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THE FAUNA OF
THE CLYDE SEA AREA

INVERTEBRATE
ZOOLOGY
Crustacea

CRUSTACEA:
EUPHAUSIACEA AND
DECAPODA

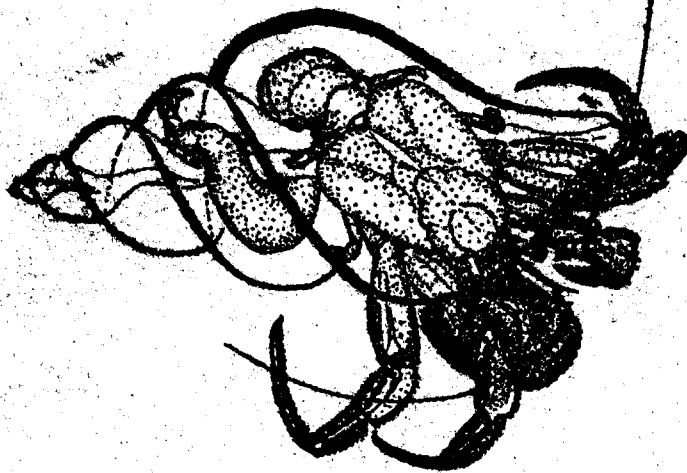
with an illustrated key to the British species

by

J. A. ALLEN

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SCOTTISH MARINE BIOLOGICAL ASSOCIATION
MILLPORT

1967

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SCOTTISH MARINE BIOLOGICAL ASSOCIATION

THE FAUNA OF THE CLYDE SEA AREA

EDITOR: H. T. POWELL

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These publications represent an attempt to bring up to date the faunal lists for the main area of research of the Marine Station, Millport. The Clyde Sea Area¹ is taken to include the Firth of Clyde, the sea lochs which connect with it, and the "plateau"¹ region lying between Arran and a line from the Mull of Kintyre to Corsewall Point, Wigtownshire. Any one person would now find it a very difficult task to bring the older, comprehensive lists^{2,3,4} up to date, and the Association therefore plans to publish lists group by group, whenever a specialist with local experience can be found to undertake the work. The aim is to provide more than a bare catalogue of species. Bibliographies and brief notes on locality, abundance and habitat will be included, with identification keys, where these will help students. It must be emphasized, however, that anyone not familiar with a group should check identifications against specific descriptions in standard works, or consult a specialist, particularly before publication.

Hydrography of the area. Mill's papers¹ still provide the most comprehensive account of topography and of the distribution of temperature and salinity with depth and season. A résumé is given by Chumley⁴, and a few copies of this are available at Millport. Notes on tidal streams are to be found in "West Coast of Scotland Pilot" (Hydrographic Dept., Admiralty), and information on climatology, water movement, surface temperatures and salinities has been published by Dr H. Barnes and the late Mr E. F. W. Goodley^{5,6,7}.

¹MILL, H. R., 1892-1894. The Clyde Sea Area. *Trans. R. Soc. Edinb.*, **36**, 641-729, 12 pl.; **38**, 1-161, 22 pl.

²ELLIOTT, G. F. S., LAURIE, M. and MURDOCH, J. B. (editors, with various authors), 1901. *Fauna, Flora and Geology of the Clyde Area*. 398 pp. Glasgow, Local Committee for the Meeting of the British Association.

³KING, L. A. L., 1912. *Clyde Marine Fauna. Supplementary List, 1911*. 39 pp. Marine Biological Association of the West of Scotland. (Reprinted from the *Annual Report* of the Association for 1911, 60-97.)

⁴CHUMLEY, J., 1918. *The Fauna of the Clyde Sea Area, being an attempt to record the zoological results obtained by the late Sir John Murray and his assistants on board the S.Y. "Medusa" during the years 1884-1892*. 200 pp. Glasgow University Press.

⁵BARNES, H., 1955. Climatological and salinity data for Millport, Scotland. *Glasg. Nat.*, **17**, 193-204.

⁶BARNES, H. and GOODLEY, E. F. W., 1958. A note on rainfall in the West of Scotland. *Glasg. Nat.*, **18**, 45-54.

⁷BARNES, H. and GOODLEY, E. F. W., 1961. The general hydrography of the Clyde Sea Area, Scotland. Part I: Description of the area; drift bottle and surface salinity data. *Bull. mar. Ecol.*, **43**, 112-150.

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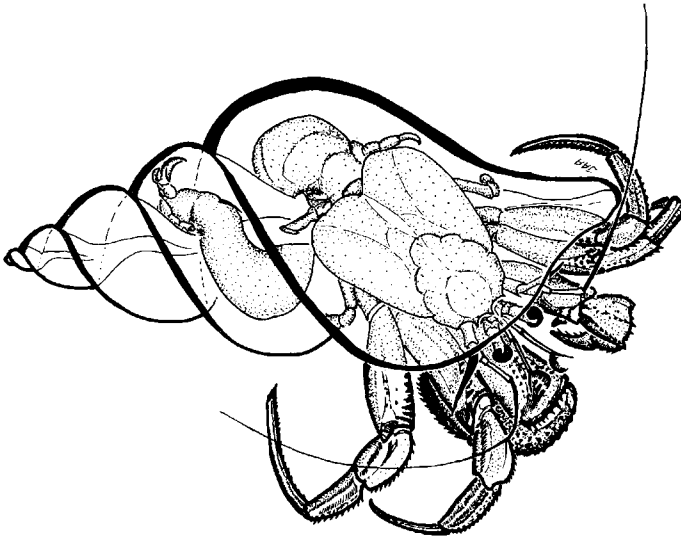
THE FAUNA OF
THE CLYDE SEA AREA

CRUSTACEA:
EUPHAUSIACEA AND
DECAPODA

with an illustrated key to the British species

by

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INTRODUCTION

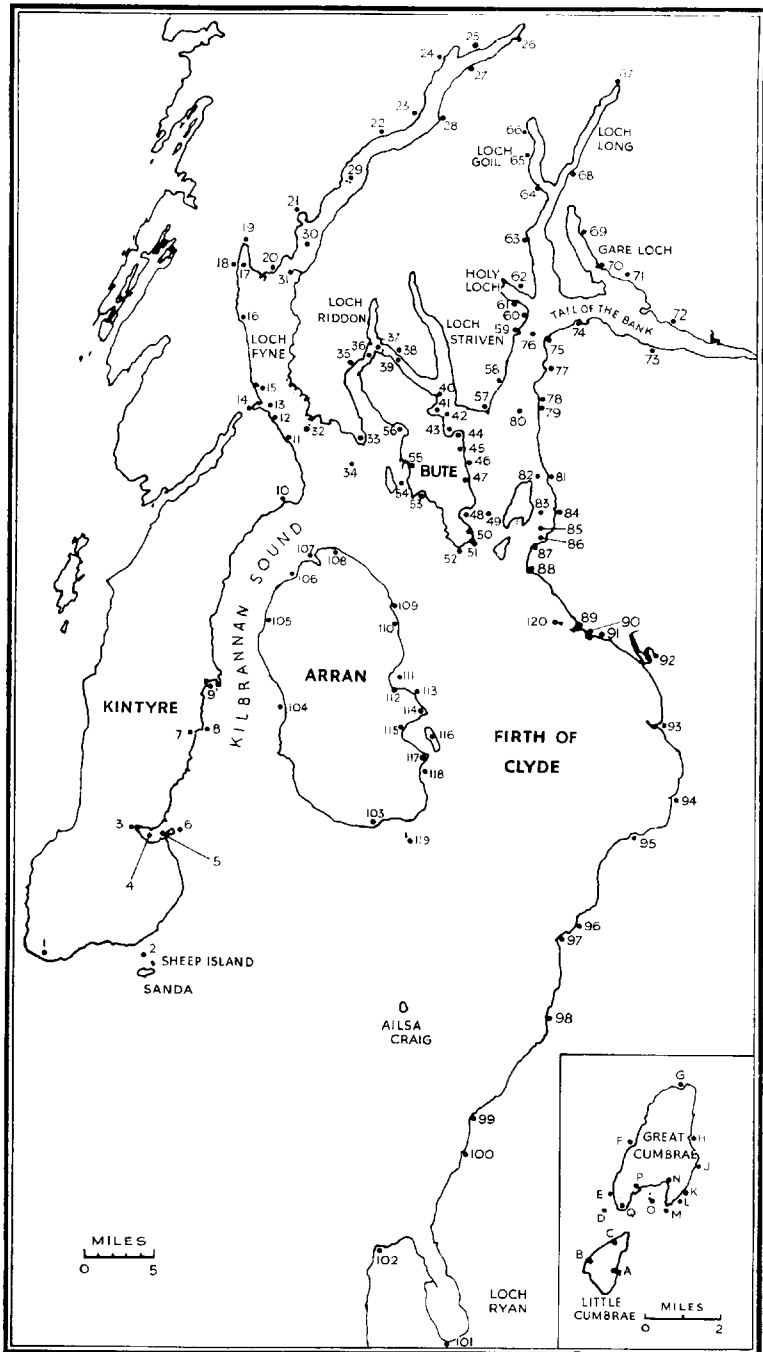
THE records kept by Dr R. B. Pike, who was a member of staff of the Marine Station, Millport, from 1945 to 1961, form the basis of the present list. During the time he was at Millport Dr Pike added considerably to our knowledge of the Eucarida with his observations on distribution and breeding. A new abstraction has now been made from previous lists and records. It is believed that the bibliography is complete, although it is possible that some records have been missed. The nomenclature used follows recent authoritative taxonomic accounts and references to these are included in the bibliography. Reference is also given to a description of each species and each is figured. The abundance of each species is noted by one of the following terms—abundant, common, fairly common, scarce, rare. Where information is available the number and sex of the specimens collected at each locality are given in brackets. The estimate of abundance of each animal is based on inspection of records, opinion of other authorities and personal knowledge. A short description of habitat is given and for many records further information may be obtained via the authority list (p. 8) and the bibliography. The entries of those species whose occurrence in the Clyde is doubtful have been enclosed in heavy square brackets. Most of the localities referred to are shown in the map on page 6. The spelling of place names follows recent Ordnance Survey maps. Bartholomew's "Half Inch" sheets 40, 43 and 44 and Admiralty Chart No. 2159 (Firth of Clyde and Approaches) show depths throughout the area.

There is no single key to the identification of the British Eucarida that is even approximately complete, furthermore there is no single work that describes and figures all the species. For a number of species no illustration exists of the whole animal. This much was clear when the list of 73 species of Eucarida present in the Clyde Sea Area was compiled. It was also realised that more and more collections were being made at the edge of the continental shelf and on the continental slope; furthermore, warm water effluents from power stations were providing conditions that allow the survival of immigrant species. Therefore, it was thought that a list of species to be found in British waters with a key and figures to their identification would be a useful addition to this publication.

Following the list of species that occur in the Clyde Sea Area, there is a list (p. 31 *et seq.*) of 201 British species that occur or are likely to occur in the area bounded by Long. 11°W, Lat. 49°N and Lat. 61°N. This is followed by a key to these species and, with the exception of *Cancer bellianus* a new British species reported while this account was in press (Mason and Davidson 1966), each one is figured in dorsal or lateral view. These figures, as well as those illustrating the terms used in the key (pp. 38–40), should be used in conjunction with the key. Where necessary, additional figures of significant morphological features have been included alongside the species in which they occur. The hermit crabs are the only exception to the rule of figuring the *complete* animal in dorsal or ventral view and here it was felt that no advantage was gained by doing so.

Many of the figures for the key are new drawings and the remainder are based on the figures of previous authorities, the latter being listed on page 37. Specimens of almost all the species keyed have been examined and I am greatly indebted to the following who have supplied specimens and given assistance in many ways: Dr L. B. Holthuis of the Rijksmuseum van Natuurlijke Historie, Leiden; E. J. Brill (publishers); A. W. Sijthoff (publishers); Dr R. G. Hartnoll and Dr D. I. Williamson of the Marine Biological Station, Port Erin; Dr D. P. Wilson of the Marine Biological Association, Plymouth; Dr Isabella Gordon and Mr R. W. Ingle of the British Museum (Natural History), London; Dr C. Edwards and Dr J. Mauchline of the Marine Station, Millport; and my colleagues Dr H. O. Bull and Dr J. B. Buchanan.

I would like to thank all those who have kindly assisted me in this task: Dr C. H. Mortimer, F.R.S., formerly Director of the Marine Station, Millport; Dr R. B. Pike of the Zoology Department, Victoria University of Wellington; and particularly the editor, Mr H. T. Powell (Millport), for his advice and help at all stages in the preparation and publication of this booklet. I would also like to thank Mrs B. Harris (Dove Marine Laboratory) for typing the manuscript.



Map showing most of the localities mentioned in the text.

KEY TO PLACES NUMBERED IN THE MAP

1 Mull of Kintyre	36 Kyles of Bute	71 Helensburgh	106 Catacol Bay
2 Sanda Sound	37 Burnt Islands	72 Cardross	107 Loch Ranza
3 Campbeltown	38 Colintrave	73 Port Glasgow	108 Cock of Arran
4 Campbeltown Loch	39 Kyles of Bute	74 Gourcock	109 Sannox Bay
5 Kildallog Bay	40 Ardmaleish Point	75 Cloch Point	110 Corrie
6 Davarr Island	41 Kames Bay	76 Dunoon Basin	111 Brodick Bay
7 Saddell	42 Ardbeg Point	77 Inverkip	112 Brodick
8 Pluck Point	43 Rothesay Bay	78 Wemyss Bay	113 Corriegills Point
9 Carradale Bay	44 Bogany Point	79 Skelmorlie	114 Clauchlands Point
10 Skipness	45 Ascog	80 Skelmorlie Bank	115 Lamlash
11 Fionn Phort	46 Kerrycroy Bay	81 Largs	116 Holy Island
12 Eilean	47 Mountstuart	82 Largs Channel	117 Kingscross
a'Chomhraig	48 Kilchattan Bay	83 Fairlie Roads	118 Whiting Bay
13 Tarbert Bank	49 Cumbrae Basin	84 Fairlie	119 Pladda
14 East Loch Tarbert	50 Hawk's Nib	85 The Perch	120 Horse Isle
15 Barmore Island	51 Glencallum Bay	(Southannan Sands)	
16 Meall Dubh	52 Garroch Head	86 Hunterston Sands	Inset:
17 Loch Gilp	53 Scalpsie Bay	87 Hunterston	Isles of Cumbrae
18 Ardrishaig	54 Inchmarnock	88 Portencross	A Castle
19 Lochgilphead	Sound	89 Ardrossan	(Little Cumbrae)
20 Silvercraigs	55 St Ninian's Bay	90 Saltcoats	B Landing place
21 Loch Gair	56 Etterick Bay	91 Ardeer	(Little Cumbrae)
22 Furnace	57 Toward Point	92 Irvine	C Hawk Craig
23 Kenmore	58 Innellan	93 Troon	D Tan Spit
24 Inveraray	59 Dunoon	94 Ayr	E Shell Hole
25 Dundarave	60 Kirn	95 Heads of Ayr	F Fintray Bay
26 Cairndow	61 Ardnadam	96 Maidens	G White Bay
27 St Catherine's	62 Kilmun	97 Turnberry	H Balloch Bay
28 Strachur	63 Ardentinny	98 Girvan	J Wishing Well
29 Minard light	64 Carrick	99 Bennane Head	K Lion Rock
30 Carrig Gour	65 Cormonachan	100 Ballantrae	L Keppel Pier
31 Oitir	66 Douglas Pier	101 Stranraer	M Farland Point
32 Sgat Mòr	67 Arrochar	102 Corsewall Point	N Kames Bay
33 Ardlamont Point	68 Arddarroch	103 Bannan	O The Eileans
34 Lamont Shelf	69 Shandon	104 Machrie Bay	P Old Pier (Millport)
35 Tighnabraich	70 Rhu	105 Pirmill	Q Portachur Point

ALPHABETICAL LIST OF PLACES NUMBERED IN THE MAP

42 Ardbeg Point	102 Corsewall Point	41 Kames Bay (Bute)	119 Pladda
68 Arddarroch	49 Cumbrae Basin	N Kames Bay	8 Pluck Point
91 Ardeer		(Cumbrae)	Q Portachur Point
63 Ardentinny	6 Davarr Island	23 Kenmore	88 Portencross
33 Ardlamont Point	66 Douglas Pier	L Keppel Pier	73 Port Glasgow
40 Ardmaleish Point	25 Dundarave	46 Kerrycroy Bay	
61 Ardnadam	59 Dunoon	48 Kilchattan Bay	70 Rhu
18 Ardrishaig	76 Dunoon Basin	5 Kildallog Bay	43 Rothesay Bay
89 Ardrossan		62 Kilmun	
67 Arrochar	14 East Loch Tarbert	117 Kingscross	7 Saddell
45 Ascog	12 Eilean a'Chomhraig	60 Kirn	90 Saltcoats
94 Ayr	56 Etterick Bay	36, 39 Kyles of Bute	2 Sanda Sound
100 Ballantrae	84 Fairlie		109 Sannox Bay
H Balloch Bay	83 Fairlie Roads	115 Lamlash	53 Scalpsie Bay
15 Barmore Island	M Farland Point	34 Lamont Shelf	32 Sgat Mòr
103 Bannan	F Fintray Bay	B Landing place	69 Shandon
99 Bennane Head	11 Fionn Phort	(Little Cumbrae)	E Shell Hole
44 Bogany Point	22 Furnace	81 Largs	20 Silvercraigs
112 Brodick		82 Largs Channel	79 Skelmorlie
111 Brodick Bay	52 Garroch Head	K Lion Rock	80 Skelmorlie Bank
37 Burnt Islands	98 Girvan	21 Loch Gair	10 Skipness
	51 Glencallum Bay	17 Loch Gilp	27 St Catherine's
26 Cairndow	74 Gourcock	19 Lochgilphead	55 St Ninian's Bay
3 Campbeltown		107 Loch Ranza	28 Strachur
4 Campbeltown Loch	C Hawk Craig		101 Stranraer
72 Cardross	50 Hawk's Nib	104 Machrie Bay	D Tan Spit
9 Carradale Bay	95 Heads of Ayr	96 Maidens	13 Tarbert Bank
64 Carrick	71 Helensburgh	16 Meall Dubh	O The Eileans
30 Carrig Gour	116 Holy Island	P Millport (Old Pier)	85 The Perch
A Castle (Little	120 Horse Isle	29 Minard light	(Southannan Sands)
Cumbrae)	87 Hunterston	47 Mountstuart	35 Tighnabraich
106 Catacol Bay	86 Hunterston Sands	1 Mull of Kintyre	57 Toward Point
114 Clauchlands Point			93 Troon
75 Cloch Point	54 Inchmarnock		97 Turnberry
108 Cock of Arran	Sound	31 Oitir	
38 Colintrave	58 Innellan	P Old Pier (Millport)	78 Wemyss Bay
65 Cormonachan	24 Inveraray		G White Bay
110 Corrie	77 Inverkip	105 Pirmill	118 Whiting Bay
113 Corriegills Point	92 Irvine		J Wishing Well

AUTHORITIES CITED IN THE FAUNISTIC SECTION

AJH & WHRL	Haddow, A. J. & Lumsden, W. H. R.	JM	Murray, J.
AMN	Norman, A. M.	JMa	Mauchline, J.
AP	Patience, A.	JP	Peden, J.
B & B	Barnes, H. & Bagenal, T. B.	JRH	Henderson, J. R.
B & S	Brook, G. & Scott, T.	JSC	Scouler, J.
C & M	Clarke, R. B. & Milne, A.	JSm	Smith, J.
CE	Edwards, C.	JSt	Steel, J.
DL	Landsborough, D.	LPWR	Renouf, L. P. W.
DR	Robertson, D.	LRF <i>et al.</i>	Fisher, L. R. <i>et alia</i>
DWD	Durney, D. W.	M'A	MacAndrew, R.
EF	Ford, E.	Maj.M.	Martin, Major
EFb	Forbes, E.	MVL	Lebour, M. V.
FGP	Pearcey, F. G.	P & W	Pike, R. B. & Williamson, D. I.
FFP	Flemyng, F. P.	RBP	Pike, R. B.
FSG	Fishery Board of Scotland, records of the 'Garland'; see Fulton (1897, 1898) and Scott (1900).	RE	Elmhirst, R.
G & M	Greville, R. K. & Miles, C. P.	RE & LALK	Elmhirst, R. & King, L. A. L.
GB	Brook, G.	RM	MacDonald, R.
JAA	Allen, J. A.	SYM	Records of the S.Y. 'Medusa'; see JM
JC	Chumley, J.	TBB	Bagenal, T. B.
JDM <i>et al.</i>	MacDonald, J. D. <i>et alia</i>	TS	Scott, T.
JG	Grieve, J.	WAH	Herdman, W. A.
JH	Heath, J. R.	WEH	Hoyle, W. E.
		WR	Russell, W.
		WTC	Calman, W. T.

EUPHAUSIACEA AND DECAPODA
OF THE CLYDE SEA AREA

Class **MALACOSTRACA**

Subclass **EUCARIDA**

Order EUPHAUSIACEA

Family **Euphausiidae**

NYCTIPHANES COUCHI (Bell) [Einarsson, 1945, 116]

Scarce.

In stomach of herrings caught off Cumbrae [DR]. Non-resident; occurs sparingly every year in late autumn and early winter [CE].

MEGANYCTIPHANES NORVEGICA (M. Sars) [Einarsson, 1945, 110]

Common, over deep water muds.

Loch Fyne, throughout its length [DR, AMN, FSG, TS, B & S, SYM, JC, JM, RM, LRF *et al.*]; Loch Goil, Loch Long [SYM, JC]; Dunoon Basin, off Brodick, Cumbrae–Arran, Kilbrannan Sound [JC]; Loch Long, off Carradale [LRF *et al.*]; Cumbrae [AP]; Largs Channel [RE]; in winter the main population is in a trough parallel to the east coast of Arran spreading as far as Tarbert; also in deep water of Kilbrannan Sound off Carradale, with smaller populations in Loch Long, south of the mouth of Loch Goil, and in Cumbrae Basin; in spring the population is concentrated to the N.E. of Arran and largely disappears from Kilbrannan Sound, from east of Arran and from Cumbrae Basin. During summer months dispersal of the population takes place and specimens are found throughout the Clyde Sea Area in depths greater than 80–100 m [JMa].

Breeding: luminescent at breeding period, spermatophores transferred in January and February, eggs are laid in March and April, larval stages April to July [JMa]; for further details of its biology see Mauchline (1959, 1960).

THYSANOESSA INERMIS (Krøyer) [Einarsson, 1945, 121]

Rare.

Clyde [GB, WEH]; off Sanda Island [FSG]; Sanda Island–Ailsa Craig [TS].

THYSANOESSA RASCHI (M. Sars) [Einarsson, 1945, 125]

Common, over deep water muds.

Clyde [TS, RM]; Loch Fyne [TS, B & S, FSG, AMN, LRF *et al.*, RM]; off Ailsa Craig [FSG]; Loch Long opposite mouth of Loch Goil, between Cumbrae and Bute [JRH]; Loch

Striven, Loch Goil, Loch Long [SYM]; Keppel Pier (Cumbrae), Loch Striven [RM]; Largs Channel [AP]. Is found wherever *M. norvegica* is found but also occurs in shallower areas, less than 80 m, where *M. norvegica* rarely occurs; the populations aggregate in deep water, > 100 m, in winter and spring, and disperse in the summer and specimens are found living over sandy mud in depths as shallow as 20–30 m [JMa].

Breeding: spawns twice a year, in early spring and autumn [RM]. In recent years, 1962–1965, it bred only once per year, in April–May [JMa]; for further details of its biology see Mauchline (1966a).

Parasite: *Thalassomyces fagei* (Boschma) (Family: Ellobiopsidae)—see Mauchline (1966b).

Order DECAPODA

Suborder NATANTIA

Section CARIDEA

Family Pasiphaeidae

PASIPHAEA SIVADO (Risso) [Kemp, 1910, 37]

Scarce, above deep water muds, 20–230 m.

Sgat Mòr (island, Loch Fyne), 230 m (4) [JRH, JC]; off Strachur, 140 m [SYM]; in mid-winter tow-nettings between Tarbert and Sgat Mòr (Loch Fyne) and at mouth of Firth [FSG]; Loch Striven, 60–80 m, Loch Goil, 70 m, Kilbrannan Sound, 20–30 m, Cock of Arran, 140–160 m, between Cumbrae and Arran, 100–180 m [JC]; Oitir (Loch Fyne) (1) [RBP].

Family Palaemonidae

PALAEEMON ELEGANS Rathke [Kemp, 1910, 132, as *Leander squilla*]

Fairly common, in rock pools below M.T.L. and in shallow water on sand and rock.

More common at mouth of Firth, Kilchattan Bay, 20 m [JRH]; Arran, rock pools [DL, G & M]; Dunoon Basin [JC]; Largs Channel [AP]; usually enters rock pools in early April, breeds, and returns to sea in September. In 1921, they first appeared in rock pools on 4 April, but following a drop in air temperature to -4°C they returned to the sea and did not re-enter the pools until 10 May [RE].

Breeding: mating observed in May, followed by spawning two days later. Incubation varies from 30 to 60 days according to the temperature [RE].

PALAEEMON SERRATUS (Pennant) [Kemp, 1910, 130, as *Leander*]

Scarce, over sand, muddy sand and gravel, 10–40 m.

Cumbrae Basin, 40 m (8, including 5 ovigerous ♀), Balloch Bay (Cumbrae), Largs Channel, 30 m (1), Tan Spit (Cumbrae), 10 m (1) [RBP]; 6 in stomachs of shags [AJH & WHRL].

Breeding: ovigerous females recorded in December, January and February [RBP].

PALAEEMONETES VARIANS (Leach) [Kemp, 1910, 123]

Rare.

Cumrae, M.L.W.S. [DR]; Inverkip [TS].

Family **Alpheidae**

ATHANAS NITESCENS (Montagu) [Kemp, 1910, 122]

Rare.

East side of Cumrae, under boulder at M.L.W.S. (5) [RBP].

ALPHEUS GLABER (Olivi) [Kemp, 1910, 120, as *A. ruber*]

Rare, from sandy mud.

Off Lion Rock (Cumrae) (2), after storm, in Agassiz trawl [RBP]; 1 mile S. of Lady Isle, 40 m (6 ♂ and 1 ♀), Millport Bay [CE].

Breeding: one female in berry 19 October 1957 [CE].

Family **Hippolytidae**

CARIDION GORDONI (Bate) [Kemp, 1910, 109]

Fairly common, in muddy sand and gravel, 10–100 m.

Throughout the Firth [JRH]; Lamlash Bay (2) [AMN]; upper Loch Fyne, 20–40 m, Loch Striven, 20–60 m, The Perch (Southannan Sands), Gare Loch, Dunoon Basin, 32–40 m, Kilbrannan Sound, 100 m, Otterard–Carradale, 36 m [JC]; Loch Goil, 10–90 m [JC, JRH]; Cumrae Basin, 80 m (3 ovigerous ♀), Balloch Bay (6♂, 4 ovigerous ♀), Oitir (Loch Fyne) (1), off Inchmarnock, 70–85 m, Carradale Bay (1) [RBP]; 1½ miles S. of Davarr Island, 26–34 m, Loch Fyne [FSG]; Largs Channel [AP].

Breeding: ovigerous females reported in March, April, May and October [RBP, JRH]. Post-larval stages in July [RBP].

Parasite: *Pleurocrypta patiencei* T. Scott [AP].

CARIDION STEVENI Lebour [Lebour, 1930, 185]

Rare.

Off Mountstuart (Bute), 20–30 m (5 ovigerous ♀, 18 January 1956), record confirmed by Dr M. V. Lebour [RBP].

EUALUS GAIMARDI (H. Milne-Edwards) [Holthuis, 1950, 46]

Fairly common, over muddy sand, mud and gravel, 12–135 m.

Loch Fyne, 20–135 m [EFB, M'A, SYM, RBP]; East Loch Tarbert [B & S]; Largs Channel, 40 m [AP, RBP]; from Lamlash Bay to head of Loch Goil, 10–90 m, off Arden-tinny (30) [JRH]; Loch Striven, 30–80 m, Loch Goil, 40–90 m, Gare Loch, 14–50 m, Dunoon Basin, 60–100 m, Kilbrannan Sound, 20–30 m, Campbeltown Loch, 16–32 m [JC]; Oitir (Loch Fyne) (3 ovigerous ♀), Keppel Pier (Cumrae) (1 ♀), Cumrae Basin, 90 m (18 ovigerous ♀), Carradale Bay, 12–15 m (2 ovigerous ♀), Lamlash Bay (plentiful) [RBP]; Machrie Bay, 14–40 m [FSG].

Breeding: ovigerous females taken in January [AP], and in January, February and April [RBP]. Larvae hatch in March [P & W].

Parasite: *Hemiarthrus abdominalis* (Krøyer) [AP].

EUALUS OCCULTUS (Lebour) [Lebour, 1936a, 96, as *Spirontocaris*]

Scarce, amongst algae just below E.L.W.S.

RE sent mixture of *Thoralus cranchi* and this species to MVL (see Lebour, 1936a); off Keppel Pier (Cumbrae) (7, including 5 ovigerous ♀), Oitir (Loch Fyne) (1) [RBP].

Breeding: ovigerous females taken in July [RBP].

EUALUS PUSIOLUS (Krøyer) [Kemp, 1919, 107, as *Spirontocaris pusiola*]

Scarce, on sand, gravel, stones and among sublittoral algae, E.L.W.S.–70 m.

Cumbrae, 20–30 m [DR]; Loch Goil and Loch Long [JRH]; Little Cumbrae (1), N. of Inchmarnock, 45–50 m (1), Lion Rock (Cumbrae), E.L.W.S. (2 ♂), Lamlash Bay (with *Thoralus cranchi*) [RBP].

Breeding: ovigerous females occur in early months of year, larvae hatch in April, and new brood is laid in April and May. Ovigerous females have been seen as late as October [RE]. One ovigerous female collected in April, hatched larvae on 5 May, moulted on 6 May and laid eggs on 7 May [RE]. Larvae in plankton from February to August [P & W].

Parasite: *Hemiarthrus abdominalis* (Krøyer) [AP], occasional [RBP].

SPIRONTOCARIS LILLJEBORGI (Danielssen) [Kemp, 1910, 103]

Common, over deep water muds and sandy muds, 20–230 m.

Largs Channel [AP]; from mouth of Firth to Loch Long, 50–200 m [JRH]; Loch Fyne, 20–140 m [SYM, B & S, FSG]; Cumbrae Basin, 80 m (plentiful), Strachur (24), off Tarbert, 30–40 m, Sgat Mòr (Loch Fyne), 230 m, Skelmorlie Bank, 70 m (6), Garroch Head–Cock of Arran, 160 m (1) [RBP].

Breeding: eggs laid in November and December, hatch 3 months later, in March and April [RBP]. Details given by RE are incorrect [RBP].

