

# New records and range expansion of lessepsian migrants in the Levantine and Aegean Seas

THEODOROS TZOMOS, NIKI CHARTOSIA, MAGDALINI CHRISTODOULOU  
AND MILTIADIS-SPYRIDON KITSOS

Department of Zoology, School of Biology, Aristoteleio University of Thessaloniki, 54124, Thessaloniki, Greece

*The lessepsian species, Upeneus pori (Pisces), Sepioteuthis lessoniana (Cephalopoda) and Aquilonastra burtoni (Echinodermata) are reported for the first time from Cyprus, while the lessepsian bivalve, Barbatia plicata is reported for the first time from Kastelorizo Island, Greece. Finally, the fish species Pempheris vanicolensis, Sphyræna pinguis and Hemiramphus far were collected more northerly than their previous records in the Aegean Sea. The geographical distribution of these species is given. According to the new records, the number of lessepsian fish, mollusc and echinoderm species known from Cyprus increases to 25, 38 and 4 species respectively.*

**Keywords:** Pisces, Mollusca, Echinodermata, lessepsian migration

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## INTRODUCTION

The first review of the phenomenon of lessepsian migration was given by Por (1978). In this review, he reported 27 lessepsian fish, 27 mollusc and 2 echinoderm species. Further information on the lessepsian migrants of these taxonomic groups, as well as their distributional expansion in the Mediterranean has been given in a significant number of publications (e.g. El Sayed, 1994; Golani *et al.*, 2002, 2004, 2006, 2007; Salman, 2002; Zenetos *et al.*, 2003, 2005; Corsini *et al.*, 2005; Por & Dimentman, 2006; Streftaris & Zenetos, 2006; Corsini-Foka & Economidis, 2007; Tzomos, 2007; Koukouras *et al.*, in press).

Up to now, 24 lessepsian fish, 37 mollusc and 3 echinoderm species have been reported from Cyprus (Tzomos, 2007; Katsanevakis *et al.*, 2009). In respect to the Aegean Sea, 29 lessepsian fish, 19 mollusc and 1 echinoderm species have been reported so far (e.g. Pancucci-Papadopoulou *et al.*, 2006; Koukouras *et al.*, 2007; Tzomos, 2007; Zenetos *et al.*, 2007; Galil, 2009).

This study aims to provide new information on the lessepsian fish, mollusc and echinoderm species at the coasts of Cyprus, Kastelorizo Island and the Aegean Sea.

## MATERIALS AND METHODS

Samplings were carried out from 2003 until 2009, at numerous stations in southern and western Cyprus, Kastelorizo Island and the Aegean Sea. The samples were collected with all

available sampling gears depending on the habitat. Samples were deposited in the Museum of the Department of Zoology, Aristoteleio University of Thessaloniki (MDZAUT).

## RESULTS

### New record from Kastelorizo Island

Phylum MOLLUSCA  
Class BIVALVIA  
Subclass PTEROMORPHIA  
Family ARCIDAE Lamarck, 1809  
Genus *Barbatia* Gray, 1842  
*Barbatia plicata* (Dillwyn, 1817).

*Acar plicata*, Zenetos *et al.* (2003), p. 210, figure 1

Material: 5 specimens; Station 3, Kastelorizo Island, Greece (Figure 1); depth: 80 m; maerl beds; 11 August 2004; shell length = 11–15 mm.

A species widely distributed in the Indo-Pacific Ocean. It has been reported from the Red Sea and the Suez Canal (Moazzo, 1939; Oliver, 1992; Oliver & Holmes, 2004; Taylor & Glover, 2004). Up to now, the only record of this species from the Mediterranean was from the coast of Israel (Barash & Danin, 1986).

This is the second record of *B. plicata* from the Mediterranean which significantly expands its known distribution in the Levantine basin.

### New records from Cyprus

Phylum MOLLUSCA  
Class CEPHALOPODA

**Corresponding author:**

Th. Tzomos

Email: tzomos@bio.auth.gr



Fig. 1. Map indicating the location of the new records of lessepsian species: (1) Lemesos Bay; (2) Pafos; (3) Kastelorizo Island; (4) Kusadasi Bay.

