Management of Biological Invasions (2015) Volume 6, Issue 4: 351–366
doi: http://dx.doi.org/10.3391/mbi.2015.6.4.04

Open Access

Research Article

Inventory of alien and cryptogenic species of the Dodecanese (Aegean Sea, Greece): collaboration through COST action training school

Maria Corsini-Foka[1]*, Argyro Zenetos[2], Fabio Crocetta[3], Melih Ertan Çinar[4], Ferah Koçak[5], Daniel Golani[6], Stelios Katsanevakis[7, 8], Konstantinos Tsiamis[9, 7], Elizabeth Cook[10], Carlo Froglia[11], Maria Triandaphyllou[12], Sami Lakkis[13], Gerasimos Kondylatos[14], Elena Tricarico[15], Ante Zuljevic[16], Mariana Almeida[17], Frederico Cardigos[18], Senem Çağlar[19], Furkan Durucan[20], António M.D. Fernandes[21], Jasmine Ferrario[22], Ines Haberle[23], Paraskevi Louizidou[1], Josif Makris[24], Martina Marić[25], Dragoş Micu[26], Carmen Mifsud[27], Chris Nall[28], Eleni Kytinou[29, 9], Dimitris Poursanidis[30], Daniele Spigoli[31], Gianluca Stasolla[32], Sercan Yapici[33] and Helen E. Roy[34]

[1]*Institute of Oceanography, Hydrobiological Station of Rhodes, Hellenic Centre for Marine Research, Cos Street, 85100 Rhodes, Greece;* [2]*Institute of Marine Biological Resources and Inland Waters, Hellenic Centre for Marine Research, 19003 Anavissos, Greece;* [3]*Stazione Zoologica Anton Dohrn, Villa Comunale, I-80121, Napoli, Italy;* [4]*Department of Hydrobiology, Ege University, Faculty of Fisheries, 35100 Bornova, Izmir, Turkey;* [5]*Institute of Marine Sciences and Technology, Dokuz Eylul University, İnciraltı, İzmir, Turkey;* [6]*Department of Ecology, Evolution and Behavior, The Hebrew University of Jerusalem, 91904 Jerusalem, Israel;* [7]*European Commission, Joint Research Centre - Institute for Environment and Sustainability (IES), H.01 Water Resources Unit, Via E. Fermi 2749, 21027 Ispra, Italy;* [8]*Department of Marine Sciences, University of the Aegean, 81100 Mytilene, Greece;* [9]*Institute of Oceanography, Hellenic Centre for Marine Research, Anavissos, 19013 Greece;* [10]*Scottish Marine Institute, Scottish Association for Marine Science, Oban, Argyll, PA37 1QA, United Kingdom;* [11]*Istituto di Scienze Marine, Consiglio Nazionale delle Ricerche, U.O.S. Ancona, Largo Fiera della Pesca, 60125 Ancona, Italy;* [12]*Department of Historical Geology-Paleontology, Faculty of Geology and Geoenvironment, National and Kapodistrian University of Athens, 15784 Greece;* [13]*Faculty of Sciences I, Lebanese University, Hadath, Beirut, Lebanon;* [14]*Hydrobiological Station of Rhodes, Hellenic Centre for Marine Research, Cos Street, 85100 Rhodes, Greece;* [15]*Department of Biology, University of Florence, via Romana 17, 50125 Firenze, Italy;* [16]*Institute of Oceanography and Fisheries, Šetalište I. Meštrovića 63, 21000 Split, Croatia;* [17]*Departamento de Biologia and CESAM, Universidade de Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal;* [18]*Departamento de Oceanografia e Pescas and IMAR, Universidade dos Açores, 9901-862 Horta, Portugal;* [19]*Department of Biology, Faculty of Science, Istanbul University, Vezneciler, 34134 Istanbul, Turkey;* [20]*Department of Fisheries Basic Sciences, University of Suleyman Demirel Isparta, Turkey;* [21]*Marine and Environmental Sciences Centre, Faculty of Sciences, University of Lisbon, Campo Grande, 1749-016 Lisboa, Portugal;* [22]*Department of Earth and Environmental Sciences, University of Pavia, Via S. Epifanio 14, 27100 Pavia, Italy;* [23]*Department of Biology, Faculty of Science, University of Zagreb, Rooseveltov trg 6, 10000 Zagreb, Croatia;* [24]*Pindou 6, 85100, Rhodes, Greece;* [25]*Marine Science and Technology Centre, Klaipeda University, H. Manto 84, LT 92294 Klaipeda, Lithuania;* [26]*National Institute for Marine Research and Development "Grigore Antipa", 300 Mamaia Blvd., 900581 Constanţa, Romania;* [27]*Environment Protection Directorate, Malta Environment and Planning Authority, Hexagon House, Spenser Hill, PO BOX 200 Marsa, MRS 1000 Malta;* [28]*Environmental Research Institute, University of the Highlands and Islands, Ormlie Road, Thurso, Caithness, KW14 7EE United Kingdom;* [29]*Department of Zoology and Marine Biology, Faculty of Biology, National and Kapodistrian University of Athens, 15784 Greece;* [30]*Institute of Applied and Computational Mathematics, Foundation for Research and Technology, Vassilika Vouton, 71110 Heraklion, Greece;* [31]*Department of Biology, University of Florence, Via Madonna del Piano, 6, 50019 Sesto Fiorentino, Italy;* [32]*Natural History Museum, University of Florence, Section of Zoology "La Specola", Via Romana, 17, 50125 Florence, Italy;* [33]*Faculty of Fisheries, Muğla Sıtkı Koçman University, 48000, Kötekli, Muğla, Turkey;* [34]*Centre for Ecology and Hydrology, Crowmarsh Gifford, Oxfordshire, OX10 8BB, United Kingdom*

**Corresponding author*

E-mail: mcorsini@hcmr.gr

Received: 30 April 2015 / Accepted: 21 August 2015 / Published online: 9 October 2015

Handling editor: Vadim Panov

Abstract

The Dodecanese region has a high prevalence of marine alien species due to its close proximity to the Suez Canal and associated Suez shipping lanes, as well as its location at biogeographical border between sub-tropical and tropical biota. This region is therefore very important for the early detection of alien species entering the Mediterranean Sea via the Suez Canal and it is imperative that monitoring of alien species is continued in order to assess the levels of biological invasion. We present results of marine alien surveys, carried out in April 2014 on the island of Rodos. Surveys were performed by a team of marine taxonomic experts and students as part of an EU wide training school, coordinated by the COST Action TD1209 "Alien Challenge". A variety of survey methods were employed to cover a number of coastal habitats. These included: rapid assessment surveys of epibiota on artificial structures in harbours, rapid assessment snorkelling surveys of biota on sublittoral bedrock, and quantified fishing surveys (both boat-seine and trammel net fishing methods). A total of 33 alien and cryptogenic species were recorded across all the survey techniques. Of these species, 9 represented first records for Rodos: the foraminiferan *Amphisorus hemprichii*, the polychaetes *Branchiomma bairdi*, *Dorvillea similis*, *Hydroides dirampha* and *Pseudonereis anomala*, the molluscs *Aplysia parvula*, *Chama pacifica* and *Septifer cumingii*, and the bryozoan *Hippopodina feegeensis*. Of note the record of the Lessepsian invader *Dorvillea similis* represents the second record in the Mediterranean Sea. Alien fish species represented a small but notable proportion of the diversity, biomass and number of individuals in fishing catch of both fishing methods. All alien fish species observed were already known to be present in Rodos. The addition of species firstly recorded in this study brings the total number of marine alien and cryptogenic species in the Dodecanese region up to 129 species. The vast majority of these alien species have entered unaided via the Suez Canal, but an increasing number have been introduced through hull fouling or ballast water transfer from shipping. The results highlight the value of conducting marine alien surveys with teams of a diverse range of taxonomic expertise, both in its scientific output and student training.

Key words: COST Action Alien Challenge, Rodos, Mediterranean, biological invasions, rapid assessment

Introduction

Invasive alien species (IAS) threaten biodiversity, ecosystem services, human health, well-being and the economy (Katsanevakis et al. 2014). The European Commission highlights the importance of Information Systems (Katsanevakis et al. 2015) to support European policies on IAS, especially the new Regulation 1143/2014, and specifically effective early warning, rapid response, prevention, and control of IAS. The COST Action TD1209 "ALIEN Challenge" aims to enhance gathering and sharing of knowledge on IAS through a network of experts (www.cost.eu/COST_Actions/fa/Actions/TD1209) engaged in a variety of activities. Training schools provide a mechanism within the framework of COST for capacity building and knowledge exchange. The first training school of the COST Action "ALIEN Challenge" focused on marine survey skills and alien species identification. The island of Rodos, Greece has excellent local facilities [Hydrobiological Station of Rhodes (HSR) of the Hellenic Centre for Marine Research] and was chosen as the location for the training school.

Located in the eastern Mediterranean region, the island of Rodos (in the Dodecanese islands complex) is heavily affected by climate change and intensification of human activities and is strongly impacted by biological invasions (Raitsos et al. 2010; Pancucci-Papadopoulou et al. 2012; Tsiamis 2012). In fact, its subtropical environment is favorable to native thermophilic biota (Papaconstantinou 2014) and also to tropical or subtropical alien biota (Corsini-Foka et al. 2014). The vast majority of aliens occurring in the wider Dodecanese area are warm-water species, mainly of Red Sea/Indo-Pacific origin and many of them are well established and integrated in the shallow water biocommunities and food web (Zenetos et al. 2009a, 2011, 2015; Pancucci-Papadopoulou et al. 2012).

The training school lasted three days, including introductory lessons on biological invasions, field work, laboratory work and a dissemination event for local stakeholders. The aim of the present work is to disseminate the outcome of the surveys conducted during the training school. Surveys were performed with various techniques along the coasts of the island, allowing (1) identification of alien species, (2) assessment of their distribution, and (3) update of the list of alien species occurring in the wider area. Cryptogenic species, defined as "species that cannot be reliably demonstrated as being either introduced or native" (Carlton 1996) and pseudoindigenous species, defined as "introduced species that are mistakenly considered as native (indigenous or endemic) to a location" (Carlton 2009) were taken into account, according to a precautionary approach.

Materials and methods

The first training school of the COST Action "ALIEN Challenge" was hosted by the Hellenic Centre for Marine Research (HCMR) in Rodos. There were 19 trainees and 13 trainers. Survey was performed on the 10th of April 2014, following a day of intensive training by the trainers Elizabeth Cook (EJC), Melih Ertan Çinar (MC), Carlo Froglia (CF), Daniel Golani (DG), Stelios Katsanevakis (SK), Sami Lakkis (SL), Helen Roy (HR), Elena Tricarico (ET), Konstantinos Tsiamis (KT), Ante Zuljevic (AnZ), Argyro Zenetos (AZ), Maria Corsini-Foka (MCF), with expertise on marine macrophytes, polychaetes, molluscs, decapods, plankton, fish, alien management, European policies and legislation on IAS. The trainees were divided into 8 groups led by at least one trainer. Four different methods were used by the groups at various locations in the city of Rodos and the surrounding coastline.

Area of study

The island of Rodos (in the Dodecanese Archipelago) is situated in the southeastern Aegean Sea, at the limits of the northwestern Levantine Sea (Figure 1). This is an interesting oceanographic position, due to the intense hydrological phenomena of the surrounding marine area (Napolitano et al. 2000; Pancucci-Papadopoulou et al. 2012).

