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A Guide to Identification of Decapoda, Euphausiacea, and Mysidacea from the Southern Beaufort Sea

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February 1990

Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2047

Fisheries and Oceans Pêches et Océans

Canada

Canadian Manuscript Report of
Fisheries and Aquatic Sciences 2047

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A GUIDE TO IDENTIFICATION OF DECAPODA, EUPHAUSIACEA, AND MYSIDACEA FROM THE SOUTHERN BEAUFORT SEA

edited by

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This is the 13th Manuscript Report
from the Central and Arctic Region, Winnipeg

PREFACE

Production of this publication was funded by the Northern Oil and Gas Action Program (NOGAP) and the Department of Fisheries and Oceans, Central and Arctic Region. It is one of a series of identification manuals to the invertebrates of the southern Beaufort Sea region. This document is in part the result of work conducted under the terms of a Department of Supply and Services contract issued to Invertebrate Research Associates (DSS Contract No.'s FP430-4-0614).

The scientific authority was M.J. Lawrence, Department of Fisheries and Oceans, Central and Arctic Region, 501 University Crescent, Winnipeg, Manitoba, R3T 2N6.

Cat. no. Fs 97-4/2047E ISSN 0706-6473

Correct citation for this publication is:

Keast, M.A., and M.J. Lawrence (ed.) 1990. A guide to identification of Decapoda, Euphausiacea, and Mysidacea from the southern Beaufort Sea. Can. Manuscr. Rep. Fish. Aquat. Sci. 2047: v + 61 p.

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Presented is a guide to three eumalacostracan orders, (Decapoda, Euphausiacea and Mysidacea), from the southern Beaufort Sea, and its coastal embayments. The guide, subdivided into order, family, genus and species is artificial and dichotomous in design. Illustrations, references and species descriptions are included.

Key words: Eumalacostraca; Decapoda; Euphausiacea; Mysidacea; taxonomy; plankton; Beaufort Sea; identification keys.

RÉSUMÉ

Keast, M.A., and M.J. Lawrence. (ed.) 1990. A guide to identification of Decapoda, Euphausiacea, and Mysidacea from the southern Beaufort Sea. Can. Manuscr. Rep. Fish. Aquat. Sci. 2047: v + 61 p.

Le présent article constitue un guide pour l'identification de trois ordres d'eumalacostracés (décapodes, euphausiacés et mysidacés) présents dans la partie sud de la mer de Beaufort et ses baies. Le guide, subdivisé en ordres, en familles, genres et espèces est de conception artificielle et dichotomique. Il comprend des illustrations, des références et des descriptions d'espèces.

Mots-clés: Eumalacostracés; décapodes; euphausiacés; mysidacés; taxinomie; plancton; mer de Beaufort; clés d'identification.

INTRODUCTION

Assessments of the effects of coastal development activities on the aquatic environment often rely upon pre- and post-development monitoring of invertebrate populations and communities.

Identification guides such as this one, restricted to regionally occuring species, offer the advantage of simplicity and allow the use of more obvious gross features as criteria for the identification of specimens. It is our intention that this simplification will result in more accurate identifications by those who are not expert taxonomists. The disadvantage to a regional guide is that it is not exhaustive for all species, so there is the possibility that a specimen may be mis-identified as opposed to being not identified. To ensure that this does not happen we encourage the use of this guide as a valuable and time saving complement to the more comprehensive taxonomic expertise and literature available.

The keys are artificial and dichotomous, using mutually exclusive couplets where possible. Phylogenetic relationships are not demonstrated. Several distinctive characters are provided within the keys to aid in identification. Key characters selected are absolute, easily perceived, and constant, except where noted. A glossary of terms used in the text is also included. The reference list provided is not exhaustive but does provide access to more information if required. The keys are for the adult stages of the euphausiids and mysids, but include both adults and juveniles of the decapods.

SOUTHERN BEAUFORT SEA SHELF

The region covered in the guide is that portion of the southern Beaufort Sea within Canadian boundaries lying to the south of 72^{o}N latitude, bound to the east by McKinley Bay (70^{o}N, 131^{o}W) and to the west by Herschel Island (69^{o}N, 138^{o}W), Yukon Territory. The bathymetry is characterized by a broad shallow continental shelf bordering the mainland coast with the shelf margin lying between the 100 and 200 m isobaths (Cornford et al. 1982). The shelf may be as far offshore as 150 km with depths of less than 10 m occurring up to 30 km offshore (Cornford et al. 1982). The shelf is discontinuous to the west off Herschel Island where the MacKenzie Trough has depths of 100 m or more within 35 km of the coastline. Eastward another trench extends from Kugmallit Bay to the outer margin of the shelf. This is most evident north of the Tuktoyaktuk peninsula.

During the summer months, Mackenzie River outflow introduces fresh water to the Beaufort Sea influencing the physical and chemical properties of the surface waters. The degree of intermixing, dependent on tides, currents and prevailing wind conditions, determines the salinity, temperature, turbidity, and nutrient levels of the waters over the shelf. The river outflow also transports alluvium which attenuates penetration of sunlight reducing photosynthesis.

Lunar tides are negligible in the Beaufort Sea. There is a reduced intertidal zone and tidal currents are usually weak.

METHODS

Most animals used for illustrative purposes were obtained from the Beaufort Sea; however, one Euphausiid species, Thysanoessa longipes Brandt, not available for drawings, was obtained from the Queen Charlotte Islands (courtesy of John D. Fulton, Department of Fisheries and Oceans (DFO), Pacific Biological Station, Nanaimo, B.C.).

The illustrations were prepared using a WILD M8 stereo microscope and a WILD M20 compound microscope each equipped with a camera lucida. Total body length was measured dorsally from the anterior margin of the cephalon to the posterior tip of the telson. The description of each species is based on the specimen illustrated. All specimens used are stored in the invertebrate collections of DFO, Winnipeg.

A KEY TO SELECT ORDERS OF EUMALACOSTRACA

1a. Carapace highly developed and fused with all of the thoracic segments; antenna 2, basal section biarticulate; no statocyst 2
(Plate II)

1b. Carapace not fused with 4 posterior thoracic segments; antenna 2, basal section not biarticulate; body slender, abdomen may appear slightly narrower than thorax for some species; statocyst present . . . . . Mysidacea
(Group 3, p. 16)
(Plate XIX, XX)

2a. Lateral sides of carapace enclose gills within well defined lateral branchial chambers; telson without a pair of movable spines; no photophores present. . . . . Decapoda
(Group 1, p.4)
(Plate I, IV)

2b. Gills present, not enclosed within lateral sides of carapace; telson with pair of movable spines; most species have photophores in each eyestalk, at base of each of 2nd and 7th thoracic appendages and between bases of 1st 4 pairs of pleopods . . . . . Euphausiacea
(Group 2, p.11)
(Plate XIV, XVI)

GROUP 1: DECAPODA

MAJOR IDENTIFYING CRITERIA

Order Decapoda

Seven genera of decapods (5 shrimp and 2 crabs), have been reported from the Southern Beaufort Sea. Four of the shrimp genera have been identified to species, however neither of the crabs has been identified beyond genus.

The use of keys to adults for distinguishing post-larval stages is not entirely satisfactory considering taxonomic characters used to distinguish between species are dependent on the developmental stage. However, juvenile specimens recovered in plankton tows from the area do resemble adults in general external morphology and can be correctly identified to species using the adult key.

Important criteria to identifying shrimp include the following:

(1) The body tends to be cylindrical or laterally compressed with a well developed abdomen.
(2) The carapace is fused dorsally to all the thoracic segments, and extends to the base of the legs enclosing the gills thus forming a branchial chamber. The rostrum, when present, is usually keel-shaped and serrated.
(3) The scaphognathite, a large exopod on the maxilla, pumps water through the branchial chamber.
(4) The 1st 3 pairs of thoracic appendages are modified as maxillipeds, the remaining 5 pairs of thoracic appendages are legs 1-5. (Plate I).
(5) The peduncle of antenna 2 has 5 segments, the segments are usually displaced so as to articulate in a zig-zag manner. (Plate II).
(6) The pleopods are large, beset with setae, and natatory in function. (Plate I).

SYSTEMATIC LIST

PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS MALACOSTRACA
SUBCLASS EUMALACOSTRACA
SUPERORDER EUCARIDA
ORDER DECAPODA
SUBORDER NATANTIA

FAMILY CRANGONIDAE
Argis dentata (Rathbun 1902)
Sabinea septemcarinata (Sabine 1824)

FAMILY HIPPOLYTIDAE
Eualus gaimardii (H. Milne-Edwards 1837)
Lebbeus White[1]
Spirontocaris phippsi (Krøyer 1841)

SUBORDER REPTANTIA
FAMILY MAJIDAE
Hyas Leach[2]

FAMILY PAGURIDAE
Pagurus Fabricius[1]

---

[1]juvenile stage - could not be keyed lower than genus (D. Laubitz, National Museum of Natural Sciences, Ottawa, personal communication).

[2]there is insufficient literature on the crabs of this region to key to species (D. Laubitz, personal communication).

A KEY TO SELECT DECAPODA FROM THE SOUTHERN BEAUFORT SEA

1a. Body laterally compressed; pleopods natatory 2

1b Body generally depressed; pleopods reduced, may be absent, not natatory 6

2a. Pereopod 1 chelate; right and left pereopods equal, pereopod 1 stout usually shorter than pereopod 2; carpus of pereopod 2 with 7 annulations; rostrum denticulate with no moveable spines, usually well developed, may be reduced . . . . . Family Hippolytidae Ortmann 3

2b. Pereopod 1 subchelate; pereopod 2 often reduced, carpus without annulations; rostrum when present generally small, usually dorsally flattened; carapace sculptered to varying degrees . . . . . Family Crangonidae Bell 5

3a. Carapace with no supraorbital spines; 3rd maxilliped with an exopod and epipod; pereopod 1 and 2 chelate; pereopods lacking exopods . . . . . Eualus Thallwitz

Rostrum[3] elongate (> 3/4 length of antennae scale), serrulate dorsally and ventrally; pereopods 1-3 with epipods . . . . . Eualus gaimardii (H. Milne-Edwards 1837) Plates I-V

3b. Carapace with supraorbital spines 4

4a. Carapace with 2 supraorbital spines on each lateral margin (1 nearest orbit margin is small, difficult to discern); 3rd maxilliped with an exopod and epipod . . . . . Spirontocaris Bate

Rostrum[3] short, stout, coarsely serrated dorsally (6-9 rostral serrations), serrulate ventrally (4-7 serrations); pereopods 1 and 2 with exopods. . . . . Spirontocaris phippsi (Krøyer 1841) Plate VI

4b. Carapace with 1 supraorbital spine on each lateral margin; 3rd maxilliped without an exopod . . . . . Lebbeus White

---

[3]serrulations on rostrum will be variable depending upon the stage of development.

5a Pereopod 2 not chelate, smaller than pereopod 1, rudimentary; rostrum short, carapace with 7 longitudinal serrated ridges . . . . . Sabinea Owen

Rostrum short with rounded tip, length slightly exceeding eyes, no serrations; 1st pair of pereopods strongly subchelate, 2nd pair slender, often reduced. . . . . Sabinea septemcarinata (Sabine 1824) Plates IX-X

5b. Pereopod 2 chelate; true rostrum absent, but rostral or anterior spine adjacent to frontal margin; carapace with 2 dorsal spines . . . . . Argis Krøyer

No true rostrum but a short rostral spine; both eyes in a single socket . . . . . Argis dentata (Rathbun 1902) Plates VII-VIII

6a. Distinct rostrum present; carapace fused with epistome laterally; abdomen brachyurous, small, straight, symmetrically bent under thorax, no biramous appendages on 6th abdominal segment . . . . . Family Majidae Alcock

Carapace much longer than broad, rostrum elongate; male abdomen with broad apex; telson elliptical to subquadrate . . . . . Hyas Leach

6b. Body soft, asymmetrical, spiral shaped; pereopods 4 and 5 rudimentary; pleopods developed only on one side; uropods with verrucose surfaces . . . . . Family Paguridae Dana

Tail fan reduced, adapted for holding body in mollusc shell (hermit crabs) . . . . . Pagurus Fabricius

DIAGNOSES AND DESCRIPTIONS

Family Hippolytidae

Eualus gaimardii (H. Milne-Edwards 1837) Plates I-V

Carapace with 2-3 dorsal serrations; female rostrum shorter than male; antennular scale in male longer than female; rostrum with variable serrations ranging from 5-11 dorsally, 2-5 ventrally (Note: individual variability dependent on geographic locality); epipods present on 1st 3 pairs of pereopods; 3rd abdominal segment with no hook or lobe in female, in rare cases a rudimentary process in male; telson with 5-7 pairs of lateral spines and 6 apical spines; female up to 58 mm, male 41 mm.

Note: The adult stage of E. gaimardii has no supra-orbital spines. These spines are present from zoeal stage II and are lost at the moult to the megalopa (Pike and Williamson 1961).

Distribution: southern Beaufort Sea (large numbers near Herschel Island and Franklin Bay); Pt. Barrow, Alaska; Prince William Sound; Hudson Bay; Richmond Gulf; Newfoundland; Wellington and Cambridge Bays; Foxe Basin; Queen Elizabeth Islands; Ungava Bay; North Sea; east coast of North America to Cape Cod, west coast of N. America to Sitka; Siberia; Jones Sound, near Coburg Island; Belcher and Wellington Channels.

References: Yashnov and Bronshtein 1948; Squires 1957, 1967a,b, 1968, 1969; Grainger 1962; Squires and Figueira 1974.

Spirontocaris phippsi (Krøyer 1841) Plate VI
(=Spirontocaris turgida (Krøyer))
(=Hippolyte phippsii Krøyer)

Carapace ridge originates at mid-cephalothorax, has 3-4 serrations directed anteriorly, lateral margins with 4 spines, 2 supraorbital spines, anterior supraorbital spine at orbit margin is small and barely visible; rostrum straight, knife-like, slightly narrowed toward base, rostrum with 6-9 serrations dorsally and 4-7 ventrally, (Note: male distinguished by narrow rostrum and almost complete absence of teeth on carapace); antennular scale for both sexes reaches the end of the 2nd peduncular segment; eyes extend to the 2nd peduncular segment; body is stout; pereopods stout, dactyl of posterior 3 pereopods short, stout with bifid tip; epipods on 1st 3 pereopods; ventral spine on 4th pleuron; abdomen conspicuously punctate; telson with 2-7 pairs of lateral spines, often not paired completely; female up to 38 mm.

Distribution: circumpolar; Bering Sea; Siberia; Bay of Fundy; Gulf of St. Lawrence; Europe south of Arctic Ocean.

References: Rathbun 1904, 1919; Calman 1909; Stappers 1911; Hart 1939; Holthuis 1947; Yashnov and Bronshtein 1948; Squires 1957, 1962, 1967a,b, 1968, 1969; Greve 1963; Mohammed and Grainger 1974; Squires and Figueira 1974.

Family Crangonidae

Argis dentata (Rathbun 1902) Plates VII-VIII

Body stout, depressed; carapace with 2 dorsal spines and 1 medialateral spine on each side; rostral spine short; eyes small, both contained in a single socket; antennal scale short with distal spine on outer margin; pereopod 1 subchelate; pereopod 2 chelate, slender; telson longer than 6th abdominal segment with 3 pairs of lateral spines; 6th abdominal segment with 2 prominent dorsal carinae more or less parallel extending beyond posterior margin as moderate spines; brown in color; female up to 83 mm, male up to 46 mm.

Distribution: southern Beaufort Sea; Bering Sea; Okhotsk Sea; Sea of Japan; Coronation Gulf.

References: Squires 1957, 1967; Williams 1974; Butler 1980; Haynes 1985.

Sabinea septemcarinata (Sabine 1824) Plates IX-X
(=Crangon septemcarinata Sabine)

Carapace with 7 longitudinal serrated ridges, median ridge usually with 4-5 serrations directed anteriorly; rostrum short with rounded tip dorsally flattened, slightly longer than eye stalks; eyes are sunken; pereopod 1 subchelate, segments thick; pereopod 2 not chelate, reduced; pereopods 3-5 slender, elongate; pleopods 1-5 well developed, similar; abdominal segment 6, 2-3x length of segment 5, with no appendages; telson apex rounded with 2 pairs of stout apical spines (1 pair short, 1 pair longer) at the lateral apex margin, between which are 13 stout apical setae, 5 pairs of lateral spines, the entire telson is beset with plumose setae; light brown in colour; up to 80 mm.

