A Laboratory Manual for the Identification of British Columbia Marine Zooplankton

by John Fulton

FISHERIES RESEARCH BOARD OF CANADA

TECHNICAL REPORT NO. 55

1968

FISHERIES RESEARCH BOARD OF CANADA

Technical Reports

FRB Technical Reports are research documents that are of sufficient importance to be preserved, but which for some reason are not suitable for scientific publication. No restriction is placed on subject matter and the series should reflect the broad research interest of FRB.

These Reports can be cited in publications, but care should be taken to indicate their manuscript status to prevent erroneous implications being drawn from data and analysis that may be preliminary. Some of the material in these Reports will eventually appear in scientific publication.

Inquiries concerning any particular Report should be directed to the issuing FRB establishment which is indicated on the title page.

FISHERIES RESEARCH BOARD OF CANADA

TECHNICAL REPORT NO. 55

A Laboratory Manual for the Identification of British Columbia Marine Zooplankton

by

John Fulton

FISHERIES RESEARCH BOARD OF CANADA

Biological Station, Nanaimo, B. C.

Pacific Oceanographic Group

May 1968

Index

A Laboratory Manual for the Identification of British Columbia Marine Zooplankton

by

John Fulton

INTRODUCTION

The systematics of the zooplankton of the Northeastern Pacific coastal waters has been investigated by various workers since the pioneer work of Herdman, Thompson and Scott in 1898. The present report is an attempt to summarize the work to date and to sort out some of the synonymies and the errors which have occurred in the past. This work has been done in conjunction with an extensive study of the biological oceanography of the Strait of Georgia.

The Strait of Georgia biological oceanography program began in January 1965 and is continuing. Thus far, some 1200 samples have been taken with a modified Hensen net hauled vertically, and some 1300 samples have been taken with high speed Miller nets towed horizontally. The nets were constructed from "Nitex" mesh with 350 μ openings. Quantitative results of the plankton sampling have been reported by Bishop et al (1966), Stephens et al (1947) and Fulton et al (1967).

At the beginning of the program it was necessary to sort and identify all the species of zooplankton collected. To facilitate the work, a reference collection of identified zooplankton species was established. Although the bulk of the specimens in the present collection were captured in regular plankton nets, a few specimens were captured with other types of gear, notably mid-water trawls. All of the specimens in the present collection

have been taken in the Strait of Georgia, Saanich Inlet, or Juan de Fuca Strait, since 1964, by personnel of the Fisheries Research Board. In addition, species found in British Columbia coastal waters by earlier workers are included in the lists.

For some species, it has been possible to include a few brief semi-quantitative remarks on their ecology. The following terms have been used throughout:

X - Species observed in the present collection.

A - Species observed by previous workers but not in the present collection.

Surface	Samples taken from less than 50 m
Mid-depth	Samples taken from deeper than 50 m but less than 200 m
Deep	Samples taken from deeper than 200 m
Rare	Less than one organism per 25 m^3
Common	1-25 organisms per 25 m^3
Abundant	More than 25 organisms per 25 m^3
Very Abundant	More than 25% of the biomass

It is to be noted that the above terminology refers to the distribution and abundance most frequently observed and does not seek to delimit or define the absolute limits of a species.

The bibliography has been selected, wherever possible, from systematic work done in British Columbia coastal waters. Where there is no local reference or taxonomic description of a species in the present collection, the author has included references to taxonomic descriptions from other parts of the world. References which the author found most useful for identifications are marked with an asterisk.

Artificial keys based on gross features of whole specimens are included for some of the more difficult groups for easy recognition. Measurements of the life history stages of some of the common species of copepods and the length-weight relationships for dominant organisms are taken from specimens preserved in 10% formalin-seawater solutions. It should be noted that some organisms shrink as much as 10% when preserved.

The Strait of Georgia is a rectangular basin connected to the ocean by Discovery Passage to the northwest and by Juan de Fuca Strait to the south. Surface salinity is mainly influenced by runoff water from the Fraser River and land drainage from the coastal mountains. Euryhaline plankters, and occasionally fresh water plankters, occur in runoff water from the Fraser River and in some shallow bays and inlets. Oceanic plankton is carried into the basin when deep water is formed in channels of the San Juan Islands, mainly during the late summer and autumn.

Biological Oceanography of Georgia Strait has been previously reported by Cameron and Mounce (1922), Lucas and Hutchinson (1927), and Hutchinson (1928). The Physical Oceanography is given by Waldichuk (1957). Complete references to the oceanography and fisheries of the Strait of Georgia are included.

Acknowledgement

The author is grateful to his colleagues and especially to Mr. R.J. LeBrasseur for discussion and assistance in the preparation of this manuscript.

References to the Oceanography

Barraclough, W.E. 1964. Contribution to the Marine Life History of the Eulachon Thaleichthys pacificus. J. Fish. Res. Bd. Canada, 21 (5): 1333-1337.

MS, 1967. Number, size and food of larval and juvenile fish caught with a two boat surface trawl in the Strait of Georgia April 25-29, 1966. Fish. Res. Bd. Canada, Manuscript Report No. 922: 54 pp.

MS, 1967. Number, size and food of larval and juvenile fish caught with an Isaacs-Kidd trawl in the surface waters of the Strait of Georgia April 25-29, 1966. Fish. Res. Bd. Canada, Manuscript Report No. 926: 79 pp.

MS, 1967. Number, size composition and food of larval and juvenile fish caught with a two boat surface trawl in the Strait of Georgia June 6-8, 1966. Fish. Res. Bd. Canada, Manuscript Report No. 928: 58 pp.

Barraclough, W.E. and J.D. Fulton. MS, 1967. Number, size composition and food of larval and juvenile fish caught with a two boat surface trawl in the Strait of Georgia July 4-8, 1966. Fish. Res. Bd. Canada, Manuscript Report No. 940: 82 pp.

Barracough, W.E. and M. Waldichuk. 1954. Offshore characteristics in the deep waters of the Strait of Georgia as indicated by bathypelagic fish. J. Fish. Res. Bd. Canada, 11 (5): 501-506.

Bernard, F. 1967. Prodrome for a distributional check-list and bibliography of the recent marine mollusca of the west coast of Canada. Fish. Res. Bd. Canada, Tech. Rpt. 2: 261 pp.

Bishop, S.O., J.D. Fulton, O.D. Kennedy and K. Stephens. MS, 1966. Data Record: Physical, Chemical and Biological Data, Strait of Georgia, 1965. Fish. Res. Bd. Canada, Manuscript Report (Oceanogr. and Limnol.), No. 211: 171 pp.

Cameron, A.T. and I. Mounce. 1922. Some Physcial and Chemical Factors Influencing the distribution of Marine Flora and Fauna in the Strait of Georgia and Adjacent Waters. Contrib. Can. Biol. 1 (4): 41-70.

Forrester, C.R. and K.S. Ketchen. 1963. A review of the Strait of Georgia Trawl fishery. Bull. Fish. Res. Bd. Canada, No. 139: 81 pp.

Fulton, J.D., O.D. Kennedy, K. Stephens and J. Skelding. MS, 1967. Data Record: Physical, Chemical and Biological Data, Strait of Georgia, 1966. Fish. Res. Bd. Canada, Manuscript Report No. 915: 145 pp.

Gilhousen, P. 1960. Migratory behaviour of adult Fraser River Sockeye. International Pacific Salmon Fisheries Commission, Prog. Rept. 1960.

Hart, J.L. and J.L. McHugh. 1944. The smelts (Osmeridae) of British Columbia. Bull. Fish. Res. Bd. Canada, No. 64: 27 pp.

Herlinveaux, R.H. 1954. Tidal currents in Juan de Fuca Strait. J. Fish. Res. Bd. Canada, 11 (6): 799-815.

Hutchinson, A.H. 1928. A Bio-hydrographical investigation of the sea adjacent to the Fraser River mouth. Trans. Roy. Soc. Canada, Ser. 3, 22 (5): 293-310.

Hutchinson, A.H. and C.C. Lucas. 1930. Effect of the Fraser River on the waters and phytoplankton of the Strait of Georgia. Proc. Fourth Pacific Sci. Cong. 1929, 3: 443-448.

1931. Epithalassa of the Strait of Georgia. Canadian J. Res., 5: 231-284.

Hutchinson, A.H., C.C. Lucas and M. McPhail. 1929. Seasonal variations in the chemical and physical properties of the waters of Georgia Strait in relation to phytoplankton. Trans. Roy. Soc. Canada, 23 (5): 177-183.

