

SPIXIANA	7	2	105–113	München, 1. Juli 1984	ISSN 0341-8391
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Brachyura of the coast of Southern Spain

(Crustacea, Decapoda)

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Abstract

During a study of the Crustacea Brachyura in the 0 to 310 m depth range on the coast of Southern Spain, from 1978 to 1981, eighty three species were taken. Data is given in this paper on the vertical distribution of each species and type of substrate where each species was found. Information is included on the presence of ovigerous females and other biological data. The record of *Palicus caronii*, *Euchiropsus liguricus*, *Heterocrypta maltzami*, *Asthenognathus atlanticus* and *Pisa carinimana* are of particular interest while the capture of *Brachynotus atlanticus* represent the first record of this species from the Mediterranean Sea and Europe.

Introduction

The Brachyura are perhaps the best known Decapodan group on African and European coasts as evidenced by the huge number of works already published about these areas, whether in the form of monographic studies, such as those of BARNARD (1950), CAPART (1951), MONOD (1956), MANNING and HOLTHUIS (1981), NOBRE (1936), INGLE (1980) and CHRISTIANSEN (1969) on the Eastern Atlantic; or those of PESTA (1918), BACESCU (1967) and ZARIQUEY (1968) on the Mediterranean Sea; or by the large number of smaller but none the less important works expeditions and faunal inventories too numerous to mention here.

The Southern coast of Spain, however, in spite of its important geographical location between Africa and Europe has not been investigated in detail and references to species captured in this area are very few.

The present study was undertaken to remedy this state of affairs. It represents the first faunal study of the area and can also be considered a complement to works such as MANNING and HOLTHUIS (1981) concerning West African Brachyuran crabs.

Area of Investigation and Methods

The coastal region of the province of Málaga, extending 129 Km. westwards from Maro to San Pedro de Alcántara and located on the northern margin of the Sea of Alboran in the Western Mediterranean, was chosen for this investigation (Fig. 1). Samples were collected from the shore to 310 metres depth but the greater part of the sampling was carried out between 0 and 100 m. In addition a few samples were taken at greater depths.

Specimens were obtained by methods varying according to the type of substrate and depth. In general trawling was employed for soft substrates, fish traps or free diving for hard substrates, while supplementary set netting was also carried out on the sea floor.

The duration of the study was four years, from 1978 to 1981 inclusive.

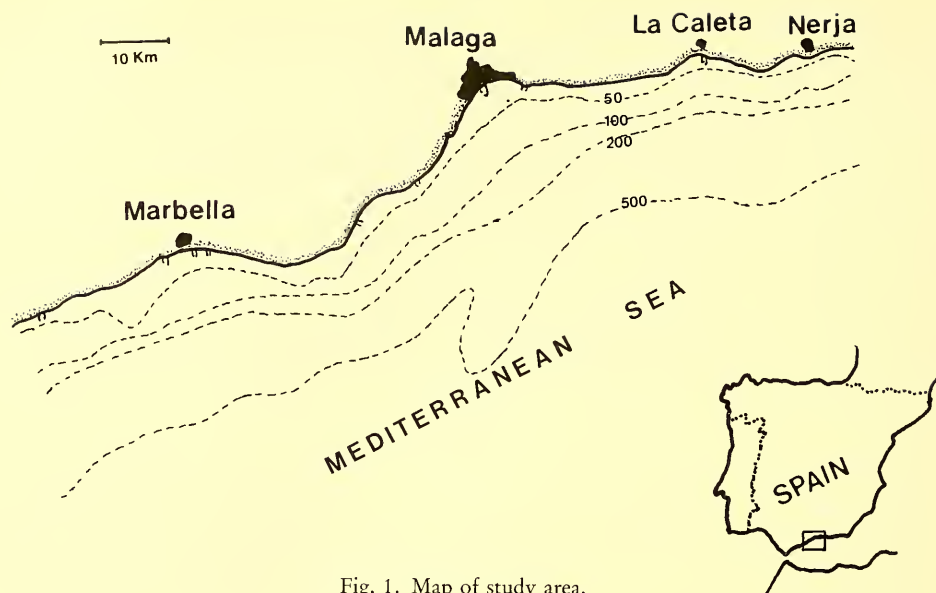


Fig. 1. Map of study area.