Distribution: Siberia; Arctic Canada to Novia Scotia; Sea of Japan; San Juan Islands; Gulf of Georgia; Greenland; Bering Sea; Okhotsk Sea; Coronation Gulf; Southern Beaufort Sea.

References: Bate 1888; Hansen 1908; Stappers 1911; Rathbun 1919; Hart 1939; Heegaard 1941; Yashnov and Bronshtein 1948; Squires 1957, 1962, 1967a,b, 1968, 1969; Mohammed and Grainger 1974.

DECAPOD LARVAL DEVELOPMENT

Some species of decapods shed their eggs freely into the ocean. This will result in various growth stages being recovered in plankton tows. Developmental growth stages of decapods have been documented in Williamson, H. C. 1915; Stephensen 1916, 1935; Lebour 1932, 1936, 1937, 1940; Needler 1933; Gurney 1939, 1942; Williamson, D. 1957a,b, 1960; Pike and Williamson 1958, 1961 and Haynes 1985. Complete larval descriptions are known for only a limited number of species. The number of stages varies depending on the genus, species and environmental conditions (Omori 1974). In addition, the number of intermoults have been shown to vary under similar or identical environmental conditions within individual species (Omori 1974).

GROUP 2: EUPHAUSIACEA

MAJOR IDENTIFYING CRITERIA

Order Euphausiacea

Euphausiids are exclusively planktonic and primarily oceanic in distribution. The known species from the Southern Beaufort Sea are represented by one family Euphausiidae, and three species, Thysanoessa raschi (M. Sars 1864), Thysanoessa inermis (Krøyer 1846), and Thysanoessa longipes Brandt 1851.

Important criteria for identifying euphausiids of the area follows:

(1) The lateral margins of the carapace do not enclose the gills.
(2) The eyes are stalked, and the shape and size are diagnostic features.
(3) None of the thoracic appendages are specialized as maxillipeds, and each are biramous. Often the 1st, 2nd, and/or 3rd are modified for feeding and 7th or 8th are reduced or vestigial.
(4) Abdominal segments 1 to 5 each have one pair of well developed pleopods with long setae. The 6th segment bears 1 pair of uropods and the telson.
(5) The telson has 1 pair of movable spines. (Plate XVI).

Euphausiids are filter-feeders with the first 6 thoracic appendages composing the filtering apparatus. Each endopodite of the thoracic appendages bears long setae. Long exposed filamentous gills called podobranchia are present on all of the thoracic appendages, although poorly developed on the first pair. The ventilating current is produced by the thoracic exopodites.

Euphausiids are luminescent having intracellular organs called photophores. Most species have one photophore located on the upper end of the ocular peduncle, one on each coxae of the 2nd and 7th thoracic appendages, and one located medially on each of the sternites of first 4 abdominal segments.

In some species the form of the feeding appendages, especially the maxillule and maxilla, can be diagnostic of a species. The dissection of mouthparts has been avoided in this key due to their diminutiveness.

The structure of the petasma, the male copulatory organ, is often used as an identifying criterion. However we have been able to use other more obvious features to distinguish the three species from the southern Beaufort Sea region. Kathman et al. (1986) provides a description of the petasmas of these three euphausiids.

SYSTEMATIC LIST

PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS MALACOSTRACA
SUBCLASS EUMALACOSTRACA
SUPERORDER EUCARIDA
ORDER EUPHAUSIACEA

FAMILY EUPHAUSIIDAE
Thysanoessa inermis (Krøyer 1846)
Thysanoessa longipes Brandt 1851
Thysanoessa raschi (M. Sars 1864)

KEY TO SELECT EUPHAUSIACEA FROM THE SOUTHERN BEAUFORT SEA

1a. Keel present on dorsal surface of carapace; 2nd pair of thoracic legs greatly elongated . . . . . *Thysanoessa longipes* Brandt 1851 Plate XIII

1b. Keel absent; thoracic appendages of equal length. 2

2a. No denticles present on lateral side of carapace; 5th and/or 6th abdominal segment possesses dorsal spine. . . . . *Thysanoessa inermis* (Krøyer 1846) Plates XI-XII

2b. One denticle on anterolateral margin of carapace; no spines on abdominal segments. . . . . *Thysanoessa raschi* (M. Sars 1864) Plates XIV-XVII

DIAGNOSES AND DESCRIPTIONS

Thysanoessa inermis (Krøyer 1846) Plates XI-XII

Carapace lateral margins with no denticles; rostrum elongate, extending slightly beyond eye, apex pointed; eyes circular, non-constricted (sometimes slightly contricted eyes are found in juveniles); antenna 1, 1st peduncle segment in male with a rounded, upward projecting lobe bearing 2 rows of slightly recurved spines, female has small setiferous lobe, 2nd peduncle segment in male with elongate lobe on dorsad anterior margin, 3rd peduncle segment with heavy dorsal crest distally, scale extends to mid-3rd segment; thoracic legs are similar; 6th abdominal segment shorter in length than sum of segments 4 and 5, with a well defined dorsal spine (1-spined form), 5th abdominal segment may have a well-defined or rudimentary dorsal spine (2-spined form), occasionally 4th abdominal segment may be spined (3-spined form[4]); adult 20-25 mm.

Distribution: circumpolar; southern Beaufort Sea; Bering Sea; British Columbia; North Pacific; Hudson Bay; North Atlantic; Chukchi Sea; Barents Sea.

References: Sars 1885; Hansen 1908; Stappers 1911; Schmitt 1919; Lebour 1926; Stephensen 1933, 1943; Dunbar 1940, 1964; Einarsson 1945; Banner 1949, 1954; Kielhorn 1952; Boden et al. 1955; Johnson 1956; Drobysheva 1957; Brinton 1962; Grainger 1962; Ponomareva 1963; Nemoto 1966; Shen 1966; Jones, L.T. et al. 1967; Geiger et al. 1968; Jones, L.T 1969; Leung 1970; Mauchline 1967, 1971a,b; Mauchline and Fisher 1969; Shih et al. 1971; Lacroix and Bourget 1973; Nemoto et al. 1973; Wing 1974; Berkes 1975, 1977a; Kulka and Corey 1978; Shih and Laubitz 1978; Smidt 1979; Kulikov 1980; Kulka et al. 1982; Lindley 1982; Sameoto 1983.

Thysanoessa longipes Brandt 1851 Plate XIII

Rostrum long and narrow, tapering distally to a point, male more slender than female; rostral keel extends backward over the carapace; carapace with a lateral denticle on its posterior half; eyes large with a conspicuous transverse constriction, dorsal section much narrower than the ventral section; antenna 1 of female with both distal peduncle segments elongated and slender; 1st to 5th abdominal segments each with posterolateral angle of the side plates produced into an acute tooth; 3rd to 5th abdominal segments with a sharp median keel; dorsal spines on abdominal segments 3-6; 2nd thoracic leg greatly elongated with the merus reaching beyond the end of the 1st antennal peduncle.

Note: According to Banner (1949) there are two forms of this species: the large form as redescribed by Hansen (1915) which is easily recognized by the long dorsal abdominal spines (length 22-30 mm); and the smaller form without the spines (length 12-17 mm).

Distribution: circumpolar; Bering Sea; NW Pacific; Sea of Japan; inhabits entire subarctic water mass; southern Beaufort Sea.

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[4]The rare 3-spined form has been recorded in the southern Beaufort Sea (Korczynski, in press).

References: Hansen 1915; Tattersall 1933; Boden et al. 1955; Ponomareva 1963; Leung 1970; Wacasey 1975; Kathman et al. 1986.

Thysanoessa raschi (M. Sars 1864) Plates XIV-XVII

Eyes large and nearly spherical, no constriction; carapace lateral margins with a pair of well developed denticles anterior to median lateral margin; rostrum slightly short of 1st peduncle segment of antennae, rostrum of female abruptly tapers to an acute angle, rostrum of male broader than female with distal portion expanded and broader than proximal portion, tip rounded; antenna 2, peduncle segment 1 with spine on anterior lateral margin; antenna 1, male, 1st and 2nd peduncle segments with small setose lobes dorsad, 3rd peduncle segment longer than 2nd for both female and male; scale extends slightly beyond 2nd peduncle segment; anterior thoracic legs of similar size and development, 2nd thoracic leg may be slightly elongate; abdomen with no keels or denticles dorsad, posterior margin of 6th segment straight; uropods usually shorter than telson; adult 20-25 mm.

Distribution: circumpolar; southern Beaufort Sea; North Pacific; Bering Sea; Hudson Bay; Gulf of St. Lawrence; Cape Cod; Barents Sea; Chukchi Sea; north Atlantic; North Sea.

References: Sars 1885; Schmitt 1919; Lebour 1926; Macdonald 1928; Tattersall W.M. 1933; Stephensen 1933, 1943; Dunbar 1940, 1964; Einarsson 1945; Banner 1949, 1954; Kielhorn 1952; Boden et al. 1955; Johnson 1956, 1958; Drobysheva 1957; Brinton 1962; Ponomareva 1963; Grainger 1965; Mauchline 1965, 1967, 1971a,b; Nemoto 1966; Jones 1969; Mauchline and Fisher 1969; Leung 1970; Shih et al. 1971; Wing 1974; Berkes 1975, 1977b; Harding 1977; Shih and Laubitz 1978; Smidt 1979; Kulikov 1980; Kulka et al. 1982; Lindley 1982; Sameoto 1983; Kathman et al. 1986.

EUPHAUSIID LARVAL DEVELOPMENT

Euphausiids representing the genus Thysanoessa Brandt shed their eggs freely into the ocean (Mauchline and Fisher 1969). This will result in the various developmental growth stages being recovered in the plankton tows.

The developmental growth stages of euphausiids are well documented (Sars 1885; Lebour 1926; Macdonald 1928; Einarsson 1945; Mauchline 1965, 1967, 1971b; Mauchline and Fisher 1969; Kulka and Corey 1978.)

GROUP 3: MYSIDACEA

MAJOR IDENTIFYING CRITERIA

Order Mysidacea

Mysids inhabit fresh, estuarine and salt waters. The species encountered in the southern Beaufort Sea all belong to the family Mysidae. The identification of mysids is difficult owing to the subtle structural differences between the species. In addition, the terminology when keying mysids can be confusing because there has been little standardization (Daly and Holmquist 1986).

An important criterion in recognizing a mysid of the family Mysidae is the presence of a prominent statocyst on the endopod of each uropod. This is a useful diagnostic characteristic not found in any other crustacean group.

Criteria of importance when identifying this group include:

(1) The carapace is not united with the last 3-4 posterior thoracic segments. Rostrum, when present, usually has a transverse groove or "cervical sulcus" on the dorsal surface in the region of the mandible.
(2) Gills are present in only two deep water families, and are not easily visible. This distinguishes them from euphausiids.
(3) The 1st pair of thoracic legs, and sometimes the 2nd, are modified as maxillipeds. The remaining 6 or 7 thoracic legs are similar; the exopodites are filamentous.
(4) In the family Mysidae, the pleopods of the female are rudimentary and not adapted for swimming. The male pleopods are natatory, the 3rd and/or 4th pleopod is elongate and modified as a copulatory organ.
(5) The antennal scale (exopodite of antenna 2) in regards to its relative proportion of length to width, the apex shape and whether it is segmented.
(6) The spination and setation on the uropods and telson, and the telson shape. Note: the absolute number of spines and/or setae should be used with caution because they vary with the total body length of the specimen.

Larval development occurs entirely within the marsupium. Upon being released, the post-larvae have the general appearance of miniature adults.

SYSTEMATIC LIST

PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS MALACOSTRACA
SUBCLASS EUMALACOSTRACA
SUPERORDER PERACARIDA
ORDER MYSIDACEA
FAMILY MYSIDAE
SUBFAMILY MYSINAE

TRIBE MYSINI
Mysis litoralis (Banner 1948)
Mysis oculata (Fabricius 1780)
Mysis polaris Holmquist 1959
Mysis relicta Loven 1861
Neomysis intermedia (Czerniavsky 1882)

TRIBE ERYTHROPINE
Erythrops erythrophthalma (Goes 1864)
Parerythrops obesa (Czerniavsky 1882)

A KEY TO SELECT MYSIDACEA FROM THE SOUTHERN BEAUFORT SEA

1a. Telson distally cleft; antennal scale elongate, apex segmented; male pleopods, 1st, 2nd and 5th rudimentary, 3rd and 4th biramous . . . . . *Mysis* Latreille 1803 2

1b. Telson not cleft 5

2a. Telson short and broad, margins nearly parallel, cleft with a right to obtuse angle; inner margin of endopod with 4 spines (ranging from 3-5) . . . . . *Mysis relicta* Loven 1861 Plates XXII-XXV

2b. Telson cleft with an acute angle. 3

3a. Uropod inner margin of endopod with 1-2 spines; telson long and narrow, margins concave . . . . . *Mysis polaris* Holmquist 1959 Plates XXII-XXV

3b. Uropod, inner margin of endopod with 3 or more spines; telson margins nearly straight 4

4a. Lateral spines of the telson extending distally to the apex, with 4 to 5 spines distal to the base of the median cleft; uropod, inner margin of endopod with 7-9 spines. . . . . *Mysis oculata* (Fabricius 1780) Plates XX-XXV

4b. Lateral spines of the telson not extending distally to the apex, 1-3 spines distal to the base of the median cleft; uropod, margin of endopod with 4-8 spines. . . . . *Mysis litoralis* (Banner 1948) Plates XXII-XXV

5a. Telson with lateral spines; antennal scale long and narrow, apex segmented, acutely pointed; male pleopods 1st to 3rd and 5th rudimentary, 4th biramous . . . . . Neomysis Czerniavsky 1882

Carapace with anterolateral margins slightly convex; antennal scale 4-5x as long as broad; uropod inner margin of endopod with 13- 20 spines; telson linguiform, with 11-16 lateral spines and 4 apical spines . . . . . Neomysis intermedia (Czerniavsky 1882) Plate XXVI

5b. Telson with no lateral spines 6

6a. Eyes, cornea reniform or oval, subglobular, markedly flattened dorsoventrally, pigment red; antennal scale, apex with no segmentation; telson trapeziform, shorter than broad, apex truncated with 2 pairs of stout spines, may or may not have median plumose setae, ... Erythrops G.O. Sars 1869

Carapace, anterior margin with a short linguiform rostrum; endopod of 8th thoracic leg extends to posterior margin of 5th abdominal segment; uropod, endopod outer margin with 6 - 7 delicate plumose setae . . . . . .Erythrops erythrophthalma (Goes 1864) Plates XXVIII-XIX

6b. Eyes more or less globular, not flattened dorso-ventrally, antennal scale, apex with small distal segmentation; telson somewhat triangular, longer than broad, with 1 pair of median plumose setae, apex with 2 - 3 pairs of spines, apex truncated . . . . . Parerythrops G.O. Sars 1869

Carapace, anterior margin slightly pointed; endopod of 8th thoracic leg extends to posterior margin of 3rd abdominal segment; uropod, endopod outer margin with 16 - 25 spines . . . .Parerythrops obesa (G.O. Sars 1864) Plates XXVII-XXVIII

DIAGNOSES AND DESCRIPTIONS

Erythrops erythrophthalma (Goes 1864) Plates XVIII-XIX

Cephalothorax distinctly wider than abdomen; carapace anterior margin with a short linguiform rostrum; antennal scale 4x as long as broad, longer than peduncle of antenna 1, no distal segmentation; eyes very large, set close together, flattened dorsoventrally, cornea reniform, pigment is carmine red; 1st thoracic leg normal, dactyl slender beset with setae; 2nd thoracic leg well developed, carpus arcuate, equal in length to propodus and dactyl combined; thoracic legs 3-7 similar, 8th with endopod extending to anterior margin of 6th abdominal segment; abdominal segment 6 not as long as segments 4 and 5 combined; pleopods in male biramous; uropod, endopod slender, tapering distally with 6-7 delicate plumose setae on outer margin; telson broader than long, no lateral spines, 4 apical spines, 2 inner spines longer than outer, and 2 median plumose setae; up to 13 mm.