1930. An oceanographic survey of the Strait of Georgia. Contr. Marine Biol., VII, Stanford Univ. Press, Stanford University, Calif., pp 87-90.

Lucas, C.C. 1929. Further oceanogrpahic studies of the sea adjacent to the Fraser River mouth. Trans. Roy. Soc. Canada, 23 (5): 29-58.

Lucas, C.C. and A.H. Hutchinson. 1927. A biohydrographical investigation of the sea adjacent to the Fraser River mouth. Trans. Roy. Soc. Canada, Ser. 3, 21 (5): 485-520.

Milne, D.J. and H. Godrey. 1964. The Chinook and Coho Salmon Fisheries of British Columbia. Bull. Fish. Res. Bd. Canada, No. 142: 46 pp.

Parsons, T.R. M.S., 1965. A general description of some factors governing primary production in the Strait of Georgia, Hecate Strait and Queen Charlotte Sound and the N.E. Pacific Ocean. Fish. Res. Bd. Canada, Manuscript Report No. 193: 34 pp.

Pickard, G.L. 1954. Currents in Georgia Strait and Trincomali Channel - CGS Marabell, 31 May-9 July, 1954. Manuscript Report Inst. of Oceanogr. University of B.C., Vancouver.

1956. Surface and bottom currents in the Strait of Georgia. J. Fish. Res. Bd. Canada, 13 (4): 581-590.

Pickard, G.L. and D.C. McLeod. 1953. Seasonal variation of temperature and salinity of surface waters of the British Columbia coast. J. Fish. Res. B. Canada, 13 (4): 581-590.

Quayle, D.B. 1964. Distribution of Introduced Marine Mollusca in British Columbia waters. J. Fish. Res. Bd. Canada, 21 (5): 1155-1181.

Scagel, R.F. 1961. Marine plant resources of British Columbia. Bull. Fish Res. Bd. Canada, No. 127: 39 pp.

Shand, J.A. 1953. Internal waves in Georgia Strait. Trans. Amer. Geophys. Union, 34 (6): 849-856.

Taylor, F.H.C. 1964. Life history and present status of British Columbia Herring Stocks. Bull. Fish. Res. Bd. Canada, 143: 81 pp.

Tully, J.P. and A.J. Dodimead. 1957. Properties of the water in the Strait of Georgia and influencing factors. J. Fish. Res. Bd. Canada, 14 (3): 241-319.

Verhoeven, L.A. and E.B. Davidoff. 1962. Marine tagging of Fraser River Sockeye Salmon. International Pacific Salmon Fisheries Commission Bull. 13: 132 pp.

Vernon, E.H. 1958. An examination of factors affecting the abundance of Pink Salmon in the Fraser River. Internationl Pacific Salmon Fisheries Commission Prog. Rpt. 1958.

Waldichuk, M. 1957. Physical Oceanography of the Strait of Georgia, British Columbia. J. Fish. Res. Bd. Canada, 14 (3): 321-486.

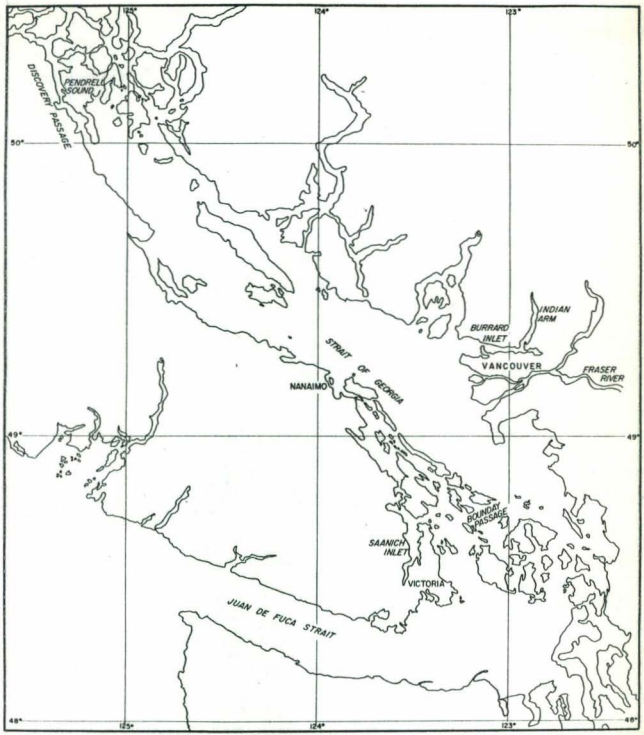


Figure 1. Map of the Strait of Georgia.

COELENTERATA

(A) Medusae

The list of the medusae has been restricted to those species which were encountered in plankton samples. A more complete list including the species found in shallow water is given by Foerster (1923). Sketches of the more common species are found in Figure 2.

Hybocodon prolifera (Agassiz, 1862)

Hybocodon prolifera	Foerster, 1923 *Russell, 1953 Mackie and Mackie, 1963

Remarks: X; Surface; Rare; Summer.

Rathkea octopunctata (M. Sars, 1835)

Rathkea blumenbachii	McMurrich, 1916 Foerster, 1923
Rathkea octopunctata	*Russell, 1953

Remarks: X; Surface; Rare; Summer.

Phialidium gregarium (Agassiz, 1862)

Phialidium languidum var. gregarium Phialidium gregarium	Foerster, 1923 *Kramp, 1962 Mackie and Mackie, 1963 Rossen-Runge, 1964

Remarks: X; Surface; Abundant; Summer.

Aequorea aequorea (Forskal, 1775)

Aequorea forskalea Aequorea aequorea	*Fraser, 1916 Foerster, 1923 Mackie and Mackie, 1963

Remarks: X; Surface; Common; Summer and Fall.

Proboscidactyla flavicirrata (Brandt, 1834)

Proboscidactyla flavicirrata	Foerster, 1923 Hyman, 1940 *Mackie and Mackie, 1963

Remarks: X; Surface; Common; Summer.

Aglantha digitale Müller, 1766

Aglantha digitale	Foerster, 1923 *Hyman, 1940 Kramp, 1961 Mackie and Mackie, 1963

Remarks: X; Deep; Common; Summer.

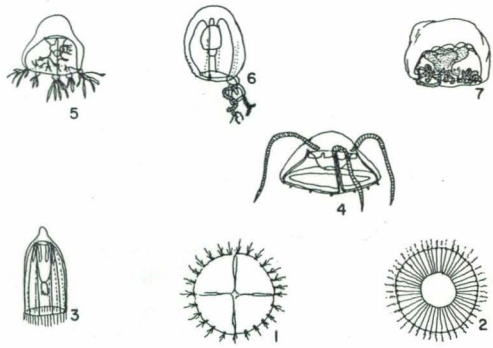
Aegina citria Eschscholtz, 1829

Aegina rosea Aegina citria	Foerster, 1923 Hyman, 1940 *Russell, 1953 Mackie and Mackie, 1963

Remarks: X; Deep; Common; All year.

Figure 2

Key to Pelagic Medusae - Strait of Georgia



Body disc shaped

(1)	four radiating canals	Phialidium
(2)	many radiating canals	Aequorea

Body bell shaped

(3)	many small tentacles on margin of bell	Aglantha
(4)	four tentacles through the upper surface of the bell	Aegina
(5)	tentacles arranged symmetrically in four clumps on margin of the bell	Rathkea
(6)	four clumps of tentacles on margin of bell, one clump larger than others	Hybocodon
(7)	tentacles usually curled up inside bell in preserved specimens	Proboscidactyla

References to the Medusae

Foerster, R.E. 1923. The Hydromedusae of the West Coast of North America, with special reference to those of the Vancouver Island Region. Contrib. Can. Biol. N.S., 1: 221-277.

Fraser, C. McL. 1916. On the development of Aequorea forskalea. Trans. Roy. Soc. Canada Ser. 3, 10 (5): 97-104.

Hyman, L.H. 1940. The Invertebrates: Protozoa through Ctenophora. McGraw-Hill (New York). 726 pp.

Kramp, P.L. 1961. Synopsis of the medusae of the world. J. Mar. Biol. Assoc. U.K., 40: 7-469.

1962. Notes on some Eastern Pacific species of Phialidium (Leptomedusae). Pac. Sc., 16 (1): 25-29.

Mackie, G.O. and G.V. Mackie. 1963. Systematic and Biological Notes on Living Hydromedusae from Puget Sound. Contri. Zool. Nat. Mus. Can. Bull. 199: 63-83.

