

Senckenberg am Meer 463.

## Decapod Crustacean Fauna of the Aegean Sea: New Information, Check List, Affinities.

With 2 Text-Figures and 4 Tables.

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### Abstract.

[KOUKOURAS, A. & DOUNAS, C. & TÜRKAY, M. & VOULTSIADOU-KOUKOURA, E. (1992): Decapod crustacean fauna of the Aegean Sea: New information, check list, affinities. — Senckenbergiana marit. 22 (3/6): 217-244, 2 figs, 4 tabs.; Frankfurt a. M.]

The examination of certain decapod crustacean collections from the Aegean Sea and the review of the relevant literature showed that the number of the species known from this area is 231. Seven of these species are reported for the first time from the eastern Mediterranean and three from the Aegean Sea. For the 19 more interesting species found, information on their distribution and their habitat is given. The numbers of decapods known from the entire Mediterranean, the Adriatic Sea, the coast of Israel and the Black Sea, according to the existing literature, are estimated. The affinities among the decapod faunas of the above areas are estimated by the coefficient of CHEKANOWSKI together with the number of species common to each pair of areas. The most strongly related fauna to that of the Aegean Sea is the fauna of the Adriatic. The fauna of the coast of Israel is more related to that of the coast of Cyprus although their degree of affinity is lower than that between Adriatic and Aegean. The two pairs of areas have an affinity with each other of about 60 %. The Black Sea has a low affinity with the other areas.

### Kurzfassung.

[KOUKOURAS, A. & DOUNAS, C. & TÜRKAY, M. & VOULTSIADOU-KOUKOURA, E. (1992): Decapode Crustaceen der Ägais: Neue Informationen, Artenliste und zoogeographische Beziehungen. — Senckenbergiana marit. 22 (3/6): 217-244, 2 Abb., 4 Tab.; Frankfurt a. M.]

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Die Untersuchung einiger Sammlungen dekapoder Crustaceen von der Ägais und die Auswertung der relevanten Literatur zeigten, daß die Gesamtartenzahl nunmehr mit 231 angegeben und drei für die Ägais. Für weitere neunzehn bemerkenswerte Arten werden Informationen über Verbreitung und Habitat gegeben. Die Artenzahl dekapoder Crustaceen des gesamten Mittelmeeres, der Adria, der israelischen Küste und des Schwarzen Meeres werden aufgrund der vorliegenden Literatur geschätzt. Die Ähnlichkeiten der Dekapodenfaunen der genannten Regionen wurden mit Hilfe des CHEKANOWSKI-Koeffizienten ermittelt. Die der Ägais-Fauna ähnlichste ist die der Adria. Die Fauna der israelischen Küste ist der von Zypern am ähnlichsten, obwohl der Ähnlichkeitsindex geringer ist als der zwischen Ägais und Adria. Die beiden genannten Arealpaare haben eine Ähnlichkeit zueinander von 60%. Das Schwarze Meer ist den übrigen untersuchten Regionen sehr unähnlich.

## Problem.

The fauna of the Aegean Sea is of special interest since it constitutes a separate subsystem in relation to the Mediterranean fauna (PÉRÈS 1967; MURDOCH & ONUF 1974). The native populations of the Aegean are a source of enrichment for the Black Sea fauna (CASPER 1957, 1968; BACESCU 1977; MOTAS 1977) while on the other hand, they are influenced by the less saline waters of the Black Sea (BACESCU et al. 1971). Furthermore, they are enriched both with Indopacific immigrants and with warmwater species of Atlantic origin (POR 1978; KOUKOURAS 1979; TÜRKAY et al. 1987).

However, despite the interest in its fauna, the Aegean remains one of the most poorly studied areas of the North and East Mediterranean. Decapod crustaceans are one of the few animal groups that have been consistently studied, mainly from the systematic point of view. The existing information on this taxon was very limited and scattered until 1958. In that year, the first list of the marine decapods of the Eastern Mediterranean was published by HOLTHUIS & GOTTLIEB (1958). According to that list, the decapod fauna of the Aegean Sea (including Sea of Marmara) consisted of 124 species (39 Natantia, 8 Macrura Reptantia, 17 Anomura, 60 Brachyura). In the above list, the species *Sergestes tenuiremis* KRÖYER 1958, *Pagurus bernhardus* (LINNAEUS 1758), *Petrolisthes boscii* (AUDOUIN 1826) and *Philyra globulosa* (BOSC 1801) are included, the presence of which was questioned by its authors. To this list of species, 8 more should be added, which are included in the publication by DRENSKY (1951) on Entomostraca and Malacostraca of the Aegean Sea, recording a total of 59 species. These 8 species had not been previously reported from the Aegean and are the following: *Parapandalus narval* (FABRICIUS), *Lysmata seticaudata* (RISSO), *Axius stirhynchus* LEACH, *Dardanus calidus* (RISSO), *Galathea intermedia* LILLJEBORG, *Ebalia tumefacta* (MONTAGU), *Thia scutellata* (FABRICIUS), *Lissa chiragra* (FABRICIUS). The record of *Hyas araneus* (LINNAEUS) among the above species should be attributed to an erroneous identification.

Since 1958, a number of publications, about 35 in all, have substantially raised the number of the decapods known from the Aegean Sea.

The main objectives of this paper are (1) to report new information on the decapod fauna of the Aegean Sea after the examination of (a) the decapod collections of the French oceanographic vessel "CALYPSO" in the South (cruise of 1955) and the North (cruise of 1960) Aegean, (b) the collection of ATHANASSOPOULOS

deposited in the Museum of the Department of Zoology in the Aristotelian University of Thessaloniki (A.U.T.), (c) a large collection of the authors from the Aegean Sea, (2) to present for the first time a check list of the decapods of the Aegean Sea, (3) to compare the decapod fauna of the Aegean with those of the adjacent Mediterranean areas (Adriatic, coasts of Israel and Cyprus, Black Sea) as well as with that of the whole Mediterranean.

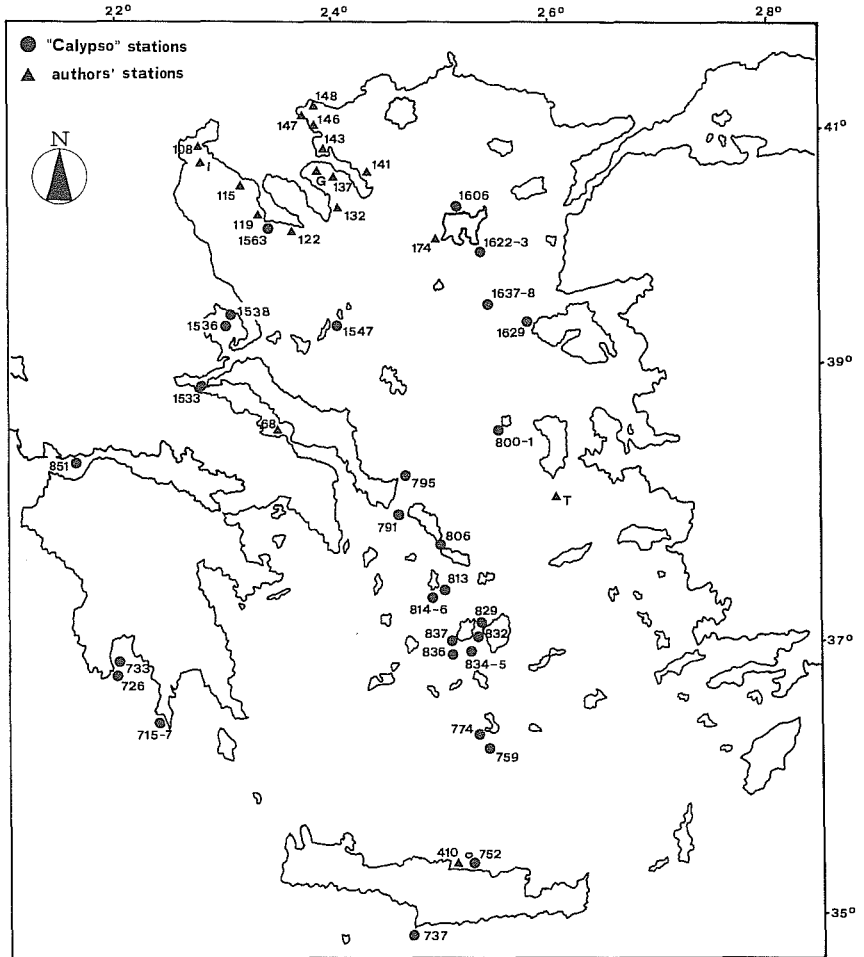


Fig. 1. Map of the Aegean Sea indicating certain sampling stations of "CALYPSO" and authors.