Seawater temperature and salinity at the surface (date 10/04/2014) were approximately 18.5-19ºC and 39.2 psu respectively; air temperature was 18-20ºC and winds of 2-3 on the Beaufort scale with a South-Southeast direction (http://poseidon.hcmr.gr).

Survey methods

Experimental fishing: Boat-seine method

The boat-seine method is a traditional technique which has been used in the Greek coastal fishery until it was prohibited in June 2010, when the European Council Regulation (EC) No. 1967/2006 was applied across Greek territorial waters. Special permission was granted to allow the use of this technique for the scientific and educational purposes of the training school. Bottom seine fishing is an ideal method for this type of scientific survey because it takes a short amount of time and targets the fish assemblage at the depth range usually colonized by alien species in the area (Corsini-Foka

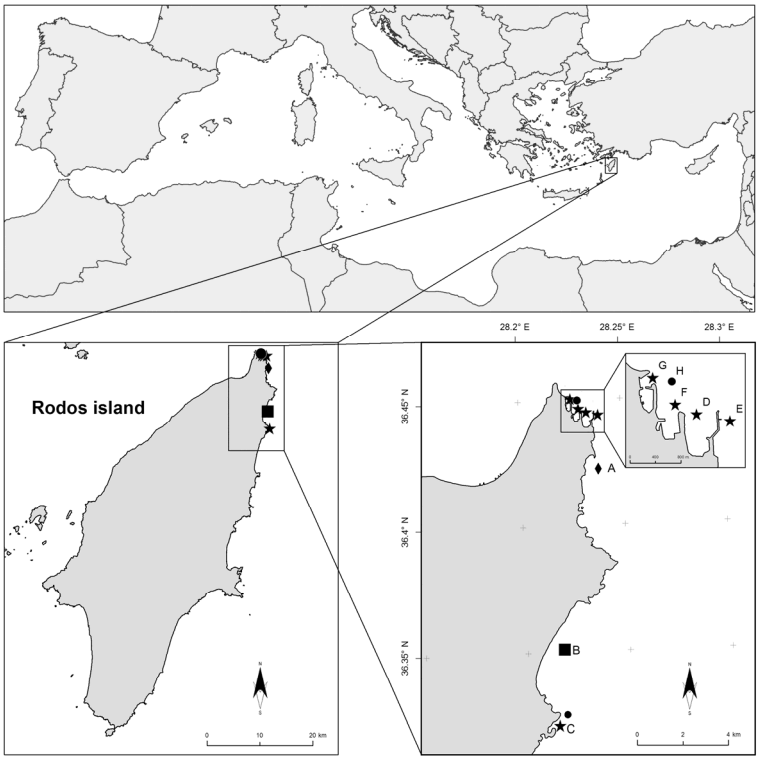

Figure 1. Map of sampling locations in Rodos. (A: Karakonero, B: Faliraki, C: Faliraki Marina, D: Tourist Port, E: Commercial Port, F: Kolona port/dock, G: Mandraki Marina, H: Three Windmills). ◆ Boat-seine; ■ Trammel net; ★By hand; ● Snorkelling.

Table 1. Sampling stations characteristics and sampling method used at Rodos.

Station code	Station name	Latitude	Longitude	Method	Depth (m)	Bottom
A	Karakonero	36°25'20"N	28°14'17"E	Boat-seine	20-40	Sandy to muddy
B	Faliraki	36°20'64"N	28°12'64"E	Trammel net	7-19	Sandy and rocks
C	Faliraki Marina	36°19'20"N	28°12'40"E	By hand, snorkelling	Up to 0.5	Hard
D	Tourist Port	36°26'40"N	28°13'53"E	By hand	Up to 0.5	Hard
E	Commercial Port	36°26'41"N	28°14'14"E	By hand	Up to 0.5	Hard
F	Kolona Port	36°26'46"N	28°13'42"E	By hand	Up to 0.5	Hard
G	Mandraki Marina	36°26'58"N	28°13'32"E	By hand	Up to 0.5	Hard
H	Three Windmills	36°26'57"N	28°13'42"E	Snorkelling	0-2	Rocky

2010). It was expected to obtain a larger biomass and a wider spectrum of species than those achieved with the trammel net method, so enabling the ratio of alien/native species to be assessed.

The boat-seine method (Danish method) was conducted off Karakonero (Station A), a small embayment on the South-southeast of Rodos' town (Figure 1; Table 1). The Karakonero fishing ground was chosen because of the absence of currents, the proximity to the HSR and the satisfactory yields it can produce in terms of quantity and diversity of organisms, according to local information from fishermen. The area is characterized by soft, sandy to muddy bottoms, interrupted by hard substrata and *Posidonia oceanica* meadows. A 12-m professional trawling fishing boat was hired to collect the samples. Trawl mesh size increased from 8 mm at its lower bound (cod end), to 11 mm, 12 mm, 32 mm and finally 1 m at its upper bound end. Fishing took place during the daytime at a depth of 20–40 m. The weather conditions were favourable, but unfortunately the trawl nets were partially destroyed during the operation by a rock or a metal object probably used for anchorage and the yield was confined to a few kilograms. A second haul was therefore not possible. Nevertheless, specimens collected were immediately transported either in styrofoam boxes or live in seawater and were introduced into aquarium tanks at the facilities of the HSR. Fish samples were identified measured with calipers (0.1 mm accuracy) and weighed (0.1 g accuracy). Material was also photographed.

Experimental fishing: Trammel net

The second fishing method used trammel nets. This type of fishing is also traditional in Greece, applied all year round whenever the weather is suitable, supporting many families throughout the coastal areas of the country.

Trammel net fishing took place at Faliraki, Station B (Figure 1; Table 1). The area is characterized by soft, sandy bottom, interrupted by hard substratum and was chosen based on prior knowledge on its diversity and abundance of organisms. A 12-m professional fully equipped fishing boat was hired for the sampling at this site. Knot to knot mesh sizes of inner and outer nets were 32 mm and 130 mm respectively. Approximately, 3000 m of these nets were deployed in late afternoon on the 9th April 2014 at depths of 7–19 m and retrieved in the early morning of the 10th April 2014. All specimens were placed in plastic containers and transported to the facilities of the HSR. Fish samples were identified and weighed (0.1 g accuracy). Material was also photographed.

Rapid assessment of epifouling on artificial structures

Sampling of artificial structures was carried out at 5 harbours: Faliraki Marina, Tourist Port, Commercial Port, Kolona Port, Mandraki Marina (Stations C, D, E, F, G respectively) (Figure 1; Table 1) by a team of 4–6 surveyors based on the rapid assessment survey technique (Ashton et al. 2006; Nall et al. 2015). A period of between 1–2 hours was spent surveying a wide variety of submerged structures at each site. All specimens were collected from a maximum depth of 0.5 m by hand. Specimens were either collected directly by hand or chisels were used to scrape encrusting organisms from the various substrates. These substrates typically included, submerged/floating ropes, boat fenders, tyres, electricity cables, pontoons, boat hulls and steel marina dock piles. Samples were preserved in 4 % formaldehyde and sea water and were transferred to HSR for further identification to species level, where possible.

Hard bottom sampling by snorkelling

Snorkelling was employed to collect benthic epifauna and flora taxa from depths of 0–2 m, on rocky substratum, at two sites: the Three Windmills station (Station H; Figure 1) and Faliraki (Station C; Figure. 1) (Table 1). Samples were preserved in 4 % formaldehyde and sea water and some specimens were kept alive in portable, aerated aquariums and transferred to HSR for further identification down to species level where possible. Herbariums were also created, for flora identification. *In situ* underwater photos were taken in addition to *ex situ* photographs at the laboratories of HSR.

Species identification of common alien species was supported by the use of taxonomic literature and aided and confirmed by the expert trainers. Trainers also alerted participants to the occurrence of alien species not widely included in the literature and provided appropriate references for their identification.

The species' nomenclature follows WoRMS (WoRMS Editorial Board 2015). Exception is the lizardfish *Saurida lessepsianus*, previously misidentified as *Saurida undosquamis* and more recently as *Saurida macrolepis* (Russell et al. 2015).

Results

Alien, cryptogenic and pseudoindigenous species

A total of 33 alien and cryptogenic species were sampled (7 macrophytes, 18 invertebrates and 8 fish species), of which 28 are of Indo-Pacific/Red Sea origin (Table 2). Nine species were completely new records for Rodos Island. The finding of the polychaete, *Dorvillea similis* (Crossland, 1924), represents the second record for the Mediterranean; the polychaete, *Branchiomma bairdi* (McIntosh, 1885), is new to Greek and Aegean waters; two other polychaetes, *Hydroides dirampha* Mörch, 1863 and *Pseudonereis anomala* Gravier, 1900, are new to the Dodecanese Islands; the foraminifer *Amphisorus hemprichii* Ehrenberg, 1840, is new to Greece; the bryozoan, *Hippopodina feegeensis* (Busk, 1884), which is rare in the eastern Mediterranean, is a new record for the Dodecanese Islands; the gastropod, *Aplysia parvula* Mörch, 1863, is new to the Dodecanese Islands; and two bivalves, *Chama pacifica* Broderip, 1834 and *Septifer cumingii* Récluz, 1849, are new to Rodos Island (Table 2).

Detailed descriptions of the above mentioned alien foraminiferan, polychaetes, bryozoan and mollusc new to Greek waters and/or Dodecanese are given below, with notes on their distribution in the Mediterranean waters.

The fouling bryozoan *Amathia verticillata* (Delle Chiaje, 1822) was first recorded in Greek waters (including Dodecanese Islands, Rodos and Chalki) in the 1970s (Castritsi-Catharios and Kiortsis 1984). *Amathia verticillata* was first described in the Tyrrhenian Sea (Naples) under the name *Hydra verticillata* Delle Chiaje, 1822, and it was considered a native to the Mediterranean Sea, thus not accounted for in Mediterranean alien lists (Zenetos

Table 2. Alien and cryptogenic species collected during COST Action samplings (see Table 1 for station codes).