Parasites: approximately 15% of the population are infected with *Hemiarthrus abdominalis* (Krøyer) [RBP]. *Bopyroides hippolytes* Krøyer (1 ♂, 1 ♀) on a specimen collected by RBP from Cumbrae Deep [CE].

SPIRONTOCARIS SPINUS (Sowerby) [Kemp, 1910, 103]

Rare, sand and gravel covered with zoophytes, 20–30 m.

Cumbrae [DR], mouth of Firth [TS].

Many of the early records refer to *S. lilljeborgi*, but those given above are probably correct [JAA].

HIPPOLYTE PRIDEAUXIANA Leach [Kemp, 1910, 100]

Rare.

An ovigerous female caught in shrimp trawl at mouth of estuary in November 1896 [TS], identification confirmed by T. R. R. Stebbing.

Breeding: larvae taken off Farland Point (Cumbrae) in June and September [RBP].

HIPPOLYTE VARIANS Leach [Kemp, 1910, 97]

Common, in rock pools at M.L.W.S. and in *Laminaria* zone.

More frequent towards mouth of Firth [JRH]; East Loch Tarbert [B & S, TS]; Kames Bay (Cumbrae) and Keppel Pier (Cumbrae) (150) [RBP]; Largs Channel [AP]; Lamlash Bay [G & M, AMN]; Davarr Island [FSG]; Loch Fyne [TS].

Breeding: spawning begins in December and January and ovigerous females occur to September. Probably two broods, the first hatching in May and the second in September [RE].

THORALUS CRANCHI (Leach) [Holthuis, 1950, 51]

Scarce, on gravel, stones and rock, E.L.W.S.-70 m.

Loch Fyne [EFB, M'A, JC], off Cumbrae, Craigmore (Bute) and Hawk's Nib (Bute), 10-40 m [JRH]; Gare Loch, 40-50 m, Pladda, 60-70 m, Cumbrae, Bute [JC]; Lamlash Bay, E.L.W.S. [RBP].

Breeding: larvae taken off Farland Point (Cumbrae) in October [RBP].

Parasite: *Hemiarthrus abdominalis* (Krøyer) [JRH, AP].

Some of the above records may refer to *Eualus occultus* (see Lebour, 1936a).

Family **Processidae***PROCESSA CANALICULATA* Leach [Nouvel & Holthuis, 1957, 33]

Scarce, in sandy mud and mud, 45-230 m.

Sgat Mòr (Loch Fyne), 230 m (several), off Brodick [JRH, JC]; in seaward part of Firth (occasional) [FSG, TS]; Garroch Head, 70 m (1 ovigerous ♀), Largs Channel, 47-52 m (4), Rothesay Bay, 45 m, Kyles of Bute, 48 m, N. of Tarbert, 147 m, Inchmarnock, 70 m (1), Bute-Cock of Arran, 160 m (1) [RBP].

Breeding: ovigerous females recorded in August [JRH]; and in June and December [RBP].

The records of JRH, JC, TS and FSG may refer to *Processa edulis* (see below).

PROCESSA EDULIS (Risso) [Nouvel & Holthuis, 1957, 16]

Rare.

Millport [MVL].

Species of the genus *Processa* are very variable in form; for discussion see Nouvel and Holthuis (1957) and Allen (1961).

Family **Pandalidae***DICHELOPANDALUS BONNIERI* (Caullery) [Kemp, 1910, 92, as *Pandalus*]

Fairly common, usually over soft mud in deep water, occasionally at shallower depths, 22-230 m.

Loch Fyne, 230 m [JP]; Loch Long, 80 m [WTC]; Garroch Head-Cock of Arran, 145-160 m (24), Carradale Bay, 24-30 m (1), Cumbrae Basin, 40-130 m (hundreds) [RBP]; over deep water muds [RE].

Breeding: egg laying begins at end of October and continues for 6–8 weeks, larvae are released between first week in February and end of April. There is no summer hatching as suggested in Elmhirst (1939) [RBP]. Larvae taken off Farland Point (Cumbrae) in June [RBP].

Parasites: *Pseudione affinis* G. O. Sars, approximately 8% of 1 year old and 14% of 2 and 3 year old *Dichelopandalus bonnieri* affected; also about 0.5% with *Hemiarthrus abdominalis* (Krøyer) [RBP].

PANDALINA BREVIROSTRIS (Rathke)

[Kemp, 1910, 97]

Common, over sandy mud, mud and gravel, 8–100 m.

Loch Fyne, 20–40 m [JP, SYM, RBP, FSG]; Largs Channel [AP]; Loch Gair, Carradale Bay, 20–50 m [FSG]; throughout Clyde as far as Gare Loch, 10–80 m [JRH]; Loch Striven, 20–80 m, Loch Goil, 8 m, Gare Loch, 20–50 m, Dunoon Basin, 10–32 m, Kilbrannan Sound, 100 m, Campbeltown Loch, 20–32 m [JC]; Cumbrae Basin, 90 m (20 ovigerous ♀), Balloch Bay (Cumbrae) (many ovigerous ♀), Skelmorlie Bank, 70 m (3 ovigerous ♀), N.W. of Inchmarnock, 35–40 m, Carradale Bay [RBP].

Breeding: ovigerous females occur from January to September, larvae hatch in April and September [RE]. Ovigerous females taken in February and from April to August [RBP]. Larvae taken off Farland Point (Cumbrae) between February and September [RBP].

Parasites: *Pleurocrypta cluthae* T. Scott [AP]; bopyrid [JRH].

PANDALUS MONTAGUI Leach

[Kemp, 1910, 86]

Common, sublittoral, over all types of bottom, largest specimens in deep water, 10–230 m.

Loch Fyne, 20–230 m [B & S, SYM, JC, FSG, WTC, JP]; East Loch Tarbert [B & S]; Ascog (Bute), 20 m [LPWR]; Largs Channel [AP]; Loch Striven, 20–80 m, Loch Goil, Gare Loch, 20–50 m, Dunoon Basin, 10–100 m, Saddell, 95 m, Brodick, 170–185 m, Pladda, 60–70 m, Kilbrannan Sound, 20–160 m, Cumbrae–Arran, 180 m, Campbeltown Loch, 20–32 m, Sanda Island–Achinhoan (Kintyre), 45 m, Sanda Island–Ailsa Craig, 50 m [JC]; Davarr Island, 26–35 m, Whiting Bay, 18–30 m, off Ailsa Craig, 50–60 m [FSG]; Lamlash Bay [G & M].

Breeding: eggs are laid between December and February, hatching of larvae commences in April after about 18 weeks incubation. Ovigerous females and larvae are occasionally seen in August and September [RE].

Parasite: approximately 10% of the population carries *Hemiarthrus abdominalis* (Krøyer) [RBP].

PANDALUS PROPINQUUS G.O.Sars

[Kemp, 1910, 89]

Scarce, over deep water muds, 40–230 m.

Sgat Mòr (Loch Fyne), 230 m [JP, WTC]; Loch Long, 80 m, first British record [WTC]; Cumbrae Basin, 40 m (5), off Loch Ranza, 75 m (20) [RBP].

Breeding: ovigerous females collected in December [RBP].

Family **Crangonidae***CRANGON ALLMANI* Kinahan

[Allen, 1960, 445]

Common, on sandy mud, mud and gravel, 10–210 m.

Everywhere in deep water, 40–210 m [TS]; upper Loch Fyne, 20–140 m [SYM, B & S, FSG, JC]; Loch Striven, 20–80 m, Loch Goil, 40–70 m, Gare Loch, 10–46 m, Dunoon Basin, 10–100 m, off Brodick, 170–200 m, between Cumbrae, Arran and Kilbrannan Sound, 20–180 m, Sanda Island–Ailsa Craig, 50 m, Sanda Island–Achinhoan, 45 m [JC]; Cumbrae Deep, off measured mile (Arran), 160 m, off Loch Ranza, Skelmorlie Bank, Carradale Bay, 20–40 m [RBP].

Breeding: spawning begins in December and continues into April, hatching occurs from April to May [RE], ovigerous females December, January, July [RBP, AP]; larvae off Keppel Pier (Cumbrae) from April to October [RBP]; probably two broods, for reproductive cycle see Allen (1960).

CRANGON CRANGON (L.)[Kemp, 1910, 137, as *C. vulgaris*]

Fairly common, on sand and sandy mud in shallow water.

On all sandy shores [JRH, RE]; East Loch Tarbert [B & S]; upper Loch Fyne, shore, Gare Loch, 6–46 m [JC]; Kames Bay (Cumbrae) [C & M]; Ascog (Bute), 20 m [LPWR]; Arran [DL].

Breeding: gonads ripe in November, spawning begins about New Year. Accurate data are few for the shrimp are offshore, hatching occurs from end of April to June. A later spawning occurs in May and June on inshore sands and hatching occurs after 6–7 weeks incubation [RE].

PONTOPHILUS SPINOSUS (Leach)

[Kemp, 1910, 160]

Fairly common, on muddy sand, mud, gravel and stones.

East Loch Tarbert [B & S]; Loch Fyne, 22–180 m [SYM, RBP]; many localities as far north as Cloch Point, 40–120 m [JRH]; Loch Striven, 30–70 m, Dunoon Basin, 10–40 m [JC]; off Arran, mouth of Firth, Largs Channel [AP]; Cumbrae Basin, 75–80 m (3), Largs Channel, 47 m (1), Kilbrannan Sound, 42 m (1 ♀), Minard light, 37 m (1), Balloch Bay (Cumbrae) (1 ♀), Skelmorlie Bank, 75 m (3 ovigerous ♀), off Loch Ranza, 130 m (2 ♀), Catacol Bay, 120 m (6 ♂, 7 ♀), Skipness, 50 m (2 ovigerous ♀) [RBP].

Breeding: ovigerous females have been recorded between March and July and in October, December and January [RE, AP, RBP]. Larvae were taken in Etterick Bay and Cumbrae Basin in July, and in April, May and September off Farland Point (Cumbrae) [RBP].

PHILOCHERAS BISPINOSUS BISPINOSUS (Hailstone & Westwood)

[Kemp, 1910, 152]

Common, on sandy mud, mud and gravel, 5–80 m.

Off Cumbrae [DR]; off Ballantrae, 30–50 m [FSG]; Gare Loch, 1 mile N.W. of Ailsa Craig, Loch Long, Loch Goil, Loch Striven and Loch Fyne, 10–80 m [AP]; between the Eileans (Cumbrae), 5 m (plentiful), Cumbrae Basin, 70–75 m (46), Largs Channel, 47 m (1), E. of Little Cumbrae light, 8–12 m (2), Skelmorlie Bank, 70 m (1) [RBP].

Breeding: ovigerous females recorded in July, August and September [AP], late

May to August [P & W]; larvae common in September [P & W]. Larvae taken off Farland Point (Cumbrae) in April, May and from July to October [RBP].

PHILOCHERAS BISPINOSUS NEGLECTUS (G. O. Sars) [Kemp, 1910, 153]

Scarce, together with *P. b. bispinosus* 5–20 m. Adults with characters intermediate between the two varieties occur.

East Loch Tarbert and Loch Fyne, 6–20 m [Ts], Etterick Bay, 20 m (2), Lamlash Bay, 16 m (1) [AP]; between the Eileans (Cumbrae), 5 m (2), Kames Bay (Cumbrae), 9 m (1), Little Cumbrae light, 6 m (1 ♀), [RBP].

Breeding: larvae hatched in May [P & W].

PHILOCHERAS ECHINULATUS (M. Sars) [Kemp, 1910, 144]

Scarce, on sandy mud, mud and gravel, 60–230 m.

Sgat Mòr (Loch Fyne), 230 m [JRH]; mouth of Firth, 5 miles S.W. of Ailsa Craig, 60 m [FSG]; Loch Fyne, Loch Long, off Arran, Kilbrannan Sound (100), Loch Goil, Loch Striven, Millport Bay, mouth of Firth [AP]; Loch Fyne W. of Tarbert, 180 m (1) [RBP].

Breeding: ovigerous females taken in July to September [AP].

PHILOCHERAS FASCIATUS (Risso) [Kemp, 1910, 151]

Rare, on muddy sand and stones and gravel, 5–10 m.

Millport Bay (1) [AP]; Farland Point (Cumbrae), 5 m (1), off Keppel Pier (Cumbrae), 8–10 m [RBP].

PHILOCHERAS SCULPTUS (Bell) [Kemp, 1910, 148]

Rare, on sand, mud and gravel, 10–230 m.

Lamlash Bay, 10 m (2) [AMN]; off Little Cumbrae, 40 m (1) [JRH]; Sgat Mòr (Loch Fyne), 230 m, off Brodick, 190 m [JC]; W. of the Perch (Southannan Sands), 18 m (1 ovigerous ♀) [RBP]; Inchmarnock, 28 m (1), off Dunoon, 16 m (1), [AP].

Breeding: ovigerous females taken in February, May and June [RE] and April [RBP]. Larvae taken off Farland Point (Cumbrae) in August [RBP].

PHILOCHERAS TRISPINOSUS (Hailstone) [Kemp, 1910, 146]

Rare, sand, gravel and stones, 5–16 m.

Kames Bay (Cumbrae), 16 m (4, 3 being ovigerous ♀) [RBP, AP]; Farland Point (Cumbrae), 5 m (1) [RBP]; Lamlash Bay, 16 m [AP].

Breeding: ovigerous females taken in July [AP] and May [RBP]. Larvae taken off Farland Point (Cumbrae) in May, July and September [RBP].

Suborder REPTANTIA

Section MACRURA

Family **Nephropsidae**

NEPHROPS NORVEGICUS (L.) [Selbie, 1914, 47]

Common, burrows in deep water muds, 14–230 m.

Loch Fyne, 160–230 m [FSG, JC, RBP]; Loch Striven, 40–80 m [JC, RBP]; Loch Goil,

40 m, Gare Loch, 14–50 m (hundreds), Dunoon Basin, 70–100 m, off Brodick, 170–195 m, Kilbrannan Sound, 95–160 m, Sanda Island–Ailsa Craig, 48 m [JC]; head of Gare Loch–mouth of Firth [JRH]; off Brodick, 168 m, N.W. of Ailsa Craig, 53 m, Loch Striven mouth, 58 m, Kilchattan Bay, 80–90 m, off Etterick Bay, 37–110 m, Loch Ranza, 73–81 m [RBP]; Largs Channel [AP]; Carradale Bay, 20–50 m, Machrie Bay, 14–40 m, Pirnmill, 50–60 m, Whiting Bay, 18–30 m, off Ballantrae, 30–50 m, around Ailsa Craig, 50–60 m [FSG], Cumbrae Basin, 40 m [B & B].

Breeding: lays eggs July to September, larvae hatch February to May, incubation lasts 8–9 months [RE]. Ovigerous females recorded by other workers were taken in July [AP]; between August and January [B & B, TBB]. Larvae taken between April and November [TBB, RBP] and are sometimes present close by the boat slip of the Marine Station (Cumbrae) and can be caught by hand [RE].

HOMARUS GAMMARUS (L.) [Selbie, 1914, 53, as *H. vulgaris*]

Common, on rocky coasts.

More frequent towards the mouth of the Firth in *Laminaria* zone [JRH]; lower Loch Fyne [B & S]; East Loch Tarbert [TS]; Largs Channel [AP]; Arran [G & M]; Farland Point (Cumbrae) [JAA].

Breeding: spawns from August to October, larvae hatching from July to September, i.e. incubation takes 11 months [RE]. Larvae off Farland Point (Cumbrae) in September [RBP].

Family **Palinuridae**

PALINURUS ELEPHAS Fabricius [Selbie, 1914, 42, as *P. vulgaris*]

Rare.

Loch Fyne, in herring net (1) [B & S]; Campbeltown Loch [JC, Maj.M]; Farland Point–Tan Spit (Cumbrae) (1), off Keppel Pier (3) [RE]; Rothesay Bay, in net (1) [WR]; near entrance to Loch Striven, one adult ♂ trawled by fishing boat, August 1966.

Family **Axiidae**

AXIUS STIRHYNCHUS Leach [Selbie, 1914, 89]

Rare.

Cumbrae Basin, one taken in Young Fish Trawl [EF, confirmed RBP].

CALOCARIS MACANDREAE Bell [Selbie, 1914, 92]

Common, burrows in deep water muds, 35–230 m.

Loch Fyne (type locality), 80–230 m [M'A, B & S, SYM, GB, RBP]; Loch Goil, 90 m (1), Gare Loch, 46 m (1), Dunoon Basin, 80 m [JC]; everywhere on muddy parts of Clyde Sea Area, occasionally in stomach contents of cod [RE]; Brodick–Troon, 77–115 m, Etterick Bay–north coast of Arran, 106–116 m, Kilbrannan Sound, 73–81 m, N.E. and N.W. of Ailsa Craig, 53 m, Cumbrae Basin, 35–50 m, Kyles of Bute, Skelmorlie Bank, 73 m [RBP]; off Wemyss Bay, 80 m, off Brodick, 190 m [JRH].

Family **Laomediidae**

JAXEA NOCTURNA (Chiereghin) [Selbie, 1914, 96]

Scarce, in sandy mud and mud, 18–80 m.

Adult fragments from stomach contents of a gurnard and a witch caught off Ailsa Craig [FGP, see TS]; Whiting Bay, 18–30 m, Loch Fyne, off Ballantrae, 30–50 m [TS, FSG]; N. of Ailsa Craig, 55 m (1), Brodick Bay–Troon, 77 m (1), 1 mile S. of Lady Isle [RBP].

Breeding: larvae frequent at times in tow-nets [RBP, FSG]. Larvae taken off Farland Point (Cumbrae) in June and July, and from the numbers of larvae recorded it would seem that the species is more abundant than the records of adults suggest [RBP].

Family **Callianassidae**

CALLIANASSA SUBTERRANEA (Montagu) [Bouvier, 1940, 101]

Rare, in sandy mud.

Lion Rock (Cumbrae), 20 m (1) [RBP], confirmed by Dr I. Gordon.

UPOGEBIA STELLATA (Montagu) [Selbie, 1914, 104]

Rare.

One in stomach of cod caught off S.W. Bute [RE]. Occurs off the west coast of Argyll [RBP].

Section ANOMURA

Family **Galatheididae**

MUNIDA BAMFFICA (Pennant) [Selbie, 1914, 72]

Fairly common, on rock, stones, gravel and sand, M.L.W.S.–140 m.

Loch Fyne, 25–40 m [TS, JSC, JRH, SYM, FSG]; Largs Channel [AP]; Loch Striven, 20–80 m, Loch Goil, shore–90 m, Gare Loch, 25–30 m, Dunoon Basin, 12–80 m, Kilbrannan Sound, 140 m [JC]; Skelmorlie Bank, 16 m, Loch Ranza, 12–15 m, Tarbert Bank, Garroch Head (1 ♂, 1 ovigerous ♀), Lion Rock (Cumbrae), 23 m (2 ♂), White Bay (Cumbrae), Lamlash Bay [RBP]; Ascog (Bute), 20 m [LPWR]; Cloch Point–Inverkip Bay [JRH].

Breeding: ovigerous females have been reported in July [JRH], November and February [RBP]; breeding winter to early summer [RE]. Larvae taken off Farland Point (Cumbrae) from February to June [RBP].

GALATHEA DISPERSA Bate [Bull, 1937, 46]

Fairly common, on sand, gravel, stones and rock, 13–100 m.

Loch Fyne, 20–60 m [SYM, FSG]; Loch Striven, 30 m, Dunoon Basin, 20–100 m, Saddell, 100 m, Pladda, 60–70 m, Arran–Ailsa Craig, 60 m, Kilbrannan Sound, Davarr Island, 40 m, Sanda–Achinhoan, 40 m, Sanda–Ailsa Craig, 50 m [JC]; Oitir (Loch Fyne), 30–40 m (8), mouth of Loch Goil, Carrig Gour (Loch Fyne), Skelmorlie Bank, 13–16 m, Etterick Bay, N. of Ailsa Craig (1), Brodick Bay, 20–30 m (2 ♂, 6 ♀), Lion Rock (Cumbrae), 23 m (1 ♂), Carradale Bay (plentiful), White Bay (Cumbrae) (plentiful), Lamlash Bay, E. of Pladda (plentiful), Whiting Bay, 35–40 m (plentiful), N.E. of Sanda Island [RBP];

Largs Channel [AP]; Whiting Bay, 18–30 m, S.W. of Ailsa Craig, 60 m, Ayr Bay, 25–40 m [FSG]; Ascog (Bute), 20 m [LPWR]; on hard ground in 20–80 m from mouth to as far north as Gare Loch [JRH].

Breeding: ovigerous females recorded in July [AP] and March [JRH]. Larvae off Farland Point (Cumbrae) in February and April to July [RBP].

Parasites: *Sacculina* [JRH]; *Pleurocrypta marginata* G. O. Sars, *Pleurocrypta longibranchiata* (Bate & Westwood) and *Pseudione crenulata* G. O. Sars [AP]—must be considered as doubtful records (see Pike, 1953).

GALATHEA INTERMEDIA Lilljeborg [Selbie, 1914, 66]

Fairly common, on rock, stones, gravel and hard mud and sand, 10–90 m.

East Loch Tarbert, Bàgh Buic (Loch Fyne) [B & S]; upper Loch Fyne 20–40 m [SYM, FSG]; on hard ground in 20–40 m from mouth to as far as Gare Loch [JRH]; Ascog (Bute), 20 m [LPWR]; Gare Loch, 12 m, Dunoon Basin, 16–90 m, Otterard–Carradale, 36 m, Sanda Island–Achinhoan, 45 m [JC]; Oitir (Loch Fyne) (9 ♀), Loch Goil mouth, Etterick Bay, Loch Ranza (many), Kames Bay (Cumbrae) (1), Brodick Bay, 20–30 m (2), Lion Rock (Cumbrae), 23 m (13), Carradale Bay, 20–40 m (plentiful), Lamlash Bay (very plentiful) [RBP]; Davarr Island, 26–35 m, Carradale Bay, 20–50 m, S.W. of Ailsa Craig, 60 m [FSG].

Breeding: records indicate single spring to summer brood [RE]. Ovigerous females taken in July [JRH]. Larvae taken off Farland Point (Cumbrae) in August and September [RBP].

Parasites: *Pleurocrypta marginata* G. O. Sars, *Pleurocrypta intermedia* (Giard & Bonnier) [RBP].

GALATHEA NEXA Embleton [Bull, 1937, 42]

Fairly common, on muddy sand, stones, rock and gravel, 10–95 m.

Loch Fyne, 25–90 m [SYM, TS, RBP, M²A, AMN]; Tan Spit (Cumbrae), 15 m [DR]; Lamlash Bay [WAH]; Skelmorlie Bank, 12–80 m [JRH]; Ascog (Bute), 20 m [LPWR]; Largs Channel [AP]; off Portencross (2), Loch Riddon mouth, Skelmorlie Bank, 13–16 m, Carradale Bay (1 ♂), White Bay (Cumbrae) (1), E. of Pladda (1), N.E. of Sanda Island (4) [RBP].

Breeding: spawns between December and April, and between May and September. First brood hatch about July [RE]; ovigerous females in July [RBP, AP]. Larvae taken off Farland Point (Cumbrae) between February and August [RBP].

Parasite: *Pleurocrypta galathea* (Hesse) [RBP].

GALATHEA SQUAMIFERA Leach [Bull, 1937, 49]

Fairly common, under stones at M.L.W.S., occasionally in deep water (70 m).

Cumbrae, M.L.W.S. [AMN, DR, JC, FSG, JRH]; East Loch Tarbert, Loch Fyne [B & S]; upper Loch Fyne, 20–30 m [SYM]; Pladda, 60–70 m, Otterard–Carradale, 60 m, Fairlie [JC]; Etterick Bay, 8–12 m, Loch Ranza, 12–15 m, Kames Bay (Cumbrae) (1), Lion Rock (Cumbrae), M.L.W.S. (fairly plentiful), Carradale Bay (1) [RBP]; Largs Channel [AP]; Arran [DL].

Breeding: spawns between December and February and larvae hatch from April to

August [RE]. Ovigerous females in July [AP]. Larvae taken off Farland Point (Cumbrae) between March and August [RBP].

Parasites: *Pleurocrypta galathea* (Hesse) [RBP]. AP records *P. longibranchiata* (Bate & Westwood) but RBP considers that the record probably refers to *P. galathea* (Hesse).

GALATHEA STRIGOSA (L.)

[Bull, 1937, 49]

Scarce, under stones at M.L.W.S. and a little below.

Cumbrae, M.L.W.S. [DR]; young specimens off Roseneath Point, 30 m [JRH]; Strachur [TS]; Loch Ranza, 12–15 m (1), Lion Rock (Cumbrae) (1) [RBP]; Largs Channel [AP]; the Eileans (Cumbrae), Millport Pier, E.L.W.S.; S.S.W. of the Perch (Southannan Sands), 6–8 m [RE].

Breeding: two broods, one is spawned from mid-winter to April and the other in May, hatchings in May and late summer [RE]. Ovigerous females in July [AP].

Family **Porcellanidae**

PORCELLANA LONGICORNIS (L.)

[Selbie, 1914, 87]

Common, on rock, gravel and stones amongst sand and mud, M.L.W.S.–100 m.

Generally distributed, M.L.W.S.–40 m [JRH, B & S]; Largs Channel [AP]; Gare Loch, Dunoon Basin, 20–100 m, Tan Spit Cumbrae, 14 m [JC]; Brodick Bay, 20–30 m, Lion Rock (Cumbrae), 23 m, Skelmorlie Bank, 13–16 m, Etterick Bay, 8–12 m, Loch Ranza, 15–17 m, Carradale Bay, Lamlash Bay, 1¼ miles N.E. of Sanda Island [RBP]; Arran [DL]; north end of Holy Island [G & M].

Breeding: spawns in spring and larvae hatch in summer. Zoeae occur in the plankton from April to September [RE]. Larvae taken off Farland Point (Cumbrae) from April to October [RBP].

Parasite: *Pleurocrypta porcellanae* Hesse [RBP].

PORCELLANA PLATYCHELES (Pennant)

[Selbie, 1914, 87]

Common, under stones, M.L.W.S. and occasionally down to 30 m.

Cumbrae, M.L.W.S. (plentiful) [DR, JC, RBP]; Largs Channel [AP]; Lamlash [JC, WAH]; Lunderston Bay (Dunoon Basin) [TS]; south coast of Arran [DWD]; Arran [DL, G & M].

Breeding: spawns in spring and larvae hatch in summer [RE]. Ovigerous females reported in July and August [AP, JRH].

Family **Lithodidae**

LITHODES MAÏA (L.)

[Bouvier, 1940, 153, as *L. maia*]

Fairly common, particularly in Loch Fyne, on mud, sandy mud and gravel, 14–150 m.

Loch Fyne, 20–150 m [B & S, SYG, JRH, JSC, FSG]; Loch Goil, 40–70 m, Kilbrannan Sound, 140 m, Cumbrae, 35 m, Campbeltown Loch, 20–32 m [JC]; off Arran [G & M, DL]; off Cumbrae [DR, JRH]; mouth of Firth [JRH]; off Fintray Bay (Cumbrae), 60–70 m (6 ovigerous ♀), Loch Ranza, 130 m (1 ♂), Loch Fyne, 120–140 m (10 ♂, 7 ovigerous ♀), off Tarbert, 100–150 m (plentiful), off Inchmarnock, 80–100 m [RBP]; Machrie Bay, 14–40 m, Carradale Bay, 20–50 m, Davarr Island, 26–35 m, Pirnmill, 50–60 m, Whiting Bay, 18–30 m [FSG]; Farland Point (Cumbrae), 40 m [RE].

Breeding: spawning in May and June with larvae hatching in following March to May [RE], but P & W report egg laying between September and November and hatching in April and May. For larval development see JDM *et al.* Three females in aquaria with new laid eggs at beginning of September, hatched larvae at end of March, one moulted and laid second batch of eggs in April [RBP].

Family Paguridae

PAGURUS BERNHARDUS (L.) [Selbie, 1921, 15, as *Eupagurus*]

Abundant, on all types of bottom, from intertidal zone to 140 m but most abundant in shallow water; young specimens in shells of *Littorina littorea* (etc.), large specimens usually in shells of *Buccinum undatum*.

Loch Fyne, shore–140 m [B & S, JC, SYM]; Loch Goil, shore–90 m, Gare Loch, shore–46 m, Dunoon Basin, 10–100 m, Saddell, 95 m, Pladda, 60–70 m, Kilbrannan Sound, 12–90 m, off Cumbrae, 125 m, Tan Spit (Cumbrae), 14 m, Campbeltown Loch, 16–32 m, Sanda–Achinhoan, 45 m [JC]; the Perch (Southannan Sands), M.L.W.S. [RE & LALK]; Long Point (Kames Bay, Cumbrae), shore (164), Lion Rock (Cumbrae), 23 m (8), Brodick Bay, 20–30 m, Etterick Bay, 10–15 m, Kilbrannan Sound, 50 m [RBP]; Craigmore (Bute) [JG]; Ascog (Bute), 20 m [LPWR]; Arran [G & M].

Breeding: ovigerous females recorded for each month except October and November; the breeding peak appears to be in winter and early spring; larvae are recorded from January to September [RE, P & W, AP]. For details of development see JDM *et al.*; for ecological notes, and observations using glass “shells”, see RE.

Parasites: *Pseudione hyndmanni* (Bate & Westwood) and *Peltogaster* [JRH]; 1.5% infected with *Athelges paguri* (Rathke), *Liriopsis pygmaea* (Rathke) also recorded [RBP].

PAGURUS CUANENSIS (Thompson) [Selbie, 1921, 26, as *Eupagurus*]

Scarce, from mud, sand and gravel, M.L.W.S.–175 m, usually found in shells of *Aporrhais*.

Clauchlands Point (Arran), in *Laminaria* zone [WAH]; Lamdash Bay [WAH, AMN, JRH]; Craigmore (Bute) [JG]; off Cumbrae [AMN, JRH]; Ascog (Bute), 20 m [LPWR]; Portencross, Skelmorlie Bank [JRH]; off Barmore Island (Loch Fyne), 175 m, Brodick Bay, 20 m (1 ♀), Whiting Bay, 40 m [RBP].

Breeding: first brood in March with the second brood in the autumn [P & W]. For details of development see JDM *et al.* Although usually found in *Aporrhais pespelicani*, about 5% were associated with *Suberites domuncula* [P & W].

Parasite: *Athelges bilobus* G. O. Sars [RBP].

PAGURUS PRIDEAUXI (Leach) [Selbie, 1921, p. 34, as *Eupagurus*]

Common, on sand, muddy sand, mud and gravel, 10–160 m, associated with *Adamsia palliata*.

