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Research article

The establishment of the invasive crab *Percnon gibbesi* (H. Milne Edwards, 1853) (Crustacea: Decapoda: Grapsidae) in Greek waters

Maria Thessalou-Legaki[1*], Argyro Zenetos[2], Venetia Kambouroglou[1], Maria Corsini-Foka[3], Petros Kouraklis[2], Costas Dounas[4] and Artemis Nicolaidou[1]
[1]*Department of Zoology-Marine Biology, School of Biology, University of Athens, Panepistimiopolis, GR 157 84, Athens, Greece*
E-mail: mthessal@biol.uoa.gr
[2]*Hellenic Centre for Marine Research, Institute of Oceanography, Anavissos 19013, Attica, Greece*
[3]*Hellenic Centre for Marine Research, Hydrobiological Station of Rhodes, GR 85100 Rhodes, Greece*
[4]*Hellenic Centre for Marine Research, Institute of Marine Biology & Genetics, Former US Base at Gournes, GR 71003, Heraklion Crete, Greece*
**Corresponding author*

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Abstract

The tropical Atlantic grapsid crab *Percnon gibbesi* (H. Milne Edwards, 1853) may be regarded as the most invasive decapod currently expanding its distribution in the Mediterranean Sea. The present paper records its presence in Greek waters since 2004. The species seems well established along the coasts of Messiniakos Gulf, Crete and Rhodes Islands as several individuals of various sizes were observed on shallow, rocky bottoms. The proximity of these localities to ports may hint at shipping as potential vector, but larval transport from already established populations across the Ionian Sea cannot be excluded. The wide adaptability, the potential for colonising new habitats and the population dynamics of *P. gibbesi* merit further investigation.

Key words: *Percnon gibbesi*, Eastern Mediterranean Sea, Greece, invasive species, Messiniakos Gulf, Crete, Rhodes

Introduction

The rapidly accelerating human activities over the past century (trade, transport, tourism) have dramatically enhanced the spread of alien species. The Mediterranean is by far the major recipient of alien species with an average of one introduction every four weeks over the past five years (Streftaris et al. 2005). According to data compiled in Galil et al. (2006), 63 alien decapod crustaceans are present in the Mediterranean. The great majority (73%) are of Indo-Pacific origin, with only 15% of tropical Atlantic origin. In Greece, 14 alien decapods have been reported, four of which were added in the past two years (Pancucci-Papadopoulou et al 2005, 2006, Corsini-Foka et al. 2006, Corsini and Kondylatos 2006, Cannicci et al. 2006). As a result of its geographical position, the great majority of alien decapods recorded so far from Greece are of Indo-Pacific origin (invasion via the Suez Canal). Thus, as for other animal groups, most alien decapods have been encountered only in SE Greek waters, their occurrence decreasing significantly northwards and westwards (Pancucci-Papadopoulou et al. 2005).

Percnon gibbesi (H. Milne Edwards, 1853) is one of the newcomers in the Mediterranean, first

observed in Linosa Isl., Sicily Straits, in 1999 (Relini et al. 2000). Subsequently, it was recorded from the Balearic Archipelago (Garcia and Reviriego 2000, Müller 2001, Deudero et al. 2005), Sardinia, Tyrrhenian Sea, Sicily and Malta (Pipitone et al. 2001, Mori and Vacchi 2002, Russo and Villani 2005). Recently Cannicci et al. (2006) reported the species from Crete and Antikythira Islands (Greece). The crab's native distribution extends from Chile to California, from Florida to Brazil and from the Gulf of Guinea to the Azores (in Galil et al. 2006). The present study records the earliest finding in Greek waters and supports its establishment towards the eastern Mediterranean region.

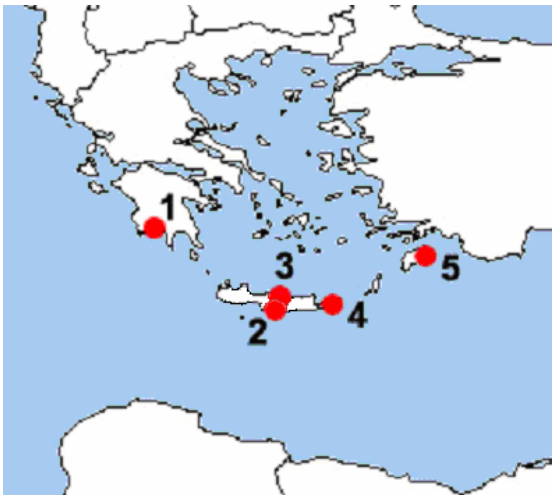

Figure 1. Distribution of *Percnon gibbesi* in Greek waters according to the present paper (see also Annex)

Results and Discussion

Living specimens of *P. gibbesi* were hand collected by snorkelling in 2004 and 2005. Several specimens were identified in the field and then returned to the sea. Seven specimens were retained, measured, preserved in 70% ethanol, and deposited at the authors' institutions. The specimens collected fit the descriptions of *P. gibbesi* from the western Atlantic coast (Williams 1984) and the central Mediterranean (Relini et al. 2000). Their carapace length ranged between 15 and 35 mm. The first Greek specimens were found on the NE coast of Messiniakos Gulf at distances ranging from 2 to 8 km from the port of Kalamata in March 2004.