Results

The results of this study are given in tabular format for a better and more rapid comprehension. The table gives the list of species found in the Málaga region together with a record of the depth of occurrence and substrate type where each species was found. Data on the presence of ovigerous females in samples collected in this study is given on a monthly basis for a annual cycle.

Included in the table is information, for comparative purposes, on the vertical distribution range and presence of ovigerous females in Spanish waters. This information has been compiled from data of some authors who are designated by numbers in brackets in the table.

The numbers shown in brackets correspond to the following authors: (1) SANTAELLA (1974); (2) FOREST (1974); (3) ZARIQUIEY (1968); (4) FOREST (1965); (5) PASTORE (1972); (6) MANNING and HOLTHUIS (1981); (7) WILLIAMS and WIGLEY (1977); (8) MIRANDA y RIVERA (1921, 1933); (9) FOREST et GUINOT (1966); (10) PESTA (1918); (11) TÜRKAY (1976a); (12) POWERS (1977); (13) CRESPO, REY & CAMIÑAS (1976); (14) TÜRKAY (1976b); (15) MAURIN (1968) taken of MANNING and HOLTHUIS (1981); (16) BOUVIER (1940); (17) MONOD (1956); (18) LAGARDERE (1973); (19) INGLE (1980); (20) CHRISTIANSEN (1969); (21) CAPART (1951); (22) FOREST (1967); (23) GONZALEZ G. (1978); (24) CROSNIER (1970); (25) O. DE BUEN (1925); (26) FOREST et ZARIQUIEY (1964); (27) FOREST (1978); (28) MASSUTI (1967); (29) RAMADAN and DOWIDAR (1972); (30) FOREST et GUINOT (1958); (31) DRACH et FOREST (1953); (32) FOREST et GANTES (1960); (33) SCHMITT, McCAIN and DAVIDSON (1973); (34) TÜRKAY (1975); (35) ŠTEVČIĆ (1973); (36) LEWINSOHN (1976); (37) FROGLIA and MANNING (1982).

The signs employed to describe the type of substrate are: S-sand, V-mud, SV-muddy sand, C-shell, R-rocky, G-caves and fissures, F-phanerogams, A-algae, Co-coraliferous, SR-sand and rocks, SA-sand and algae, SVR-muddy sand and rocks, SG-coarse sand, SGA-coarse sand and algae, SF-fine sand.

The data on ovigerous females in Spanish waters compiled, except in the one case referred to in the table, from ZARIQUIEY (1968) and FOREST (1965) is represented by broken lines. The information on egg carrying females collected in this study is represented by solid lines.