Distribution: southern Beaufort Sea; east coast of Canada and United States to S Florida; North Atlantic Ocean; White Sea; Kara Sea; Barents Sea; British Isles; Skagerrak.

References: Stappers 1911; Tattersall, W.M. 1939; Banner 1948a; Yashnov 1948; Nouvel 1950b; Tattersall and Tattersall 1951; Wigley and Burns 1971.

Mysis litoralis (Banner 1948) Plates XX-XXV

Carapace with anterolateral angles rounded; rostrum apex slightly pointed; margins arched; antennal scale length 5-6x width, segmented apically; thoracic legs 3-8, carpo-propodus of endopod has 7-9 segments, Kathman et al. (1986) reports 5 segments of carpo-propodus; all pleopods of female rudimentary; 1st, 2nd and 5th pleopods of male rudimentary, 4th biramous and extends beyond posterior margin of 6th abdominal segment; uropods with 4-8 spines on inner margin of endopod; telson up to 20-25 lateral spines and 1-3 spines between apex and level of base of median cleft, 1 pair of apical spines, cleft rounded proximally; 12-30 mm.

Distribution: southern Beaufort Sea; NE Pacific from Alaska to Washington; Cape Lisburne; Bernard Harbour; Sinclair Lake; Pt. Barrow, Alaska; NE Baffin Island; North Atlantic; East Siberian and Laptev Seas.

References: Brunel 1960; Geiger 1969; Shih et al. 1971; Leung 1972; Shih and Laubitz 1978; De Ladurantaye and Lacroix 1980; Daly and Holmquist 1986; Kathman et al. 1986.

Mysis oculata (Fabricius 1780) Plates XX-XXV

Carapace with anterolateral angles rounded; rostrum short, apex round; antennal scale 5-6x as long as broad, apically blunt and segmented; eyes large, extending forward beyond distal margin of 2nd peduncle segment of antenna 1; thoracic legs 3-8, propodus composed of 6-7 secondary segments; uropod, inner margin of endopod with 7-9 spines; telson long and narrow, more than 2 1/2x as long as broad at the apex, 25-30 lateral spines extending proximally to apex with about 4-5 spines distal to base of median cleft, cleft is deep and narrow,

rounded proximally, margins subparallel, depth is 18-25% of the length of telson; 15-28 mm.

Distribution: circumpolar; southern Beaufort Sea; Bering Sea; North Atlantic; Hudson Bay.

References: Hansen 1908; Stappers 1911; Schmitt 1919; Stephensen 1933, 1943; Wesenberg-Lund 1937; Tattersall, W.M. 1939; Banner 1948b, 1954; Yashnov 1948; Nouvel 1950a; Tattersall and Tattersall 1951; Tattersall, O.S. 1954; Brunel 1960; Grainger 1962; Geiger 1969; Shih et al. 1971; Leung 1972; Kathman et al. 1986.

Mysis polaris Holmquist 1959 Plates XXII-XXV

Carapace with anterolateral margins rounded; rostrum very short, apex rounded; antennal scale 4-5x as long as broad, apically blunt and segmented; eyes extend to 2nd peduncle segment of antenna 1; thoracic legs 2-8, carpo-propodus composed of 6-8 segments; uropod, inner margin of endopod with 1-2 spines; telson long and narrow from 8-9x as long as broad at the apex, margins converge, each with more than 25 lateral spines extending proximally to apex, apical cleft deep and narrow; 18-25 mm.

Distribution: southern Beaufort Sea; Arctic Ocean; North Pacific; central arctic basin; coast of Alaska; Kara Sea; East Siberian and Laptev Seas.

References: Holmquist 1959; Brunel 1960; Geiger 1969; Leung 1972; Kulikov 1980.

Mysis relicta Loven 1861 Plates XXII-XXV

Carapace with anterolateral angles rounded; rostrum apex rounded; eyes large, extending forward beyond distal margin of 2nd peduncle segment of antenna 1; antennal scale length 4x width, segmented apically; 1st thoracic leg modified as gnathobase; thoracic legs 3-8, carpo-propodus of endopod with 6-7 segments; 4th pleopod of male may be very long extending to apex of telson, exopod with 7 segments - variable depending on maturity; uropods with 4-5 spines (ranging from 3-5) on lower margin of endopod; telson 3 1/2x as long as broad at base, usually with 17-20 spines on each lateral margin and extending to the level of the base of median cleft, no spines from base of cleft to the 1 pair of apical spines, cleft is distinctly broad, margins straight, meeting at a right angle, depth of cleft, is usually 8-12% of length of telson, can be up to 17%; 15-18 mm.

Distribution: freshwater lakes in cold temperate regions; nearshore marine and estuarine waters in arctic; southern Beaufort Sea.

References: Schmitt 1919; Wesenberg-Lund 1937; Tattersall, W.M. 1939; Larkin 1948; Yashnov 1948; Nouvel 1950a; Tattersall and Tattersall 1951; Banner 1954; Tattersall, O.S. 1954; Beeton 1960; Brunel 1960; Hynes et al. 1960; Holmquist 1963; Shih et al. 1971; Leung 1972; Kathman et al. 1986; Vainola 1986.

Neomysis intermedia (Czerniavsky 1882) Plate XXVI

Carapace with anterolateral margins pointed; rostrum short, triangular, with an obtusely pointed apex; antennal scale 4-5x as long as broad, apically segmented, acute; eyes extend to 2nd peduncle segment of antenna 1; 4th male pleopod extends to mid-telson; uropod, inner margin of endopod with 13-20 spines (note: number of spines varies between left and right uropod of the same individual); telson somewhat triangular, apically blunt, 11-16 pairs of lateral spines and 4 apical spines, 2 long and 2 short; 10-12 mm.

Note: variability among specimens will occur in the segmentation of the carpopropodus and spination of uropods and telson - this is developmental.

Distribution: southern Beaufort Sea; some lakes of northern Alaska and northwest Canada; Asian Pacific coast; west coast of Alaska; Chukchi Sea.

References: Ueno 1935, 1936; Miyadi 1938; Tattersall, W.M. 1951; II 1964; Murano 1966; Holmquist 1973.

Parerythrops obesa (G.O. Sars 1864) Plates XXVII-XXVIII

Cephalothorax broadly oblong in dorsal view; carapace short and broad, posterolateral margins concave with bases of the thoracic legs exposed; rostrum pointed, anterolateral angle rounded; antenna 1, peduncle segment 3 equal in length to peduncle segments 1 and 2; antenna 2, antennal scale length is 3x greater than width, apex with small segmentation; eyes large, set widely apart, globular not flattened dorsoventrally, stalks small, narrow proximally, cornea large, somewhat reniform, occupying 2/3 of eye, pigment deep yellow-brown; 1st thoracic leg robust, well developed with a large hatchet-shaped epipodite; 2nd thoracic leg with merus slightly arcuate and longer than carpus; thoracic legs 3-8 similar to Erythrops but somewhat more robust and shorter; abdomen is sharply flexed at its junction with the cephalothorax - this is more pronounced in ovigerous females giving the animal an obese appearance in lateral view, hence the name obesa; female pleopods reduced to simple unjointed plates becoming progressively longer on the posterior segments, 1st pair of male pleopods reduced, remainder are well developed and biramous; uropod, inner margin of endopod with 16-25 spines, statocysts large; telson triangular, narrowing distally, lateral margins spineless, apex truncate with 2 pairs of spines, inner spines 2-3x longer than outer, 2 plumose setae located medially; up to 12-14 mm.

Distribution: southern Beaufort Sea; Barents Sea; Norway; North Atlantic; Ireland; Greenland; Lofoten.

References: Stappers 1911; Yashnov 1948; Nouvel 1950b; Tattersall and Tattersall 1951.

GLOSSARY

ANAMORPHIC	Type of development in which gradual changes occur from one stage to the next.
ANNULATIONS	The formation of rings; a ringlike structure.
ANTENNA	The paired segmented sensory organs, borne one on each side of the head.
ANTENNAL SCALE	Also known as squame or scaphocerite - flattened process of antenna 2 attached to the peduncle - may be segmented apically and beset with setae.
ANTENNAL SPINE	Spine(s) located on anterolateral margin of cephalon below eye orbit.
ANTENNULE	A small antenna, usually the more anterior and smaller of the 2 pairs of antennae.
APEX	That part of any joint or segment opposite the base by which it is attached.
APICAL	At, near or pertaining to the apex of any structure.
ARCUATE	Arched, curved like a bow.
BASIS	The 2nd segment of thoracic appendage - also referred to as a basipodite.
BIFID	Cleft or divided into two parts.
BIRAMOUS	Having two branches.
BRACHYUROUS	Having a short, reduced abdomen, e.g. crabs.
BRANCHIAL CHAMBER	Portion of the carapace which encloses the gills.
CARAPACE	An exoskeletal shield covering of the thorax in crustacea.
CARINAE	Keel-like structure; not necessarily high or acute.
CARPUS	The 5th segment of a crustacean appendage - also referred to as carpopodite.

CEPHALOTHORAX	The anterior portion of the body of certain arthropods, where the head and thorax are fused together.
CHELA	A terminal pincer formed by an immovable and movable finger.
CHELATE	Having the form of a chela.
CHELIPED	Appendage with a chela.
COXA	The first or proximal segment of a thoracic appendage - also referred to as coxopodite.
CLAVIFORM	Club-shaped.
DACTYL	Terminal segment (7th) of a thoracic appendage, also referred to as dactylopodite.
DENTICULATE	Set with little teeth or notches.
DISTAL	Away from the point of origin.
ENDOPOD	Inner branch or ramus of a biramous crustacean appendage.
EPIPOD	A flat, leaflike structure attached to the coxa of the thoracic appendages which functions as a gill separator.
EPISTOME	Structure anterior to or overhanging the mouth.
EXOPOD	Outer branch or ramus of a biramous crustacean appendage.
FOSSORIAL	Adapted for burrowing or digging.
FULVOUS	Yellow-brown in colour.
FURCA	One of the paired caudal rami.
GNATHOBASE	Lobe or projecting portion of one of the basal segment of an appendage situated near the mouth, and used in the process of feeding.
GNATHOPOD	Modified thoracic appendages 1 and 2, used for grasping, holding, or excavating.
INSTAR	The stage of the development or the form assumed between successive molts.

ISCHIUM	The 3rd segment of a thoracic appendage.
LAGENIFORM	Bottle - shaped.
LAMELLA	A thin, plate-like structure or layer.
LINGUIFORM	Tongue-shaped.
MARSUPIUM	A brood pouch on the ventral surface of all adult females, formed by 2, 3, or 7 interlocking pairs of oostegites.
MAXILLA	One of the 1st or 2nd pair of mouthparts posterior to the mandibles.
MAXILLULE	Typically the smallest set of appendages associated with the feeding.
MAXILLIPED	One of the 3 pairs of appendages located posterior to the maxillae - found in animals characteristic of being maxillary filter feeders.
MERUS	The 4th segment of a thoracic appendage.
NATATORY	Modified for swimming.
OOSTEGITE	A plate-like expansion of the basal segment of a thoracic appendage in many crustaceans that helps to form a receptacle for the eggs.
ORBIT	Eye socket.
OVIGEROUS	Egg bearing, applies to the fertized female.
PEDUNCLE	The basal segment(s) of paired, usually biramous appendages, as in pleopods, uropods, or antennae.
PEREOPOD	A thoracic appendage, composed of 7 segments differing in structure depending on function.
PETASMA	Male copulatory organ - modified endopodites of 1st pair of pleopods.
PLEOPOD	A biramous appendage of the abdomen, may be rudimentary in some species.
PLEURON (pl. pleura)	The lateral portion of the abdomen of an arthropod.

PLUMOSE	Feather-like.
PODOBRANCHIA	Long, exposed filamentous gills present on all of the thoracic appendages of Euphausiids.
PREHENSILE	Fitted or adapted for grasping, holding or seizing.
PROPODUS	The 6th segment of a thoracic appendage.
PUNCTATE	Marked by minute dots, pits, depressions, or punctures.
RENIFORM	Kidney-shaped.
ROSTRUM	A median process extending anteriorly from cephalothorax of malacostracans.
RUDIMENTARY	Undeveloped.
SCAPHOGNATHITE	A flattened process on maxilla 2 of decapod crustaceans which functions in creating a water current over the gills.
SCHIZOPOD	Obsolete term for an old grouping incorporating Euphausiacea and Mysidacea.
SERRATE	Notched, teeth like a saw-blade.
SERRULATE	Finely serrated, with minute teeth.
SETA, PL. SETAE	Slender hair-like structure.
STATOCYST	An organ of equilibrium, consists of fluid-filled sac containing statoliths - located on the endopods of the uropods for most Mysidacea.
STERNITE	The sclerotized ventral surface of a body segment.
SUBCHELA	Prehensile appendage formed by folding back of dactyl against propodus.
SUBCHELATE	A prehensile condition of the pereopod or gnathopod, less than fully chelate.
SUBPARALLEL	Nearly parallel.
SUBQUADRATE	Not quite a square.
SULCUS	A groove or furrow.

SUPRAORBITAL	Situated above the eye.
TAIL FAN	Telson and uropods combine to form a fan-like structure.
TELSON	Terminal portion of the abdomen, part of tail fan.
THELYCUM	Female reproductive organ in euphausiids.
TRAPEZIFORM	Quadrilateral with no parallel sides.
THORAX	The portion of the body that is in the middle of three chief divisions; in regards to crustaceans it is usually fused with the head to form the cephalothorax.
TRUNCATE	Blunt; appearance of sharply cut-off or broken-off squarely.
UNIRAMOUS	Having a single branch.
UROPOD	One of paired appendages attached to 6th abdominal somite, part of tail fan.
VERRUCOSE	A wart or wart-like elevations.
VESTIGIAL	Small or degenerate.
ZOEAL	Relating to an early larval form of a decapod crustacean.

ACKNOWLEDGMENTS

We wish to thank Dr. Rita Korczynski for her work preparing the original draft upon which this guide is based. We thank V. de Jong for the drawings that accompany the text. We wish to thank D. Chiperzak, G. Hopky, G. Lacho, and W.R. Sauve for their efforts in the field. We would also like to thank F. Rafi and D. Laubitz for their verifications of the species. Special thanks are due to B. Austin and N. Stellard for reviewing and providing the extensive comments which have improved the quality of this guide. Thanks are due to G. Lacho, F. Rafi, and D. Rystephanuk for reviewing earlier versions of the manuscript. We also thank J. Schick for typing the manuscript, and G. Lacho for his computer assistance.