#### Order TEUTHOIDEA

Family LOLIGINIDAE d'Orbigny, 1845

Genus *Sepioteuthis* Blainville, 1824

*Sepioteuthis lessoniana* Férussac, 1831 in Lesson, 1830–1831

*Sepioteuthis lessoniana*, Roper *et al.* (1984), pp.109–111, figures 1–5; Nesis (1987), p.147, figures 35K & L.

Material: 1 specimen; Station 2, Pafos, Cyprus (Figure 1); depth: 0 m (surface); date: 14 August 2009; mantle length = 32 cm.

This Indo-Pacific teuthid species has a wide distribution, from the Red Sea and the southern African coast through to Japan, Hawaii and north-eastern Australia (Nesis, 1987). Its first record in the Mediterranean Sea was from Iskenderun Bay, southern Turkish coast (Salman, 2002), while it has also been recorded from Israel (Mienis, 2004) and recently from the Aegean Sea (Lefkaditou *et al.*, 2009).

This is the first record of this species from Cyprus and also the first record of a lessepsian cephalopod species from the island. *Sepioteuthis lessoniana* seems to be well established in the area, since it is regularly found in the Cypriot fish markets.

#### Phylum ECHINODERMATA

Class ASTEROIDEA

Family ASTERINIDAE Gray, 1840

Genus *Aquilonastra* O'Loughlin, 2004

*Aquilonastra burtoni* (Gray, 1840)

*Asterina burtoni*, Tortonese (1966), p. 3, figures 1 & 2; Achituv (1969), pp. 329–342, figures I1, I4, I5, I6 & II1; Kojadinovic *et al.* (2004), pp. 225–230, figures 1, 6 & 7.

*Asterina wega*, Achituv (1969), pp. 329–342, figures I2, II2, II3 & II4.

*Aquilonastra burtoni*, O'Loughlin & Waters (2004), p. 13.

Material: 5 specimens; Station 2, Pafos, Cyprus (Figure 1); depth: 0–3 m; rocky substratum; 10 August 2003; disc diameter = 4–5 mm.

It is a lessepsian asteroid species, previously known as *Asterina burtoni* Gray, 1840 and *A. wega* Perrier, 1869 (O'Loughlin & Waters, 2004). It has a wide distribution in the Indo-Pacific Ocean, from the Hawaiian Islands and Australia to Madagascar, eastern Africa, the Red Sea (e.g.

Tortonese, 1960; Clark & Rowe, 1971) and the Suez Canal (Mortensen, 1926). The first record of this species in the Mediterranean was from Lebanon (Tortonese, 1966), while it has also been reported from the Israeli coast (Achituv, 1969).

This is the first record of the species from Cyprus.

Superclass PISCES

Class ACTINOPTERYGII

Order PERCIFORMES

Family MULLIDAE

Genus *Upeneus* Cuvier, 1829

*Upeneus pori* Ben-Tuvia & Golani, 1989

*Upeneus pori* Ben-Tuvia & Golani (1989), p. 105, figures 1–2; Golani *et al.* (2002), pp. 136–137, figure 1.

Material: 1 specimen; Station 1, Lemesos, Cyprus (Figure 1); depth: 13 m; rocky substratum; 1 June 2004; standard length = 11.3 cm.

This lessepsian species is distributed in the western Indian Ocean, from the Red Sea to the Gulf of Oman (Golani *et al.*, 2002). In the Mediterranean it was originally recorded from the southern Turkish coast (Kosswig, 1950) while later on, it was recorded from the Israeli coast (Ben-Tuvia, 1953), the Mediterranean coast of Egypt (El Sayed, 1994), Libya (Ben-Abdallah *et al.*, 2004), Tunisia (Ben Souissi *et al.*, 2005) and recently from Rodos Island, Aegean Sea (Corsini *et al.*, 2005).

This is the first record of *U. pori* from Cyprus.

### Fish range expansion in the Aegean Sea

Superclass PISCES

Class ACTINOPTERYGII

Order PERCIFORMES

Family SPHYRAENIDAE

Genus *Sphyraena* Artedi in Röse, 1793

*Sphyraena pinguis* Günther, 1874

*Sphyraena chrysotaenia*, Bauchot (1987), pp.1378 & 1380, figure 1; Golani *et al.* (2002), pp. 156–157, figure 1.

*Sphyraena pinguis*, Doiuchi & Nakabo (2005), pp. 132–151, figures 2C, 3E, F & 6.

