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Biogeographical homogeneity in the eastern Mediterranean Sea – III. New records and a state of the art of Polyplacophora, Scaphopoda and Cephalopoda from Lebanon

(Mollusca)

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The Mediterranean molluscan fauna is widely studied, and is largely considered as the best known in the world. However, mostly due to a severe bias in the geographical samplings, a difference is observed between the knowledge on the central and the western areas and that available for the Levantine Sea. Based on literature reports (spanning over a period of more than 150 years) and extensive fieldwork (altogether covering more than 20 years), a first updated check-list of polyplacophorans, scaphopods and cephalopods from Lebanon (eastern Mediterranean Sea) is provided here. *Leptochiton bedullii* Dell'Angelo & Palazzi, 1986, *Parachiton africanus* (Nierstrasz, 1906), *Chiton phaseolinus* Monterosato, 1879, *Lepidochitona caprearum* (Scacchi, 1836), *Lepidochitona monterosatoi* Kaas & Van Belle, 1981 and specimens ascribed to the *Sepioteuthis lessoniana* Férussac in Lesson, 1831 complex are new records for Lebanon. The occurrence of *Alloteuthis subulata* (Lamarck, 1798) and *Acanthochitona discrepans* (Brown, 1827) is excluded as the species records are based on a possible misidentification and a misreading, respectively. For each treated species we present a detailed Lebanese record list, a brief morphological description and its known geographic distribution. Finally, updated Mediterranean check-lists of the three classes are provided.

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Introduction

Despite the continuous efforts to provide updated datasets of the Mediterranean marine fauna, our knowledge on the Levantine area – especially in the north-eastern part – still remains considerably poor when compared to the central and western basin (e.g. Vacelet et al. 2007, Harmelin et al. 2009, Morri et al. 2009). This is mostly due to undersampling and the lack of recent comprehensive studies. This holds also true for the Mollusca, despite the Mediterranean molluscan fauna being commonly considered as the best known in the world (Oliverio 2003, Coll et al. 2010). Additionally, while most of the Mediterranean malacological studies concern the two main classes (Gastropoda and Bivalvia), the remaining classes are often neglected due to the objective paucity of taxonomical specialists.

The knowledge on the Lebanese marine fauna, in particular, had a similar history to the rest of the Levant area. A comprehensive and updated check-list of molluscan species from Lebanon is currently missing, and data on distribution, taxonomy and ecology of molluscan taxa are mostly scattered throughout various papers published over a period of more than 150 years. Concerning polyplacophorans, scaphopods and cephalopods, there are few papers available from the beginning of the past century (Pallary 1919, Gruvel & Moazzo 1929, Gruvel 1931, Pallary 1938). During the last eighty years hardly ten sources (papers, notes, abstracts and non-peer-reviewed articles or reports) marginally cited chitons (Polyplacophora), tusk shells (Scaphopoda), and squids, octopuses and cuttelfishes (Cephalopoda) from Lebanon, without discussions or comparisons with neighbouring areas (Spada 1971, Fadlallah 1975, Roper et al. 1984, Bitar 1996, Bitar & Kouli-Bitar 1998, Majdalani 2004, Lelli et al. 2006, Bonfitto et al. 2011, Colloca & Lelli 2012, Lakkis 2013).

Based on the material collected within the CEDRE framework (French-Lebanese co-operation programme 1999-2002: Zibrowius & Bitar 2003, Morri et al. 2009), additional samples provided by some of us (here GB and BDA), and on a critical review of the literature records, the local Molluscan fauna is currently reviewed. Aim of the present paper, the third in the series on Lebanese mollusca (see Crocetta et al. 2013a,b), is to gather all available data to provide the first detailed compilation of the species of Polyplacophora, Scaphopoda and Cephalopoda from Lebanon, with morphological description and biogeographical remarks for all taxa, and comments on some previously published records. In addition, an updated check-list of the Mediterranean species of the three classes is compiled.

Materials and methods

Bibliographic data

Lebanese check-lists. An extensive literature survey has been conducted, according to the same methods reported by Crocetta et al. (2013a,b). Indexed papers were searched for, but an attempt to cover as much as possible – also the grey literature (i.e. non indexed papers, but including also non peer-reviewed journals, books, congress abstracts, etc.) – has also been performed. Literature record listing has been as exhaustive as possible, regardless of each record referring to an independent finding. Collected data were re-analysed and taxonomically adjusted to allow for comparisons. A comprehensive overview of the Lebanese flora and fauna has been recently published (Lakkis 2013), including also a checklist of the Mollusca. This work, however, lacks any critical approach, is mostly not based on concrete material (nor, when available, is the location of the voucher specified) and does not refer to recent bibliography. The strong incongruences and uncertainties on systematics, taxonomy, nomenclature and identification of native and non-native species are the reasons why it was excluded from the present review.

Mediterranean check-lists. The updated Mediterranean check-lists were based on previously published check-lists (see key references to the Appendices listed in alphabetical order in the literature list, but preceded by numbers between square brackets), integrated by a critical appreciation of recent literature records and personal expertise of the authors, including field research and analysis of material from private and institutional collections. Hereby the excluded species and the rationale for their exclusion are explicitly reported. These exclusions mainly base on records not consistently justified (e.g. "first Mediterranean records" represented by mere names in lists, with no clear figures, nor morphological description and/or comparisons with similar species; records based on empty shells of doubtful origin only, etc.). References with numbers in square brackets are as citations used in the Appendices.

Study area and sampling

Lebanon lies at the easternmost tip of the Mediterranean Sea, on the north-eastern corner of the Levant basin. It is located approx. 450 km north of the Suez Canal (Fig. 1), along the natural pathways of many of the Indo-Pacific taxa spreading from the Red Sea, according to the prevailing Mediterranean currents (Bergamasco & Malanotte-Rizzoli 2010). Several localities have been sampled by two of us (GB and HZ) between 1999 and 2002 within the CEDRE framework, and this material was later enriched by further samples, photos and personal observations provided by some of us (here GB and BDA) since 1988. Samples of Polyplacophora and Scaphopoda have been collected by hand during snorkelling and SCUBA diving in daylight hours only, while cephalopods were predominantly photo-documented. A high diversity of habitats was examined,

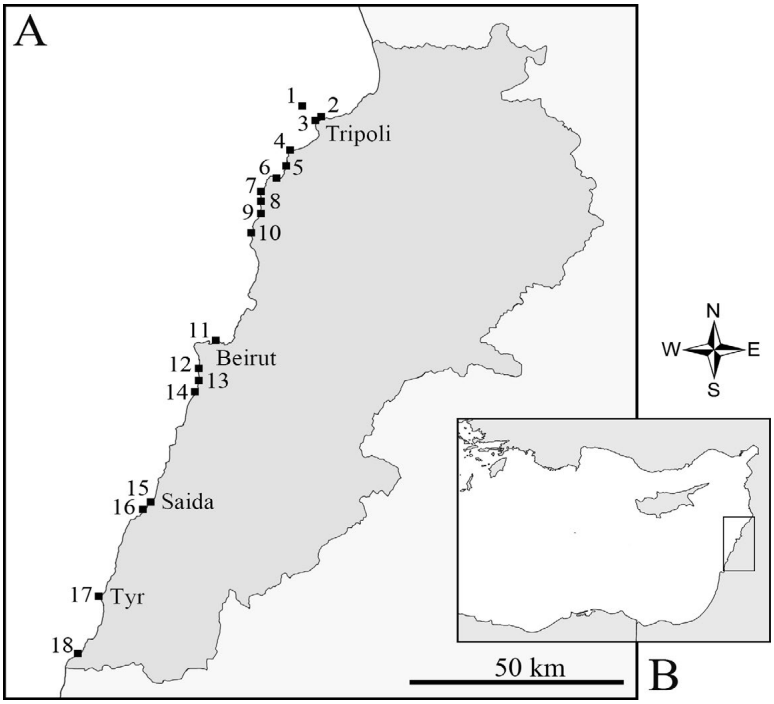

Fig. 1. Study area. **A.** Map of the sampling sites corresponding to the localities reported in Table 1. **B.** The Levant Sea, with location of Lebanon (black rectangle).

including almost all available biotopes from the intertidal down to ca. 40 m depth. Specimens of Polyplacophora, Scaphopoda and Cephalopoda were found at 18 sites, listed in Table 1 (see also Fig. 1).

Laboratory work and updated taxonomy and nomenclature

Living samples hereby analysed were soon fixed in 2 % buffered formaldehyde and subsequently transferred to 100 % EtOH, or dehydrated and dry preserved along with empty shells or loose plates, and are currently preserved at Dipartimento di Biologia e Biotecnologie "Charles Darwin" (University of Rome "La Sapienza" – Italy: BBCD), Muséum National d'Histoire Naturelle (Paris – France: MNHN) and in Bruno Dell'Angelo's private collection (Genova – Italy: BDA). In the case of dead specimens, very worn ones were discarded to exclude as much as possible the contamination from taphocoenotic assemblages. Where applicable, identifications were carried out by two authors (here FC and BDA) up to species level. Updated systematic listing (up to family level) follows Check List of European Marine Mollusca (CLEMAM), whilst taxonomy and nomenclature follow the World Register of Marine Species (WoRMS). Unpublished records of alien species have been deposited in EASIN (European Alien Species Information Network: see Katsanevakis et al. 2012).

Table 1. Sampling localities shown in Figure 1, with coordinates. Details of biotopes from which the collections/observations were made are reported under each species.

No.	Sites	Coordinates	
		Latitude	Longitude
1	Ramkine Island	34°29'47" N	35°45'38" E
2	Beddawi	34°28'16" N	35°51'34" E
3	Tripoli	34°27'28" N	35°49'34" E
4	Anfeh	34°21'43" N	35°43'36" E
5	El Heri	34°18'37" N	35°41'51" E
6	Ras El Chakaa	34°18'47" N	35°40'59" E
7	Hannouch	34°18'26" N	35°40'35" E
8	Selaata	34°17'03" N	35°39'31" E
9	Batroun	34°15'13" N	35°39'19" E
10	El Barbara	34°11'32" N	35°37'19" E
11	Beirut	33°54'55" N	35°31'57" E
12	Khaldeh	33°46'44" N	35°28'10" E
13	Jiyeh	33°39'20" N	35°24'56" E
14	Wadi El Zeini	33°37'18" N	35°23'55" E
15	Saida	33°34'00" N	35°22'10" E
16	El Zahrani	33°29'46" N	35°20'01" E
17	Tyr	33°15'56" N	35°11'24" E
18	Nakoura	33°06'57" N	35°07'11" E

Abbreviations

spm	live-collected specimen/s
sh	empty shell/s
v	loose plates
det	determinavit

Results

The cumulative list of species of Polyplacophora, Scaphopoda and Cephalopoda from Lebanon is summarised in Table 2. Detailed information about bibliographic references, the accepted taxonomic status, the material examined for each species and some specific remarks are listed below. Diagnoses hereby reported are not entirely based on the material examined, but on a mix of literature data supplemented with own observations. A total of 26 species (eleven Polyplacophora, five Scaphopoda and ten Cephalopoda) have been reliably checked from Lebanon, and 23 of them were identified to species level. Three more have been ascribed to as many species complex, pending taxonomical reviews. New Lebanon records are marked with an asterisk. For literature records, the use (or not) of parentheses for taxon authorships has been reported as originally employed in each literature record. The original style (caps v. small, italics v. roman) has been corrected, whilst the original spelling has been maintained and is followed by [sic!] if wrong. The numbers in parentheses within "material examined" refer to the location of finding, as numbered in Table 1.