Loch Fyne, 20–140 m [B & S, SYM, JC, RBP]; Loch Striven, 20–40 m, Gare Loch, Dunoon Basin, 10–100 m, Kilbrannan Sound, 12–160 m, Davarr Island, 40 m, Campbeltown Loch, 20–32 m, Sanda–Achinhoan, 40–45 m, Sanda–Ailsa Craig, 50 m [JC]; Ascog (Bute), 20 m [LPWR]; Campbeltown Loch, 27 m, Kilbrannan Sound, 42–50 m, Skelmorlie

Bank, 20 m, Loch Ranza, 25 m, Lion Rock (Cumbrae), 23 m, Sanda Island, 40–50 m, Cumbrae Deep, 90 m, Carradale Bay [RBP]; Largs Channel [AP]; Arran [G & M].

Breeding: ovigerous females occur throughout the year. There appear to be two main breeding peaks, one from winter to early spring and the other in early autumn [RE, P & W, JRH, AP]. For details of development see JDM *et al.* Larvae are least common in November [RBP]. After the carapace measures 8 mm in length, they do not change shells [RBP].

Parasites: *Athelges paguri* (Rathke) [AP]; *Athelges prideauxi* Giard & Bonnier—first British record from a specimen taken in Kilbrannan Sound [RBP]; *Pseudione hyndmanni* (Bate & Westwood) [AP]—this is the only British record of a *Pseudione* in *Pagurus prideauxi* and should be confirmed [RBP].

PAGURUS PUBESCENS (Krøyer) [Selbie, 1921, 29, as *Eupagurus*]

Fairly common, on coarse sand, mud, rock and gravel, 10–110 m, usually in *Suberites domuncula*.

Loch Fyne, 20–40 m [SYM, JC, FSG, RBP]; Davarr Island, 40 m, Loch Striven, 20–60 m, Pladda, 60–70 m; Saddell, 100 m, Loch Goil, 60–100 m, Gare Loch, 10–50 m, Dunoon Basin, 10–100 m, Tan Spit (Cumbrae), 14 m, Campbeltown Loch, 16–32 m [JC]; Garroch Head, 110 m (1 ♀), 110 m, mouth of Loch Goil, Skelmorlie ½ mile S. of the buoy, Mountstuart (Bute), 24 m (1 ♀), off Little Cumbrae light, 40–60 m (4 ♂), off Loch Ranza, 40–60 m (2 ♂), Fintray Bay (Cumbrae), 20–30 m (5), Farland Point (Cumbrae) (9) [RBP]; Whiting Bay, 20–30 m [FSG, RBP]; Carradale Bay, off Sanda Island [RBP, JC]; S.W. of Ailsa Craig, 60 m, off Ballantrae, 30–50 m, Arran—Heads of Ayr, 70–80 m [FSG]; Largs Channel [AP]; East Loch Tarbert [TS]; Tan Spit (Cumbrae), Farland Point (Cumbrae), 20 m [JP].

Breeding: broods are laid in winter and early spring and are incubated for about three months [P & W]. Larvae taken off Farland Point (Cumbrae) in March [RBP]. For details of development see JDM *et al.* The above records include those of *Eupagurus kroyeri* (Stimpson) which is the same species (see Selbie, 1921, and Squires, 1964).

Parasite: *Pseudione hyndmanni* [RBP, JRH].

[*PAGURUS SCULPTIMANUS* Lucas [Selbie, 1921, 19, as *Eupagurus*]

Rare.

Minard light (Loch Fyne), 20–50 m [SYM]. Doubtful record. P & W give no authentic record from farther north than the Aran Islands off the west coast of Ireland.]

CATAPAGUROIDES TIMIDUS (Roux) [Bouvier, 1940, 143]

Rare.

Off Cumbrae, (2 ♂) [P & W].

ANAPAGURUS CHIROACANTHUS CHIROACANTHUS (Lilljeborg)

[Selbie, 1921, 48]

Scarce, on clean sand, gravel and muddy sand, 10–40 m.

Lamlash Bay [AMN, JRH, JC]; Skelmorlie Bank, off Portencross, Tan Spit (Cumbrae),

10–40 m [JRH, JC]; East Loch Tarbert [B & S]; upper Loch Fyne, 20–30 m [JC]; off Mountstuart (Bute), 24 m (1♂), off Castle (Little Cumbrae), 20 m (1♂, 1 immature ♀), off Farland Point (Cumbrae) [RBP].

Breeding: ovigerous females and larvae found during most of the year, probably two broods [P & W]. For details of development see JDM *et al.*

Parasite: *Athelges tenuicaudis* G. O. Sars [RE]; this was the only British record (Pike, 1953) until another specimen was collected near the Isle of Man in 1955 (Bruce *et alia*, 1963).

ANAPAGURUS HYNDMANNI (Bell) [Selbie, 1921, 49]

Fairly common, from sand, mud, muddy stones and gravel, just below M.L.W.S.–35 m.

Firth of Clyde, 20–30 m [AMN]; off Cumbrae [DR]; East Loch Tarbert [TS]; off Mountstuart (Bute) (2 ovigerous ♀), Little Cumbrae (off Castle and landing place), 4–25 m (5♂, 7 ovigerous ♀, 1 immature ♀), off Farland Point (Cumbrae), 35 m [RBP]; off Ascog (Bute) [LPWR].

Breeding: ovigerous females from March to September, larvae March to November [P & W]. For development see JDM *et al.*

Parasites: *Pseudione hyndmanni* (Bate & Westwood) and *Athelges paguri* (Rathke) [AP], but RBP states that *Pseudione hyndmanni* is not found on this species.

ANAPAGURUS LAEVIS (Bell) [Selbie, 1921, 44]

Common, usually on muddy sand or gravel, 20–210 m.

Generally distributed in Clyde, 20–210 m [JRH]; upper Loch Fyne, 20–72 m [B & S, SYM, RBP]; off Minard light (Loch Fyne), 22–50 m, off Dundarave (Loch Fyne) [SYM]; East Loch Tarbert [B & S]; off Craigmore (Bute) [JG]; Toward Point–Rothesay [TS]; Portencross (1♂, 2♀), Skipness, very plentiful with *Turritella communis*, Cumbrae Basin (337 in 2 hauls), White Bay (Cumbrae), Lion Rock (Cumbrae), 23 m, Brodick Bay, 20–30 m [RBP]; Loch Striven, 20–40 m, Loch Goil 12–70 m, Gare Loch, 6–46 m, Dunoon Basin, 12–100 m, Saddell, 94 m, Otterard–Carradale, 30–40 m [JC]; Kilbrannan Sound, 80–90 m, off Campbeltown, 18–37 m [JC, RBP]; Eterrick Bay (Bute), 59 m, Fairlie Roads, Oitir (Loch Fyne), Tarbert Bank (Loch Fyne) [RBP]; Sanda–Ailsa Craig, 50 m [FSG].

Breeding: ovigerous females and larvae occur throughout most of the year [P & W, AP, JRH, RE]. For details of development see JDM *et al.* and RE.

Parasites: *Athelges paguri* (Rathke), *Pseudione hyndmanni* (Bate & Westwood) [AP]; *Chlorogaster sulcatus* (Lilljeborg) (4 from Cumbrae Basin), *Peltogaster* sp. (6 from Cumbrae Basin and 1 from Skipness) [RBP].

Section BRACHYURA

Family Leucosiidae

EBALIA CRANCHI Leach [Bouvier, 1940, 209]

Scarce, on muddy sand and gravel, 20–40 m.

Lamlash Bay [DL, Maj.M]; off Lion Rock (Cumbrae) [AP]; Brodick Bay (1♂, 1♀), Whiting Bay, 40 m (3♂), Kames Bay, 20 m (1♂), between Tan Spit (Cumbrae) and Little Cumbrae light, 35 m (1♂) [RBP].

[*EBALIA GRANULOSA* H. Milne-Edwards [Bouvier, 1940, 211]
Rare.
Off Davarr Island, 30 m [AP]. Probably a misidentification [JAA].]

EBALIA TUBEROSA (Pennant) [Bouvier, 1940, 211]
Common on sand, stones and gravel, 10–120 m.

Lamlash Bay, off Cumbrae, Skelmorlie Bank, 10–60 m [JRH]; off Fort Matilda [TS]; Dunoon Basin, 10–40 m, Otterard–Carradale, 36–60 m, Cumbrae, 40–120 m, Bute, 28 m [JC]; off Portencross, (1 ♂, 2 ovigerous ♀), Maidens Bay (Ayrshire), 20 m (1 ♂), Kilbrannan Sound (2), Sanda Island (4 ♂, 1 ovigerous ♀), off Little Cumbrae light, 25 m (22 ♂, 8 ♀), Skelmorlie Bank, 20 m (3 ♂), White Bay (Cumbrae), 300 yds from shore (2 ♂), Whiting Bay (1 ♀), Tan Spit (Cumbrae), 15 m (7 ♂, 3 ovigerous ♀), Fintray Bay (Cumbrae), 20 m (5 ♂, 5 ♀), N.E. of Sanda Island, 48 m (1 ♂), Lamlash Bay, 20 m, off Farland Point (Cumbrae) (50) [RBP]; off Davarr Island 28 m, Largs Channel [AP]; N. of Holy Island [G & M].

Breeding: ovigerous females have been recorded mainly between April and August, but an occasional ovigerous female has been taken in December and January; larvae are recorded off Farland Point (Cumbrae) in July and August [RBP].

EBALIA TUMEFACATA (Montagu) [Bouvier, 1940, 209]
Scarce, on muddy sand and gravel, 12–85 m.

Lamlash Bay [FSG, JRH]; Millport Bay [DR]; Kilbrannan Sound, 30 m [GB]; Dunoon Basin, 16–85 m [JC]; White Bay (Cumbrae), 40 m (1 ♂), off Castle (Little Cumbrae), 12 m (1 ♀), off Fintray Bay (Cumbrae), 20 m (2 ♂, 2 ovigerous ♀), Tan Spit (Cumbrae), 15 m (1 ♂, 2 ovigerous ♀), Tan Spit–Little Cumbrae light (2 ♀), off Dunagoil Bay (Bute), 30 m (1 ♀), off Lion Rock (Cumbrae) (1 ovigerous ♀) [RBP]; Largs Channel [AP].

Breeding: ovigerous females have been taken in April and May (with recently laid eggs) and in January [RBP].

Family **Majidae**

MAJA SQUINADO (Herbst) [Bouvier, 1940, 321, as *Maia*]
Rare, records doubtful.

Among rocks between Innellan and Dunoon (1878) [son of PFF], this specimen was exhibited to Natural History Society of Glasgow; off Ardrossan [Maj.M]; W. of Bute [JG]; off S. end of Bute, recorded in Corporation of Glasgow Museums and Art Galleries Report, 1913, p. 27, confirmed by Mr A. Grey [RE].

HYAS ARANEUS (L.) [Bouvier, 1940, p. 334]

Common, on rocky shores in *Laminaria* zone and sublittorally on sand, stones, gravel and rock down to 95 m.

Loch Fyne, M.L.W.S.–60 m [SYM, JC, B & S, FSG]; Loch Striven, shore–60 m, Loch Goil, shore–40 m, Gare Loch, 6–50 m, Dunoon Basin, 12–80 m, Saddell, 95 m, Otterard–Carradale, 36–40 m, Davarr Island, 40 m, Campbeltown Loch, 14–32 m [JC]; Craigmore (Bute) [JG]; Gare Loch, Loch Goil [JRH]; Largs Channel [AP]; Oitir (Loch Fyne), Etterick Bay, 8–12 m (common), Carradale Bay (4) [RBP]; Arran [DL, G & M].

Breeding: ovigerous females recorded in every month [AP, RE, RBP]. Newly laid eggs have been recorded in February, March, July, September, October and November. Hatching occurs in March and in summer, two broods are occasionally produced without an intervening moult [RE]. Larvae were taken off Farland Point (Cumbrae) between April and June [RBP].

HYAS COARCTATUS Leach [Bouvier, 1940, 335]

Common, on gravel, mud and stones, 6–160 m (tends to occur in deeper water than *H. araneus*).

Loch Fyne, 20–160 m [B & S, SYM, RBP, JC]; Loch Striven, 20–60 m, Loch Goil, 12–40 m, Gare Loch, 6–30 m, Dunoon Basin, 12–85 m, Saddell, 95 m, Otterard-Carradale, 36–56 m, Pladda, 60–70 m, Cumbrae, 120–125 m, Kilbrannan Sound, 20–100 m, Davarr Island, 40 m, Tan Spit (Cumbrae), 14 m, Sanda Island-Achinhoan, 40–45 m, Sanda Island-Ailsa Craig, 50 m [JC]; Cumbrae Basin (7 ovigerous ♀), Carrig Gour (Loch Fyne), 55 m, Oitir (Loch Fyne), 30–40 m, Blind Man Rock (Campbeltown), 37 m (1), Kilbrannan Sound, 40–45 m, Skelmorlie Bank, 13–16 m, Loch Ranza, 25 m, S. of Skipness, 50 m (1), Sanda Island (3) [RBP]; from all stations [FSG]; Largs Channel [AP]; Ascog (Bute), 20 m [LWPR].

Breeding: ovigerous females February to September [RE], July and October [AP], November, March, May and July [RBP]. Those kept in aquarium and hatching larvae in November laid a second brood the following May. Larvae were taken off Farland Point (Cumbrae) in March and April [RBP].

EURYNOME ASPERA (Pennant) [Bouvier, 1940, 340]

Fairly common, on sandy mud and gravel, 12–120 m.

Clyde, 20–120 m [JRH]; W. of Fort Matilda, 20 m [TS]; Gare Loch [JC]; Lamlash Bay [WAH]; off Castle (Little Cumbrae) (1 ♀), Garroch Head, off Portencross (1 ovigerous ♀), Kilbrannan Sound, Etterick Bay, 12 m (2), Loch Ranza, 25–30 m (fairly plentiful), off Sanda Island, 40–50 m, N. of Sheep Island (1), Whiting Bay, 35–40 m (4 ♂, 3 ♀), Skelmorlie Bank (1 ♂), Tan Spit (Cumbrae), 26–30 m (plentiful) [RBP]; Largs Channel [AP]; N. of Holy Island (3 or 4) [G & M].

Hartnoll (1961) distinguishes two British species of *Eurynome*. Dr R. B. Pike in a personal communication informs me that he has examined closely the Clyde specimens and compared them with the two forms sent to him by Dr Hartnoll from the Isle of Man. He found a range of intergrades between the two forms and it was impossible to separate the Clyde specimens into two distinct groups [JAA].

Breeding: ovigerous females in February, April and from June to August [RE]; July [AP]; August [WAH]; and in January, May and August [RBP]; larvae taken off Farland Point (Cumbrae) in July, August and September [RBP].

INACHUS DORSETTENSIS (Pennant) [Bouvier, 1940, 353]

Common, on sand, muddy sand, stones, gravel and rock, 6–125 m.

Loch Fyne, 20–60 m [B & S, SYM, RBP, FSG]; Ascog (Bute), 20 m [LPWR]; Arran [G & M, DL]; off Greenock [TS]; Largs Channel [AP]; all parts of the Clyde up to Gare Loch [JRH]; Loch Striven, 20–30 m, Loch Goil, Gare Loch, 6–50 m, Dunoon Basin, 16–100 m, Saddell, 95 m, Otterard-Carradale, 36–40 m, Cumbrae Basin, 120–125 m, Tan Spit

(Cumbrae), 14 m, Sanda Island–Achinhoan, 40 m [JC]; Brodick Bay, 20 m, Campbeltown, 37 m, Kilbrannan Sound, 40–50 m, N. of Fairlie Pier, Skelmorlie Bank, 13–16 m, Etterick Bay, 8–12 m, Loch Ranza, 15–17 m, Carradale Bay, Fintray Bay (Cumbrae) [RBP]; Machrie Bay, 18–30 m, W. of Ailsa Craig, 50 m [FSG].

Breeding: ovigerous females taken in every month, eggs are laid in January, June, August and November and larvae hatch in spring and June [RE]. Ovigerous females taken in July [AP], March [JRH], December, January and August [RBP].

INACHUS DORYNCHUS Leach

[Bouvier, 1940, 355]

Rare, on sandy mud and gravel.

Off Cumbrae [DR]; Largs Channel (1) [AP]; Kilbrannan Sound, 50 m, Otterard–Carradale, 56 m, Sanda–Achinhoan, 45 m, Cumbrae, 40 m [JC]; Machrie Bay, 18–30 m, Pirnmill, 50–60 m, off Ballantrae, 30–50 m, off Ailsa Craig, 50–60 m [FSG]. RBP records it from the West coast of Scotland but not from the Clyde area and it is probable that it is restricted to the southern part of the Firth.

Breeding: the one specimen taken from the Largs Channel in July was an ovigerous female [AP].

INACHUS LEPTOCHIRUS Leach

[Bouvier, 1940, 356]

Scarce, on mud and muddy sand, 37–230 m.

Firth of Clyde [AMN]; S.W. end of Cumbrae–Bute, 40 m [DR]; Largs Channel [AP]; Cumbrae Basin, 90 m (1 ♂, 3 ♀), off Campbeltown, 37 m (1 ♂), 37 m, Sgat Mòr (Loch Fyne), 230 m (1 ♀) [RBP].

Breeding: one larva taken off Farland Point (Cumbrae) in September [RBP].

ACHAEUS CRANCHI Leach

[Bouvier, 1940, 360]

Rare.

Off Cumbrae (1) [DR]; upper Loch Fyne, 20 m [SYM]; off Pladda, 60–70 m [JC].

MACROPODIA LONGIROSTRIS (Fabricius)

[Bouvier, 1940, 365]

Fairly common, on muddy sand, stones and gravel, 20–70 m.

Largs Channel [AP]; Lamlash Bay, off Cumbrae, off Rùnnan-eùn Point (Bute), off Inverkip, 20–70 m [JRH]; off Greenock [TS]; Brodick Bay, 20 m (1 ♀), Ascog (Bute) (5 ovigerous ♀), Portencross (1 ♀) [RBP]; Loch Fyne [B & S]; 'Appears to be replacing *M. rostrata*' [DR].

Breeding: ovigerous females have been reported in July [AP], March and August [JRH] and in June and November [RBP].

MACROPODIA ROSTRATA (L.)

[Bouvier, 1940, 362]

Fairly common, on sand, gravel and stones, 8–60 m.

Upper Loch Fyne, 20–50 m [SYM, FSG]; Ascog (Bute), 20 m [LPWR]; off Arran [G & M]; Tan Spit (Cumbrae) [DR]; Largs Channel [AP]; Lion Rock (Cumbrae) (1 ♀), 23 m, Campbeltown, 37 m, N. of Fairlie Pier, 15 m, Etterick Bay, 8–12 m, Loch Ranza, 15–17 m, Carradale Bay (1 ♂) [RBP]; Carradale Bay, 20–50 m, off Ailsa Craig, 50–60 m [FSG].

Breeding: ovigerous females have been recorded in winter and spring [RE], July [AP] and August [RBP].

Family **Corystidae**

CORYSTES CASSIVELAUNUS (Pennant) [Bouvier, 1940, 218]

Scarce, in sand, below M.L.W.S. to 37 m.

Kames Bay (Cumbrae), washed ashore after storms [DR]; at mouth of Firth (1 ♂) [FSG]; Dunoon Basin, 16–32 m [JC]; off Blind Man Rock, Campbeltown, 37 m [RBP]; Arran [DL].

Family **Portunidae**

PORTUMNUS LATIPES (Pennant) [Bouvier, 1940, 231]

Rare.

Washed ashore on Irvine sands [DR].

CARCINUS MAENAS (L.) [Bell, 1853, 76]

Very common, on all shores (rock, stones, gravel, sand and mud) between tidemarks and in shallow water, occasionally down to 60 m.

On all shores [JRH]; Loch Fyne, shore and 20–60 m [B & S, JC]; Loch Striven, 20–40 m, Loch Goil, 12–40 m, Gare Loch, 6–50 m, Dunoon Basin, 16–30 m, Campbeltown Loch, 20–32 m [JC]; off Craigmore (Bute) [JG]; the Perch (Southannan Sands), 15 m, Holy Loch off Kilmun Pier (67 in one haul), Kelburn Bank (Fairlie Roads), 12m, Fairlie Pier [RBP]; the Perch (Southannan Sands), M.L.W.S. [RE & LALK]; Largs Channel [AP]; Loch Fyne [FSG]; Arran [G & M]; common all around Cumbrae, especially in neighbourhood of brackish water, animals on shore tend to be smaller than those in sublittoral [JH].

Breeding: mature females, October and November; spawning, November to May; hatching, late March to late August; period of development 16–18 weeks in winter and 12–14 weeks in summer; zoeae, April to September. The largest females mature before smaller ones [RE]; larvae September [Jst]; copulation June to September, spawning November–May [JH].

Parasites: specimens from Row Bay and Gare Loch are heavily infested with *Sacculina carcini* Thompson [JRH]; *Sacculina* was present on 25% of specimens taken by RBP. About 10% infected by *S. carcini* in Balloch Bay (Cumbrae); cysts of the acanthocephalan *Polymorphus botulis* also fairly common [JH].

MACROPIPUS ARCUATUS (Leach) [Palmer, 1927, 884, as *Portunus*]

Scarce, on sand and gravel, M.L.W.S.–40 m.

Firth of Clyde [AMN]; off Cumbrae [DR]; Lamlash Bay [WAH]; off the Perch (Southannan Sands), 40 m (1), Carradale Bay (1), Tan Spit (Cumbrae), 15 m (1 ♂) [RBP]; Largs Channel [AP]; Kelburn Bank (Fairlie Roads), Fairlie, Balloch Bay (Cumbrae), shore–16 m [RE]; Farland Point (Cumbrae), 24 m [JRH].

Breeding: ovigerous females recorded in July [AP]. Larvae taken off Farland Point (Cumbrae) in August [RBP].

MACROPIPUS CORRUGATUS (Pennant) [Palmer, 1927, 881, as *Portunus*]

Rare, on stones and gravel, 15 m.

Tan Spit (Cumbrae), 15 m (2 ♂) [JRH, RBP]. One of those collected by RBP confirmed by Dr Isabella Gordon.

MACROPIPUS DEPURATOR (L.) [Palmer, 1927, 893, as *Portunus*]

Common, on sand, muddy sand and gravel, 6–125 m.

Loch Fyne, 10–60 m [B & S, SYM, FSG]; Craigmore (Bute) [JG]; Loch Goil, Gare Loch, 6–50 m, Dunoon Basin, 12–100 m, off Cumbrae, 120–125 m, Kilbrannan Sound, Tan Spit (Cumbrae), 14 m, Campbeltown Loch, 20–32 m [JC]; Largs Channel [AP]; Kelburn Bank (Fairlie Roads), 8–16 m (8) [RE, RBP]; Garroch Head, 78 m (1), Kyles of Bute, mouth of Loch Riddon, 14 m (2), Etterick Bay, 8–12 m (plentiful), Carradale Bay (1) [RBP]; Carradale Bay, 20–50 m, Machrie Bay, 14–40 m, Pirnmill, 50–60 m, off Ailsa Craig, 50–60 m [FSG].

Breeding: spawns from January to June, larvae hatch from April to August, the incubation period being about 12–16 weeks, two broods each year [RE]. Ovipigerous females taken in March, July and August [AP], July [JRH], January (newly laid eggs) [RBP]. Larvae taken off Farland Point (Cumbrae) from July to August [RBP].

MACROPIPUS HOLSATUS (Fabricius) [Palmer, 1927, 889, as *Portunus*]

Rare, on sand and gravel, 40–70 m.

Off Castle (Little Cumbrae), 40 m [RBP]; Pladda, 60–70 m [JC]. In 1936 a seine net haul in Kames Bay (Cumbrae) could produce 12 or more, but 20 years previously very rare [RE].

MACROPIPUS MARMOREUS (Leach) [Palmer, 1927, 888, as *Portunus*]

Scarce, muddy sand, 14–40 m.

Taken with *M. depurator* [JRH]; Loch Fyne [B & S]; Dunoon Basin, 14–40 m [JC].

MACROPIPUS PUBER (L.) [Palmer, 1927, 882, as *Portunus*]

Fairly common, on sand, gravel, stones and rock, E.L.W.S.–80 m.

Loch Fyne, E.L.W.S.–30 m [B & S, SYM, JRH, FSG]; Cumbrae [AMN, DR, JRH]; off Barmore Island (Loch Fyne) [TS]; Loch Ranza, 15–17 m (plentiful), S. of Skipness, 50 m (few) [RBP]; Largs Channel, 60–80 m (1) [AP]; Arran [DL].

Breeding: ovipigerous females recorded from April to September [RE, JRH]; larvae hatch from May to August (data scanty) [RE]. Larvae taken off Farland Point (Cumbrae) from June to October [RBP].

MACROPIPUS PUSILLUS (Leach) [Palmer, 1927, 885, as *Portunus*]

Common, on sand, muddy sand, gravel and stones, 10–100 m.

Loch Fyne, 10 m [B & S, SYM]; throughout the area as far north as Gare Loch, 10–80 m [JRH]; Greenock [TS]; Loch Goil, Gare Loch, Dunoon Basin, 14–100 m, Saddell, 95 m, Otterard–Carradale, 36–40 m, Campbeltown Loch, 14–32 m [JC]; Largs Channel [AP]; Inchmarnock–Bute (1), off Castle (Little Cumbrae) (1 ♂, 2 ♀), Little Cumbrae light, 25 m (1 ♂, 2 ♀), Portencross (1 ovipigerous ♀), Lion Rock (Cumbrae), 23 m (1 ♂), Fintray Bay (Cumbrae), 18–20 m (2 ♂, 10 ♀), Kilbrannan Sound, 40–45 m (2), Etterick Bay, 10–15 m, Sanda Island (3) [RBP].

Breeding: ovipigerous females taken in July [AP]; March and May [RBP].

Family **Pirimelidae**

- PIRIMELA DENTICULATA* (Montagu) [Bouvier, 1940, 225]
 Rare, from clean, rather coarse sand.
 Off Brigurd Spit (Hunterston), 3–10 m (1 ♂, 1 ♀), 1965 [CE].

Family **Atelecyclidae**

- ATELECYCLUS ROTUNDATUS* (Olivi) [Forest, 1957, 469]
 Scarce, from muddy sand, sand and shell gravel.
 Alland Bank (Millport Bay) (1) [DR]; occasionally in stomach contents of cod [RE, AP]; off Lion Rock (Cumbrae) by Mr Grey, Etterick Bay (Bute) (2), S. of Pladda, 50 m (1) [AP]; Hunterston Sands (1 ♂), off Garroch Head (1 immature ♂, 2 immature ♀), off Little Cumbrae light, 100 m (2 ♂), N. of Sanda Island, 40 m [RBP].

Family **Canceridae**

- CANCER PAGURUS* L. [Bell, 1853, 59]
 Common, under rock and stones at M.L.W.S. and sublittorally on rock, stones and sandy mud, M.L.W.S.–60 m.
 On rocky shores throughout area [B & S, RE, JRH]; Ascog (Bute), 20 m [LPWR]; Dunoon Basin, 16–32 m, Otterard–Carradale, 30 m [JC]; Fairlie Roads, off East Loch Tarbert, 30–40 m [RBP]; Kilchattan Bay, 20 m [JAA]; Kilbrannan Sound, 20–60 m, Whiting Bay, 18–30 m, Loch Fyne [FSG]; Largs Channel [AP]; Arran [G & M].
 Breeding: fully ripe females, November; spawning, December to February; hatching, July to September; period of development, 7–8 months; zoea stages, July to October; moulting, June to October [RE]; freshly laid eggs, 18 November 1948 [RBP]; ovigerous females in July and August [AP].

Family **Xanthidae**

- PILUMNUS HIRTELLUS* (L.) [Bouvier, 1940, 255]
 In some years common, under stones in *Laminaria* zone, M.L.W.S.
 Farland Point (Cumbrae), M.L.W.S. (2) [DR]; Lion Rock (Cumbrae), M.L.W.S. (1 ♂ in 1949; plentiful, ca 100, in 1950; 1954 and 1960) [RBP].
- MEDAEUS COUCHI* (Bell) [Bouvier, 1940, 267, as *Xantho*]
 Scarce, on sand, sandy mud and gravel, 30–104 m.
 Off Farland Point (Cumbrae), 40 m [AP]; Cumbrae Basin, 60–104 m (2), Garroch Head, 60–80 m (5), off Little Cumbrae light, 100 m (9 ♂, 1 ♀), off Portencross (1), 2 miles N.E. of Sanda Island, 46 m (2 ♂, 1 ♀), off Farland Point (Cumbrae) (6 ♂, 10 ♀), Fairlie Channel, 30 m (1 ♀) [RBP]. Food of cod [RE].
 Breeding: ovigerous females taken in April and May [RBP].

- XANTHO PILIPES* A. Milne-Edwards [Drach & Forest, 1953, 16]
 Rare.
 One taken at mouth of Firth [FSG].

Family **Goneplacidae**

GONEPLAX RHOMBOIDES (L.) [Bouvier, 1940, 278, as *G. angulata*]

Scarce, on muddy sand, 8–80 m.

Off Ayrshire coast [G & M]; Ardeer, on shore [JSm]; off Ailsa Craig, 50–60 m [FSG, TS]; S.E. of Mull of Kintyre (1 ♀) [TS]; occasionally in stomachs of cod [RE]; Arran, Ayrshire coast [DL]; off Largs, 80 m (several), Etterick Bay (Bute), Inchmarnock, the Plateau [AP]; Kilchattan Bay, 40 m (1 ♂), Cumbræ Basin, 30 m (2 ♂), Largs Channel, 30–45 m (5 ♂), Kames Bay, washed ashore (1 ♂), Lion Rock (Cumbræ), washed ashore after storm (1 ♂, 2 ♀), off Fairlie, 8–10 m (2 ♂) [RBP].

Family **Pinnotheridae**

PINNOTHERES PISUM (Pennant) [Bouvier, 1940, 301]

Fairly common, in *Modiolus modiolus* and occasionally in *Cardium edule*.

In *Modiolus modiolus* and *Cardium edule* [JRH]; in *Modiolus* from the beds between Inchmarnock and Bute [JAA]; Largs Channel [AP]; Arran [DL].

Breeding: eggs are laid in April and May and larvae hatch in March [RE]. Ovigerous females in June [AP]. Larvae taken off Farland Point (Cumbræ) in September and October [RBP].