Species	Origin	Stations								Sampling method	Remarks
		A	B	C	D	E	F	G	H		
Macroalgae											
Hypnaea spinella	Circumtropical			+					+	By hand, snorkelling	
Ganonema farinosum	Indian Ocean			+					+	By hand, snorkelling	
Caulerpa cylindracea	Indo West Pacific			+					+	By hand, snorkelling	
Caulerpa racemosa var. lamourouxii	Indo West Pacific			+					+	By hand, snorkelling	
Stypopodium schimberi	Red Sea			+					+	By hand, snorkelling	
Lophocladia lallemandii	Indo West Pacific								+	Snorkelling	
Magnoliophyta											
Halophila stipulacea	Red Sea								+	Snorkelling	
Foraminifera											
Amphisorus hemprichii	Circumtropical	+								Boat-seine, on *Posidonia*	1st record in Greek waters
Polychaeta											
Dorvillea similis	Indo West Pacific			+						By hand	2nd Mediterranean record, 1st record in Greek waters
Pseudonereis anomala	Indo West Pacific			+						By hand	1st record in Dodecanese
Branchiomma bairdi	West Atlantic/East Pacific			+				+		By hand	1st record in Greek waters
Hydroides dirampha	Circumtropical							+		By hand	1st record in Dodecanese
Bryozoa											
Amathia verticillata	Unknown							+		By hand	
Hippopodina feegeensis	Indo West Pacific							+		By hand	3rd Mediterranean record
Mollusca Gastropoda											
Aplysia parvula	Circumtropical			+						By hand	1st record in Dodecanese
Conomurex persicus	Indian Ocean	+	+							Boat-seine, trammel net	
Cerithium scabridum	Indo-Pacific								+	Snorkelling	
Mollusca Bivalvia											
Brachidontes pharaonis	West Indian			+						By hand	
Septifer cumingii	Red Sea	+		+					+	Boat-seine, snorkelling, by hand	1st record in Rodos
Chama pacifica	Indo West Pacific								+	Snorkelling	1st record in Rodos
Dendostrea cf. *folium*	Indo West Pacific/Red Sea			+	+	+	+	+	+	By hand, snorkelling	
Crustacea Decapoda											
Penaeus pulchricaudatus	Indian Ocean		+							Trammel net	
Percnon gibbesi	Atlantic?								+	Snorkelling	
Portunus segnis	Indian Ocean		+							Trammel net	
Goniointradens paucidentatus	Indo West Pacific		+	+						Trammel net, by hand	
Fish											
Fistularia commersonii	Indo West Pacific	+	+						+	Boat-seine, trammel net, snorkelling	
Lagocephalus sceleratus	Indo West Pacific		+							Trammel net	
Pteragogus trispilus	Indian/Red Sea	+								Boat-seine	
Sargocentron rubrum	Indo West Pacific		+							Trammel net	
Siganus luridus	Indian Ocean		+						+	Trammel net, snorkelling	
Siganus rivulatus	Red Sea	+	+						+	Boat-seine, trammel net	
Stephanolepis diaspros	Red Sea	+								Boat-seine	
Upeneus pori	Indian Ocean	+								Boat-seine	
Total		**8**	**9**	**13**	**1**	**1**	**1**	**5**	**15**		

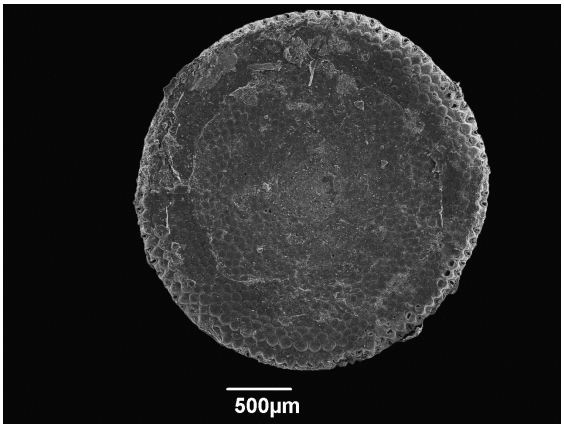

Figure 2. *Amphisorus hemprichii* from Rodos (Photo by M. Dimiza).

et al. 2010, 2012). However, a Caribbean origin has recently been suggested for this bryozoan (Galil and Gevili 2014). Here it is provisionally classified as 'pseudoindigenous' and has been included within the list.

Station H, sampled by snorkelling, was the richest in term of alien species diversity (15 species), followed by Station C, where 13 alien species were collected by hand; a high number of alien species were also obtained using the boat-seine and trammel net techniques at Stations A and B, where 8 and 9 species were registered respectively (Table 2).

Remarks on new findings for Greek waters/Dodecanese

1. Amphisorus hemprichii Ehrenberg, 1839 (Foraminifera, Tubothalamea) (Figure 2)

Material examined: Karakonero (Station A), on rhizomes and leaves of *Posidonia oceanica* collected by boat-seine between 20–40 m.
Notes: The test is discoidal and the circular and annual chambers are subdivided by septula into two separate layers of chamberlets. The apertures are located at the test periphery between the chamberlets in a double row.

Amphisorus hemprichii has often been confused with flat modifications of *Marginopora vertebralis* Quoy and Gaimard, or with microspheric *Sorites orbiculus* (Forskål, 1775) (Langer and Hottinger 2000). It is an epiphytic species reported in sea-grasses, coralline red and filamentous green algae, and it hosts dinoflagellate symbionts (Leutenegger 1984). This species lives in high-energy environments showing a maximum depth distribution between 20 and 30 m and tolerates a wide range of temperatures (14–38ºC).

Distribution: It is a cosmopolitan species found in the Atlantic, Pacific and Indian Oceans and the Red Sea (Langer and Hottinger 2000). In the eastern Mediterranean it is known from Egypt (Samir et al. 2003) and southern coasts of Turkey (Meriç et al. 2008). So far, *A. hemprichii* has not been recorded in previous studies of alien Foraminifera distribution in the Aegean Sea (Koukousioura et al. 2010).

2. Pseudonereis anomala Gravier, 1900 (Anellida, Polychaeta) (Figure 3A)

Pseudonereis anomala Gravier, 1900: 191–197, figures 50–52, pl.12; Çinar and Ergen, 2005: 316–321, figures 2–4.
Material examined: Faliraki (Station C), 1 m, among algae, 3 specimens.
Notes: Largest specimen complete, 44 mm long, 2.2 mm wide, with 80 chaetigers. Animal cream coloured, with brownish pigmentation on anterior part of worms. Prostomium bottle-shaped, with two digitiform antennae, two pairs of black eyes in rectangular arrangement, massive palps. Posterior parapodia with well-developed dorsal ligule, extending far beyond parapodial lobe.
Distribution: This species is of Red Sea/West Indian origin. In the Mediterranean Sea, it is present in the Levantine Sea and the North and Southwest Aegean waters (Çinar and Ergen 2005; Kambouroglou and Nicolaidou 2006) as well as the east coast of Sicily, in the Central Mediterranean (D'Alessandro et al. 2015). It is abundant in the shallow-water hard bottom benthic habitats of the region and has been accepted as an invader species (Zenetos et al. 2010). This is the first record of the species from the Dodecanese Islands.

3. Dorvillea similis (Crossland, 1924) (Anellida, Polychaeta) (Figure 3B)

Staurocephalus (*Dorvillea*) *similis* Crossland, 1924: 100–106, figures 119–126.
Dorvillea similis; Çinar 2009: 2301–2302, Figure 6.
Material examined: Faliraki (Station C), 1 m, among algae, 1 specimen.
Notes: Incomplete specimen, with anterior end, 6 mm long, 0.9 mm wide, with 22 chaetigers. Body pale brownish, without colour markings (Figure 3B). Prostomium almost rounded, slightly longer than wide; with two reddish, large eyes. Two antennae with seven joints. Palps stout, slightly shorter than antennae (Figure 3B).
Distribution: It is a Lessepsian invader that abundantly occurs among algae on the Levantine coast of Turkey (Çinar 2009). It is the second time this species has been recorded in the Mediterranean Sea.

Figure 3. A. *Pseudonereis anomala*, dorsal view, B. *Dorvillea similis*, dorsal view, C. *Branchiomma bairdi*, dorsal view, D. *Hydroides dirampha*, lateral view. Scale bar: A= 1.6 mm, B= 0.71 mm, C= 2 mm, D= 4 mm.

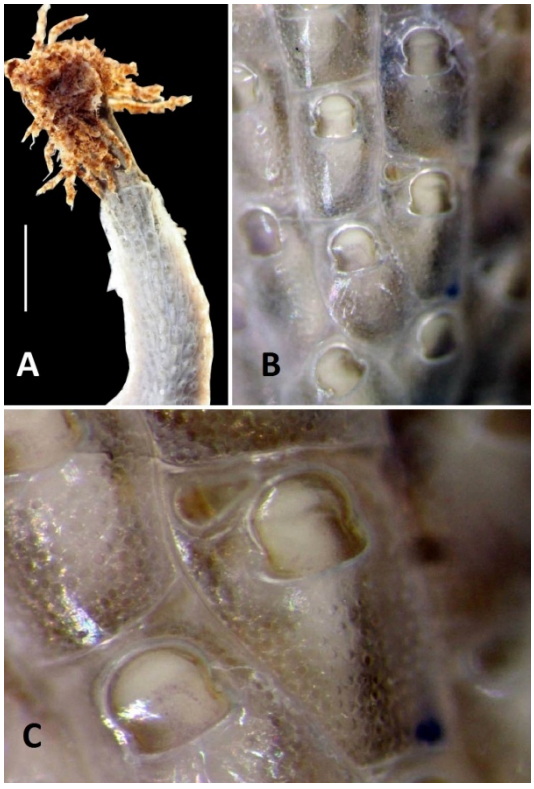

Figure 4. *Hippopodina feegeensis*. A: General view of colony settled on a tube of *Branchiomma bairdi*, B: Group of autozooid, C: Primary orifice of autozooid and an adventitious avicularium. Scale bar: A= 3.5 mm, B= 0.52 mm, C= 0.19 mm.

4. Branchiomma bairdi (McIntosh, 1885) (Anellida, Polychaeta) (Figure 3C)

Branchiomma bairdi; Tovar-Hernández and Knight-Jones 2006: 13–17, figures 3a–d, h–k, 9c–f, 10c, 11b; Çinar 2009: 2320, figure 13.
Material examined: Mandraki (Station G), 1 m, on concrete, 16 specimens; Faliraki (Station C), 1 m, on concrete, 3 specimens.
Notes: Largest specimen complete, 38 mm long, 3 mm wide; branchial crown 13 mm long, thorax 4 mm long, abdomen 21 mm long. Thorax with 8 chaetigers, abdomen with 54 chaetigers, branchial crown with 30 pairs of radioles. Tube leathery. Body brownish, with small dark brownish spots on surface (Figure 3C). Crown with brown bands. Macrostylodes strap-like, almost four times longer than other stylodes. Radiolar eyes small. Some tubes of *B. bairdi* collected from Mandraki (Station G) were covered by two bryozoan species (see below) and two polychaete species [*Salmacina incrustans* Claparède, 1870 and *Janua pagenstecheri* (Quatrefages, 1866)].

Distribution: This species was first reported from Cyprus [Çinar, 2005 (cited as *B. boholense* Grube, 1878)] and the Levantine coast of Turkey (Çinar 2009) and then found along the coasts of Italy (Strait of Messina, Brindisi Harbour, Sicily and Gulf of Naples), Malta and Spain (Mediterranean) (Arias et al. 2013). The finding of *B. bairdi* reported here documents the first occurrence of this alien in the Greek waters and the Aegean Sea, although it has been previously recorded at the extremity of the Northeastern Levantine Sea, at Göcek and Fethiye in Turkey (Çinar 2009).

5. Hydroides dirampha Mörch, 1863 (Anellida, Polychaeta) (Figure 3D)

Hydroides dirampha; Zibrowius 1971: 705–707, figures 6–9; Bianchi 1981: 63–64, figure 21.
Hydroides diramphus; Çinar 2006: 226, Figure 3.
Material examined: Mandraki (Station G), 1 m, on concrete, 1 specimen.
Notes: Incomplete specimen, posterior part missing, 42.2 mm long. Body pale yellowish in colour; tips of

Figure 5. A specimen of *Aplysia parvula* from Rodos (A: dorsal view, B: lateral view).

radii and spines brownish. Thorax 5.2 mm long, 2 mm wide, with 7 chaetigers. Abdomen 29.5 mm, with 40 chaetigers. Branchial crown 7.5 mm long, with 42 radioles. Peduncle plus operculum 8 mm long; funnel with 44 radii possessing pointed tips; verticil with 16 spines, similiar in shape and size; tips of spines T shaped, flattened.
Reproduction: Specimen with oocytes in abdominal coelomic cavity; 50–60 μm in diameter.
Distribution: This species was originally described from the St. Thomas, West Indies (Caribbean Sea, West Atlantic Ocean) (Mörch, 1863). It has been known to be present in Mediterranean Sea for more than one century, described as *Eupomatus lunulifer* in the Gulf of Naples by Claparède (1870), which was then synonymized with *H. dirampha* by Zibrowius (1971). The species is now widely distributed in tropical regions, and occurs in the western and eastern Mediterranean Sea (see Çinar 2006). This is the first finding of *H. dirampha* in the Dodecanese Islands.

