Ruppia maritima* L. and occasionally with the charophyte *Lamprothamnium papulosum* J. Groves, but the latter was recorded only in areas of the Akrotiri wetland with generally lower salinity values. In areas with extreme salinity values, *A. filiformis* was found only in monospecific beds. The limited depth that the species has adapted to, can be attributed to its ecophysiological characteristics. According to Cook & Guo (1990), *A. filiformis* cannot utilize bicarbonates and depends on CO_2 as a carbon source. Thus, it is necessary for the plants to grow close to the water surface in order to absorb CO_2 from the atmosphere. It mostly occupies alkaline water bodies exposed to wind and waves, conditions that are met in these coastal wetlands of Cyprus, where the slightest wave action exposes the plant parts to the atmosphere.

In spite of its wide distribution, *A. filiformis* is an apparent rarity and in danger of extinction because it's preferred habitats appear to be favoured by localities used for refuse dumping (Den Hartog, 1981; Cook & Guo, 1990). As a colonizer of saline shallow waters that dry up in the summer, *A. filiformis* is threatened by pressures directly acting on its habitats, which alter their natural characteristics. As in many other Mediterranean wetlands, *A. filiformis* faces severe threats such us human alteration, habitat fragmentation, pollution, etc. that could lead to its extinction from the island. Therefore, conservation management measures are required urgently. In Cyprus, in particular, in view of the competing demand for water use, coastal areas are in the focus of various human ac-

tivities and illegal trespassing in these wetlands is common practice. Due to severe risk of habitat alteration and disturbance, we consider this rare species as endangered for the flora of Cyprus and suggest its insertion in the Red Data Book of the Flora of Cyprus.

1.2. First report of the red alga *Sebdenia dichotoma* (Rhodophyta, Sebdeniaceae) in Greece

By K. Tsiamis, M. Salomidi, V. Gerakaris and Y. Issaris

The red alga *Sebdenia dichotoma* Berthold is reported for the first time from Greece. Specimens were collected at a depth of 25 m in July 2012 from the Korinthiakos Gulf (Gulf of Corinth), in Livadostra bay (38° 11.962' N, 23° 7.439' E), by means of SCUBA diving.

Thalli were erect, up to 7 cm in height, reddish, cartilaginous, smooth, rising from a basal disc; fronds slightly compressed, to 5 mm wide, dichotomously branched in one plane, tapering towards the apex to 1 mm in diameter; in cross section, medulla lax, composed of a network of both stellate cells, 35-40 µm in diameter with 3-5 extensions, and long rhizoidal cells, up to 160x12 µm; subcortical cells rectangular to rounded, 40-60 µm in diameter, decreasing in size towards the cortex; in surface view, pigmented cortical cells ovoid, 3-6 µm in diameter; gland cells absent; tetrasporangia scattered in the cortex, cruciately divided, to 30 µm in diameter. Only a few individuals were found, scattered on hard substrata (Fig. 2) and associated with large stands of *Osmundaria volubilis* (Linnaeus) Norris.

First described from Italy (Berthold, 1884), it has also been reported from the Western (Coppejans, 1979) and the Eastern Mediterranean Sea (Taskin *et al.,* 2008), the Iberian Atlantic coast (Berecibar *et al.,* 2009), and the Canary Islands (Gil-Rodríguez *et al.,* 2003).

Fig. 2: *Sebdenia dichotoma* in the field (photo by M. Salomidi).

2. Animals

2.1 Range expansion of the burrowing goby *Trypauchen vagina* (Bloch and Schneider, 1801) to the Mediterranean Sea

By D.Yaglioglu, D. Ayas, D. Erguden and C. Turan

The burrowing goby *Trypauchen vagina* (Bloch and Schneider, 1801) has a widespread distribution throughout the Indo-Pacific, South Africa coast, and New Caledonia (Salameh *et al*., 2010). It inhabits estuarine and coastal waters and it occurs in silty or muddy areas, at a depth of 20-90 m (Murdy, 2006). *T. vagina* was recorded for the first time in the Mediterranean Sea along the Israeli coast, north of Tel Aviv, in December 2009 and it was considered as a Lessepsian immigrant (Salameh *et al*., 2010). The next record of the species in the Mediterranean Sea was reported in October 2010 from Iskenderun Bay (Akamca *et al.,* 2011).