SPECIES	General	VERTICAL RANGE Spain	Málaga	TYPES OF SUBSTRATES Málaga	OVIGEROUS FEMALES IN SPAIN											
					J	F	M	A	M	J	J	A	S	O	N	D
Fam. DROMIIDAE De Haan, 1833																
<i>Dromia personata</i> (Linnaeus, 1759)	2(1)(5)-300(2)	10(3)-48(4)	2-82	R,S,G.												
Fam. HOMOLIDAE De Haan, 1839																
<i>Homola barbata</i> (Fabricius, 1793)	10-30(6)-685(7)	40(3)-250(8)	50-110 250(8)	VR,V,SV,?R												
Fam. OORIPPIDAE Mac Leay, 1838																
<i>Medorippe lanata</i> (Linnaeus, 1767)	10(9)(10)-1038(11)	40-100(3)	11-67 200(8)	V												
<i>Ethusa mascarone</i> (Herbst, 1785)	Littoral-82(12) 2-650(16)	Shallow water- 75(3)	10-81 Max. 18-30	V,SV,S												
Fam. CALAPPIDAE De Haan, 1833																
<i>Calappa granulata</i> (Linnaeus, 1758)	13(14)-400-700(15)	30(3)-150(8)(3)	3-102 150(8)	S,SV,V,C												
Fam. LEUCOSIIDAE Samouelle, 1819																
<i>Ilia nucleus</i> (Linnaeus, 1758)	4(3)-162(16)(17)	4(3)-48(4)	31-34	SV,S												
<i>Ebalia tuberosa</i> (Pennant, 1777)	Sublittoral(3)-200(18)	40-98(4)	26-111	SV,V												
<i>Ebalia cranchii</i> Leach, 1817	7(19)-550(3)-1000(17)		In fishing nets													
<i>Ebalia granulosa</i> H. Milne Edwards, 1837	Littoral-445(3)-2983?(19)		35-102	SV,V												
<i>Ebalia deshayesi</i> Lucas, 1846	12(14)-100(3)	5-50(3)	18-72	S,SV												
<i>Ebalia tumefacta</i> (Montagu, 1808)	2-155(19)	20-54(3)	35-42	SV												
<i>Ebalia edwardsi</i> Costa, 1838	Sea shore-190(3)	Sea shore(3)- 5-7(4)	Sea shore	S												
Fam. CORYSTIDAE Samouelle, 1819																
<i>Corystes cassivelaunus</i> (Pennant, 1777)	0-50(18)-90(20)	9-20(3)	Sea shore-15	SF,S												
Fam. ATELECYCLIDAE Ortmann, 1893																
<i>Atelecyclus rotundatus</i> (Olivier, 1792)	Littoral(17)-300(6)- 748(16)(17)	20-90(3)	11-78 Max. 18-29	SV,V,S												
<i>Atelecyclus undecimdentatus</i> (Herbst, 1783)	Sublittoral-30(21)(17)	To 30(3)	1,5-51 Max. 2-15	S												
Fam. THIIDAE Dana, 1852																
<i>Thia scutellata</i> (Fabricius, 1793)	0-50(18)	10-20(3)	2-7	S												
Fam. PIRIMELIDAE Alcock, 1899																
<i>Pirimela denticulata</i> (Montagu, 1808)	0,3(3)-200(16)	0,3-1(3)	0,1-6	SR,SA,F												
Fam. PORTUNIDAE Rafinesque, 1815																
<i>Carcinus aestuarii</i> Nardo, 1847	Sea shore-6(22)	Sea shore	0-1	SVR												
<i>Carcinus maenas</i> (Linnaeus, 1758)	0-62(17)-rare at 200 (20)(7)	Shallow water	0-1	SVR,SR												
<i>Portunus latipes</i> (Pennant, 1777)	0(3)-28(17)	Shallow water	0-10 Max. 2-4	S												
<i>Xaiva biguttata</i> (Risso, 1816)	Littoral-Some half a score of meters (17)	Few meters(3)	0-6	S,SARF												
<i>Macropipus tuberculatus</i> (Roux, 1830)	80(19)-500(16)	Common at 300-400(3)	90-310	V,SV												
<i>Liocarcinus arcuatus</i> (Leach, 1814)	Littoral(17)-108(6)	Shallow water (3)- 19(4)	0,1-44	S,SAF												
<i>Liocarcinus puber</i> (Linnaeus, 1767)	Littoral-80(19)	Littoral	1,5-15	R												
<i>Liocarcinus corrugatus</i> (Pennant, 1777)	10(3)-90(14)	10-50(3)	2-44 Max. 25-30	S,SAF												
<i>Liocarcinus maculatus</i> (Risso, 1827)	5-73(37)	20(3)-50(4)	14-109 Max. 25-30	S,SV,SG,G												
<i>Liocarcinus zariquieyi</i> (Gordon, 1968)	5(3)-60(37)	5-30(3)	27-31	S												
<i>Liocarcinus depurator</i> (Linnaeus, 1758)	1-2-450(20)	Shallow water-300(3)	1-310-450 Max. 36-90	SV,V,S,SG,C,...												
<i>Liocarcinus marmoreus</i> (Leach, 1816)	0(18)-85(20)-200(19)		2-6	S												
<i>Liocarcinus vernalis</i> (Risso, 1816)	Sea shore-20(17)	Sea shore-20(3)	0-7	S												
<i>Polydora henslowii</i> (Leach, 1820)	To 375(11)	To 250(25)	2-15	Pelagic												
<i>Sathynectes maravigna</i> (Prestandrea, 1839)	100-1455(3)(12)	100-1455(3)	60-300	SV,V												
<i>Sathynectes longipes</i> (Risso, 1816)	20(3)-91(19)	20-90(3)	?	?												
<i>Portunus hastatus</i> (Linnaeus, 1767)	1(1)-25(5)		2-6	S												
Fam. GERYONIDAE Colosi, 1923																
<i>Geryon longipes</i> A. Milne Edwards, 1881	250(22)-1430(11)	300(3)-1000(4)	300-310 890(28)	V												