6. Hippopodina feegeensis (Busk, 1884) (Bryozoa, Gymnolaemata) (Figure 4)

Material examined: A colony collected from Mandraki (Station G) at 1 m depth. Encrusting colony covered completely tube-building sabellid polychaete, *B. bairdi* described above, where also the bryozoan *Cradoscrupocellaria bertholletii* (Audouin, 1826) was present.
Notes: Autozooids generally rectangular, separated by distinct margins. Frontal wall perforated with numerous small pores. Primary orifice hoof-shaped and rounded anterior portion.

Proximal margin slightly concave or straight with two lateral condyles pointing proximally. Adventitious avicularium positioned disto-laterally to orifice and oriented transversely above distal part of orifice; mandible triangular, crossbar complete (Figure 4). In specimen, adventitious avicularium always single and generally zooids without avicularia. However, the specimens collected from the Philippines were characterised by a pair of proximo medially pointing avicularia located at the distal part of the orifice (Tilbrook 1999). The length of the avicularia collected from different localities is variable among specimens (Levinsen 1909). In the Rodos specimens, the rostrum did not include a long, thin terminal part.
Distribution: *Hippopodina feegeensis* is a circumtropical species. It forms encrusting sheets on artificial substrates, coral rubble and basalt cobbles of intertidal pools (Hayward 1988). This species it is commonly reported from coral substrate and/or reef environments (Winston 1986). It is widely distributed in the Indo-Pacific region and Red Sea, but also occurs in the tropical western Atlantic as well (Powell 1969a). This species was introduced to the Mediterranean Sea via the Suez Canal and firstly reported from the Israeli coast within the Mediterranean Sea (Powell, 1969b) and then from the Greek coast (Milos) (Morri et al. 1999). This is the first record of *H. feegeensis* in the Dodecanese Islands and the third time this species is being recorded in the Mediterranean Sea.

7. Aplysia parvula Mörch, 1863 (Mollusca, Gastropoda) (Figure 5)

Material examined: Faliraki Marina (Station C), 0.5–1 m, amidst algae, 5 specimens.
Notes: Small aplysiid species, head well developed, with oral tentacles at the front of the head, on either side of the mouth, and smaller auriculate rhinophores just above the eyes. Short parapodia fused near the tail and enclosing the mantle cavity. Dorsal mantle quite thin, with an oval foramen through which a flat fragile shell is observed. Tail well developed. Reddish-brownish in colour, mottled whitish (often big white spots are formed by clusters of smaller white spots). Black eyes inside a whitish-pinkish circular area. Purplish borders of foot, parapodia and mantle foramen (sometimes interrupted by whitish bands), as well as tips of oral tentacles and rhinophores. Internal anatomy of the specimens not observed, although they have been sent to Ángel Valdés (Pomona, California) for subsequent molecular analysis.
Distribution: *Aplysia parvula* is currently considered a circumtropical species, being both recorded in the Indo-Pacific region and Red Sea, and in the whole Atlantic Ocean. Since 1959, it also colonized the Mediterranean, with multiple records from its eastern (e.g. Swennen 1961; Bebbington 1975; Barash and Danin 1971, 1988), central (e.g. Bebbington 1975;

Table 3. Results of fishing actions.

	Boat-seine		Trammel net	
	Native	Alien	Native	Alien
Fish species	21	5	18	5
Fish abundance	1533	46	67	14
Fish biomass (g)	38661	4596	9370	2310
Cepahlopod species			2	
Cephalopod abundance			7	
Cephalopod biomass (g)			2310	
Other Invertebrates species		3	4	4
Ratio Alien/Native species (Fish)	0.24		0.28	
Ratio Alien/Native abundance (Fish)	0.03		0.21	
Ratio Alien/Native biomass (Fish)	0.13		0.25	

Cattaneo 1982; Perrone 1983; Jaklin 1998) and western (e.g. Ballesteros et al. 1986; Ballesteros and Templado 1987) parts. However, worldwide specimens identified as such may belong to a still unsolved complex of cryptic species. Therefore, its assignment as a cryptogenic species is mostly due to uncertainties regarding its taxonomic status. Relationships with the native putative sister species *Aplysia punctata* (Cuvier, 1803) and possible spreading pattern are widely debated for the Mediterranean Sea population (e.g. Zenetos et al. 2010; Crocetta 2012; Crocetta et al. 2015a).

Fish catches

In the single boat-seine haul carried out at Station A, a total number of 1579 fish specimens were caught, with a biomass of 43.3 kg (Table 3). Centracanthidae (*Spicara* spp.) and Sparidae [*Boops boops* (Linnaeus, 1758)] dominated both in term of specimen number (1350) and biomass (32.7 kg). In the net, also two native species of cephalopods were present (7 individuals, 2.31 kg total weight). Alien fish species represented 19 % of the total fish diversity (21 native, 5 alien), and comprised 3 % of total fish specimens counted but 11 % of the total fish biomass, due to the presence of 20 individuals of *Fistularia commersonii* Rüppell, 1838 with a weight of 4.2 kg. Three alien invertebrates were also observed (Table 3).

In the trammel net applied at Station B, alien fish species represented 22 % of total fish diversity (18 native, 5 alien), 17.3 % of total fish specimens and 19.8 % of total fish biomass (Table 3).

Total fish species encountered along the two fishing techniques used were 31 native and 8 alien, while 2 native and 6 alien invertebrates were observed (Table 3). All alien species collected during the fishing survey were previously known to be present in the area of Rodos.

Alien marine macrophytes

Alien marine macrophytes constitute a significant element of Rodos benthic vegetation. Most of the alien taxa observed were common species and exhibited high abundancies. In the Three Windmills station (Station H), the alien red macroalga *Hypnea spinella* (C. Agardh) Kützing was monopolizing the upper rocky sublittoral zone, indicating an aggressive invasive behavior. Nevertheless, no new alien macroalgal taxa for the Island of Rodos were detected, probably due to intense algal studies that have taken place in the island during the last decade (Tsiamis 2012).

Review of alien and cryptogenic species in the Dodecanese complex

A review of alien species in the waters of the Dodecanese Islands (March 2015) was performed. Species in previous inventories were removed if, according to Zenetos et al. (2012), they have extended their distribution range from the Atlantic via Gibraltar unaided. By including records of species recently published and the 6 new findings reported in the present work, the list of aliens reaches 129 species, the great majority of which (66 %) are established (Supplementary material Table S1). Phytoplanktonic species are included with some reservation. The cyanobacterium *Trichodesmium erythraeum* Ehrenberg ex Gomont, 1893, which has a wide distribution in tropical and subtropical waters has a limited distribution in the Mediterranean (Israel, Turkey, Greece, Italy) (Guiry and Guiry 2015; Spatharis et al. 2012; Çinar et al. 2011). Hence its alien status is questionable.

The vast majority of the aliens introduced in the area are tropical species of Indo West Pacific/Indian Ocean/Red Sea/tropical Atlantic origin. Of the alien

species known to be present in the Dodecanese Islands, approximately 60 % were introduced via the Suez Canal unaided (Lessepsian migration), whilst approximately 25 % of introductions occurred via shipping (9% introduced by shipping via Suez) (Table S1). Thirteen of the species listed are considered cryptogenic, while the occurrence of five species, namely the red macroalgae *Asparagospis armata* Harvey and *Sarconema scinaioides* Børgesen, the bivalve *Acar plicata* (Dillwyn, 1817), the gastropod *Alvania dorbignyi* (Audouin, 1826) and the fish *Iniistius pavo* (Valenciennes, 1840), is questionable.

The single *A. armata* record from Rodos Island is based only to a tetrasporophyte specimen (Kousouris et al. 1973). Since the tetrasporophyte of *A. armata* is indistinguishable from the tetrasporophyte of the sister species *A. taxiformis*, Rodos record of *A. armata* should be considered as questionable. Regarding *S. scinaioides*, there is no confirmed record from Rodos Island. According to Tsiamis (2012), the species was transferred from Rodos to Athens in the early 1970s for agar extraction experiments, but the original source site in Rhodes Island remains unknown and despite numerous samplings around the Island during the recent years (Tsiamis 2012) the species was never detected.

According to one of the authors (F. Crocetta), the presence of *Acar plicata* is hereby considered questionable because the depth declared by Tzomos et al. (2010) clearly suggests a misidentification for the similar native species *Acar clathrata* (Defrance, 1816), a common species in the circalittoral from the Dodecanese. As observed also by the same author, the specimen figured by Tenekides (1989) as *A. dorbignyi* is a misidentification for the native *Alvania colossophilus* Oberling, 1970.

The absence of further records of *I. pavo* since 2004, and based on its resemblance with the native *Xyrichtys novacula* (Linnaeus, 1758), its presence in Dodecanese is also considered (by M. Corsini-Foka) as questionable.

The present records indicate that there is no information regarding alien species on some Dodecanese islands, like Agathonisi, Patmos, Leros and various smaller ones, while Rodos, the capital of the Archipelago and the larger one, concentrates the majority of records, 107 alien species (82 % of the total species recorded), followed by Kastellorizo with 24 species (Figure 6). The dominance of alien zoobenthic invertebrates (71 species) is evident, followed by fish (29 species) and phytobenthos (23 species) (Figure 7). Concerning invertebrates, Mollusca accounts for 34 %, followed by Crustacea Decapoda and Stomatopoda (31%) and Polychaeta (18 %) (Figure 7). Phytobenthos is dominated by

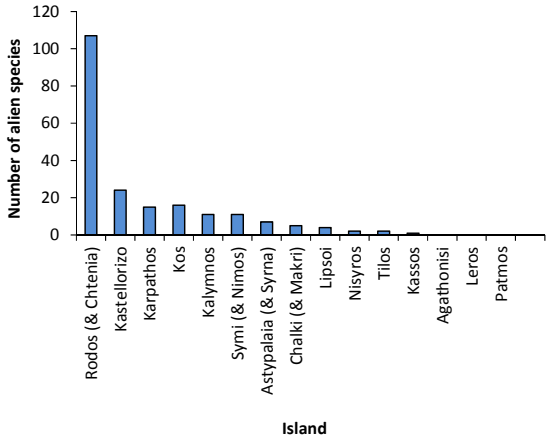

Figure 6. Number of marine alien species recorded from each of the major Dodecanese islands.