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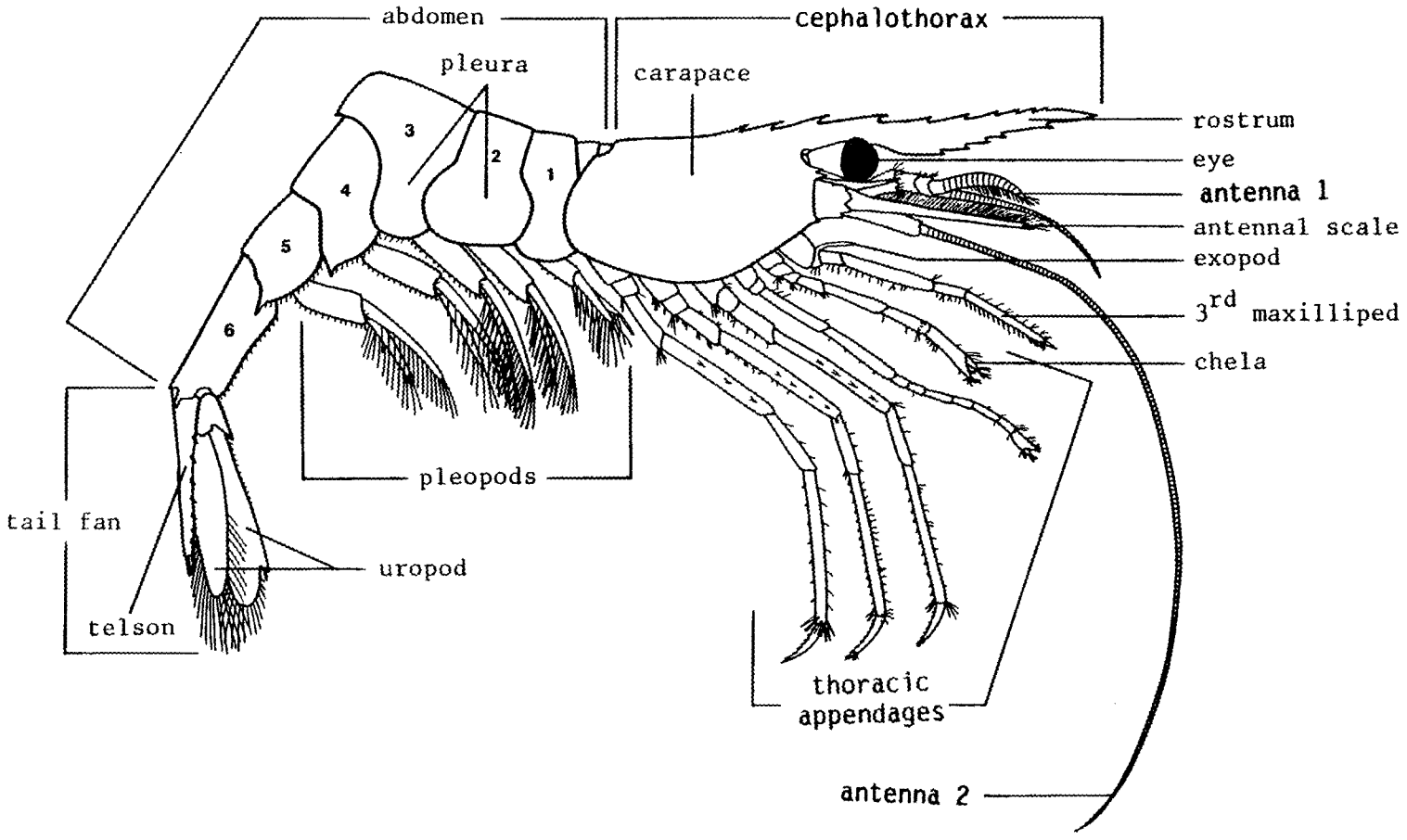
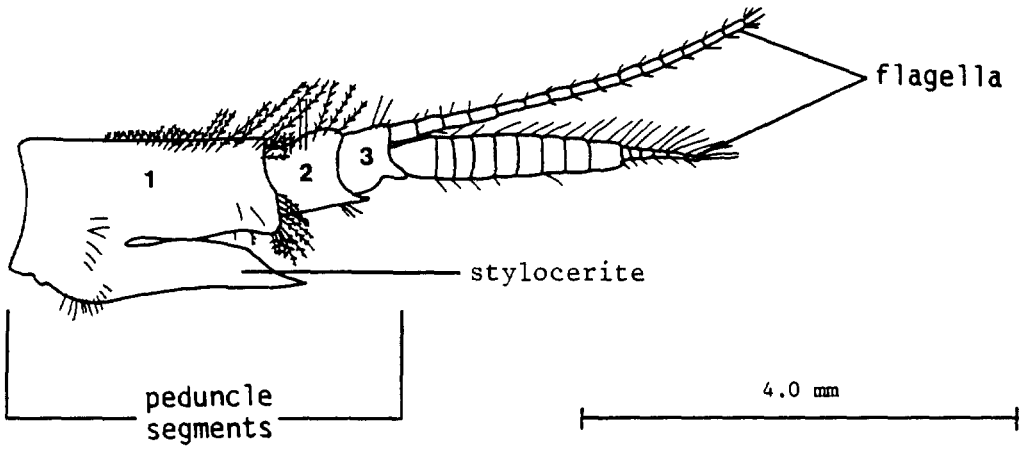
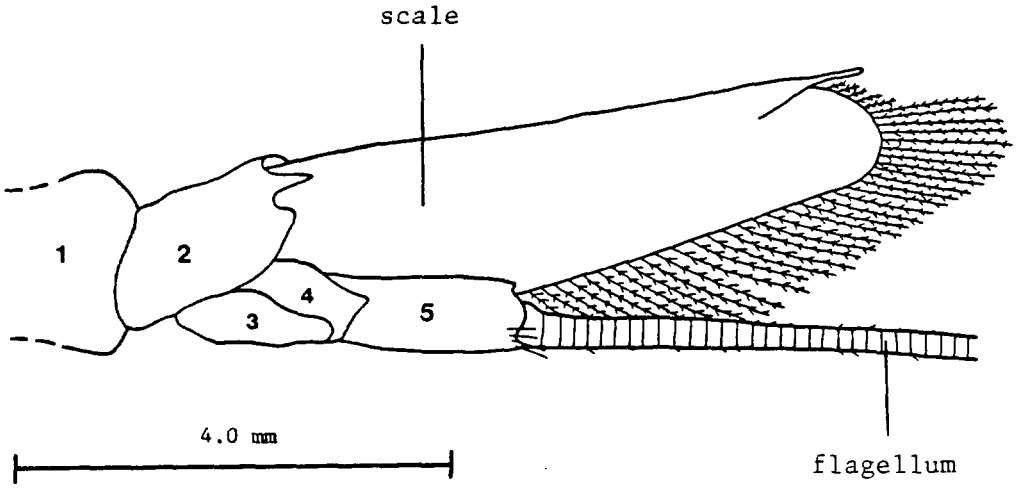


External morphology of Eualus gaimardii (H. Milne - Edwards 1837), TL = 41.8 mm ♂

HIPPOLYTIDAE PLATE II

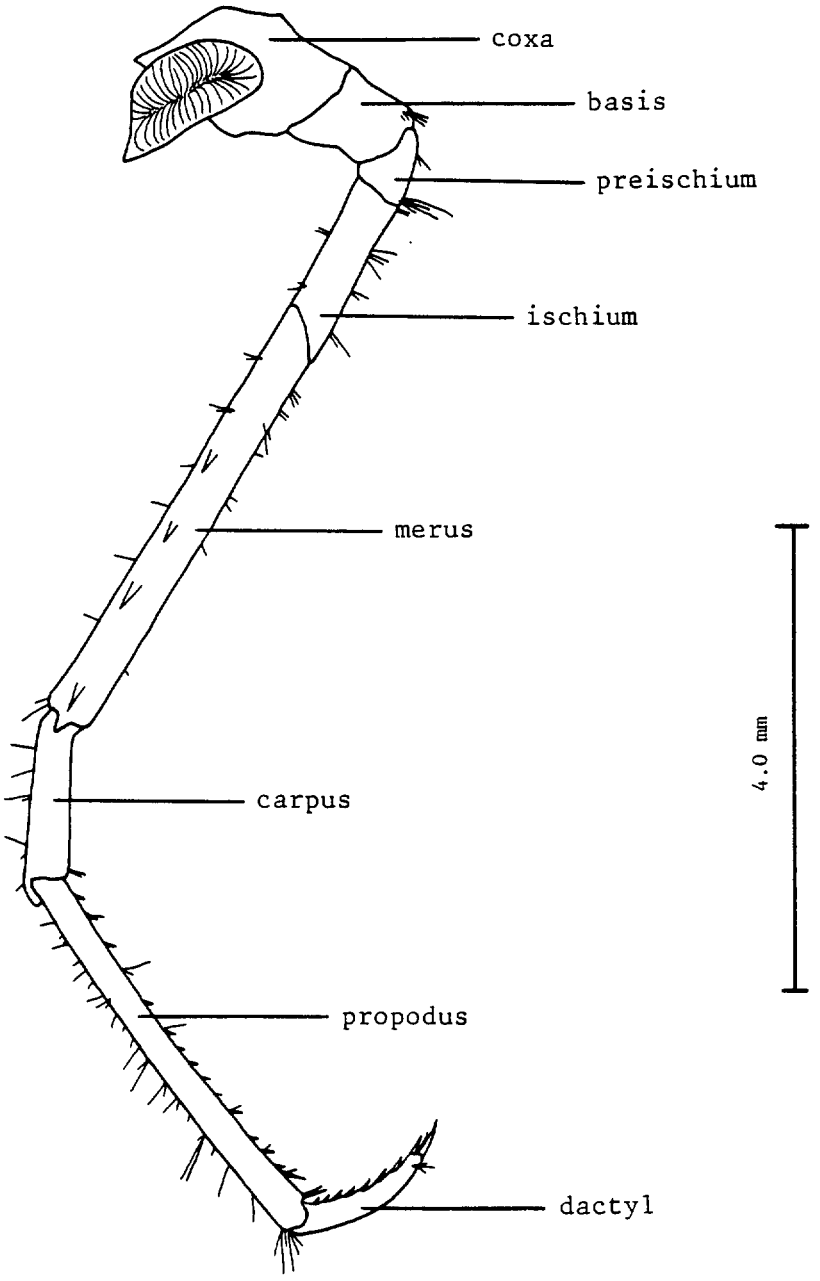


Antenna 1 of Eualus gaimardii (M. Milne-Edwards 1837). ♂

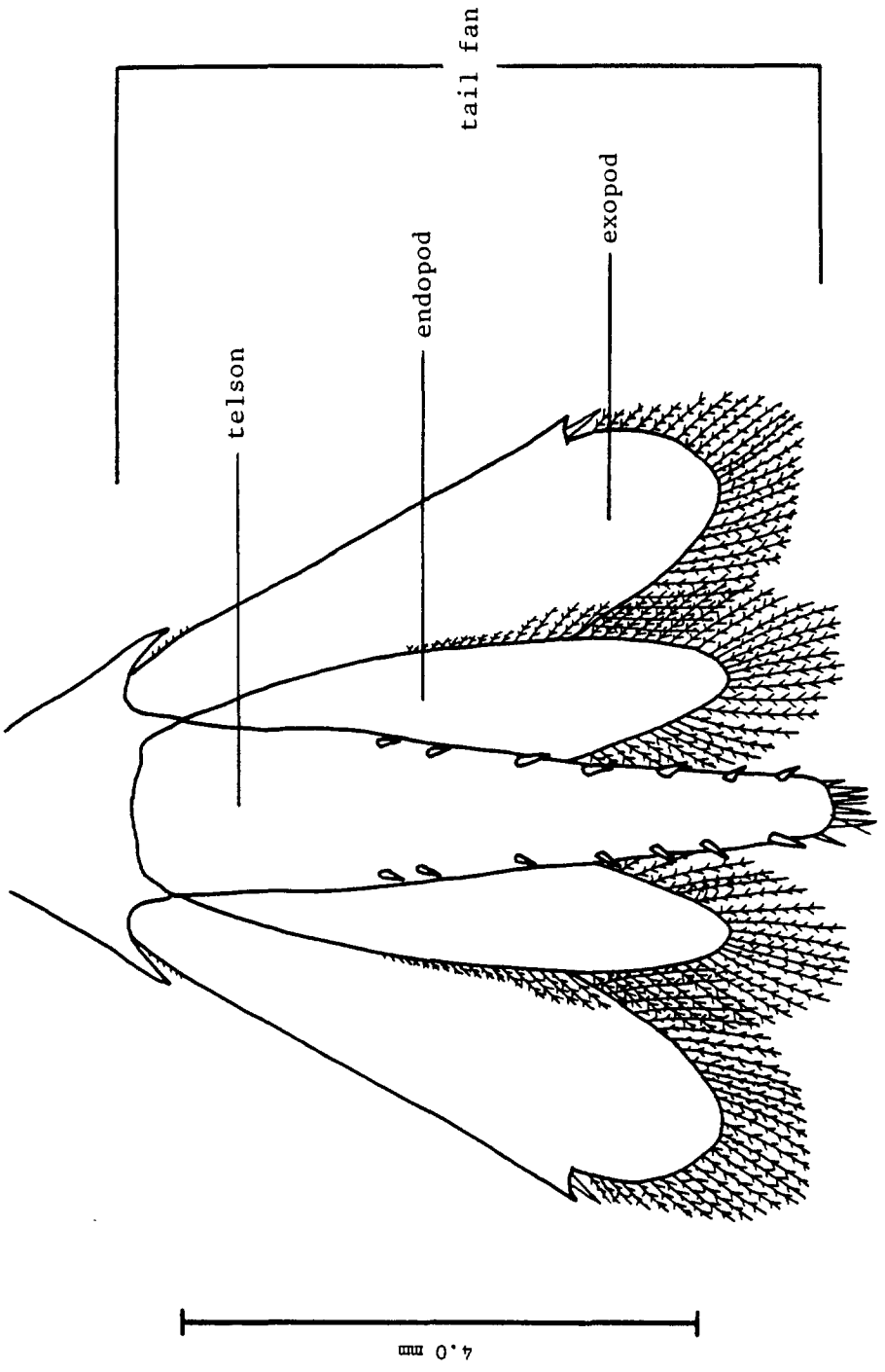


Antenna 2 of Eualus gaimardii (H. Milne - Edwards 1837), ♀

HIPPOLYTIDAE PLATE III



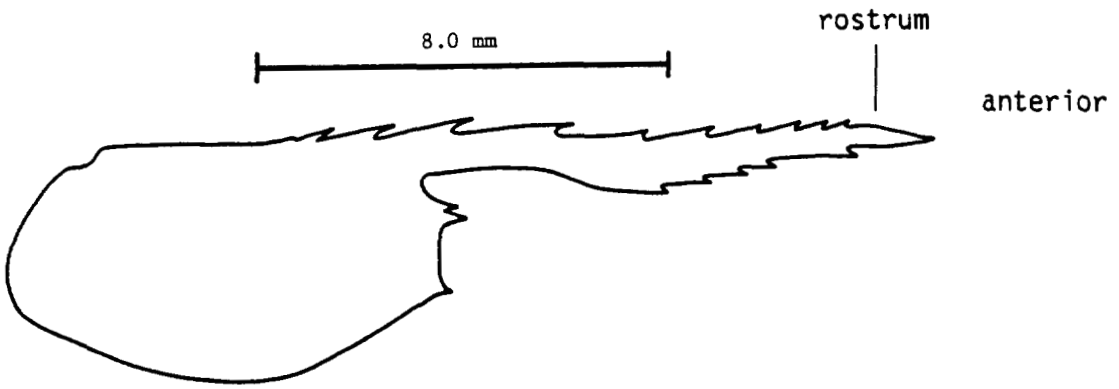
4th Thoracic appendage of Eualus gaimardii (H. Milne - Edwards 1837), ♂



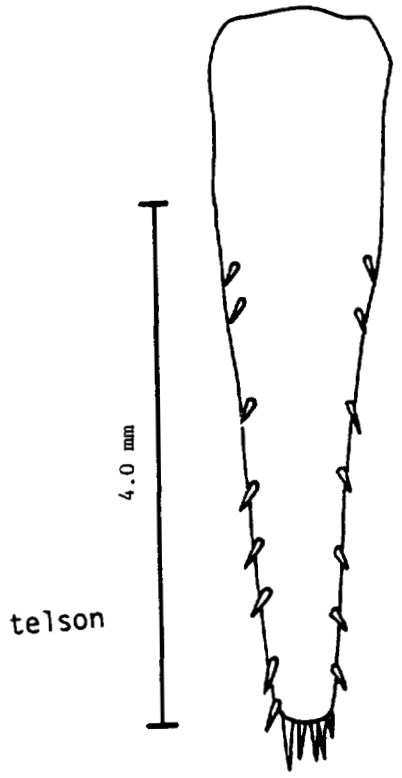
Tail fan of Eualus gaimardii (H. Milne - Edwards 1837), ♂

PLATE V

HIPPOLYTIDAE



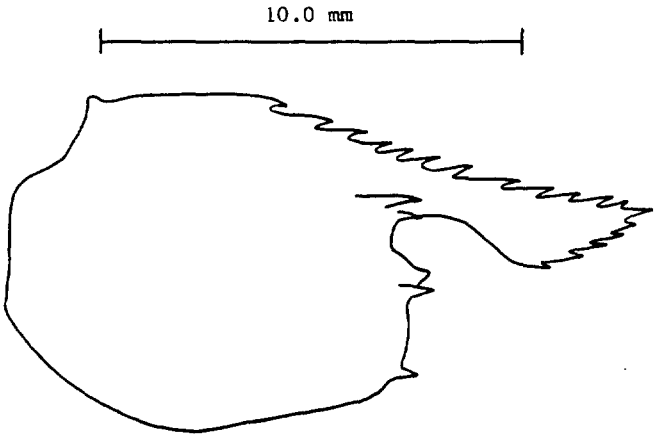
carapace (lateral)