One *T. vagina* specimen was collected by a commercial trawler on 28 October 2012 on the Anamur coast-Mersin Bay, Turkey (35°53′28″N, 33°09′19″E) at a depth of 25-30 m. The specimen (Fig. 3) was deposited in the fish collection of Duzce University, Faculty of Art

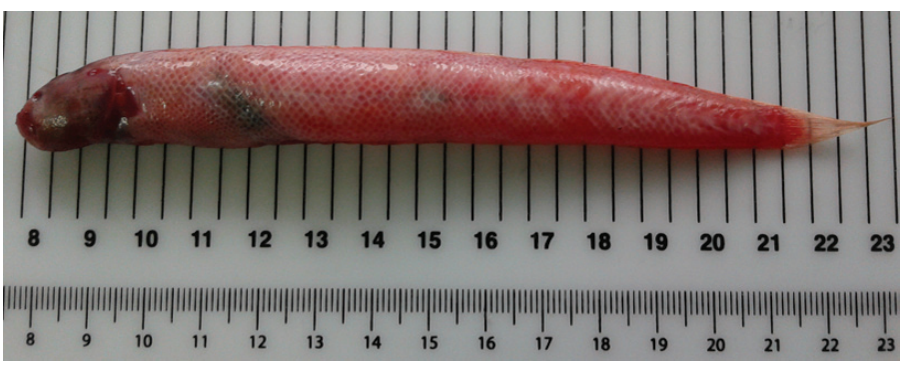

Fig. 3: *Trypauchen vagina* caught in North-eastern Mediterranean Sea, Turkey.

and Science, department of biology (catalogue number: DUFC/2012-001). The morphometric characteristics and the colour patterns of the specimen are in agreement with the description of *T. vagina* by Randall (1995) and Murdy (2006) as well as by Salameh *et al*. (2010) and Akamca *et al.* (2011).

The finding of *T. vagina* in Mersin Bay suggests that the population is expanding westward in the Mediterranean Sea. It would be interesting to investigate the feeding habits of *T. Vagina* in its new environment and its interactions with other native and alien fish species.

2.2 *Gebiacantha talismani* (Bouvier, 1915) (Decapoda, Upogebiidae) in Turkish waters

By M. Sezgin, A. S. Ateş and T. Katağan

Available information on the thalassinid crustacean fauna of the Turkish Seas is relatively restricted compared to other parts of the Mediterranean. Nevertheless, Ateş *et al.* (2010), compiling the updated list on Turkish decapod crustaceans, have added five thalassinid species. In June 2012, two individuals of *Gebiacantha talismani* (Bouvier, 1915) were collected during a grab (0.1 m^2) survey cruise along the Turkish Mediterranean coast, the Akkuyu coast of Mersin specifically (36° 11'45" N and 33° 53' 29" E). A Van Veen grab was used at depth of 78 m on a mud bed covered with mollusc shell remains. The specimens were photographed (Fig. 4) and deposited in the invertebrate collections of the Hydrobiology Department, Faculty of Fisheries, Sinop University with catalogue code: SNU-FF/CRS/2012-01. Ngoc-Ho (2003) reported that this thalassinid species was found on the soft-bottoms (muddy sand) with shells at depths between 20 and 150 m. Likewise, another specimen was found on a bottom with shell remains at a depth of 155 m in southern Spain (García Raso, 1996). According to Ngoc-Ho (2003), the general distribution of the species is along the Central Mediterranean (Malta), Eastern Mediterranean (Lybia and Greece) and northwest coast of Africa, from Morocco to Congo. This is the first record of the genus *Gebiacantha* from Turkey and, based on this reference, the number of thalassinids in the Turkish seas has increased to six.