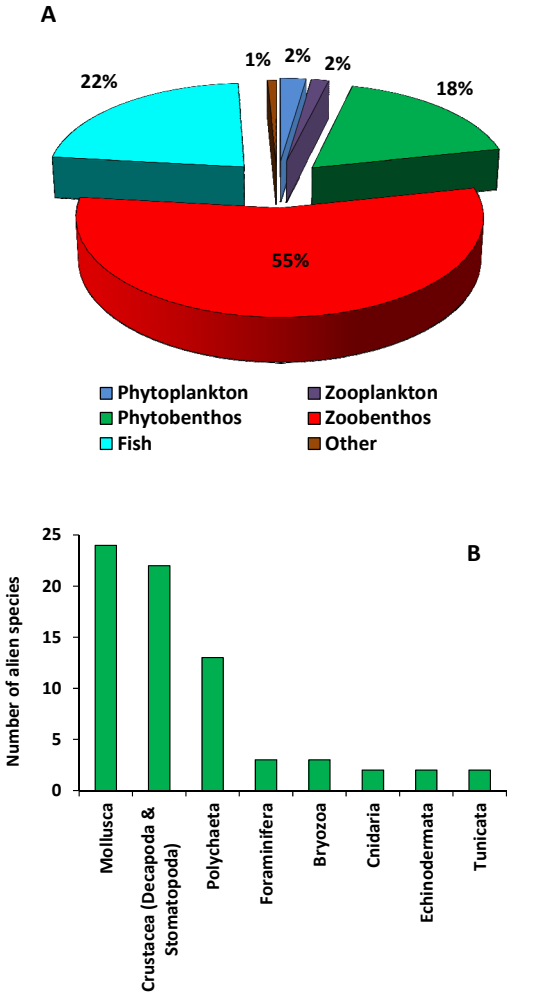

Figure 7. Percentage of major groups of aliens in Dodecanese (A) and detail on alien zoobenthic composition (B).

Rhodophyta (17 species), followed by Ulvophyceae (3 species), Phaeophyceae (2 species) and Magnoliophyta (1 species).

Fishes comprised a total of 29 alien species belonging to 21 families, with 8 new families added to the local and Hellenic ichthyofauna (Champsodontidae, Fistulariidae, Hemiramphidae, Holocentridae, Leiognathidae, Monacanthidae, Pempheridae, Siganidae) (Table S1).

Discussion

The surveys, which took place as an integral part of the training workshop, provided the golden opportunity to record 33 alien and cryptogenic species, 9 of which were unknown to Rodos Island. The newly recorded species included the polychaete *Dorvillea similis* reported for the second time in the Mediterranean Sea and the bryozoan *Hippopodina feegeensis*, considered casual in the eastern Mediterranean (Zenetos et al. 2010). Furthermore, they enabled the first record of the polychaete *Branchiomma bairdi* for the whole Aegean Sea and Greece, the first record of the foraminifer *Amphisorus hemprichii* for Greece and the addition of two polychaetes (*Pseudonereis anomala*, *Hydroides dirampha*) and one gastropod (*Aplysia parvula*) to the Dodecanese alien biota, filling gaps on their known distribution. The occurrence of the molluscs *Septifer cumingii* Récluz, 1849 and *Chama pacifica* Broderip, 1835 observed in Rodos confirms the wide distribution of these two species, already known from the nearby islands of Astypalaia and Karpathos respectively (Zenetos et al. 2011; Crocetta and Russo 2013).

Furthermore, the surveys provided the opportunity to monitor the occurrence and abundance of previously recorded alien species in the coastal waters of the island of Rodos and to investigate sites, which have been generally poorly studied until now. The alien species outlined in the updated list of the Dodecanese, are mostly thermophilic, the majority (80% of the total) of Indo-Pacific/Red Sea origin. Most of the marine aliens known in the Dodecanese region appeared to have reached the area via progressive migration from the Suez Canal (Golani 2010; Pancucci-Papadopoulou et al. 2012; Corsini-Foka and Pancucci-Papadopoulou 2012), however in the last few years the frequency of introductions as a result of shipping has increased (Çinar et al. 2006; Katsanevakis et al. 2013). For example, shipping and general maritime traffic have been blamed as a possible vector for the recent introduction of two new alien crabs, *Actaeodes tomentosus* (H. Milne Edwards, 1834), and *Xanthias lamarckii* (H. Milne Edwards, 1834) to Rodos and the nearby area (Corsini-Foka and Kondylatos 2015).

The marine alien species recorded in the Dodecanese to date represent 52 % of the total marine aliens occurring in Greek waters (247 species, cf. Zenetos et al. 2015; ELNAIS 2015; present work) and about 13 % of marine alien species recorded in the Mediterranean (1020 species; Gerovasileiou et al. in press). The high number of alien macrophytes inventoried in the Dodecanese, further classify this marine region as one of the most biologically polluted of the Aegean Sea (Tsiamis 2012). In relation to alien zoobenthic organisms, the picture has changed in recent years: in fact, in contrast to the past, where decapods and stomatopods dominated over molluscs (Pancucci-Papadopoulou and Corsini-Foka 2010), today the number of alien species in the area appears to be equally shared between molluscs and crustaceans (decapods and stomatopods).

All the 29 alien bony fishes recorded in the study area are Lessepsian immigrants and have enriched the Hellenic ichthyofauna, with the addition of 8 families (Papaconstantinou 2014). The family Tetraodontidae, which has contributed with 5 new species to the area, is the one most successful in bioinvasions (Corsini-Foka 2010).

The results of the present study from Rodos match the geographic distribution of Red Sea (Lessepsian) fish immigrants in the Mediterranean, as presented by Golani (1998, 2010), namely, an east-west gradient of number of species. At the most eastern coast of the Mediterranean, the coast of Israel, there are 88 Lessepsian fish species; two additional Lessepsian fish species have been found so far only in Lebanon (Bariche 2011; Bariche and Heemstra 2012). Turan et al. (2014) and Bilecenoğlu et al. (2014) listed 65 Lessepsian fish species in the Turkish Mediterranean coast and 29 occur in the Dodecanese Islands (see Table S1). Thirteen such species have reached the central Mediterranean waters of Tunisia and Sicily (Bradai et al. 2004; Ben Souissi et al. 2014). Only three Lessepsian fish species have reached the western basin of the Mediterranean, namely *F. commersonii, Lagocephalus sceleratus* (Gmelin, 1789) and *Siganus luridus* (Rüppel, 1829); all three were found in the present study at Rodos.

The composition of fish species obtained by both types of fishing activities (boat-seine and trammel net) showed a ratio of aliens to native species of approximately 1:4 and did not differ from results obtained from previous studies carried out in recent years, with the same techniques, around the island (Corsini-Foka and Pancucci-Papadopoulou 2010). In terms of biomass, catches were low and results

confirmed that alien fish species show a higher impact in the shallower waters on sandy habitat, where trammel net method is used, compared to the lightly deeper waters on *Posidonia oceanica*, where the boat-seine sampling was performed (Corsini-Foka et al. 2010). The characteristic predominance of Centracanthidae and Sparidae by the boat-seine technique both in terms of density and biomass obtained in this work has been already discussed (Kalogirou et al. 2010). Among the 29 alien fish registered in the area, only 8 species were encountered in our surveys (all common to the area). *Siganus luridus* and *S. rivulatus* have economic value since their early stages of colonization (Corsini-Foka 2010), while *F. commersonii* is now marketable, due to its local abundance. Other fishes caught in nets, as *Pteragogus trispilus* Randall, 2013, *Sargocentron rubrum* (Forsskål, 1775) and *Stephanolepis diaspros* Fraser-Brunner, 1940 are currently discarded (small size, unpalatable). The alien mullid *Upeneus pori* Ben-Tuvia and Golani, 1989, elsewhere abundant in the Levantine waters (Gücu et al. 2010), is regularly present today in coastal fishery of Rodos, more common than the congeneric alien *Upeneus moluccensis* (Bleeker, 1855), but it does not seem to reach a biomass comparable to the native commercially important mullids, *Mullus barbatus barbatus* Linnaeus, 1758 or *Mullus surmuletus* Linnaeus, 1758. Although only one specimen of the highly toxic fish *L. sceleratus* was captured in our surveys, the abundance of this species in the area continues to be devastating both to biodiversity and fisheries, with an ecological and socio-economic impact in the region (Pancucci-Papadopoulou et al. 2012), similarly to other eastern Mediterranean locations (Rousou et al. 2014).

Other alien fish of economic value in the area, but not captured in the present samplings, are *Sphyraena chrysotaenia* Klunzinger, 1884 and *Etrumeus golanii* DiBattista, Randall and Bowen, 2012. Schools of *S. chrysotaenia* are commonly caught in boat seine nets (cf. Kalogirou et al. 2012) and trammel nets, while schools of the pelagic *E. golanii* are captured with purse-seines in the wider region (Çinar et al. 2011; Corsini-Foka et al. 2014).

Among alien invertebrates recorded in the present work, the mollusc *Conomurex persicus* (Swainson, 1821), the shrimp *Penaeus pulchricaudatus* Stebbing, 1914 and the crab *Portunus segnis* (Forsskål, 1775) are common and they are acquiring some local commercial importance. The crabs *Percnon gibbesi* (H. Milne Edwards, 1853) and *Gonioinfradens paucidentatus* (A. Milne Edwards, 1861) are abundant and exhibit invasive properties (Corsini-Foka et al. 2014).

In the Dodecanese, a region belonging to the biogeographic "Lessepsian Province" of the Mediterranean Sea (Por 1990), the majority of records of aliens and information on their establishment have been from Rodos. Rodos Island is regularly studied and monitored through various research programs. Although the current number of alien records from Rodos is significantly higher than that reported for the rest of the Dodecanese Archipelago, a large number of inputs obtained through ELNAIS since 2007 (Zenetos et al. 2015) provided knowledge of alien species presence and distribution in the complex underwater habitats of the Hellenic seas, including the smaller islands of the Dodecanese. The resulting picture of alien distribution in the area reflects clearly the Levantine character of Kastellorizo, where a higher number of alien species was registered compared to the other small islands of the Archipelago. Many records from Kastellorizo were provided by citizen scientists (Zenetos et al. 2011, 2013).

In terms of marine xenodiversity in Rodos, alien macrophytes and fish are about 10 % and 11 % of total number of species known in their respective groups (Tsiamis 2012; Papaconstantinou 2014), alien crustaceans (Decapoda and Stomatopoda) are 18 % of total number of species registered (Corsini-Foka and Pancucci-Papadopoulou 2012), while alien molluscs account approximately 6 % of total number of species (MCF, unpublished data).

A large number of the listed alien species are considered invasive or potentially invasive in the Mediterranean Sea (Zenetos et al. 2010). As already suggested in Corsini-Foka and Pancucci-Papadopoulou (2012), monitoring of the biota in this geographically crucial region that is subjected to invasions and considered biopolluted (Pancucci-Papadopoulou et al. 2011), is imperative.

The rate of alien introductions in the Dodecanese is increasing. Many of these introductions are from species already established in the Levantine that are expanding their range. The latest introductions to the region, in addition to the present study, include *Herdmania momus* (Savigny, 1816), *A. tomentosus*, *Melibe viridis* (Kalaart 1858), *Penaeus aztecus* Ives, 1891 and *Palisada maris-rubri* (K.W.Nam and Saito) K.W. Nam (Gerovasileiou and Yssaris 2014; Kondylatos and Corsini-Foka 2015; Corsini-Foka and Kondylatos 2015; Tsiamis and Gerakaris 2015).

It is also worth mentioning that, during the training school, a species of Polychaete new to science, *Myrianida rodosensis* Çinar, 2015, was discovered and described by Çinar (2015).