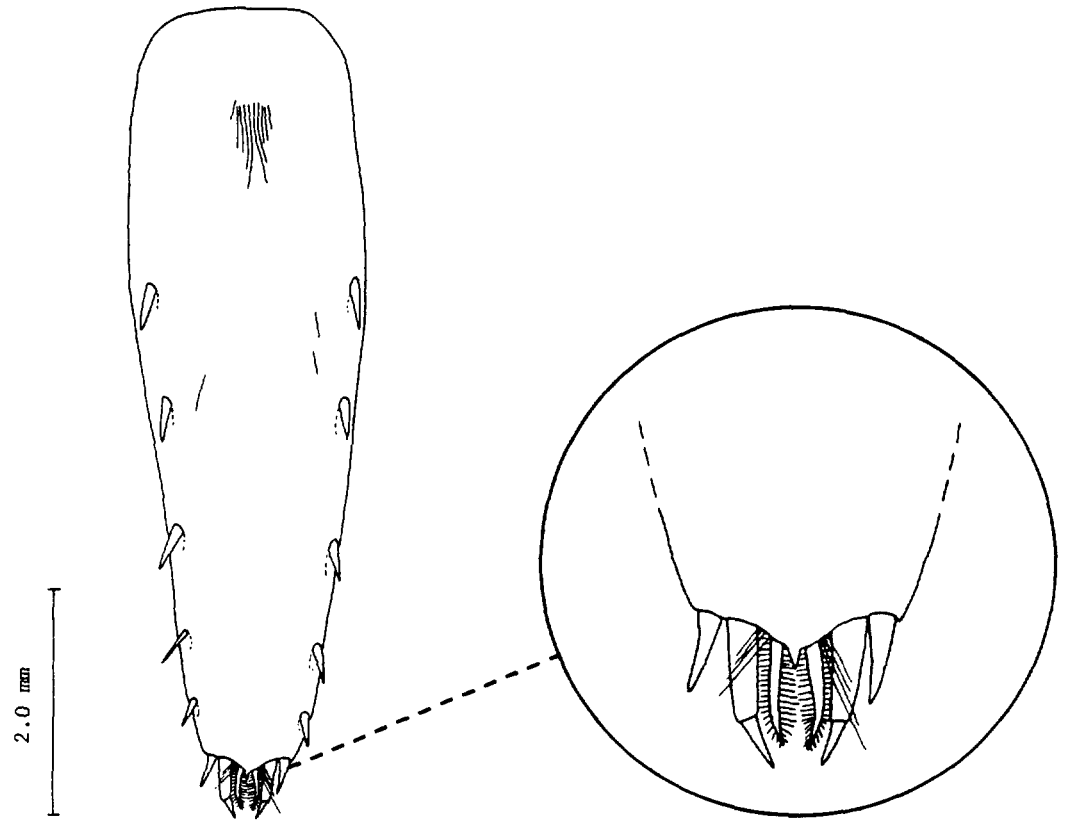
Eualus gaimardii (H. Milne - Edwards 1837), ♂

HIPPOLYTIDAE

PLATE VI



carapace (lateral)

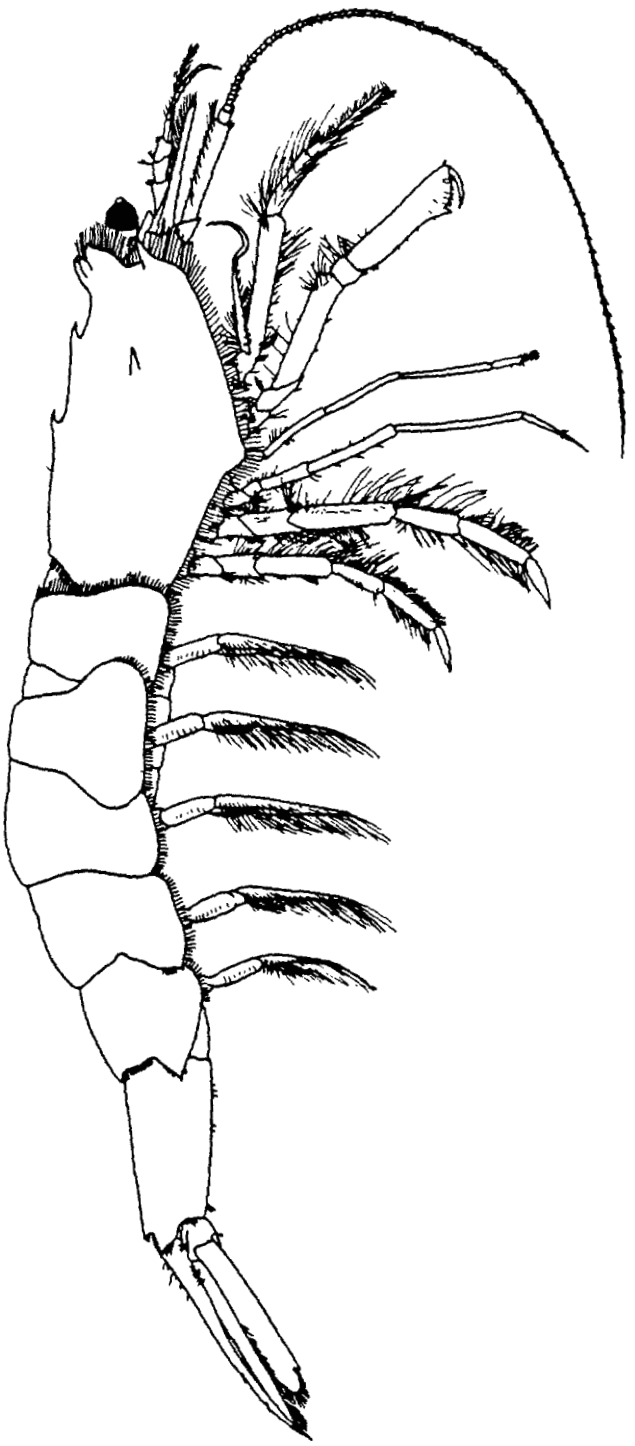


telson

Spirontocaris phippsi (Krøyer 1841), ♀

PLATE VII

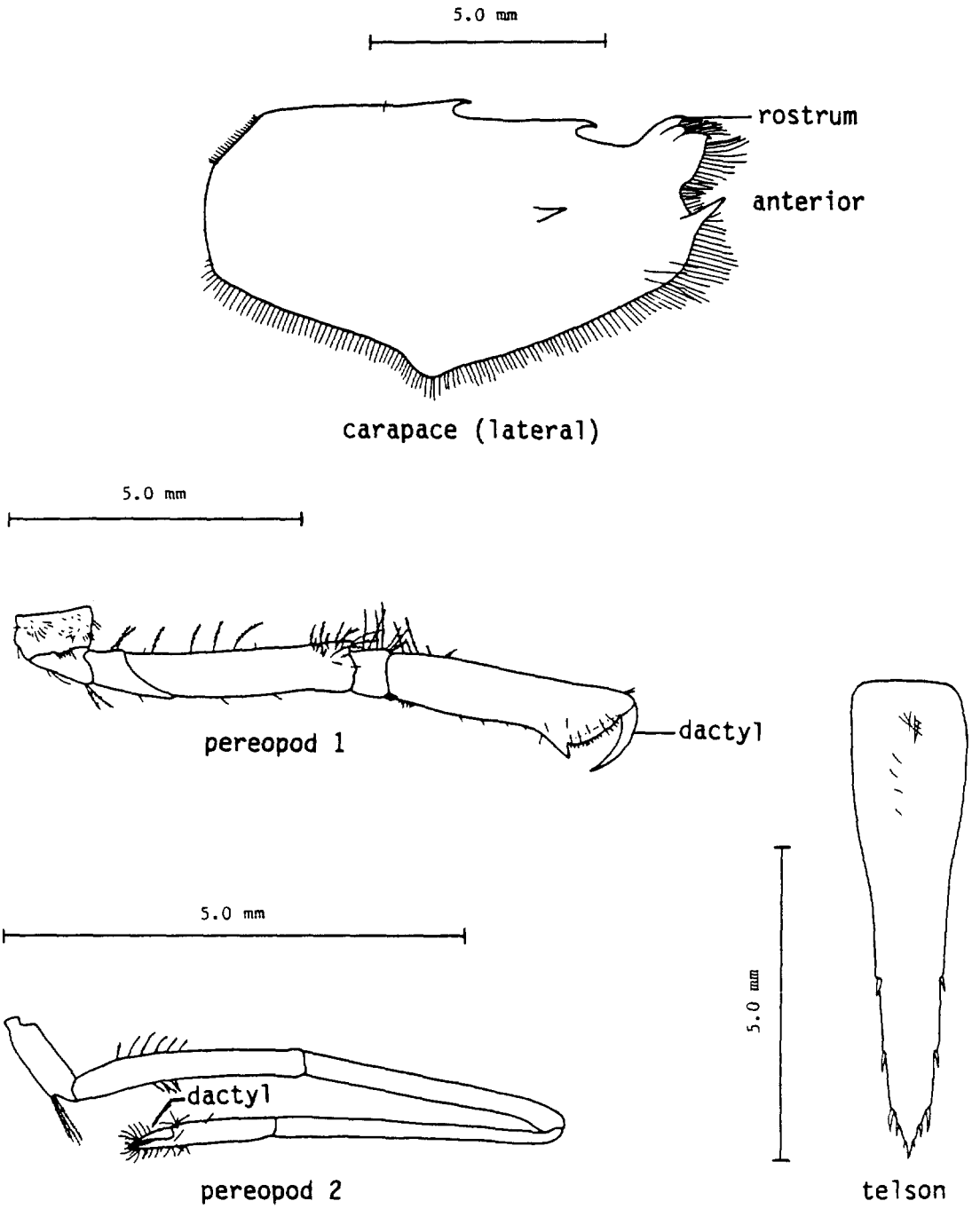
CRANGONIDAE



TL = 36.0 mm

Argis dentata (Rathbun, 1902)

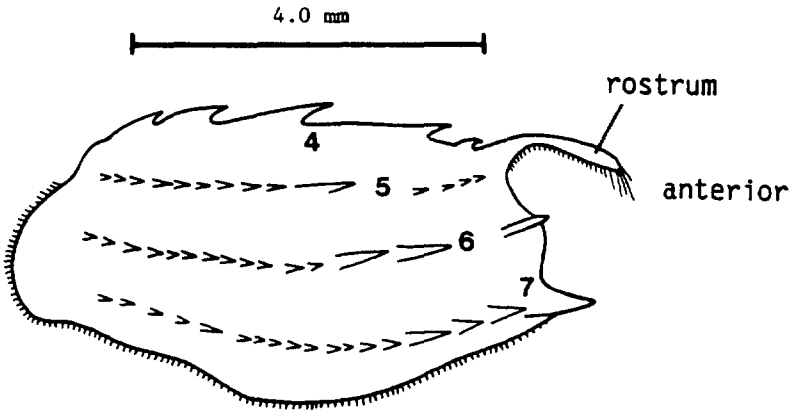
CRANGONIDAE PLATE VIII



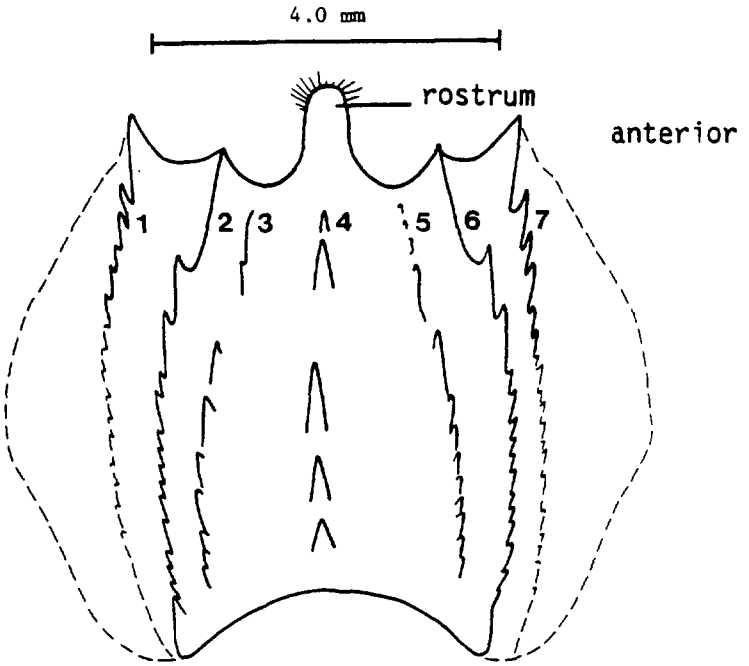
Argis dentata (Rathbun 1902)

CRANGONIDAE

PLATE IX



carapace (lateral)

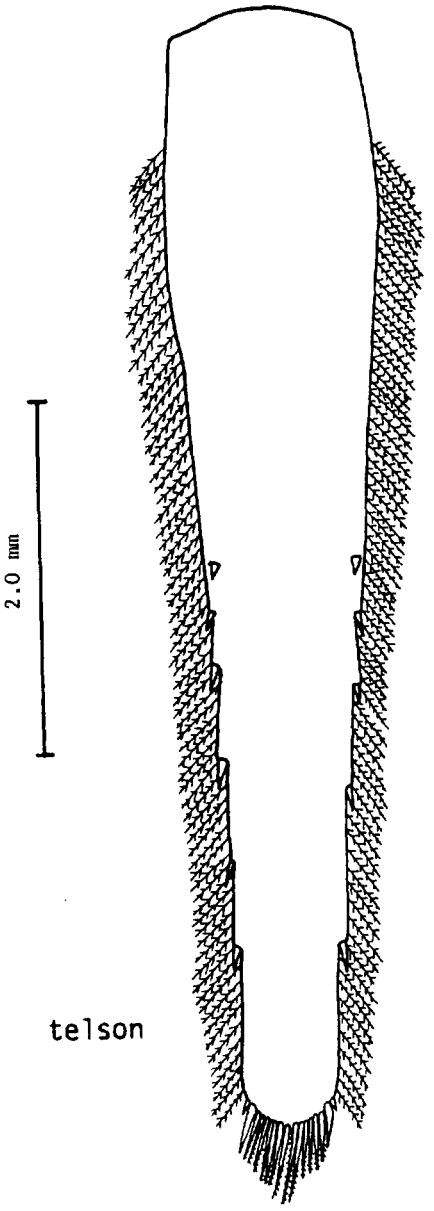


carapace (dorsally flattened)

Sabinea septemcarinata (Sabine 1824), ♂

CRANGONIDAE

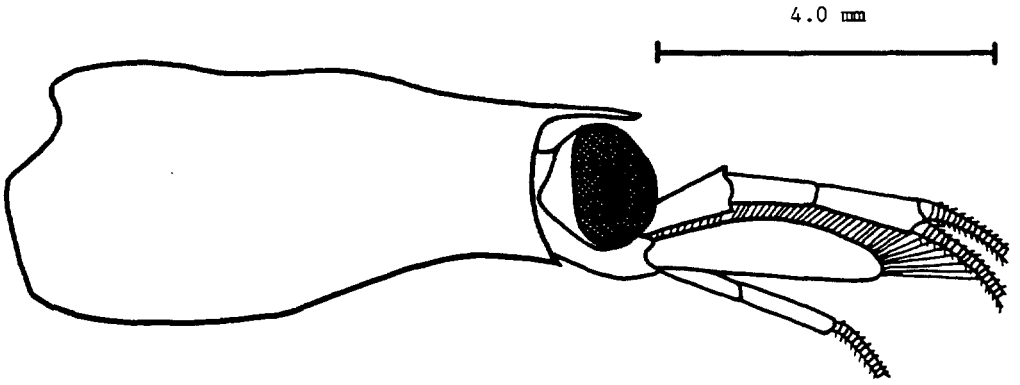
PLATE X



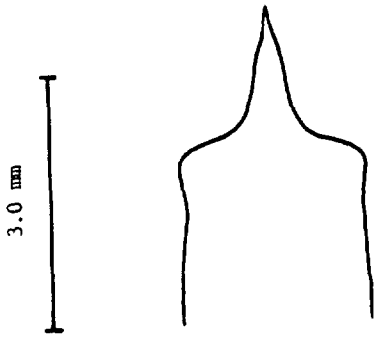
Sabinea septemcarinata (Sabine 1824), ♂

EUPHAUSIIDAE

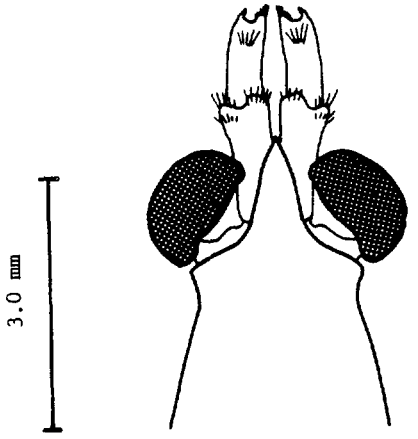
PLATE XI



carapace (lateral)



anterior carapace
(dorsal view ♀)