Table 2. Polyplacophora, Scaphopoda and Cephalopoda known from Lebanon, based on bibliographic records (BR) and/or new material examined (ME).

Family	Taxon	BR	ME
Class Polyplacophora			
Leptochitonidae	*Leptochiton bedullii*		X
	Parachiton africanus		X
Chitonidae	*Chiton corallinus*	X	X
	Chiton olivaceus	X	X
	Chiton phaseolinus		X
Ischnochitonidae	*Ischnochiton rissoi*	X	X
Callochitonidae	*Callochiton septemvalvis*	X	X
Lepidochitonidae	*Lepidochitona caprearum*		X
	Lepidochitona monterosatoi		X
Acanthochitonidae	*Acanthochitona crinita*	X	X
	Acanthochitona fascicularis	X	X
Class Scaphopoda			
Dentaliidae	*Antalis dentalis*	X	
	Antalis inaequicostata	X	X
	Antalis vulgaris	X	X
Fustiariidae	*Fustiaria rubescens*	X	
Gadilidae	*Dischides politus*	X	
Class Cephalopoda			
Sepiidae	*Sepia elegans*	X	
	Sepia officinalis	X	X
Loliginidae	*Alloteuthis media*	X	
	Loligo vulgaris	X	
	Sepioteuthis lessoniana complex		X
Ommastrephidae	*Illex coindetii*	X	
Octopodidae	*Callistoctopus macropus* complex	X	
	Eledone moschata	X	
	Octopus vulgaris complex	X	X
Argonautidae	*Argonauta argo*	X	

Class Polyplacophora Gray, 1821

Family Leptochitonidae Dall, 1889

**Leptochiton bedullii* Dell'Angelo & Palazzi, 1986

Material examined. (2) Beddawi: 06/1995 – sediment, 10–22 m: 30 v, BDA det (BDA); (16) El Zahrani: 06/1995 – sediment, 15.5–28.5 m: 2 v, BDA det (BDA).

Diagnosis. Animal small, maximum length ~1 cm, elongate oval, moderately elevated, subcarinated. Colour of tegmentum dirty white to brownish, sometimes with darker spots. Girdle narrow. Head valve semicircular, front slope straight, posterior margin widely V-shaped, notched in middle. Intermediate valves broadly rectangular, subcarinated, anterior margin slightly concave between apophyses, lateral margins rounded, posterior margin slightly convex with apex inconspicuous, lateral areas moderately raised. Tail valve with anterior margin convex, mucro posterior and prominent, posterior slope concave directly behind mucro. Tegmentum with minute granules, arranged in numerous, close-set, radiating rows on head valve, lateral areas of intermediate valves, and in postmucronal area of tail valve; arranged in longitudinal rows in central area of intermediate valves and in antemucronal area of tail valve. Articulamentum without insertion laminae, apophyses small, more or less triangular, widely separated by straight sinus, intermediate valves strongly calloused along the posterior margin, callosity clearly forwardly produced in jugal part.

Distribution. Central and Eastern Mediterranean Sea (see Appendix 1).

**Parachiton africanus* (Nierstrasz, 1906)

Material examined. (1) Ramkine Island: 31/05/2000 – coarse sand, 13 m: 1 v, BDA det (MNHN).

Diagnosis. Animal small, usually ~1 cm (although maximum length ~2.5 cm reported), total length more than twice total width, elongate oval, rounded profile, Colour of the tegmentum from yellowish white to light purple, with darker, reddish brown maculae. Girdle thin. Head valve semicircular, front slope straight, posterior margin shaped. Intermediate valves rectangular, non-carinate, apex not visible, posterior margin straight, lateral areas little elevated, only distinguishable by different sculpture. Tail valve semi-oval, very depressed, longer than wide, rounded mucro located at ~7/8th of valve length towards posterior margin, very long posterior valve, ~1/4 length of whole shell. Tegmentum with fine, oval granules, arranged in radial series in head valve and in postmucronal area of tail valve, interrupted by weak growth striae; granules arranged in longitudinal series in central area of intermediate valves and in antemucronal area of tail valve, slightly convergent on the jugal tract; granules arranged quincuncially in lateral areas of intermediate valves, interrupted by 6–7 concentric growth striae. Articulamentum without insertion laminae, apophyses more or less triangular, scarcely developed, separated by wide jugal sinus.

Distribution. The entire Mediterranean Sea (see Appendix 1).

Family Chitonidae Rafinesque, 1815

Chiton corallinus (Risso, 1826)

Literature records. *Chiton corralinus* [sic!] (Risso) – Fadlallah 1975: 69; Bitar 1996: 116; *Chiton corallinus* (Risso, 1826) – Bitar & Kouli-Bitar 1998: 38.

Material examined. (2) Beddawi: 06/1995 – sediment, 10–22 m: 42 v, BDA det (BDA); (6) Ras El Chakaa: 04/06/2000 – >10 m: 1 spm, BDA det (MNHN); (9) Batroun: 16/10/1999 – old town, 1 m: 1 spm, BDA det (MNHN); (16) El Zahrani: 06/1995 – sediment, 15.5–28.5 m: 15 v, BDA det (BDA).

Diagnosis. Animal of medium size, maximum length ~2.5 cm, elongate oval, carinated, rather elevated, girdle moderately wide. Colour variable, generally red or with prevalence of reddish nuances. Head valve semicircular, front slope straight, posterior margin widely V-shaped. Intermediate valves rectangular, carinated, anterior margin convex, lateral margins truncated, posterior margin concave with barely suggested apex, lateral areas clearly defined. Tail valve semicircular, anterior margin convex, central mucro evident but not prominent. Headvalve, lateral areas of intermediate valves, and postmucronal area of tail valve smooth, while each pleural area has 7–10 small longitudinal outward-leaning folds. Articulamentum with apophyses wide, rounded, tending to trapezoidal in tail valve, connected by short, dentate jugal plate, slit formula: 8-10/1/9–11.

Distribution. Northern part of the Atlantic coast of Morocco (see Kaas et al. 2006), and the entire Mediterranean Sea (see Appendix 1).

Chiton olivaceus Spengler, 1797

Literature records. *Chiton olivaceus* Spengler – Pallary 1919: 172; Gruvel & Moazzo 1929: 425; Gruvel 1931: 449; Pallary 1938: 47; Spada 1971: 90; Bitar 1996: 116; *Chiton olivaceus* Spengler, 1797 – Bitar & Kouli-Bitar 1998: 38.

Material examined. (1) Ramkine Island: 01/06/2000 – under stones, 3–5 m: 3 spm, BDA det (MNHN); (2) Beddawi: 06/1995 – sediment, 10–22 m: 12 v, BDA det (BDA); (3) Tripoli: 20/09/2002 – harbour entrance, breakwater jetty, 5 m: 2 spm, BDA det (MNHN); (5) El Heri (marina Beaulieu): 03/06/2000 – under stones, 1–5 m: 13 spm, BDA det (MNHN); (6) Ras El Chakaa: 04/06/2000 – cave, 3–5 m: 1 spm, BDA det (MNHN); 21/09/2002 – under stones, 12 m: 2 spm, BDA det (MNHN); (8) Hannouch: 18/09/2002 – under stones, 1–5 m: 25 spm, BDA det (MNHN); (9) Batroun: 16/10/1999 – old town, "Phenician wall", incrusted vertical wall, 9 m: 2 spm, BDA det (MNHN); under stones, 2–5 m: 53 spm, BDA det (MNHN); (13) Jiyeh: 15/02/1991 – beach: 1 spm, BDA det (photo Ghazi Bitar); (16) El Zahrani: 06/1995 – sediment, 15.5–28.5 m: 6 v, BDA det (BDA); (17) Tyr: 25/10/1999 – Sour, shoal, on rocks, 12 m: 1 spm, BDA det (MNHN); Nakoura: 22/09/2002 – jetty, 5 m: 1 spm, BDA det (MNHN).

Diagnosis. Animal of large size, maximum length ~4.5 cm, elongate oval, carinated, girdle moderately wide. Colour very variable, with prevalence of olive, green or brown shades. Head valve semioval, front slope faintly convex, posterior margin widely V-shaped. Intermediate valves rectangular, carinated, anterior and posterior margins more or less straight, apex clear indicated, lateral areas neatly separated from central areas. Tail valve semicircular, anterior margin straight, central mucro scarcely evident. Head valve, lateral areas of intermediate valves, and postmucronal area of tail valve with sculpture of rather coarse radial grooves, while pleural areas sculptured on each side by 6–15 small longitudinal outward-leaning folds. Articulamentum with apophyses wide, rounded, tending to trapezoidal in tail valve, connected by short, dentate jugal plate, slit formula: 8–9/1/9–13.

Distribution. Northeastern Atlantic, restricted to Tangers and along the southern coast of Portugal (see Kaas et al. 2006), and the entire Mediterranean Sea (see Appendix 1).

**Chiton phaseolinus* Monterosato, 1879

Material examined. (6) Ras El Chakaa: 04/06/2000 – cave sediment, 3–4.5 m: 2 v, BDA det (MNHN).

Diagnosis. Animal small, maximum length ~1 cm, elongate oval, moderately elevated, subcarinated. Colour uniformly light green, tending sometimes to lighter tonality, brownish, or even reddish. Girdle moderately wide, of similar uniform coloration, but lighter. Head valve semicircular, front slope weakly convex, posterior margin widely V-shaped. Intermediate valves subrectangular, rounded, anterior margin straight to weakly convex, lateral margins rounded, posterior margin straight with barely evident apex, lateral areas hardly elevated and hardly separated from central areas. Tail valve semi-elliptic, anterior margin convex, mucro scarcely evident in anterior position. Anterior valve, lateral areas of intermediate valves, and postmucronal area of tail valve smooth, while pleural areas sculptured on each side by 5–8 longitudinal outward-leaning grooves, of which only first two or three reach the anterior margin. Articulamentum with apophyses wide, triangular, tending to trapezoidal in tail valve, connected by short, finely denticulate jugal plate, slit formula: 8–14/1/8–9.