2.3. First record of the alien decapod shrimp *Melicertus hathor* (Decapoda, Penaeidae) in Greek waters

By K. Kapiris and K. Dogrammatzi

The second dominant group among alien species in the Mediterranean is crustaceans (159 species) and among them decapods is the prevalent group (Zenetos *et al*., 2012). The Aegean Sea hosts 27 alien decapod (9 Dendrobranchiata, 1 Caridea, 17 Brachyura) crustaceans (21 Indo-Pacific, 6 Atlantic species) (Kapiris *et al*., 2012). The invasive shrimp *Melicertus hathor* (Burkenroad, 1959) lives in shallow marine and estuarine waters (to a depth of up to 40 meters), on sandy-mud bottoms (Dore & Frimodt, 1987). *M. hathor* differs from all other Mediterranean penaeids in that the anterior process of the thelycum bears two long tapering "horns".

The studied Indo-pacific decapod is established in the Levantine Sea (Yumurtalik Bight) (Çinar *et al*., 2011) and has also been reported in other western Turkish areas, such as Antalya (Gokoglu and Kaya, 2006) and Gökova Bay (Yokes *et al*., 2007), close to Kastellorizo island. The present invasive species has expanded, as expected, to Greek territory. This study is the first record for *M. hathor* from Greek territory.

Three individuals (two males and one female) were caught on a 10-20 cm deep sandy bottom, using a brail

Fig. 5: Three individuals of *Melicertus hathor* caught in the Kastellorizo Island area.

Fig. 4: General view of *Gebiacantha talismani*, found in Akkuyu, Mersin (photo by M. Sezgin).

net, in the Agios Savvas area (36º 08'06'' N and 29º 35'38'' E, Kastellorizo island, Aegean Sea) in August 2012. The specimens were transferred to the Institute of Marine Biological Resources and Inland Waters of the Hellenic Centre for Marine Research; they were identified, measured by electronic calliper and photographed (Fig. 5). The carapace length (CL) of males was 29.04 and 26.79 mm, while that of the female was 29.11 mm. The total lengths (TL) were 98.27-103.83 and 111.45 mm, respectively. The total weight (W) of males was 9.94-11.47 gr and that of the female was 15.94 gr. The above measurements were similar to those of the specimen found in Gökova Bay (Yokes *et al*., 2007) or smaller than those found in Antalya (Gokoglu and Kaya, 2006).

2.4 First record of an alien jellyfish *Cassiopea andromeda* (Forsskål, 1775) from the Mediterranean Coast of Lattakia (Syria)

By H. Durgham

Cassiopea andromeda (Forsskål, 1775) is a venomous scyphomedousa, whose native range includes the Red Sea and the Indo-Pacific Ocean (Mariottini and Pane, 2010). The first record of *C. andromeda* in the Mediterranean was obtained from Cyprus (Maas, 1903). Since then, *C. andromeda* has been well established in the Levantine and Aegean Seas (Schäffer, 1955; Goy *et al*., 1988; Çevik *et al*., 2006; Zenetos *et al*. 2011; Nicolaidou *et al*. 2012) but was hitherto unknown from the Syrian coastal waters.

Two young *C. andromeda* specimens (Fig. 6), 5 cm in diameter, were caught in the coastal waters of Lattakia, about 6 km north of Lattakia port (35°33'48.91'' N, 35°43'2.30'' E), on 16 November 2012. The temperature and salinity at the sampling time were 21°C and 39 ‰, respectively. The two specimens were collected at depths of 0.5 and 3 m, they were photographed, fixed in 4 % formaldehyde, and stored at the zooplankton laboratory of the High Institute of Marine Research, Tishreen University (Syria).

2.5. *Amphistegina lobifera* in Zakynthos island, Ionian Sea

By M. Triantaphyllou and M. Dimiza

Amphistegina lobifera Larsen is a tropical Indo-Pacific endosymbiont calcifying benthic foraminiferal species. Nowadays, it is the most successful foraminifer invader in the coastal ecosystems of the eastern Mediterranean, owing to the ongoing warming trend (e.g., Triantaphyllou *et al*., 2009; Koukousioura *et al*., 2010; Langer *et al*., 2012). Because of its obligate algal symbiosis, its relatively long (one-year) life span (Triantaphyllou *et al*., 2012) and requirement for clear, nutrient-poor waters, it has been proposed as a non-indigenous but sensitive indicator of water quality in the eastern Mediterranean (FORAM-index; Koukousioura *et al*., 2011).