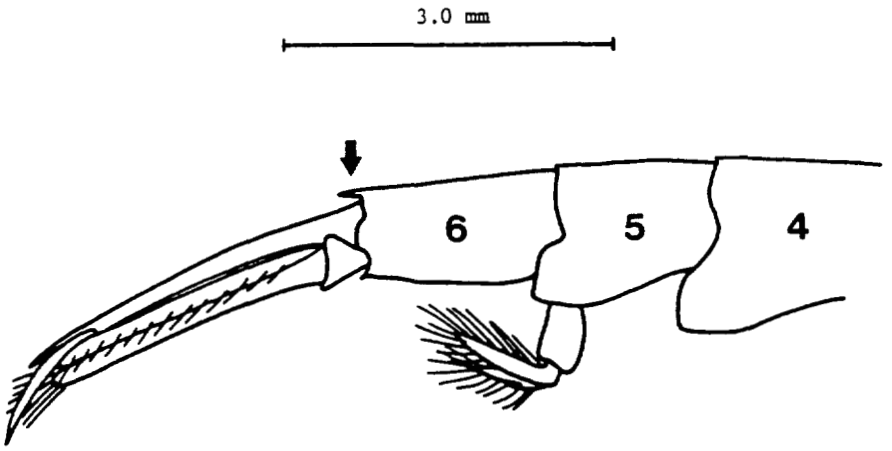


anterior carapace
(dorsal view ♂)

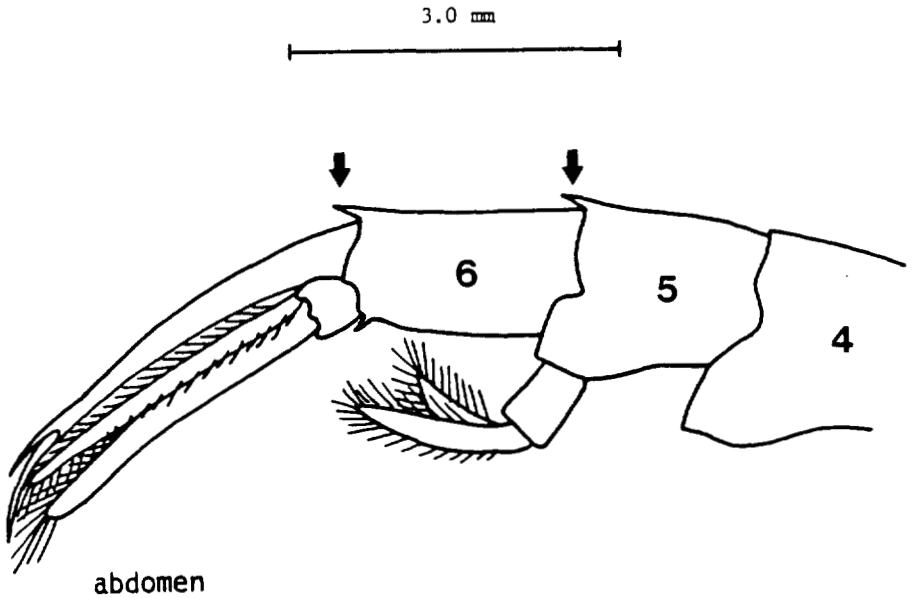
Thysanoessa inermis (Krøyer 1846)

PLATE XII

EUPHAUSIIDAE



abdomen



abdomen

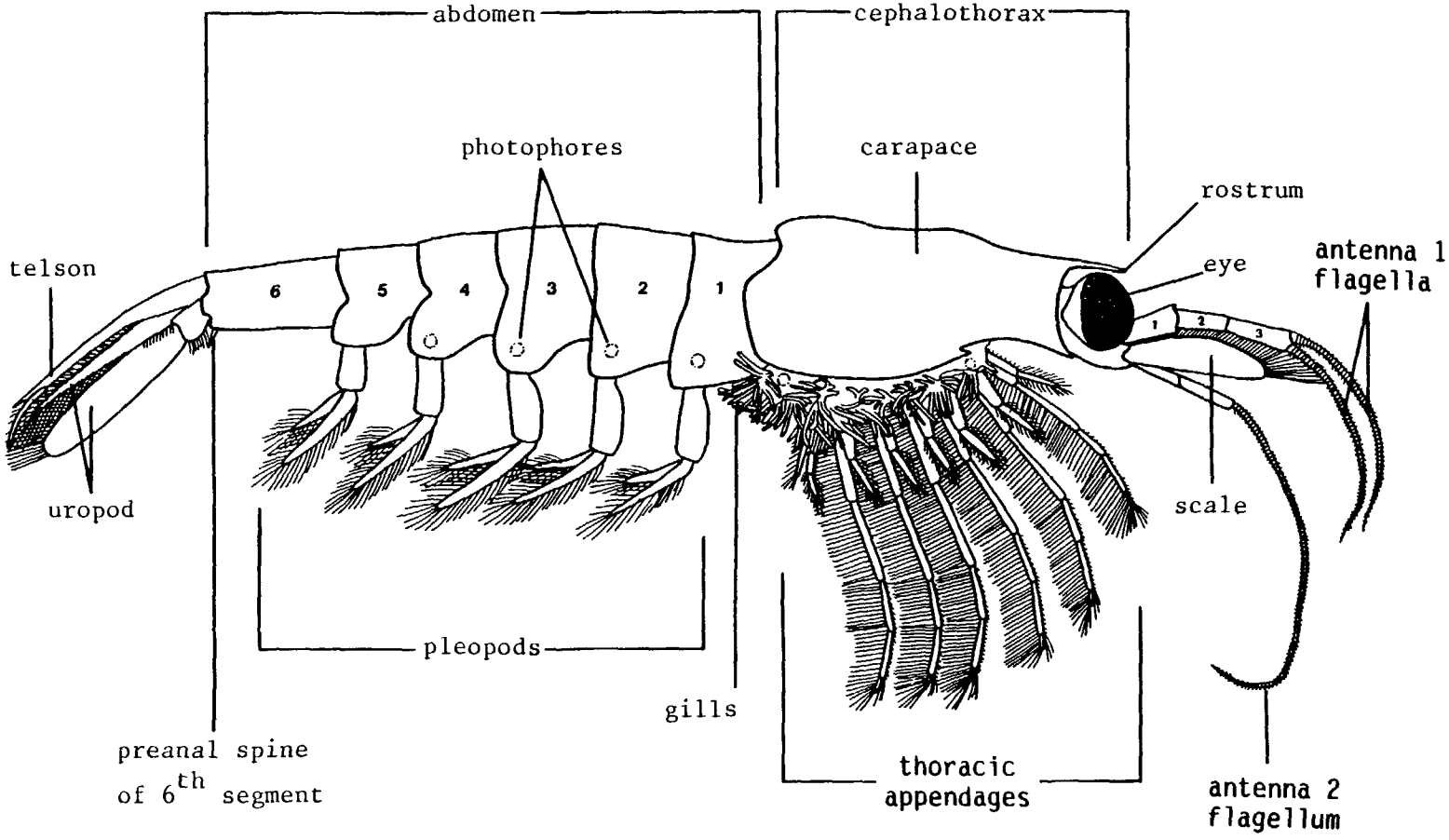
Thysanoessa inermis (Krøyer 1846), ♂

EUPHAUSIIDAE

PLATE XIII

TL = 23.0 mm

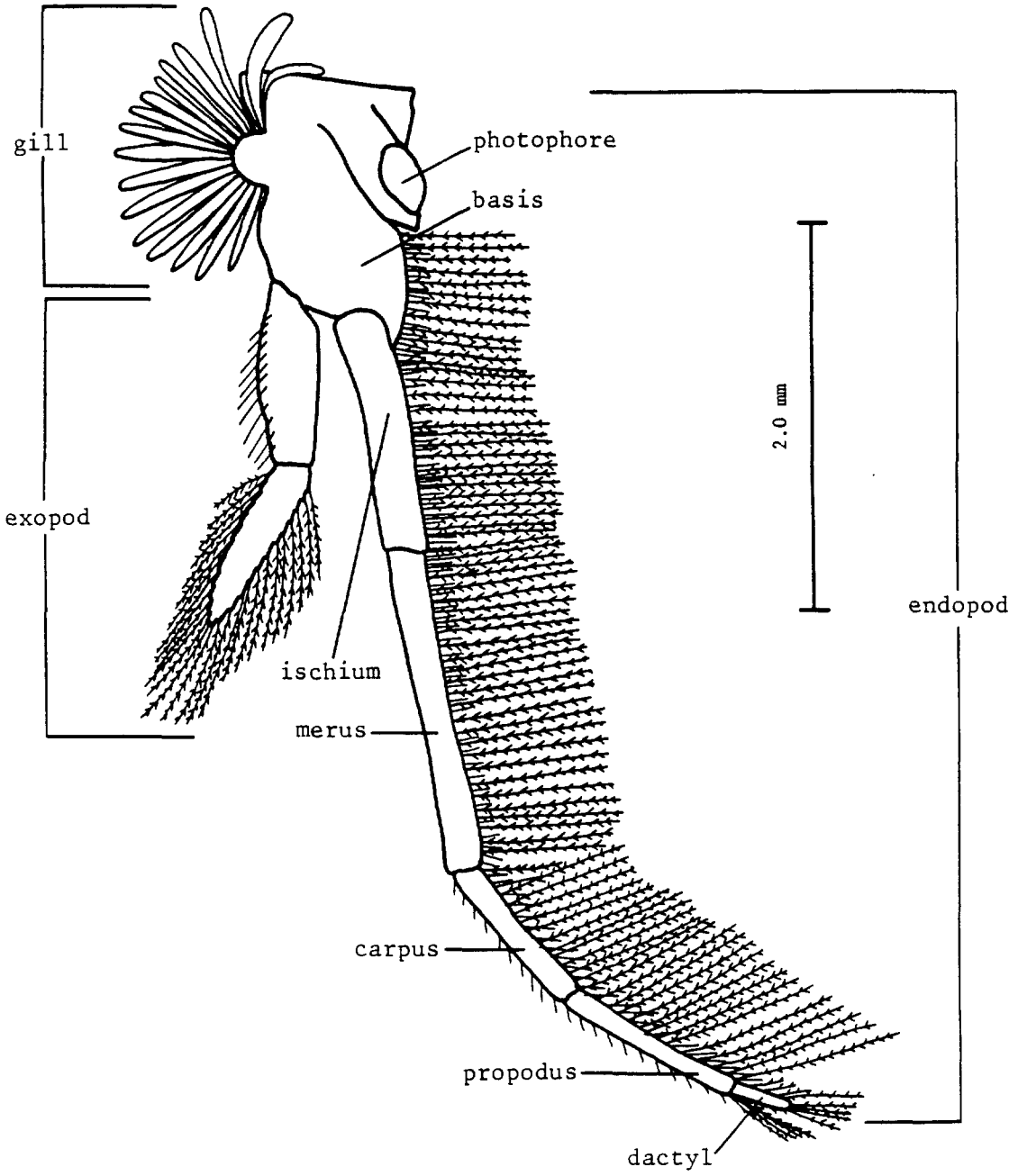
Thysanoessa longipes Brandt 1851



External morphology of Thysanoessa raschi (M. Sars 1864), TL = 18 .4 mm ♀

EUPHAUSIIDAE

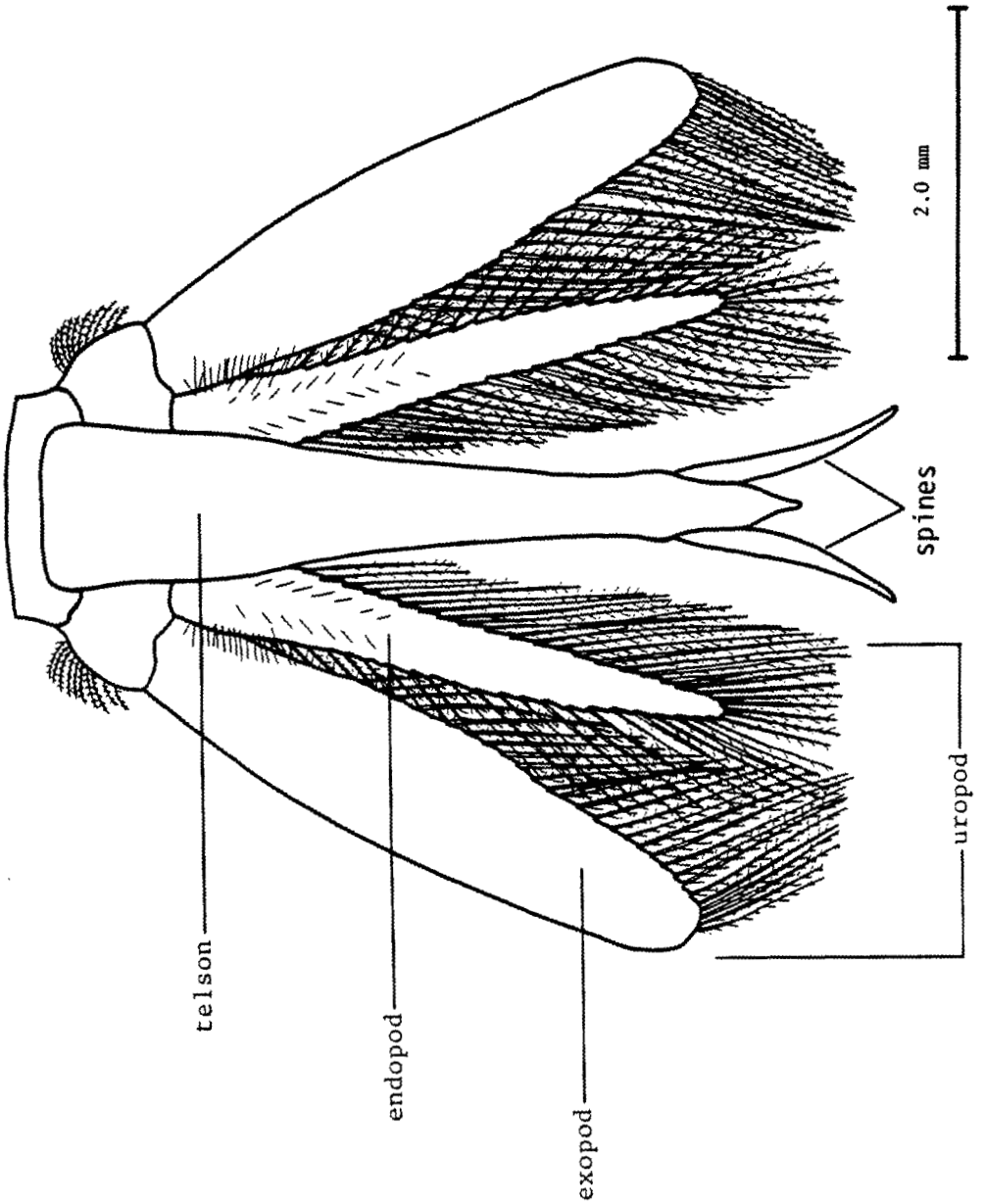
PLATE XV



2nd Thoracic appendage of Thysanoessa raschi (M. Sars 1864), ♀

EUPHAUSIIDAE

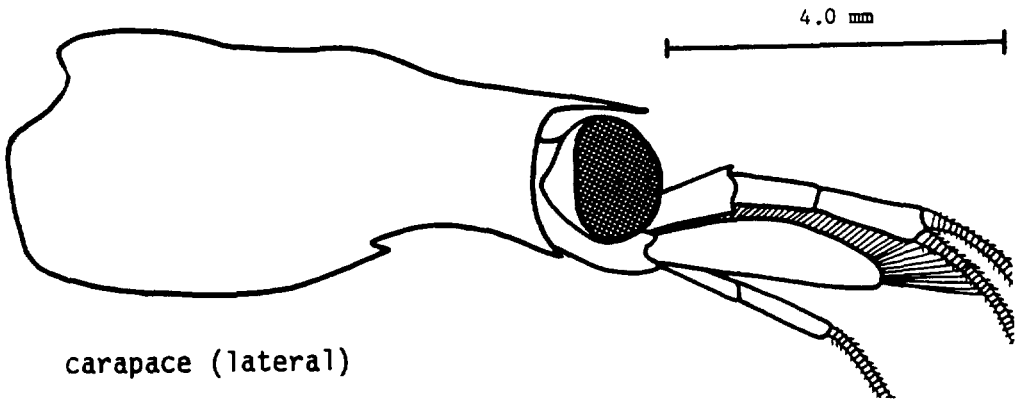
PLATE XVI



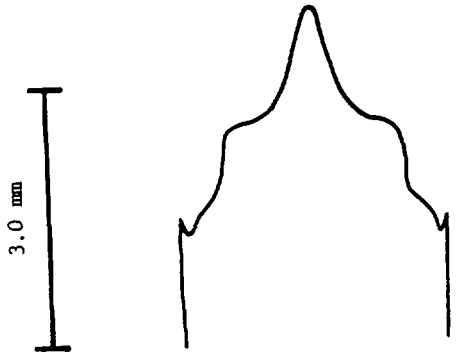
Telson and uropods of Thysanoessa raschi (M. Sars 1864), ♀