Distribution. The entire Mediterranean Sea (see Appendix 1).

Family Ischnochitonidae Dall, 1889

Ischnochiton rissoi (Payraudeau, 1826)

Literature records. *Ischnochiton rissoi* (Payr.) – Fadlallah 1975: 69; *Ischnochiton rissoi* Payraudeau – Bitar 1996: 116; *Ischnochiton rissoi* (Payraudeau, 1826) – Bitar & Kouli-Bitar 1998: 38.

Material examined. (1) Ramkine Island: 01/06/2000 – under stones, 3–5 m: 1 spm, BDA det (MNHN); (2) Beddawi: 06/1995 – sediment, 10–22 m: 30 v, BDA det (BDA); (3) Tripoli: 20/09/2002 – harbour entrance, breakwater jetty, 5 m: 1 spm, BDA det (MNHN); (9) Batroun: 23/09/2002 – under stones, low depth: 2 spm, BDA det (MNHN); (16) El Zahrani: 06/1995 – sediment, 15.5–28.5 m: 2 v, BDA det (BDA).

Diagnosis. Animal of medium size, maximum length ~2.5 cm, elongate oval, moderately elevated, back evenly rounded to subcarinated. Colour very variable, olive or greyish to reddish, always with lighter stains. Head valve semicircular, front slope weakly convex, posterior margin widely V-shaped. Intermediate valves subrectangular, with rounded profile, anterior margin straight on jugal side, obliquely truncated at the corners, posterior margin straight, apex inconspicuous, lateral areas moderately raised. Tail valve semi-oval, mucro centrally swollen but not prominent, posterior slope straight to slightly concave. Head valve, lateral areas of intermediate valves, and postmucronal area of tail valve with concentric wavy lirae, often intersected by fine radiating grooves, which appears granular; the concentric lirae continue longitudinally on central area of intermediate valves, and on antemucronal area of tail valve, more spaced on lateral margins, closer and finer in jugal area. Articulamentum with apophyses rounded, tending to trapezoidal in tail valve, jugal sinus wide, slit formula: 10–13/1/9–12.

Distribution. Northeastern Atlantic, restricted to the surroundings of Gibraltar (see Dell'Angelo & Smriglio 1999), and the entire Mediterranean Sea (see Appendix 1). Records from the Canary Islands, Selvagens and Azores (Bergenhayn 1931) require confirmation.

Family Callochitonidae Plate, 1901

Callochiton septemvalvis (Montagu, 1803)

Literature records. *Callochiton laevis* [sensu] (Montg.) (not *Chiton laevis* Pennant, 1777) – Fadlallah 1975: 69; *Callochiton laevis* [sensu] Montagu (not *Chiton laevis* Pennant, 1777) – Bitar 1996: 116; *Callochiton septemvalvis* (Montagu, 1803) – Bitar & Kouli-Bitar 1998: 38.

Material examined. (2) Beddawi: 06/1995 – sediment, 10–22 m: 20 v, BDA det (BDA); (16) El Zahrani: 06/1995 – sediment, 15.5–28.5 m: 11 v, BDA det (BDA).

Diagnosis. Animal of medium size, maximum length ~3 cm, oval, moderately elevated, carinated. Colour very variable, reddish to dark brown, more or less mottled with spots of various colours. Girdle very wide, about a third of animal's total width, with four bands of lighter colour almost always present. Head valve semicircular, front slope straight to slightly concave, posterior margin widely V-shaped. Intermediate valves broadly rectangular, carinated, anterior margin regularly convex or somewhat sinuate, lateral margins rounded, posterior margin slightly concave both sides the pronounced apex, lateral areas raised. Tail valve semicircular, with small, hardly raised central mucro, posterior slope straight or very slightly concave directly behind mucro. Tegmentum with very fine quincuncially

arranged microgranules, closely beset with black "shell-eyes", irregularly arranged on anterior valve, lateral areas of intermediate valves, and postmucronal area of tail valve, concentric growth lines present. Articulamentum with very wide, rather short, regularly rounded apophyses, connected by jugal lamina, insertion plates short, slit formula: 16–20/2–3/14–18.

Distribution. Northeastern Atlanctic, European coast from Norway and the Shetland Islands to the Canary Islands (see Dell'Angelo & Smriglio 1999), and the entire Mediterranean Sea (see Appendix 1).

Remarks. This species has a very complicated taxonomic history, reported by Dell'Angelo & Smriglio (1999). Mediterranean specimens are generally characterised by 3–5 longitudinal grooves on both sides of the central areas, which may or not reach the front margins of the valves (Kaas 1978, Dell'Angelo & Palazzi 1994).

Family Lepidochitonidae Iredale, 1914

**Lepidochitona caprearum* (Scacchi, 1836)

Material examined. (7) Selaata: 23/10/1999 – amidst *Dendropoma* sp., intertidal: 1 spm, BDA det (BDA).

Diagnosis. Animal of medium size, maximum length ~2 cm, oval, little elevated, back rounded. Colour roseate olivaceous, with irregular grey or whitish stripes. Girdle moderately wide, with series of green and grey stripes. Head valve little less than semicircular, with 8–10 radial depressions crossing surface. Intermediate valves rectangular, rounded, anterior margin almost straight or slightly concave, a slight apex is noticeable in juvenile specimens but tends to disappear in adults, lateral areas hardly raised, though indicated by a rounded diagonal rib. Tail valve small, broadly triangular, much smaller than head valve, mucro elevated, in subcentral position, postmucronal slope almost straight. Tegmentum evenly sculptured with rather coarse granules, irregularly arranged in quincunx. Articulamentum with apophyses strong, from trapezoidal to subtriangular in intermediate valves, neatly rectangular and very developed in tail valve, slit formula: 8–10/1/10–12.

Distribution. Northeastern Atlantic, only known from along the southern coast of Spain and Portugal and the Selvagens Islands (see Dell'Angelo & Smriglio 1999), and the entire Mediterranean Sea (see Appendix 1).

**Lepidochitona monterosatoi* Kaas & Van Belle, 1981

Material examined. (2) Beddawi: 06/1995 – sediment, 10–22 m: 50 v, BDA det (BDA); (16) El Zahrani: 06/1995 – sediment, 15.5–28.5 m: 6 v, BDA det (BDA).

Diagnosis. Animal small, maximum length ~1 cm, elongate oval, moderately elevated, subcarinated. Colour variable, green to light green-grey, with yellowish nuances. Head valve semicircular, the posterior margin forms very obtuse angle, circularly indented in middle, adult specimens with eight wide radial depressions. Intermediate valves rectangular, subcarinated, anterior margin slightly concave between apophyses, posterior margin with strongly protruding apex, lateral areas elevated. Tail valve small, semi-elliptic, anterior margin slightly convex, mucro subcentral, only slightly prominent, posterior slope little concave. Tegmentum uniformly granulated, granules roundish/oval, convex, arranged in quincunx on end valves, lateral areas and jugal parts of intermediate valves, in curved, diverging, longitudinal series on pleural areas of intermediate valves, and on antemucronal area of tail valve. Articulamentum with apophyses triangular in intermediate valves, trapezoidal in tail valve, jugal sinus wide, slit formula: 8/1/11.

Distribution. The entire Mediterranean Sea (see Appendix 1). The presence in the Red Sea (Strack 1993) is unconfirmed and requires further analyses.

Family Acanthochitonidae Pilsbry, 1893

Acanthochitona crinita (Pennant, 1777)

Literature records. *Acanthochiton* [sic!] *gracilis* (Jeffreys) – Fadlallah 1975: 69; *Acanthochiton* [sic!] *gracilis* (Jeffreys) – Bitar 1996: 116; *Acanthochitona discrepans* (Brown, 1827) sensu Bitar & Kouli-Bitar (1998) – Bitar & Kouli-Bitar 1998: 38; *Acanthochitona crinita* (Pennant, 1777) – Bonfitto et al. 2011: 173.

Material examined. (2) Beddawi: 06/1995 – sediment, 10–22 m: 1 v, BDA det (BDA); (4) Anfeh: 26/10/1999 – under rocks on a sandy bottom, 20 m: 2 spm, BDA det (MNHN).

Diagnosis. Animal of medium size, maximum length ~2 cm, elongate oval, subcarinated. Colour not uniform and very variable, typically olive green, with various degrees of blotches in which brown, yellow, purple and white variously combine. Girdle wide, with an analogous variable colour. Head valve semicircular. Intermediate valves ellipsoidal, very variable, with straight to rounded profile of lateral

margins giving valve nearly pentagonal shape, subcarinated, jugal area generally wider than that in *A. fascicularis*, little elevated, hardly separated from the lateropleural area, apex evident. Tail valve ellipsoidal, jugal area similar to that of intermediate valves, mucroevident in central position, postmucronal slope strongly concave just behind mucro. Tegmentum uniformly covered with irregularly arranged granules, shaped from oval to more or less elongate drop, with flat or slightly concave surface: jugal area with fine longitudinal striae. Articulamentum amply projecting from under the tegmentum, with quadrangular strongly protruding apophyses, delimiting a wide jugal sinus, slit formula: 5/1/2.

Distribution. Atlantic coast of Europe (as far north as Norway) and North America, plus Madeira, the Azores, the Canary Islands and the Cape Verde Archipelago (see Dell'Angelo & Smriglio 1999), and the entire Mediterranean Sea (see Appendix 1).

Remarks. The Lebanese record of *Acanthochitona discrepans* (Brown, 1827) by Bitar & Kouli-Bitar (1998) was based on the reinterpretation of the record of *Acanthochiton* [sic!] *gracilis* (Jeffreys) [= *Acanthochitona crinita* (Pennant, 1777)] by Fadlallah (1975). However, *Acanthochitona discrepans* (Brown, 1827) is a distinct species (Dell'Angelo & Smriglio 1999, Bonfitto et al. 2011, Moreno & Gofas 2011), only confirmed from the Alboran Sea within the Mediterranean area (Moreno & Gofas 2011).

Acanthochitona fascicularis (Linnaeus, 1767)

Literature records. *Acanthochiton* [sic!] *fassicularis* [sic!] (L) – Fadlallah 1975: 69; *Acanthochiton* [sic!] *fascicularis* (L) – Bitar 1996: 116; *Acanthochitona fascicularis* (Linné, 1767) – Bitar & Kouli-Bitar 1998: 38; Bonfitto et al. 2011: 173.

Material examined. (2) Beddawi: 06/1995 – sediment, 10–22 m: 35 v, BDA det (BDA); (8) Hannouch: 18/09/2002 – under stones, 1–5 m: 2 spm, BDA det (MNHN); (16) El Zahrani: 06/1995 – sediment, 15.5–28.5 m: 21 v, BDA det (BDA).