Amphistegina lobifera (Fig. 7) was collected from northern Alykanas bay (37.53 N, 20.45 E, NE Zakynthos island, Ionian Sea) on July 2012. It was found in algal material collected at a water depth of less than 0.5 m. During the study period, mean monthly sea surface temperature and salinity reached 24.1ºC and 38.56 ‰ respectively. The species dominated the algal foraminiferal popula-

Fig. 7: *Amphistegina lobifera* from Zakynthos.

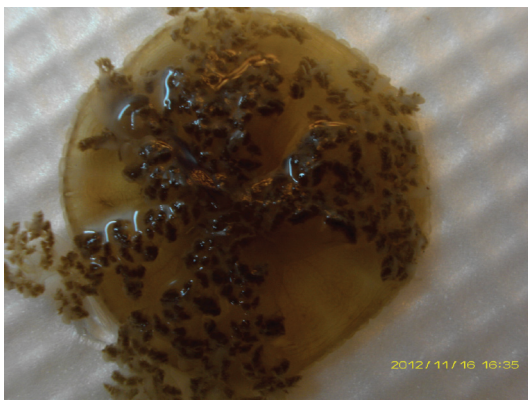

Fig. 6: *Cassiopea andromeda* collected near Lattakia Port, Syria (photo by H. Durgham).

tions with a relative abundance of up to 75%. Living *A. lobifera* specimens ranged in diameter between 0.3 and 1.6 mm. The high proportions (exceeding 87%) of juvenile and intermediate-sized tests (<0.1 mm) indicate that asexual reproduction takes place during this period, following the life-cycle pattern described for the Aegean Sea (Triantaphyllou *et al*., 2012).

Amphistegina has already been mentioned from the Ionian Sea (Corfu Island; Langer *et al*., 2012), whereas it is recorded for the first time from the island of Zakynthos. Apparently, the observed high relative abundances are the result of very successful inhabitation of this species, implying significant impact on the structure and composition of local benthic foraminiferal communities and important contribution to carbonate sand-size sediments.

2.6. Report of *Pontarachna adriatica* Morselli, 1980 (Acari, Hydrachnidia), from Piran Bay (Slovenia), found in a fish gut

By V. Pešić, M. Grego and T. Chatterjee

The single specimen of *Pontarachna adriatica* Morselli, 1980, was collected during gut content analysis of the Golden grey mullet (*Lisa aurata* (Risso, 1810)) collected in Piran Bay (45.48906 N, 13.57947 E) at the depth of 12 m. This species was described by Morselli (1980) from the northern Adriatic brackish waters (Italy) and later on reported from the Turkish Black Sea coast (Sinop Bay) by Pešić *et al*. (2013).

The water mite family Pontarachnidae Koenike, 1910, the only family of the Hydrachnidia occurring in the marine environment, represents a diverse and widespread, but still neglected group of marine meiofauna (Pešić *et al*., 2012). Most species are characterised by bright orange or red colouration. Pontarachnid mites tend to be distasteful to fish (Kerfoot, 1982). However, some studies have shown that pontarachnid mites occasionally occur in the gill filaments or in the gut of marine fishes. *Pontarachna episce* Smit, 2008, was collected from a gill filament of the Shi Drut or Bearded Umbrine (*Umbrina cirrosa*), collected in the Mediterranean Sea near Turkey (Smit, 2008). Liu *et al.* (2008) studied the feeding habits of *Austrolethops wardi*, a gobiid fish inhabiting burrows of the thalassinidean shrimp *Neaxius acanthus* in the seagrass beds of Barrang Lompo and Bone Batang Island, Spermonde Archipelago (Indonesia), and reported that pontarachnid mites represent 2% of all the ingested animal food of this fish. It is worth noting that freshwater mites (Hydrachnidia) also occur sporadically in the gut of fishes. However, in some cases, hydrachnid mites were found in large numbers in the gut of freshwater fishes: In Lake Prosunduy, Russia, water mites attained a maximum of 384 individuals in one specimen of *Coregonus peled* (data taken from Sokolow, 1940). In general, a higher percent of freshwater mites in the ingested animal food of fishes was found in water bodies (lakes and streams) with generally oligotrophic conditions restricted either to higher elevations in mountains and arctic and boreal areas (Sokolow, 1940).