A CLASSIFIED LIST OF
THE BRITISH SPECIES OF EUCARIDA

(Asterisks denote species recorded from the Clyde Sea Area)

Subclass **EUCARIDA**

Order EUPHAUSIACEA

Family EUPHAUSIIDAE

Genus *Euphausia* Dana

Euphausia krohni (Brandt)

Genus *Thysanopoda* H. Milne-Edwards

Thysanopoda acutifrons Holt &
Tattersall

Thysanopoda microphthalmalpa G. O.
Sars

Genus *Nyctiphanes* G. O. Sars

**Nyctiphanes couchi* (Bell)

Genus *Meganyctiphanes* Holt &
Tattersall

**Meganyctiphanes norvegica* (M. Sars)

Genus *Thysanoessa* Brandt

**Thysanoessa inermis* (Krøyer)

Thysanoessa gregaria G. O. Sars

Thysanoessa longicaudata (Krøyer)

**Thysanoessa raschi* (M. Sars)

Genus *Stylocheiron* G. O. Sars

Stylocheiron longicorne G. O. Sars

Stylocheiron maximum Hansen

Genus *Nematoscelis* G. O. Sars

Nematoscelis megalops G. O. Sars

Order DECAPODA

Suborder NATANTIA

Section CARIDEA

Superfamily OPLOPHOROIDEA

Family OPLOPHORIDAE

Genus *Acanthephyra* A. Milne-
Edwards

Acanthephyra haeckeli (von
Martens)

Acanthephyra purpurea A. Milne-
Edwards

Genus *Ephyrina* Smith

Ephyrina benedicti Smith

Ephyrina bifida Stephenson

Ephyrina hoskyni Wood Mason

Genus *Hymenodora* G. O. Sars

Hymenodora glacialis (Buchholz)

Genus *Systellaspis* Bate

Systellaspis braueri (Balss)

Systellaspis debilis (A. Milne-
Edwards)

Family NEMATOCARCINIDAE

Genus *Nematocarcinus* A. Milne-
Edwards

Nematocarcinus ensifer (Smith)

Family ATYIDAE

Genus *Atyaephyra* de Brito Capello

Atyaephyra desmaresti (Millet)

Superfamily PASIPHAEOIDEA

Family PASIPHAEIDAE

Genus *Pasiphaea* Savigny

Pasiphaea multidentata Esmark

**Pasiphaea sivado* (Risso)

Pasiphaea tarda Krøyer

Genus *Parapasiphae* Smith

Parapasiphae sulcatifrons Smith

Superfamily BRESILIOIDEA

Family BRESILIIDAE

Genus *Bresilia* Calman

Bresilia atlantica Calman

Superfamily PALAEMONOIDEA

Family PALAEMONIDAE

- Genus *Leander* Desmarest
Leander tenuicornis (Say)
- Genus *Palaemon* Weber
Palaemon adpersus (Rathke)
 **Palaemon elegans* Rathke
Palaemon longirostris H. Milne-Edwards
 **Palaemon serratus* (Pennant)
- Genus *Palaemonetes* Heller
 **Palaemonetes varians* (Leach)
- Genus *Typton* da Costa
Typton spongicola da Costa

Superfamily ALPHEOIDEA

Family ALPHEIDAE

- Genus *Athanas* Leach
 **Athanas nitescens* (Montagu)
- Genus *Alpheus* Fabricius
 **Alpheus glaber* (Oliv)
Alpheus macrocheles (Hailstone)

Family HIPPOLYTIDAE

- Genus *Caridion* Goës
 **Caridion gordonii* (Bate)
 **Caridion steveni* Lebour
- Genus *Leontocaris* Stebbing
Leontocaris lar Kemp
- Genus *Eualus* Thallwitz
 **Eualus gaimardi* (H. Milne-Edwards)
 **Eualus occultus* (Lebour)
 **Eualus pusiolus* (Krøyer)
- Genus *Spirontocaris* Bate
 **Spirontocaris lilljeborgi* (Danielssen)
Spirontocaris phippii (Krøyer)
 **Spirontocaris spinus* (Sowerby)
- Genus *Lebbeus* White
Lebbeus polaris (Sabine)
- Genus *Hippolyte* Leach
Hippolyte huntii (Gosse)
 **Hippolyte prideauxiana* Leach
 **Hippolyte varians* Leach
- Genus *Cryptocheles* G. O. Sars
Cryptocheles pygmaea G. O. Sars

- Genus *Thorulus* Holthuis
 **Thorulus cranchii* (Leach)
- Genus *Bythocaris* G. O. Sars
Bythocaris gracilis Smith
Bythocaris payeri (Heller)
Bythocaris simplicirostris G. O. Sars
- Genus *Lysmata* Risso
Lysmata seticaudata Risso

Family PROCESSIDAE

- Genus *Processa* Leach
 **Processa canaliculata* Leach
 **Processa edulis* (Risso)
Processa parva Holthuis

Superfamily PANDALOIDEA

Family PANDALIDAE

- Genus *Plesionika* Bate
Plesionika martia (A. Milne-Edwards)
- Genus *Dichelopandalus* Caullery
 **Dichelopandalus bonnierii* Caullery
- Genus *Pandalina* Calman
 **Pandalina brevisrostris* (Rathke)
- Genus *Pandalus* Leach
Pandalus borealis Krøyer
 **Pandalus montagui* Leach
 **Pandalus propinquus* G. O. Sars

Superfamily CRANGONOIDEA

Family CRANGONIDAE

- Genus *Sabinea* Ross
Sabinea sarsi Smith
Sabinea septemcarinata (Sabine)
- Genus *Crangon* Fabricius
 **Crangon allmani* Kinahan
 **Crangon crangon* (L.)
- Genus *Sclerocrangon* G. O. Sars
Sclerocrangon boreas (Phipps)
Sclerocrangon jacqueti (A. Milne-Edwards)
- Genus *Pontophilus* Leach
Pontophilus norvegicus (M. Sars)
 **Pontophilus spinosus* (Leach)

Genus *Philocheras* Leach**Philocheras bispinosus bispinosus*
(Hailstone & Westwood)**Philocheras bispinosus neglectus*
(G. O. Sars)**Philocheras echinulatus* (M. Sars)**Philocheras fasciatus* (Risso)**Philocheras sculptus* (Bell)**Philocheras trispinosus* (Hailstone)Genus *Pontocaris* Bate*Pontocaris lacazei* (Gourret)

Section STENOPODIDEA

Family STENOPODIDAE

Genus *Richardina* A. Milne-Edwards*Richardina spinicincta* A. Milne-
Edwards

Section PENAEIDEA

Family PENAEIDAE

Genus *Gennadas* Bate*Gennadas elegans* Smith*Gennadas valens* (Smith)Genus *Solenocera* Lucas*Solenocera siphonocera* (Phillipi)Genus *Penaeus* Fabricius*Penaeus trisulcatus* LeachGenus *Funchalia* Johnson*Funchalia woodwardi* Johnson

Family SERGESTIDAE

Genus *Sergestes* A. Milne-Edwards*Sergestes arcticus* Smith*Sergestes mollis* Smith*Sergestes robustus* Krøyer

Suborder REPTANTIA

Section MACRURA

Superfamily NEPHROPSOIDEA

Family NEPHROPSIDAE

Genus *Nephropsis* Wood-Mason*Nephropsis atlantica* NormanGenus *Nephrops* Leach**Nephrops norvegicus* (L.)Genus *Homarus* H. Milne-Edwards**Homarus gammarus* (L.)

Family ASTACIDAE

Genus *Astacus* L.*Astacus pallipes* Lereboullet

Superfamily ERYONOIDEA

Family ERYONIDAE

Genus *Polycheles* Heller*Polycheles granulatus* Faxon*Polycheles nanus* (Smith)*Polycheles sculptus* (Smith)*Polycheles typhlops* Heller

Superfamily SCYLLAROIDEA

Family PALINURIDAE

Genus *Palinurus* Fabricius**Palinurus elephas* Fabricius*Palinurus mauritanicus* Gruvel

Family SCYLLARIDAE

Genus *Scyllarus* Fabricius*Scyllarus arctus* (L.)

Superfamily THALASSINOIDEA

Family AXIIDAE

Genus *Axius* Leach**Axius stirhynchus* LeachGenus *Calocaris* Bell**Calocaris macandreae* BellGenus *Calocarides* Wollebaek*Calocarides coronatus* (Trybom)

Family LAOMEDIIDAE

Genus *Faxea* Nardo**Faxea nocturna* (Chiereghin)

Family CALLIANASSIDAE

Genus *Callianassa* Leach*Callianassa laticauda* Otto**Callianassa subterranea* (Montagu)Genus *Upogebia* Leach*Upogebia deltaura* Leach*Upogebia littoralis* (Risso)**Upogebia stellata* (Montagu)

Section ANOMURA

Superfamily GALATHEOIDEA

Family UROPTYCHIDAE

Genus *Uroptychus* A. Milne-Edwards*Uroptychus nitidus concolor* (Milne-Edwards & Bouvier)*Uroptychus rubrovittatus* (A. Milne-Edwards)Genus *Chirostylus* Ortmann*Chirostylus formosus* A. Milne-Edwards

Family GALATHEIDAE

Genus *Munida* Leach**Munida bamffica* (Pennant)Genus *Munidopsis* Whiteaves*Munidopsis crassa* Smith*Munidopsis curvirostra* Whiteaves*Munidopsis tridentata* (Esmark)Genus *Galathea* Fabricius**Galathea dispersa* Bate**Galathea intermedia* Lilljeborg**Galathea nexa* Embleton**Galathea squamifera* Leach**Galathea strigosa* (L.)

Family PORCELLANIDAE

Genus *Porcellana* Lamarck**Porcellana longicornis* (L.)**Porcellana platycheles* (Pennant)

Superfamily PAGUROIDEA

Family LITHODIDAE

Genus *Lithodes* Latreille**Lithodes maja* (L.)Genus *Neolithodes* (Milne-Edwards & Bouvier)*Neolithodes grimaldi* (Milne-Edwards & Bouvier)

Family PAGURIDAE

Genus *Diogenes* Dana*Diogenes pugilator* (Roux)Genus *Parapagurus* Smith*Parapagurus pilosimanus* SmithGenus *Pagurus* Fabricius**Pagurus bernhardus* (L.)*Pagurus carneus* Pocock**Pagurus cuanensis* (Thompson)**Pagurus prideauxi* (Leach)**Pagurus pubescens* (Krøyer)**Pagurus sculptimanus* Lucas*Pagurus variabilis* Milne-Edwards & BouvierGenus *Catapaguroides* Milne-Edwards & Bouvier**Catapaguroides timidus* (Roux)Genus *Clibanarius* Dana*Clibanarius erythropus* (Latreille)Genus *Nematopagurus* Milne-Edwards & Bouvier*Nematopagurus longicornis* Milne-Edwards & BouvierGenus *Anapagurus* Henderson**Anapagurus chiroacanthus**chiroacanthus* (Lilljeborg)*Anapagurus chiroacanthus gracilis* Fenizia**Anapagurus hyndmanni* (Bell)**Anapagurus laevis* (Bell)

Section BRACHYURA

Subsection DROMIACEA

Superfamily DROMIOIDEA

Family DROMIIDAE

Genus *Dromia* Fabricius*Dromia vulgaris* H. Milne-Edwards

Superfamily THELXIOPEOIDEA

Family HOMOLIDAE

Genus *Paromola* Wood-Mason*Paromola cuvieri* (Risso)

Subsection OXYSTOMATA

Family LEUCOSIIDAE

Genus *Ebalia* Leach**Ebalia cranchi* Leach**Ebalia granulosa* H. Milne-Edwards*Ebalia nux* Norman**Ebalia tuberosa* (Pennant)**Ebalia tumefacta* (Montagu)

Subsection BRACHYGNATHA

Superfamily OXYRHYNCHA

Family PARTHENOPIDAE

Genus *Lambrus* Leach*Lambrus massena* Roux

Family MAJIDAE

Genus *Maja* Lamarck**Maja squinado* (Herbst)Genus *Pisa* Leach*Pisa gibbsi* Leach*Pisa tetraodon* (Pennant)Genus *Hyas* Leach**Hyas araneus* (L.)**Hyas coarctatus* LeachGenus *Eurynome* Leach**Eurynome aspera* (Pennant)Genus *Rochinia* A. Milne-Edwards*Rochinia carpenteri* (Thomson)Genus *Chionoecetes* Krøyer*Chionoecetes opilio* (Fabricius)Genus *Dorhynchus* Norman*Dorhynchus thompsoni* NormanGenus *Inachus* Fabricius**Inachus dorsettensis* (Pennant)**Inachus dorynchus* Leach**Inachus leptochirus* LeachGenus *Achaeus* Leach**Achaeus cranchi* LeachGenus *Macropodia* Leach*Macropodia egyptia* (H. Milne-Edwards)**Macropodia longirostris* (Fabricius)**Macropodia rostrata* (L.)

Superfamily BRACHYRHYNCHA

Family CORYSTIDAE

Genus *Corystes* Latreille**Corystes cassivelaunus* (Pennant)

Family PORTUNIDAE

Genus *Portumnus* Leach*Portumnus biguttatus* Risso**Portumnus latipes* (Pennant)Genus *Carcinus* Leach**Carcinus maenas* (L.)Genus *Macropipus* Prestandrea**Macropipus arcuatus* (Leach)**Macropipus corrugatus* (Pennant)**Macropipus depurator* (L.)**Macropipus holsatus* (Fabricius)**Macropipus marmoreus* (Leach)**Macropipus puber* (L.)**Macropipus pusillus* (Leach)*Macropipus tuberculatus* (Roux)Genus *Polybius* Leach*Polybius henslowi* LeachGenus *Bathynectes* Stimpson*Bathynectes longipes* (Risso)*Bathynectes superba* (da Costa)

Family PIRIMELIDAE

Genus *Pirimela* Leach**Pirimela denticulata* (Montagu)

Family ATELECYCLIDAE

Genus *Atelecyclus* Leach**Atelecyclus rotundatus* (Olivi) (= *A. septemdentatus* (Montagu))*Atelecyclus undecimdentatus* (Herbst)(= *A. cruentatus* Desmarest and*A. rotundatus* Risso)Genus *Thia* Leach*Thia polita* Leach

Family CANCRIDAE

Genus *Cancer* L.*Cancer bellianus* Johnson**Cancer pagurus* L.

Family GERYONIDAE

Genus *Geryon* Krøyer*Geryon tridens* Krøyer

Family XANTHIDAE

Genus *Pilumnus* Leach**Pilumnus hirtellus* (L.)Genus *Pilumnoides* Milne-Edwards & Lucas*Pilumnoides perlatus* (Poëppig)Genus *Rithropanopeus* Rathbun*Rithropanopeus harrisi tridentatus* (Maitland)

Genus *Neopanope* A. Milne-Edwards

Neopanope texana sayi (Smith)

Genus *Medaeus* Dana

**Medaeus couchi* (Bell)

Genus *Xantho* Leach

Xantho floridus (Montagu)

**Xantho pilipes* A. Milne-Edwards

Pachygrapsus marmoratus

(Fabricius)

Genus *Planes* Bowdich

Planes minutus (L.)

Genus *Brachynotus* de Haan

Brachynotus sexdentatus Risso

Genus *Eriocheir* de Haan

Eriocheir sinensis H. Milne-

Edwards

Family GONEPLACIDAE

Genus *Goneplax* Leach

**Goneplax rhomboides* (L.)

Family GRAPSIDAE

Genus *Pachygrapsus* Randall

Family PINNOTHERIDAE

Genus *Pinnotheres* Latreille

Pinnotheres pinnotheres (L.)

**Pinnotheres pisum* (Pennant)

KEY TO THE BRITISH SPECIES OF EUCARIDA

For convenience the key is arranged as far as possible in classificatory order. The major families and sections are arranged under their various names, so that it is possible to take short cuts when identifying species known to belong to a particular group. The terms used in the key are defined by the figures A–K (pp. 38–40) and the index of terms on pp. 41–42.

The main authorities consulted in the preparation of the key and the illustrations which follow it are as follows: Balss (1926, 1957–61), Barnard (1950), Bouvier (1940), Bull (1937), Chace (1940), Einarsson (1945), Forest (1957), Gordon and Ingle (1956), Hansen (1908, 1922), Hartnoll (1963), Holthuis (1950, 1955), Kemp (1910), Lebour (1930, 1936a, b), Monod (1956), Nouvel and Holthuis (1957), Palmer (1927), Perkins (1928), Pike and Williamson (1959), Rathbun (1918, 1929, 1930), Sars (1912), Schmitt (1921), Selbie (1914, 1921), Sivertsen and Holthuis (1956), Smith (1879), Sund (1920), Trybom (1904), Wollebaek (1908). These references are included in the bibliography (pp. 107–113).

FIGURES ILLUSTRATING TERMS USED IN THE KEY

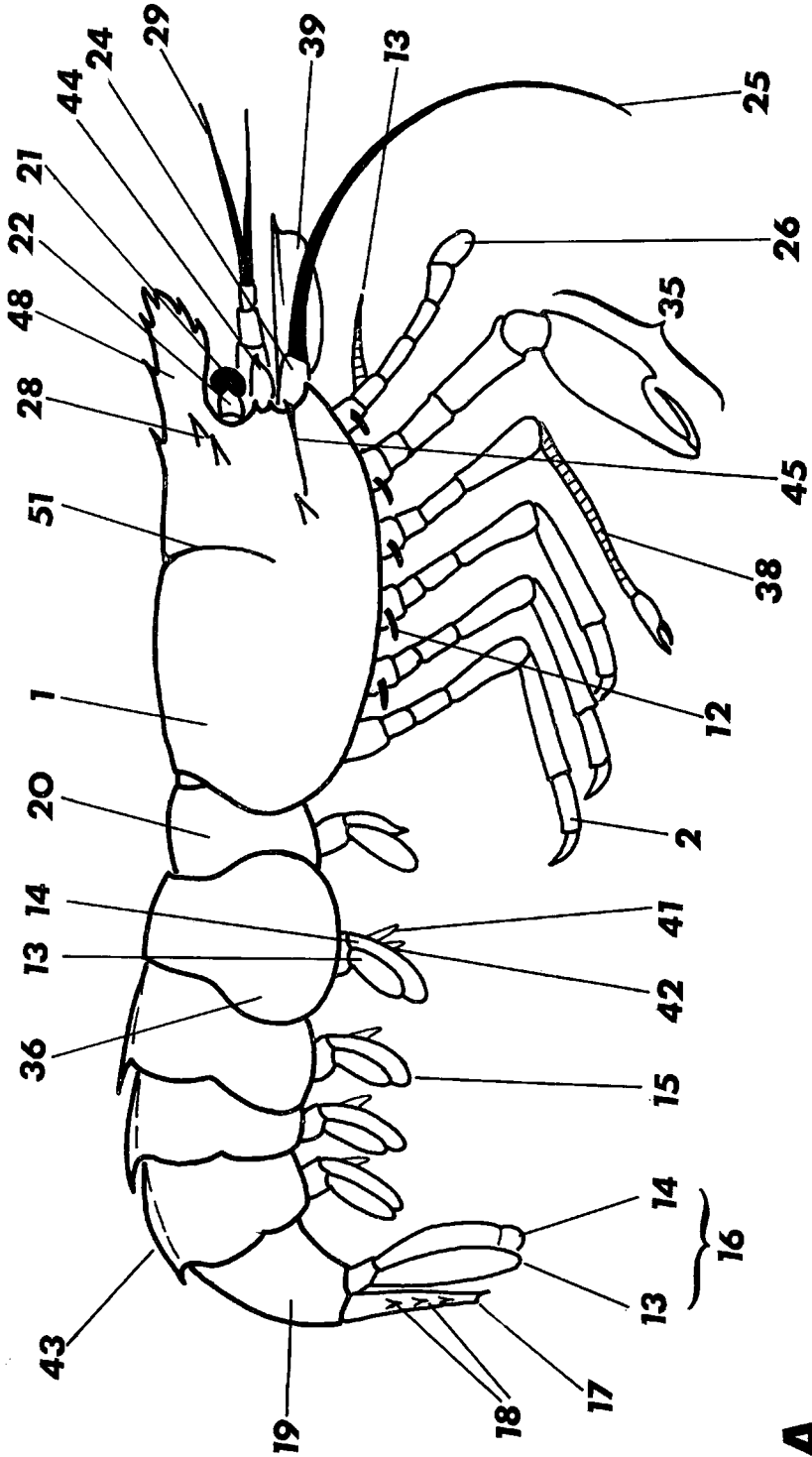
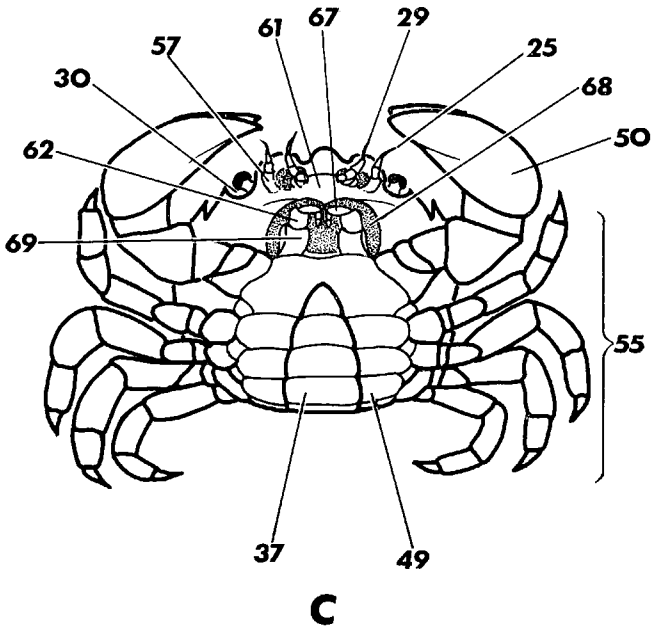
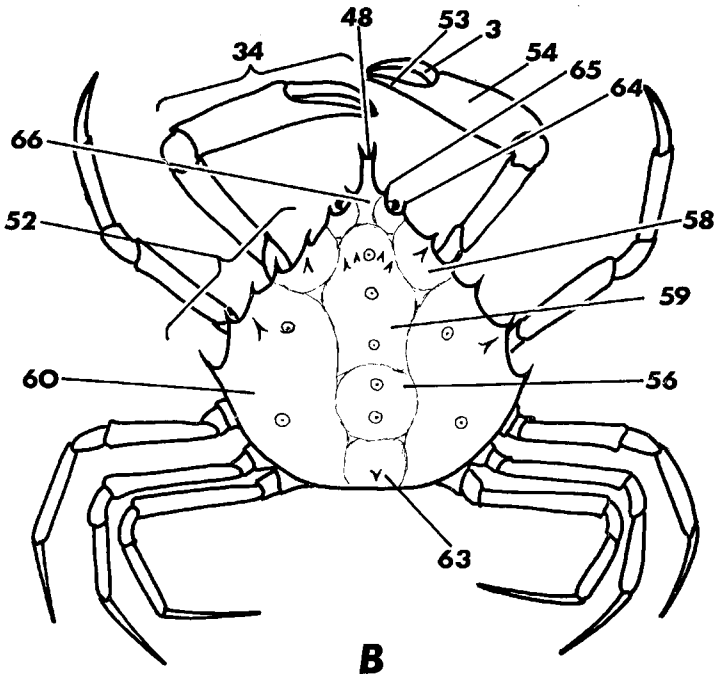
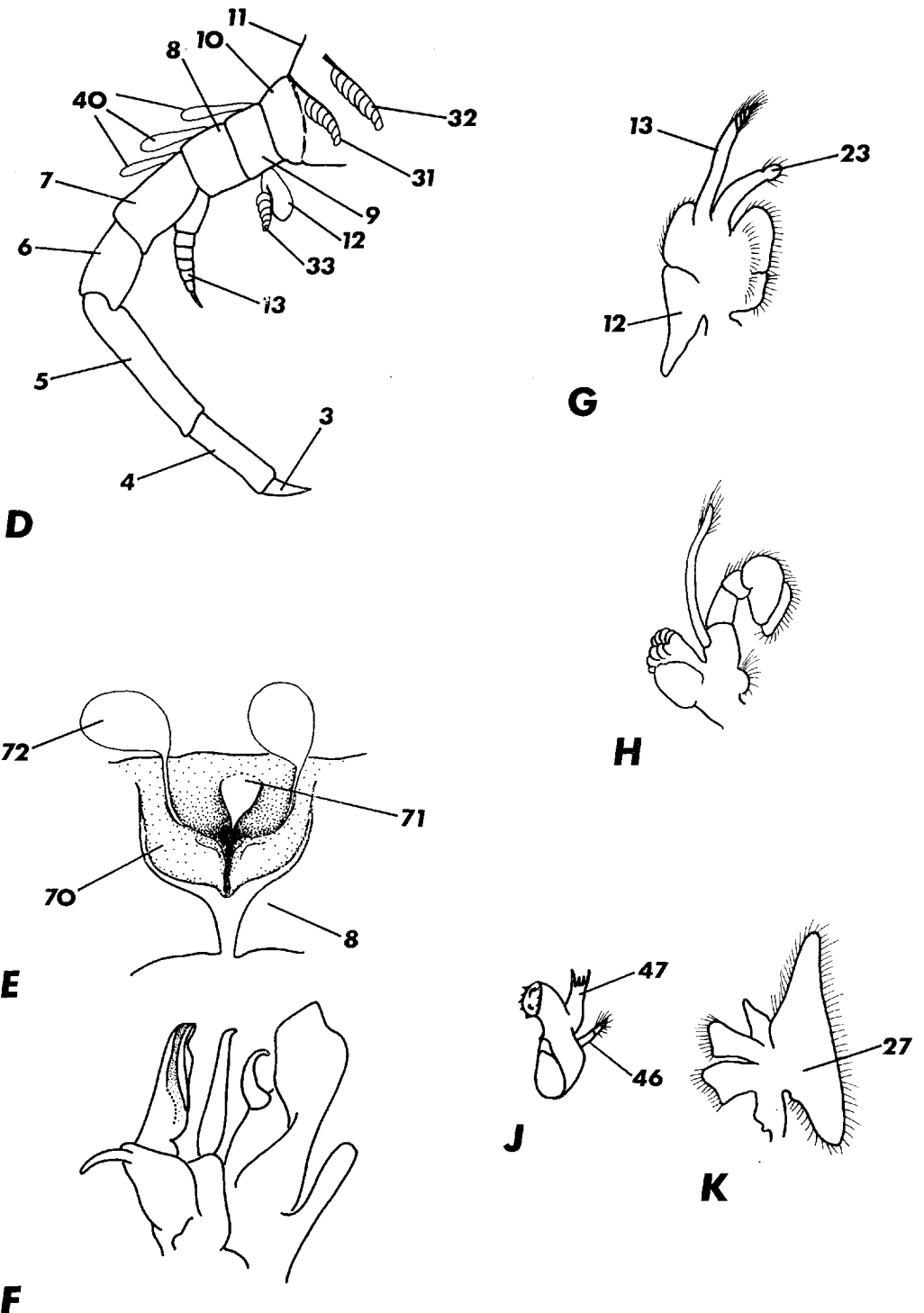


Fig. A. Generalized lateral view of a natant decapod to illustrate terms used in key

A



Figs. B and C. Generalized dorsal (B) and ventral (C) views of brachyuran decapods to illustrate terms used in key.



Figs. D-K. Generalized figures of eucaridan appendages to illustrate terms used in key: D, thoracic limb; E, thelycum, the female copulatory organ of euphausiids and penaeids; F, petasma, male copulatory organ of euphausiids and penaeids; G, first maxilliped; H, second maxilliped; J, mandible; K, maxilla.

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9 Coxopodite .. 40	28 Ocular spines .. 38	53 Thumb 39
3 Dactylopodite .. 39, 40	30 Orbit 39	64, 65 Tooth 39
— Dendrobranchia— branched filaments	54 Palm 39	— Trichobranchia— finger-like filaments
	— Petasma 40	16 Uropod 38
	2, 50, 55 Pereiopod .. 38, 39	— Vas deferens, see 5th coxae p. 92
		55 Walking legs .. 39

KEY

EUCARIDA. Carapace fused with all thoracic segments; mandible without lacinia mobilis in adult; thoracic legs flexed between carpopodite and meropodite; eyes always stalked; 2-segmented antennal peduncle; no oostegites; usually development includes a metamorphosis.

- | | |
|---|-------------------------|
| 1. First three pairs of thoracic limbs not modified as maxillipeds; exopodite of maxilla small | <i>(Euphausiacea)</i> 2 |
| — First three pairs of thoracic limbs modified as maxillipeds; exopodite of maxilla large, forming a scaphognathite | <i>(Decapoda)</i> 12 |

*EUPHAUSIACEA**

- | | |
|---|---|
| 2. Lateral denticles on the carapace | 3 |
| — No lateral denticles on the carapace | 6 |
| 3. One pair of lateral denticles on the carapace | 4 |
| — Two pairs of lateral denticles on the carapace | <i>Euphausia krohni</i> (p. 73) |
| 4. Eyes circular or subcircular; none of the thoracic limbs elongate | 5 |
| — Eyes divided; second pair of thoracic limbs elongate | <i>Thysanoessa gregaria</i> (p. 73) |
| 5. Anterior margin of the carapace with post-ocular spines; a reflected leaflet on the first segment of the antennule | <i>Meganctiphanes norvegica</i> (p. 72) |
| — No post-ocular spines and no reflected leaflet on the antennule | <i>Thysanoessa raschi</i> (p. 73) |
| 6. A dorsal spine on the last abdominal segment | 7 |
| — No dorsal spine on the last abdominal segment | 8 |
| 7. A reflected leaflet on the first segment of the antennule | <i>Nyctiphanes couchi</i> (p. 72) |
| — No reflected leaflet; great sexual dimorphism in the armature of the antennule | <i>Thysanoessa inermis</i> (p. 73) |

* See Einarsson (1945) for a key that includes oceanic species occurring off the continental shelf to the west and south-west of the British Isles some of which species may be expected occasionally in coastal waters.