In July 2005, the species was found on the eastern coast of Rhodes, where an ovigerous female was collected, as well as on three locations in Crete (Figure 1, Annex). Most individuals were found at 1.5-2 m depth in a variety of rocky microhabitats, from crevices on vertical rocks to boulders and photophilous algae (Annex).

Observations in Messiniakos Gulf through to 2006 confirmed the persistent occurrence of *P. gibbesi*. Preliminary assessment of crab density showed an increase in the summer of 2005 (~ 1 indiv. m^{-2}), and a decline in numbers during the winter of 2005-2006.

The Mediterranean habitat of preference for the species seems to be the shallow infra-littoral rocky shore, more frequently around 1-2 m depth (Müller 2001, Deudero et al. 2005, present study), characterized by the occurrence of boulders. Although boulders - with or without macroalgal cover - are considered as an important habitat feature for the newly established western Mediterranean populations, the crab was found on a variety of rocky surfaces in the Greek localities. This may reflect a still unbalanced condition of the new arrival in Greek waters. Earlier studies (Pipitone et al. 2001, Müller 2001), found the crab present only in certain sites on the same island, a fact occurring also in its native range (e.g. Edgar et al. 2004, Mille-Pagaza et al. 2003). More recently, however, Deudero et al. (2005) reported its occurrence all around Dragonera Island (Balearic Archipelago), where it attains abundances of up to 3 indiv. m^{-2}, although showing a very patchy distribution.

The first alien decapod of tropical E. Atlantic origin found in Greek waters was the swimming crab *Callinectes sapidus* Rathbun, 1896 (Serbetis 1959), arriving in ballast waters. *Percnon gibbesi* may have entered the western Mediterranean through larval drift/adult movements (Pipitone et al. 2001, Abelló et al. 2003), or accidental transport through shipping (Mori and Vacchi 2002, Cannicci et al. 2006). At present, it is difficult to determine the means of arrival of *P. gibbesi* in Greek waters. The earlier record in Messiniakos Gulf, near the port of Kalamata, hints at a possibility of shipping as a vector. However, considering the geographical position of the Greek localities on the Hellenic Arch, colonization via larval transport by currents crossing the Ionian Sea seems to be reasonable. It is suggested that the relatively long larval phase (Paula and Hartnoll 1989) possibly made this transport successful, while the large size of the first crab stage (Hartnoll 1992) facilitated subsequent colonization.

Whatever the means, the observation of several individuals in a wide size range, of an ovigerous female in Rhodes as well as the timing of the consecutive findings in Greek sites confirm that the species is currently invading the eastern Mediterranean. Its algivorous feeding habit (Puccio et al. 2006) may prove advantageous in this oligotrophic environment. Because of its rapid spread, *P. gibbesi* has been proposed to be included in the 100 worst invasive marine species at the European level (SEBI2010, 2006).

Further surveys in southern Greek waters to assess the extent of *P. gibbesi* occurrence, including monitoring of population density and reproduction in selected sites, and studies for the determination of potential competitors and predators are needed. These surveys should be conducted as part of a collaborative trans-Mediterranean study in order to obtain comparable results on habitat preference and population density and to follow the evolution of this invasion.

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References

Abelló P, Visauta E, Bucci A and Demestre M (2003) Noves dades sobre l'expansió del cranc *Percnon gibbesi* (Brachyura: Grapsidea: Plagusiinae) a la Mediterrànea occidental. Bolletí de la Societat d'Història Natural de les Balears 46: 73-77

Cannicci S, Garcia L and Galil BS (2006) Racing across the Mediterranean-first record of *Percnon gibbesi* (Crustacea: Decapoda: Grapsidae) in Greece. JMBA2 – Biodiversity Records, published online. http://www.mba.ac.uk/jmba/pdf/5300.pdf

Corsini M and Kondylatos G (2006) On the occurrence of two brachyurans, *Myra subgranulata* and *Herbstia kondyliata*, on Rhodes Island (SE Aegean Sea). Crustaceana 79: 167-174

Corsini-Foka M, Margies P and Santorinios E (2006) First record of the exotic brachyuran *Leucosia signata* from Rhodes. In: Abstracts of the 8th Pan-Hellenic Symposium of Oceanography & Fisheries, Thessaloniki, Greece, 4-8 June 2006

Deudero S, Frau A, Cedra M and Hampel H (2005) Distribution and densities of the decapod crab *Pecrnon gibbesi*, an invasive Grapsidae, in western Mediterranean waters. Marine Ecology Progress Series 285: 151-156

Edgar GJ, Banks S, Fariña JM, Calvopiña M and Martínez C (2004) Regional biogeography and macroinvertebrate communities in the Galapagos archipelago. Journal of Biogeography 31: 1107-1124