The specimen collected from Piran Bay (Fig. 8) is in good agreement with the original description (Morselli, 1980). In addition, we provide some measurements of the specimen from Piran Bay, which represent the first record of this species found in a gut of a fish from Slovenia.

Fig. 8: *Pontarachna adriatica* female from Piran Bay (photo by M. Rihter).

Female: Idiosoma length/width 320/300 µm; genital field 60 µm long; postgenital sclerite bowed, 40 µm in length; palp: total length 208 µm; dorsal length (in µm) of palpal segments (P-1-5): P-1, 24; P-2, 48; P-3, 48; P-4, 68; P-5, 20; gnathosoma 94 µm long; dorsal length (in µm) of I-leg (segments 2-6): 36, 48, 45, 62, 82.

2.7 First occurrence of *Menoethius monoceros* Latreille, 1825 in the Gulf of Tunis (Northern Tunisia)

By J. Ben Souissi, J. Zaouali, M. Rifi and C. d'Udekem d'Acoz

M. monoceros is a widely distributed Indo-Pacific shallow-water species occurring from the Red Sea to Hawaii and from Japan to South Africa (Dai and Yang, 1991). In the Red Sea, the species has been recorded in several localities: the Gulf of Aqaba, Sinai Peninsula, the Gulf of Suez, and Dahlak Archipelago (Griffin and Tranter, 1974). So far, it has been recorded only once in the Mediterranean Basin: a specimen found in 1978 in the cloaca or a sea cucumber collected off Sparviero Island in the Tyrrhenian Sea (Falciai, 2002). It is usually recorded from lower shore to 33 m, between algae, on

gravel, on oyster beds, on coral reefs, etc. (Griffin and Tranter, 1986) and sometimes found in the cloaca of holothurians (Falciai, 2002).

During a field survey in Northern Tunisia, near the small fishing port of Sidi Daoud (37°02'40 61»N - 10°54'25.50»E), 0.1 m depth, on rocks, in February 16, 2011, a single male specimen was collected (Fig. 9, coll. Mme Jamila Ben Souissi, Royal Belgian Institute of Natural Sciences). The long entire rostrum of this short-legged spider crab is unique for Mediterranean majoideans. However, it must be pointed out that this species is very variable under various names (Griffin and Tranter, 1986).

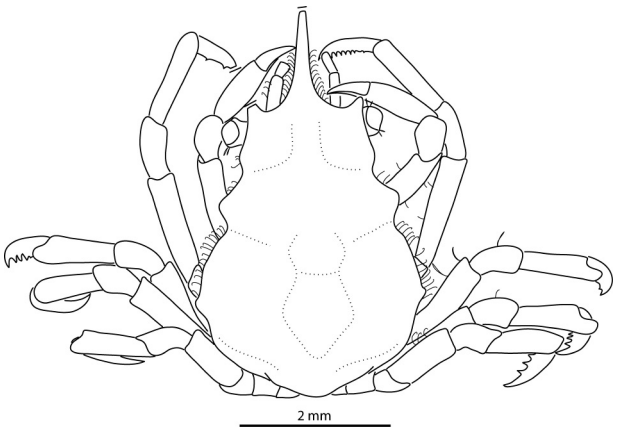

Fig. 9: *Menoethius monoceros* (Latreille, 1825), male, northern Tunisia, rocky shore near Sidi Daud (drawing by C. d'Udekem d'Acoz).