						J F M A M J J A S O N D											
Fam. XANTHIDAE																	
MacLeay, 1838																	
Pilumnus spinifer	Sublittoral-100(17)-180(29)	40-100(3)	1-89	SV,SG,S,V,C,...													
H. Milne Edwards, 1834			Max. 18-37														
Pilumnus villosissimus	3(3)-70(29)	3-4(3)	2-6 232?	SR,R													
(Rafinesque, 1814)																	
Pilumnus hirtellus	1(30)-77(4)	Shallow water(3)-77(4)	1-6	Co,SF,SR													
(Linnaeus, 1761)																	
Eriphia verrucosa	A few meters	A few meters	0-1	R													
(Forsk., 1775)																	
Xantho poressa	First meters(31)-0(8)(22)-5(4)	0(8)-5(4)	0-1	SR													
(Oliv., 1792)																	
Xantho pilipes	To 100(31)-110(19)	Shallow water(3)-70(4)	0-45	S,SVR,SGA													
A. Milne Edwards, 1867																	
Xantho inciscus inciscus	Littoral-40-100(31)(3)	Littoral-40(3)	0-1,5	SR													
(Leach, 1814)																	
Xantho inciscus granulicarpus	0-100(3)	0,5-10(3)	0-1	SR													
(Forest, 1953)																	
Monodactylus couchi	7(19)-60(3)(32)-1300(11)	60-1000(3)	85-300	SV,V													
(Couch, 1851)																	
Fam. PINNOTHERIDAE																	
De Haan, 1833																	
Pinnotheres pisum	Littoral(21)-50(4)	47-50(4)	0-48	Commensal in Bivalves													
(Linnaeus, 1767)																	
Pinnotheres pinnotheres	16-94(33)		6-65	Commensal in Bivalves													
(Linnaeus, 1758)																	
Asthenognathus atlanticus	8-70(33)		0-16	S Commensal?													
Monod, 1933																	
Fam. PALICIDAE																	
Rathbun, 1898																	
Palicus caronii	23(9)-100(9)(17)	52-91(3)	46-50	SAC													
(Roux, 1830)																	
Fam. GONEPLACIDAE																	
MacLeay, 1838																	
Goneplax rhoeboides	4(8)-760(9)-1478(19)	4(8)-550(4)	0-310	SV,V,S													
(Linnaeus, 1758)			Max. 37-74														
Fam. GRAPSIDAE																	
MacLeay, 1838																	
Pachygrapsus marmoratus	0-5(4)	Sea shore(3)-5(4)	0-5	SR,R													
(Fabricius, 1787)			Max. 0-0,5														
Pachygrapsus maurus	Intertidal	Intertidal(3)	0-3	R,SR													
(Lucas, 1846)																	
Pachygrapsus transversus	0-10(9)	Intertidal(3)	0-0,5	SR,R													
(Gibbes, 1850)																	
Planes minutus	On floating objects																
(Linnaeus, 1758)																	
Euchirograpsus liguricus	10(32)-359(34)	54-350(3)	?	?													
H. Milne Edwards, 1853																	
Brachynotus sexdentatus	Littoral	1-2(3)	0-1	SR,SVR,R													
(Risso, 1827)																	
Brachynotus atlanticus	Littoral		0,1	SR													
(Forest, 1957)																	
Fam. PARTENOPIIDAE																	
MacLeay, 1838																	
Heterocrypta maltzami	5-550(9)-900(16)	110(8)	22-50	SF													
(Miers, 1881)																	
Parthenope massena	3(3)(9)-500(16)(17)	3-100(3)	3-55	S,SC,SA,SG													
(Roux, 1830)			Max. 14-27														
Parthenope angulifrons	10(3)-80(5)	10-40(3)	2-30	S,SA													
(Latreille, 1825)																	
Parthenope macrocheilos	80(5)-1478?(16)	Quite deep(3)	55-74	SV													
(Herbst, 1790)																	
Fam. MAJIDAE																	
Samouelle, 1819																	
Maja squinado	2(35)(1)(19)-75(9)	To 50(3)	3-55	S,SV,R													
(Herbst, 1788)																	
Maja crispata	0(3)(36)-50(29)	Sea shore-40(3)	0,1-40	SR,R,SA													
(Risso, 1827)																	
Acanthorx lunulatus	0-0,1(30)(36)-10(9)	0(3)-5(4)	0-2	SA,RA,A													
(Risso, 1816)																	
Eurynome aspera	10-550(16)(17)(21)-684(19)	To 75(3)	14-96	S,SA,SC,SV													
(Pennant, 1777)																	
Herbstia condyliata	2(6)(3)-22(54)(3)	To 54(3)	1-20	R													
(Fabricius, 1787)																	
Lissa chiragra	20(3)-60(16)	20-40(3)	1-27	R,S,Co													
(Fabricius, 1775)																	
Anamathia rissoana	30-1000(16)	400(3)-775(13)	650-775(13)														
(Roux, 1828)																	
Pisa tetradon	Littoral-100(16)(17)(21)	0,3-more than 50(3)	0-44	R,RA,SR													
(Pennant, 1777)																	
Pisa muscosa	4(3)-70(29)	4-40(3)	14-33	S,SV													
(Linnaeus, 1758)																	
Pisa carinimana	2(21)-100(6)		4-44	SA													
(Miers, 1879)																	
Pisa armata	Littoral(17)-162(24)	To 50 or more(3)	18-102	Mainly SV													
(Latreille, 1803)			Max. 74-78														
Pisa nodipes	Sublittoral-75(17)	To 75(3)	9-44	S,RA													
(Leach, 1815)																	
Achaeus gracilis	0,5-20(3)	0,5-20(3)	0,1-43	RA,SA,S,F													
(Costa, 1839)																	
Achaeus cranchii	Littoral-68(6)-70(19)	20(3)-50(4)(3)	22-40	SA													
(Leach, 1817)																	
Inachus communissimus	15(3)-48(4)	15(3)-48(4)	5-78	S,SV,V,C													
(Rizza, 1839)			Max. 15-42														
Inachus dorsettensis	A few meters(6)-168(11)-256(19)	30(3)-98(4)	5-109	V,SV,S													
(Pennant, 1777)			Max. 20-43														
Inachus phalangium	4(3)-150(6)	4-40(3)	6-15	SR													
(Fabricius, 1775)																	