Rossen-Runge, E.L. 1964. On the Biology of sexual reproduction of Hydromedusae, Genus Phialidium Leuckhart. Pac. Science, 16 (1): 15-24.

Russell, F.S. 1953. The medusae of the British Isles. Cambridge Univ. Press: 530 pp.

COELENTERATA

(B) Siphonophora

The siphonophores of the Northeastern Pacific have been identified by Dr. G.O. Mackie and reported by Berkeley and Berkeley (1960). Some of the specimens in the present collection were kindly identified by Dr. A.K. Totton of the British Museum of Natural History.

Nanomia bijuga Chiaje, 1841

Stephanomia bijuga	Bigelow, 1911
Nanomia bijuga	Totton, 1954
	Berkeley and Berkeley, 1960
	*Totton, 1965a

Remarks: A; This species has been recorded from Oak Bay and Friday Harbour.

Nanomia cara A. Agassiz, 1865

Nanomia sp. (N. cara Agassiz)	Berkeley and Berkeley, 1960
Nanomia cara	Mackie and Boag, 1963
	*Totton, 1965a

Remarks: A; Reported from Friday Harbour, Oak Bay and Sidney Island regions.

Lensia baryi Totton, 1965

? Diphyes truncata	Bigelow, 1913
Lensia sp. aff. leloupi	Totton, 1965a
Lensia baryi	*Totton, 1965b

Remarks: X; Deep; Rare; Spring and Summer. Type specimen from Burke Channel. Named for Dr. B.McK. Barry, Institute of Oceanography, University of British Columbia.

Muggia atlantica Cunningham, 1892

Muggia atlantica	*Totton and Fraser, 1955 Berkeley and Berkeley, 1960 Mackie and Boag, 1963 Totton, 1965a

Remarks: X; Rare; Deep; All year.

Dimophyes arctica Chun, 1897

Dimophyes arctica	*Totton and Fraser, 1955 Berkeley and Berkeley, 1960 Totton, 1965a

Remarks: X; Deep; Common; All year.

Chelophyes appendiculata (Eschscholtz, 1829)

Diphyes appendiculata	McMurrich, 1916
Chelophyes appendiculata	*Totton, 1965a

Remarks: A; Identified in deep samples from Burke Channel.

References to the Siphonophora

Berkeley, E. and C. Berkeley. 1960. Some further records of pelagic polychaeta from the Northeast Pacific north of latitude 40° N and east of longitude 175° W. Can. J. Zool., 38: 787-799.

Bigelow, H.B. 1913. Medusae and siphonophorae collected by the U.S. Fisheries Steamer "Albatross" in the Northwestern Pacific, 1906. Proc. U.S. Nat. Mus., 44: (1946) 1-119.

Mackie, G.O. and D.A. Boag. 1963. Fishing, feeding and digestion in siphonophores. Publ. Staz. Napoli, 33: 178-196.

McMurrich, J.P. 1916. Notes on the plankton of the B.C. Coast. Trans. Roy. Soc. Canada, Ser. 3, 10 (5): 75-89.

Totton, A.K. 1965a. A synopsis of the siphonophore. British Mus. Nat. Hist. 230 pp.

1965b. A new species of Lensia (Siphonophora Diphydae) from the coastal waters of Vancouver, B.C.; and its comparison with Lensia achilles Totton and another new species Lensia cordata. Ann. and Mag. Nat. History, 13 (8): 71-76.

Totton, A.K. and J.H. Fraser. 1955. Siphonophora. Fich. Ident. Zoopl., 55.

CTENOPHORA

Ctenophores are the most important invertebrates in the euphotic zone of the Strait of Georgia from late June until mid-October. Mayer (1912) discusses their biology and taxonomy.

Pleurobrachia pileus (Müller, 1776)

Pleurobrachia bachei	A. Agassiz, 1865
	Wailes, 1929
Pleurobrachia rhododactyla	A. Agassiz, 1865
Pleurobrachia pileus	Mayer, 1912
	Wailes, 1929
	*Liley, 1958

Remarks: X; Surface; Very abundant; Summer and Fall.

Bolinopsis infundibulum (Müller, 1776)

Bolinopsis infundibulum	Mayer, 1912
Bolinopsis microptera	Wailes, 1929
Bolinopsis infundibulum	*Liley, 1958

Remarks: X; Surface; Abundant; This is a fragile species which disintegrates in a plankton net. Bolinopsis was observed in the shallow water of Departure Bay and Long Harbour in the spring of 1967.

Beroe cucumis Fabricius, 1730

Idyia roseola	A. Agassiz, 1865
Beroe ovata	Mayer, 1912
Beroe cucumis	Mayer, 1912
Beroe abyssicola	Mortensen, 1927
Beroe abyssorum	Wailes, 1929
Beroe abyssicola	Berkeley, 1930
Beroe cucumis	*Liley, 1958

Remarks: X; Deep; Rare; All year. There seems to be no trace in the literature of Wailes' species B. abyssorum. Specimens from the deep water of Strait of Georgia resemble Mayer's description of B. cucumis.

References to the Ctenophora

Agassiz, Alexander. 1865. North American Acalephae. Harvard Univ. Mus. of Comparative Zoology - Illustrated Cat.

Berkeley, C. 1930. Symbiosis of Beroe and a Flagellate. Contri. Can. Biol. N.S., 6 (2).

Liley, R. 1958. Ctenophora. Fich. Ident. Zoopl., 82.

Mayer, A.G. 1912. Ctenophores of the Atlantic coast of North America. Carnegie Inst. Wash. Pub., 162: 58 pp.

Mortensen, T.L. 1927. Two new Ctenophores. Papers from Dr. Th. Mortensen's Pacific expedition, 1914-1916, 39. Videns Medd. fra Dansk. Nat. Foren, 83: 277-288.

Wailes, G.H. 1929. Marine-Zoo-Plankton of British Columbia. Mus. and Art Notes (Vancouver), 4 (4): 159-165.

POLYCHAETA

Four polychaete species occur in the present collection. In most deep hauls in the Strait of Georgia polychaetes make up 10% to 20% of the total biomass. The most complete keys for the North Pacific Polychaeta are given by Dales (1957).

Rhynchonerella angelini Kinberg, 1866

Callizona angelini	Berkeley, 1930
	*Berkeley and Berkeley, 1948
	Berkeley and Berkeley, 1957
Rhynchonerella angelini	Dales, 1957
Callizona angelini	Berkeley and Berkeley, 1960
Rhynchonerella angelini	Tebble, 1962

Remarks: X; Surface; Rare; Spring.

Tomopteris septentrionalis Quatrefuges, 1865

Tomopteris septentrionalis	Berkeley, 1924
	Wailes, 1929
	Berkeley and Berkeley, 1948
	*Dales, 1957
	Berkeley and Berkeley, 1957
	Tebble, 1962

Remarks: X; Mid-depth and deep; Abundant.

Tomopteris renata Berkeley and Berkeley, 1948

Tomopteris elegans	Berkeley, 1924
	Wailes, 1929
Tomopteris renata	Berkeley, 1930
	*Berkeley and Berkeley, 1948
Tomopteris pacifica	Dales, 1957
Tomopteris renata	Berkeley and Berkeley, 1957
	Berkeley and Berkeley, 1960
Tomopteris pacifica	Tebble, 1962

Remarks: X; Deep; Rare.

Typhloscolex mulleri Busch, 1851

Typhloscolex mulleri	*Berkeley and Berkeley, 1948 Dales, 1957 Tebble, 1962

Remarks: X; Deep; Rare.

References to the Polychaeta

Berkeley, E. 1930. Polychaetous annelids from the Nanaimo District. Pt. 5 Ammocharidae to Myzostomidae. Contrib. Can. Biol. N.S., 6: 65-77.

Berkeley, E. and C. Berkeley. 1948. Polychaeta Errantia. Fish. Res. Bd. Canada, Canadian Pacific Fauna, No. 9b (1), 100pp.

1957. On some pelagic Polychaeta from the Northeast Pacific North of latitude 40° N and East of longitude 175° W. Can. J. Zoology 35: 573-578.

1960. Some further records of pelagic polychaeta from the Northeast Pacific North of latitude 40° N and East of longitude 175° W. Can. J. Zoology. Vol. 38: 787-799.

Dales, R.P. 1957. Pelagic polychaetes of the Pacific Ocean. Bull. Scripps Inst. Oceanogr., 7 (2): 99-168.