PLATE XVII

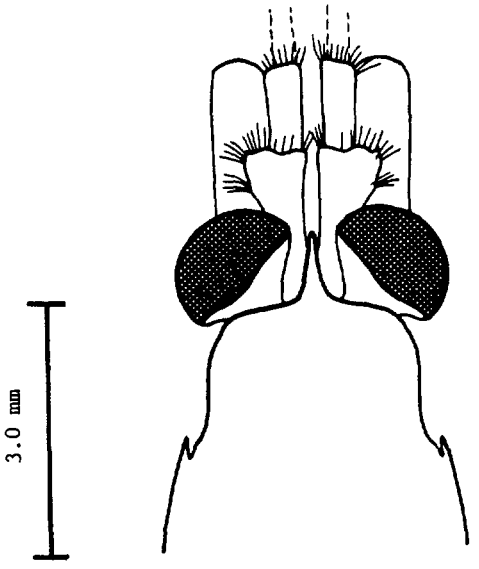
EUPHAUSIIDAE



carapace (lateral)



anterior carapace
(dorsal view ♂)

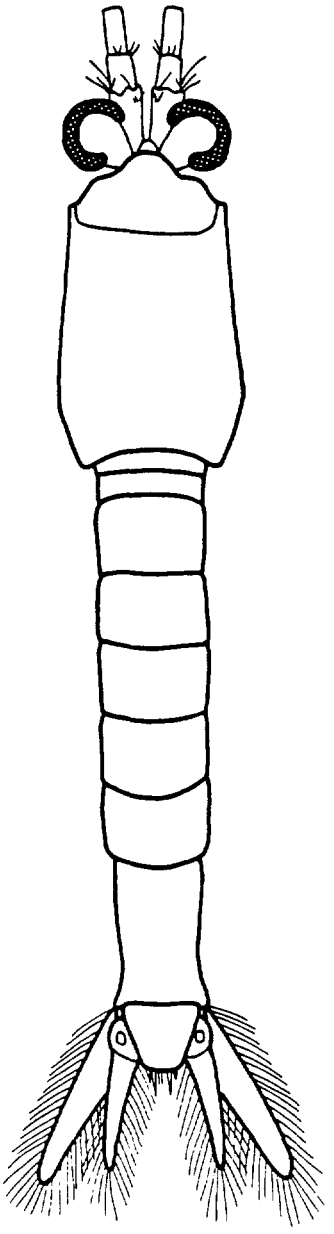


anterior carapace
(dorsal view ♀)

Thysanoessa raschi (M. Sars 1864)

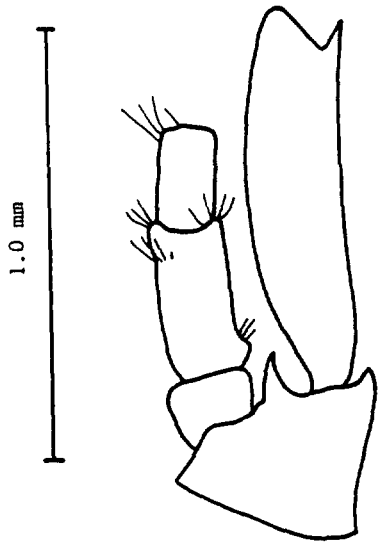
MYSIDAE

PLATE XVIII

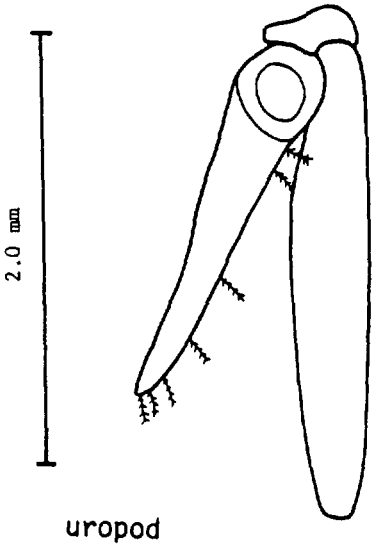


juvenile

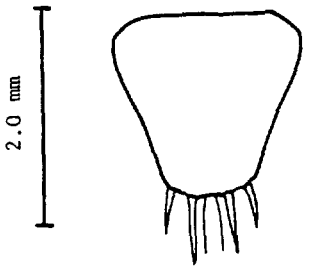
Erythrops erythrophthalma (Goës 1864)



antenna 2

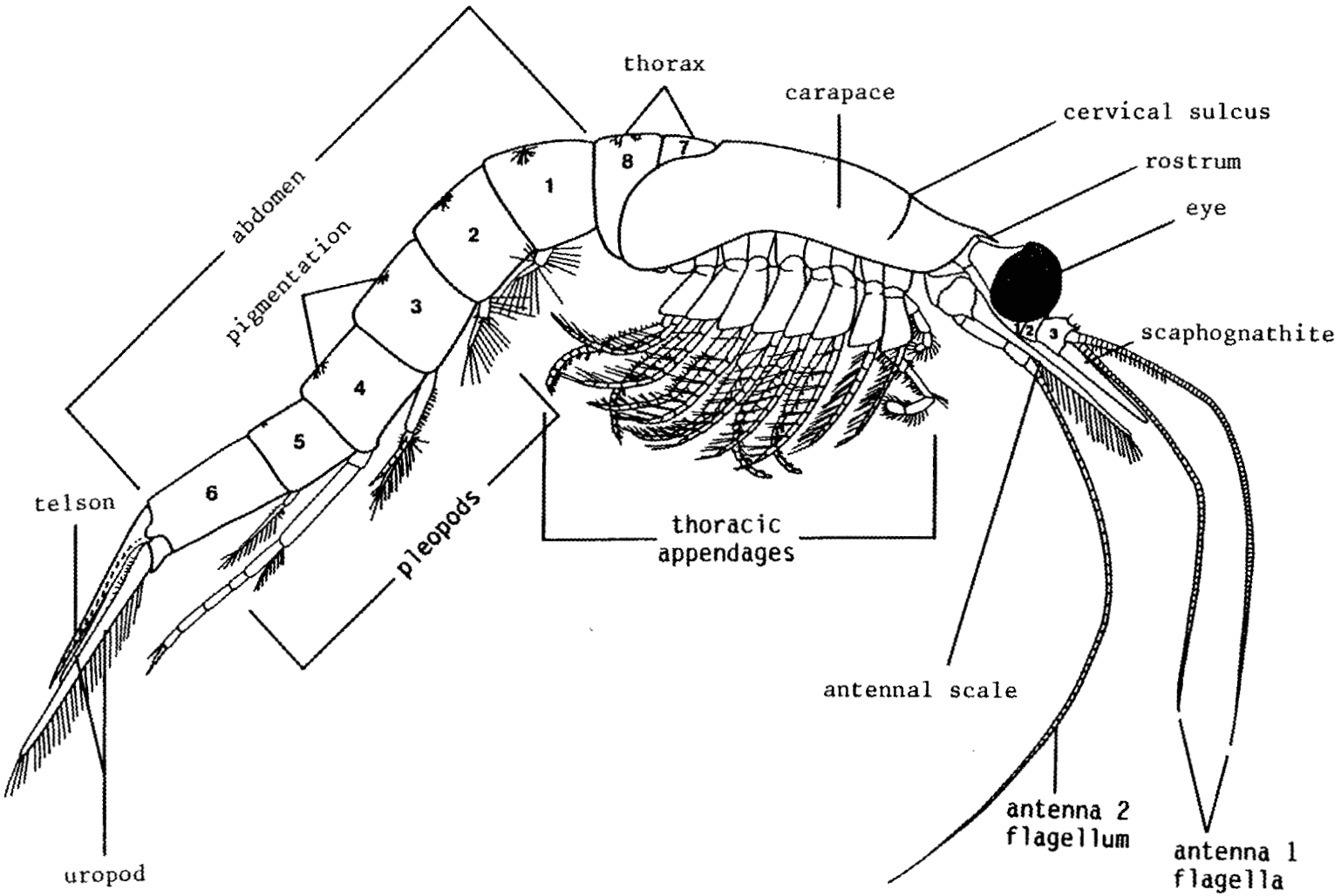


uropod

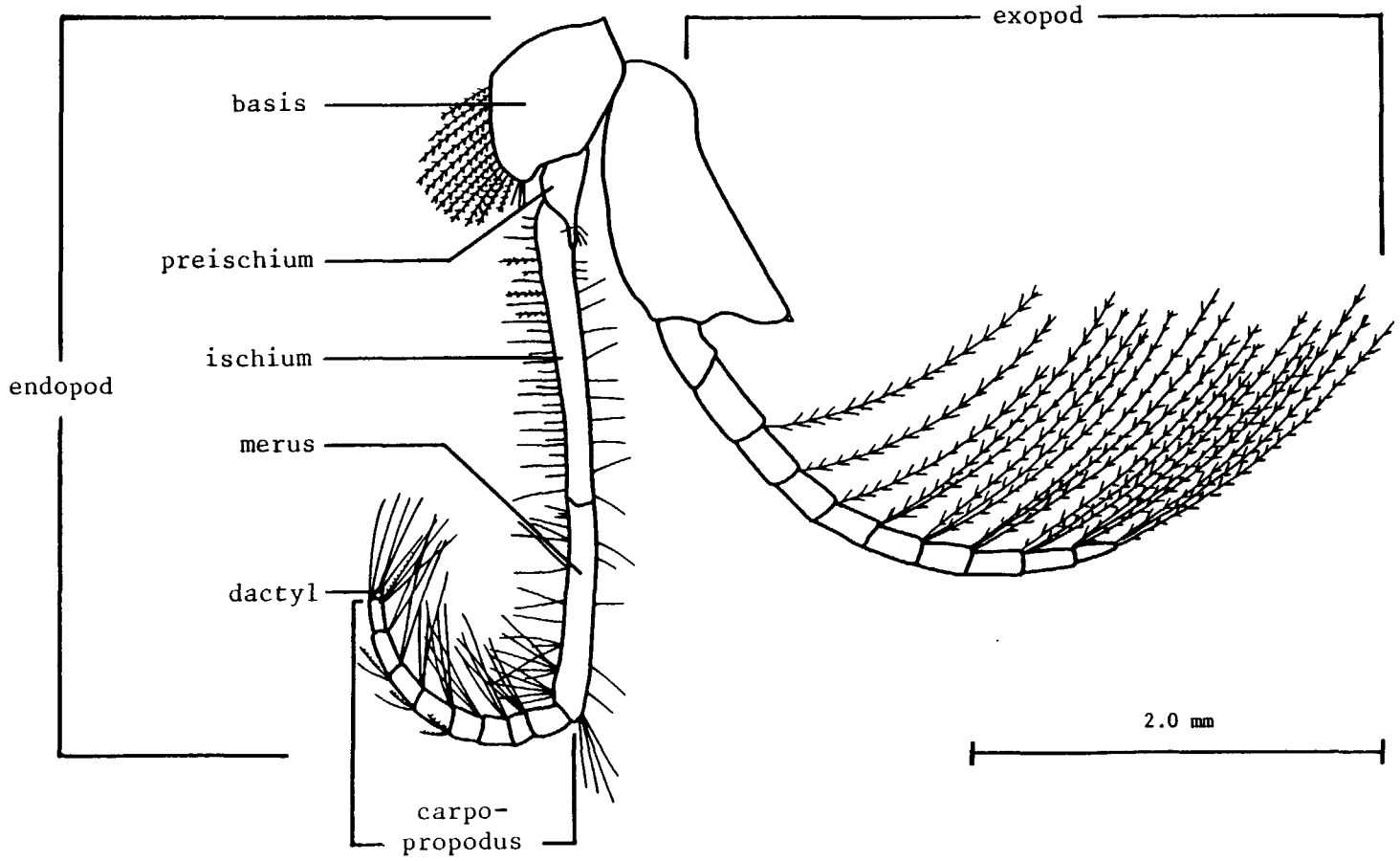


telson

Erythrops erythrophthalma (Goës 1864)