The expertise available in this COST Action "ALIEN Challenge" training school covered a wide,

but not complete, range of marine taxa. The results of the surveys therefore have a propensity mainly for macroalgae, polychaetes, molluscs, decapods and fishes, while other taxa such as cnidarians, tunicates or others, not included in expertise, were not reported in the results. It is worth to mention also that trainees were graduate or postgraduate students or employees, most with a general marine biology background, few specialized taxonomically in a specific group of marine organisms.

To conclude, and taking into consideration the above, the participation of experts of a number of different marine taxa as well the attendance of the training school by experienced trainees, were imperative for the positive outcome of the surveys that took place in Rodos. The surveys, which focused on a variety of ecosystems throughout the coastal environment revealed a substantial number of new sightings of alien species and highlights what can be achieved in a short time by a team with a wide range of taxonomic expertise. Furthermore, the concluding stakeholder event provided means of presenting the results of the surveys to members of the local community including people from local trades such as fishing and tourism and politicians. The willingness of the local community to disseminate the findings more widely through production of identification guides (Zenetos 2015) in collaboration with the HSR was appreciated by all on the training school.

Acknowledgements

The training school was an activity of the COST Action TD1209 "ALIEN Challenge" and funded through the COST (European Cooperation in Science and Technology) Association which is supported by the EU Framework Programme Horizon 2020. Authors are grateful to Dr. A. Sioulas, Director and all the staff of the Hydrobiological Station of Rhodes-Hellenic Centre for Marine Research for providing essential support in organizing and hosting the School. They thank also the General Board of Forest and Agriculture Affairs, the General Fishery Board of the Greek Ministry of Agricultural Development and Food, the Fishery Department of Dodecanese of the South Aegean Region for providing boat-seine fishing permission and the Port Authority for assistance during fishing samplings. They warmly thank Captain Iasar Karaosman and the crew of the fishing boat "Taxiarchis" and Captain Stavroula Vagianou and the crew of the fishing boat "Captan Stelios" for their availability in hosting School participants in fishing activities and for their unique contributions to "on board" lessons. Thanks also to H. Kyriakidou for providing GIS map of Rodos and M. Dimiza for providing photo of *Amphisorus hemprichii*. Katherine Turvey is gratefully acknowledged for her ongoing support in implementing the activities of the COST Action "ALIEN Challenge". Authors are grateful to three anonymous reviewers for their valuable and constructive comments on the first version of this manuscript.

References

Aplikioti M, Louizidou P, Mystikou A, Marcou M, Stavrou P, Kalogirou S, Tsiamis K, Panayotidis P, Kuepper FC (2016) Further expansion of the alien seaweed *Caulerpa taxifolia* var. *distichophylla* (Sonder) Verlaque, Huisman and Procacini (Ulvophyceae, Bryopsidales) in the Eastern Mediterranean Sea. *Aquatic Invasions* (in press)

Arias A, Giangrande A, Gambi MC, Anadon N (2013) Biology and new records of the invasive species *Branchiomma bairdi* (Annelida: Sabellidae) in the Mediterranean Sea. *Mediterranean Marine Science* 14(1): 162–171, http://dx.doi.org/10.12681/mms.363

Ashton G, Boos K, Shucksmith R, Cook EJ (2006) Rapid assessment of the distribution of marine non-native species in marinas in Scotland. *Aquatic Invasions* 1: 209–213, http://dx.doi.org/10.3391/ai.2006.1.4.3

Ballesteros M, Templado J (1987) *Aplysia parvula* en las costas de la Península Ibérica. *Publicaciones del Departamento de Zoología (Barcelona)* 13: 55–62

Ballesteros M, Álvarez C, Mateo B (1986) Aproximación a la fauna de opistobranquios de la isla de Menorca. *Publicaciones del Departamento de Zoología (Barcelona)* 12: 93–106

Barash A, Danin Z (1971) Opisthobranchia (Mollusca) from the Mediterranean waters of Israel. *Israel Journal of Zoology* 20: 151–200

Barash A, Danin Z (1988) Contribution to the knowledge of opisthobranchia of Cyprus. *Bollettino Malacologico* 24 (9–12): 243–260

Bariche M (2011) First record of the cube boxfish *Ostracion cubicus* (Ostraciidae) and additional records of *Champsodon vorax* (Champsodontidae) from the Mediterranean. *Aqua, International Journal of Ichthyology* 17: 181–184

Bariche M, Heemstra P (2012) First record of the blacktip grouper *Epinephelus fasciatus* (Teleostei: Serranidae) in the Mediterranean Sea. *Marine Biodiversity Records* 5: e1, http://dx.doi.org/10.1017/S1755267211000509

Barnich R, Fiege D (2003) The Aphroditoidea (Annelida: Polychaeta) of the Mediterranean Sea. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft* 559: 1–167

Bebbington A (1975) On a collection of *Aplysia* species from Naples with a note on the distribution of *Aplysia parvula* (GASTROPODA, OPISTHOBRANCHIA) in the Mediterranean. *Pubblicazioni della Stazione Zoologica di Napoli* 39: 121–128

Ben Souissi J, Rifi M, Ghanem R, Boughedir W, Capapé C, Azzurro E (2014) First record of the twobar sea bream *Acanthopagrus bifasciatus* (Teleostei: Sparidae) in the Mediterranean Sea. *Mediterranean Marine Science* 15(2): 437–439, http://dx.doi.org/10.12681/mms.774

Bianchi CN (1981) *Guide per il riconoscimento delle specie animali delle acque lagunari e costiere italiane.* AQ/1/96. 5. Policheti Serpulidei. Consiglio Nazionale delle Ricerche, 187 pp

Bilecenoğlu M, Kaya M, Cihangir B, Çiçek E (2014) An updated checklist of the marine fishes of Turkey. *Turkish Journal of Zoology* 38 (6): 901–929, http://dx.doi.org/10.3906/zoo-1405-60

Blanc-Vernet L (1969) Contribution à l'étude des foraminifères de Méditerranée. *Recueil des travaux de la Station Marine d'Endoume* 64: 1–281

Bradai MN, Quignard J-P, Bouain A, Jarboui A, Ouannes-Ghorbel A, Ben Abdallah J, Zaouali J, Ben Salem S (2004) Ichtyofaune autochtone et exotique des côtes Tunisiennes: recensement et biogeography. *Cybium* 28: 315–328

Buzzurro G, Greppi E (1994) Presenza di *Smaragdia (Smaragdella) souverbiana* (Montrouzier, 1863) nel Mediterraneo orientale. *Bollettino Malacologico* 29: 319–321

Carlton JT (1996) Biological invasions and cryptogenic species. *Ecology* 77(6): 1653–1655, http://dx.doi.org/10.2307/2265767

Carlton JT (2009) Deep Invasion Ecology and the Assembly of Communities in Historical Time. In: Rilov G, Crooks JA (eds), Biological Invasions in Marine Ecosystems. 13, Ecological Studies 204, Springer-Verlag, Berlin Heidelberg, pp 13–44, http://dx.doi.org/10.1007/978-3-540-79236-9_2

Castritsi-Catharios J, Kiortsis V (1984) Bryozoaires côtiers de Grèce. Proposition d'une mèthode automatisèe de dètermination systèmatique. *Biologia Gallo-Hellenica* 11 (1): 89–98

Cattaneo R (1982) Contributo alla conoscenza del genere *Aplysia* L.: *Aplysia parvula* Guilding in Mörch (Mollusca, Opisthobranchia). *Il Naturalista Siciliano* nuova serie 6 (suppl. 1): 130–132

Claparède É (1870) Les annélides chétopodes du Golfe de Naples. Supplément. *Mémoires de la Société de physique et d'histoire naturelle de Genève* 20 (2): 365–542

Corsini-Foka M (2010) Current status of alien fishes in Greek seas. In: Golani D, Appelbaum-Golani B (eds), *Fish invasions of the Mediterranean Sea: change and renewal*. Pensoft Publishers, Sofia-Moscow, pp 219–253

Corsini-Foka M, Pancucci-Papadopoulou MA (eds) (2010) *Preliminary results on the study of the alien fauna in the southeastern Aegean Sea*. Final Technical Report, HCMR–HSR, 77 pp (in Greek)

Corsini-Foka M, Pancucci-Papadopoulou MA (2012) Inventory of Crustacea Decapoda and Stomatopoda from Rhodes Island (Eastern Mediterranean Sea), with emphasis on rare and newly recorded species. *Journal of Biological Research-Thessaloniki* 19: 359–371

Corsini-Foka M, Kondylatos G (2015) First occurrence of *Actaeodes tomentosus* (H. Milne Edwards, 1834) (Brachyura: Xanthidae: Actaeinae) in the Mediterranean Sea. *Mediterranean Marine Science* 16(1): 201–205, http://dx.doi.org/10.12681/mms.1113

Corsini-Foka M, Pancucci-Papadopoulou MA, Kalogirou S (2010) Is the Lessepsian Province in expansion? The Aegean Sea experience. FAO, EASTMED, 2010. Report of the Sub-Regional Technical meeting on the Lessepsian migration and its impact on Eastern Mediterranean fishery. GCP/INT/041/EC–GRE–ITA/TD-04, pp 50–59

Corsini-Foka M, Kondylatos G, Santorinios E (2014) The role of the Aquarium of Rhodes (eastern Mediterranean Sea) on raising public awareness to marine invasions, with a note on the husbandry and trade of marine aliens. *Cahiers de Biologie Marine* 55 (2): 173–182

Crocetta F (2012) Marine alien Mollusca in Italy: a critical review and state of the knowledge. *Journal of the Marine Biological Association of the United Kingdom* 92: 1357–1365, http://dx.doi.org/10.1017/S002531541100186X

Crocetta F, Russo P (2013) The alien spreading of *Chama pacifica* Broderip, 1835 (Mollusca: Bivalvia: Chamidae) in the Mediterranean Sea. *Turkish Journal of Zoology* 37: 92–96, http://dx.doi.org/10.3906/zoo-1110-28

Crocetta F, Poursanidis D, Tringali LP (2015a) Biodiversity of sea slugs and shelled relatives (Mollusca: Gastropoda) of the Cretan Archipelago (Greece), with taxonomic remarks on selected species. *Quaternary International,* http://dx.doi.org/10.1016/j.quaint.2015.02.061

Crocetta F, Mariottini P, Salvi D, Oliverio M (2015b) Does GenBank provide a reliable DNA barcode reference to identify small alien oysters invading the Mediterranean Sea? *Journal of the Marine Biological Association of the United Kingdom* 95: 111–122, doi: http://dx.doi.org/10.1017/S0025315414001027

Crossland C (1924) Polychaeta of tropical east Africa, the Red Sea, and Cape Verde Islands collected by Cyril Crossland, and of the Maldive Archipelago collected by Professor Stanley Gardiner, M.A., F.R.S. The Lumbriconereidae and Staurocephalidae. *Proceedings of the Zoological Society of London* 1924: 1–106

Çinar ME (2005) Polychaetes from the coast of northern Cyprus (eastern Mediterranean Sea), with two new records for he Mediterranean Sea. *Cahiers de Biologie Marine* 46: 143–159

Çinar ME (2006) Serpulid species (Polychaeta: Serpulidae) from the Levantine coast of Turkey (eastern Mediterranean), with special emphasis on alien species. *Aquatic Invasions* 1(4): 223–240, http://dx.doi.org/10.3391/ai.2006.1.4.6

Çinar ME (2009) Alien polychaete species (Annelida: Polychaeta) on the southern coast of Turkey (Levantine Sea, eastern Mediterranean), with 13 new records for the Mediterranean Sea. *Journal of Natural History* 43 (37–38): 2283–2328, http://dx.doi.org/10.1080/00222930903094654