The occurrence of *M. monoceros* in the Gulf of Tunis was unexpected. So far, it has been recorded only once in the Mediterranean Basin: a specimen found in 1978 in the cloaca of a sea cucumber collected off Sparviero Island in the Tyrrhenian Sea (Falciai, 2002). This finding could be the outcome of accidental maritime transport, the species being considered as easily transportable in this way (Yeo *et al.,* 2011). Since this date, the species has not been recorded in the Mediterranean. Its recent occurrence in Tunisian coastal waters is probably due to maritime transport via ship hulls or ballast waters. However, this crab could also have crossed the Red Sea via the Suez Canal as did many other so-called Lessepsian species. The lack of records between the Red Sea and Tunisia does not support the hypothesis. Nevertheless, despite the regular monitoring of maritime fauna in Turkey and Israel, the lack of exploration along the southern coast of the Levant Basin could explain the significant number of undetected Lessepsian species. Since only one specimen of *M. monoceros* has been found in northern Tunisia, it cannot be ascertained whether populations have established there.

The presence in Northern Tunisia of the Indo-Pacific tropical and subtropical majoid *Menaethius monoceros* confirms the high capacity of its dispersal, as already suggested by Yeo *et al.* (2011). This occurrence in Northern Tunisia is probably the result of environmental modifications such us climate change and anthropogenic pressure, strong enough to allow such bioinvasion. This record confirms the tendency of numerous non-native species in Tunisian waters to expand, materialized by the flux of the Lessepsian crab *Eucrate crenata* from the Gulf of Gabes to the Gulf of Tunis (Ben Souissi *et al.,* 2003).

2.8 Notes on some alien species colonizing artificial substrata in Saronikos Gulf

By L. Polychronidis, S. Katsanevakis, Y. Issaris, F. Kerkhof and A. Zenetos

The Saronikos Gulf, which hosts one of the busiest ports in Europe, is known as a hot spot area for introduced biota in Greece (Zenetos *et al*., 2011). During a rapid assessment survey conducted in September 2010, five alien species were collected. The sampling sites were within the limits of the Naval Base of Salamina and surrounding Hellenic Navy installations, which are restricted areas, and required special access permission. Due to security restrictions, they had never been sampled previously for the presence of marine alien species.

Sampling was conducted by snorkelling at two sites: Site 1 was the Frigate station (part of the Naval port) in Salamina Naval Base (approximately 37º58'7.61″N; 23º32'10.20″E) and Site 2 was the breakwater and surrounding infralittoral zone in the area in front of the Navy Petty Officer's School in Skaramangas (approximately 38º0'3.21″N; 23º35'21.05″E). Samples were collected by chisel scrapping from artificial substrates (concrete breakwaters) and additionally, in the case of site 1, from the keels of three moored vessels (Frigates). Specimens were preserved in alcohol and stored in the laboratory of the Hellenic Centre of Marine Research.

The barnacles *Balanus* (*Perforatus) perforatus* (Bruguière, 1789) and *Balanus trigonus* Darwin, 1854, dominated the species collected (Fig. 10) along with *Mytilus galloprovincialis, Pinctada radiata, Ostrea spp* and *Patella* spp. Three barnacles (*Balanus trigonus, Megabalanus tintinnabulum* and *Megabalanus coccopoma*) (Figure 1) and two bivalves (*Chama asperella* and *Cucurbitula cymbium*), that were previously unreported or poorly reported from the Saronikos Gulf, are of special interest. On the contrary, the pearl oyster *Pinctada radiata* is very abundant in the Saronikos Gulf.