Diagnosis. Animal of large size, maximum length ~5 cm, elongate oval, subcarinated. Colour not uniform, very variable, brown-green to red-orange. Girdle wide, with analogous variable colour. Head valve semicircular. Intermediate valves triangular to pentagonal, subcarinated, jugal area generally narrow, elevated, and neatly separated from the lateropleural area, apex well evident. Tail valve almost circular to ellipsoidal, jugal area similar to that of the intermediate valves, mucro well evident in central position, postmucronal slope concave just behind the mucro. Tegmentum uniformly thickly covered with small, irregularly arranged roundish granules, with flat or slightly concave surface, jugal area with fine longitudinal striae. Articulamentum with quadrangular and very protruding apophyses, delimiting a wide jugal sinus, slit formula: 5/1/2.

Distribution. Northeastern Atlantic, from the British Channel and Bretagne to the Azores and the Canary Islands (see Dell'Angelo & Smriglio 1999), and the entire Mediterranean Sea (see Appendix 1).

Class Scaphopoda Bronn, 1862

Family Dentaliidae Children, 1834

Antalis dentalis (Linnaeus, 1758)

Literature records. *Dentalium dentalis* Linné – Gruvel & Moazzo 1929: 426; Gruvel 1931: 449; Pallary 1938: 47; *Dentalium dentalis* L. – Bitar 1996: 121; *Dentalium dentalis* Linné, 1758 – Bitar & Kouli-Bitar 1998: 41.

Diagnosis. Shell thick, lightly curved, tubular, elephant tusk shaped. Maximum length ~3 cm. Usually whitish/greyish coloured, although pinkish specimens may be found. Often not uniform in colour. Sculpture of ~10 longitudinal round primary ribs near apical zone, increasing to ~20 toward the aperture. Secondary ribs of equal thickness may occur. Intervals between ribs much more wide than the width of the ribs. No slit or notch. Rounded anterior aperture.

Distribution. Eastern Atlantic (see Steiner & Kabat 2004) and the entire Mediterranean Sea (see Appendix 2).

Antalis inaequicostata (Dautzenberg, 1891)

Literature records. *Dentalium inaequicostatum* Dautzenberg – Pallary 1938: 47; Bitar 1996: 121; *Dentalium inaequicostatum* Dautzenberg, 1891 – Bitar & Kouli-Bitar 1998: 41.

Material examined. (7) Selaata: 06/07/2003 – boundary between sandy and rocky bottom, 7 m: 1 spm, FC det (BBCD); (15) Saida: 05/06/2000 – off Nahr El Ouali, sand, 31 m: 1 sh, FC det (BBCD).

Diagnosis. Shell thick, moderately curved, tubular, elephant tusk shaped. Maximum length ~7 cm. Usually light pinkish coloured, although reddish or whitish specimens may be found. Entirely striated by ~10 primary ribs toward the apex, often alternating with secondary and tertiary (obsolete toward the apex) ribs of unequal thickness. Ribs large and flat,

short interval between the ribs. Disruptions in shell are quite common. No slit or notch. Apex with oval short central pipe in adult specimens. Rounded or subcircular/polygonal anterior aperture.

Distribution. Eastern Atlantic (see Steiner & Kabat 2004) and the entire Mediterranean Sea (see Appendix 2).

Antalis vulgaris (da Costa, 1778)

Literature records. *Dentalium vulgare* da Costa – Gruvel & Moazzo 1929: 426; Gruvel 1931: 449; *Dentalium vulgare* da Costa = *tarentium* [sic!] Lamarck – Pallary 1938: 47; *Dentalium vulgare* da Costa – Bitar 1996: 121; *Dentalium vulgare* da Costa, 1778 – Bitar & Kouli-Bitar 1998: 41.

Material examined. (9) Batroun: 16/10/1999 – old town, "Phenician wall", 12 m: 1 spm, FC det (BBCD).

Diagnosis. Shell thick, lightly curved, tubular, elephant tusk shaped. Maximum length ~6 cm. Usually whitish coloured with pinkish apex, although entirely whitish, pinkish or yellowish specimens may be found. Striated posteriorly (~30 ribs) near the apex and smooth anteriorly near the aperture, longitudinal ribs obliterating more and more toward. Disruptions in shell are quite common. No slit or notch. A central pipe may be present in the apex of in adult specimens. Rounded anterior aperture.

Distribution. Eastern Atlantic (see Steiner & Kabat 2004) and the entire Mediterranean Sea (see Appendix 2).

Family Fustiariidae Steiner, 1991

Fustiaria rubescens (Deshayes, 1825)

Literature records. *Dentalium rubescens* Deshayes – Gruvel & Moazzo 1929: 426; Gruvel 1931: 449; *Pseudoentalis rubens* [sic!] Deshayes – Pallary 1938: 47; *Dentalium rubens* [sic!] Deshayes – Bitar 1996: 121; *Fustiaria rubescens* (Deshayes, 1826 [sic!]) – Bitar & Kouli-Bitar 1998: 41.

Diagnosis. Shell thin, moderately curved, tubular, elephant tusk shaped. Maximum length ~5 cm. Colour ranging from whitish to pinkish-brownish. Surface entirely smooth and glossy, with no longitudinal sculpture. Disruptions in shell may be present. Rounded anterior aperture, with a slit at the posterior one.

Distribution. Eastern Atlantic (see Steiner & Kabat 2004) and the entire Mediterranean Sea (see Appendix 2).

Family Gadilidae Steiner, 1992

Dischides politus (Wood S., 1842)

Literature records. *Dischides bifissus* S. Wood – Pallary 1938: 48; *Dishides* [sic!] *bifissus* S. Wood – Bitar 1996: 121; *Cadulus politus* (Wood S., 1842) – Bitar & Kouli-Bitar 1998: 41.

Diagnosis. Shell thin, curved, tubular, sub-cylindrical. Maximum length ~1 cm. Transparent in colour, although whitish coloured stripes may be present. Usually entirely smooth, with few growth lines visible at high magnification. Ventral lobe somewhat shorter than the dorsal lobe. Rounded anterior hole, with a cleft at the posterior aperture.

Distribution. Eastern Atlantic (see Steiner & Kabat 2004) and the entire Mediterranean Sea (see Appendix 2).

Class Cephalopda Cuvier, 1795

Family Sepiidae Leach, 1817

Sepia elegans Blainville, 1827

Literature records. *Sepia elegans* – Majdalani 2004: 40.

Diagnosis. Body elongated-oval, mantle flattened dorso-ventrally, usually red, brown, orange or light pink in colour. Maximum mantle length ~9 cm. A pair of flat, wide fins running entire mantle length. Internal cuttlebone elongated, without rostrum. Striated part of cuttlebone usually extending beyond half length. Head large and rounded, separated from body, with mouth surrounded by eight arms (each carrying variously arranged biserial and tetraserial rows of suckers) and two longer tentacles. Tentacular clubs short, broad, with 6–8 suckers in each transverse row, three or four enlarged medial suckers. Sexual dimorphism present, fourth left arm of males hectocotylised for ⅔ of its length (by modification in one or two rows of suckers widely spaced proximally, distal end of hectocotylus with minute suckers).

Distribution. Northeastern Atlantic, from western England to western Africa (up to 15° S) (see Jereb & Roper 2005), and the entire Mediterranean Sea (see Appendix 3).

Sepia officinalis Linnaeus, 1758

Literature records. *Sepia officinalis* – Gruvel 1931: 126; *Sepia officinalis* Linné – Pallary 1938: 14; *Sepia officinalis* L. – Bitar 1996: 42, 121; Majdalani 2004: 40; *Sepia officinalis* Linnaeus, 1758: Roper et al. 1984: 48.

Material examined. (12) Khaldeh: 28/12/2009 – beach, after storm: 6 spm, FC det (photo Ghazi Bitar).

Diagnosis. Body oval shaped, mantle flattened dorso-ventrally, usually grey-brown in colour. Mature specimens with zebra stripes pattern on dorsal surface of mantles during breeding season. Maximum mantle length ~49 cm. A pair of flat, wide, fins, with narrow white band along outer margin, running entire mantle length. Small white spots at mantle-fins junction. Internal cuttlebone rounded anteriorly. Rostrum present posteriorly, visible externally in young individuals only. Striated part of cuttlebone not extending beyond half length. Head large and rounded, separated from body. Mouth surrounded by eight arms (each carrying four rows of suckers) and two longer tentacles. Tentacular clubs with 5-6 suckers in each transverse row, median ones moderately enlarged. Sexual dimorphism present, fourth left arm of males hectocotylised (by four to eight rows of small suckers proximally).

Distribution. Northeastern Atlantic (from the Shetland Islands and southern Norway) to northwestern Africa (up to 16° N) (see Jereb & Roper 2005), and the entire Mediterranean Sea (see Appendix 3).

Family Loliginidae Lesueur, 1821

Alloteuthis media (Linnaeus, 1758)

Literature records. *Loligo subulata* sensu Gruvel (1931) – Gruvel 1931: 126; *Loligo subulata* sensu Bitar (1996) – Bitar, 1996: 121.

Diagnosis. Mantle elongated, thin, relatively narrow, posterior end with short pointed tail. Maximum mantle length ~13 cm. Usually pinkish, brownish or greyish with visible chromatophores. A pair of flat, rounded/rhombic fins running entire mantle length and tail. *Gladius* thin, transparent, with wide vane and stout rachis gradually narrowing posteriorly. Head relatively small and rounded, separated from body. Mouth surrounded by eight arms of unequal size (each carrying two rows of suckers) and two longer tentacles. Buccal suckers absent. Tentacular clubs expanded with four suckers in each transverse row. Sexual dimorphism present, fourth left arm of males hectocotylised.

Distribution. Northeastern Atlantic (reported from about 20° N to 60° N) (see Jereb & Roper 2010), and the entire Mediterranean Sea (see Appendix 3).

Remarks. Lefkaditou et al. (2012) convincingly suggested that Lebanese records of *Alloteuthis subulata* (Lamarck, 1798) should be referred to *Alloteuthis media* (Linnaeus, 1758). This was supported by the the local abundance of the species reported by Gruvel (1931).

Loligo vulgaris Lamarck, 1798

Literature records. *Loligo officinalis* [sic!] – Gruvel 1931: 126; Bitar 1996: 121; *Loligo vulgaris* – Majdalani 2004: 41.

Diagnosis. Mantle elongated, robust, cylindrical in its anterior part and conical in its posterior part, usually reddish-purplish. Maximum mantle length ~64 cm in males. A pair of flat and large rhomboid fins running ~⅔ of mantle length. *Gladius* thin, transparent, with wide vane and stout rachis gradually narrowing posteriorly. Head relatively small and rounded, separated from body. Mouth surrounded by eight arms of unequal size (each carrying two rows of suckers); arm sucker rings with around 20 teeth and two longer tentacles. Buccal suckers present. Tentacular clubs with four suckers in each transverse row, manus with six to eight enlarged suckers; sucker rings with ~30 teeth. Sexual dimorphism present, the fourth left arm of males hectocotylised by modification of suckers in its distal part into papillae.