Tebble, N. 1962. The distribution of pelagic polychaetes across the North Pacific Ocean. Bull, Brit. Mus. (Nat. History) Zoology, 7 (9): 373-492.

Izuka, Ahira. 1914. On the pelagic annelids of Japan. Tokyo Imperial University J. Coll. Sci., 36 (5): 1-14.

CLADOCERA

Aside from Wailes' list (1929), there are no records of Cladocera from this coast. The size of the mesh openings of the nets (350 μ) used in the present program may allow Cladocera to pass through. Apstein (1901) or Dakin and Colefax (1940) give a good account of their systematics. The Cladocera taken in the present programme were not positively identified.

	Evadne tergestina	Claus, 1877
Evadne tergestina		Wailes, 1929 *Dakin and Colefax, 1940
	Evadne nordmanni	Loven, 1836
Evadne nordmanni		*Apstein, 1901 McMurrich, 1916 (?) Wailes, 1929 (very close but more rounded posteriorly)
	Podon polyphemoides	Leuckhart, 1859
Podon polyphemoides		*Apstein, 1901 Wailes, 1929 (very abundant)
	Podon leuckartii	Sars, 1862
Podon leuckartii		*Apstein, 1901 McMurrich, 1916 Wailes, 1929 (very abundant)

Table 1

Key to the Cladocera - Strait of Georgia

Genus Podon - constriction between head and body

Genus Evadne - no constriction between head and body

Species	Number of setae on the exopodite			
	1st leg	2nd leg	3rd leg	4th leg
Evadne nordmanni	2	2	1	1
Evadne tergestina	2	3	3	1
Podon leuckartii	1	1	1	2
Podon polyphemoides	3	3	3	2

References to the Cladocera

Apstein, C. 1901. Die Cladoceren. Nordisches Plankton, VII, Lief 1.

Dakin, W.J. and A.N. Colefax. 1940. The plankton of the Australian coastal waters off New South Wales. Pub. Univ. Sydney, Dept. Zool. 1: 215 pp.

Wailes, G.H. 1929. Marine-Zoo-Plankton of British Columbia. Museum and Art Notes (Vancouver), 4 (4): 159-165.

OSTRACODA

The benthic and littoral ostracods of the Vancouver Island region are described by Smith (1952). McHardy (1964) describes the ecology of the planktonic ostracods of Indian Arm. Only the planktonic forms are listed here.

Conchoecia elegans Sars, 1865

Conchoecia elegans — Smith, 1952; *McHardy, 1964

Remarks: X; Mid-depths and deep; Abundant.

Conchoecia alata minor McHardy, 1964

Conchoecia alata minor — *McHardy, 1964

Remarks: X; Mid-depth and deep; Common. Type species from "British Columbia inlets".

Conchoecia spinorostris Claus, 1891

Conchoecia spinirostris — Smith, 1952

Remarks: A

References to the Ostracoda

Lucas, V.Z. 1931. Some Ostracoda of the Vancouver Island Region. Contrib. Can. Biol. and Fish. N.S., 6: 399-404.

McHardy, R.A. 1964. Marine Ostracods from the Plankton of Indian Arm, British Columbia, including a diminuitive subspecies resembling Conchoecia alata major Rudjakov. J. Fish. Res. Bd. Canada, 21 (3): 555-576.

Smith, V.Z. 1952. Further Ostracoda of the Vancouver Island Region. J. Fish. Res. Bd. Canada, 9 (1): 16 - 41.

COPEPODA

Campbell (1929) was the first person to make an intensive study of the copepod systematics of this area. Cameron (1957) lists and discusses the distribution of copepods in the Queen Charlotte Island region; Légaré (1957) does the same for the Strait of Georgia region.

For some time now there has been discussion in the literature as to the status of such species as Calanus finmarchicus, C. glacialis and C. helgolandicus. Brodsky (1948) treats them as separate species while some authors - Fleminger (1967)- suggest they may be variations of the same species caused by environmental factors. Shan (1962) compares the morphology of three Indian Arm species with their North Atlantic counterparts. This report accepts the North Pacific names for those species under question.

Brodsky's work (1950) is the most useful reference for calanoid copepods of the North Pacific and has been followed here unless otherwise noted.

The author wishes to thank Dr. T. S. Park of the Woods Hole Oceanographic Institute for his help in identifying difficult species.

COPEPODA
Order: Calanoida

Calanus pacificus	Brodsky, 1948
Calanus finmarchicus	McMurrich, 1916 Campbell, 1929 Davis, 1949 Cameron, 1957 Légaré, 1957
Calanus pacificus	Brodsky, 1948 *Brodsky, 1950
Calanus sp.	Shan, 1962

Remarks: X; Surface and mid-depth; Abundant all year; For a discussion of the taxonomic status of this species see Shan (1962).

Calanus plumchrus Marukawa, 1921

Calanus sp.	Sato, 1913
Calanus plumchrus	Marukawa, 1921
Calanus tonsus	Campbell, 1929
	Campbell, 1930
	*Campbell, 1934
	Davis, 1949
Calanus tonsus var. plumchrus	Brodsky, 1950
Calanus plumchrus	Tanaka, 1956
Calanus tonsus	Cameron, 1957
	Légaré, 1957

Remarks: X; Egg to Stage V surface; Stage V & VI deep; Very abundant; All year.

Calanus cristatus Krøyer

Calanus cristatus	Campbell, 1929
	Davis, 1949
	*Brodsky, 1950
	Cameron, 1957
	Légaré, 1957

Remarks: X; Deep; Rare; Spring and summer.

Eucalanus bungii bungii Johnson, 1938

Eucalanus elongatus	Esterly, 1905
	Campbell, 1929
Eucalanus bungii bungii	*Johnson, 1938
	Brodsky, 1950
Eucalanus bungii	Davis, 1949
	Cameron, 1957
	Légaré, 1957

Remarks: X; Mid-depth & deep; Abundant.

Rhincalanus nasutus Giesbrecht, 1888

Rhincalanus nasutus	*Brodsky, 1950
	Cameron, 1957

Remarks: A.

Paracalanus parvus (Claus, 1863)

Paracalanus parvus	McMurrich, 1916 Campbell, 1929 Davis, 1949 *Brodsky, 1950 Cameron, 1957 Légaré, 1957

Remarks: X; Surface & Mid-depth; Abundant.

Pseudocalanus minutus (Krøyer, 1849)

Pseudocalanus elongatus	McMurrich, 1916 Campbell, 1929 *Brodsky, 1950
Pseudocalanus minutus	Davis, 1949 Tanaka, 1956 Cameron, 1957 Légaré, 1957 Frolander, 1962

Remarks: X; Surface & Mid-depth; Abundant. For a discussion of the taxonomic status of Pseudocalanus see Frolander (1962).

Microcalanus pusillus (Sars, 1903)

Microcalanus pusillus	Campbell, 1929 Brodsky, 1950 Légaré, 1957

Remarks: X; Surface; Abundant.

Clausocalanus acuicornis (Dana, 1849)

Clausocalanus acuicornis	*Brodsky, 1950 Cameron, 1957

Remarks: A.

Spinocalanus brevicaudatus Brodsky, 1950

Spinocalanus brevicaudatus	Brodsky, 1950

Remarks: X; Deep; Common in Pendrell Sound.

Aetidius armatus Boeck, 1872

Aetidius armatus	Campbell, 1929 Davis, 1949 *Brodsky, 1950 Cameron, 1957 Légaré, 1957

Remarks: X; Mid-depth & Deep; Common.

Aetidius pacificus Brodsky, 1950

Aetidius pacificus	*Brodsky, 1950

Remarks: X; Deep; Rare.

Bradyidius saanichi Park, 1965

Bradyidius saanichi	Park, 1965

Remarks: X; Mid-depth to Deep; Common. Type locality: Saanich Inlet. This species is common in Saanich Inlet. It rarely occurs in the Strait of Georgia.

Chiridius gracilis Farran, 1908

Chiridius gracilis	*Vervoort, 1952 Cameron, 1957

Remarks: X; Deep; Common.

Pseudoaetideus armatus (Boeck, 1873)

Chiridius armatus	Wailes, 1929
Pseudoaetideus armatus	*Brodsky, 1950

Remarks: A; This species was listed by Wailes (1929), but it seems likely that Wailes, working in the same Laboratory as Campbell, mistakenly listed Chiridius armatus instead of Chiridius tenuispinis which was on Campbell's list. C. tenuispinis occurred on Clemens' lists (1933) which Wailes helped to compile, but C. armatus did not.