Material examined: 1 specimen; Station 4, Kusadasi Bay, Aegean coast of Turkey (Figure 1); depth: 10 m; 21 August 2004; standard length = 19.5 cm.

The barracuda, *Sphyraena pinguis* has a wide distribution in the Indo-West Pacific, from the southern African coast and the Red Sea to southern Australia, Papua New Guinea and Japan (Doiuchi & Nakabo, 2005). The first record of this species in the Mediterranean was from the Israeli coast (Spicer, 1931). Since then, it has significantly expanded its distribution on the southern Turkish coast (Akyüz, 1957), Lebanon (George *et al.*, 1964), Rodos Island and the Gulf of Fethiye in the Aegean Sea (Corsini & Economidis, 1999; Torcu & Mater, 2000). It has also been reported from Libya (Stirn, 1970), Malta (Lanfranco, 1993) and the Adriatic Sea (Pallaoro & Dulcic, 2001).

In the framework of the present study a single specimen of this species was caught in Kusadasi Bay, at the Aegean coast of Turkey. This record expands the distribution of this species in the Aegean Sea, although it has already been reported from the Black Sea (Boltachev, 2009).

## Family PEMPHERIDAE

Genus *Pempheris* Cuvier, 1829*Pempheris vanicolensis* Cuvier, 1831*Pempheris vanicolensis*, Mooi (2001), p. 3204.

Material examined: 1 specimen; Station 4, Kusadasi Bay, Aegean coast of Turkey (Figure 1); depth: 5 m; rocky substratum; 20 August 2004; standard length = 10.5 cm.

*Pempheris vanicolensis* has a wide distribution in the Indo-Pacific Ocean, from the Red Sea and the eastern African coast until the Samoa Islands (Golani & Diamant, 1991). The first Mediterranean record of this species was from Lebanon (Mouneimne, 1979). Since then, it has been reported from Israel (Golani & Ben-Tuvia, 1986), Kastelorizo Island (Papaconstantinou & Caragitsou, 1987), the southern Turkish coast (Gucu *et al.*, 1994), Cyprus (Torcu *et al.*, 2001) and from the northern African coast until Tunisia (Bradai & Bouain, 2001). In respect to the Aegean Sea, this species has been reported from Rodos Island (ELNAIS, 2009) and Heraklion Bay, Crete (Tingilis *et al.*, 2003).

The recording of this species in Kusadasi Bay expands its known distribution in the Aegean Sea.

## Order BELONIFORMES

Family HEMIRAMPHIDAE

Genus *Hemiramphus* Cuvier, 1816*Hemiramphus far* (Forsskål, 1775)*Hemiramphus far*, Bauchot (1987), p. 1124, figure 1.

Material examined: 1 specimen; Station 4, Kusadasi, Aegean coast of Turkey (Figure 1); depth: 3 m; 22 August 2004; standard length = 25 cm.

*Hemiramphus far* is an Indo-Pacific species. Its known geographical distribution extends from the Red Sea and the eastern African coast to the Samoa Islands (Froese & Pauly, 2009). This species was originally recorded in the Mediterranean from the Israeli coast (Steinitz, 1927). It has also been recorded from Syria (Gravel, 1931), the southern Turkish coast (Kosswig, 1950), Cyprus (Demetropoulos & Neocleous, 1969), the Adriatic Sea (Collette & Parin, 1986), Egypt (Ben-Tuvia, 1978; El Sayed, 1994) and Libya (Shakman & Kinzelbach, 2006). In the Aegean Sea, *H. far* has been recorded from Rodos Island (Tortonese, 1946) and the Gokova Gulf (Torcu & Mater, 2000).

The recording of this species in Kusadasi Bay expands its known distribution northerly in the Aegean Sea.

According to the results of the present study, the number of lessepsian fish, molluscs and echinoderms known from Cyprus increases to 25, 38 and 4 species respectively. However, Cyprus still has a much lower lessepsian species number in relation to the neighbouring areas (Tzomos, 2007; Galil, 2009; Katsanevakis *et al.*, 2009). This should mainly be attributed to the relatively long distance of Cyprus from the mainland, and to the presence of cold waters, off the coasts of the island which possibly prohibit the approach of the lessepsian thermophilic species (Gilat, 1964; Por, 1978).