Inachus thoracicus Roux, 1830	25(21)–200(29)	30(4)–80(3)	14–78	SA, S, SVR, R	
Inachus aguiarii	20(16)–200(6)	20–100(3)	14–66	SA, S, SVR, R	
Brito Capello, 1876					
Macropodia rostrata (Linnaeus, 1775)	0–50–150(26)(27)	A few meters–70(3)	5–94 Max. 18–42	S, SV, C, SR, SA...	
Macropodia linaresi Forest & Zariquiey, 1964	20–80(26)(27)–86(19)	30–80(3)	18–55	S	
Macropodia czerniavskii (Brandt, 1880)	10–80(26)	10(3)–37(4)	0, 3–2	RA, F	
Macropodia longirostris (Fabricius, 1775)	Some meters–130(26)	4–50(3)	18–55 Max. 18–36	SA, S	
Macropodia longipes (A. Milne Edwards & Bouvier 1899)	50–445(27)	70–100(3)	9–310 Max. 40–270	SV, V, S	

Comments on some species

A record of the capture the *Cancer pagurus* Linnaeus, 1758, in the port of Málaga and the report of a sighting of another at 10 meters depth in the littoral region in the eastern region of Málaga by a free diver cannot be confirmed since this species was not found or seen during the current study.

A variety of sponges (*Euspongia* sp., *Suberites* sp., etc) were observed on the dorsal surface of *Dromia personata* (L.) where they are attached near the fifth legs, while on occasion specimens of *Alcyonium palmatum* Pallas were sometimes found in the same position.

Although *Homola barbata* (Fab.) is cited as being found beyond 50 m in this study, one specimen was taken on the harbour walls of Caleta de Vélez, perhaps dislodged during the cleaning of a fishing boat.