Gaidius columbiae Park, 1967

Chiridius tenuispinis	Campbell, 1929 ? Légaré, 1957
Gaidius columbiae	Park, 1967

Remarks: X; Deep; Abundant; Type locality: Strait of Georgia. Campbell notes that her specimens of C. tenuispinis had shorter spines than was described at that time. It seems likely that she was looking at G. columbiae.

Gaidius pungens Giesbrecht, 1895

Gaidius pungens	Campbell, 1929 Davis, 1949 *Brodsky, 1950 Légaré, 1957

Remarks: X; Deep; Rare.

Gaidius variabilis Brodsky, 1950

Gaidius variabilis	*Brodsky, 1950

Remarks: X; Deep; Common.

Gaetanus intermedius Campbell, 1930

Gaetanus intermedius	Campbell, 1930 Davis, 1949 Brodsky, 1950
Gaetanus armiger	*Shan, 1962

Remarks: X; Deep; Rare; Type locality: Deep Cove, Indian Arm.

Euchirella pulchra (Lubbock, 1856)

Euchirella pulchra	*Brodsky, 1950

Remarks: X; Deep; Rare.

Euchirella rostrata (Claus, 1866)

Euchirella rostrata	Esterly, 1905 Campbell, 1929 Davis, 1949 *Brodsky, 1950

Remarks: X; Deep; Rare.

Euchaeta japonica Marukawa, 1921

Euchaeta japonica	Marukawa, 1921 Campbell, 1929 *Campbell, 1934
Paraeuchaeta japonica	Brodsky, 1950 Cameron, 1957 Légaré, 1957

Remarks: X; Deep; Abundant.

Scaphocalanus echinatus Farran, 1905

Scaphocalanus echinatus	Tanaka, 1961

Remarks: X; Deep; Common.

Scaphocalanus brevicornis G. O. Sars, 1900

Scaphocalanus brevicornis	Brodsky, 1950

Remarks: X; Deep; Rare.

Racovitzanus antarcticus Giesbrecht, 1902

Racovitzanus antarcticus	Brodsky, 1950

Remarks: X; Deep; Rare.

Scolecithricella minor (Brady, 1883)

Scolecithricella minor var. occidentalis	*Brodsky, 1950
Scolecithricella minor	Cameron, 1957 Légaré, 1957

Remarks: X; Mid-depth; Common.

Scolecithricella ovata (Farran, 1905)

Scolecithricella ovata	Brodsky, 1950

Remarks: X; Deep; Rare.

Scolecithricella subdentata (Esterly, 1905)

Scolecithricella subdentata	*Brodsky, 1950 Cameron, 1957

Remarks: A

Tharybis fultoni Park, 1967

Tharybis fultoni	Park, 1967

Remarks: X; Deep; Rare. Type locality: Strait of Georgia.

Eurytemora americana Williams, 1906

Eurytemora thompsoni	Willey, 1923
Eurytemora transversallis	Campbell, 1930
Eurytemora americana	*Heron, 1964

Remarks: X; Surface; Common.

Eurytemora hirundoides (Nordquist, 1888)

Eurytemora hirundoides	Esterly, 1924 Campbell, 1929 Davis, 1949 *Brodsky, 1950 Cameron, 1957 Légaré, 1957

Remarks: X; Surface; Common.

Eurytemora pacifica Sato, 1913

Eurytemora johanseni	Willey, 1920 Davis, 1949 Brodsky, 1950 Légaré, 1957
Eurytemora pacifica	*Heron, 1964

Remarks: A

Epischura nevadensis Lilljeborg, 1889

Epischura nevadensis	Marsh, 1933

Remarks: X; Surface; Rare.

Metridia lucens Boeck, 1864

Metridia lucens	Campbell, 1929 Davis, 1949 *Brodsky, 1950 Cameron, 1957 Légaré, 1957 Shan, 1962

Remarks: X; Surface at night, Mid-depth in daytime; Abundant. For a discussion of Metridia from Indian Arm and a comparison of its morphology with the morphology of specimens from other areas see Shan (1962).

Metridia okhotensis Brodsky, 1950

Metridia longa	Campbell, 1929 Davis, 1949 Cameron, 1957 Légaré, 1957
Metridia okhotensis	*Brodsky, 1950

Remarks: X; Deep; Common. The morphology of the specimens in the present collection agrees with Brodsky's description.

Pleuromamma quadrungulata Dahl, 1892

Pleuromamma quadrungulata	Davis, 1949

Remarks: X; Deep; Rare.

Centropages abdominalis Sato, 1913

Centropages hamatus var. Centropages mcmurrichi	McMurrich, 1916 Willey, 1923 Campbell, 1929 Davis, 1949 *Brodsky, 1950 Légaré, 1957

Remarks: X; Surface; Abundant.

Diaptomus sp. Westwood, 1836

Diaptomus sp.	Légaré, 1957

Remarks: A; Since this genus is composed exclusively of fresh water forms it is most likely that Légaré's specimen was found in run-off water.

Heterorhabdus tanneri Giesbrecht, 1895

Heterorhabdus tanneri — Brodsky, 1950

Remarks: X; Deep; Rare.

Heterorhabdus proximus Davis, 1949

Heterorhabdus proximus — *Davis, 1949; Cameron, 1957

Remarks: A; Cameron (1957) lists H. proximus as one of the species of which her identification was uncertain.

Centrogaptilus porcellus Johnson, 1936

Centrogaptilus porcellus — Johnson, 1936; *Brodsky, 1950; Légaré, 1957

Remarks: A

Candacia bipinnata Giesbrecht, 1892

Candacia bipinnata — Brodsky, 1950

Remarks: X; Deep; Rare.

Candacia columbiae Campbell, 1929

Candacia columbiae — Campbell, 1929; Davis, 1949; *Brodsky, 1950; Cameron, 1957; Légaré, 1957

Remarks: X; Deep; Rare. Type locality: Deserted Bay, Quatsino Sound, Raphael Point (West coast Vancouver Island).

Anomalocera pattersoni Templeton, 1837

Anomalocera pattersoni	Herdman et al, (1897) Wailes, 1929

Remarks: A; It is most likely that Thompson was looking at Epilabidocera amphitrites when he compiled Herdman's list of species. Clemens (1933), Johnson (1932), and Davis (1949) consider this record as being in error. Wailes omitted A. pattersoni when he helped Clemens compile his list (1933).

Pontella tenuiremis Giesbrecht, 1889

Pontella tenuiremis	Wilson, 1950

Remarks: A; Wilson records this species from Beaver Harbour, Vancouver Island.

Epilabidocera amphitrites (McMurrich, 1916)

Paralabidocera amphitrites	McMurrich, 1916 Campbell, 1929 Wailes, 1929
Epilabidocera amphitrites	Davis, 1949 *Brodsky, 1950 Cameron, 1957 Park, 1965

Remarks: X; Surface; Common; Type locality 3½ miles off Amphitrite Point, West coast of Vancouver Island.

Acartia clausi Giesbrecht, 1889

Acartia clausi	Esterly, 1924 Campbell, 1929 Wailes, 1929 Davis, 1949 *Brodsky, 1950 Cameron, 1957 Légaré, 1957

Remarks: X; Surface; Common; Spring & Summer.

Acartia longiremis (Lilljeborg, 1853)

Acartia longiremis	McMurrich, 1916
	Campbell, 1929
	Wailes, 1929
	Davis, 1949
	Wilson, 1950
	*Brodsky, 1950
	Cameron, 1957
	Légaré, 1957
	Frolander, 1962

Remarks: X; Surface; Abundant; Spring & Summer.

Tortanus discaudatus (Thompson & Scott, 1897)

Tortanus discaudatus	McMurrich, 1916
	Campbell, 1929
	Wailes, 1929
	Davis, 1949
	*Brodsky, 1950
	Cameron, 1957
	Légaré, 1957

Remarks: X; Surface; Common; Spring & Summer.

COPEPODA
Order: Cyclopoida

Oithona spinirostris Claus, 1863

Oithona spinirostris	Campbell, 1929
	Olson, 1949
Oithona plumifera	Davis, 1949
	Cameron, 1957
	Légaré, 1957
Oithona spinirostris	Frolander, 1962

Remarks: X; All depths; Abundant. For a discussion of the morphological differences between O. spinirostris and O. plumifera see Olson (1949) and Frolander (1962).

Oithona helgolandica Claus, 1863

Oithona similis	McMurrich, 1916
Oithona helgolandica	Campbell, 1929
	Davis, 1949
	Cameron, 1957
	Légaré, 1957

Remarks: X; All depths; Common.