Abb. 1. Karte der Ägais mit Sammelstationen der „CALYPSO“ und der Autoren.

## Material and Methods.

The "CALYPSO" material examined was extracted from 77 of the 152 sampling stations of the 1955 cruise in the S-Aegean and from 47 of the 122 stations of the cruise of 1960 in the N-Aegean Sea. This material, sent to us by Dr. H. ZIBROWIUS, is now deposited in the Museum of the Department of Zoology (A.U.T.). A very small part of the decapod material collected by "CALYPSO" in the Aegean Sea is deposited in the "Muséum National d'Histoire Naturelle" in Paris (FOREST, personal communication) and we did not have the opportunity to examine this. The "CALYPSO" stations in which the most interesting specimens were found, as well as descriptive information are shown in Fig. 1 and Tab. 1. The coordinates of the "CALYPSO" stations have been given by BLANC (1958) and PÉRÈS & PICARD (1958).

A small, 30-year-old decapod collection belonging to Dr. ATHANASSOPOULOS (Professor in the Department of Zoology, A.U.T.) and deposited in the Museum of the Department of Zoology in A.U.T., was also examined. This collection includes specimens collected at various sites along the Greek coasts (depths 0–100 m), over a period ranging from 1912 to 1940.

Besides these, the authors examined a large collection of decapods from 250 sampling stations, from depths between 0 and 1000 m, distributed over the entire Aegean Sea. The specimens, collected with fishing nets, various types of grabs and dredges and by scuba diving, were deposited in the Museum of the Department of Zoology. The sampling sites which enriched the number of the known species are also given in Fig. 1. In Tab. 1 sampling dates, depths and substratum type are presented.

In order to estimate the affinity of the decapod fauna of the Aegean Sea with those of adjacent areas, the qualitative coefficient of CHEKANOWSKI,  $2a/2a+b+c$ , was used (a, the number of common species between the areas 1 and 2; b, the number of species of area 1 that do not exist in area 2; and c, the number of species of area 2 that do not exist in area 1).

## Results and Discussion.

### The Examined Material.

#### Collections of "CALYPSO":

The examined material included 550 individuals which were found to belong to 79 decapod species (19 Natantia, 3 Macrura Reptantia, 13 Anomura and 44 Brachyura). All these species are presented in Tab. 2. Among them, 31 of the 36 species reported by PÉRÈS & PICARD (1958) and JACQUOTTE (1962) are included.

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Table 1. Data of certain sampling stations of "CALYPSO" and authors. — Aegean Sea.

Tabelle 1. Stationsdaten der „CALYPSO“ und der Autoren. — Ägaisches Meer.

Station	Date	Depth (m)	Type of substrate
''CALYPSO''			
715	9. 9.1955	115-120	biogenic detritus
716	9. 9.1955	73	biogenic detritus
717	9. 9.1955	65	coarse sand
726	11. 9.1955	38- 40	sandy-silt
733	12. 9.1955	37	silty-sand
737	13. 9.1955	55- 73	coralligenous
752	17. 9.1955	90-123	coarse sand
759	18. 9.1955	90-100	biogenic detritus
774	20. 9.1955	128-146	biogenic detritus
791	24. 9.1955	145-150	silty-sand
795	25. 9.1955	90	biogenic detritus
800	25. 5.1989	140-150	biogenic detritus
801	25. 9.1955	120-130	biogenic detritus
806	26. 9.1955	45	coralligenous
813	27. 9.1955	68	sandy-silt
814	27. 9.1955	115	biogenic detritus
815	27. 9.1955	104	biogenic detritus
816	27. 9.1955	100	biogenic detritus
829	28. 9.1955	37	sandy-silt
832	28. 9.1955	46	gravels, coarse sand
834	28. 9.1955	75	biogenic detritus
835	28. 9.1955	88	biogenic detritus
836	29. 9.1955	102	biogenic detritus
837	29. 9.1955	82	biogenic detritus
851	2. 10.1955	48	silt
1533	23. 5.1960	100	sandy-silt
1536	24. 5.1960	68	silt
1547	25. 5.1960	110	biogenic detritus
1563	25. 5.1960	80	sandy-silt
1606	3. 6.1960	100	biogenic detritus
1622	3. 6.1960	90	biogenic detritus
1623	3. 6.1960	120	biogenic detritus
1629	3. 6.1960	180	sandy-silt
1637	6. 6.1960	50	coralligenous
1638	6. 6.1960	75	coralligenous
<b>Authors</b>			
68	15. 8.1971	0- 18	sand, <i>Zostera</i>
108	14. 9.1974	2	sand
115	5. 9.1976	9	sand, <i>Zostera</i>
119	15. 6.1976	3	rock
122	25. 6.1988	0- 15	coarse sand
132	25. 6.1987	0- 5	sponges
137	27. 6.1987	0- 6	sponges
141	27. 6.1987	0- 4	sponges
143	29. 6.1976	2	rock, <i>Cystoseira</i>
146	14. 8.1964	3	fine sand
147	15. 4.1981	2-	coarse sand, <i>Zostera</i>
148	15. 4.1981	20	medium sand, <i>Zostera</i>
174	6. 8.1975	7	rock, ascidians
410	15. 9.1988	20	sand, <i>Postonia</i>
I	20. 5.1968	25-	silt, ascidians
G	13. 3.1975	150	silt, sponges
T	16. 4.1975	150-350	silt

Table 2. Marine decapod crustacean species from the Aegean Sea (examined collections and literature). — C. C. = "CALYPSO" collection; As.C. = ATHANASSOPOULOS collections; A.C. = authors collections; H & G = HOLTHUIS & GOTTLIEB (1958) list.

Tabelle 2. Marine Crustacea Decapoda der Ägais (Untersuchte Sammlungen und Literatur). — C. C. = „CALYPSO“; As. C. = Sammlung ATHANASSOPOULOS; A. C. = Sammlungen der Autoren; H & G = Liste von HOLTHUIS & GOTTLIEB (1958).