Bathymetric distribution data on *Ebalia granulosa* (H. Milne Edw.) and *E. cranchii* (Leach) has not previously been given for Spanish waters (ZARIQUIEY, 1968). One specimen of this genus, possessing intermediate characters, could not be clearly assigned to either species.

Thia scutellata (Fab.) isn't frequently encountered. It appears in the samples in association with *Albunea carabus* (L.) and *Atelecyclus undecimdentatus* (Herbst) in sandy littoral substrates.

The width/length relationship of specimens of the genus *Carcinus* taken in this study in comparison with data of ALMAÇA (1972) and ZARIQUIEY (1968) is:

	Data obtained by author	ALMAÇA	ZARIQUIEY
<i>C. maenas</i>	1.29–1.35	1.21–1.37	1.22–1.35
<i>C. aestuarii</i>	1.25–1.27	1.17–1.27	—

Pilumnus spinifer H. Milne Edw. is quite frequently encountered. Two anomalies were observed, in one specimen the carpus of the fifth leg has two spines while in another specimen the left anterolateral margin has only three teeth instead of the usual five. Small individuals of this species were occasionally found in the roots of phanerogams but this was not the case with the adults.

Pilumnus villosissimus (Raf.) is a species less frequently found in comparison to the previous one. In observations made by free diving it has been established that it quite commonly occurs on rocky substrates beneath the tentacles of large anemones together with several specimens of *Scyllarus arctus* (L., 1758). *Inachus phalangium* (Fab.), on the other hand, appears also in the middle of the anemone tentacles, the only place where this species has been found.

The species *Paractaea rufopunctata* (H. Milne Edw., 1834), not found in the study area, appears very occasionally in the Granada coastal region at the Punta de la Mona (GARCIA RASO & BARRAJON, 1982) which is very close to the study zone. It is possible that it could occur on rocky substrates with phanerogams in the extreme east of the study area.

Both species of the genus *Pinnotheres* Bosc, 1802, *P. pisum* (L.) and *P. pinnotheres* (L.) have been found principally inside the bivalve *Atrina pectinata* (L., 1767). *P. pisum*, was also encountered, but less frequently, in *Mytilus edulis* (L., 1758) and only rarely in *Donax trunculus* L., 1758.