Çinar ME (2015) A new species of Myrianida (Polychaeta: Syllidae: Autolytinae) from Rhodes (Greece, eastern Mediterranean). *Journal of the Marine Biological Association of the United Kingdom* 95: 1101–1104, http://dx.doi.org/10.1017/S0025315415000107

Çinar ME, Ergen Z (2005) Lessepsian migrants expanding their distributional ranges; *Pseudonereis anomala* (Polychaeta: Nereididae) in Izmir Bay (Aegean Sea). *Journal of the Marine Biological Association of the United Kingdom* 85: 313–321, http://dx.doi.org/10.1017/S002531540501203h

Çinar ME, Katagan T, Öztürk B, Egemen Ö, Ergen Z, Kocatas A, Önen M, Kirkim F, Bakir K, Kurt G, Dagli E, Kaymakci A, Acik S, Dogan A, Özcan T (2006) Temporal changes of soft-bottom zoobenthic communities in and around Alsancak Harbour (Izmir Bay, Aegean Sea), with special attention to the autecology of exotic species. *Marine Ecology and Evolutionary Perspective* 27: 229–246, http://dx.doi.org/10.1111/j.1439-0485.2006.00102.x

Çinar ME, Bilecenoğlu M, Öztürk B, Katağan T, Yokeş MB, Aysel V, Dağli E, Açik S, Özcan T, Erdoğan H (2011) An updated review of alien species on the coasts of Turkey. *Mediterranean Marine Science* 12 (2): 257–316, http://dx.doi.org/10.12681/mms.34

D'Alessandro M, Castriota L, Consoli P, Romeo T, Andaloro F (2015) *Pseudonereis anomala* (Polychaeta, Nereididae) expands its range westward: first Italian record in Augusta and Siracusa harbours. *Marine Biodiversity*, http://dx.doi.org/10.1007/s12526-015-0334-8

ELNAIS-Ellenic Network on Aquatic Invasive Species 2015, http://elnais.hcmr.gr

Galil BS, Gevili R (2014) *Zoobotryon verticillatum* (Bryozoa: Ctenostomatida: Vesiculariidae), a new occurrence on the Mediterranean coast of Israel. *Marine Biodiversity Records* 7, e17, http://dx.doi.org/10.1017/S1755267214000086

Ganias G (1989) Contribution to the Study of Bryozoan of the Aegean Sea. PhD Thesis, University of Athens, Athens, Greece, 312 pp (in Greek)

Gerovasileiou V, Issaris Y (2014) First record of the Indo-Pacific ascidian *Herdmania momus* (Savigny, 1816) in Greek waters. In: Katsanevakis S, et al. (2014) New Mediterranean Biodiversity Records (October, 2014). *Mediterranean Marine Science* 15 (3): 675–695, http://dx.doi.org/10.12681/mms.1123

Gerovasileiou V, Voultsiadou E, Issaris Y, Zenetos A (In press) Evaluating alien biodiversity in Mediterranean marine caves and potential impact on cave communities. *Marine Ecology*

Giannuzzi-Savelli R, Pusateri F, Palmeri A, Ebreo C, Coppini M, Margelli A, Bogi C (2001) Atlante delle Conchiglie Marine del Mediterraneo. Vol. 7 (Bivalvia: Protobranchia - Pteriomorpha). Edizioni Evolver, Roma, 247 pp

Golani D (1998) Distribution of Lessepsian migrant fish in the Mediterranean. *Italian Journal Zoology* 65 (Supplement): 95–99, http://dx.doi.org/10.1080/11250009809386801

Golani D (2010) Colonization of the Mediterranean by Red Sea fishes via the Suez Canal-Lessepsian migration. In: Golani D, Appelbaum-Golani B (eds), Fish invasions of the Mediterranean Sea: change and renewal. Pensoft Publishers, Sofia-Moscow, pp 145–188

Gravier C (1900) Contribution à l'étude des Annélides Polychètes de la Mer Rouge. *Nouvelles Archives du Muséum National d'Histoire Naturelle (Paris)*, Series 42: 137–282

Guiry MD, Guiry GM (2015) AlgaeBase. World-wide electronic publication, National University of Ireland, Galway. http://www.algaebase.org (Accessed on 15 January 2015)

Gücu AC, Ok M, Sakınan S (2010) Past and present of fish fauna in the NE Levant Sea and factor facilitating the colonization by Lessepsian fishes. FAO, EastMed, 2010. Report of the Sub-Regional Technical meeting on the Lessepsian migration and its impact on Eastern Mediterranean fishery. GCP/INT/041/EC–GRE–ITA/TD-04, pp 88–108

Hayward PJ (1988) Mauritian cheilostome Bryozoa. *Journal of Zoology* 215(2): 269–356, http://dx.doi.org/10.1111/j.1469-7998.1988.tb04900.x

Ignatiadou L (1987) Phytoplankton. In: Karydis M (ed), Oceanographic and ecological survey of the SE Aegean Sea (1983-1984), Data Report NCMR, 202 pp

Jaklin A (1998) Contributions to the Rijeka Bay (Adriatic Sea) marine fauna. II. Gastropoda. In: Arko-Pijevac M, Kovačić M, Crnković D (eds) Natural history researches of the Rijeka region, Natural History Museum Rijeka, pp 571–581

Kalogirou S, Corsini-Foka M, Sioulas A, Wennhage H, Pihl L (2010) Diversity, structure and function of fish assemblages associated with *Posidonia oceanica* beds in an area of eastern Mediterranean and the role of non-indigenous species. *Journal of Fish Biology* 77: 2338–2357, http://dx.doi.org/10.1111/j.1095-8649.2010.02817.x

Kalogirou S, Mittermayer F, Pihl L, Wennhage H. (2012) Feeding ecology of indigenous and non-indigenous fish species within the family Sphyraenidae. *Journal of Fish Biology* 80: 2528–2548, http://dx.doi.org/10.1111/j.1095-8649.2012.03306.x

Kambouroglou V, Nicolaidou A (2006) A new alien species in Hellenic waters: *Pseudonereis anomala* (Polychaeta, Nereididae) invades harbors in the Eastern Mediterranean. *Aquatic Invasions* 1(2): 97–98, http://dx.doi.org/10.3391/ai.2006.1.2.8

Kapiris K, Dogrammatzi K (2013) First record of the alien decapod shrimp *Melicertus hathor* (Decapoda, Penaeidae) in Greek waters. In: Siokou I, et al. (2013) New Mediterranean Marine Biodiversity records (June 2013). *Mediterranean Marine Science* 14(1): 238–249, http://dx.doi.org/10.12681/mms.450

Katsanevakis S, Zenetos A, Poursanidis D, Nunes AL, Deriu I, Bogucarskis K, Cardoso AC (2013) ELNAIS meets EASIN: distribution of marine alien species in Greece using EASIN mapping

services and ELNAIS spatial data. *Mediterranean Marine Science* 14(1): 95–98, http://dx.doi.org/10.12681/mms.329

Katsanevakis S, Wallentinus I, Zenetos A, Leppäkoski E, Çinar ME, Oztürk B, Grabowski M, Golani Dl, Cardoso AC (2014) Impacts of invasive alien marine species on ecosystem services and biodiversity: a pan-European review. *Aquatic Invasions* 9: 391–423, http://dx.doi.org/10.3391/ai.2014.9.4.01

Katsanevakis S, Deriu I, D'Amico F, Nunes AL, Pelaez Sanchez S, Crocetta F, Arianoutsou M, Bazos I, Christopoulou A, Curto G, Delipetrou P, Kokkoris Y, Panov V, Rabitsch W, Roques A, Scalera R, Shirley SM, Tricarico E, Vannini A, Zenetos A, Zervou S, Zikos A, Cardoso ACC (2015) European Alien Species Information Network (EASIN): supporting European policies and scientific research. *Management of Biological Invasions* 6(2): 147–157. http://dx.doi.org/10.3391/mbi.2015.6.2.05

Kondylatos G, Corsini-Foka M (2015) First record of *Penaeus aztecus* Ives, 1891 (Crustacea, Decapoda) and *Melibe viridis* (Kelaart, 1858) (Gastropoda, Nudibranchia) in the southeastern Aegean Sea (Greece). In: Zenetos A, et al. (2015) New Mediterranean Biodiversity Records (April 2015). *Mediterranean Marine Science* 16 (1): 266–284, http://dx.doi.org/10.12681/mms.1292

Koukousioura O, Dimiza MD, Triantaphyllou MV (2010) Alien foraminifers from Greek coastal areas (Aegean Sea, Eastern Mediterranean). *Mediterranean Marine Science* 11 (1): 155–172, http://dx.doi.org/10.12681/mms.98

Koussouris TH, Nikolaidou A, Bogdanos C (1973) Etude préliminaire du phytobenthos de la région de Lindos de l'ile de Rhodes. *Oceanology and Limnology* 11: 715–743 (in Greek)

Langer MR, Hottinger L (2000) Biogeography of selected "larger" foraminifera. *Micropaleontology*, Supplement, 46: 105–126

Leutenegger S (1984) Symbiosis in benthic foraminifera: specificity and host adaptations. *Journal of Foraminiferal Research* 14 (1): 16–35, http://dx.doi.org/10.2113/gsjfr.14.1.16

Levinsen GMR (1909) Morphological and systematic studies on the Cheilostomatous Bryozoa. Carlsberg Fund and Fr. Bagge, Copenhagen, 431 pp, http://dx.doi.org/10.5962/bhl.title.5690

Meriç E, Avşar N, Yokeş MB (2008) Some alien foraminifers along the Aegean and southwestern coasts of Turkey. *Micropaleontology* 54 (3-4): 307–349

Mörch OAL (1863) Revisio critica Serpulidarum. Et Bidrag til Rørormenes Naturhistorie. *Naturhistorisk Tidsskrift*, København, Series 3, 1: 347–470

Morri C, Bianchi CN (1999) Hydroids (Cnidaria: Hydrozoa) from the Aegean Sea, mostly epiphytic on algae. *Cahiers de Biologie Marine* 40: 283–29

Morri C, Bianchi CN, Cocito S, Peirano A, De Biase AM, Aliani S, Pansini M, Boyer M, Ferdeghini F, Pestarino M, Dando P (1999) Biodiversity of marine sessile epifauna at an Aegean island subject to hydrothermal activity: Milos, eastern Mediterranean Sea. *Marine biology* 135: 729–739, http://dx.doi.org/10.1007/s002270050674

Nall CR, Guerin AJ, Cook EJ (2015) Rapid assessment of marine non-native species in northern Scotland and a synthesis of existing Scottish records. *Aquatic Invasions* 10: 107–121, http://dx.doi.org/10.3391/ai.2015.10.1.11

Napolitano E, Oguz, Malanotte-Rizzoli P, Yilmaz A, Sansone E (2000) Simulations of biological production in the Rhodes and Ionian basins of the eastern Mediterranean. *Journal of Marine Systems* 24:277–298

Nordsieck F (1973) A new Neritidae in the Mediterranean. *La Conchiglia* 5: 4

Pancucci-Papadopoulou MA (1994) New records of echinoderm species in Greek waters. *Bios* 2: 31–33

Pancucci-Papadopoulou MA, Corsini-Foka M (2010) The chronicle of alien species in Dodecanese Islands: a pathway of introduction in European coastal waters. 39th CIESM Congress, Venice, 10–14 May 2010. *Rapport Committée internationale Mer Méditerranée,* 39: 621