	C. C.	As. C.	A. C.	H&G
<b>Natantia</b>				
<i>AcanthePHYra eximia</i> SMITH 1884				+
<i>AcanthePHYra pelagica</i> (Risso 1816)				+
<i>AcanthePHYra purpurea</i> A. MILNE EDWARDS 1881				
<i>Alpheus dentipes</i> GUÉRIN 1832	+		+	+
<i>Alpheus glaber</i> (OLIVI 1792)	+		+	+
<i>Alpheus macrocheles</i> (HALLSTONE 1835)	+		+	+
<i>Alpheus playdactylus</i> COUTIÈRE 1897	+			
<i>Aristaeomorpha foliacea</i> (Risso 1827)			+	+
<i>Aristeus antennatus</i> (Risso 1816)			+	
<i>Athanas amazone</i> HOLTHUIS 1951	+			
<i>Athanas nitescens</i> (LEACH 1814)	+		+	+
<i>Automate branchialis</i> HOLTHUIS & GOTTLIEB 1958	+			
<i>Chlorotocus crassicornis</i> (COSTA 1871)			+	+
<i>Crangon crangon</i> (LINNAEUS 1758)		+	+	+
<i>Eualus occultus</i> (LEBOUR 1936)	+		+	
<i>Gennadas elegans</i> (SMITH 1882)				+
<i>Gnathophyllum elegans</i> (Risso 1816)			+	
<i>Hippolyte holthuisi</i> ZARIQUEY ALVAREZ 1953				
<i>Hippolyte inermis</i> LEACH 1815			+	+
<i>Hippolyte leptocerus</i> (HELLER 1863)				
<i>Hippolyte leptometrae</i> LEDOYER 1969				
<i>Hippolyte longirostris</i> (CZERNIAVSKY 1868)			+	+
<i>Lysmata seticaudata</i> (Risso 1816)			+	
<i>Lucifer typus</i> H. MILNE EDWARDS 1837				+
<i>Nematocarcinus ensifer</i> (SMITH 1882)				+
<i>Odontozona minoica</i> DOUNAS & KOUKOURAS 1989			+	
<i>Palaemon adpersus</i> RATHKE 1837			+	+
<i>Palaemon elegans</i> RATHKE 1837		+	+	+
<i>Palaemon longirostris</i> H. MILNE EDWARDS 1837			+	+
<i>Palaemon seratus</i> (PENNANT 1777)		+	+	+
<i>Palaemon xiphias</i> RISSO 1816	+		+	
<i>Palaemonetes antennarius</i> (H. MILNE EDWARDS 1837)			+	
<i>Pandalina brevisrostris</i> (RATHKE 1843)	+		+	+
<i>Parapandalus narval</i> (FABRICIUS 1787)			+	
<i>Parapanaeus longirostris</i> (LUCAS 1846)		+	+	+
<i>Pasiphaea multidentata</i> ESMARK 1866				
<i>Pasiphaea sivado</i> (Risso 1816)			+	+
<i>Penaeus (Melicertus) kerathurus</i> (FORSKAL 1775)		+	+	+
<i>Periclimenes amethysteus</i> (Risso 1827)			+	
<i>Periclimenes scriptus</i> (Risso 1822)	+		+	
<i>Philocheras bispinosus</i> (HALLSTONE 1835)			+	
<i>Philocheras echinulatus</i> (M. SARS 1861)			+	
<i>Philocheras fasciatus</i> (Risso 1816)			+	
<i>Philocheras monacanthus</i> (HOLTHUIS 1961)			+	
<i>Philocheras sculptus</i> (BELL 1847)			+	
<i>Philocheras trispinosus</i> (HALLSTONE 1835)			+	
<i>Plesionika acanthonotus</i> (SMITH 1882)				+

<i>Plesionika edwardsii</i> (BRANDT 1851)				+	
<i>Plesionika heterocarpus</i> (COSTA 1871)				+	+
<i>Plesionika martia</i> (A. MILNE EDWARDS 1883)				+	+
<i>Pontocaris cataphractus</i> (OLIVI 1792)	+				+
<i>Pontocaris lacazei</i> (GOURRET 1887)				+	
<i>Pontonia flavomaculata</i> HELLER 1864				+	
<i>Pontonia pinnophylax</i> (OTTO 1821)	+				+
<i>Pontophilus spinosus</i> (LEACH 1815)				+	+
<i>Processa acutirostris</i> NOUVEL & HOLTHUIS 1957				+	
<i>Processa canaliculata</i> LEACH 1815				+	+
<i>Processa edulis</i> (RISSO 1816)				+	+
<i>Processa elegantula</i> NOUVEL & HOLTHUIS 1957					+
<i>Processa macrophthalma</i> NOUVEL & HOLTHUIS 1957	+				
<i>Processa modica</i> WILLIAMSON 1979	+				
<i>Processa nouveli</i> AL-ADHUB & WILLIAMSON 1975				+	
<i>Processa robusta</i> NOUVEL & HOLTHUIS 1957				+	
<i>Sergestes (Sergestes) vigilax</i> STIMPSON 1860					+
<i>Sergestes (Sergia) robustus</i> SMITH 1882				+	+
<i>Sergestes arcticus</i> KRÖYER 1855					+
<i>Sicyonia carinata</i> (BRÜNNICH 1768)		+		+	+
<i>Solenocera membranacea</i> (RISSO 1816)	+			+	+
<i>Stenopus spinosus</i> RISSO 1827					
<i>Synalpheus gambarelloides</i> (NARDO 1847)	+			+	+
<i>Synalpheus hululensis</i> COUÏRIÈRE 1908				+	
<i>Thoralus cranchii</i> (LEACH 1817)	+			+	+
<i>Thoralus sollaudi</i> (ZARIQUELY CENNARRO 1935)					+
<i>Typton spongicola</i> COSTA 1844				+	+

### Macrura reptantia

<i>Axius stirhynchus</i> LEACH 1815					
<i>Callianassa acanthura</i> CAROLI 1946					
<i>Callianassa candida</i> (OLIVI 1792)				+	
<i>Callianassa subterranea</i> (MONTAGU 1808)				+	+
<i>Callianassa truncata</i> GIARD & BONNIER 1890					
<i>Callianassa tyrhena</i> (PETAGNA 1792)	+				
<i>Calliax lobata</i> (GAILLANDE & LAGARDÈRE 1966)					
<i>Calliax punica</i> SAINT LAURENT & MANNING 1982					
<i>Calocaris macandreae</i> BELL 1846				+	
<i>Gouretia denticulata</i> (LUTZE 1937)				+	
<i>Homarus gammarus</i> (LINNAEUS 1758)		+			+
<i>Jaxea nocturna</i> NARDO 1847				+	
<i>Nephrops norvegicus</i> (LINNAEUS 1758)		+		+	+
<i>Palinurus elephas</i> (FABRICIUS 1787)		+		+	+
<i>Polycheles typhlops</i> HELLER 1862				+	+
<i>Scyllarides latus</i> (LATREILLE 1803)				+	+
<i>Scyllarus arcticus</i> (LINNAEUS 1758)				+	+
<i>Scyllarus pygmaeus</i> (BATE 1888)	+			+	+
<i>Upogebia deltaura</i> (LEACH 1815)				+	
<i>Upogebia pusilla</i> (PETAGNA 1792)				+	+
<i>Upogebia stellata</i> (MONTAGU 1808)					
<i>Upogebia talismani</i> (BOUVIER 1915)	+				
<i>Upogebia tipica</i> (NARDO 1869)				+	

### Anomura

<i>Anapagurus bicorniger</i> A. MILNE EDWARDS & BOUVIER 1892	+			+	
<i>Anapagurus breviaculeatus</i> FENTZIA 1937					+