Distribution. Eastern Atlantic Ocean and the North Sea (from approximately 55° N) to off the southwestern coast of Africa (20° S) (see Jereb & Roper 2010), and the entire Mediterranean Sea (see Appendix 3).

Remarks. The Lebanese records of *"Loligo officinalis"* clearly refer to *Loligo vulgaris* Lamarck, 1798.

**Sepioteuthis lessoniana* Férussac in Lesson, 1831 complex

Material examined. (1) Ramkine Island: 28/08/2010, 5 m: 1 spm, FC det (photo Ghazi Bitar); (5) El Heri: 22/09/2012, 3-4 m: 3 spm, FC det (photo Ghazi Bitar); (10) El Barbara: 12/10/2008, 2 m: 1 spm, FC det (photo Ghazi Bitar); (17) Tyr 17/10/2009, 5 m: 4 spm, FC det (photo Ghazi Bitar) (Fig. 2).

Diagnosis. Body elongated, mantle robust, cylindrical in anterior part, conical in posterior part. Maximum mantle length ~42 cm in males. A pair of flat and large fins running almost entire mantle length, their outline forming an oval shape. *Gladius* thin, transparent, with wide vane and stout rachis gradually narrowing posteriorly. Head large and

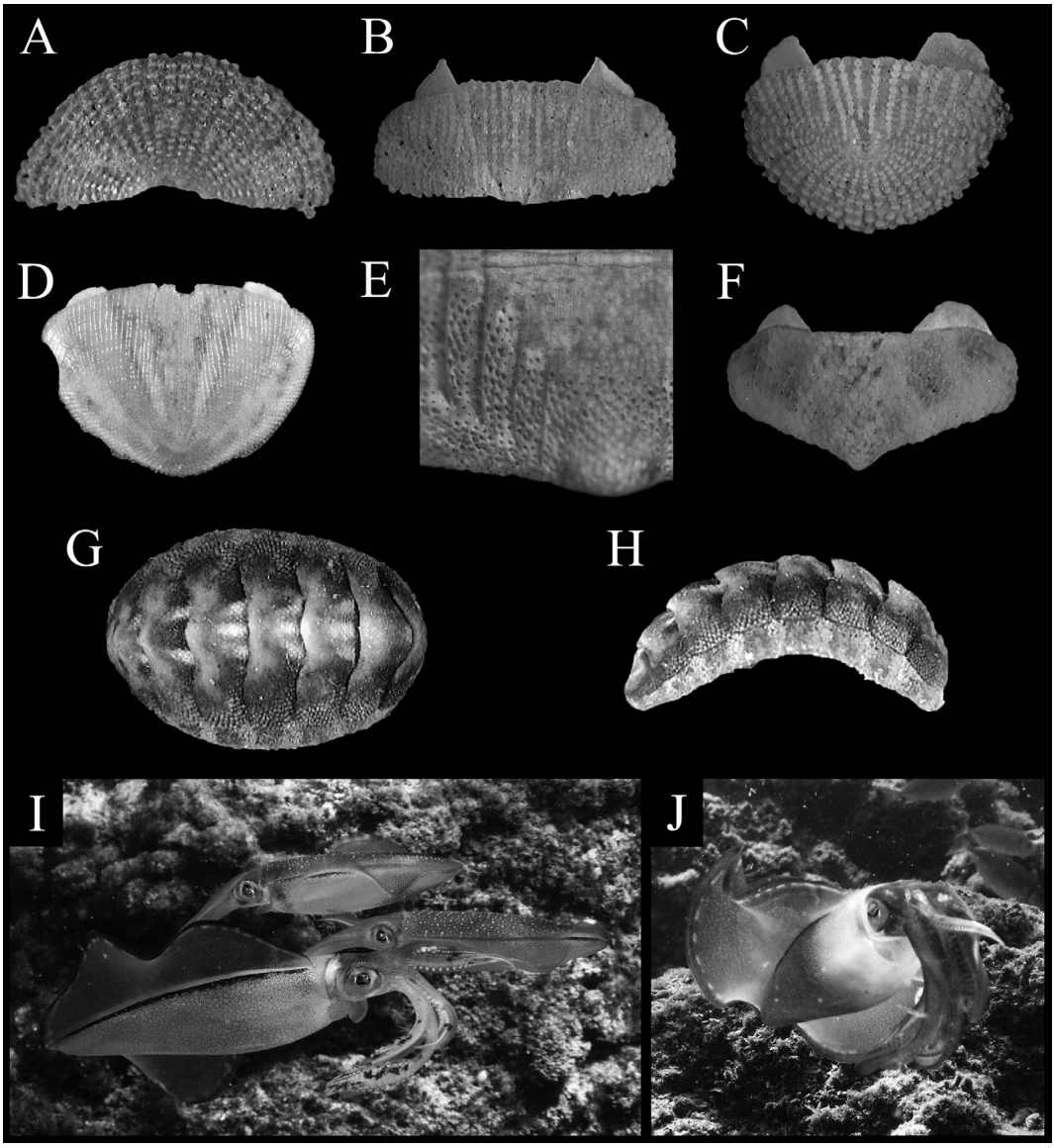

Fig. 2. New Lebanese records (specimens not to scale, sizes of valves reported as width, size of *Lepidochitona caprearum* specimen as length). **A–C.** *Leptochiton bedullii* Dell'Angelo & Palazzi, 1986 – Beddawi 06/1995. **A.** Head valve, 1.7 mm. **B.** Intermediate valve, 2.7 mm. **C.** Tail valve, 2 mm. **D.** *Parachiton africanus* (Nierstrasz, 1906). Tail valve, 3 mm. **E.** *Chiton phaseolinus* Monterosato, 1879 – Ras El Chakaa 04/06/2000. Detail magnification of the intermediate valve. **F.** *Lepidochitona monterosatoi* Kaas & Van Belle, 1981 – Beddawi 06/1995. Intermediate valve, 2.5 mm. **G, H.** *Lepidochitona caprearum* (Scacchi, 1836) – Selaata 23/10/1999, 9.2 mm. **I, J.** *Sepioteuthis lessoniana* Férussac in Lesson, 1831 complex – Tyr 17/10/2009, **J.** with *Siganus rivulatus* Forsskål & Niebuhr, 1775 in the background.

rounded, separated from body. Mouth surrounded by eight arms of unequal size (each carrying two rows of suckers); arm sucker rings with sharp triangular teeth and two longer tentacles. Tentacular clubs long, median manal suckers moderately enlarged, rings with sharp teeth. Sexual dimorphism present, fourth left arm of males hectocotylised by modification in distal part (two rows of suckers transformed in conical papillae).

Distribution. Widely distributed in the Indo-West Pacific region, Red Sea included (see Jereb & Roper 2010), and the central and eastern Mediterranean Sea (see Appendix 3).

Remarks. Genetic data indicate that different morphotypes previously ascribed to *Sepioteuthis lessoniana* Férussac in Lesson, 1831 actually comprise a complex of species (Segawa et al. 1993, Lianos & Adams 2005, Aoki et al. 2008). Thus, we hereby prefer to keep the examined material under "*Sepioteuthis lessoniana* Férussac in Lesson, 1831 complex".

Family Ommastrephidae Steenstrup, 1857

Illex coindetii (Vérany, 1839)

Literature records. *Illex coindetii* – Majdalani 2004: 41; Colloca & Lelli 2012: 13.

Diagnosis. Mantle elongated, robust, cylindrical in anterior part, conical in posterior part, usually orangish-brownish in colour. Maximum mantle length ~37 cm, females larger than males. A pair of flat and quite large rhomboid fins running ~⅓ of mantle length. *Gladius* thin, transparent, with wide vane and stout rachis gradually narrowing posteriorly. Head wide and robust, separated from body. Mouth surrounded by eight long and robust arms of unequal size (each carrying two rows of suckers) and two longer tentacles. Tentacular clubs with notched sucker rings or with crenulations and eight small suckers in each transverse row, on the distal part (*dactilus*). Sexual dimorphism present, fourth left or right arm of males longer than the opposite and hectocotylised by modification in its distal part of trabeculae to papillae, fringed flaps and knobs.

Distribution. Western Atlantic Ocean (from 37°N to 3°N) and Eastern Atlantic Ocean (from 60°N to 20°S) (see Jereb & Roper 2010), and the entire Mediterranean Sea (see Appendix 3).

Family Octopodidae d'Orbigny, 1839

Callistoctopus macropus (Risso, 1826) complex

Literature records. *Octopus macropus* – Gruvel 1931: 126; *Octopus macropus* Risso – Bitar 1996: 121; *Octopus macropus* Risso, 1826 – Bitar & Kouli-Bitar 1998: 41.

Diagnosis. Quite robust and large and slightly muscular mantle, circular, usually elongate or ovoid, variable in colour, usually reddish or brownish with distinct pattern of numerous white/bluish spots on dorsal mantle, head and arms. Maximum mantle length ~15 cm, maximum body length ~150 cm. Siphon usually visible, protruding from pallial cavity. Internal shell very small in form of non-mineralised stylets. Head relatively small, united to the mantle. Mouth surrounded by eight arms of similar size, each carrying two rows of suckers. Webs shallow, arm formula 1>2>3>4. Sexual dimorphism present, third right arm of males hectocotylised and significantly shorter than opposite arm.

Distribution. Worldwide in warm to warm-temperate waters (see Roper et al. 1984), and the entire Mediterranean Sea (see Appendix 3).

Remarks. According to Norman (2003), worldwide specimens previously ascribed to *Callistoctopus macropus* (Risso, 1826) comprise a complex of possibly cryptic species. Although *Octopus macropus* has been presumably described from the Mediterranean Sea, we prefer to keep the examined material under "*Callistoctopus macropus* (Risso, 1826) complex".

Eledone moschata (Lamarck, 1798)

Literature records. *Eledone moschata* – Gruvel 1931: 126; *Eledone moschata* Lamarck – Bitar 1996: 121; *Eledone moschata* (Lamarck, 1798) – Bitar & Kouli-Bitar 1998: 41.

Diagnosis. Robust, quite large and slightly muscular mantle, circular, variable in colour usually brownish-greyish with black large spots on dorsal mantle. Maximum mantle length ~14 cm, maximum body length ~40 cm. Siphon usually visible, protruding from pallial cavity. Internal shell lacking. Head relatively small, united to mantle. Mouth surrounded by eight arms of similar size (each carrying one row of suckers). Typical arm formula: 1=2=3>4. Arm tips without suckers and covered by glandular tissue. Webs deep. Sexual dimorphism present, mature males with modified suckers on arm tips in form of paired transverse ridges (30 pairs of low ridges) and right third arm hectocotylised (~85–90 % of its length).