8. Eyes small, almost circular, undivided 9
 — Eyes large, divided 10
9. Terminal process of the petasma only half the length of the proximal process, spoon-shaped and tapering towards the end; sternal plate of the thelycum with three rounded ridges *Thysanopoda acutifrons* (p. 72)
 — Terminal process of the petasma approximately the same length as the proximal process, increasing in breadth towards the end with a transverse row of terminal saw teeth; sternal plate forms a horse-shoe shaped ridge *Thysanopoda microphthalma* (p. 72)
10. Luminous globules on the four foremost abdominal segments 11
 — Luminous globule on the foremost abdominal segment only; elongate legs with false chelae, eyes twice as high as they are broad *Stylocheiron longicorne* (p. 72)
 — Luminous globule on the foremost abdominal segment only; elongate legs terminating in real chelae, eyes not twice as high as broad *Stylocheiron maximum* (p. 72)
11. Upper portion of the eyes narrower than the lower part; last abdominal segment equal to or slightly shorter than the two preceding put together *Thysanoessa longicaudata* (p. 73)
 — The two portions of the eyes about the same breadth *Nematoscelis megalops* (p. 73)

DECAPODA

12. Body usually laterally compressed; pleopods natatory; pereopods with the basipodite and ischiopodite free, one fixed point in the carpo-propodal articulation (Natantia) 13
 — Body usually depressed; pleopods never natatory; the anterior pereopods at least with the basipodite and ischiopodite fused, two fixed points in the carpo-propodal articulation (Reptantia) 90

NATANTIA

13. Pleura of the second abdominal somite overlapping those of the first and third; no chelae on the third pereopods; gills phyllobranchiate (Caridea) 15
 — Pleura of the second abdominal somite not overlapping those of the first; third pereopod with a chela 14
14. Third pereopod much stronger than those preceding; males without a petasma; gills trichobranchiate (Stenopodidea) 82

- Third pereopod never stronger than those preceding, usually all chelipeds are of equal strength; males with a petasma, gills dendrobranchiate
(Penaeidea) 83

CARIDEA

15. First pair of pereopods chelate or simple 16
- First pair of pereopods subchelate, carpopodite of second pair of pereopods not subdivided (Crangonidae) 68
16. Fingers of all four chelae slender with pectinate cutting edges (Pasiphaeidae) 33
- Cutting edges of the fingers of the chelae not all pectinate 17
17. Carpopodite of second pair of pereopods not subdivided, first pair of pereopods with well developed chelae 18
- Carpopodite of second pair of pereopods usually subdivided into two or more segments, but if not, the first pair of pereopods are not chelate 23
18. First pair of pereopods stronger and heavier, though often shorter, than the second pair 19
- First pair of pereopods usually more slender than, rarely subequal to, the second pair 20
19. Ends of fingers of first two pairs of pereopods dark coloured; last joint of the second maxilliped applied as a strip along the side of the penultimate segment; exopodite of the first maxilliped with a distinct flagellum (Palaemonidae) 36
- Ends of fingers of first two pairs of pereopods not dark; last joint of the second maxilliped at the end of the penultimate segment (Bresiliidae) *Bresilia atlantica* (p. 74)
20. Pereopods usually with exopodites, if not, fingers of chelae with terminal brush of long hairs 21
- Pereopods without exopodites, chelae without terminal brushes of long hairs (Palaemonidae) 36
21. Mandible without palp; fingers of chelae with conspicuous terminal brushes, last three pairs of pereopods not conspicuously lengthened (Atyidae) *Atyaephyra desmaresti* (p. 74)
- Mandible with palp; fingers of chelae without terminal brushes, pereopods with exopodites 22
22. Last three pairs of pereopods not conspicuously lengthened, carpopodite of these legs distinctly shorter than propopodite (Oplophoridae) 26

- Last three pairs of pereopods enormously lengthened, carpopodite of these legs several times longer than propodite
(Nematocarcinidae) *Nematocarcinus ensifer* (p. 74)
- 23. Chela of first pair of pereopods distinct, at least on one side 24
- Chela of first pair of pereopods microscopically small or absent
(Pandalidae) 63
- 24. First pair of pereopods both chelate 25
- Only one of the first pair of pereopods chelate, the other ending in a simple curved dactylopodite
(Processidae) 61
- 25. Ends of the fingers of the first pair of chelae usually dark coloured, first pair of chelipeds short, rather heavy, but not swollen; eyes free, not covered by carapace
(Hippolytidae) 44
- Ends of fingers of first chelae not dark coloured; eyes partly or wholly covered by the carapace; first pereopods distinctly stronger than the second, swollen and often unequal
(Alpheidae) 42

Oplophoridae

- 26. Last four abdominal somites, at least, carinate along mid dorsal line 29
- Sixth abdominal somite without a dorsal carina 27
- 27. Ischiopodite and meropodite of pereopods very broad and much compressed laterally 30
- Pereopods normal 28
- 28. Eyes very small and poorly pigmented; anterior margin of the first abdominal somite entire, not toothed; telson terminating in a truncate, spinose tip
Hymenodora glacialis (p. 74)
- Eyes very large and well pigmented; anterior margin of the first abdominal somite armed with a distinct lobe or tooth overlapping the hind margin of the carapace, telson with a sharp pointed end piece and laterally armed with spines 32
- 29. No posterior spine on the fourth abdominal somite; telson armed with 2-7 pairs of lateral spines
Acanthephyra purpurea (p. 74)
- A posterior spine on the fourth abdominal somite, telson armed with 7-12 pairs of lateral spines
Acanthephyra haeckeli (p. 74)
- 30. A posterior tooth or spine on the third abdominal somite 31
- No posterior tooth or spine on the third abdominal somite; 10-13 pairs of lateral spines on the telson
Ephyrina hoskyni (p. 75)

31. Posterior tooth on the third abdominal somite triangular; 20–25 pairs of lateral spines on the telson *Ephyrina benedicti* (p. 75)
 — Posterior tooth on third abdominal somite broad and bifid at the end; 5–8 pairs of lateral spines on the telson *Ephyrina bifida* (p. 75)
32. Rostrum triangular and less than half the length of the carapace; hind margins of the fourth and fifth abdominal somites not denticulate, sixth somite at least twice as long as the fifth *Systellaspis braueri* (p. 75)
 — Rostrum slender and longer than the carapace; hind margins of the fourth and fifth abdominal somites denticulate, sixth somite less than twice as long as the fifth *Systellaspis debilis* (p. 75)

Pasiphaeidae

33. Mandible without palp; rostrum formed by an erect postfrontal spine 34
 — Mandible with palp; rostrum a normal forward directed prolongation of the carapace *Parapasiphae sulcatifrons* (p. 85)
34. Telson forked 35
 — Telson not forked, truncate *Pasiphaea sivado* (p. 85)
35. 7–12 spines on the basipodite of the second pereopod
Pasiphaea multidentata (p. 85)
 — 1–5 spines on the basipodite of the second pereopod *Pasiphaea tarda* (p. 85)

Palaemonidae

36. Rostrum very short, unarmed; antennules biramous; second pair of pereopods asymmetrical; mandibular palp absent; scaphocerite rudimentary; lives in sponges *Typton spongicola* (p. 76)
 — Rostrum well developed with teeth above and below; antennules triramous; second pair of pereopods symmetrical 37
37. Mandible without a palp *Palaemonetes varians* (p. 76)
 — Mandible with a palp 38
38. First pleopod of the male with a well developed appendix interna on the endopodite; branchiostegal groove absent; propopodite of the fifth pereopod without transverse rows of setae on the distal part of the posterior margin; the two median setae of the posterior margin of the telson very stout *Leander tenuicornis* (p. 76)
 — First pleopod of the male without or with a rudimentary appendix interna on the endopodite; branchiostegal groove generally present and visible as a sharp line; propopodite of the fifth pereopod with transverse rows of setae on the distal part of the posterior margin; the two median setae of the posterior margin of the telson are slender 39

39. Dactylopodite of the second pereopod about one third of the length of the propodite; three dorsal rostral teeth behind the level of the posterior rim of the eye socket; two-segmented mandibular palp
Palaemon elegans (p. 76)
- Dactylopodite of the second pereopod about half as long as the propodite; at the most two dorsal rostral teeth behind the level of the posterior rim of the eye socket; three segmented mandibular palp 40
40. Rostrum curving upwards at the tip, the dorsal teeth do not extend into the distal third of the rostrum; carpopodite of the second pereopod shorter than the meropodite
Palaemon serratus (p. 76)
- Rostrum straight, its dorsal edge toothed along the whole length; carpopodite of the second pereopod longer than the meropodite 41
41. Two dorsal rostral teeth behind the level of the posterior rim of the eye socket, the second of these teeth about $1\frac{1}{2}$ times more distant from the first than it is from the next distally
Palaemon longirostris (p. 76)
- One dorsal rostral tooth behind the level of the posterior rim of the eye socket, all the teeth about equidistant from each other *Palaemon adspersus* (p. 76)

Alpheidae

42. Rostrum very short; eyes wholly covered in dorsal view by the projecting anterior margin of the carapace; outer branch of the antennule uniramous; antennal scales reduced; no articulated process on the sixth somite at the base of the uropods 43
- Rostrum comparatively long; eyes only partially covered in dorsal view by the projecting anterior margin of the carapace; outer branch of the antennule biramous for more than half its length; antennal scales well developed; an articulated process on the sixth somite at the base of the uropods
Athanas nitescens (p. 79)
43. Frontal portion of the carapace evenly rounded from side to side and produced as a short spine in front of each eye, thus giving the anterior margin a tridentate appearance; right and left chelae of the first pereopods closely similar in shape and size, without longitudinal carinae, less than three times as long as wide, the dactylopodite articulating with the propodite by a curious lateral and oblique movement
Alpheus macrocheles (p. 79)
- Frontal portion of the carapace convex over each eye, the rostrum continued backwards as a separate elevation with a groove on each side, anterior margin rounded in front of the eyes, not tridentate; right and left chelae of the first pereopods very dissimilar in shape and size, the larger is nearly four times as long as wide with four longitudinal carinae, the dactylopodites articulating normally
Alpheus glaber (p. 79)

Hippolytidae

44. Mandible with palp 45
 — Mandible without palp 54
45. Supraorbital spines absent from the carapace 46
 — Carapace with one or more supraorbital spines 51
46. Mandibular palp composed of three segments, carpopodite of second pereiopod two-segmented 47
 — Mandibular palp with one or two segments 48
47. A relatively deep rostrum that curves downwards, its tip does not quite reach the level of the distal end of the antennular peduncle, 5–7 teeth on the upper side; antennal flagellum about the same length or longer than the body, inner branch of the antennule with about 18 segments (not including those of the flagellate tip) in the female and more in the male; living specimens deeply pigmented, the colour a brownish crimson; found between tidemarks and just below low water *Caridion steveni* (p. 80)
 — Rostrum nearly straight and projects beyond the antennular peduncle, 6–10 teeth on the upper side; antennal flagellum $\frac{3}{4}$ length of body; inner branch of antennules with about 14 segments (not including those of the flagellate tip) in the female and 18–20 in the male; living specimens lightly pigmented, transparent, in colour a salmon pink; found sublittorally 30 m and below *Caridion gordonii* (p. 80)
48. Mandibular palp consisting of one segment, carpopodite of second pereiopod four-segmented *Leontocaris lar* (p. 80)
 — Mandibular palp consisting of two segments, carpopodite of second pereiopod seven-segmented 49
49. Rostrum long, reaching to at least threequarters the length of the antennal scale *Eualus gaimardi* (p. 80)
 — Rostrum short, not reaching one third the length of the antennal scale 50
50. Apex of rostrum bi- or tri-dentate (occasional specimen with single point); epipodite on first two pereiopods *Eualus occultus* (p. 80)
 — Apex of rostrum simple acuminate, very occasionally bi-dentate; epipodite on first three pereiopods *Eualus pusiolus* (p. 80)
51. Carapace with two or more supraorbital spines on each side; third maxilliped with an exopodite 52
 — Carapace with one supraorbital spine on each side; third maxilliped without an exopodite *Lebbeus polaris* (p. 80)

52. Dorsal teeth never reaching the posterior third, and rarely the posterior half, of the carapace and similar in size; one supraorbital spine usually smaller than other *Spirontocaris phippii* (p. 77)
- Dorsal teeth continued to at least two thirds of the way to the posterior margin of the carapace and of markedly differing sizes, supraorbital spines of equal size 53
53. Dorsal teeth extending almost to the posterior edge of the carapace; third abdominal somite produced as a stout hooked tooth over the succeeding somite; apex of the rostrum with an arcuate space between two spinous tips *Spirontocaris spinus* (p. 77)
- Dorsal teeth extending to two thirds the length of the carapace; third abdominal somite not, or only slightly, produced into a tooth over the succeeding segment; apex of the rostrum a moderately long single point *Spirontocaris lilljeborgi* (p. 77)
54. Mandible with an incisor process 55
- Mandible without an incisor process 58
55. Carpopodite of the second pereiopod with three segments 56
- Carpopodite of the second pereiopod with six or seven segments 57
56. Rostrum almost as long as the carapace, with a prominent dorsal tooth at the base of the rostrum; carapace plus rostrum three times as long as deep; cornea large; antennal scale about three times as long as broad *Hippolyte varians* (p. 77)
- Rostrum much shorter than the carapace, without a prominent dorsal spine; carapace plus rostrum twice as long as deep; cornea large; antennal scale twice as long as broad; associated with *Antedon bifida* *Hippolyte hunti* (p. 77)
- Rostrum longer than the carapace, usually without a dorsal tooth at the base (may be present in young specimens), carapace plus rostrum four times as long as deep, cornea small, antennal scale fully four and a half times as long as broad *Hippolyte prideauxiana* (p. 77)
57. Dactylopodite of the first pereiopod less than one sixth of the length of the propodite; telson with about 20 spinules on each lateral margin; unpigmented eyes *Cryptocheles pygmaea* (p. 78)
- Dactylopodite of the first pereiopod at least one third of the length of the propodite; telson with less than 5 pairs of lateral spines *Thoralus cranchi* (p. 78)
58. Supraorbital spines present on the carapace 59
- Supraorbital spines absent *Lyasmata seticaudata* (p. 78)

59. Median carina of the carapace reduced to a slight gibbosity which is armed with two minute successive denticles; rostrum extending in front of the carapace to about the middle of the first segment of the antennular peduncle; supra-orbital spines very large; telson with three pairs of lateral spines

Bythocaris simplicirostris (p. 78)

— Median carina without or with one anterior spine; rostrum short not extending in front of the carapace and barely reaching the base of the antennular peduncle; telson with two pairs of lateral spines

60

60. Eye relatively large, the greatest width of the cornea about half the greatest width of the antennal scale; antennal scale longer than the carapace; the proximal pair of lateral spines on the proximal half of the telson

Bythocaris gracilis (p. 78)

— Eye relatively small, the greatest width of the cornea about one third the greatest width of the antennal scale; antennal scale shorter than the carapace; the proximal pair of lateral spines on the distal half of the telson

Bythocaris payeri (p. 78)

Processidae

61. The stylocerite without a tooth at the anterior external corner

Processa edulis (p. 82)

— The stylocerite with a tooth at the anterior external corner

62

62. Left and right second pereopods equal in length

Processa parva (p. 82)

— Left and right second pereopods very unequal in length

Processa canaliculata (p. 82)

Pandalidae

63. Rostrum at least as long as the carapace

64

— Rostrum not more than half the length of the carapace

Pandalina brevirostris (p. 81)

64. Lateral process of the antennule distally broad and rounded; second pair of pereopods unequal in length

65

— Lateral process of the antennule acutely pointed distally; second pair of pereopods equal in length, or very nearly so

Plesionika martia (p. 81)

65. Third maxilliped without an exopodite

66

— Third maxilliped with an exopodite

Dichelopandalus bonnieri (p. 81)

66. Carpopodite of the second pereopod on the right side with at least twenty annulations; antennal scale not much narrowed in front and the outer edge straight

67

- Carpopodite of the second pereiopod on the right side with four annulations; antennal scale very narrow in front, outer edge concave
Pandalus propinquus (p. 81)
- 67. Rostrum with 12–16 teeth above and 7 below, the dorsal teeth extending well into the anterior third of the rostrum; lamellar portion of the antennal scale extending beyond the apical spine
Pandalus borealis (p. 81)
- Rostrum with 10–12 teeth above and 5–6 below, the dorsal teeth do not extend beyond the middle of the rostrum; apical spine of the antennal scale extending beyond the lamellar portion
Pandalus montagui (p. 81)

Crangonidae

- 68. Second pereiopods chelate 70
- Second pereiopods simple, not chelate 69
- 69. Rostrum obtuse *Sabinea septemcarinata* (p. 83)
- Rostrum acute *Sabinea sarsi* (p. 83)
- 70. First pereiopods without an exopodite; endopodite of the last four pairs of pleopods much less than half the length of the exopodite and divided into two segments 73
- First pereiopods with an exopodite; endopodite of the last four pairs of pleopods nearly as long as the exopodite and composed of a single segment 71
- 71. Second pereiopods reaching at least to the distal extremity of the carpopodite of the first pair; inferior apices of the branchiae turned forwards; an arthrobranch at the base of the third maxillipeds *Pontocaris lacazei* (p. 82)
- Second pereiopods at most not reaching beyond the distal extremity of the meropodite of the first pair, usually much shorter; inferior apices of the branchiae turned backwards; no arthrobranch at the base of the third maxillipeds 72
- 72. First lateral carina of carapace armed with three teeth, the second with two teeth *Pontophilus spinosus* (p. 83)
- First lateral carina of the carapace armed with two teeth, the second with only one *Pontophilus norvegicus* (p. 83)
- 73. Lateral process of the antennule acutely pointed distally; second pereiopods with the dactylopodite less than half the length of the propopodite 79
- Lateral process of the antennule distally truncate or rounded; second pereiopods with the dactylopodite much more than half the length of the propopodite 74
- 74. Apex of the rostrum rounded or triangular 76

- Apex of the rostrum squarely truncate or emarginate 75
75. Apex of rostrum squarely truncate; only one spine on the median line of the carapace, abdomen smooth and unsculptured; antennal scale with only the usual distal spine on its outer edge *Philocheras fasciatus* (p. 84)
- Apex of the rostrum emarginate; several spines on the median line of the carapace; abdomen strongly sculptured; antennal scale with a stout spine at about the middle of its outer edge *Philocheras sculptus* (p. 84)
76. Carapace with one or two spines in the median line 77
- Carapace with three spines in the median line *Philocheras echinulatus* (p. 84)
77. Carapace with one median and a pair of lateral spines, the median being somewhat in advance of the lateral *Philocheras trispinosus* (p. 84)
- Carapace with one median spine behind which there is a second tubercle-like spine 78
78. Numerous minute tubercles arranged in longitudinal series on either side of the median line *Philocheras bispinosus bispinosus* (p. 84)
- No tubercles on either side of the mid line *Philocheras bispinosus neglectus* (p. 84)
79. Carapace without strong sculpture; an arthrobranch usually present at the base of the third maxilliped 80
- Carapace with very strong sculpture; no arthrobranch at the base of the third maxilliped 81
80. Sixth abdominal somite smooth on the dorsal side *Crangon crangon* (p. 83)
- Sixth abdominal somite channelled and bicarinate on the dorsal side *Crangon allmani* (p. 83)
81. Abdominal segments 3–5 each with a dorsal carina; three spines on the dorsal carina of the carapace *Sclerocrangon boreas* (p. 82)
- No dorsal carina on abdominal segments; two median dorsal spines on the carapace, the anterior one above and longer than the rostrum *Sclerocrangon jacqueti* (p. 82)

STENOPODIDEA

82. Dactylopodite of the fourth and fifth pereopod simple, relatively long and slender; carapace with a transverse row of some thirty procumbent spines which extend downwards on either side to more than half the depth of the carapace *Richardina spinicineta* (p. 85)

PENAEIDEA

83. Last two pairs of pereopods well developed; branchiae numerous
(Penaeidae) 86
- Last two pairs of pereopods reduced in length; not more than eight branchiae
on either side (Sergestidae) 84

Sergestidae

84. Supraorbital spines well developed; third antennular segment very slender
when viewed from above *Sergestes arcticus* (p. 79)
- No supraorbital spines; third antennular segment stout 85
85. Eyes very small, little broader than the eye-stalk; distal segment of the eye
stalk long and slender, its width hardly increasing from base to eye; third
pereopods with one true branchia and a branchial lamella
Sergestes mollis (p. 79)
- Eyes large; distal segment of the eye-stalk short and increasing in width from
base to eye; third pereopods with two pleurobranchia
Sergestes robustus (p. 79)

Penaeidae

86. Inner border of the first segment of the antennular peduncle with a twisted
setose scale forming an incomplete inner wall to the orbit; rostrum well
developed with numerous dorsal teeth 88
- No scale on the inner border of the first segment of the antennular peduncle;
rostrum very short with one dorsal tooth 87
87. Infra-antennal angle wide but very obtuse, meropodite of the third pereopod
shorter than the carpopodite *Gennadas valens* (p. 86)
- Infra-antennal angle wide but subspinous, meropodite of the third pereopod
longer than the carpopodite *Gennadas elegans* (p. 86)
88. Antennular flagellum cylindrical 89
- Antennular flagellum thin, compressed and internally channelled throughout
its length, two arthrobranchs and an epipodite on the fourth pair of pereopods
Solenocera siphonocera (p. 86)
89. Rostrum dentate on the dorsal and ventral edges *Penaeus trisulcatus* (p. 86)
- Rostrum dentate on the dorsal edge only *Funchalia woodwardi* (p. 86)

REPTANTIA

90. Fifth pair of pereopods similar in size and thickness to those anterior (note *Paromola* and *Dromia*, p. 96) 91
 — Fifth pair of pereopods and sometimes the fourth much modified and smaller than those preceding; sternite of last thoracic segment free (Anomura) 112
91. Abdomen large, symmetrical; uropods present and developed into a tail fan (Macrura Reptantia) 92
 — Abdomen comparatively small, dorso-ventrally flattened, symmetrical, recurved on to the sternal face of the enlarged cephalothorax; tail fan not developed, only rarely are uropods present and then are rudimentary (Brachyura) 143

MACRURA REPTANTIA

92. First three pairs of pereopods chelate 93
 — Third pair of pereopods (sometimes also the first and second) not chelate 94
93. Fourth and usually fifth pair of pereopods chelate; eyes rudimentary, eye-stalks immovable (Eryonidae) 95
 — Fourth pair of pereopods not chelate; eyes well developed and movable (Astacidae and Nephropsidae) 99
94. The whole of the upper side of the carapace covered with spines of various sizes; a pair of flat projections of the carapace partially roof over the eyes (Palinuridae and Scyllaridae) 102
 — Carapace smooth, at the most having a few spines at the base of the rostrum; no horn-like process over the eye (Thalassinoidea) 104

Eryonidae

95. Rostral spine double 96
 — Rostral spine single *Polycheles typhlops* (p. 87)
96. No ridge on the sixth abdominal tergum; one spine on the outer angle of the basal joint of the antennular peduncle 97
 — A double ridge on the sixth abdominal tergum; two spines on the outer angle of the basal joint of the antennular peduncle 98
97. Lateral margins of the carapace toothed, the median carina faint and marked by a double row of granules *Polycheles granulatus* (p. 87)
98. Chelipeds slightly shorter than the body, ridge on sixth tergum very prominent with jagged edges *Polycheles nanus* (p.87)

- Chelipeds much longer than the body, ridge on sixth tergum low, with smooth edges
Polycheles sculptus (p. 87)
- 99. Last thoracic sternite immovable and fused to the preceding sternite; the podobranchia arises independently at the foot of the epipodite and thus the lamellae are separate from one another; marine (Nephropsidae) 100
- Last thoracic sternite free and mobile; the podobranchial filaments are fixed directly on to the epipodial blade; freshwater
(Astacidae) *Astacus pallipes* (p. 88)

Nephropsidae

- 100. Eyes small without pigment; no antennal scale *Nephropsis atlantica* (p. 88)
- Eyes large, well pigmented; antennal scale present 101
- 101. Eyes very large, reniform, broader than the eye-stalks; antennal scale foliaceous
Nephrops norvegicus (p. 88)
- Eyes large, but not broader than the eye-stalks; antennal scale spine-like
Homarus gammarus (p. 88)
- 102. Antennal peduncle subcylindrical ending in a long flagellum; eye-stalks never housed in a deep frontal hollow; carapace convex on the dorsal side; body robust but relatively slender (Palinuridae) 103
- Antenna wide, the proximal segment of the antennal peduncle dilated as a triangular blade, flagellum reduced to a large blade with lobed edges; carapace depressed and much larger than the abdomen; body heavy and thickset
(Scyllaridae) *Scyllarus arctus* (p. 88)

Palinuridae

- 103. First pereiopod subchelate owing to the presence of a broad tooth on the underside of the propopodite; spines on the mid-line of the carapace not distinctly arranged into two parallel rows
Palinurus elephas (p. 89)
- First pereiopod not subchelate, tooth on the distal underside of the propopodite small and pointed; spines in the mid-line of the carapace arranged in two parallel rows
Palinurus mauritanicus (p. 89)
- 104. No thalassinian line on the carapace; large abdominal pleura (Axiidae) 106
- A thalassinian line present; abdominal pleura usually small 105
- 105. Both endopodite and exopodite of the uropods with a transverse suture; podobranchia on at least the first three pairs of pereiopods
(Laomediiidae) *Faxeia nocturna* (p. 89)

- Neither endopodite nor exopodite of the uropods with a transverse suture; pereopods without podobranchia (Callianassidae) 108

Axiidae

106. Body compressed; no median dorsal ridge on the carapace; no suture on the exopodite of the uropods; eyes pigmented *Axius stirhynchus* (p. 89)
- Body cylindrical; a suture across the distal end of the exopodite of the uropods; eyes unpigmented 107
107. A thin, low, median dorsal ridge reaching the whole length of the carapace; outer surface of the eye flat *Calocaris macandreae* (p. 89)
- The median dorsal ridge of the carapace not reaching the transverse cervical groove, outer surface of the eye rounded *Calocarides coronatus* (p. 89)

Callianassidae

108. Rostrum large and triangular; first pereopods equal; no appendix interna on pleopods 3–5 110
- Rostrum very much reduced; first pereopods unequal; an appendix interna on pleopods 3–5 109
109. Telson as long as the inner branch of the uropods; third maxillipeds slender and pediform *Callianassa subterranea* (p. 90)
- Telson much shorter than the inner branch of the uropods; third maxillipeds operculariform, 3rd and 4th segments very broad, last three segments slender *Callianassa laticauda* (p. 90)
110. No spines along the latero-frontal edges of the carapace; the 'thumb' of the first pereopod almost as long as the dactylopodite *Upogebia deltaura* (p. 90)
- A pointed tooth (ocular spine) at the latero-frontal edge of the carapace; the 'thumb' of the first pereopod much shorter than the dactylopodite 111
111. Propopodite of the first pereopod greatly dilated at the level of the 'thumb', the latter being widely separated from the dactylopodite; the telson is very narrow and truncate at the rear *Upogebia littoralis* (p. 90)
- Propopodite not greatly dilated and the 'thumb' is little separated from the dactylopodite; the telson is only slightly narrowed posteriorly and is slightly hollowed at the posterior edge *Upogebia stellata* (p. 90)

ANOMURA

112. When uropods are present these are modified for holding the body into shells, the uropods are nearly always asymmetrical as also is the abdomen; the abdomen is usually soft with reduced terga and pleura (Paguroidea) 126

- Uropods always present, usually developed into a tail fan, they are simple and symmetrical as is the rest of the body; abdomen curved ventrally, the terga and pleura well developed (Galatheoidea) 113
- 113. Telson with one or two sutures; posterior half of the abdomen bent under the first half and telson tucked over the last abdominal segment; 3rd segment of the antennal peduncle independent of the second and usually with a scale (Uroptychidae) 115
- Telson with numerous sutures making three pairs of lobes around one that is central; second and third segments of antennal peduncle fused and without a scale 114
- 114. Macruriform; rostrum either large and triangular or with spines; carapace longer than wide with well developed antero-lateral angles (Galatheidae) 117
- Cancriform; the rostrum little developed; carapace broad, almost circular on outline with the abdomen closely pressed against the sternum (Porcellanidae) 125

Uroptychidae

- 115. Rostrum spiniform; carapace very spiny with the lateral margins obscure; no rudimentary antennal scale; chelipeds often more than five times as long as the carapace plus abdomen, walking legs also very long and slender
Chirostylus formosus (p. 95)
- Rostrum flat and triangular; lateral margins of the carapace well defined; well developed antennal scale; chelipeds long, walking legs moderately long 116
- 116. Dorsal surface of the carapace bearing numerous fine hairs; no movable spines on the lower edge of the propopodite of the walking legs; upper and lower surface of the chelipeds covered with scales bearing a row of hairs
Uroptychus rubrovittatus (p. 95)
- Dorsal surface of the carapace without hairs; movable spines on the lower edge of the propopodite of the walking legs; chelipeds smooth without scales, and without hairs, except at the tips *Uroptychus nitidus concolor* (p. 95)

Galatheidae

- 117. Exopodite of the first maxilliped does not end in a flagellum; eyes opaque, non-pigmented and without facets; carapace very heavily calcified 118
- Exopodite of the first maxilliped with a flagellum; eyes pigmented and with facets; carapace lightly calcified 120
- 118. Rostrum tridentate *Munidopsis tridentata* (p. 95)
- Rostrum spiniform 119

119. A transverse ridge on the middle of the cardiac region with a strong forwardly directed spine; a forwardly directed dorsal, median, spine on the first three abdominal segments *Munidopsis curvirostra* (p. 95)
- No strongly marked ridge and spine in the middle of the cardiac region; no median dorsal spines on the first three abdominal segments *Munidopsis crassa* (p. 95)
120. Rostrum broad, flattened and armed with teeth 121
- Rostrum spiniform; supraorbital spines very long *Munida bamffica** (p. 95)
121. Basal joint of the antennule with two strong spinous processes *Galathea intermedia* (p. 94)
- Basal joint of the antennule with three strong spinous processes 122
122. Spines on the mid-dorsal surface of the propopodite of the cheliped; pereopods 1–5 without epipodite *Galathea strigosa* (p. 94)
- No spines on the dorsal surface of the propopodite of the cheliped; pereopods 1–3 with epipodite 123
123. Meropodite of the third maxilliped much longer than the ischiopodite; chelipeds covered with scaly tubercles *Galathea squamifera* (p. 94)
- Meropodite of the third maxillipeds almost the same length as the ischiopodite, or slightly shorter; chelipeds covered with hairs or with scales fringed anteriorly with short setae 124
124. Abdominal segments with a single transverse furrow; rostrum clear cut and concave, almost free from setae; a blue labrum and blue line on the pleural fold *Galathea nexa* (p. 94)
- Abdominal segments with three transverse furrows, rostrum almost straight and thickly covered in scales and setae; no blue labrum and no blue on the pleural fold *Galathea dispersa* (p. 94)

Porcellanidae

125. Chelipeds with a fringe of dense setae on their outer edge, large claws, and with a denticulated lobe at the base of the inner edge of the carpopodite *Porcellana platycheles* (p. 91)
- Chelipeds without setae, narrow claws, and with no denticulated lobe on the carpopodite *Porcellana longicornis* (p. 91)
126. Abdomen strongly calcified and pressed against sternum as in the Brachyura, no uropods (Lithodidae) 127
- Abdomen soft, twisted and adapted for living in a spiral shell (Paguridae) 128

* For discussion of subspecies see Bouvier (1940).