Oithona plumifera Baird, 1843

Oithona plumifera	Davis, 1949
	Cameron, 1957
	Légaré, 1957

Remarks: X; Deep; Rare.

Oncaea borealis Sars, 1918

Oncaea borealis	Campbell, 1929
	*Rose, 1933

Remarks: X; Mid-depths & Deep; Common.

Oncaea conifera Giesbrecht, 1892

Oncaea conifera	*Rose, 1933
	Davis, 1949
	Cameron, 1957
	Légaré, 1957

Remarks: A

Oncaea subtilis Giesbrecht, 1892

Oncaea subtilis	Campbell, 1929 *Rose, 1933 Davis, 1949

Remarks: A

Corycaeus anglicus Lubbock, 1857

Corycaeus affinis	McMurrich, 1916 Campbell, 1929
Corycaeus anglicus	*Rose, 1933
Corycaeus affinis	Davis, 1949 Cameron, 1957 Légaré, 1957

Remarks: X; Mid-depth; Common.

Corycaeus catus F. Dahl, 1894

Corycaeus obtusus	Herdman, Thompson and Scott, 1897
Corycaeus catus	Wilson, 1950 *Mori, 1964

Remarks: A

Ascomyzon rubrum Campbell, 1929

Ascomyzon rubrum	*Campbell, 1929 Légaré, 1957

Remarks: A; Type locality: Departure Bay, Horsewell Rocks.

Macrocheiron sargassi Sars, 1916

Macrocheiron sargassi	Campbell, 1930

Remarks: A

COPEPODA
Order: Harpacticoida

Tigriopus californicus (Baker, 1912)

Tigriopus triangulus	Campbell, 1930
Tigriopus californicus	Monk, 1941
	*Lang, 1948

Remarks: A; Normal habitat is tide pools.

Amphiascus phyllopus (Sars, 1906)

Amphiascus phyllopus	Campbell, 1929
	*Lang, 1948

Remarks: A; Lang, 1948 lists Campbell's reference to this species as an uncertain identification. The species has been described from European and Mediterranean coastal waters.

Diosaccus spinatus Campbell, 1929

Diosaccus spinatus	Campbell, 1929
	*Lang, 1948
	Légaré, 1957

Remarks: A; Type locality: Departure Bay.

Tisbe furcata (Baird, 1837)

Idya furcata	McMurrich, 1916 ?
	Campbell, 1929
	Légaré, 1957
Tisbe furcata	*Lang, 1948

Remarks: A

Zaus aurelii Poppe, 1884

Zaus caeruleus	Campbell, 1929
Zaus aurelii	*Lang, 1948

Remarks: A

Harpacticus chelifer (Milne-Edwards, 1840)

Harpacticus chelifer — Wilson, 1950

Remarks: A; Wilson records this species from Beaver Harbour, Vancouver Island.

Harpacticus uniremis Krøyer, 1842

Harpacticus uniremis — Campbell, 1929
*Lang, 1948
Légaré, 1957

Remarks: A

Microsetella norvegica (Boeck, 1864)

Microsetella norvegica — *Lang, 1948
Davis, 1949
Cameron, 1957

Remarks: A

Microsetella rosea (Dana, 1852)

Microsetella rosea — Esterly, 1905
Campbell, 1929
*Lang, 1948
Davis, 1949
Cameron, 1957

Remarks: X; Mid-depth; Common.

COPEPODA
Order: Monstrilloida

Monstrilla helgolandica Claus, 1863

Monstrilla helgolandica — Rose, 1933; *Park, 1967

Remarks: X; Rare.

Monstrilla longiremis Giesbrecht, 1892

Monstrilla longiremis — Rose, 1933; *Park, 1967

Remarks: X; Rare.

Monstrilla spinosa Park, 1967

Monstrilla spinosa — *Park, 1967

Remarks: X; Rare; Type locality: Saanich Inlet.

Monstrilla wandelii Stephenson, 1913

Monstrilla wandelii — *Park, 1967

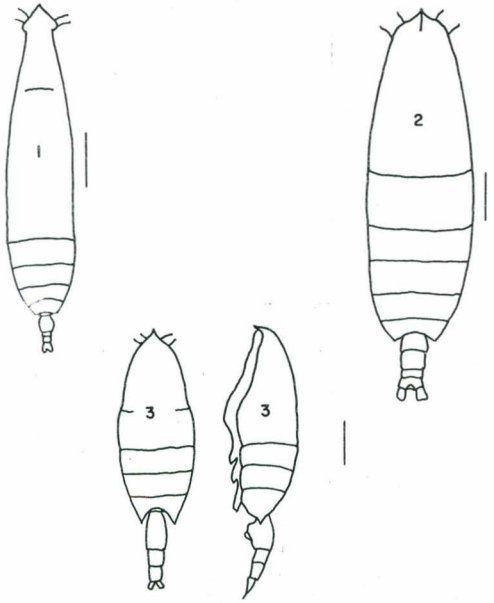
Remarks: X; Rare.

Key to the Adult Copepoda - Strait of Georgia

This Key is designed for the identification of adult Copepods which have reached their largest size. In the adults the segments of the urosome are generally well defined; there are usually 3-4 segments in the female and 4-5 segments in the male. The first segment in the urosome of the female is usually swollen. Stage V Copepods may be identified using these Keys bearing in mind the above differences.

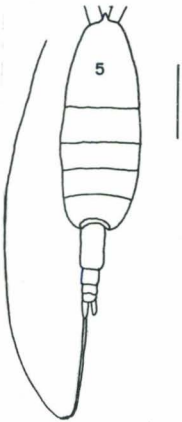
Figure 3

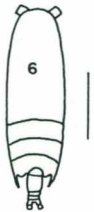
Key to the Adult Copepoda - Strait of Georgia



Copepods $\geq$ 5.5 mm total length

(1)	body transparent head triangular shaped	Eucalanus bungii bungii	6.6-8.0 mm
(2)	body not transparent head with medial crest or keel	Calanus cristatus	8.6-10.4
(3)	prominent mouth parts genital segment enlarged	Euchaeta japonica	6.3-6.5



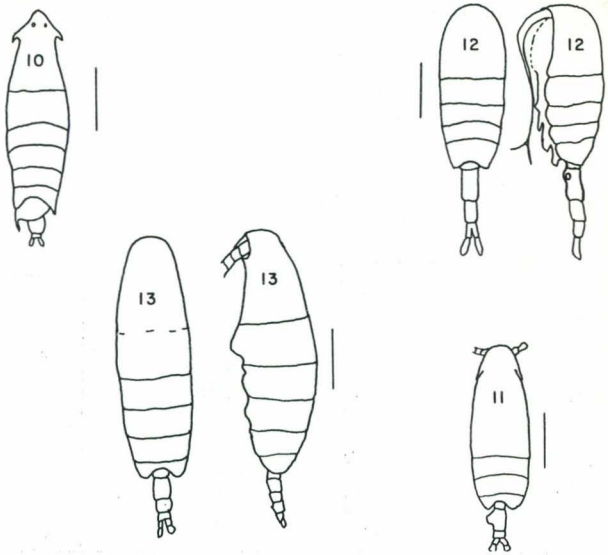


Copepods 3.2 to 5.5 total length

(4)	prominent black photophore on the side of the body	Pleuromamma quadrungulata	3.3-5.0 mm
(5)	one of the seta of the urosome enlarged and longer than the body	Heterorhabdus tanneri	3.8-4.2

Posterior corners of prosome angular or produced as spines -

(6)	spines pointed and symmetrical	Gaidius pungens	3.0-3.5
(7)	spines rounded and asymmetrical	Candacia columbiae	3.5-4.1



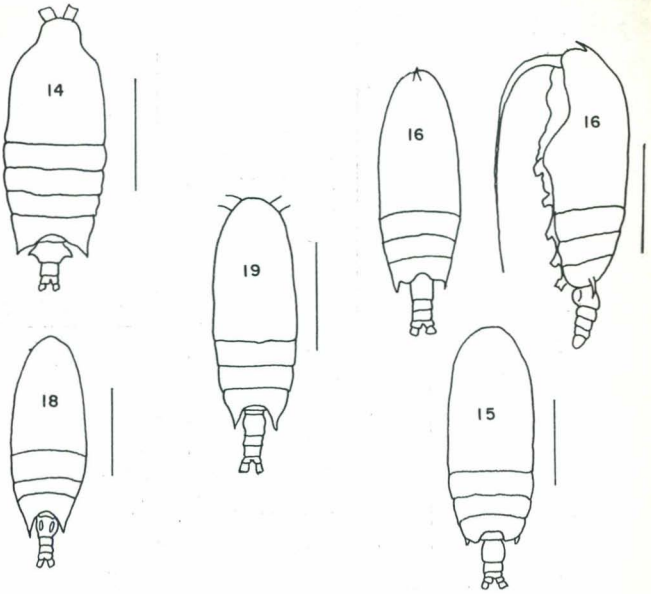
Copepods 3.2 to 5.5 mm total length (cont'd)