Distribution. Eastern Atlantic (Gulf of Cadiz) (see Roper et al. 1984), and the entire Mediterranean Sea (see Appendix 3).

Octopus vulgaris Cuvier, 1797 complex

Literature records. *Octopus vulgaris* Lamarck, 1798 [sic!] – Roper et al. 1984: 212; *Octopus vulgaris* – Bitar 1996: 42; *Octopus vulgaris* – Lelli et al. 2006: 9.

Material examined. (8) Hannouch: 25/6/2012 – rocky bottom, in a hole, 12 m: 1 spm, FC det (photo Ghazi Bitar); (11) Beirut: 01/05/2008 – AUB (American Uni-

versity of Beirut), amidst *Colpomenia*, 3 m: 1 spm, FC det (photo Ghazi Bitar); (14) Wadi El Zeini: 04/06/2009 – amidst photophilous algae, 3 m: 1 spm, FC det (photo Ghazi Bitar); 08/06/2009 – rocky bottom, in a hole, 3 m: 1 spm, FC det (photo Ghazi Bitar).

Diagnosis. Robust, large and very muscular mantle, slightly circular or saccular. Very variable in colour from yellow brown to red brown, usually brownish. Maximum mantle length ~25 cm, maximum body length ~130 cm. Siphon usually visible, protruding from pallial cavity. Internal shell present as chitinous stylets. Head relatively small, united to mantle, with one to two supraocular papillae over each eye. Mouth surrounded by eight muscular arms of similar size (each carrying two rows of suckers). Lateral arms longer than others. Arm formula: 3>2>4>1. Webs of moderate depth. Sexual dimorphism present, in mature males proximal suckers more enlarged (typically two to three on arm) and third right arm hectocotylised by modification of tip into a small spoon-shaped *ligula* and slightly shorter than opposite arm.

Distribution. Worldwide in temperate and tropical waters (see Roper et al. 1984), and the entire Mediterranean Sea (see Appendix 3).

Remarks. Genetic data indicate that different worldwide morphotypes previously ascribed to *Octopus vulgaris* Cuvier, 1797 actually comprise a complex of species (review of molecular studies in De Luca et al. 2014). Although *O. vulgaris* is the type species of the genus, no type locality or type specimens are known, and a neotype has not yet been designated and deposited (Guerra et al. 2010). In fact, Sweeney & Roper (1998) listed the type material as present in MNHN, but it was not found there (Lu et al. 1995; V. Héros, personal communication), and the announcement of a future neotype designation from Banyuls-sur-Mer (Mediterranean France) by Mangold & Hochberg (1991) and Mangold (1998) is invalid since it has never been followed by the proper full paper. Therefore, we hereby prefer to keep the examined material under "*Octopus vulgaris* Cuvier,1797 complex".

Family Argonautidae Tryon, 1879

Argonauta argo Linnaeus, 1758

Literature records. *Argonauta argo* Linné – Pallary 1919: 167; Pallary 1938: 14; *Argonauta argo* L. – Bitar 1996: 121.

Diagnosis. Marked sexual dimorphism present, with females up to 20 times bigger than males Female mantle length usually more than 10 cm (shell up to 30 cm), male body length ~1.5 cm (not including hectocotylus). In adult females robust and large mantle, slightly circular or conical, usually from silver to brownish in colour with large chromatophores. External white 'shell' (with brood chamber function) secreted by modified first dorsal arms. 'Shell' coiled and laterally compressed, with a narrow keel and stained black sharp bumps along the keel and smooth ridges across 'shell'. Head relatively small and rounded, united to the mantle. Mouth surrounded by eight long arms of unequal size (each carrying two rows of small suckers). First dorsal arms with wide lobes. Arm formula: 4>2>3. Web shallow between all arms. Males lacking external 'shell', with only seven arms visible. Third right arm hectocotylised, enclosed in a sac situated under left eye.

Distribution. Cosmopolitan species, with a circumglobal distribution in the Atlantic, Pacific and Indian Ocean (between approximately 40° N and 40° S) (see Roper et al. 1984), and the entire Mediterranean Sea (see Appendix 3).

Discussion

According to the present new checklists, at least 37 polyplacophoran, 15 scaphopod and 68 cephalopod species are known with certainty from the Mediterranean Sea (see Appendix 1, 2 and 3). However, the continuous description of new species from the Mediterranean (more than one hundred molluscs during the last decade: Crocetta et al. 2012), the partly unexpected results obtained by the combined use of a molecular and morphological approach (e. g. Calvo et al. 2009), and the increasing trend of colonization of the Mediterranean Sea by alien species (Zenetos et al. 2010, 2012), lead to the assumption that the presently known diversity is underestimated. The 26 species listed here from Lebanon represent a particularly poor fauna; in fact they account for ca. 30 %, 33 % and 15 % of the known Mediterranean Polyplacophora, Scaphopoda and Cephalopoda, respectively. They comprise six families of Polyplacophora (Leptochitonidae, Chitonidae, Ischnochitonidae, Callochitonidae, Lepidochitonidae and Acanthochitonidae), three of Scaphopoda (Dentaliidae, Fustiariidae and Gadilidae) and five of Cephalopoda (Sepiidae, Loliginidae, Ommastrephidae, Octopodidae, Argonautidae). Loliginidae, Octopodidae and Chitonidae represent the richest families, with three species each, and the most diverse genera are *Chiton* and *Antalis*, comprising three species each. The Lebanese data are based on an inappropriate sampling methodology for these groups of molluscs, since the new material originated from general sampling of benthic species

and communities. The knowledge on Mediterranean species of these three classes is mainly based on amateur observations (polyplacophorans and scaphopods) and on the analysis of fishing bycatches (cephalopods), and contrarily to nearby countries, Lebanon mostly lacks both (G. Bitar, unpublished data). As observed also in opisthobranchs and bivalves (Crocetta et al. 2013a,b), no polyplacophoran, scaphopod or cephalopod is endemic to Lebanon.

Of the 26 taxa treated herein, six species (five polyplacophorans and one cephalopod) are new records for the Lebanese fauna. All the newly recorded polyplacophoran species, namely *Leptochiton bedullii* Dell'Angelo & Palazzi, 1986, *Parachiton africanus* (Nierstrasz, 1906), *Chiton phaseolinus* Monterosato, 1879, *Lepidochitona caprearum* (Scacchi, 1836) and *Lepidochitona monterosatoi* Kaas & Van Belle, 1981 are, however, already known from the eastern Mediterranean Sea (Dell'Angelo & Smriglio 1999). On the contrary, the presence of the bigfin reef squid deserves attention. Widespread throughout the Indo-Pacific and the Red Sea, the species of *Sepioteuthis* that has entered the Mediterranean Sea is now well established in the Levant Sea, as shown by the multiple records from Egypt, Israel, Cyprus, Turkey and Greece (Salman 2002, Salman & Katagan 2002, Mienis 2004, Riad 2008, Lefkaditou et al. 2009, Tzomos et al. 2010, Waheed & Gareb 2010, Zenetos et al. 2011). The recent records from Tunisian waters (Hattour in Eleftheriou et al. 2011) indicated a further expansion of the species westwards. Specimens of the *Sepioteuthis lessoniana* Férussac in Lesson, 1831 complex constitute the only alien species found within the three classes hereby analysed. Therefore, contrarily to the biogeographical homogeneity previously reported in other groups (Crocetta et al. 2013a,b), these classes do not seems to be affected by alien species introductions, as also pointed out by the low total number of alien species previously recorded from the Mediterranean Sea (two confirmed Polyplacophora and five confirmed Cephalopoda: see Appendix 1, 2 and 3).

The relatively poor knowledge on the fauna of the Levant basin, and especially of the north-eastern part, has been previously stressed by several authors (e. g. Vacelet et al. 2007, Harmelin et al. 2009, Morri et al. 2009), and the present data definitively underline such gaps. While most of the malacological studies of the Mediterranean deal with the two main classes Gastropoda and Bivalvia, informations about the remaining classes are underrepresented mainly due to paucity of taxonomists. It is evident that a better understanding of the current patterns and dynamics of the eastern Mediterranean biodiversity may yield outcomes of value for the entire Mediterranean marine biology. The coasts of Lebanon may offer a wide range of remarkable case studies, and may therefore function as an excellent natural laboratory to study ongoing processes in the Mediterranean biodiversity.

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Appendix 1

Updated check-list of Mediterranean Polyplacophora. Bold: alien species in the Mediterranean Sea. The numbers between square brackets refer to key recent bibliographic references.

Class Polyplacophora Gray, 1821	References
Order Lepidopleurida Thiele, 1909	
Family Leptochitonidae Dall, 1889	
Genus *Lepidopleurus* Risso, 1826	
Lepidopleurus cajetanus (Poli, 1791)	[2,14,15,19,28,39]
Genus *Leptochiton* Gray, 1847	
Leptochiton asellus (Gmelin, 1791)	[14,19,38]
Leptochiton algesirensis (Capellini, 1859)	[14,15,19,28,39]
Leptochiton bedullii Dell'Angelo & Palazzi, 1986	[15,19]
Leptochiton cancellatus (Sowerby, 1840)	[14,15,19,28,39]
Leptochiton cimicoides (di Monterosato, 1879)	[14,15,19,39]
Leptochiton geronensis Kaas & Van Belle, 1985	[14,15,19]
Leptochiton pepezamorai Carmona Zavilde, Urgorri & García, 2004	[15,18]
Leptochiton sarsi Kaas, 1981	[15,18]
Leptochiton scabridus (Jeffreys, 1880)	[14,15,19,28,39]
Leptochiton xanthus Kaas & Van Belle, 1990	[15,19]
Genus *Parachiton* Thiele, 1909	
Parachiton africanus (Nierstrasz, 1906)	[14,15,19]
Family Hanleyidae Bergenhayn, 1955	
Genus *Hanleya* Gray, 1857	
Hanleya hanleyi (Bean in Thorpe, 1844)	[14,15,19]
Order Chitonida Thiele, 1909	
Family Chitonidae Rafinesque, 1815	
Genus *Chiton* Linnaeus, 1758	
***Acanthopleura* sp.**	[See Notes]
Chiton corallinus (Risso, 1826)	[2,14,15,19,28,39]
Chiton olivaceus Spengler, 1797	[2,14,15,19,28,39]
Chiton phaseolinus Monterosato, 1879	[14,15,19,39]
***Chiton hululensis* (Smith, 1903)**	[2,14,15,19]
Family Ischnochitonidae Dall, 1889	
Genus *Bathychiton* Dell'Angelo & Palazzi, 1988	
Bathychiton biondii Dell'Angelo & Palazzi, 1988	[15,19]
Genus *Ischnochiton* Gray, 1847	
Ischnochiton rissoi (Payraudeau, 1826)	[2,14,15,19,28,39]
Ischnochiton usticensis Dell'Angelo & Castriota, 1999	[14,15,19]
Ischnochiton tsekosi Koukouras & Karachle, 2005	[14,15,28]
Genus *Stenosemus* von Middendorff, 1847	
Stenosemus dolii (Van Belle & Dell'Angelo, 1998)	[14,15,19]
Stenosemus vanbellei (Kaas, 1985)	[14,15,19]
Family Callistoplacidae Pilsbry, 1893	
Genus *Callistochiton* Dall, 1879	
Callistochiton pachylasmae (Monterosato, 1879)	[14,15,19]
Family Callochitonidae Plate, 1901	
Genus *Callochiton* Gray, 1847	
Callochiton calcatus Dell'Angelo & Palazzi, 1994	[14,15,19]
Callochiton septemvalvis (Montagu, 1803)	[2,14,15,19,28,39]
Family Lepidochitonidae Iredale, 1914	
Genus *Lepidochitona* Gray, 1821	
Lepidochitona canariensis (Thiele, 1909)	[14,15,19]
Lepidochitona caprearum (Scacchi, 1836)	[2,14,15,19,28,39]
Lepidochitona cinerea (Linnaeus, 1767)	[2,14,15,19,28,39]