Lithodidae

127. Tip of rostrum bifid; second abdominal segment fused to the first and consists of one piece; fairly long spines on the carapace *Lithodes maja* (p. 91)
- Rostrum simple; second abdominal segment composed of five pieces separated by sutures, the outermost indistinct, thus apparently only three; extremely long spines on the carapace *Neolithodes grimaldi* (p. 91)

Paguridae

128. Third maxillipeds are contiguous at their base 129
- Third maxillipeds are widely separate at their base 130
129. Chelipeds subequal; immovable rostral point; finger and thumb of chelipeds move horizontally *Clibanarius erythropus* (p. 92)
- Left cheliped much larger than the right and different in form; a movable point on the eye socket between the ocular scales; finger and thumb of the chelipeds move obliquely *Diogenes pugilator* (p. 92)
130. Paired broad leaf-like uniramous pleopods modified for sexual purposes on the first and second abdominal appendages in the male; genital opening of the female on the coxa of the left third pereopod only; finger and thumb of the chelipeds move obliquely *Parapagurus pilosimanus* (p. 92)
- No paired pleopods in the male; genital openings of the female on the coxa of both the third pereopods 131
131. A pair of two jointed sexually modified pleopods on the first abdominal segment of the female; in the male, vas deferens protruding from the coxa of both fifth pereopods, that from the right long and ending in a long filament, that from the left a short tube or papilla *Nematopagurus longicornis* (p. 92)
- No paired pleopods in the female; if present and paired, the protruding vas deferens does not end in a long filament 132
132. Left cheliped equal or only very slightly smaller than the right; male with both vas deferens protruding, that from the right curving over to the left side *Catapaguroides timidus* (p. 92)
- Left cheliped clearly smaller than the right; male without or with only the left vas deferens projecting 133
133. The vas deferens does not protrude from either coxa of the fifth pereopod of the male; with the exception of *Pagurus pubescens* which has four, there are many more than four spines present on each side of the hind margin of the telson 137
- The vas deferens protrudes from the left fifth pereopod and is bent outwards in a semicircle; four spines present on each side of the telson; rostrum very wide and rounded (*P. pubescens* has a sharp pointed rostrum) 134

134. Ocular peduncle short, being half the length of the anterior hard part of the carapace, and fairly wide with a dilated cornea *Anapagurus laevis* (p. 91)
- Ocular peduncle long, more than half the length of the anterior hard part of the carapace, and slender without a dilated cornea 135
135. Antennular peduncle, when fully extended is three times as long as the ocular peduncle; right cheliped without or with very few hairs
- Anapagurus hyndmanni* (p. 91)
- Antennular peduncle, when fully extended about half as long again as the ocular peduncle; right cheliped hairy 136
136. The dorsal surface of the propopodite of the right cheliped has, towards the proximal internal angle, a well marked crest surmounted by three or four saw-like teeth, external to this crest a less distinct line runs from the proximal end towards the base of the 'thumb'; the right chela has a broad oval shape
- Anapagurus chiroacanthus* (p. 91)
- The short inner toothed crest of the typical form is replaced by a smooth and less prominent toothless crest, the second line is absent; the right chela is a narrow almond shape *Anapagurus chiroacanthus gracilis* (p. 91)
137. Right cheliped devoid of setae 138
- Right cheliped covered with long or short setae 141
138. Median frontal projection forming a distinct sharp rostrum 139
- Median frontal projection rounded and not forming a distinct rostrum 140
139. Propopodite of the right cheliped smooth and glistening
- Pagurus carneus* (p. 93)
- Propopodite of the right cheliped tuberculate and not smooth
- Pagurus bernhardus* (p. 93)
140. A strong keel armed with teeth on the dorsal surface of the propopodite of the left cheliped
- Pagurus variabilis* (p. 93)
- No strong keel armed with teeth on the dorsal surface of the propopodite of the left cheliped
- Pagurus prideauxi* (p. 93)
141. Propopodite of the right cheliped with three depressions on the dorsal surface and with strong, distinct teeth on the external margin
- Pagurus sculptimanus* (p. 92)
- Propopodite of the right cheliped without depressions or teeth 142
142. Rostrum round; setae on the right cheliped long and plumose forming a matted fur; carpopodite as long as the palm of the right cheliped
- Pagurus cuanensis* (p. 93)
- Rostrum produced as a sharp point; setae on the right cheliped are short and arranged in groups springing from the base of tubercles; carpopodite as long as the right cheliped
- Pagurus pubescens* (p. 93)

BRACHYURA

143. Buccal frame more or less quadrangular 144
 — Buccal frame triangular 146
144. A pair of pleopods on the first abdominal sternite of the female; female genital apertures coxal; last pair of legs modified, reduced in size and held dorsally; first segment of the antennal peduncle is macruriform with the excretory pore on its internal angle (Dromiacea) 147
 — No pleopods on the first abdominal sternite of the female; female genital openings sternal; last pair of walking legs normal, rarely reduced and only exceptionally dorsal in position; first segment of the antennal peduncle forming a small operculum below which is the excretory pore (Brachygnatha) 145
145. Carapace triangular, narrowed in front, usually forming a distinct pointed or spined rostrum; orbits usually incomplete (Oxyrhyncha) 152
 — Carapace broad in front, rostrum reduced or absent; orbits well developed (Brachyrhyncha) 167
146. Posterior thoracic sternites broad, such that the bases of the walking legs are far apart; either the last pair of legs normal in position or the last two pairs of legs carried dorsally (Oxystomata) 148
 — Posterior thoracic sternites narrow, keel like, such that the bases of the second to fourth walking legs are close together; last pair of legs dorsal in position (Gymnopleura)

DROMIACEA

147. Eyes and antennules retractile into orbito-antennular sockets; sternum of female traversed by a pair of two obliquely longitudinal grooves; pleurobranchia at the base of the second to fifth walking legs (Dromiidae) *Dromia vulgaris* (p. 96)
 — Eyes and antennules not retractile; sternum of female not traversed by obliquely longitudinal grooves; no pleurobranchia at the base of the fifth walking legs (Homolidae) *Paromola cuvieri* (p. 96)

*OXYSTOMATA***Leucosiidae**

148. Third abdominal segment free in the female; the sixth abdominal segment free in the male 149
 — The third and sixth abdominal segments fused to the middle segments in both sexes; carapace polygonal, hepatic swellings cause a pronounced hollow on the antero-lateral flank of the carapace; the gastric carina, cardiac projection and the branchial projections combine together to form a cross *Ebalia tuberosa* (p. 96)

149. Walking legs more or less granular but without teeth or tubercles 150
- Walking legs fairly granular with teeth and tubercles *Ebalia granulosa* (p. 96)
150. Carapace sub-rounded or sub-oval, not, or only slightly, depressed at the front, hepatic projections present, gastric and branchial projections absent or much reduced, lateral margins edged with a line of large projecting granules; the chelipeds long, the dactylopodite very much shorter than the palm of the propopodite *Ebalia nux* (p. 96)
- Carapace polygonal, depressed at the front but with a gastric carina and with the branchial regions inflated or with projections, no row of large granules at the lateral edges; the dactylopodite about as long as the palm of the propopodite 151
151. Branchial regions of the carapace not greatly inflated except that they are capped by a projection where the granules are large and prominent; carapace not wider than its length, the crest on the upper edge of the claws is low and obtuse *Ebalia cranchi* (p. 96)
- Branchial region of the carapace is inflated and its granulations are very small; carapace wider than long, the crest on the upper edge of the claws is strong and projecting *Ebalia tumefacta* (p. 96)

BRACHYGNATHA

152. Chelipeds much stronger and longer than the walking legs and movement is restricted at the basal segment; orbits well defined; basal joint of the antenna small, short and not fused with the epistome (Parthenopidae) *Lambrus massena* (p. 96)
- Chelipeds rarely much longer than the walking legs and very mobile at their base; basal joint of the antenna well developed, usually fused with the epistome and sometimes also to the side of the rostrum; orbits absent or slightly defined by a projecting process at the anterior edge of the carapace (Majidae) 153
153. Walking legs seldom much longer than the chelipeds, except in the case of *Chionoecetes* where they are compressed and flattened; carapace usually oval-triangular; the basal segment of the antennal peduncle not very slender and little lengthened, the junction between the epistome and the internal part of the base of the basal segment marked by a groove; the meropodite of the third maxilliped is about as wide as the ischiopodite and carries the carpopodite at its anterior internal angle; eye-stalks retractile 154

- Walking legs very slender and very much longer than the chelipeds; basal segment of the antennal peduncle elongate, strong, but narrow; carapace triangular; the meropodite of the third maxilliped narrower than the ischiopodite and carries the carpopodite at the anterior edge; abdomen is six segmented in both sexes, segments 6 and 7 having fused 161
- 154. When the eye is retracted the cornea is visible from above 155
 - When the eye is retracted the cornea is completely hidden from above by orbital projections *Maja squinado* (p. 97)
- 155. Rostrum with a pair of long, or very long, divergent points 156
 - Rostrum bifid, divergent or not divergent; if divergent, the two processes are either very short, flattened and triangular, or, if of moderate length, divergent only at the tip 157
- 156. Legs strongly armed with tubercles and short spines *Eurynome aspera** (p. 97)
 - Legs little or not armed *Rochinia carpenteri* (p. 97)
- 157. The two processes of the rostrum short and flattened; chelipeds much shorter than the walking legs, the latter being compressed *Chionoecetes opilio* (p. 97)
 - Two parts of the rostrum either not divergent, or divergent only at tip; chelipeds never much shorter than the walking legs 158
- 158. Rostrum moderately long, the two parts parallel except at the tip where they diverge 159
 - Rostrum short, the two parts do not diverge 160
- 159. Test covered with very short hairs that are slightly wider than long; the edge of the carapace in the branchial region armed with sharp tooth-like tubercles the last two being somewhat larger than the others; dorsally the carapace is little projecting with a low tubercle in the intestinal region
 - Pisa tetraodon* (p. 97)
 - Test covered with short hairs that are longer than wide with a pointed, but slightly dilate, tip; the posterior tooth of the branchial region of the carapace is stout and sharp, the other teeth are either very reduced or absent; the intestinal region has a high dorsal projection *Pisa gibbsi* (p. 97)
- 160. The carapace edge below the post-ocular tooth is dilated so that the carapace has a lyrifform shape *Hyas coarctatus* (p. 99)
 - The region below the post-ocular tooth is not dilated so that the carapace is subtriangular *Hyas araneus* (p. 99)
- 161. Orbit with at least one post-ocular spine, eye-stalks retractile; dactylopodite of the walking legs not markedly arcuate 162

* See page 25.

- Orbit without spines; eye-stalks non-retractile; dactylopodite of the fourth and fifth walking legs sickle-shaped 165
- 162. One pre-ocular spine; rostrum fairly long with the two parts diverging
Dorhynchus thompsoni (p. 98)
- No pre-ocular spine; rostrum short, flat and emarginate in front 163
- 163. Gastric region of the carapace armed with a transverse series of four tubercles in front of a strong, unpaired tubercle; rostrum short, at the most the tip barely exceeds the end of the antennal peduncle; no sternal callosity on thorax of male
Inachus dorsettensis (p. 99)
- The two inner tubercles of the gastric series are absent; rostrum clearly extends beyond the level of the antennal peduncle 164
- 164. Rostrum lance-shaped, divided but the edges of the two parts are contiguous or nearly so; branchial tubercles low and obtuse; no sternal callosity in the male
Inachus dorynchus (p. 99)
- The two parts of the rostrum diverge; branchial tubercles (except the posterior) and those on the cardiac region raised and pointed; a white sternal callosity in the male
Inachus leptochirus (p. 99)
- 165. Rostrum short, bifurcate at the tip; the basal segment of the antennal peduncle fused to the surrounding parts
Achaeus cranchi (p. 98)
- Rostrum relatively long and thin, with two contiguous parts; the basal segment of the antennal peduncle fused proximally with the epistome but free in front 166
- 166. Rostrum longer than the antennal peduncle, straight and usually inclined upwards from the longitudinal axis of the carapace; the basal segment of the antennal peduncle has two or three large spines on its inferior face; the epistome has at least two pairs of pointed spines
Macropodia longirostris (p. 98)
- Rostrum almost as long as antennal peduncle but with a distinct downward curve; basal segment of antennal peduncle without or with a number of small spines; the spines on the epistome reduced to blunt projections
Macropodia egyptia (p. 98)
- Rostrum rarely reaches half the length of the antennal peduncle; the basal segment of the antennal peduncle and the epistome are without spines
Macropodia rostrata (p. 98)
- 167. Orbits complete; carapace rarely elongate-oval; rostrum often absent; flagellum of the antenna usually short and not usually setose 168
- Orbits formed but more or less incomplete; carapace elongate-oval; rostrum present; antenna with a long heavily setose flagellum
(Corystidae) *Corystes cassivelaunus* (p. 103)

168. The carpopodite of the third maxilliped inserted at or near the inner angle of the meropodite; male genital openings usually coxal; right chela often larger than the left 169
- The carpopodite of the third maxilliped not inserted at or near the inner angle of the meropodite; male genital openings sternal; in no species is the right chela always larger than the left 196
169. Fifth pair of legs flattened, more or less adapted for swimming (Portunidae) 170
- Legs not adapted for swimming 183

Portunidae

170. Endostome without lateral crests; the terminal dilation of the endopodite of the first maxilliped simple or nearly so; dactylopodite of the fifth walking leg lanceolate 171
- Endostome with lateral crests; the terminal dilation of the endopodite of the first maxilliped with a lobule 173
171. Dactylopodite of the fifth walking leg a wide lanceolate shape, that of the second to fourth walking legs with a stylet tip, but enlarged proximally; abdomen of the male very narrow; the first pleopod straight 172
- Dactylopodite of the fifth walking legs a narrow lanceolate shape, that of the second to fourth walking legs narrow and styliform; abdomen of the male triangular; the first pleopod bent outwards *Carcinus maenas* (p. 100)
172. Carapace slightly longer than wide, weakly dentate, the front strongly trilobed; meropodite of the third maxilliped projecting beyond the buccal frame on to the epistome *Portunus latipes* (p. 100)
- Carapace slightly wider than long, strongly toothed, front obtuse with vague indication of three lobes; third maxilliped does not extend beyond the buccal frame *Portunus biguttatus* (p. 100)
173. Dactylopodite of the second to fourth walking legs a broad lanceolate shape, that of the fifth walking leg an oval ramus; carapace subcircular *Polybius henslowi* (p. 100)
- Dactylopodites of the second to fourth walking legs styliform, that of the fifth walking leg oval or a wide lanceolate shape; carapace polygonal 174
174. Second walking legs shorter than those following; front of carapace 4-lobed or simple; the posterior antero-lateral tooth much longer than the others 175
- Second walking legs longer than those following; front of the carapace simple or trilobed, rarely with three to five pairs of small narrow lobes; antero-lateral teeth usually subequal 176

175. Front of the carapace simple or with faint indications of four lobes; the distal tooth of the carpopodite of the chelipeds is simple, and there is one spine at the distal end of the inner of the two longitudinal carinae of the claw
Bathynectes longipes (p. 100)
- Front of the carapace four-lobed or four-toothed; the distal tooth of the carpopodite of the chelipeds is very strong with secondary teeth on its anterior edge, five longitudinal carinae on the claw that are armed with teeth
Bathynectes superba (p. 100)
176. Front of carapace with 8–10 teeth
Macropipus puber (p. 101)
- Front of carapace with three lobes or teeth, or entire 177
177. Front of the carapace entire and ‘ciliated’; dactylopodite of fifth leg lanceolate with a median rib; the fourth antero-lateral tooth of the carapace smaller than the others
Macropipus arcuatus (p. 102)
- Front of the carapace with three lobes or teeth 178
178. Front of the carapace with three relatively wide lobes the median being the most advanced; dactylopodite of the fifth leg acutely lanceolate 179
- Front of the carapace with three teeth, the tips of which are rounded or pointed 180
179. The front of the carapace projecting; dactylopodite of the fifth leg without a distinct median rib; carapace almost hairless and usually smooth
Macropipus pusillus (p. 102)
- The front of the carapace little projecting, but crenulated; dactylopodite of the fifth leg with a strong median rib; carapace hairy and with transverse granular lines
Macropipus corrugatus (p. 101)
180. The fifth antero-lateral tooth of the carapace at least twice as long as the others; carapace wide, flattened and coarsely tuberculate; numbers of short hairs present over the whole of the body; propopodite and dactylopodite of the fifth legs longitudinally ribbed
Macropipus tuberculatus (p. 101)
- The fifth antero-lateral tooth not greatly extended; ventral side of the body hairless; propopodite and dactylopodite without well developed ribs 181
181. Carapace with numerous short granular lines, the frontal teeth acute; dactylopodite of the fifth leg broad distally; carpopodite of the chelipeds with two teeth on the posterior external margin
Macropipus depurator (p. 101)
- These characters not combined 182
182. Frontal teeth of the carapace relatively acute, the median the most advanced, the antero-lateral teeth externally sinuate or flattened; orbits small; carpopodite of the chelipeds with two teeth on the postero-external margin, chelae sharply carinate; meropodite of the fourth pair of legs twice as long as that of the fifth; colour brownish grey with a tinge of green
Macropipus holsatus (p. 101)

- Frontal teeth of the carapace rounded, the median not much projecting beyond the others, the external edge of the antero-lateral teeth convex; orbits large; carpopodite of the chelipeds without a tooth on its postero-external margin, carinae of chelae obsolete; meropodite of the fourth pair of legs only half as long again as that of the fifth legs; colour marbled in various shades of brown *Macropipus marmoreus* (p. 102)
183. Antennules fold back longitudinally, or almost so 184
 — Antennules fold back obliquely 188
184. Carapace subcircular (Atelecyclidae) 185
 — Carapace wider than long, broadly oval or hexagonal 187

Atelecyclidae

185. Front of carapace toothed 186
 — Front of carapace without teeth *Thia polita* (p. 102)
186. Carapace with very small granulations in the gastric region with very few hairs; the three rostral teeth prominent; meropodite of the third maxilliped much shorter than the ischiopodite and barely as wide; carapace as wide as, or slightly less wide than its length *Atelecyclus rotundatus* (p. 102)
 — Carapace covered with coarse granules, the granules bearing hairs; the rostral teeth are small; meropodite of the third maxilliped as long as the ischiopodite and wider; carapace clearly wider than long *Atelecyclus undecimdentatus* (p. 102)
187. Carapace hexagonal, the antero-lateral crest with five strong teeth; antennal flagellum very short, wide at the base, with a number of setae at the tip (Pirimelidae) *Pirimela denticulata* (p. 103)
 — Carapace transversely oval, antero-lateral border without teeth; antennal flagellum short, irregularly positioned setae, fewer terminally (Cancridae) *Cancer pagurus* (p. 103)
 — (Carapace transversely oval, antero-lateral border with many small, fine, sharp teeth *Cancer bellianus*)*
188. Carapace distinctly quadrangular (Goneplacidae) *Goneplax rhomboides* (p. 103)
 — Carapace transversely oval 189

* Specimens of the subtropical species *Cancer bellianus* Johnson may, very rarely, occur to the west and north of Ireland and Scotland. This is due to larval transport in an influx of Gulf Stream water of abnormally high temperature (Mason and Davidson, 1966). This species is not illustrated but a good figure is given in Bouvier (1940).

189. Three very strong spines on the antero-lateral border of the carapace, the most posterior being the strongest, the front of the carapace is very wide with two median teeth and a smaller tooth at the outer edge close to the orbit (4 in all); second and third walking legs much longer than the chelipeds (Geryonidae) *Geryon tridens* (p. 103)
- If present, teeth rather than spines on the antero-lateral border of the carapace; second and third walking legs rarely slightly longer than the chelipeds, usually shorter; never the combination of characters listed under *Geryon* (Xanthidae) 190

Xanthidae

190. The ridges that define the efferent branchial channels extend to the anterior boundary of the buccal cavity and are usually very strong 191
- The ridges that define the efferent branchial channels, if present, are low and confined to the posterior part of the endostome 193
191. Chelipeds very strong and very roughly tuberculate; anterior two-thirds of the carapace strongly tuberculate *Pilumnoides perlatus* (p. 104)
- The carapace not strongly tuberculated 192
192. Antero-lateral edge of the carapace with five teeth; carapace with hairs *Pilumnus hirtellus* (p. 104)
- The first two of the five antero-lateral teeth fused, making four in all; no hairs on the carapace *Rithropanopeus harrisi tridentatus* (p. 104)
193. Antero-lateral margin of the carapace continued forward and downward to the anterior angle of the buccal cavity instead of to the orbit; carpopodite and propodite of chelipeds tuberculate *Medaeus couchi* (p. 104)
- Antero-lateral margin of the carapace continued to the orbit 194
194. Fourth antero-lateral tooth of carapace arcuate or lobiform, chelipeds clearly unequal in size *Neopanope texana sayi* (p. 104)
- Fourth antero-lateral tooth triangular, chelipeds almost equal in size 195
195. Upper edge of the carpopodite of walking legs with a thick fringe of hairs; meropodite of the third maxilliped with an external projection so that the anterior edge is longer than the length of the segment *Xantho pilipes* (p. 104)
- Upper edge of the carpopodite of the walking legs with isolated hairs at the most; external edge of the meropodite of the third maxilliped not greatly projecting so that the anterior edge is shorter than the length of the segment *Xantho floridus* (p. 104)

196. Small commensal crabs; rounded carapace, eyes and orbits very small; meropodite of the third maxilliped very large and usually fused with the ischiopodite (Pinnotheridae) 197
- Free living crabs; carapace quadrangular or hexagonal; ischiopodite and meropodite of the third maxilliped free and normal (Grapsidae) 198

Pinnotheridae

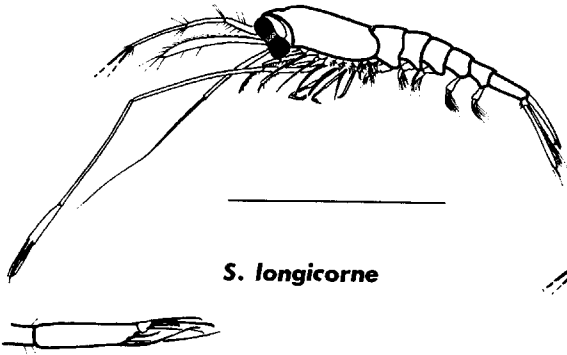
197. Front of the carapace without a hollow; dactylopodite of the walking legs about half the length of the propodite and strongly curved at the tip
Pinnotheres pisum (p. 105)
- Front of the carapace with a slight hollow, more noticeable in the male, dactylopodite of the walking legs much more than half the length of the propodite and only slightly curved at the tip
Pinnotheres pinnotheres (p. 105)

Grapsidae

198. Front of carapace strongly deflected; the gap between the third maxillipeds very wide and lozenge shaped, carapace transversely striated anteriorly
Pachygrapsus marmoratus (p. 105)
- Front of carapace little or not deflected; the gap between the third maxillipeds not very wide and not lozenge shaped 199
199. Spinules on the dactylopodites of the walking legs; carapace smooth
Planes minutus (p. 105)
- No spinules on the dactylopodite of the walking legs 200
200. Meropodite of the third maxilliped wider than long and equal in length to the ischiopodite; propodite of chelipeds without a mat of hairs
Brachynotus sexdentatus (p. 105)
- Meropodite of the third maxillipeds longer than wide and much shorter than the ischiopodite; a mat of hairs on the propodite of the chelipeds
Eriocheir sinensis (p. 105)

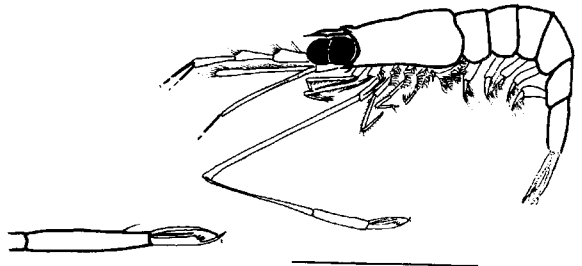
ILLUSTRATIONS OF THE BRITISH SPECIES OF EUCARIDA

The scale, given as a line against each figure, represents 1 cm.

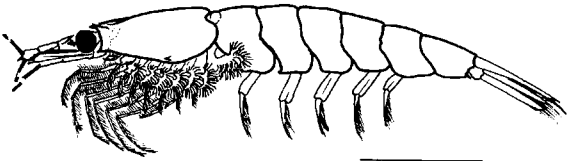


S. longicorne

STYLOCHEIRON

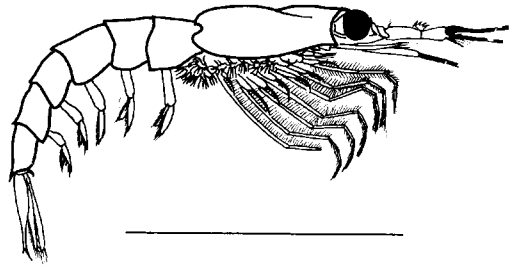
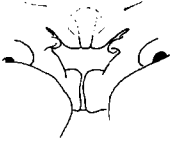


S. maximum



Meganyctiphanes norvegica

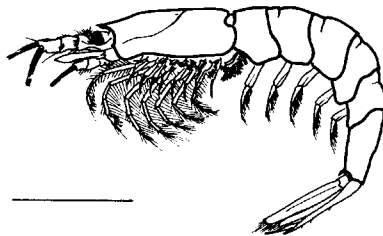
thelycum



Nyctiphanes couchi



petasma

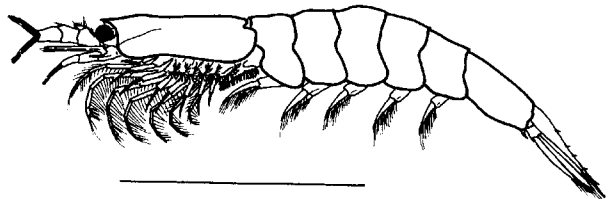


T. acutifrons

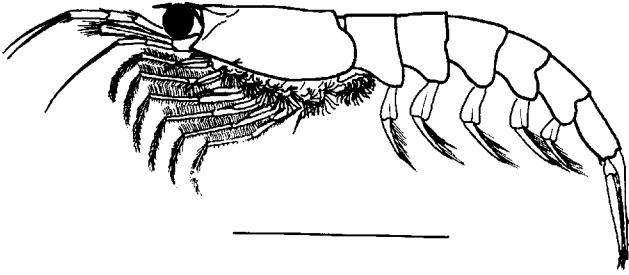
thelycum



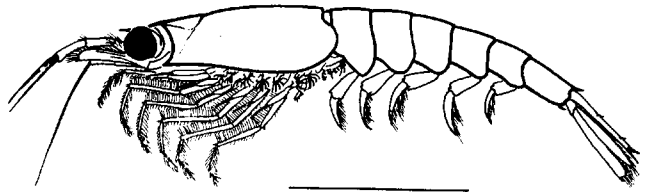
THYSANOPODA



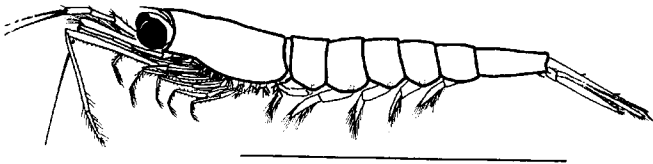
T. microphthalmma



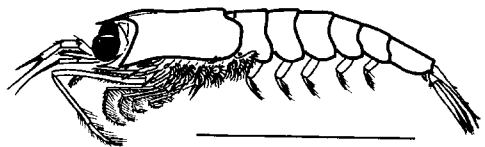
T. raschi



T. inermis

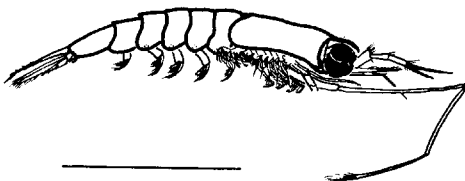


T. longicaudata

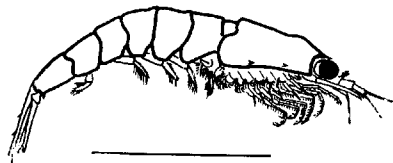


T. gregaria

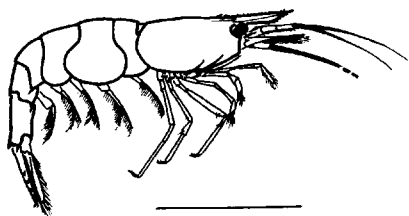
THYSANOESSA



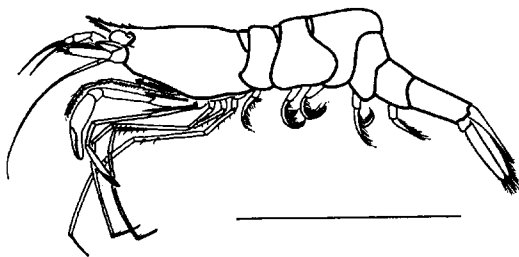
Nematoscelis megalops



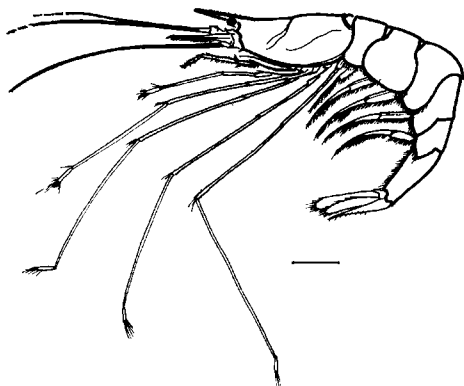
Euphausia krohni



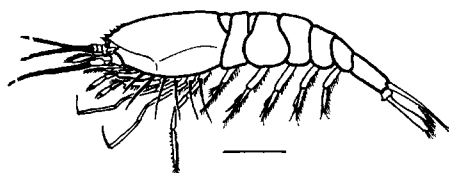
***Atyaephyra*
*desmaresti***



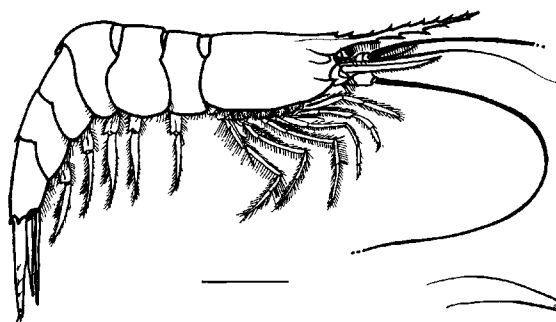
Bresilia atlantica



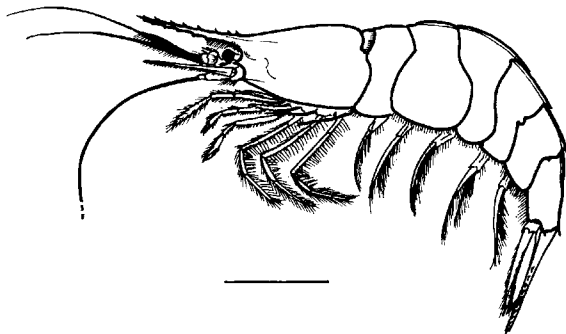
Nematocarcinus ensifer



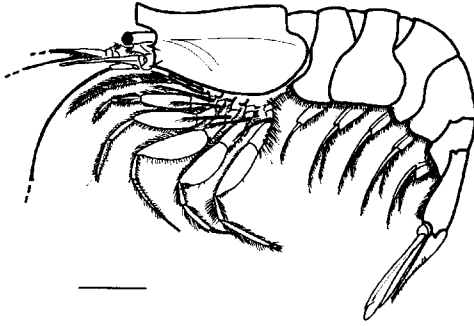
***Hymenodora*
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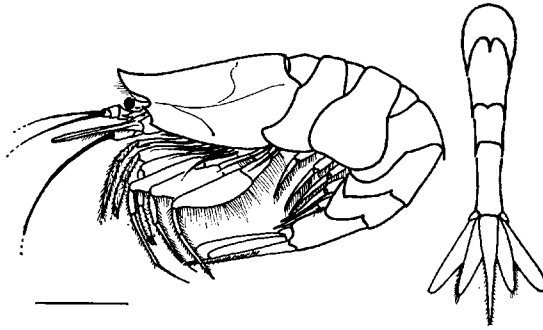
***AcanthePHYra*
*purpurea***