Pancucci-Papadopoulou MA, Corsini-Foka M, Raitsos DE (2011) Alien invasions and climatic changes: the southeastern Aegean experience. *Proceedings of the 12th International Conference on Environmental Science and Technology, Rhodes, Greece,* A1376–A1383

Pancucci-Papadopoulou MA, Raitsos DE, Corsini-Foka M (2012) Biological invasions and climatic warming: implications for southeastern Aegean ecosystem functioning. *Journal of the Marine Biological Association of the United Kingdom* 92: 777–789, http://dx.doi.org/10.1017/S0025315411000981

Papaconstantinou C (2014) Fauna Graeciae. An updated checklist of the fishes in the Hellenic Seas. Monographs on Marine Sciences, 7, HCMR, Athens, Greece, 340 pp

Perna E (2013) La collezione Perna Atlanto-Mediterranea –Gastropoda. *I Quaderni di Malachia* 7: 1–271

Perrone A (1983) Opistobranchi (Aplysiomorpha, Pleurobranco-morpha, Sacoglossa, Nudibranchia) del litorale salentino (Mar Jonio) (Elenco – Contributo primo). *Thalassia Salentina* 12 (13): 118–144

Por FD (1990) Lessepsian migration. An appraisal and new data. *Bulletin de l'Institut Océanographique Monaco*, Numéro spécial 7: 1–10

Powell NA (1969a) A Checklist of Indo-Pacific Bryozoa in the Red Sea. *Israel Journal of Zoology* 18: 357–362

Powell NA (1969b) Indo-Pacific Bryozoa new to the Mediterranean coast of Israel. *Israel Journal of Zoology* 18: 157–168

Raitsos DE, Beaugrand G, Georgopoulos D, Zenetos A, Pancucci-Papadopoulou MA, Theocharis A, Papathanassiou E (2010) Global climate change amplifies the entry of tropical species into the Mediterranean Sea. *Limnology and Oceanography* 55: 1478–1484, http://dx.doi.org/10.4319/lo.2010.55.4.1478

Rousou M, Ganias K, Kletou D, Loucaides A, Tsinganis M (2014) Maturity of the pufferfish *Lagocephalus sceleratus* in the southeastern Mediterranean Sea. *Sexuality and Early Development in Aquatic Organisms* 1: 35–44, http://dx.doi.org/10.3354/sedao00005

Russell BC, Golani D, Tikochinski Y (2015) *Saurida lessepsianus* a new species of lizardfish (Pisces: Synodontidae) from the Red Sea and Mediterranean Sea, with a key to *Saurida* species in the Red Sea. *Zootaxa* 3956: 559–568, http://dx.doi.org/10.11646/zootaxa.3956.4.7

Samir AM, Abdou HF, Zazou SM, El-Menhawey WH (2003) Cluster analysis of recent benthic foraminifera from the Northwestern Mediterranean coast of Egypt. *Revue de Micropaleontologie* 46: 111–130, http://dx.doi.org/10.1016/S0035-1598(03)00018-7

Simboura N, Nicolaidou A (2001) The Polychaetes (Annelida, Polychaeta) of Greece: checklist, distribution and ecological characteristics. Monographs on Marine Sciences, 4, NCMR, Athens, Greece, 115 pp

Simboura N, Zenetos A (2005) Increasing Polychaete diversity as a consequence of increasing research effort in Greek waters: new records and exotic species. *Mediterranean Marine Science* 6 (1): 75–88, http://dx.doi.org/10.12681/mms.194

Simboura N, Kurt Sahin G, Panagoulia A, Katsiaras N (2010) Four new alien species on the coasts of Greece (Eastern Mediterranean). *Mediterranean Marine Science* 11(2): 341–352, http://dx.doi.org/10.12681/mms.81

Simboura N (2011) An overlooked alien species present on the coasts of Greece (Eastern Mediterranean): the polychaete *Polycirrus twisti* Potts (Polychaeta: Terebellidae). *Mediterranean Marine Science* 12 (1): 239–246, http://dx.doi.org/10.12681/mms.62

Siokou-Frangou I, Gotsis-Skreta O, Christou E, Pagou K (1999) Plankton characteristics in the Aegean, Ionian and NW Levantine seas. In: Malanotte-Rizzoli P, Eremeev V (eds), The Eastern Mediterranean as a Laboratory Basin for the Assessment of Contrasting Ecosystems, NATO Science Series 51, pp 205–223, http://dx.doi.org/10.1007/978-94-011-4796-5_15

Spatharis S, Skliris N, Meziti A, Kormas KA (2012) First record of a *Trichodesmium erythraeum* bloom in the Mediterranean Sea. *Canadian Journal of Fisheries and Aquatic Sciences* 69(8): 1444–1455, http://dx.doi.org/10.1139/f2012-020

Stefani F, Aquaro G, Azzurro E, Colorni A, Galli P (2012) Patterns of genetic variation of a Lessepsian parasite. *Biological Invasions* 14: 1725–1736, http://dx.doi.org/10.1007/s10530-012-0183-3

Swennen C (1961) On a collection of Opisthobranchia from Turkey. *Zoologische Medelingen* 38: 41–75

Tenekides NS (1989) On a collection of shells from the Greek Seas. Protopapa Press, Athens, Greece, 187 pp (in Greek)

Tilbrook KJ (1999) Description of *Hippopodina feegeensis* and three other species of *Hippopodina* Levinsen, 1909 (Bryozoa: Cheilostomatida). *Journal of Zoology* 247: 449–456, http://dx.doi.org/10.1111/j.1469-7998.1999.tb01008.x

Tovar-Hernández MA, Knight-Jones P (2006) Species of *Branchiomma* (Polychaeta: Sabellidae) from the CaribbeanSea and Pacific coast of Panama. *Zootaxa* 1189: 1–37

Tsiamis K (2012) Alien macroalgae of the sublittoral zone of the Greek coasts. PhD Thesis, University of Athens, Greece, 336 pp

Tsiamis K, Gerakaris V (2015) First report of the red alga *Palisada maris-rubri* (Ceramiales, Florideophyceae) in the Eastern Mediterranean Sea. In: Tsiamis K, et al. 2015. New Mediterranean Biodiversity Records (July, 2015) *Mediterranean Marine Science* 16(2): http://dx.doi.org10.12681/mms.1440

Turan C, Erguden D, Gürlek M, Yaglioglu D, Uygur N (2014) First record of the blue-barred parrotfish, *Scarus ghobban* Forsskål, 1774 from Turkish coastal waters. *Journal of Applied Ichthyology* 30 (2): 424–425, http://dx.doi.org/10.1111/jai.12402

Tzomos T, Chartosia N, Christodoulou M, Kitsos MS (2010) New records and range expansion of lessepsian migrants in the Levantine and Aegean Seas. *Marine Biodiversity Records* 3: e10, http://dx.doi.org/10.1017/S1755267209991114

Winston JE (1986) An Annotated Checklist of Coral-Associated Bryozoans. *American Museum Novitates* 2859: 1–39

WoRMS Editorial Board (2015). World Register of Marine Species. Available from http://www.marinespecies.org at VLIZ. Accessed 2015–05–10

Zenetos (ed) (2015) Illustrated guide of marine alien species for students and citizen scientists - Target species for rapid assessment surveys in the Mediterranean**.** COST1209 Action, Alien Challenge, 22 pp

Zenetos A, Gofas S, Russo G, Templado J (2003) Molluscs. In: Briand F (ed), CIESM Atlas of exotic species in the Mediterranean. CIESM Publishers, Monaco, 3, pp 1–380

Zenetos A, Pancucci-Papadopoulou MA, Zogaris S, Papastergiadou E, Vardakas A, Aligizaki K, Economou AN (2009a) Aquatic alien species in Greece (2009): tracking sources, patterns and effects on the ecosystem. *Journal of Biological Research-Thessaloniki* 12: 1350–172

Zenetos A, Ovalis P, Kalogirou S (2009b) Closing the gap: *Cerithium scabridum* Philippi, 1848 found in the South Aegean (Greece, Mediterranean Sea). *Journal of Biological Research-Thessaloniki* 11: 107–110

Zenetos A, Gofas S, Verlaque M, Çinar ME, García Raso JE, Bianchi CN, Morri C, Azzurro E, Bilecenoğlu M, Froglia C, Siokou I, Violanti D, Sfriso A, San Martín G, Giangrande A, Katağan T, Ballesteros E, Ramos-Esplá A, Mastrotaro F, Ocaña O, Zingone A, Gambi MC, Streftaris N (2010) Alien species in the Mediterranean Sea by 2010. A contribution to the application of European Union's Marine Strategy Framework Directive (MSFD). Part I. Spatial distribution. *Mediterranean Marine Science* 11(2): 381–493, http://dx.doi.org/10.12681/mms.87

Zenetos A, Katsanevakis S, Poursanidis D, Crocetta F, Damalas D, Apostolopoulos G, Gravili C, Vardala-Theodorou E, Malaquias M (2011) Marine alien species in Greek Seas: Additions and amendments by 2010. *Mediterranean Marine Science* 12(1): 95–120, http://dx.doi.org/10.12681/mms.55

Zenetos A, Gofas S, Morri C, Rosso A, Violanti D, García Raso JE, Çinar ME, Almogi-Labin A, Ateş AS, Azzurro E, Ballesteros E, Bianchi CN, Bilecenoğlu M, Gambi MC, Giangrande A, Gravili C, Hyams-Kaphzan O, Karachle V, Katsanevakis S, Lipej L, Mastrototaro F, Mineur F, Pancucci-Papadopoulou MA, Ramos-Esplá A, Salas C, San Martín G, Sfriso A, Streftaris N, Verlaque M (2012) Alien species in the Mediterranean Sea by 2012. A contribution to the application of European Union's Marine Strategy Framework Directive (MSFD). Part 2. Introduction trends and pathways. *Mediterranean Marine Science* 13(2): 328–352, http://dx.doi.org/10.12681/mms.327

Zenetos A, Koutsogiannopoulos D, Ovalis P, Poursanidis D (2013) The role played by citizen scientists in monitoring marine alien species in Greece. *Cahier de Biologie Marine* 54 (3): 419–426

Zenetos A, Arianoutsou M, Bazos I, Balopoulou S, Corsini-Foka M, Dimiza M, Drakopoulou P, Katsanevakis S, Kondylatos G, Koutsikos N, Kytinou E, Lefkaditou E, Pancucci-Papadopoulou MA, Salomidi M, Simboura N, Skoufas G, Trachalakis P, Triantaphyllou M, Tsiamis K, Xentidis NJ, Poursanidis D (2015) ELNAIS: A collaborative network on Aquatic Alien Species in Hellas (Greece). *Management of Biological Invasions* 6(2): 185–196, http://dx.doi.org/10.3391/mbi.2015.6.2.09

Zibrowius H (1971) Les espèces Méditerranéennes du genre *Hydroides* (Polychaeta, Serpulidae). Remarques sur le prétendu polymorphisme de *Hydroides uncinata*. *Téthys* 2: 691–746

The following supplementary material is available for this article:

Table S1. Inventory of marine alien and cryptogenic species in Dodecanese Islands (March 2015).

This material is available as part of online article from:
http://www.reabic.net/journals/mbi/2015/Supplements/MBI_2015_CorsiniFoka_etal_Supplement.xls