<i>Anapagurus brevicarpus</i> A. MILNE EDWARDS & BOUVIER 1892				
<i>Anapagurus chiroacanthus</i> (LILLJEBORG 1856)				
<i>Anapagurus laevis</i> (BELL 1845)				
<i>Anapagurus longispina</i> A. MILNE EDWARDS & BOUVIER 1900				
<i>Anapagurus petiti</i> DECHANCÉ & FOREST 1962				
<i>Calcinus tubularis</i> (LINNAEUS 1767)				
<i>Cestopagurus timidus</i> (ROUX 1830)				
	+		+	
<i>Clibanarius erythropus</i> (LATREILLE 1818)				
	+	+	+	+
<i>Dardanus arrosor</i> (HERBST 1796)				
	+		+	+
<i>Dardanus calidus</i> (RISSO 1827)				
			+	
<i>Diogenes pugilator</i> (ROUX 1829)				
			+	+
<i>Galathea bolivari</i> ZARIQUEY ALVAREZ 1950				
			+	+
<i>Galathea cenarroi</i> ZARIQUEY ALVAREZ 1968				
			+	
<i>Galathea dispersa</i> BATE 1859				
			+	
<i>Galathea intermedia</i> LILLJEBORG 1851				
	+		+	
<i>Galathea nexa</i> EMBLETON 1834				
			+	+
<i>Galathea squamifera</i> LEACH 1814				
	+		+	+
<i>Galathea strigosa</i> (LINNAEUS 1767)				
				+
<i>Munida curvimana</i> A. MILNE EDWARDS & BOUVIER 1894				
	+		+	
<i>Munida iris rullanti</i> ZARIQUEY ALVAREZ 1952				
	+		+	
<i>Munida rugosa</i> (FABRICIUS 1775)				
			+	+
<i>Munida tenuimana</i> G. O. SARS 1872				
				+
<i>Nematopagurus longicomis</i> A. MILNE EDWARDS & BOUVIER 1892				
<i>Paguristes eremita</i> (LINNAEUS 1767)				
			+	+
<i>Pagurus anachoretus</i> RISSO 1827				
	+	+	+	+
<i>Pagurus chevreuxi</i> (BOUVIER 1896)				
<i>Pagurus cuanensis</i> BELL 1845				
	+		+	+
<i>Pagurus excavatus</i> (HERBST 1791)				
	+		+	+
<i>Pagurus forbesii</i> BELL 1845				
			+	+
<i>Pagurus prideaux</i> LEACH 1815				
	+		+	+
<i>Pisidia bluteli</i> (RISSO 1816)				
			+	
<i>Pisidia longimana</i> (RISSO 1816)				
	+		+	
<i>Porcellana platycheles</i> (PENNANT 1777)				
			+	+
<b>Brachyura</b>				
<i>Acanthonyx lunulatus</i> (RISSO 1816)				
			+	+
<i>Achaeus cranchii</i> LEACH 1817				
	+	+	+	+
<i>Achaeus gracilis</i> (O. G. COSTA 1839)				
<i>Anamathia rissoana</i> (ROUX 1828)				
<i>Atelecyclus rotundatus</i> (OLIVI 1792)				
	+		+	
<i>Bathynectes longipes</i> (RISSO 1816)				
	+			+
<i>Bathynectes maravigna</i> (PRESTANDREA 1839)				
				+
<i>Brachynotus foresti</i> ZARIQUEY ALVAREZ 1968				
			+	
<i>Brachynotus gemmellari</i> (RIZZA 1839)				
			+	
<i>Brachynotus sexdentatus</i> (RISSO 1827)				
			+	+
<i>Calappa granulata</i> (LINNAEUS 1758)				
		+	+	+
<i>Callinectes sapidus</i> RATHBUN 1896				
			+	
<i>Cancer pagurus</i> LINNAEUS 1758				
				+
<i>Carcinus aestuarii</i> NARDO 1847				
			+	+
<i>Corystes cassivelaunus</i> (PENNANT 1777)				
			+	+
<i>Dorhynchus thomsoni</i> THOMSON 1873				
				+
<i>Dromia personata</i> (LINNAEUS 1758)				
	+	+	+	+
<i>Ebalia cranchii</i> LEACH 1817				
				+
<i>Ebalia deshayesi</i> LUCAS 1846				
	+		+	
<i>Ebalia edwardsii</i> COSTA 1838				
			+	



	C.C.	As.C.	A.C.	H&G
<i>Ebalia granulosa</i> H. MILNE EDWARDS 1837	+		+	
<i>Ebalia nux</i> A. MILNE EDWARDS 1883	+		+	+
<i>Ebalia tuberosa</i> (PENNANT 1777)	+		+	+
<i>Ebalia tumefacta</i> (MONTAGU 1808)				
<i>Ergasticus clouei</i> STUDER 1883	+			+
<i>Eriphia venucosa</i> (FORSKAL 1775)			+	+
<i>Ethusa mascarone</i> (HERBST 1785)	+	+	+	+
<i>Eurynome aspera</i> (PENNANT 1777)	+		+	+
<i>Geryon longipes</i> A. MILNE EDWARDS 1881				+
<i>Goneplax rhomboides</i> (LINNAEUS 1758)	+	+	+	+
<i>Herbstia condyliata</i> (FABRICIUS 1787)			+	
<i>Heterocrypta maltzani</i> MIERS 1881			+	
<i>Homola barbata</i> (FABRICIUS 1793)				+
<i>Ilia nucleus</i> (LINNAEUS 1758)		+	+	+
<i>Inachus aguarii</i> BRITO CAPELLO 1876				
<i>Inachus communissimus</i> RIZZA 1839	+		+	
<i>Inachus dorsettensis</i> (PENNANT 1777)	+		+	+
<i>Inachus leptochirus</i> LEACH 1817	+		+	+
<i>Inachus parvirostris</i> (RISSO 1816)	+			
<i>Inachus phalangium</i> (FABRICIUS 1775)	+		+	
<i>Inachus thoracicus</i> ROUX 1830	+	+	+	+
<i>Latreillia elegans</i> ROUX 1830			+	
<i>Liocarcinus arcuatus</i> (LEACH 1814)	+	+	+	+
<i>Liocarcinus corrugatus</i> (PENNANT 1777)	+	+	+	+
<i>Liocarcinus depurator</i> (LINNAEUS 1758)	+	+	+	+
<i>Liocarcinus maculatus</i> (RISSO 1827)	+		+	+
<i>Liocarcinus vemalis</i> (RISSO 1816)			+	+
<i>Liocarcinus zariquieyi</i> (GORDON 1968)	+			
<i>Lissa chiragra</i> (FABRICIUS 1775)	+		+	
<i>Macropipus tuberculatus</i> (ROUX 1830)			+	+
<i>Macropodia czernjawszkii</i> (BRANDT 1880)			+	
<i>Macropodia linaresi</i> FOREST & ZARIQUIEY ALVAREZ 1964	+		+	
<i>Macropodia longipes</i> (A. MILNE EDWARDS & BOUVIER 1899)	+		+	
<i>Macropodia longirostris</i> (FABRICIUS 1775)		+	+	+
<i>Macropodia rostrata</i> (LINNAEUS 1761)	+		+	+
<i>Maja crispata</i> RISSO 1827			+	+
<i>Maja goltziana</i> D'OLIVEIRA 1888			+	
<i>Maja squinado</i> (HERBST 1788)		+	+	+
<i>Medorippe lanata</i> (LINNAEUS 1767)	+		+	+
<i>Merocryptus boletifer</i> A. MILNE EDWARDS & BOUVIER 1894	+			+
<i>Microcassiope minor</i> (DANA 1852)				
<i>Monodaeus couchii</i> (COUCH 1851)				+
<i>Monodaeus guinotae</i> FOREST 1976	+		+	
<i>Necora puber</i> (LINNAEUS 1767)				+
<i>Ocypode cursor</i> (LINNAEUS 1758)				+
<i>Pachygrapsus marmoratus</i> (FABRICIUS 1787)		+	+	+
<i>Pachygrapsus transversus</i> (GIBBES 1850)				
<i>Palicus caronii</i> (ROUX 1830)	+			+
<i>Paractaea monodi</i> GUINOT 1969	+			
<i>Paragalene longicrura</i> (NARDO 1869)				
<i>Paromola cuvieri</i> (RISSO 1816)				+
<i>Parthenope angulifrons</i> LATREILLE 1825			+	
<i>Parthenope expansa</i> (MIERS 1879)	+			+
<i>Parthenope macrochelos</i> (HERBST 1790)	+	+	+	+
<i>Parthenope massena</i> (ROUX 1830)	+		+	+
<i>Pilumnus aestuarii</i> NARDO 1869				
<i>Pilumnus hirtellus</i> (LINNAEUS 1761)			+	+