Posterior corners of prosome angular or produced as spines (cont'd) -

(9)	spines variable, sometimes rounded and sometimes pointed	Gaidius variabilis	4.0-4.1 mm
(10)	prominent eyes, lateral edges of head produced as hooks	Epilabidocera amphitrites	3.2-4.0

Posterior corners of prosome not angular or produced as spines -

(11)	urosome asymmetrical	Euchirella pulchra	3.4-4.0
(12)	urosome more than 1/3 the length of the body	Metridia okhotensis	4.1-4.5
(13)	urosome less than 1/3 the length of the body	Calanus plumchrus	4.0-5.4



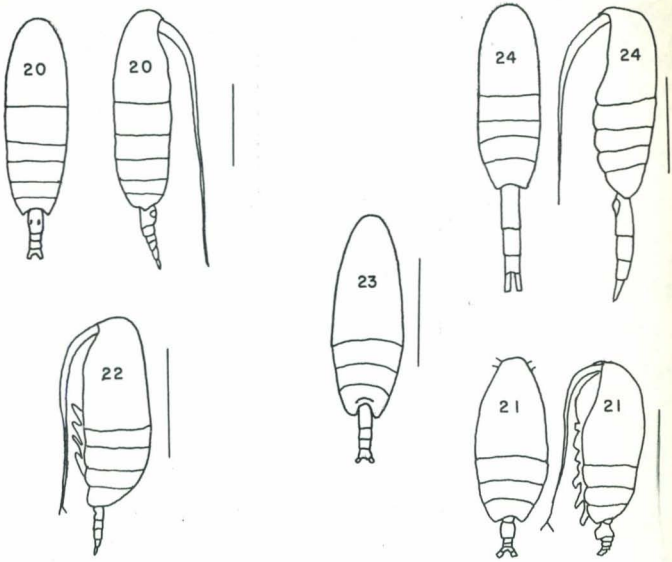
Copepods 2.0 to 3.1 mm total length

Posterior corners of prosome angular or produced as spines -

(14)	posterior corners angular, urosome with lateral projections	Candacia bipinnata	2.2-2.5 mm
(15)	spines blunt or rounded	Gaidius columbiae	3.0-3.2

Spines acute -

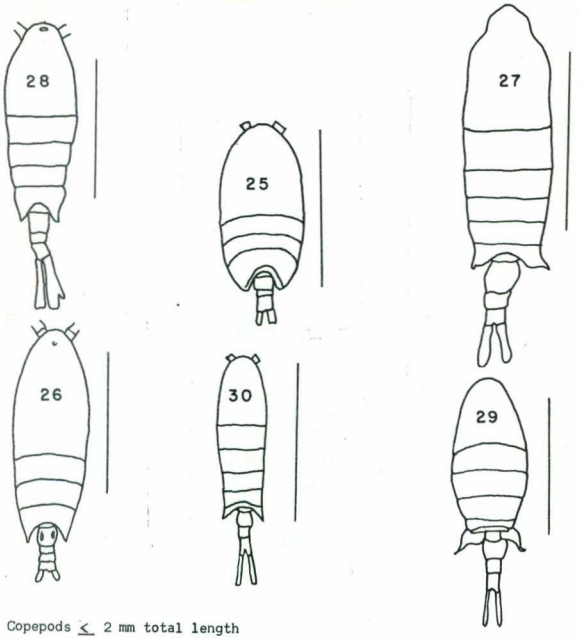
(16)	cephalic spine	Gaetanus intermedius	2.1
(17)	spines extend less than 1/2 the length of the genital segment	Chiridius gracilis	2.4-4.8
(18)	genital segment nearly round	Aetidius pacificus	2.2-3.0
(19)	genital segment rectangular	Bradyidius saanichi	2.3-2.6
(6)	spines curving inwards towards genital segment	Gaidius pungens	3.0-3.5



Copepods 2.0 to 3.1 mm total length (cont'd) -

Posterior corners of prosome not angular or produced -

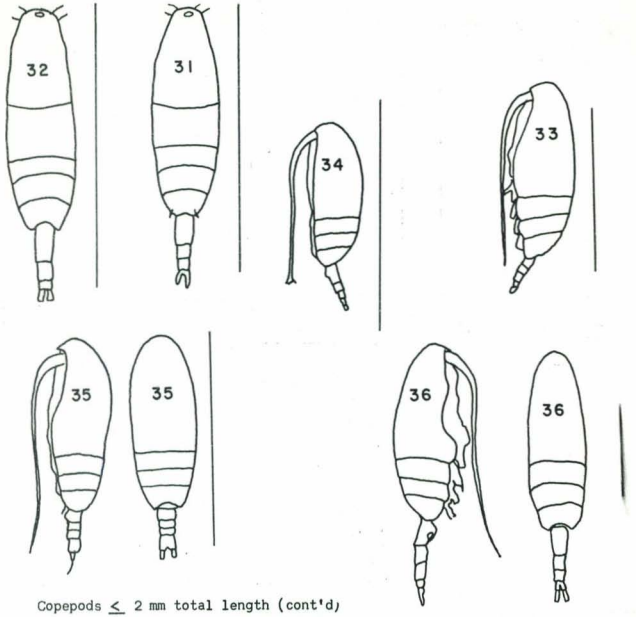
(20)	1st antennae as long or longer than body	Calanus pacificus	2.5-3.5 mm
(21)	1st antennae shorter than the body, body robust, urosome relatively short; urosome swollen when viewed laterally	Euchirella rostrata	2.9-3.1
(22)	urosome not swollen	Scolecithricella ovata	2.2
(23)	body not particularly robust; urosome medium (less than 1/3 body length)	Racovitzanus antarcticus	2.1-2.4
(24)	urosome long (more than 1/3 body length)	Metridia lucens	2.5-2.9



Copepods $\leq$ 2 mm total length

Posterior corners of prosome angular or produced as spines or wings -

(25)	body robust, urosome relatively short	Tharybis fultoni	1.2-1.3 mm
(26)	posterior corners produced as symmetrical spines	Aetidius armatus	1.3-2.0
(27)	posterior corners produced as asymmetrical spines, urosome asymmetrical	Centropages abdominalis	1.6-2.1
(28)	posterior corners produced as symmetrical rounded spines, urosome asymmetrical	Tortanus discaudatus	1.4-2.3
(29)	posterior corners produced as "wings", last segment of urosome covered with spinules	Eurytemora americana	1.6-1.8
(30)	posterior corners produced as "wings", last segment of urosome smooth	Eurytemora hirundoides	1.0-1.6



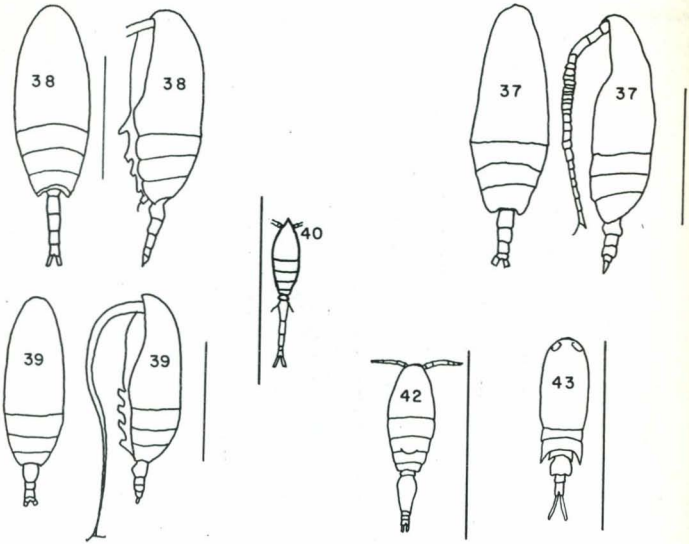
Copepods $\leq$ 2 mm total length (cont'd)

Posterior corners of prosome not angular or produced as spines; urosome of three segments -