The observed increase of the mean annual temperature of the Mediterranean waters (e.g. Béthoux *et al.*, 1990; Laubier *et al.*, 2003; Vargas-Yáñez *et al.*, 2005) could possibly explain both the increasing trend in the entrance rate of the lessepsian migrants and the progressive geographical dispersal of previously known lessepsian species in the Mediterranean (Tzomos, 2007; Koukouras *et al.*, in press).

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## REFERENCES

- Achituv Y.** (1969) Studies on the reproduction and distribution of *Asterina burtoni* Gray and *A. wega* Perrier (Asteroidea) in the Red Sea and the eastern Mediterranean. *Israel Journal of Zoology* 18, 329–342.
- Akyüz E.F.** (1957) Observations on the Iskenderun red mullet (*Mullus barbatus*) and its environment. *Proceedings and Technical Papers, General Fisheries Council for the Mediterranean* 4, 305–326.
- Barash A. and Danin Z.** (1986) Further additions to the knowledge of Indo-Pacific Mollusca in the Mediterranean Sea (lessepsian migrants). *Spixiana* 9, 117–141.
- Bauchot M.-L.** (1987) Poisson osseux. In Fischer W., Schneider M. and Bauchot M.-L. (eds) *Fiches FAO d'identification des espèces pour les besoins de la pêche. (Révision 1). Méditerranée et mer Noire. Zone de pêche 37 Vertébrés Volume II*. Rome: FAO, CEE, pp. 891–1422.
- Ben-Abdallah A.R., Alturky A.A. and Fituri A.A.** (2004) Commercially exploited fishes in Libya. In *Actes des 6e Journées tunisiennes des sciences de la Mer (ATSMer). Tunis, Novembre 2003. Bulletin de l'Institut National des Sciences et Technologies de la Mer, 2025 Salammbô Spécial Number*, pp. 52–55.
- Ben Souissi J., Mejri H., Zaouali J. and Capapé C.** (2005) On the occurrence of the Por's goatfish, *Upeneus pori* (Mullidae) in southern Tunisia (central Mediterranean). *Cybium* 29, 410–412.
- Ben-Tuvia A.** (1953) Mediterranean fishes of Israel. *Bulletin of the Sea Fisheries Research Station, Haifa* 8, 1–40
- Ben-Tuvia A.** (1978) Immigration of fishes through the Suez Canal. *Fishery Bulletin* 76, 249–255.
- Ben-Tuvia A. and Golani D.** (1989) A new species of goatfish (Mullidae) of the genus *Upeneus* from the Red Sea and the eastern Mediterranean. *Israel Journal of Zoology* 36, 103–112.
- Béthoux J.P., Gentili B., Raunet J. and Taillez D.** (1990) Warming trend in the Western Mediterranean deep water. *Nature* 347, 660–662.
- Boltachev A.R.** (2009) Specifying species belonging to barracuda of group *Sphyræna obtusata* (Pisces: Sphyrænidae) found in the Black Sea. *Journal of Ichthyology* 49, 128–131.
- Bradai M.N. and Bouain A.** (2001) Diversité de la faune ichthyologique du Golfe de Gabès. *VIIIe Journées nationales des acquis de la recherche agricole, Nabeul, 13 et 14 novembre 2001. INSTM/PEMPH 01*, pp. 1–6.
- Clark A.M. & Rowe F.W.E.** (1971) *Monograph of shallow-water Indo-West Pacific echinoderms*. London: Trustees of the British Museum (Natural History).
- Collette B.B. and Parin N.V.** (1986) Hemiramphidae. In Whitehead P.J.P., Bauchot M.L., Hureau J.C., Nielsen J. and Tortonese E. (eds) *Fishes of the north-eastern Atlantic and the Mediterranean, Volume II*. Paris: UNESCO, pp. 620–622.
- Corsini M. and Economidis P.S.** (1999) Distribution extension of two lessepsian migrants found in the marine area of the island of Rhodes (Aegean Sea, Greece). *Cybium* 23, 195–199.
- Corsini M., Margies P., Kondilatos G. and Economidis P.S.** (2005) Lessepsian migration of fishes to the Aegean Sea: first record of *Tylerius spinosissimus* (Tetraodontidae) from the Mediterranean, and six more fish records from Rhodes. *Cybium* 29, 347–354.