	C.C.	As.C.	A.C.	H&G
<i>Pilumnus spinifer</i> H. MILNE EDWARDS 1834	+	+	+	+
<i>Pilumnus villosissimus</i> (RAFINESQUE 1814)			+	
<i>Pinnotheres marioni</i> GOURRET 1887			+	
<i>Pinnotheres pinnotheres</i> (LINNAEUS 1758)			+	+
<i>Pinnotheres pisum</i> (LINNAEUS 1767)			+	+
<i>Pirimela denticulata</i> (MONTAGU 1808)	+		+	
<i>Pisa armata</i> (LATREILLE 1803)	+	+	+	+
<i>Pisa corallina</i> (RISSO 1816)	+		+	
<i>Pisa muscosa</i> (LINNAEUS 1758)	+	+	+	+
<i>Pisa nodipes</i> (LEACH 1815)	+		+	+
<i>Pisa tetraodon</i> (PENNANT 1777)			+	
<i>Portunus latipes</i> (PENNANT 1777)	+		+	+
<i>Portunus pestai</i> FOREST 1967			+	
<i>Portunus hastatus</i> (LINNAEUS 1767)			+	+
<i>Sipus zariquieyi</i> GORDON 1953			+	
<i>Thalamita admete</i> (HERBST 1803)				+
<i>Thalamita poissonii</i> (AUDOUIN 1826)				
<i>Thia scutellata</i> (FABRICIUS 1793)				
<i>Xaiva biguttata</i> (RISSO 1816)				+
<i>Xantho granulicarpus</i> FOREST 1953	+		+	+
<i>Xantho pilipes</i> A. MILNE EDWARDS 1867	+		+	
<i>Xantho poressa</i> (OLIVI 1792)		+	+	+

For ten of the 79 identified species, new taxonomic, zoogeographical or habitat information is given below.

### *Alpheus platydactylus* COUTIÈRE 1897.

One individual of this species was found in the N-Aegean Sea, "CALYPSO" station 1629 (west coast of Lesbos Island, at a depth of 180 m) and 12 individuals in the S-Aegean, "CALYPSO" stations 752, 759, 774, 791, 806 (Santorini, Dia, Kea, Tinos and Andros Islands). In station 806 (between Andros and Tinos Islands, on a coralligenous bottom, 45 m deep) this species was found together with the alpheid species *A. macrocheles* and *A. dentipes*. In station 791 (between Andros and Evia Islands, on a silty-sandy substrate, 145 m deep) it was also found together with *A. macrocheles* (5 individuals of each species). After examination of this material we think that the species *A. platydactylus* and *A. macrocheles* are well distinguished from each other on the basis of their morphological features as given by COUTIÈRE (1897), FOREST (1965) and CROSNIER & FOREST (1966, 1973). No transitional forms of these species were found. We thus concluded that they are two different species which can coexist. This seems to suggest that *A. platydactylus* does not replace *A. macrocheles* in deeper waters as COUTIÈRE (1897) suggested. Up to now, the species was found only in the Mediterranean near Ibiza (Balearic Islands) by FOREST (1965), at depths between 135 and 200 m. According to HOLTHUIS (1951) and FOREST (1965) it was also identified in Cape Verde, the Azores and the Madeira Islands at depths between 55-75 and 600 m. This is the first record of this species from the eastern Mediterranean.

*Automate branchialis* HOLTHUIS & GOTTLIEB 1958.

Only one individual of this species was found in "CALYPSO" station 832 located between Paros and Naxos Islands, at a depth of 46 m, on a substrate consisting of gravel and algae. It had been previously found on the coasts of Israel (18–73 m) (HOLTHUIS & GOTTLIEB 1958), in the Gulf of Manfredonia in the south-western Adriatic Sea, on sandy-muddy deposits, 18 m deep (FROGLIA 1975) and on the coasts of Malta (ŠTEVČIĆ 1979). Its collection for the first time in the Aegean Sea supports the view that it is a true Mediterranean species (FROGLIA 1975).

*Athanas amazone* HOLTHUIS 1951.

One individual from station 851 (Patraikos Gulf, 48 m deep, silty substrate). It was known in the Mediterranean from numerous localities off the coast of Israel (HOLTHUIS & GOTTLIEB 1958), from the Gulf of Lion (CROSNIER & FOREST 1973) and from an indefinite location off the Aegean Turkish coasts (KOCATAŞ 1981). Recently, it was found in the Gulf of Naples and the Gulf of Venice (FROGLIA & ARGENTI in press).

*Scyllarus pygmaeus* (BATE 1888).

One individual from station 1622 (south coast of Limnos Island, 90 m deep, coralligenous bottom), one from station 733 (Gulf of Kalamata, 37 m deep, *Posidonia* meadows), 4 from station 737 (south coast of Crete, 50–70 m deep, coralligenous bottom), 1 from station 795 (south-east coast of Evia Island, 90 m deep, coralligenous bottom) and 1 from station 806 (between Tinos and Andros Islands, 45 m deep, coralligenous bottom). It was known from the NE coasts of Rhodos Island (LEWINSOHN 1974). Its presence has also been reported from the coasts of Cyprus and Israel, as well as from various localities of the Adriatic and the western Mediterranean (FOREST & HOLTHUIS 1960; LEWINSOHN 1974; FROGLIA 1976).

*Upogebia talismani* BOUVIER 1915.

Four individuals from station 1606 (north coast of Limnos Island, 100 m deep). This species was known in the Mediterranean only from the coast of Lybia (SAINT LAURENT 1971a) the coasts of Malta (ŠTEVČIĆ 1979) and Rhodos Island (THESSALOU-LEGAKIS 1986). Its presence in the north Aegean Sea extends its northern limit of distribution, significantly.

*Liocarcinus zariquieyi* (GORDON 1968).

One individual from station 1536 (Pagasitikos Gulf, 70 m deep, silty substrate), 2 from station 806 (see above) and 1 from station 829 (between Paros and Naxos Islands, 45 m deep, sandy-silt substrate). The only known report of the species from

the Aegean Sea is that by LEWINSOHN (1976) from the coasts of Rhodos. It is known from various localities of the Mediterranean under the name *M. pusillus* (MANNING & FROGLIA 1982).

*Monodaeus guinotae* FOREST 1976.

Five individuals from stations 1563 (south-west coast of Chalkidiki Peninsula), 791 (south coast of Evia), 800 (south-west of Psara Island) and 836 (between Paros and Antiparos Islands), at depths between 100 and 150 m, on sandy-silt bottoms. The presence of this species in the north Aegean has been reported by TÜRKAY & KOUKOURAS (1988) from the south coast of Sithonia Peninsula, at depths between 200 and 550 m. In the Mediterranean, it was known from the Gulf of Taranto (FOREST 1976), Balears (FOREST 1965) and the coast of Israel (FOREST & GUINOT 1958). PÉRÈS & PICARD (1958) recorded the presence of *Monodaeus couchi* in "CALYPSO" station 788 (south-west coast of Kea Island), at depths between 70 and 80 m. In our opinion, this material should be reexamined, because both in the "CALYPSO" material and in our large decapod collections coming from various areas off the coast of Crete, individuals only of the species *M. guinotae* have been found.

*Paractea monodi* GUINOT 1969.

One individual was found from station 726 (Gulf of Kalamata, 38–40 m, on biogenic detritus). This is the first record of this species from the Aegean Sea. It has been found in various localities of the western and eastern Mediterranean under the name *Actaea rufopunctata* (MONCHARMONT 1969; ZARIQUIEY ALVAREZ 1968; RAMADAN & DOWIDAR 1976).

*Palicus caronii* (ROUX 1830).

Six individuals were found from stations 1637 and 1638 (off the north-west coast of Mytilini Island, 50–75 m deep, coralligenous bottom), 1622 (off the south coast of Limnos Island, 90 m deep, coralligenous bottom), 801 (off the south-west coasts of Psara Island, 120–130 m deep, coralligenous bottom) and 717 (off the south-west coast of Matapan Cape (Tenaron), 65 m deep, coralligenous bottom). This species was known in the eastern Mediterranean only from the coast of Israel (HOLTHUIS & GOTTLIEB 1958) and Saronikos Gulf in the south Aegean Sea (VAMVAKAS 1971). It is also known from the Adriatic Sea and the western Mediterranean (ZARIQUIEY ALVAREZ 1968; ŠTEVČIĆ 1969).

*Inachus parvirostris* (Risso 1816).