***Balanus trigonus* Darwin, 1854**

Many specimens of *Balanus trigonus* (several with animal) were collected from both sampling sites, either directly attached to the artificial substrata (concrete piers and one frigate hull) or attached to mussel *Mytilus* sp. shells living on the rocky shore or attached to the hull. It has been noted that this species commonly co-oc-

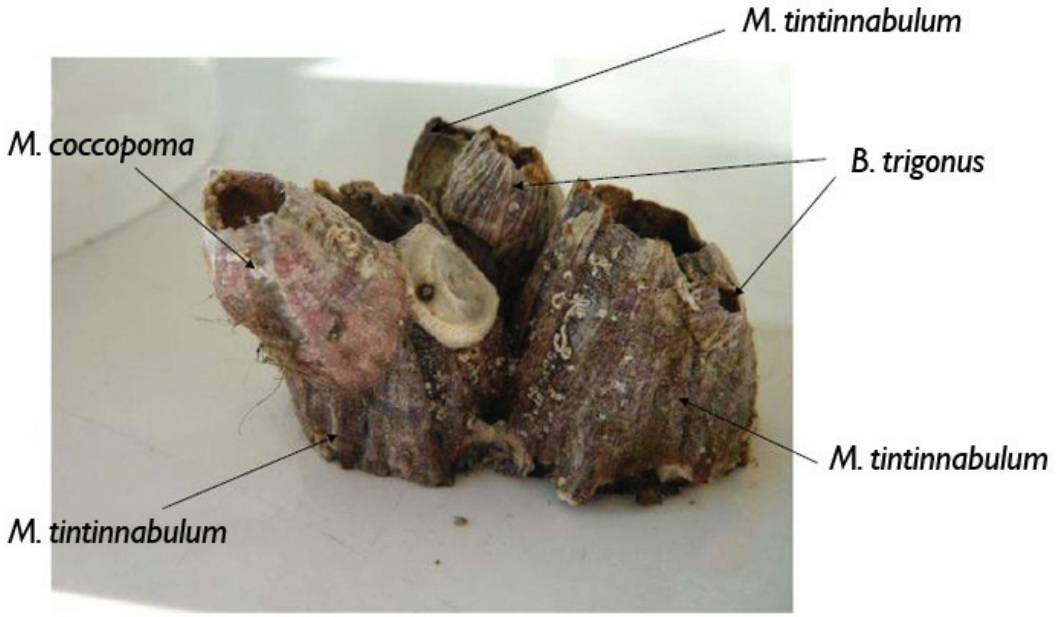

Fig. 10: Barnacles found attached on one of the frigate hulls in Saronikos Gulf (photo by F. Kerckhof, RBINS).

curs with *Megabalanus tintinnabulum* (Kerckhof *et al*., 2010), which was also the case in this study. The species is widely distributed in the North Aegean Sea (Koukouras & Matsa, 1998) including the Gulf of Thessaloniki (Antoniadou *et al*., 2013). This is the first record of this species in the Saronikos Gulf.

***Megabalanus tintinnabulum* (Linnaeus, 1758)**

A number of empty specimens of *Megabalanus tintinnabulum* were collected from sampling site 1, (Site 1: frigate hull and *in situ*, site 2: *in situ*). This cosmopolitan barnacle is a common species in the fouling community of ship hulls and has thus be been frequently transported all over the world. It has been recorded as an introduced species in both the European coast of the Atlantic Ocean (Kerckhof *et al*., 2007) and the Mediterranean Sea although it is not considered as established in the latter. The species has been previously reported from Greek waters; it was found on a ship hull in 1996 (Zenetos *et al*., 2009).

***Megabalanus coccopoma* (Darwin, 1854)**

One empty specimen was present in an aggregation of barnacles scraped from the hull (Fig. 1) of a frigate at Site 1. This species is also a common member of the fouling community of ship hulls (Kerckhof & Cattrijsse, 2001). It has often been confused with *M. tintinnabulum* in the past, although there are clear differences between both species (Kerckhof & Cattrijsse, 2001). This species has as native distribution restricted to the Central American Pacific coast (Henry & McLaughlin, 1986). During the past decades, however, it has been introduced to various regions all over the world including the North Sea, West African waters and Japan (Kerckhof *et al*., 2007; Kerckhof *et al*., 2010), but not in the Mediterranean. This is the first record from Greek waters but also from the Mediterranean, where the species is presumably unreported due to its similarity with *M. tintinnabulum.*

***Chama asperella* Lamarck, 1819**

Chama asperella, misidentified as *Chama aspersa* Reeve, 1846 in the Mediterranean (Appeltans *et al*., 2013), is a very common Indo-Pacific epifaunal bivalve, which was first reported from the outer Saronikos Gulf and Evvoikos Gulf in 2007 (Ovalis & Zenetos, 2007) and later from the Thermaikos Gulf where it had been collected even earlier (2005: Manousis *et al*., 2010). Two living specimens were found among aggregates of oysters and barnacles. The species is now considered to be well established in Greek waters, presumably transported by shipping, but natural expansion of Red Sea populations into the Mediterranean cannot be ruled out.