- Corsini-Foka M. and Economidis P.S.** (2007) Allochthonous and vagrant ichthyofauna in Hellenic marine and estuarine waters. *Mediterranean Marine Science* 8/1, 67–89.
- Demetropoulos A. and Neocleous D.** (1969) The fishes and crustaceans of Cyprus. *Fisheries Bulletin of the Ministry of Agriculture and Natural Resources (Cyprus)* 1, 1–21.
- Doiuchi R. and Nakabo T.** (2005) The *Sphyræna obtusata* group (Perciformes: Sphyrænidae) with a description of a new species from southern Japan. *Ichthyological Research* 52, 132–151.
- El Sayed R.S.** (1994) *Check-list of Egyptian Mediterranean fishes*. Alexandria, Egypt: National Institute of Oceanography and Fisheries, pp. 1–77.
- ELNAIS** (2009) *Ellenic Network on Aquatic Invasive Species*: <http://elnais.ath.hcmr.gr>
- Froese R. and Pauly D.** (2009) *FishBase. World Wide Web electronic publication*. [www.fishbase.org](http://www.fishbase.org), version (09/2009).
- Galil B.S.** (2009) Taking stock: inventory of alien species in the Mediterranean Sea. *Biological Invasions* 11, 359–372.
- George C.J., Athanassiou V.A. and Boulos I.** (1964) The fishes of the coastal waters of Lebanon. *Miscellaneous Papers in the Natural Sciences, The American University of Beirut* 4, 1–24.
- Gilat E.** (1964) The macrobenthonic invertebrate communities on the Mediterranean continental shelf of Israel. IAEA radioactivity in the sea. *Bulletin de l'Institut Océanographique (Monaco)* 62, 1–46.
- Golani D. and Ben-Tuvia A.** (1986) New records of fishes from the Mediterranean coast of Israel including Red Sea immigrants. *Cybiurn* 10, 285–291.
- Golani D. and Diamant A.** (1991) Biology of the sweeper, *Pempheris vanicolensis* Cuvier & Valenciennes, a lessepsian migrant in the eastern Mediterranean, with a comparison with the original Red Sea population. *Journal of Fish Biology* 38, 819–827.
- Golani D., Orsi-Relini L., Massuti E. and Quignard J.-P.** (2002) *CIESM atlas of exotic species in the Mediterranean 1 Fishes*. [F. Briand, ed.] Monaco: CIESM Publishers.
- Golani D., Orsi-Relini L., Massuti E. and Quignard J.-P.** (2004) Dynamics of fish invasions in the Mediterranean: update of the CIESM Fish Atlas. *Rapport Commission International Mer Méditerranée* 37, 367.
- Golani D., Orsi-Relini L., Massuti E. and Quignard J.-P.** (2006) *Online CIESM atlas of exotic fishes in the Mediterranean*. <http://www.ciesm.org/atlas>.
- Golani D., Orsi-Relini L., Massuti E., Quignard J.-P. and Dulčić J.** (2007) Fish invasion of the Mediterranean—retrospective and prospective. *Rapport Commission International de la Mer Méditerranée* 38, 10.
- Gruvel A.** (1931) *Les Etats de Syrie. Richesses marines et fluviales, exploitation actuelle, avenir*. Paris: Société des Editions Géographiques, Maritimes et Coloniales, pp. 72–134.
- Gucu A.C., Bingel F., Avsar D. and Uysal N.** (1994) Distribution and occurrence of Red Sea fish at the Turkish Mediterranean coast, northern Cilician basin. *Acta Adriatica* 34, 103–113.
- Katsanevakis S., Tsiamis K., Ioannou G., Michailidis N. and Zenetos A.** (2009) Inventory of alien marine species of Cyprus. *Marine Mediterranean Science* 10, 109–133.
- Kojadinovic J., Falquet M.-P., Mangion P. and Conand C.** (2004) Distribution, abundance and asexual reproduction of *Asterina burtoni* (Asteroidea: Echinodermata) from La Reunion reefs (Western Indian Ocean). In Heinzeller T. and Nebelsick J.H. (eds) *Echinoderms: Munchen*. London: Taylor and Francis Group, pp. 225–230.