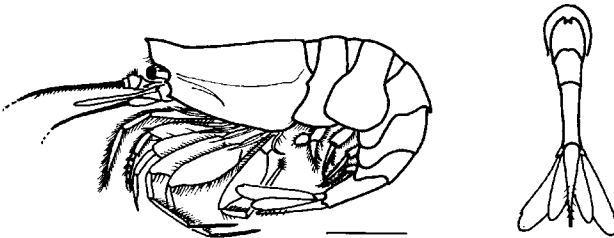
AcanthePHYra haeckeli



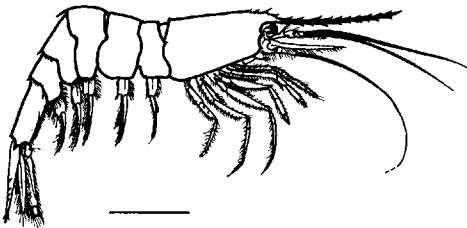
E. hoskyni



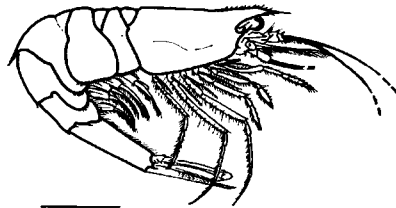
E. benedicti



E. bifida

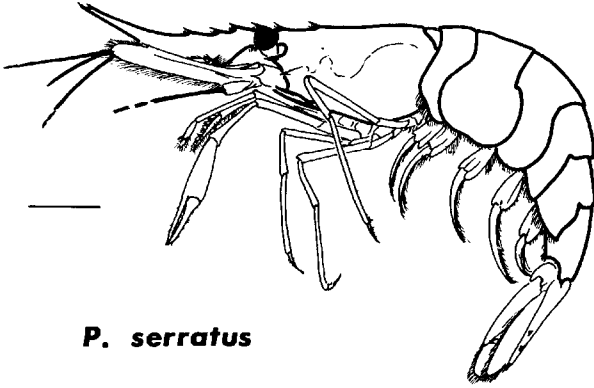


S. debilis

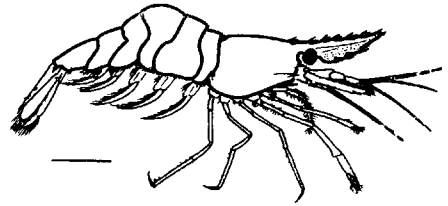


S. braueri

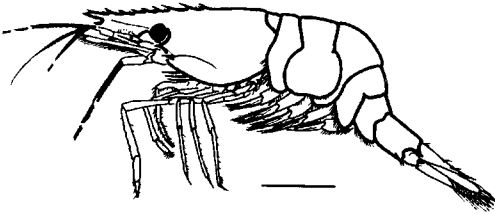
EPHYRINA & SYSTELLASPIS



P. serratus

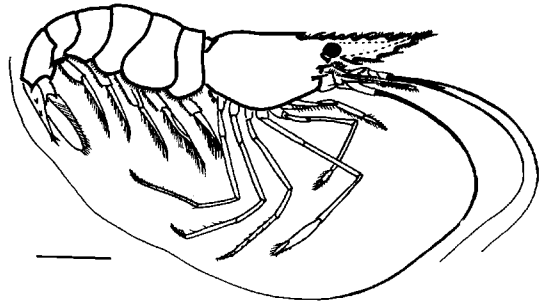


P. adspersus

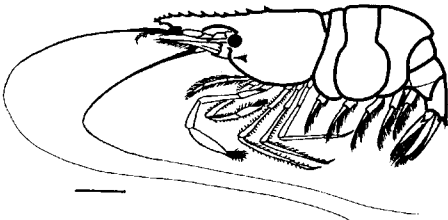


P. elegans

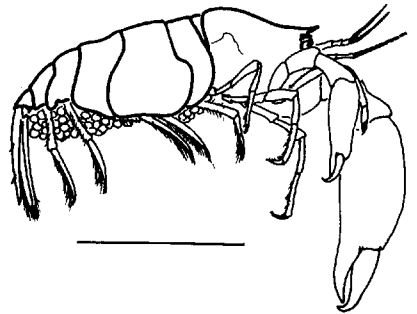
PALAEEMON



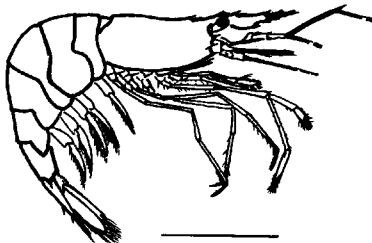
P. longirostris



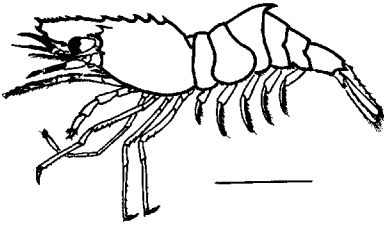
Leander tenuicornis



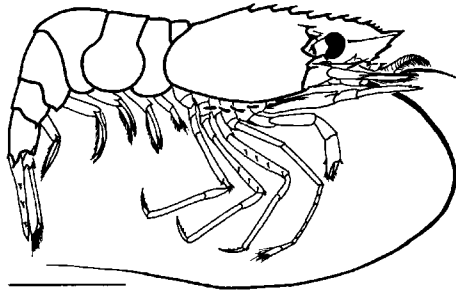
Typton spongicola



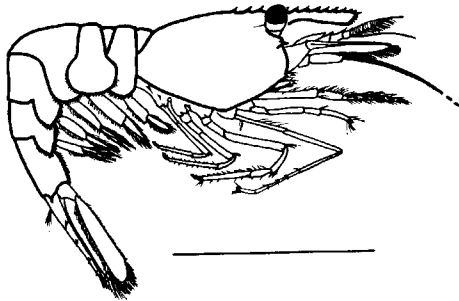
Palaemonetes varians



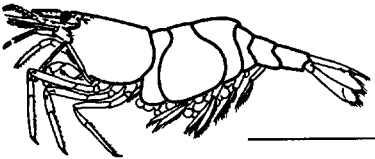
S. spinus



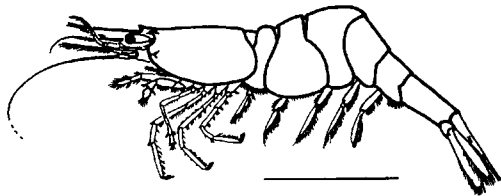
S. lilljeborgi



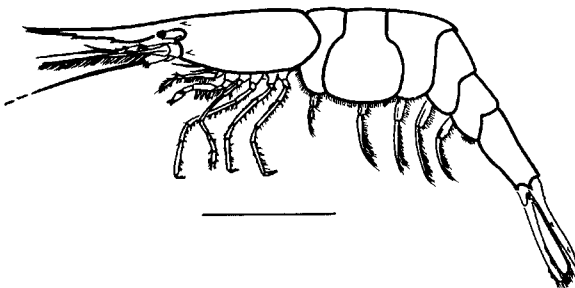
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H. hunti

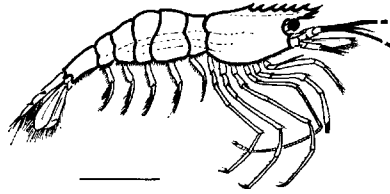


H. varians

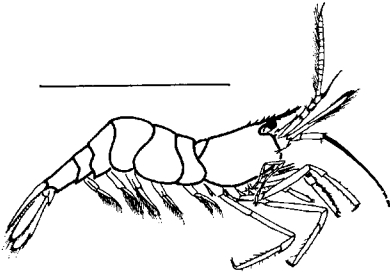


H. prideauxiana

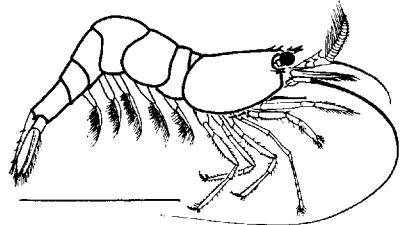
SPIRONTOCARIS & HIPPOLYTE



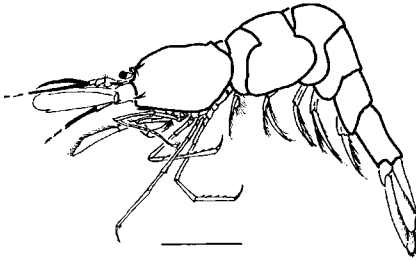
Lysmata seticaudata



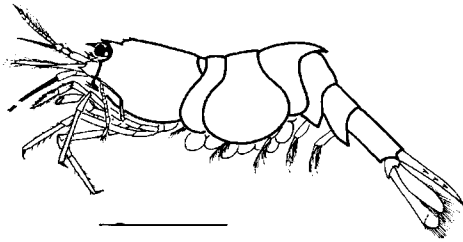
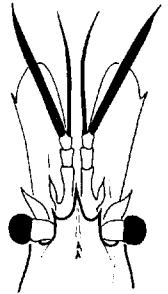
Cryptocheles pygmaea



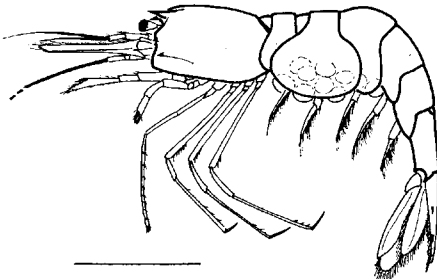
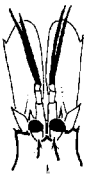
Thoralus cranchi



B. payeri

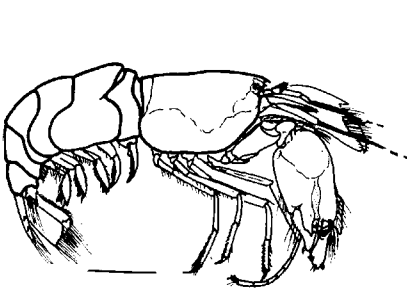


B. simplicirostris

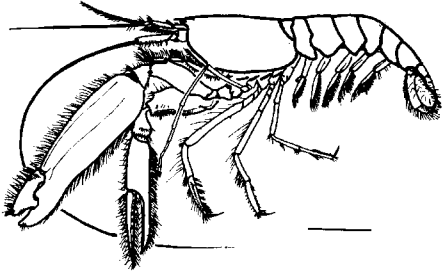
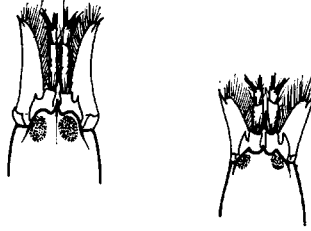