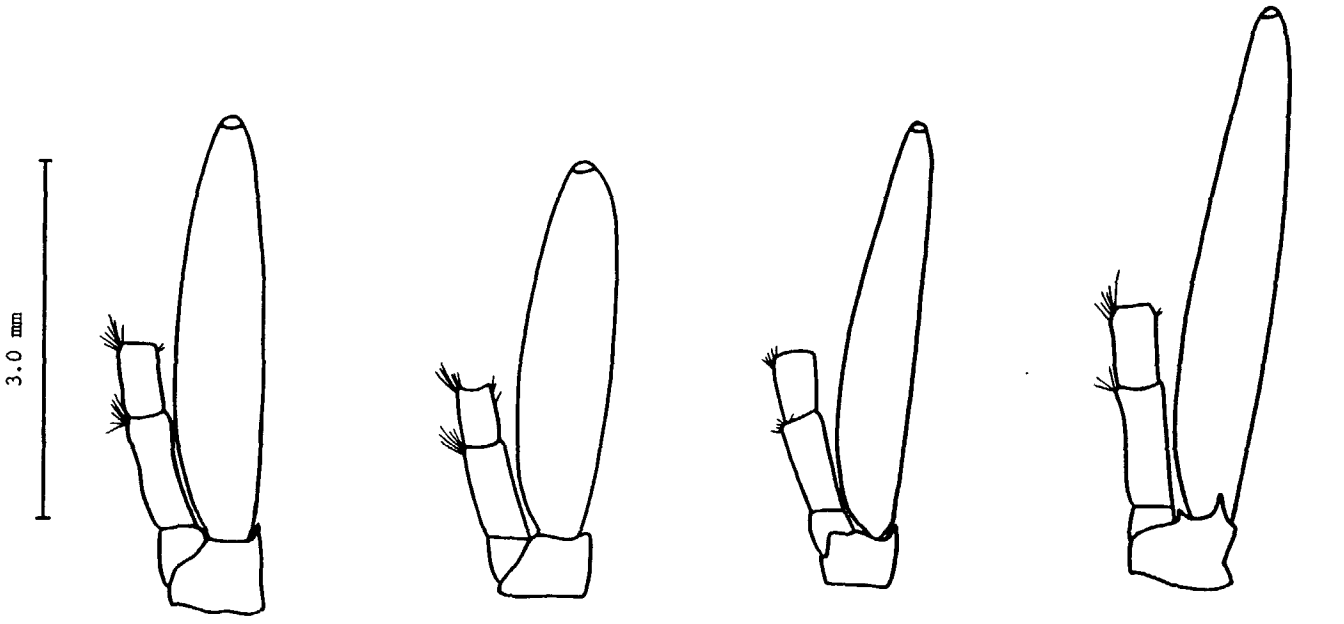


External morphology of Mysis oculata (Fabricius 1780), TL = 21.2 mm ♂



3rd Thoracic appendage of Mysis oculata (Fabricius 1780), ♂

ANTENNAL SCALE



Mysis polaris Holmquist

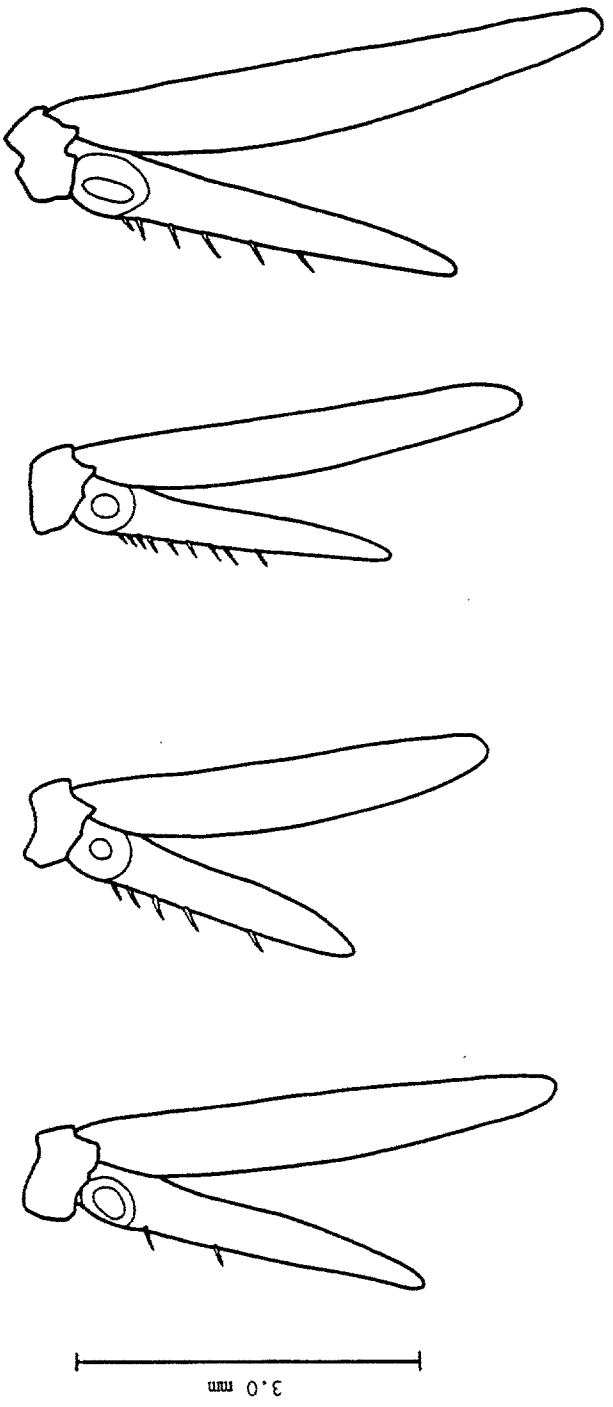
Mysis relicta Loven

Mysis oculata (Fabricius)

Mysis litoralis (Banner)

MYSIDAE

PLATE XXIII



Mysis litoralis (Banner)

Mysis oculata (Fabricius)

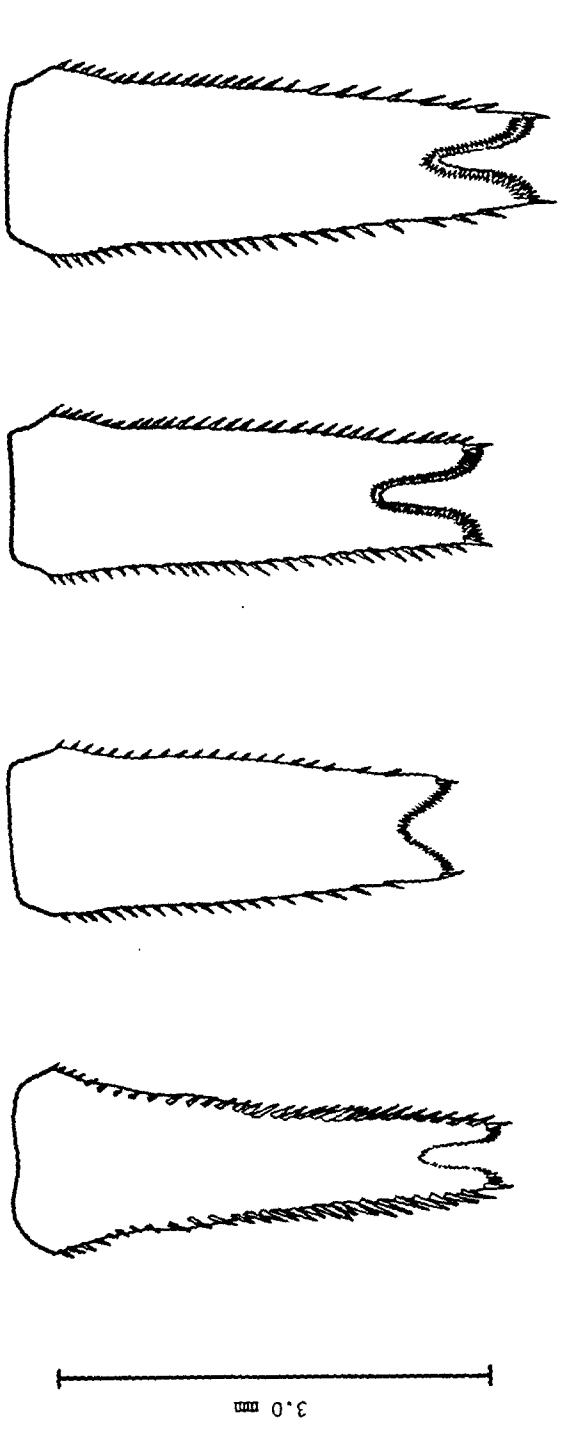
Mysis relicta Loven

Mysis polaris Holmquist

UROPOD

MYSIDAE

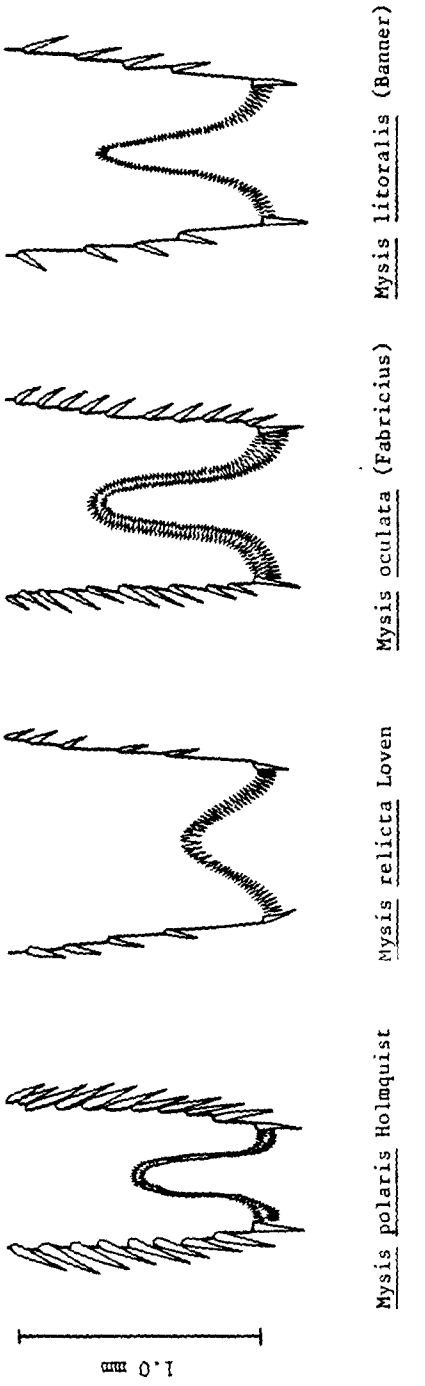
PLATE XXIV



TELSON

MYSIDAE

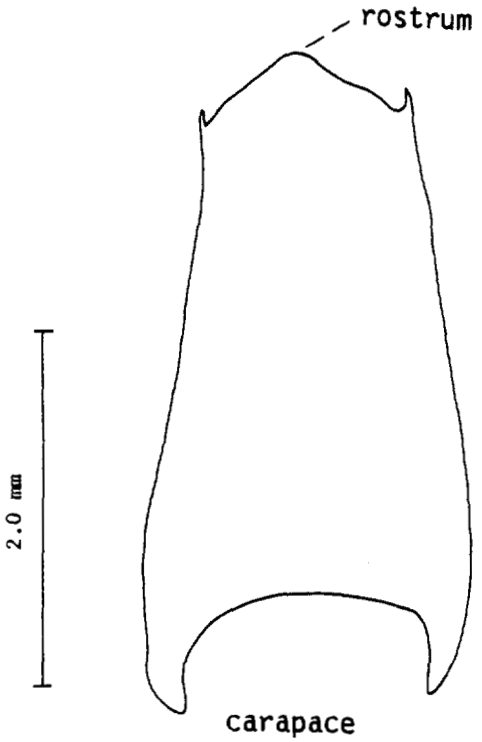
PLATE XXV

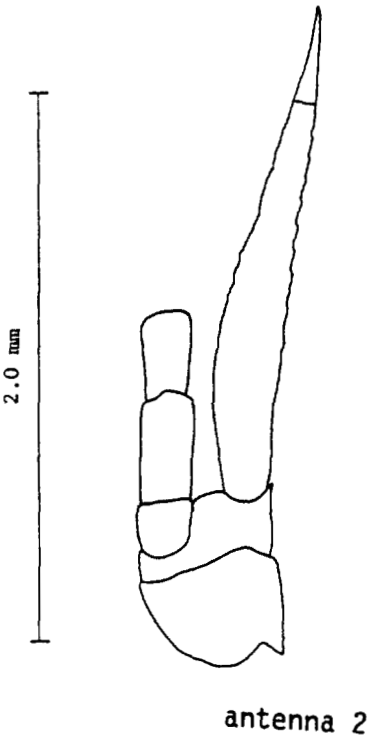


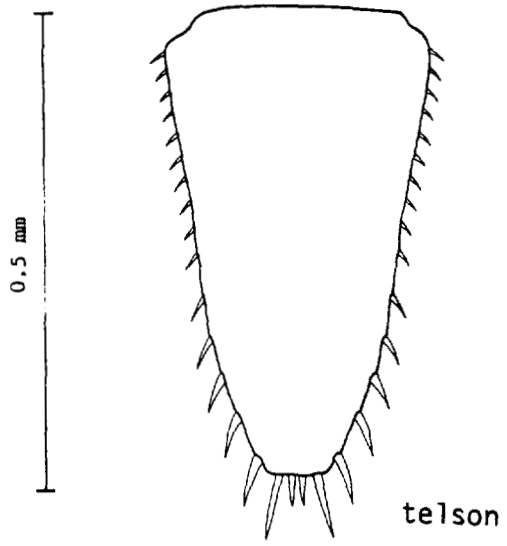
TELSON (APEXES)

MYSIDAE

PLATE XXVI



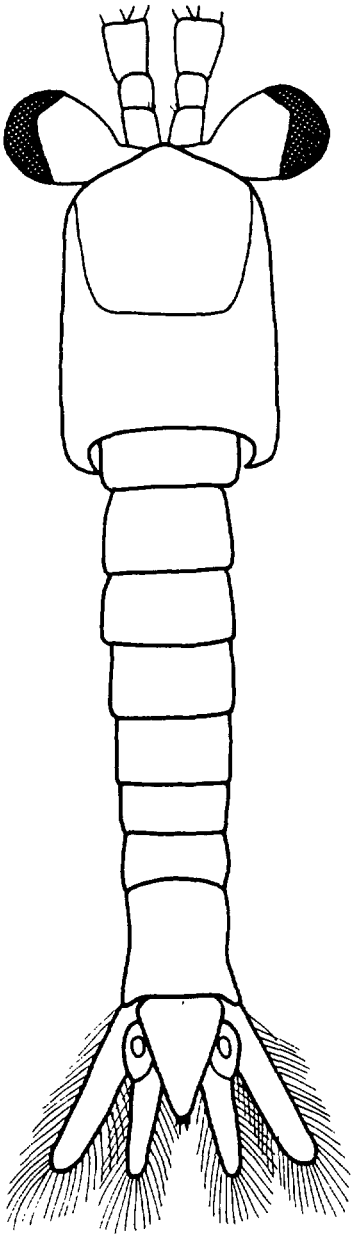




Neomysis intermedia (Czerniavsky 1882), ♂

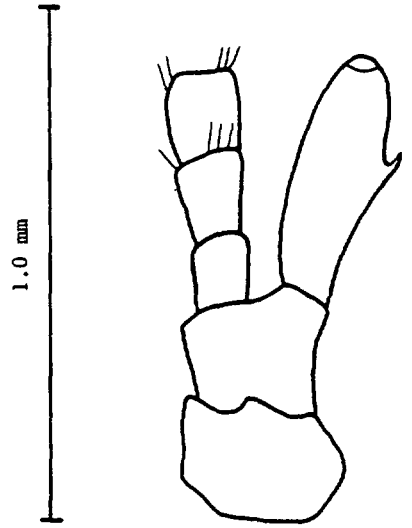
MYSIDAE

PLATE XXVII

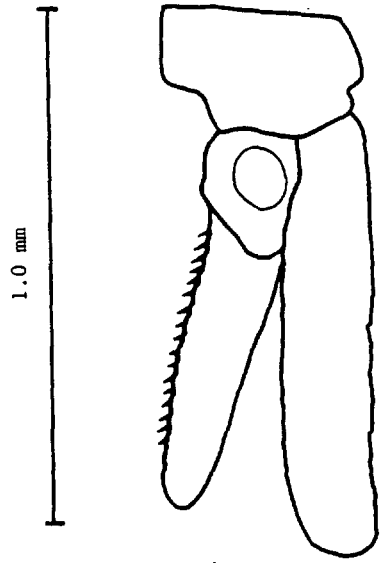


juvenile

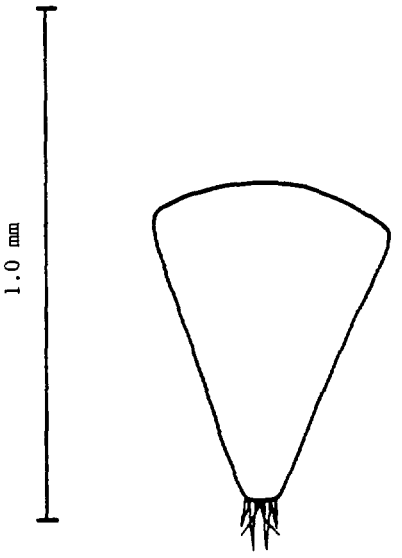
Parerythrops obesa (G.O. Sars 1864)



antenna 2



uropod



telson

Parerythrops obesa (G.O. Sars 1864), juv.

APPENDIX 1

VERIFICATION OF SPECIES

The following species incorporated within the systematic lists were verified by the following persons:

National Museum of Natural Sciences
National Museums of Canada, Ottawa, Ontario
Dept. of Invertebrate Zoology

1) D. Laubitz - verified specimens obtained in samples processed by Invertebrate Research Associates, Winnipeg for D.F.O., Winnipeg

Euphausiids:
Thysanoessa inermis (Krøyer 1846)
Thysanoessa raschi (M. Sars 1864)

Mysids:
Erythrops erythropthalma (Goes 1864)
Mysis litoralis (Banner 1948)
Mysis oculata (Fabricius 1780)
Mysis polaris Holmquist 1959
Mysis relicta Loven 1861
Neomysis intermedia (Czerniavsky 1882)
Parerythrops obesa (G.O. Sars 1864)

Decapods:
Argis dentata (Rathbun 1902)
Eualus gaimardii (H. Milne-Edwards 1837)
Hyas sp.
Lebbeus sp.
Pagurus sp.
Sabinea septemcarinata (Sabine 1824)
Spirontocaris phippsi (Krøyer 1841)