Thirty one individuals of the species were found from "CALYPSO" stations 715, 716, 717, 791, 795, 800, 813, 814, 815, 816, 834, 835, 836, 837, 1533, 1547, 1622, 1623, 1638, in the S and N Aegean Sea, at depths between 60 and 160 m,

mainly on sand-silty and silty or coralligenous substrates. It is distributed in the Aegean Sea from Cape Matapan (Tenaron) to the south coast of Chalkidiki Peninsula. The examined material answers to the description given for the species by MANNING & FROGLIA (1982), who gave its distribution in the Adriatic and the western basin of the Mediterranean. This is the first record of this species from the Aegean and the eastern Mediterranean, but because it was confused with *I. dorsettensis* (MANNING & FROGLIA 1982), it is possible that it has been misidentified from other areas, also.

#### Collection of ATHANASSOPOULOS.

The 1912–1940 decapod collection of Professor ATHANASSOPOULOS, deposited in the Museum of the Department of Zoology of A.U.T., includes 31 species collected from various localities along the Greek coast line, at depths ranging between 0 and 100 m (Tab. 2). All specimens belong to species common in Greek seas, even though some of them had been misidentified. However, none of these specimens belongs to the species *Philyra globulosa* (BOSC 1801) as reported by ATHANASSOPOULOS (1917). The presence of this Indo-Pacific species in the Greek seas has been questioned by HOLTHUIS & GOTTLIEB (1958). Moreover, no specimens were found to belong to *Necora puber* reported by ATHANASSOPOULOS (1917) as *Portunus puber*. On the other hand, one specimen of *Liocarcinus corrugatus* which was found, was not included in the relevant publications by ATHANASSOPOULOS (1917, 1921).

#### Collections of the Authors.

The numerous decapod specimens examined from various localities of the Aegean, were found to belong to 162 species given in Tab. 2. New information on the decapod fauna of the Aegean Sea is given by the 9 following species.

#### *Synalpheus hululensis* COUTIÈRE 1908.

The potential Lessepsian migrant (POR 1978) found in the coastal region of Evia Island (1 female individual) by KOUKOURAS & KATTOULAS (1974), was later found by KOUKOURAS (1979) and more recently, in considerable numbers, along the coasts of the Chalkidiki Peninsula (stations 122, 132, 137, 141) in the canals of the sponges *Agelas oroides* (SCHMIDT), *Ircinia variabilis* (SCHMIDT) and *Sarcotragus foetidus* (SCHMIDT), a fact that confirms the extension of its northern limit of distribution.

#### *Pontocaris lacazei* (GOURRET 1887).

Numerous individuals were found off the south coast of Chios Island (station T), at a depth of 150–350 m, on silty substrate. This is the first record of this species from the Aegean Sea and as far as we know from the eastern basin of the

Mediterranean. Its distribution in the western Mediterranean and the Adriatic has been given by ZARIQUIEY ALVAREZ (1968), ŠTEVČIĆ 1976, MANNING & FROGLIA (1982).

*Periclimenes amethysteus* (Risso 1827).

One ovigerous female was found from Thermaikos Gulf (station 108), at a depth of 2 m. It was found associated with the anemone *Condylactis aurantiaca* (DELLE CHIAJE) which had settled on a sandy substrate. According to our knowledge, it was known only from some localities of the western Mediterranean (ZARIQUIEY ALVAREZ 1968) and from the Adriatic Sea (HOLTHUIS 1961; ŠTEVČIĆ 1969). This is the first record of this species from the eastern Mediterranean.

*Processa robusta* NOUVEL & HOLTHUIS 1957.

Six individuals were found in the Strymonikos Gulf (station 146), in fine sand (Median diameter = 176  $\mu\text{m}$ ), at a depth of about 2.5 m where the salinity was 28 %. According to the available information, there are no previous records of this species in the eastern basin of the Mediterranean. It is known in the Adriatic (ŠTEVČIĆ 1969) and the western Mediterranean (ZARIQUIEY ALVAREZ 1968).

*Munida iris rutilanti* ZARIQUIEY ALVAREZ 1952.

One female individual was found in the Singitikos Gulf (station 6), at a depth of about 150 m, inside the sponge *Mycale syrinx* (SCHMIDT) together with *Typton spongicola*. As far as we know, this species was known in the eastern Mediterranean only in the Evoikos Gulf (KOUKOURAS & KATTOULAS 1975).

*Galathea cenarroi* ZARIQUIEY ALVAREZ 1968.

Eleven individuals were dredged in Strymonikos Gulf (stations 147, 148), on substrates of coarse (Md = 586  $\mu\text{m}$ ) and medium (Md = 392  $\mu\text{m}$ ) sand with *Zostera*, in depths of 2.5 and 20 m respectively. One of the females (carapace length 5.6 mm, total length 8.4 mm) was ovigerous, carrying 92 eggs of a 0.3 mm mean diameter. This is the first record of this species from the eastern Mediterranean. It is known from the Catalan coast of Spain (ZARIQUIEY ALVAREZ 1968) and the northern Adriatic (MANNING & ŠTEVČIĆ 1982).

*Corystes cassivelaunus* (PENNANT 1777).

Two individuals were found on the coast of Iraklion, Crete (station 410), in a depth of 20 m on sandy substrate with *Posidonia* and one individual from Evoikos Gulf (station 68), in a *Zostera* meadow at a depth of 15 m. The only other record

we know from the eastern Mediterranean is that of SANTUCCI (1928) from Carpathos (Scarpanto) Island in the south Aegean Sea. This species is known from Adriatic Sea (ŠTEVČIĆ 1969) as well as from the western Mediterranean (ZARIQUIEY ALVAREZ 1968).

*Pinnotheres marioni* GOURRET 1887.

Two individuals of the third Mediterranean species of pea crabs were collected, the first from the south-west coast of Limnos Island (station 174), inside the branchial sac of the ascidian *Molgula occulta* KUPFFER, at a depth of 7 m and the second from the Thermaikos Gulf (station 1), inside the branchial sac of the ascidian *Microcosmus polymorphus* HELLER, at a depth of about 40 m. *P. marioni* was known up to now only from the Gulf of Marseilles where it has been found in the ascidians *Ascidia mentula* MÜLLER and *Phallusia mammilata* (CUVIER), as well as in the bivalve *Cardium*, according to GOURRET (1887). The finding of this species again after a gap of 100 years, especially in the eastern Mediterranean, is not surprising because only a few studies on the fauna associated with ascidians and bivalves have been carried out.

*Inachus phalangium* (FABRICIUS 1775).

Three ovigerous females were found along the coasts of Chalkidiki Peninsula. The first individual was found on a sandy substrate (Md = 398  $\mu$ m) with *Zostera*, at a depth of 9 m (station 115); the second on hard substrate covered with *Cystoseira* at a depth of 2 m (station 143); and the third among the individuals of a very dense population of the sea anemone *Anemonia viridis* (FORSKAL), at a depth of 3 m (station 119). The maximum length of the carapace was 13.5 mm and the maximum number of eggs 450. The mean egg diameter was 0.6 mm. This is the first record of this species from the Aegean Sea. In the eastern Mediterranean it was known only from Alexandria, Egypt (HOLTHUIS & GOTTLIEB 1958) and the north-east coast of Cyprus (LEWINSOHN & HOLTHUIS 1986). It is also known from the Adriatic Sea and the western Mediterranean (ZARIQUIEY ALVAREZ 1968; ŠTEVČIĆ 1969).

### Decapod Fauna of the Aegean Sea and other Adjacent Areas. Comparisons — Affinities.

DURIŠ (1987a) estimated the number of the known decapod crustacean species in the Mediterranean to be 329, without giving the relevant information sources.

In the present study, in order to have a more complete estimation of the known decapods of the Mediterranean, we reviewed the relevant literature which showed that at present there are 327 known Mediterranean decapod species. In Tab. 3 the numbers of species for each subdivision of Decapoda are given separately.