B. gracilis

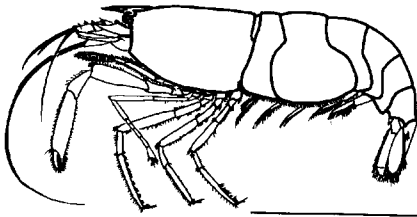
BYTHOCARIS



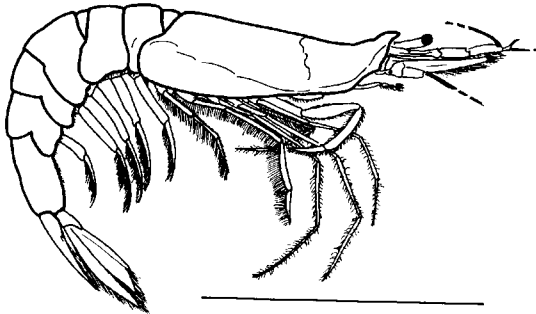
Alpheus macrocheles



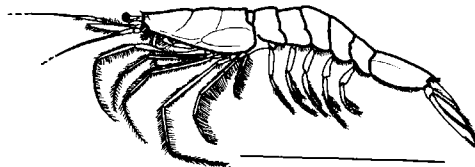
Alpheus glaber



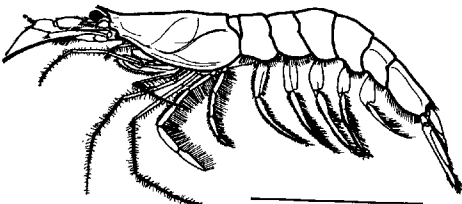
Athanas nitescens



S. mollis

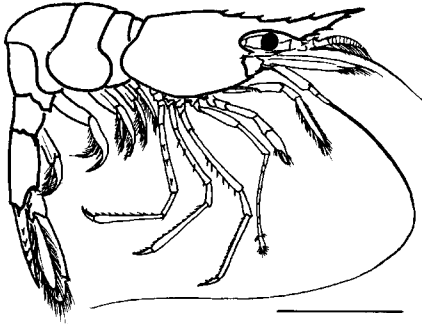


S. arcticus



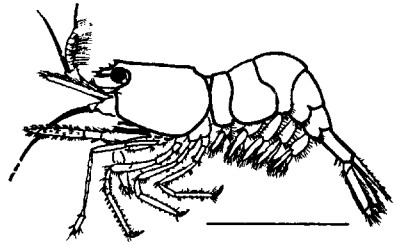
S. robustus

SERGESTES

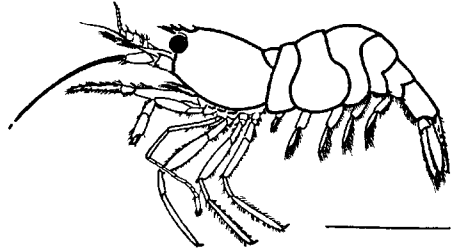


E. gaimardi

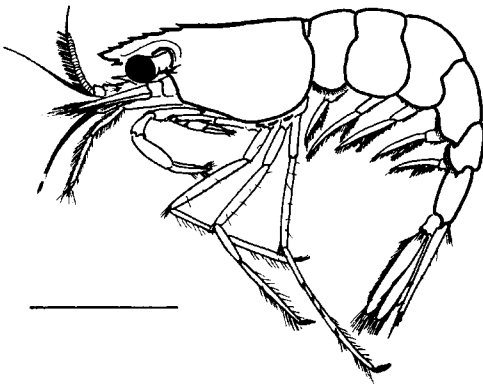
EUALUS



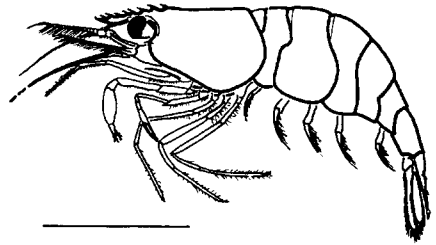
E. occultus



E. pusiolus



C. steveni

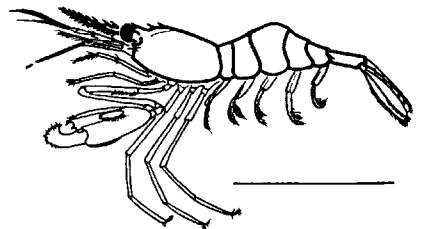


C. gordonii

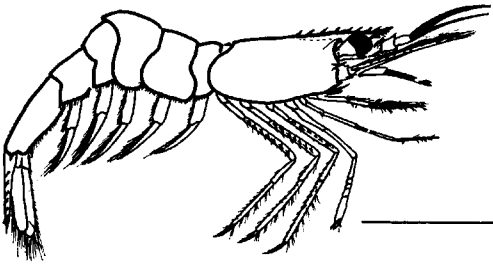
CARIDION



Lebbeus polaris



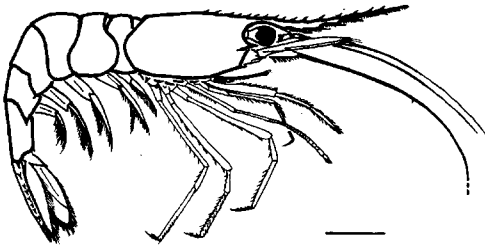
Leontocaris lar



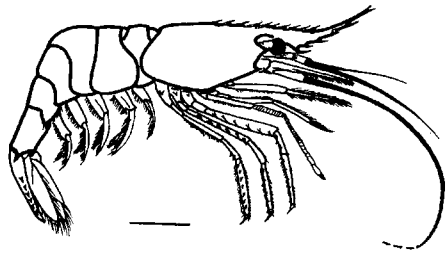
Pandalina brevirostris



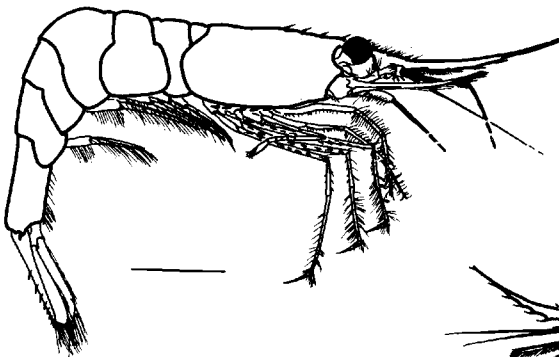
Plesionika martia



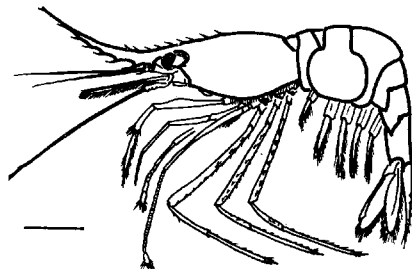
Pandalus borealis



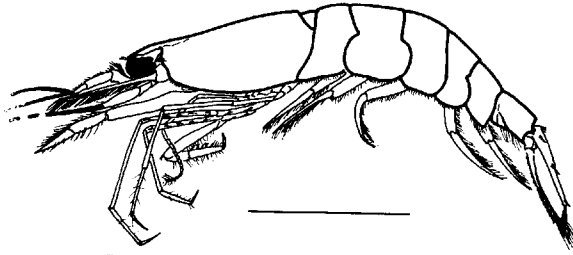
Pandalus montagui



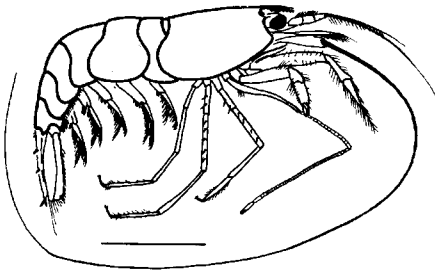
Dichelopandalus bonnierii



Pandalus propinquus



P. parva



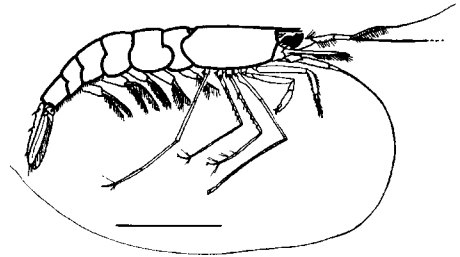
P. edulis



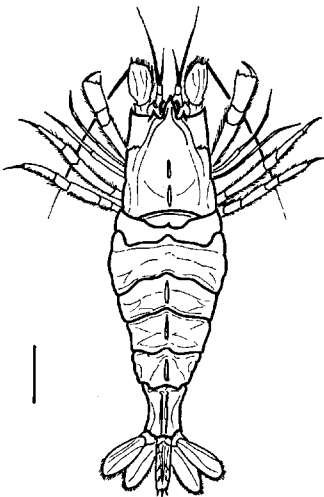
stylocerite
and orbit



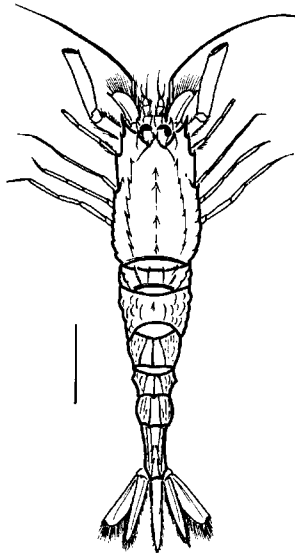
PROCESSA



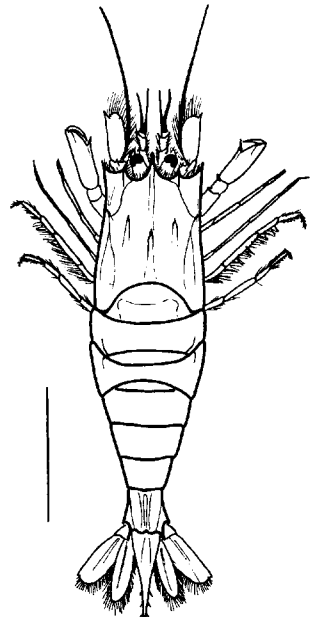
P. canaliculata



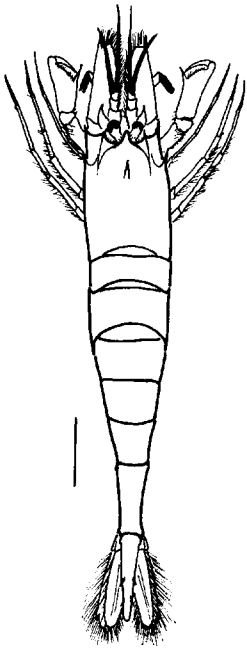
Sclerocrangon boreas



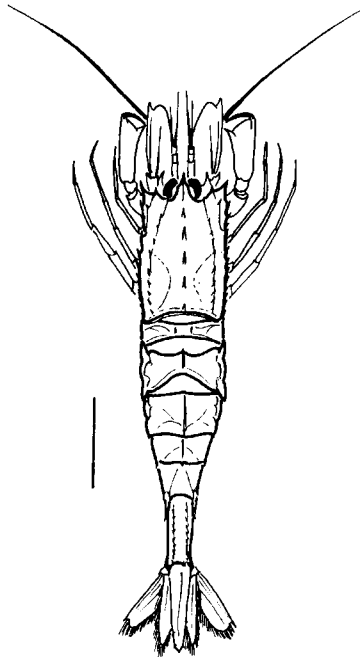
Pontocaris lacazei



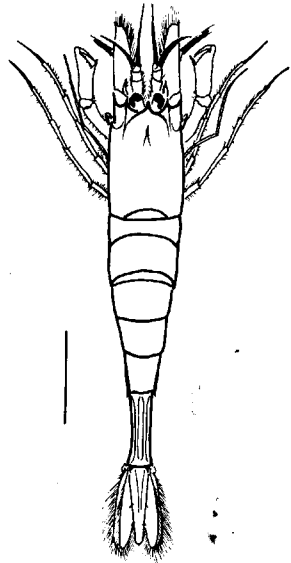
Sclerocrangon jacqueti



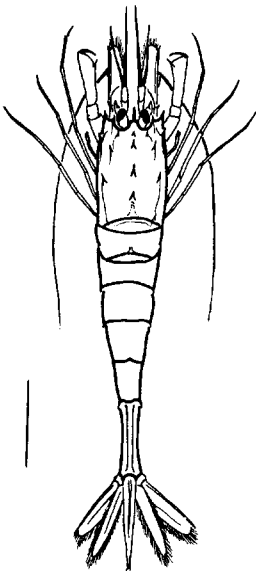
Crangon crangon



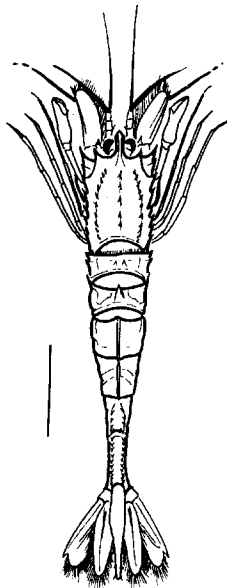
Sabinea sarsi



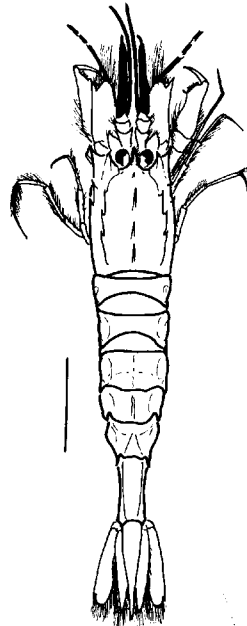
Crangon allmani



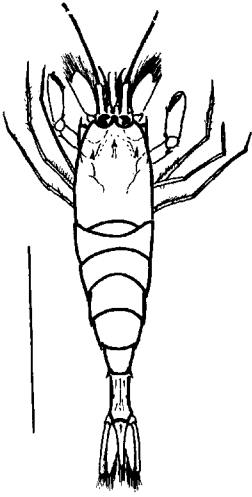
*Pontophilus
norvegicus*



*Sabinea
septemcarinata*



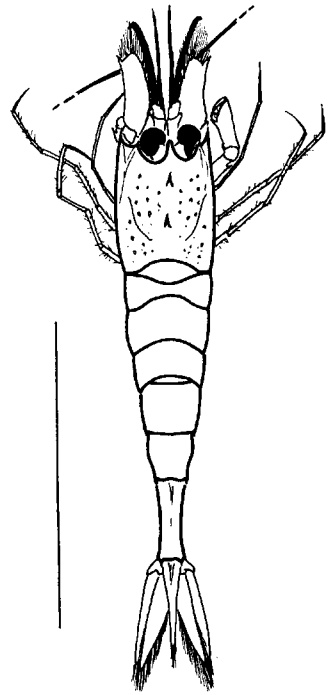
*Pontophilus
spinosus*



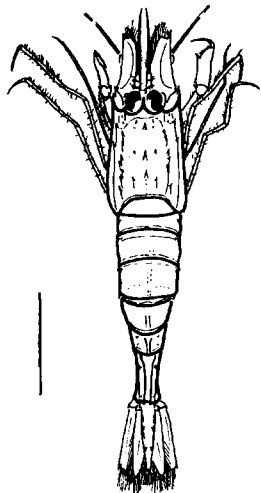
P. trispinosus



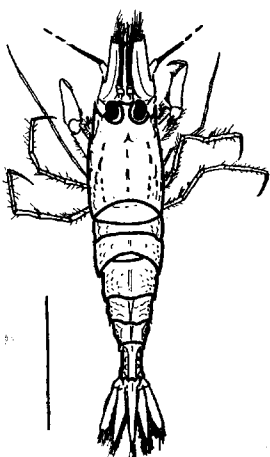
P. b. neglectus



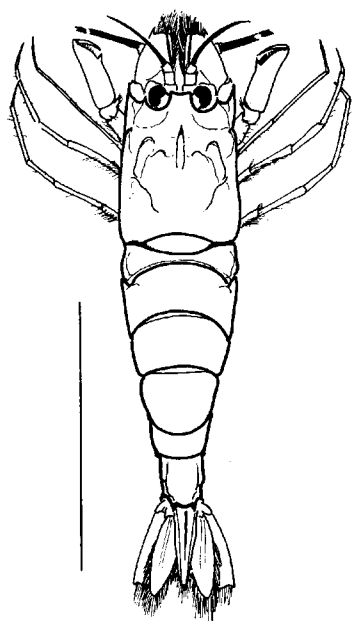
*P. bispinosus
bispinosus*



P. echinulatus

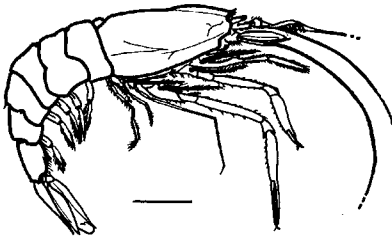


P. sculptus

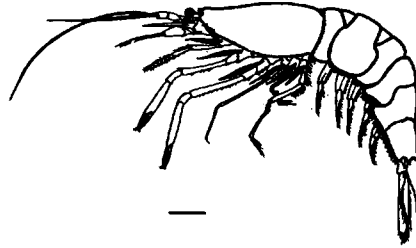


P. fasciatus

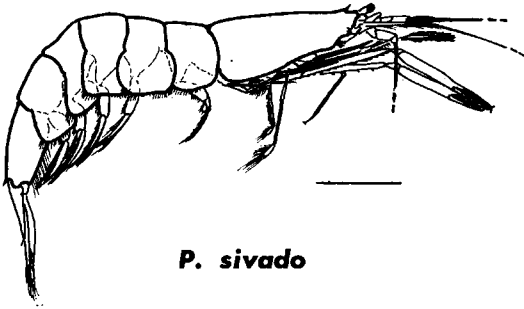
PHILOCHERAS



**Parapasiphae
sulcatifrons**

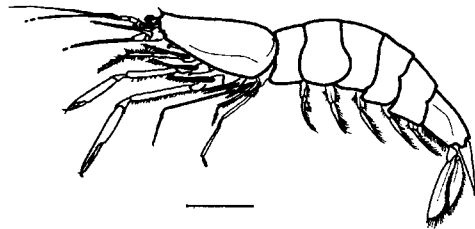


P. tarda

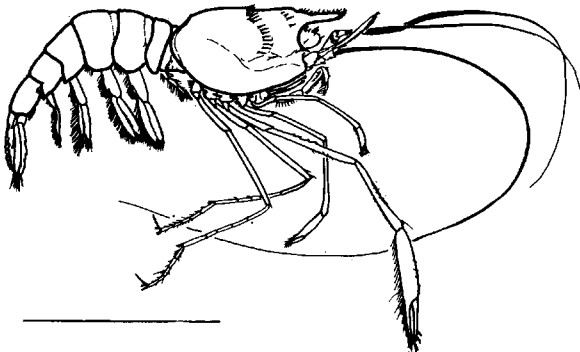


P. sivado

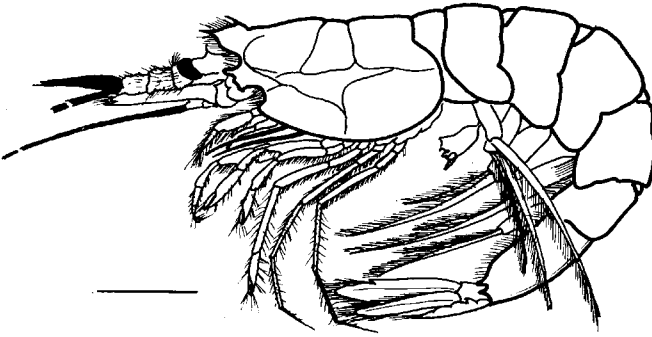
PASIPHAEA



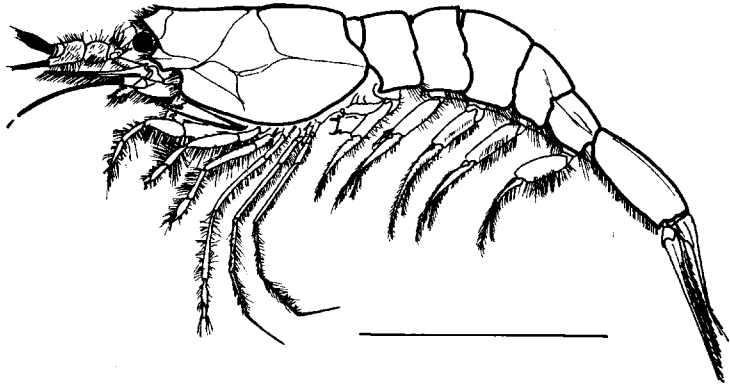
P. multidentata



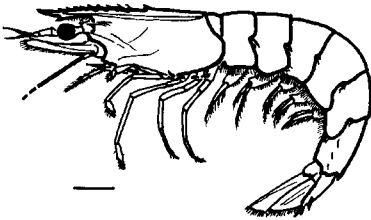
Richardina spinicincta



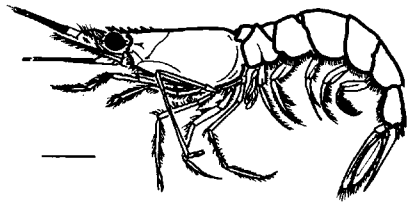
Gennadas valens



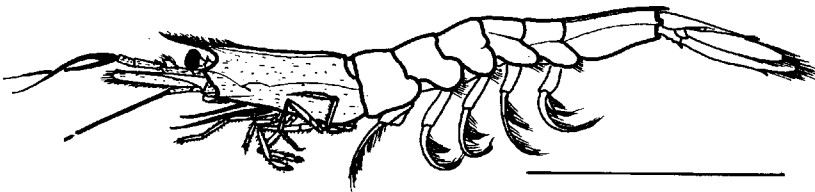
Gennadas elegans



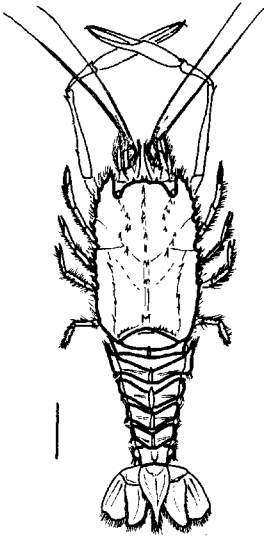
Penaeus trisulcatus



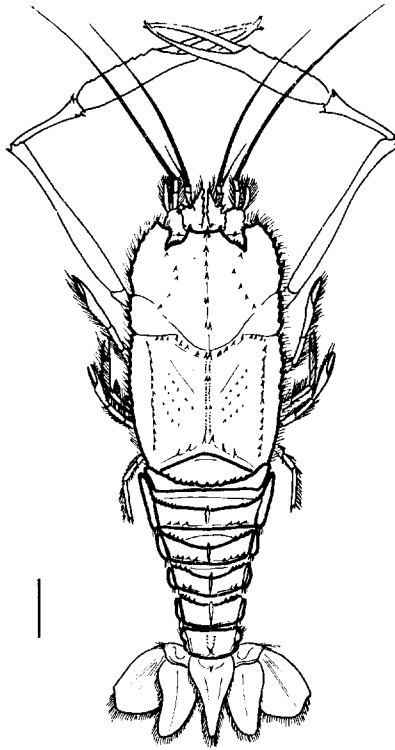
Solenocera siphonocera



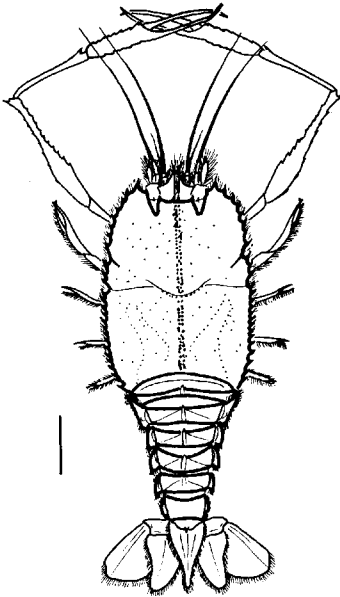
Funchalia woodwardi



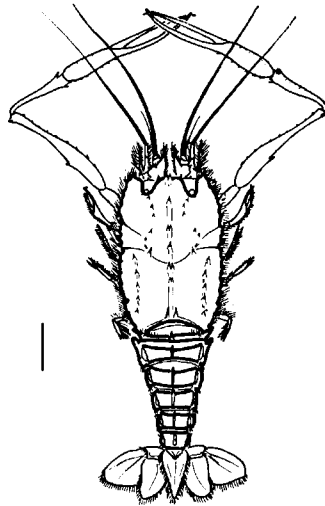
P. nanus



P. typhlops

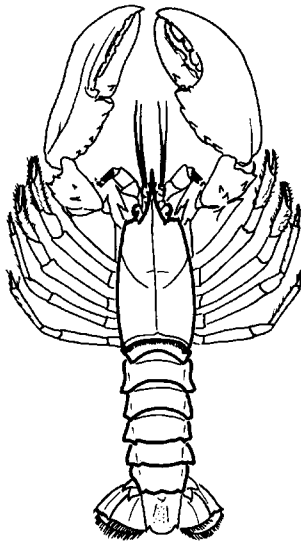


P. granulatus

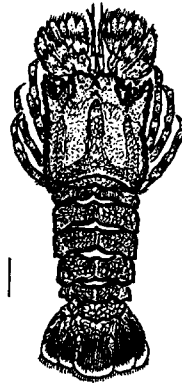


P. sculptus

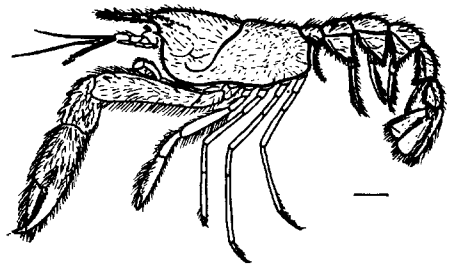
POLYCHELES



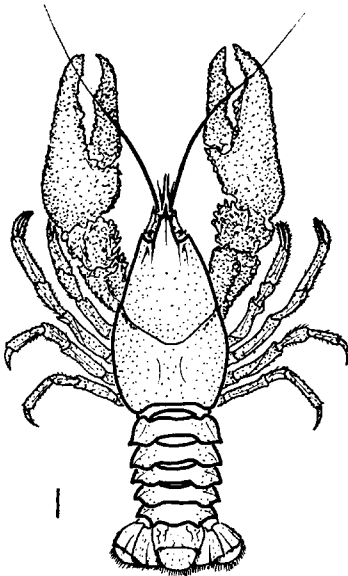
Homarus gammarus



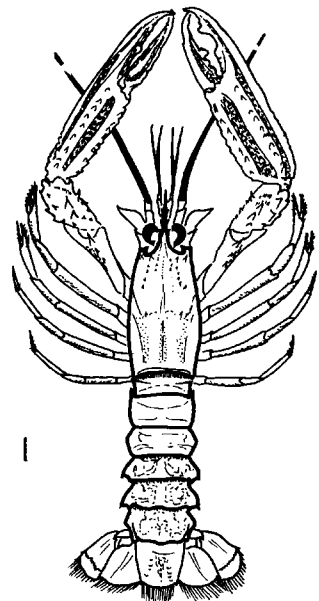
Scyllarus arctus



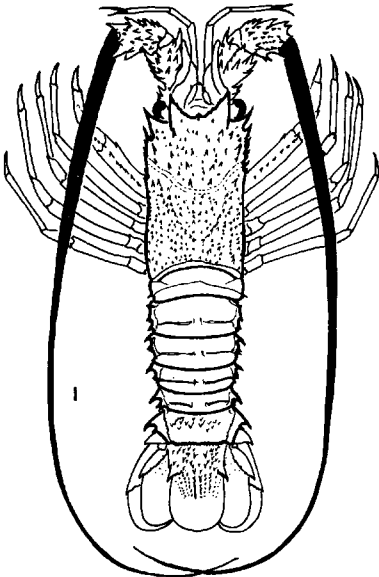
Nephropsis atlantica



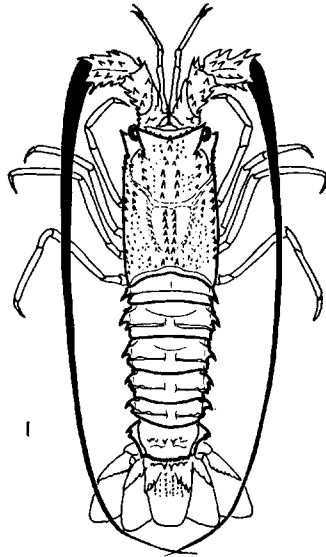
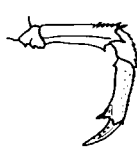
Astacus pallipes



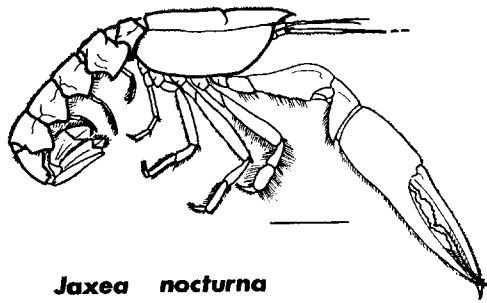
Nephrops norvegicus



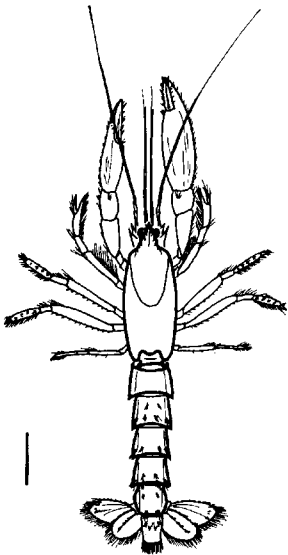
Palinurus elephas



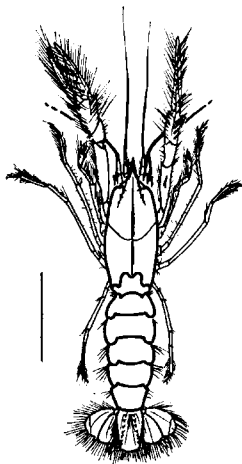
Palinurus mauritanicus



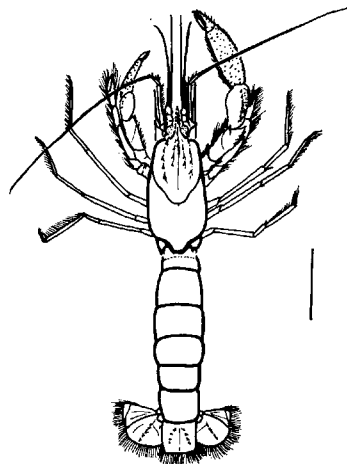
Jaxea nocturna



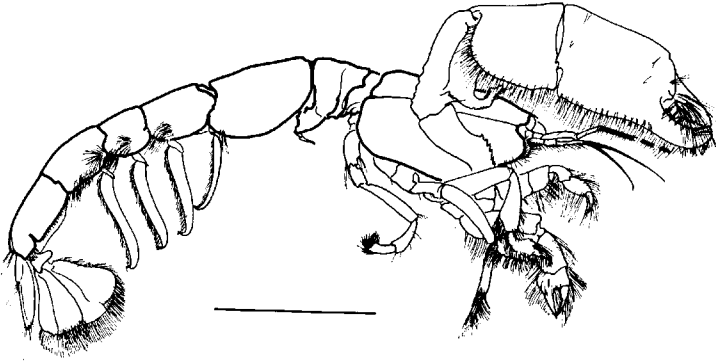
Axis stirhynchus



Calocaris macandreae



Calocarides coronatus

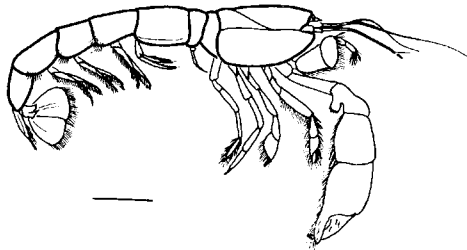


3rd m' ped

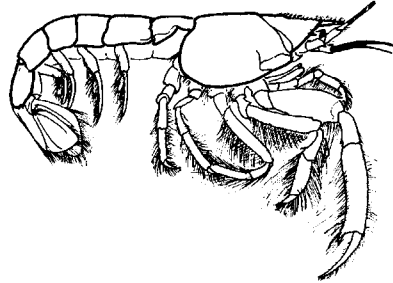
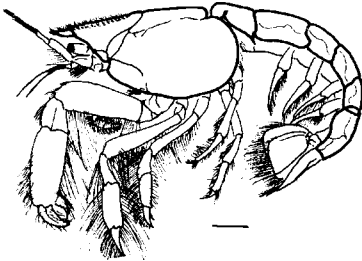


C. subterranea

CALLIANASSA

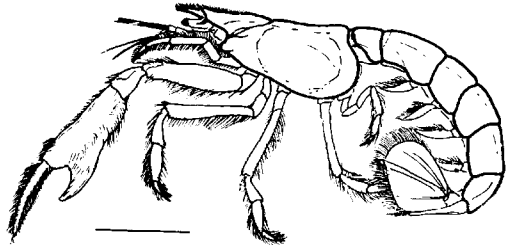


C. laticauda



U. stellata

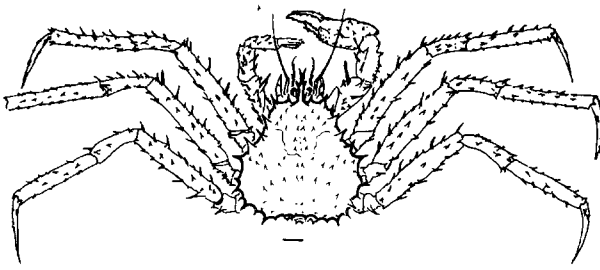
U. deltaura



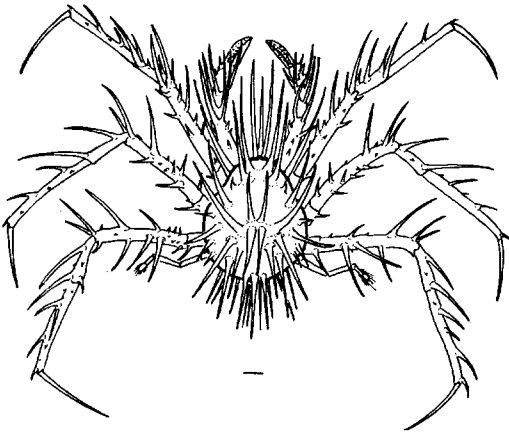
U. littoralis



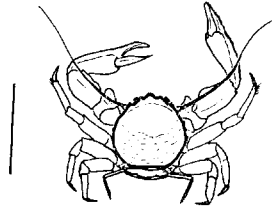
UPOGEBIA



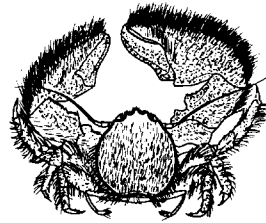
Lithodes maja



Neolithodes grimaldi

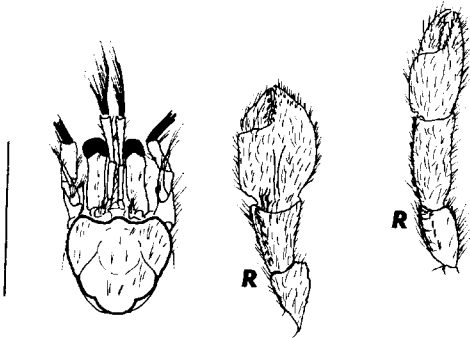


P. longicornis



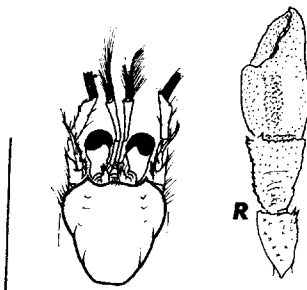
P. platycheles

PORCELLANA

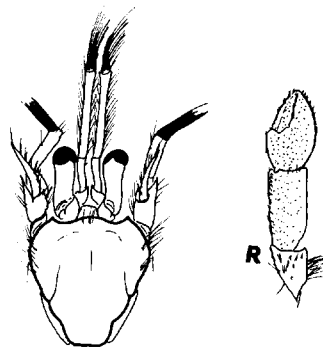


A. chiroacanthus

A. c. gracilis

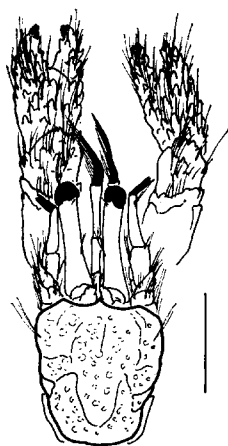


A. laevis

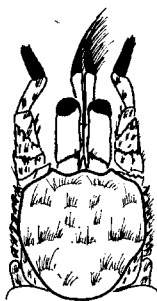


A. hyndmanni

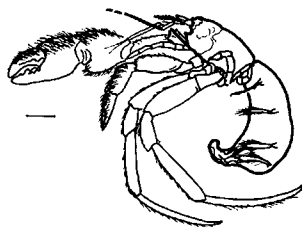
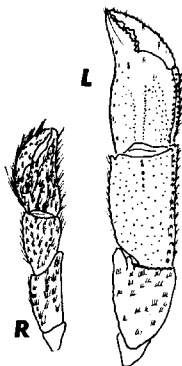
ANAPAGURUS



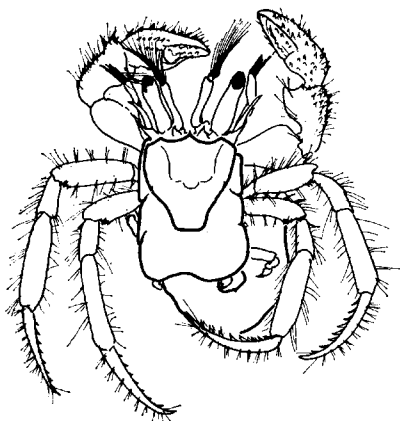
Clibanarius erythropus



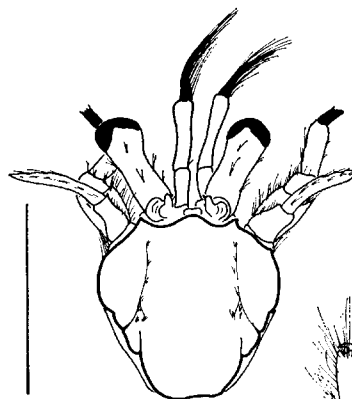
Diogenes pugilator



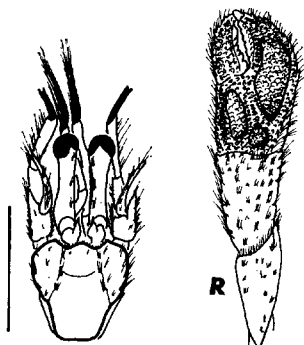
Parapagurus pilosimanus



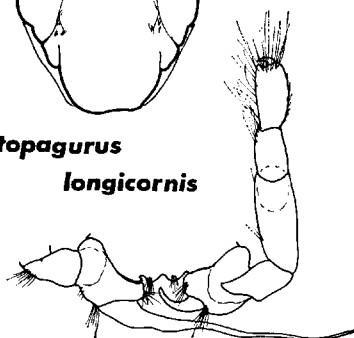
Catapaguroides timidus



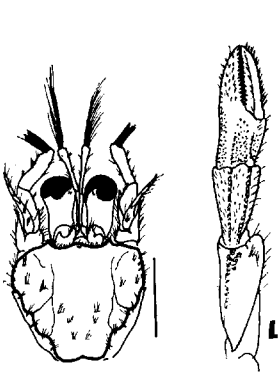
Nematopagurus longicornis



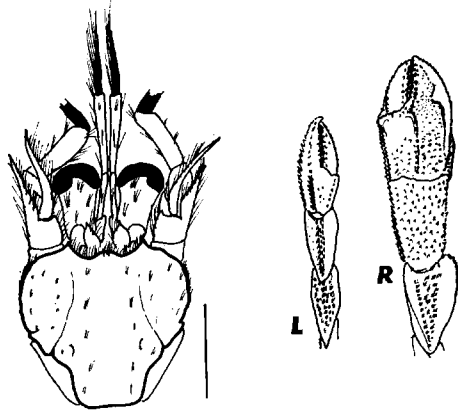
Pagurus sculptimanus



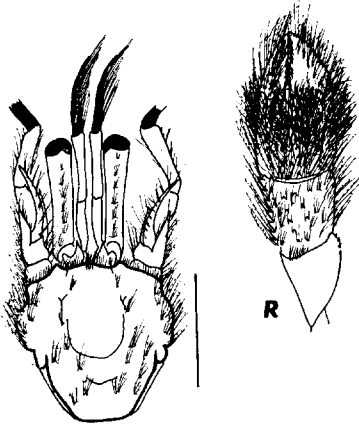
male 5th coxae



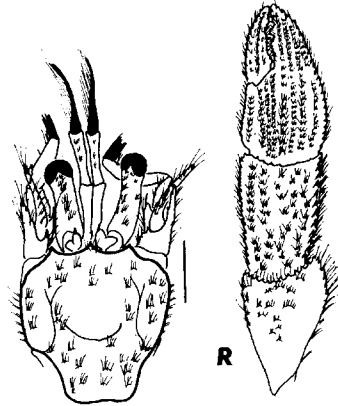
P. prideauxi



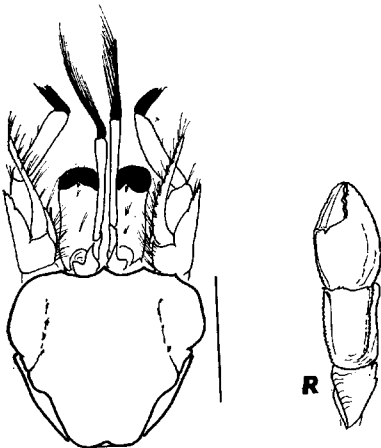
P. variabilis



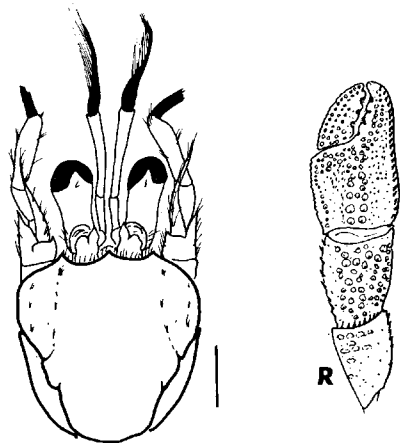
P. cuanensis



P. pubescens

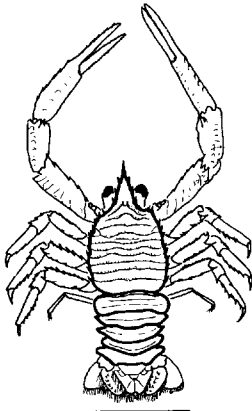


P. carneus



P. bernhardus

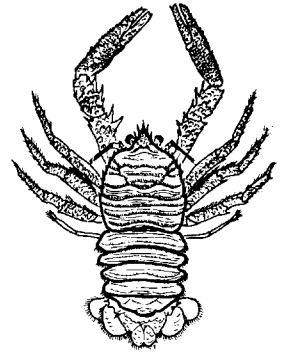
PAGURUS



G. intermedia



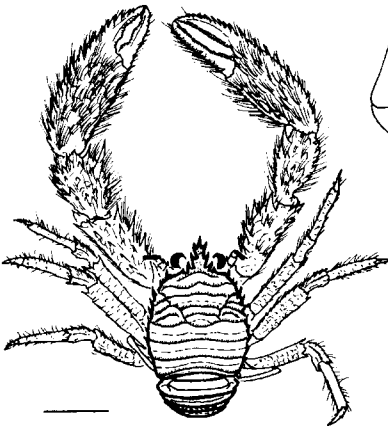
ant'le



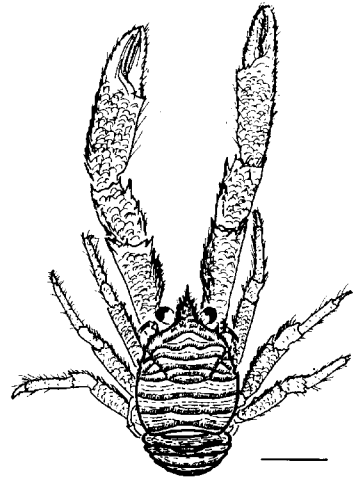
G. squamifera



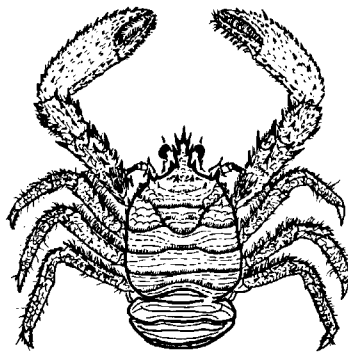
3rd m'ped



G. nexa

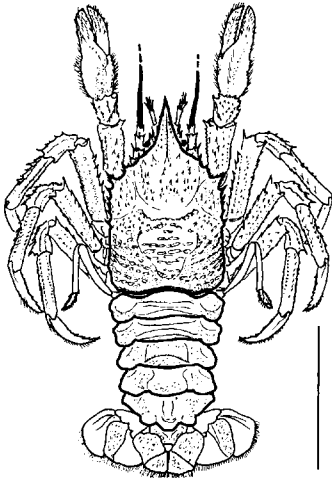


G. dispersa

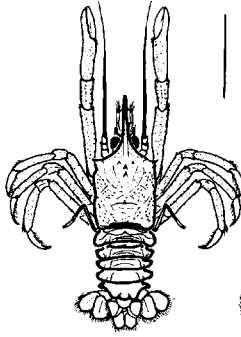


G. strigosa

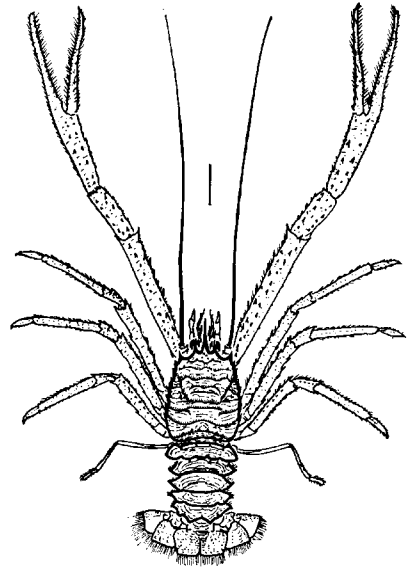
GALATHEA



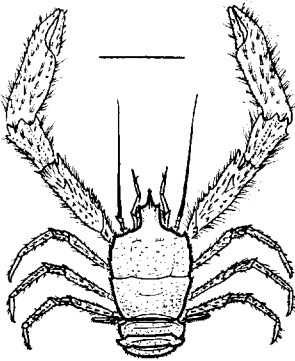
Munidopsis crassa



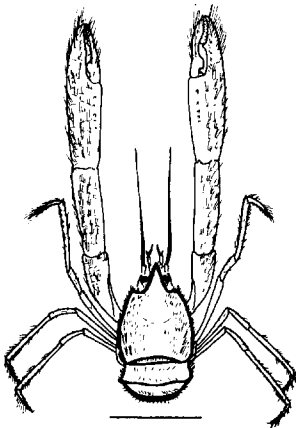
Munidopsis curvirostra



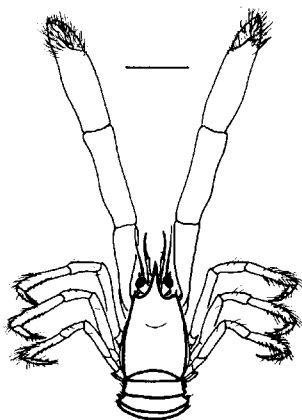
Munida bamffica



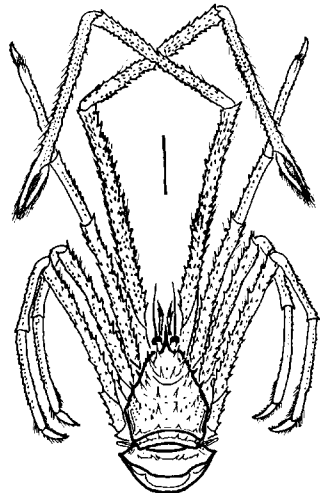
Munidopsis tridentata



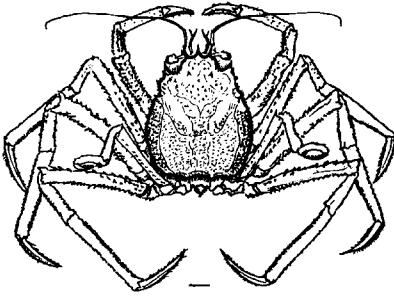
Uroptychus rubrovittatus



Uroptychus nitidus concolor



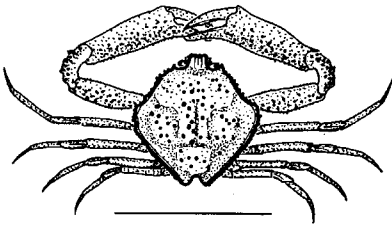
Chirostylus formosus



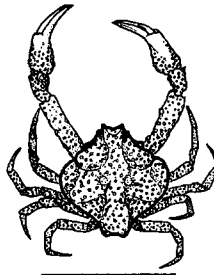
Paromola cuvieri



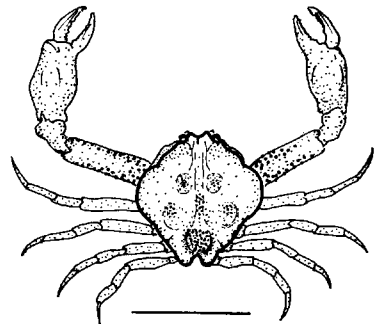
Dromia vulgaris



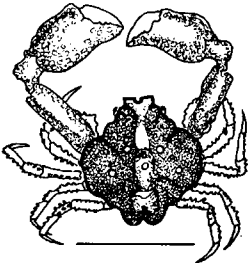
E. nux



E. tuberosa ♂

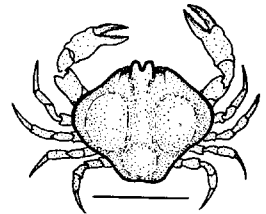


E. cranchi

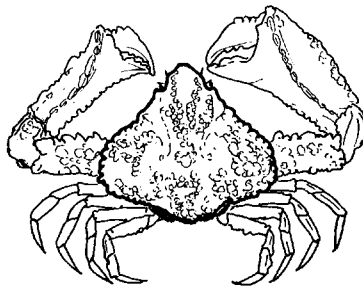


E. granulosa ♂

EBALIA



E. tumefacta



Lambrus massena