***Cucurbitula cymbium* (Spengler, 1783)**

Cucurbitula cymbium (ex *Gastrochaena cymbium*) is a tropical Indo-Pacific alien species. It is known from the Saronikos Gulf since 1974 (Tenekides, 1989) and was recently reported from the Thermaikos Gulf (Manousis *et al*., 2010). In our samples, a few living specimens were found boring into oysters attached to concrete piers at Site 2.

The study area is situated in the northernmost part of the Saronikos Gulf, inside the semi-enclosed Elefsis bay, a heavily anthropogenically disturbed area (Galanopoulou *et al*., 2009). Both sampling sites are in very close vicinity to a major shipyard, an oil refinery, and a number of scrap yards. This heavy shipping activity seems to be responsible for the introduction of many species in the Saronikos Gulf. Although apparently not all have been established yet, the repeated introduction of certain species e.g. on ship hulls could eventually lead to their permanent introduction. It is worth mentioning that one of the frigates (site 1) had recently returned from peacekeeping duties as part of a NATO task force

from the Persian Gulf. At present (3/2013), the majority of the approximately 100 marine alien species recorded in the Saronikos Gulf are suspected to have been introduced through shipping (AZ, unpublished). It is known that increasing worldwide ocean traffic enhances both the translocation of biota and the chances of survival and establishment of species in non-native regions (Kerckhof *et al*., 2010). All five species included in this study seem to have been introduced in the area through shipping, which is the most common pathway of introduction of marine alien species in Europe (Katsanevakis *et al*., 2013).

2.9 *Centropages furcatus* (Dana, 1849) in the Aegean Sea

By I. Siokou

The calanoid copepod *Centropages furcatus* is a cosmopolitan epipelagic species inhabiting mainly the equatorial and subtropical zones (Razouls *et al.*, 2005-2012). In the Mediterranean Sea, it was firstly recorded in the waters off Lebanon, considered as a Lessepsian immigrant (Lakkis, 1990), and its presence is most important in the warm period (Lakkis, 1995). In September 1988, one specimen of the species was found in the upper 50 m layer of a station positioned at 36º N and 29º30 E (NW Levantine Sea), (Siokou-Frangou *et al*., 1999). The study of the mesozooplankton composition annual cycle in a coastal area of the Northeast Levantine in 1998 revealed the occurrence of *C. furcatus* throughout the year, with higher abundance values (70 ind m^{-2}) in autumn (Uysal & Shmeleva, 2012). In spring 1998, the species was recorded in the Sea of Marmara (Unal *et al.*, 2000), while its presence in the western Mediterranean requires confirmation (Razouls *et al*., 2005-2012).

Fig. 11: *Centropages furcatus* female collected in the Aegean Sea (photo by C. Frangoulis).

The analysis of a subsample collected at a station positioned at 39º 26 N and 25º 33 E (Northeast Aegean Sea) revealed the presence of a female specimen of *C. furcatus* (Fig. 11), whose diagnostic features are in full agreement with the figures given by Razouls *et al*. (2005-2012). The sample was obtained in January 2011 by vertical towing of a WP-2 net in the 0-50 m layer. During the sampling period, the Levantine Intermediate Water (Temperature: 16.2 º C and Salinity: 38.8) covered the entire water column of the above station (Zervakis, pers. commun.). The occurrence of the species in the Northeast Aegean Sea suggests its spreading by the Levantine Intermediate Water pathway from the NW Levantine Sea through the eastern straits of the Cretan Arc and along the east Aegean Sea.

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