The above number of Mediterranean decapod species (327) is based on the following references: GOURRET (1887), LO BIANCO (1903); FOREST & GUINOT (1956), HOLTHUIS & GOTTLIEB (1956, 1958), HOLTHUIS (1961, 1987), LEWINSOHN & HOLTHUIS (1964, 1978a), FOREST (1965, 1967, 1976), GAILLANDE & LAGARDÈRE (1966), ZARIQUIEY ALVAREZ (1968), LEDOYER (1969), DE SAINT LAURENT (1971 a, b), RELINI-ORSI & RELINI (1972), FREDJ (1974), PASTORE (1976, 1984), RAMADAN & DOWIDAR (1976), DE SAINT LAURENT & BOZIĆ (1976), CASANOVA (1976), FOREST & CALS (1977), NÖEL & AMOUROUX (1977), FROGLIA & MANNING (1978), NÖEL (1978), POR (1978), FROGLIA (1979), RELINI-ORSI & MORI (1979), DE SAINT LAURENT & LE LOEUFF (1979), MANNING & HOLTHUIS (1981), COSTA (1982), GARCIA RASO (1982, 1984 a, 1984 b, 1987), MANNING & FROGLIA (1982), DE SAINT LAURENT & MANNING (1982), GARCIA RASO & SALAS CASANOVA (1985), INGLE (1985), RICE & DE SAINT LAURENT (1986), THESSALOU-LEGAKIS (1986), DURIŠ (1987 b), TÜRKAY (1987), GALIL et al. (1988/89), DOUNAS & KOUKOURAS (1989), VERESTCHAKA (1989), PRETUS (1990).

Out of the 327 Mediterranean species, 34 (10.40 %) are considered as Lessepsian immigrants in spite of the fact that this is disputed. Eighteen of these species are Natantia, one *Macrura Reptantia* and fifteen *Brachyura* (Tab. 3). Their presence in the eastern basin of the Mediterranean has been established by HOLTHUIS & GOTTLIEB (1956, 1958), LEWINSOHN & HOLTHUIS (1964, 1978a), RAMADAN & DOWIDAR (1976), POR (1978), LEWINSOHN & GALIL (1982), GALIL (1986), HOLTHUIS (1987), DURIŠ (1987 b), TÜRKAY (1989) and GALIL et al. (1989).

### Aegean Sea, Including Sea of Marmara and Patraikos Gulf.

HOLTHUIS & GOTTLIEB (1958) collected all the up-to-date relevant literature and gave a check list of the decapod crustaceans of the eastern Mediterranean. According to this list, the decapod fauna of the Aegean Sea consisted of 120 species, which are indicated in Tab. 2. The review of the relevant literature showed that since 1958, 35 more papers giving information on the decapod fauna of the Aegean Sea have been published, and also that HOLTHUIS & GOTTLIEB (1958) had not taken into account the paper by DRENSKY (1951) which contains information on the decapod fauna of the Aegean Sea, adding new species as well.

These papers that raised the number of the decapod species of the Aegean to 221, are in chronological order the following: DRENSKY (1951), PÉRÈS & PICARD (1958), SERBETIS (1959), HOLTHUIS (1961), JACQUOTTE (1962), MAKKAVIEVA (1963), KINZELBACH (1964), DRACH (1968), GELDIAY & KOCATAŞ (1968a, 1968b, 1970), PÉRÈS (1968), LEDOYER (1969), KOCATAŞ (1971, 1981), VAMVAKAS (1971), KOUKOURAS (1972/73, 1979), GEORGIAIDIS & GEORGIAIDIS (1974), KATTOULAS & KOUKOURAS (1974, 1975), KOUKOURAS & KATTOULAS (1974, 1975), LEWINSOHN (1974, 1976), TÜRKAY (1976, 1982 a, 1982 b), BIANCHI & MORI (1983), KALOPISSIS & KALOPISSIS (1984), ÖZEL (1986), THESSALOU-LEGAKIS (1986), TÜRKAY et al. (1987), TÜRKAY & KOUKOURAS (1988), DOUNAS & KOUKOURAS (1989).

The present study increased the number of decapod species known from the Aegean Sea by 10, the total number of species known from this area being at present 231 (74 *Natantia*, 23 *Macrura Reptantia*, 35 *Anomura* and 99 *Brachyura*). These 231 species, which comprise 70.64 % of the Mediterranean decapod fauna (Tab. 3), are given in Tab. 2. As mentioned above, from this number, 5 species (*Sergestes tenuiremis*, *Pagurus bernhardus*, *Petrolisthes boscii*, *Philyra globulosa*, *Hyas araneus*) are not included because their previous records from the Aegean are considered uncertain.



Among the species of this list, the species *Acanthephyra purpurea*, A. MILNE EDWARDS and *Ebalia tumefacta* (MONTAGU) are included: the presence of the former has been recently reported from the Aegean Sea by KATAĞAN et al. (1988), and of the latter by KOCATAŞ (1981), although both are considered Atlantic species by CROSNIER & FOREST (1973), and FOREST (1965), and MANNING & HOLTHUIS (1981) correspondingly.

### Adriatic Sea.

After the publication of the first list of the Adriatic decapod fauna by ŠTEVČIĆ (1969), several publications increased the number of decapod species known from this area to 203, representing 62.08% of the Mediterranean fauna (Tab. 3).

These publications are the following: MONCHARMONT (1969), ŠTEVČIĆ (1971, 1976, 1982, 1985), FROGLIA (1972, 1975, 1976a, 1976b, 1979), MERKER-POČEK (1976), SVOBODA & SVOBODA (1975), PASTORE & VACARELLA (1977), FROGLIA & MANNING (1978), MANNING & ŠTEVČIĆ (1982) FROGLIA & GIANNINI (1984).

Recently, ŠTEVČIĆ (1990) published a new list of Adriatic decapods including 210 species. If we exclude 7 species whose presence needs further confirmation, the number of the species in this list is identical to the one we estimated.

### Black Sea.

On the basis of the papers by MARION (1898), CASPERS (1957), BACESCU (1967), BACESCU et al. (1971), FROGLIA & MANNING (1978), GUTU (1980), KOCATAŞ (1981), MONIN (1984) and VERESTCHAKA (1989), the decapod fauna of the Black Sea numbers today 46 species (Tab. 3) corresponding to only 14.07% of the Mediterranean fauna. Among these species, the acclimatized species *Pandalus latirostris* (RATHKE) is included.

Table 3. Distribution of the decapod species in the Mediterranean and the Black Sea. — Left column, number of species; right column, percentages of the total number of the Mediterranean species.

Tabelle 3. Verbreitung von Dekapodenarten im Mittel- und Schwarzen Meer. — Linke Spalte: Artenzahl; rechte Spalte: Prozentsatz in Bezug zur Gesamtartenzahl des Mittelmeeres.

REGIONS	Natantia		M. Reptantia		Anomura		Brachyura		TOTAL	
Mediterranean Sea	119	36.39	34	10.40	43	13.15	131	40.06	327	
(Lessepsian immigrants)	18	5.50	1	0.30	-	-	15	4.59	34	10.40
Aegean Sea	74	22.63	23	7.03	35	10.70	99	30.28	231	70.64
Adriatic Sea	67	20.49	19	5.81	34	10.40	83	25.38	203	62.08
Black Sea	13	3.98	4	1.22	7	2.14	22	6.73	46	14.07
Cyprus coast	31	9.48	8	2.45	15	4.59	59	18.04	113	34.56
Israel coast	48	14.68	11	3.36	22	6.73	61	18.65	142	43.42

## Coast of Cyprus.

Until recently, very little information was available concerning the decapod fauna of Cyprus, reported mainly by DEMETROPOULOS & NEOCLEOUS (1969). However, in 1986 LEWINSOHN & HOLTHUIS published a complete catalogue of the decapods of Cyprus which recorded 113 species (Tab. 3), representing 34.56% of the Mediterranean fauna. We are not aware of any more recent publications on Cyprus decapods.