Lepidochitona furtiva (Monterosato, 1879)	[14,15,19]
Lepidochitona monterosatoi Kaas & Van Belle, 1981	[14,15,19,28,39]
Family Chaetopleuridae Plate, 1899	
Genus *Chaetopleura* Shuttleworth, 1853	
Chaetopleura angulata (Spengler, 1797)	[15,19,39]
Family Acanthochitonidae Pilsbry, 1893	
Genus *Acanthochitona* Gray, 1821	
Acanthochitona crinita (Pennant, 1777)	[2,10,14,15,19,28,39]
Acanthochitona discrepans (Brown, 1827)	[39]
Acanthochitona fascicularis (Linnaeus, 1767)	[2,10,14,15,19,28,39]
Acanthochitona oblonga Leloup, 1981	[10,15,19]

Excluded species and notes

Family Leptochitonidae Dall, 1889

Leptochiton boettgeri Sulc, 1934. This is a fossil species, synonymised in the past with the recent *Leptochiton bedullii* Dell'Angelo & Palazzi, 1986. Recently, it has been uncorrectly listed for the Mediterranean Sea [14,43], but is here excluded in agreement with the most widely shared taxonomic view [see discussions in 19].

Family Chitonidae Rafinesque, 1815

***Acanthopleura* sp.** This taxon has been recently recorded from Tripoli (Lybia, Mediterranean Sea) as *A. gemmata* (de Blainville, 1825), which was concomitantly considered as a senior synonym of *Acanthopleura vaillanti* de Rochebrune, 1882 [sic! for *Acanthopleura vaillantii* Rochebrune, 1882] [60]. Additionally, more recent literature excluded it from the Mediterranean species [14] or considered its presence as "questionable" [3]. However, despite our attempts to analyse concrete specimens were unsuccessful, we were able to analyse photographs by J. Zaouali of two specimens from Zarzis (Tunisia) and Tripoli (Lybia), respectively. The identification of these specimens as belonging to the genus *Acanthopleura* is correct, but we were not able to identify them up to species level from photographs only. Additionally *A. gemmata* and *A. vaillanti* (previously regarded as synonyms) are now considered different species, the former being recorded in the Indo-Pacific (Red Sea excluded) and the latter being recorded in the Red Sea [11,20,56]. The identification of the Mediterranean specimens as *A. gemmata* is therefore in disagreement with the putative origin (Red Sea) suggested in the article where this taxon has been recorded [60] and would rather suggest an introduction by shipping or another vector from the Indo-Pacific. Taking that into account, we hereby prefer to list it as *Acanthopleura* sp., waiting for subsequent taxonomical analysis on the Mediterranean material.

Family Ischnochitonidae Dall, 1889

Connexochiton platynomenus Kaas, 1979. This is an Atlantic species, synonymised in the past with the Mediterranean *Bathychiton biondii* Dell'Angelo & Palazzi, 1988. Recently, it has been uncorrectly listed for the Mediterranean Sea [14], but we keep the two taxa as distinct species, and *C. platynomenus* is therefore excluded from the Mediterranean list.

Appendix 2

Updated check-list of confirmed Mediterranean Scaphopoda. Bold: alien species in the Mediterranean Sea. The numbers between square brackets refer to key recent bibliographic references.

Class Scaphopoda Bronn, 1862	References
Order Dentaliida da Costa, 1776	
Family Dentaliidae Children, 1834	
Genus *Antalis* Adams & Adams, 1854	
Antalis agilis (M. Sars in G. O. Sars, 1872)	[14,15,24]
Antalis caprottii Martínez-Ortí & Cádiz, 2012	[34]
Antalis dentalis (Linnaeus, 1758)	[2,14,15,24,34,42]
Antalis inaequicostata (Dautzenberg, 1891)	[2,14,15,24,34,42]
Antalis novemcostata (Lamarck, 1818)	[34,48]
Antalis panorma (Chenu, 1843)	[2,14,15,24,42,48]
Antalis rossati (Caprotti, 1966)	[2,14,15,24,42]
Antalis vulgaris (da Costa, 1778)	[2,14,15,24,34,42,48]
Family Fustiariidae Steiner, 1991	
Genus *Fustiaria* Stoliczka, 1868	
Fustiaria rubescens (Deshayes, 1825)	[2,14,15,24,34,42,48]

Family Gadilinidae Chistikov, 1975	
Genus *Episiphon* Pilsbry & Sharp, 1897	
Episiphon filum (G. B. Sowerby II, 1860)	[14,15,24]
Order Gadilida Starobogatov, 1974	
Family Entalinidae Chistikov, 1979	
Genus *Entalina* Monterosato, 1872	
Entalina tetragona (Brocchi, 1814)	[2,14,15,24,42]
Family Pulsellidae Scarabino in Boss, 1982	
Genus *Pulsellum* Stoliczka, 1868	
Pulsellum lofotense (Sars, 1865)	[14,15,24,42]
Family Gadilidae Stoliczka, 1868	
Genus *Cadulus* Philippi, 1844	
Cadulus jeffreysi (Monterosato, 1875)	[14,15,24,42,48]
Cadulus subfusiformis (Sars, 1865)	[14,15,24]
Genus *Dischides* Jeffreys, 1867	
Dischides politus (Wood, 1842)	[2,14,15,24,34,42,48]

Excluded species and notes

Family Dentaliidae Children, 1834

Antalis entalis (Linné, 1758). This is an Atlantic species. It has been recently listed for the Mediterranean Sea [14], but any attempt to verify its presence in the Mediterranean Sea has been unsuccessful (F. Crocetta, unpublished data), and it is here conservatively excluded awaiting further evidences and in agreement with recent literature [see discussions in 24].

***Dentalium octangulatum* Donovan, 1804.** This Indo-pacific species was never recorded alive from the Mediterranean Sea, and was only discarded on an Italian Adriatic beach as a dead packaging material of fishing baits imported from Taiwan [57]. It was recently included among Mediterranean aliens as found in Italy [23: supplementary material]. However, this species was then excluded by the most recent reviews of alien species from Italy, including one focused on molluscs [16,40], and should be definitively not listed among the Mediterranean species, including aliens (B. S. Galil and A. Zenetos, personal communications).

Appendix 3

Updated check-list of confirmed Mediterranean Cephalopoda. Bold: alien species in the Mediterranean Sea. The numbers between square brackets refer to key recent bibliographic references.

Class Cephalopoda Cuvier, 1795	References
Order Sepiida Zittel, 1895	
Family Sepiidae Leach, 1817	
Genus *Sepia* Linnaeus, 1758	
Sepia elegans Blainville, 1827	[2,5,12,14,15,25,26,33,49]
Sepia officinalis Linnaeus, 1758	[2,5,12,14,15,25,26,33,49]
Sepia orbignyana Férussac, 1826	[2,5,12,14,15,25,26,33,49]
***Sepia pharaonis* Ehremberg, 1831 complex**	[1,5,14,35,49]
Order Sepiolida Fioroni, 1981	
Family Sepiolidae Leach, 1817	
Genus *Heteroteuthis* Gray, 1849	
Heteroteuthis dispar (Rüppel, 1844)	[4,5,12,14,25,33,49,50]
Genus *Neorossia* von Boletzky, 1971	
Neorossia caroli (Joubin, 1902)	[4,5,12,14,25,26,33,49,50]
Genus *Rondeletiola* Naef, 1921	
Rondeletiola minor (Naef, 1912)	[2,4,5,12,14,25,26,33,49]
Genus *Rossia* Owen, 1834	
Rossia macrosoma (Delle Chiaje, 1830)	[4,5,12,14,25,26,33,49]
Genus *Sepietta* Naef, 1912	
Sepietta neglecta Naef, 1916	[2,4,5,12,14,25,33,49]
Sepietta obscura Naef, 1916	[2,4,5,12,14,25,33]