- Kosswig C.** (1950) Erythraische Fische im Mittelmeer und an der Grenze der Ägais. In von Jordans A. and Peus F. (eds.) *Syllegomena Biologica*. Leipzig: Akademischer Verlag, pp. 203–212.
- Koukouras A., Sinis A.I., Bobori D., Kazantzidis S. and Kitsos M.S.** (2007) The echinoderm (Deuterostomia) fauna of the Aegean Sea, and comparison with those of the neighbouring seas. *Journal of Biological Research* 7, 67–92.
- Koukouras A., Kitsos M.S., Tzomos Th. and Tselepidis A.** (in press) Evolution of the entrance rate and of the spatio-temporal distribution of the lessepsian Decapoda (Crustacea) in the Mediterranean Sea. *Crustaceana*.
- Lanfranco G.G.** (1993) *The fish around Malta (Central Mediterranean)*. Malta: Progress Press Co.
- Laubier L., Pérez T., Lejeune C., Garrabou J., Chevaldonné P., Vacelet J., Boury-Esnault N. and Harmelin J.-G.** (2003) La Méditerranée se réchauffe-t-elle? *Marine Life* 13, 71–81
- Lefkaditou E., Corsini-Foka M. and Kondylatos G.** (2009) Description of the first lessepsian squid migrant, *Sepioteuthis lessoniana* (CEPHALOPODA: Loliginidae), from the Aegean Sea (Eastern Mediterranean). *Mediterranean Marine Science* 10, 87–97.
- Mienis H.K.** (2004) New data concerning the presence of lessepsian and other Indo Pacific migrants among the mollusks in the Mediterranean Sea with emphasize on the situation in Israel. In Öztürk B. and Salman A. (eds) *Proceedings of the 1st National Malacology Congress, 1–3 September 2004, Izmir*. *Turkish Journal of Aquatic Life* 2, 117–131.
- Moazzo P.G.** (1939) Mollusques testacés marins du Canal de Suez. *Mémoires de l'Institut d'Égypte* 38, 1–283.
- Mooi R.D.** (2001) Pempheridae. Sweepers (bullseyes). In Carpenter K.E. and Niem V.H. (eds) *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 5. Bony fishes part 3 (Menidae to Pomacentridae)*. Rome: FAO, pp. 3201–3204.
- Mortensen T.** (1926) Cambridge Expedition to the Suez Canal in 1924. VI. Report on the Echinoderms. *Transactions of the Zoological Society of London* 22, 117–131.
- Mouneimne N.** (1979) Poissons nouveaux pour les côtes Libanaises. *Cybiurn* 6, 105–110.
- Nesis K.N.** (1987) *Cephalopods of the world*. Neptune City, USA: T.F.H. Publications.
- O'Loughlin P.M. and Waters J.M.** (2004) A molecular and morphological revision of genera of Asterinidae. (Echinodermata: Asteroidea) *Memoirs of Museum Victoria* 61, 1–40.
- Oliver P.G.** (1992) *Bivalved seashells of the Red Sea*. Christa Hemmen, Wies-Baden and National Museum of Wales, Cardiff.
- Oliver P.G. and Holmes A.M.** (2004) Cryptic bivalves with descriptions of new species from the Rodrigues lagoon. *Journal of Natural History* 38, 3175–3227.
- Pallaoro A. and Dulčić J.** (2001) First record of *Sphyræna chrysotaenia* (Klunzinger, 1884) (Pisces, Sphyrænidae) from the Adriatic Sea. *Journal of Fish Biology* 59, 179–182.
- Pancucci-Papadopoulou M.A., Zenetos A., Corsini-Foka M. and Politou Ch.-Y.** (2006) Update of marine aliens in Hellenic waters. *Mediterranean Marine Science* 6, 147–158.
- Papaconstantinou C. and Caragitsou E.** (1987) The first occurrence of the lessepsian fish immigrant *Pempheris vanicolensis* in territorial Greek waters. *Thalassographica* 9, 78–79.
- Por F.D.** (1978) *Lessepsian migration—the influx of Red Sea biota into the Mediterranean by way of the Suez Canal*. *Ecological Studies*, 23. Berlin: Springer-Verlag.