## Coast of Israel.

The decapod fauna of the Mediterranean coast of Israel has been listed in detail by HOLTHUIS & GOTTLIEB (1958); it was then found to consist of 117 species. The few publications that followed (FOREST & GUINOT 1958; LEWINSOHN & HOLTHUIS 1964, 1978 a, 1978 b; LEWINSOHN 1974; LEWINSOHN & GALIL, 1982; GALIL et al. 1989) raised the number of species known from this area to 142 (43.42% of the Mediterranean fauna) (Tab. 3).

## Comparisons — Affinities.

The four of the above areas, whose decapod fauna was examined, are located in the eastern part of the Mediterranean, which is generally called "eastern Mediterranean" and separated from the western part by the Sicilian-Tunisian sill. According to POR & DIMENTMAN (1989), this binary division of the Mediterranean does not simplify its picture, because while the western area is relatively homogenous and geologically similar, the eastern is complex. The Adriatic Sea is shallow with relatively low winter temperatures and low salinity. The Aegean Sea, separated from the Adriatic by the extremely deep Ionian Sea, is shallow and has low salinities and temperatures and furthermore suffers the influx of the Black Sea. The coasts of Israel and Cyprus are included in the Levantine Sea which is deep with high salinities and temperatures. POR & DIMENTMAN (1989) repropoed to recognize a "Lessepsian Province" within the Mediterranean which will probably contain, beside the Levantine basin, also the Ionian Sea and especially the southern Mediterranean; the Aegean Sea, and especially its northern part will not be part of this new province. The Levantine basin is the most oligotrophic area of the Mediterranean being an extremely stressed marine environment with a 30% impoverishment in the general diversity of its marine biota, but this might change in the future, even dramatically, because of the Lessepsian influx (POR & DIMENTMAN 1989). Finally, the Black Sea whose decapod fauna is compared to those of the other four areas, constitutes a separate, different ecosystem, although neighbouring, mainly due to its low salinities.

As can be seen from the review of the relevant literature, there has been a large sampling effort from all the above mentioned areas, in both shallow and deep waters. The number of new species found during recent sampling is relatively small. We therefore consider these areas to be fairly well studied. Less studied perhaps are the coasts of Cyprus, where some common species from the Aegean and the coast of Israel have still not been reported.

Table 4. Numbers of common species (down, left) and affinities (up, right) among the decapod faunas of certain areas of the Mediterranean and the Black Sea.

Tabelle 4. Anzahl gemeinsamer Arten (unten links) und Ähnlichkeiten (oben rechts) zwischen einigen Regionen des Mittelmeeres und dem Schwarzen Meer.

	Aegean Sea	Adriatic Sea	Black Sea	Cyprus coast	Israel coast
Aegean Sea		87.1	29.8	61.6	62.5
Adriatic Sea	189		32.4	35.7	31.4
Black Sea	41	40		65.6	62.6
Cyprus coast	106	100	29		70.0
Israel coast	110	104	30	89	

The numbers of the species known from each area (Tab. 3) show that the richest faunas are those of the Aegean and the Adriatic Sea. Among these two, the former seems to be richer (28 species more), in spite of the fact that the latter has been more intensively studied. An attempt to explain this difference seems to be premature for various reasons and of course further analysis of the faunas of the two areas is needed. The same seems to be true for the other areas as well. The fauna of the Israel coast is enriched by a relatively large number of Lessepsian immigrants (29 species). The poorest in number of species is the Black Sea, due to the special conditions prevailing there. The most important factor seems to be the reduced salinity of its waters.

The numbers of the known decapods from the Aegean and the Adriatic Sea, although relatively high, are still well below the total number of the Mediterranean decapod species (by 23 and 111 species respectively). This may be attributed to the following reasons, in order of importance: a. the faunas of these two areas do not normally include Lessepsian immigrants which raise the total number of Mediterranean species by 34 (10.40%), b. they do not include an important number of Atlantic species which have as an eastern limit of distribution in the Mediterranean various areas of the western basin, c. the lack of intense samplings in the pelagial,

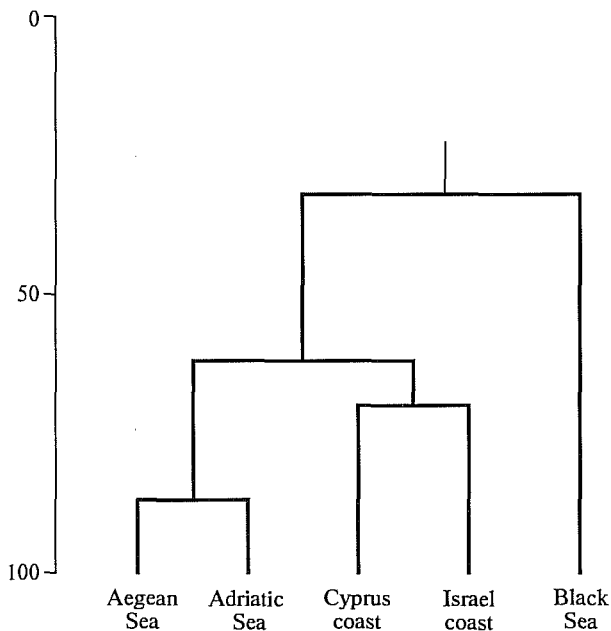


Fig. 2. Dendrogram showing the decapod faunal affinity among certain areas of the Mediterranean Sea.

Abb. 2. Dendrogramm zur Darstellung der faunistischen Ähnlichkeiten zwischen einigen Gebieten des Mittelmeeres.

where an important number of rather common pelagic species may not yet have been found, and d. some rare benthic species which have not been found due partly to the fact that the western basin of the Mediterranean has been more intensively studied.

The affinities among the decapod faunas of the Aegean, the Adriatic, the Black Sea, the coasts of Cyprus and Israel, estimated by the coefficient of CHEKANOWSKI, together with the numbers of species common to each pair of areas, are given in Tab. 4 and Fig. 2.

The most strongly related fauna to that of the Aegean Sea is the fauna of the Adriatic (189 species in common). The above two areas, besides being characterized by fairly similar environmental conditions, have two more common features. The first is that both are not impoverished as the Levantine basin and the second that they both have no or very few Lessepsian elements. Of course, this does not automatically imply a close relationship. The problem is that information on the Ionian Sea fauna is too scarce to identify whether there is a confluent connection between both seas. The fauna of the coast of Israel is qualitatively more related to that of the coast of Cyprus although their degree of affinity (70%, 89 species in common) is lower than that among Adriatic and Aegean (87.1%). Such a faunal

relationship is expected, because the two areas are relatively close to one another, inside the Levantine Sea. The fact that the decapod fauna of the Israel coast seems richer than that of Cyprus (142 species instead of 113) should be attributed to the very limited Lessepsian immigrants that reached in the latter area than in the former, and secondly to the less intensive research done in the coast of the former. The affinity between the faunas of the two areas is negatively influenced by the fact that some of the species found in Cyprus (and also in the Aegean) have not yet been found on the coast of Israel. The two pairs of areas have an affinity with each other of about 58%. The Black Sea has a low affinity with the other areas (30%), not only because of its impoverished fauna, but also because of endemic species.

A more detailed evaluation of these affinities is considered premature for the moment, due to the reasons mentioned above. However, we think that further studies yielding new species from these areas, will not greatly influence the affinity among their faunas.

### Summary.

The study of material coming from the cruises of "CALYPSO" in the South (1955) and North (1960) Aegean Sea, as well as from the authors' collections all over the Aegean revealed the presence of 7 new decapod crustacean species for the eastern Mediterranean fauna and 3 new species for the Aegean fauna. The distribution and habitat of these and other species are reported. A check list of the decapod fauna of the Aegean Sea is given for the first time. The number of decapods known from the entire Mediterranean is estimated and compared to those of the Aegean, the Adriatic, the coasts of Israel and Cyprus and the Black Sea. The degrees of affinity among the decapod faunas of these areas are also estimated and discussed.

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