Sepietta oweniana (d'Orbigny, 1841)	[2,4,5,12,14,25,26,33,49]
Genus *Sepiola* Leach, 1817	
Sepiola affinis Naef, 1912	[4,5,12,14,25,33,49]
Sepiola aurantiaca Jatta, 1896	[5,14,25,27,33]
Sepiola bursadhaesa Bello, 2013	[7]
Sepiola intermedia Naef, 1912	[4,5,12,14,25,33,49]
Sepiola ligulata Naef, 1912	[4,5,12,14,25,33,49]
Sepiola robusta Naef, 1912	[4,5,12,14,25,33,49]
Sepiola rondeletii Leach, 1817	[2,4,5,14,25,26,33,49]
Sepiola steenstrupiana Levy, 1912	[2,4,5,14,25,33,49]
Genus *Stoloteuthis* Verril, 1881	
Stoloteuthis leucoptera (Verril, 1878)	[4,5,12,14,25,46]
Order Myopsida Naef, 1916	
Family Loliginidae Lesuer, 1821	
Genus *Alloteuthis* Wülker, 1920	
Alloteuthis media (Linnaeus, 1758)	[2,5,12,14,25,26,32,33,49]
Alloteuthis subulata (Lamarck, 1798)	[2,5,12,14,25,26,32,33,49]
Genus *Loligo* Lamarck, 1798	
Loligo forbesii Steenstrup, 1857	[5,12,14,25,26,33,49,50]
Loligo vulgaris Lamarck, 1798	[2,5,12,14,15,25,26,33,49,50]
Genus *Sepioteuthis* Blainville, 1824	
***Sepioteuthis lessoniana* Férussac in Lesson, 1831 complex**	[5,14,29,49,51]
Order Oegopsida d'Orbigny, 1845	
Family Enoploteuthidae Pfeffer, 1900	
Genus *Abralia* Gray, 1849	
Abralia verany (Rüppell, 1844)	[5,12,14,25,26,33,49]
Genus *Abraliopsis* Joubin, 1896	
Abraliopsis morisii (Vérany, 1839)	[5,6,14,25,26,33,46,49,50]
Family Pyroteuthidae Pfeffer, 1912	
Genus *Pterygioteuthis* Fischer, 1896	
Pterygioteuthis giardi Fischer, 1896	[5,14,33,50]
Genus *Pyroteuthis* Hoyle, 1904	
Pyroteuthis margaritifera (Rüppell, 1844)	[5,14,33,49,50]
Family Ancistrocheiridae Pfeffer, 1912	
Genus *Ancistrocheirus* Gray, 1849	
Ancistrocheirus lesueurii (d'Orbigny, 1842)	[5,14,25,33,46,49,50]
Family Octopoteuthidae Berry, 1912	
Genus *Octopoteuthis* Rüppell, 1844	[See Notes]
Octopoteuthis sicula Rüppell, 1844	[5,14,21,25,33,49,50]
Genus *Taningia* Joubin, 1931	
Taningia danae Joubin, 1931	[45]
Family Onycoteuthidae Gray, 1847	
Genus *Ancistroteuthis* Gray, 1849	
Ancistroteuthis lichtensteinii (Férussac, 1835)	[5,12,14,25,31,33,49,58]
Genus *Onychoteuthis* Lichtenstein, 1818	
Onychoteuthis banksii (Leach, 1817)	[5,12,14,25,33,46,49,50]
Onychoteuthis mollis (Appellöf, 1891)	[9,25,33]
Family Cycloteuthidae Naef, 1923	
Genus *Cycloteuthis* Joubin, 1919	
Cycloteuthis sirventi Joubin, 1919	[5,14,25]
Family Histioteuthidae Verrill, 1881	
Genus *Histioteuthis* d'Orbigny, 1841	
Histioteuthis bonnellii (Férussac, 1835)	[5,12,13,14,25,33,49,50,58]
Histioteuthis reversa (Verrill, 1880)	[5,12,14,25,33,49,50,58]

Family Brachioteuthidae Pfeffer, 1908	
Genus *Brachioteuthis* Verril, 1881	
Brachioteuthis riisei (Steenstrup, 1882)	[5,14,21,31,33,46,49,50]
Family Ommastrephidae Steenstrup, 1857	
Genus *Illex* Steenstrup, 1880	
Illex coindetii (Vérany, 1839)	[2,5,12,14,25,26,33,49,50]
Genus *Ommastrephes* d'Orbigny, 1835	
Ommastrephes bartramii (Lesueur, 1821)	[2,5,12,14,25,26,33,49]
Genus *Todarodes* Steenstrup, 1880	
Todarodes sagittatus (Lamarck, 1798)	[5,12,14,15,25,26,33,49]
Genus *Todaropsis* Girard, 1890	
Todaropsis eblanae (Ball, 1841)	[2,5,12,14,25,26,33,49]
Family Architeuthidae Pfeffer, 1900	
Genus *Architeuthis* Steenstrup, 1857	
Architeuthis dux Steenstrup, 1857	[26]
Family Thysanoteuthidae Keferstein, 1866	
Genus *Thysanoteuthis* Troschel, 1857	
Thysanoteuthis rhombus Troschel, 1857	[5,12,14,25,26,33,49,50]
Family Chiroteuthidae Gray, 1849	
Genus *Chiroteuthis* d'Orbigny, 1841	
Chiroteuthis veranii (Férussac, 1835)	[5,14,25,33,46,49,50,58]
Family Cranchiidae Prosch, 1849	
Genus *Cranchia* Leach, 1817	
Cranchia scabra Leach, 1817	[5,14,44]
Genus *Galiteuthis* Joubin, 1898	
Galiteuthis armata Joubin, 1898	[5,12,14,25,30,33,49,50]
Genus *Megalocranchia* Pfeffer, 1884	
Megalocranchia sp.	[5,8,12,14]
Genus *Taonius* Steenstrup, 1861	
Taonius pavo (Lesuer, 1821)	[46]
Genus *Teuthowenia* Chun, 1910	
Teuthowenia megalops (Prosch, 1849)	[5,14,25,33,54]
Unassigned order	
Family Chtenopterygidae Grimpe, 1922	
Genus *Chtenopteryx* Appellöf, 1890	
Chtenopteryx sicula (Vérany, 1851)	[5,12,14,33,46,49,50]
Order Octopoda Leach, 1818	
Family Opisthoteuthidae Verrill, 1896	
Genus *Opisthoteuthis* Verrill, 1883	
Opisthoteuthis calypso Villanueva, Collins, Sànchez & Voss, 2002	[5,12,14,46,55]
Family Octopodidae d'Orbigny, 1840	
Genus *Amphioctopus* Fischer, 1882	
***Amphioctopus* sp.**	[See notes]
Genus *Bathypolypus* Grimpe, 1921	
Bathypolypus sponsalis (Fischer & Fischer, 1892)	[5,12,14,25,33,49]
Genus *Callistoctopus* Taki, 1964	
Callistoctopus macropus (Risso, 1826) complex	[2,5,12,14,25,26,33,49,50]
Genus *Eledone* Leach, 1817	
Eledone cirrhosa (Lamarck, 1798)	[5,12,14,25,26,33,49,50]
Eledone moschata (Lamarck, 1798)	[2,5,12,14,15,25,26,33,49]
Genus *Macrotritopus* Grimpe, 1922	
Macrotritopus defilippi (Vérany, 1851)	[2,5,12,14,25,26,33,49,50]
Genus *Octopus* Cuvier, 1798	
Octopus salutii Vérany, 1836	[2,5,12,14,25,26,33,49,50]
***Octopus cyanea* Gray, 1849**	[36]

Octopus vulgaris Cuvier, 1797 complex	[2,5,12,14,25,26,33,49,50]
Genus *Pteroctopus* Fischer, 1882	
Pteroctopus tetracirrhus (delle Chiaje, 1830)	[5,12,14,25,26,33,49,50]
Genus *Scaeurgus* Troschel, 1857	
Scaeurgus unicirrhus (delle Chiaje, 1841)	[5,12,14,25,26,33,49,50]
Family Tremoctopodidae Tryon, 1879	
Genus *Tremoctopus* delle Chiaje, 1830	
***Tremoctopus gracilis* (Eydoux & Souleyet, 1852)**	[5,14,41]
Tremoctopus violaceus delle Chiaje, 1830	[2,5,12,14,25,26,33,46,49]
Family Ocythoidae Gray, 1849	
Genus *Ocythoe* Rafinesque, 1814	
Ocythoe tuberculata Rafinesque, 1814	[5,12,14,26,33,46,49]
Family Argonautidae Tryon, 1879	
Genus *Argonauta* Linnaeus, 1758	
Argonauta argo Linnaeus, 1758	[2,5,12,14,15,25,26,33,49,50]

Excluded species and notes

Family Spirulidae Owen, 1836

Spirula spirula (Linnaeus, 1758). This is a circumtropical species, whose records for the Mediterranean Sea have been based on empty shells only [25,26]. It has been recently listed for the Mediterranean Sea [5,14], but any attempt to verify its presence in the Mediterranean Sea with living specimens has been unsuccessful (D. Capua, unpublished data). It is here conservatively excluded in the lack of records of living specimens, as floating shells may be easily transported across Gibraltar from the nearby Atlantic waters.

Family Sepiidae Leach, 1817

***Sepia gibba* Ehrenberg, 1831.** This is an Indo-Pacific species, whose record for the Mediterranean Sea has been based on a beached *sepion* without any trace of soft parts [22,37]. No confirmed records have so far become available, and it has not been listed among the Mediterranean species [14]. Any attempt to verify its presence in the Mediterranean Sea has been unsuccessful (D. Capua, unpublished data), and it is here conservatively excluded due to the lack of records of living specimens.

Family Sepiolidae Leach, 1817

Sepiola atlantica d'Orbigny, 1842. This is an Atlantic species, recorded in the past for the Tyrrhenian Sea as a binomial name in a list only [59]. No confirmed records have so far become available, and it has not been listed among the Mediterranean species [5,14]. Any attempt to verify its presence in the Mediterranean Sea has been unsuccessful (D. Capua, unpublished data), and it is here conservatively excluded awaiting confirmed records or careful re-analysis of the material (if available) on which the species has been recorded.

Family Octopoteuthidae Berry, 1912

Genus *Octopoteuthis* Rüppell, 1844. Species belonging to the genus *Octopoteuthis* need to be critically reviewed [17]. Whilst *Octopoteuthis sicula* Rüppell, 1844 has been originally described from the Mediterranean Sea, the presence of one additional species [*O. megaptera* (Verrill, 1885)] has been advocated [52] and, more recently, disputed [43]. However, a careful redescription of diagnostic characters of each species is mandatory, and the only genetic data available for an unidentified Mediterranean *Octopoteuthis* sample did not prove conclusive for species delimitation and identification, and resulted in high similarity with sequences deposited in the GenBank under the names of *O. megaptera* and *O. danae* Joubin, 1931 [17]. Therefore, even if the presence of one, or more, further species in the Mediterranean Sea can neither be ruled out nor be confirmed at present, we have hereby conservatively included only *O. sicula* due to its type locality (western Mediterranean Sea: [see 17]).

Family Bathyteuthidae Pfeffer, 1900

Bathyteuthis abyssicola Hoyle, 1885. This is an Atlantic species. It has been recently listed for the Mediterranean Sea [5,14], but no confirmed records are known from the Mediterranean Sea, as previously discussed [25,47]. Any attempt to verify its presence in the Mediterranean Sea has been unsuccessful (D. Capua, unpublished data), and it is here conservatively excluded awaiting confirmed records or careful re-analysis of the material on which the species has been recorded, which may in fact belong to *Chtenopteryx sicula* (Vérany, 1851) [25,47].

Family Octopodidae d'Orbigny, 1840

***Amphioctopus aegina* (Gray, 1849)/*A. kagoshimensis* (Ortmann, 1888)**. Mediterranean specimens belonging to an alien *Amphioctopus* have been often dubitatively identified as *A. aegina*/*A. kagoshimensis* [5,14,49,51,53], although the most recent reference opted – without specific reasons – for *A. aegina* [43]. We hereby conservatively list it as *Amphioctopus* sp., pending further analysis.