Galil BS, Froglia C and Noël P (2006) CIESM Atlas of Exotic Species in the Mediterranean. Volume 2. Crustaceans: decapods and stomatopods, Check-list of exotic species. http://www.ciesm.org/atlas/appendix2.html Cited 7 April 2006

Garcia L and Reviriego B (2000) Presència del cranc subtropical *Percnon gibbesi* (H. Milne Edwards, 1853) (Crustacea, Decapoda, Grapsidae) a les Illes Balears. Primera cita a la Mediterrania occidental. Bolletí de la Societat d'Història Natural de les Balears 43: 81-89

Hartnoll RG (1992) Megalopae and early postlarval stages of East African Percnon. Journal of Zoology London 228: 51-67

Mille-Pagaza S, Pérez-Chi A and Sánchez-Salazar ME (2003) Littoral decapods of Socorro Island, Revillagigedo Archipelago, Mexico. Revista de Biologia Tropical 51: 175-182

Mori M, Vacchi M (2002) On a new occurrence of the alien flat crab *Percnon gibbesi* (H. Milne Edwards), in the southern Sicily (Central Mediterranean Sea). Annali del Museo Civico di Storia Naturale "Giacomo Doria" 94: 295-301

Müller C (2001) Erstnachweis der Flachkrabbe *Percnon gibbesi* (Crustacea: Decapoda: Grapsidae) für die Balearischen Inseln. Senckenbergiana Maritima 31: 83-89

Paula J and Hartnoll RG (1989) The larval and post-larval development of *Percnon gibbesi* (Crustacea, Brachyura, Grapsidae) and the identity of the larval genus *Pluteocaris*. Journal of Zoology London 218: 17-37

Pancucci-Papadopoulou MA, Kevrekidis K, Corsini-Foka M and Simboura N (2005) Changes in species: invasion of exotic species. (336-342) In: E. Papathanassiou and A. Zenetos (eds) State of the Hellenic marine environment. HCMR Publications, Athens

Pancucci-Papadopoulou MA, Zenetos A, Corsini-Foka M and Politou CH-Y (2006) Update of marine aliens in Hellenic waters. Mediterranean Marine Science (in press)

Pipitone C, Badalamenti F and Sparrow A (2001) Contribution to the knowledge of *Percnon gibbesi* (Decapoda, Grapsidae), an exotic species spreading rapidly in Sicilian waters. Crustaceana 74: 1009-1017

Puccio V, Relini M, Azzuro E and Orsi Relini L (2006) Feeding habits of *Percnon gibbesi* (H. Milne Edwards, 1853) in the Sicily Strait. Hydrobiologia 557: 79-84

Relini M, Orsi L, Puccio V and Azzurro E (2000) The exotic crab *Percnon gibbesi* (H. Milne Edwards, 1853) (Decapoda, Grapsidae) in the central Mediterranean. Scientia Marina 64: 337-340

Russo GF and Villani G (2005) Spreading of the allochthonous species *Percnon gibbesi* in the central Tyrrhenian Sea. Biologia Marina Mediterranea 12: 329-330

SEBI2010, 2006. Streamlining European 2010 Biodiversity Indicators. http://biodiversity-chm.eea.eu.int/information/indicator/F1090245995 Cited 7 April 2006

Serbetis C (1959) Un nouveau crustacé commestible en mer Egeé *Callinectes sapidus* Rath. (Decapod brach.). General Fisheries Council for the Mediterranean (GFMC) Proceedings and Technical Papers 5: 505-507

Streftaris N, Zenetos A and Papathanassiou E (2005) Globalisation in marine ecosystems: the story of non-indigenous marine species across European seas. Oceanography and Marine Biology An Annual Review 43: 419-453

Williams AB (1984) Shrimps, lobsters and crabs of the Atlantic coast of the eastern United States, Maine to Florida. Smithsonian Institution Press, Washington, DC

Annex

Records of *Percnon gibbesi* in coastal waters of Greece in 2004-2005*

Map Ref.	Location	Record coordinates		Record date	Habitat (depth)	Collector
		Latitude, °N	Longitude, °E			
	Messiniakos Gulf					
1	Mikra Mantinia-Akrogiali-Almyros	36°58.4'	22°08.8'	March 2004	Crevices on vertical rocks (1-2 m)	P. Kouraklis
	Crete					
2	Kaloi Limenes (south coast)	34°55.9'	24°48.2'	December 2005	Boulders (1.5 m)	C. Dounas
3	Tobrouk (north coast)	35°20.0'	25°12.8'	July 2005	Photophilous algae (1.5-2 m)	C. Dounas
4	Kato Zakros-Xerokambos (east coast)	35°03.4'	26°14.7'	August 2005	Rock crevices (1 m)	C. Dounas
	Rhodes					
5	Pefki (east coast)	36°04.0'	28°03.2'	July 2005	Rocks (2 m)	P. Margies

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