- Por F.D. and Dimentman Ch.** (2006) *Mare Nostrum. Neogene and anthropic natural history of the Mediterranean Basin, with emphasis on the Levant*. Sofia and Moscow: Pensoft.
- Roper C.F.E., Sweeney M.J. and Nauen C.E.** (1984) *FAO species catalogue. Volume 3. Cephalopods of the world. An annotated and illustrated catalogue of species of interest to fisheries*. FAO Fish Synopsis 125.
- Salman A.** (2002) New report of the loliginid squid *Sepioteuthis lessoniana* Lesson, 1830 in the Mediterranean. *Israel Journal of Zoology* 48, 249–250.
- Shakman E. and Kinzelbach R.** (2006) The halfbeak fish, *Hemiramphus far* (Forskål, 1775), in the coastal waters of Libya. *Zoology in the Middle East* 39, 111–112.
- Spicer I.J.** (1931) Fisheries. In *Report of the Department of Agriculture and Forests for the years 1927–30*. Jerusalem: Printing Office, Russian Building, pp. 159–160.
- Steinitz W.** (1927) Beiträge zur Kenntnis der Küstenfauna Palästinas. I. *Pubblicazioni della Stazione Zoologica di Napoli* 8, 311–353.
- Stirn J.** (1970) Some notes on western trends of lessepsian migration. *Journées Ichthyologiques, Rome, CIESM*, 187–190.
- Streftaris N. and Zenetos A.** (2006) Alien marine species in the Mediterranean—the 100 ‘Worst Invasives’ and their impact. *Mediterranean Marine Science* 7, 87–118.
- Taylor J.D. and Glover E.A.** (2004) Diversity and distribution of subtidal benthic molluscs from the Dampier Archipelago, Western Australia; results of the 1999 dredge survey (DA2/99). *Records of the Western Australian Museum* 66, 247–291.
- Tingilis G., Anezaki L., Valla E., Lymberakis P., Kapantagakis A., Biyiakis S. and Kauri S.** (2003) First records of lessepsian fish fauna migrants from Crete marine area. *Proceedings of the Eleventh Panhellenic Congress of Ichthyologists*. Preveza, pp. 47–50.
- Torcu H. and Mater S.** (2000) Lessepsian fishes spreading along the coasts of the Mediterranean and the southern Aegean Sea of Turkey. *Turkish Journal of Zoology* 24, 139–148.
- Torcu H., Aka Z. and Isbilir A.** (2001) An investigation on fishes of the Turkish Republic of Northern Cyprus. *Turkish Journal of Veterinary and Animal Sciences* 25, 155–159.
- Tortonese E.** (1946) On some fishes from the eastern Mediterranean (Island of Rhodes). *Annals and Magazine of Natural History* 13, 710–715.
- Tortonese E.** (1960) Echinoderms from the Red Sea. I. Asteroidea. *Bulletin No. 29 of the Sea Fisheries Research Station, Haifa* 19, 17–23.
- Tortonese E.** (1966) Echinoderms from the coast of Lebanon. *Miscellaneous Papers in the Natural Sciences, the American University of Beirut* 5, 2–5.
- Tzomos Th.** (2007) *Investigation of the progress of the lessepsian immigratory current, in respect of Mollusca and Pisces*. Masters thesis. Aristoteleio University of Thessaloniki, Thessaloniki, Greece.
- Vargas-Yáñez M., Salat J., Luz Fernández de Puelles M., López-Jurado J.L., Pascual J., Ramírez T., Cortés D. and Franco I.** (2005) Trends and time variability in the northern continental shelf of the western Mediterranean. *Journal of Geophysical Research*, 110 (C10019).
- Zenetos A., Gofas S., Russo G. and Templado J.** (2003) *CIESM atlas of exotic species in the Mediterranean 3 Molluscs*. [F. Briand, Ed.]. Monaco: CIESM Publishers.
- Zenetos A., Çinar M.E., Pancucci-Papadopoulou M.A., Harmelin J.G., Furnari G., Andaloro F., Bellou N., Streftaris N. and Zibrowius H.** (2005) Annotated list of marine alien species in the Mediterranean with records of the worst invasive species. *Mediterranean Marine Science* 6, 63–118.
- and
- Zenetos A., Vassilopoulou V., Salomidi M. and Poursanidis D.** (2007) Additions to the marine alien fauna of Greek waters (2007 update). *JMBA Biodiversity Records*, 5928.

#### Correspondence should be addressed to:

Th. Tzomos  
 Department of Zoology  
 School of Biology  
 Aristoteleio University of Thessaloniki, 54124  
 Thessaloniki, Greece  
 email: ttzomos@bio.auth.gr