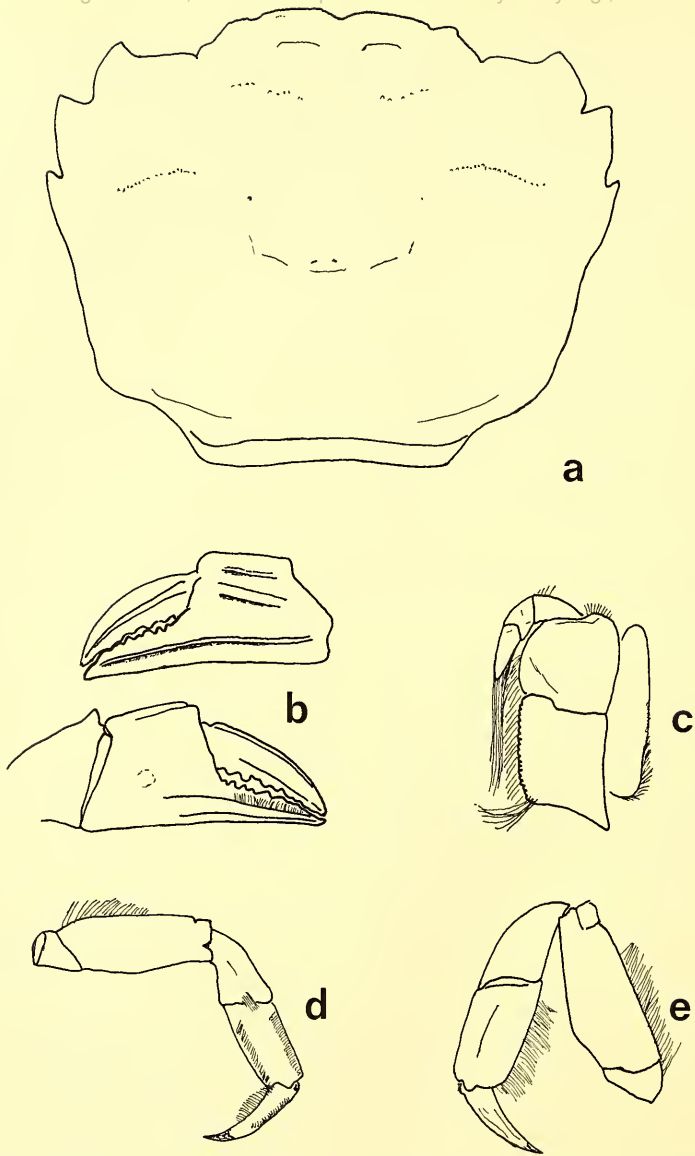


Fig. 2. *Brachynotus atlanticus* Forest, ♀: a, carapace; b, left cheliped; c, third maxilliped; d, second pereopod; e, fifth pereopod.

Specimens of *Asthenognathus atlanticus* Monod have been taken free-living on the soft substrates or found thrown up on the beach, while one specimen was found in the stomach of *Raja asterias* Delaroché 1809. The only records from the Mediterranean of this species, known to the author, are those of NOEL et AMOUROUX (1977) and GARCIA RASO & JIMENEZ MILLAN (1981). The average dimensions given by them are:

	Width	Length
♂♂	11.78 mm	7.50 mm
♀♀	13.33 mm	7.96 mm

Goneplax rhomboides (L.) is one of most abundant Brachyuran species in the study zone, together with *Liocarcinus depurator* (L.) and *Pachygrapsus marmoratus* (Fab.). The capture of two specimens at O m. was very unusual. The smaller ovigerous female found had a width of 13.4 mm.

The only Brachyuran taken with the parasite *Sacculina* were *Inachus communissimus* Rizza, *I. dorsettensis* (Pennant) and *Monodaenus couchi* (Couch). The former species, in a number of cases, even carried two of these parasites while the latter was observed to do so in one case only.

A number of interesting species were taken during this study. *Bathynectes longipes* (Risso), is a rare species and only one specimen was encountered. *Liocarcinus zariquieyi* (Gordon), a species with a wide geographical distribution and known from England (ZARIQUIEY, 1968; INGLE, 1980) to Canary Islands (ZARIQUIEY, 1968; MANNING & HOLTHUIS 1981) and Mediterranean is considered quite a rare species and was previously known only from the Catalan coast in Spain. Similarly only two specimens of *Palicus caronii* (Roux), captured in 1950 at Cadaqués were reported by ZARIQUIEY (1968). *Euchirograpsus liguricus* H. Milne Edw. is not a common species in the Mediterranean Sea and only two specimens were taken during this study. ZARIQUIEY (1968) did not record *Heterocrypta maltzami* Miers from Spain and considered it very rare based in the works of MIRANDA & RIVERA (1921, 1933). Representatives of this species, moreover, are absent from the reference collections in the Oceanographic Institute (I.E.O.) of Málaga. The presence of *Pisa carinimana* Miers in the study zone represents for the European Mediterranean the single area where this species is reported. Other species of rare occurrence are *Inachus aguiarii* Britto Capello, *Macropodia linaresi* Forest et Zariquiey and *M. czerniavskii* (Brand). According to available data this record of the latter species is its most westerly reported occurrence to date.

Finally, the capture of two specimens of *Brachynotus atlanticus* Forest is of special note. These conform exactly to the descriptions given by FOREST (1957) concerning the line of frontal granulations, the internal margin of the third maxillipeds, the position of the anterolateral teeth and the keels of the chelipeds (Fig. 2). However the length/width ratio of the propodite of the P2 and P5 legs is similar to it of *B. sexdentatus*. The capture of these specimens represents the first record of this species in the Mediterranean Sea. It extends northwards its known distribution since the previous most northerly records of the species are from the Atlantic coast of Morocco at 34° 53' latitud.

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Zeitschrift/Journal: [Spixiana, Zeitschrift für Zoologie](#)

Jahr/Year: 1984

Band/Volume: [007](#)

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Artikel/Article: [Brachyura of the coast of Southern Spain \(Crustacea, Decapoda\) 105-113](#)