(31)	last segment of metasome rounded, with two short stiff setae	Acartia longiremis	0.98-1.25 mm
(32)	last segment of metasome rounded, with 3-5 marginal spinules	Acartia clausi	0.91-1.22

Urosome of four segments -

(33)	body robust, urosome relatively short	Scolecithricella minor	1.25-1.4
(34)	total length less than 1 mm	Microcalanus pygmaeus pusillus	0.7-0.9
(35)	5th leg present but reduced, urosome relatively thick	Paracalanus parvus	0.7-1.3
(36)	no 5th leg, genital segment swollen	Pseudocalanus minutus	1.2-2.0



Copepods $\leq$ 2 mm total length (cont'd)

Posterior corners of prosome not angular or produced as spines; urosome of four segments -

(37)	segments 5-15 of 1st antennae wider than long	Scaphocalanus echinatus	1.7-2.0 mm
(38)	5th leg present but reduced, urosome relatively slender	Scaphocalanus brevicornis	1.9-2.1
(39)	no 5th leg, 1st antennae longer than body	Spinocalanus brevicaudatus	1.6-1.8

Urosome of five segments or more; 5th leg on 1st segment of urosome -

(40)	head pointed when viewed dorsally	Oithona spinirostris	0.7-1.2
(41)	head rounded	Oithona helgolandica	0.7-0.96
(42)	1st antennae short	Oncaea borealis	0.7-1.4
(43)	head provided with cuticular lenses	Corycaeus anglicus	0.8-1.1

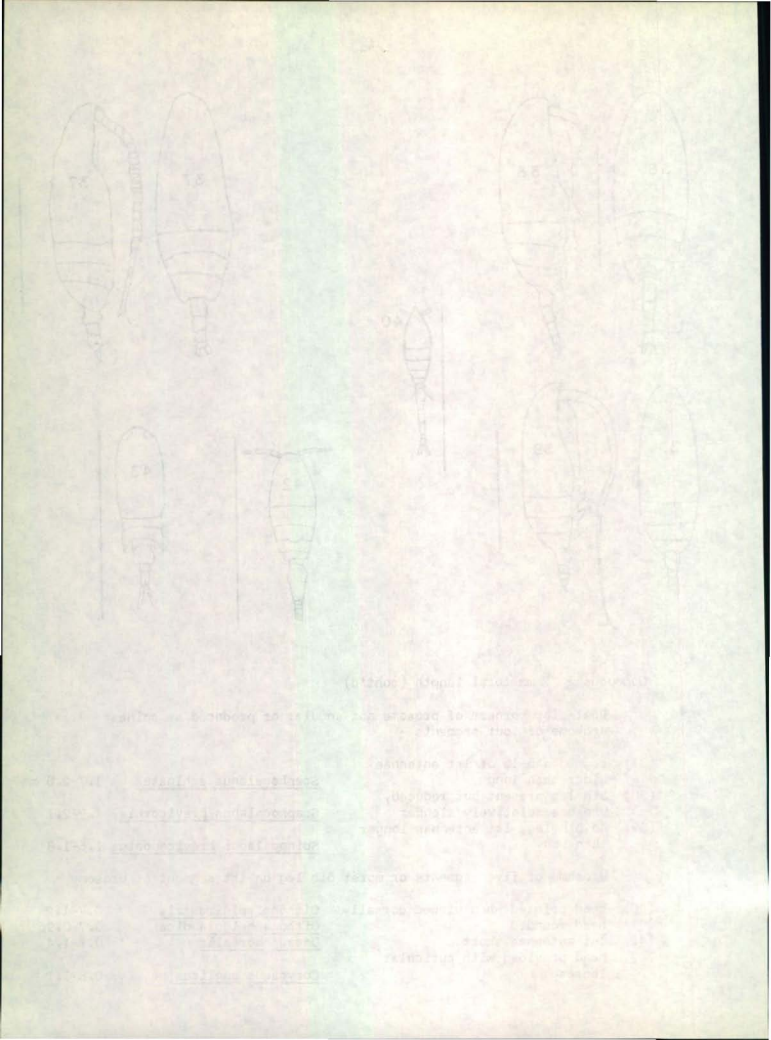


Table 2

Size of Some Copepod Nauplii Preserved in Formalin.

Species	Stage	Length in mm I	II	III	IV	V	VI	For a detailed account see
Acartia longiremis		0.12	0.14	0.16	0.19	0.23	0.27	Oberg, 1906
Oithona spinirostris		0.13	0.15	0.17	0.20	0.24	0.27	Gibbons & Ogilvie, 1933
Pseudocalanus minutus		0.18	0.18	0.26	0.33	0.38	0.44	Ogilvie, 1953
Metridia lucens		0.19	0.21	0.27	0.34	0.41	0.46	Ogilvie, 1953
Calanus finmarchicus		0.22	0.27	0.40	0.48	0.55	0.61	Ogilvie, 1953
Calanus plumchrus		0.29	0.30	0.35	0.46	0.56	0.70	Campbell, 1934
Eucalanus bungii bungii		0.22	0.30	0.49	0.66	0.82	0.97	Johnson, 1937
Euchaeta japonica		0.59	0.64	0.66	0.69	0.80	0.87	Campbell, 1934

Remarks: Measurements are taken from preserved samples. Specimens may shrink as much as 10% during preservation. Our experience suggests that there is little or no size difference between North Pacific and North Atlantic representatives of the same species.

Table 3

Size of Copepodite Stages Preserved in Formalin

		Total body length (mm)	No. of abdominal segments	Pairs of legs
Calanus plumchrus				
	I	0.9 - 1.3	1	2
	II	1.2 - 1.5	2	3
	III	1.8 - 2.4	2	4
	IV	2.8 - 3.4	3	5
	V	4.1 - 5.2	4	5
	VI ♀	4.5 - 5.2	4	5
	VI ♂	4.6	5	5
Calanus pacificus				
	I	0.5	2	2
	II	1.2	2	3
	III	1.5	2	4
	IV	1.8	3	5
	V	2.5 - 3.5	4	5
	VI ♀	2.8 - 3.5	4	5
	VI ♂	2.5	5	5
Calanus cristatus				
	I	1.20	2	2
	II	2.0	2	3
	III	3.24	2	4
	IV	4.90 - 5.3	3	5
	V	7.1 - 8.9	4	5
	VI ♀	8.5 - 10.4	4	5
	VI ♂	9.0 - 9.8	5	5
Pseudocalanus minutus		(from Wiborg, 1948)		
	I	0.57 - .60	2	2
	II	0.60 - .69	2	3
	III	0.83	2	4
	IV	1.05	3	4
	V	1.10 - 1.36	4	4
	VI ♀	1.12 - 2.0	4	4
	VI ♂	1.1 - 1.36	5	5

Table 3 (cont'd)

Size of Copepodite Stages Preserved in Formalin

		Total body length (mm)	No. of abdominal segments	Pairs of legs
Metridia lucens				
	I	0.53	1	2
	II	0.74	1	3
	III	1.08	2	4
	IV	1.28	3	4
	V ♀	1.8 - 2.1	3	5
	V ♂	1.8 - 1.5	4	5
	VI♀	2.5 - 2.9	3	5
	VI♂	2.0 - 2.3	5	5
Eucalanus bungii bungii (from Johnson, 1937)				
	I	1.3 - 1.6	1	2
	II	2.0 - 1.6	1	3
	III	2.9 - 3.0	1	4
	IV ♀	3.6 - 3.8	2	4
	IV ♂	3.4 - 3.7	2	5
	V ♀	4.9 - 5.2	2	4
	V ♂	4.5 - 4.8	3	5
	VI ♀	6.5 - 8.0	4	5
	VI ♂	4.8 - 5.4	4	5
Euchaeta japonica (from Campbell, 1934)				
	I	1.3	2	2
	II	1.8	2	3
	III	2.3	2	4
	IV ♀	3.3	3	4
	IV ♂	3.3	3	5
	V ♀	4.8	4	4
	V ♂	4.8	4	5
	VI ♀	5.5	4	4
	VI ♂	5.0	4	5
Gaetanus intermedius (from Shan, 1962)				
	I	0.85	2	2
	II	1.15	2	3
	III	1.55	2	4
	IV ♀	2.00	3	4
	IV ♂	2.00	3	5
	V ♀	2.70	4	4
	V ♂	2.65	4	5
	VI ♀	2.90 - 3.2	4	5
	VI ♂	2.80 - 3.1	4	5

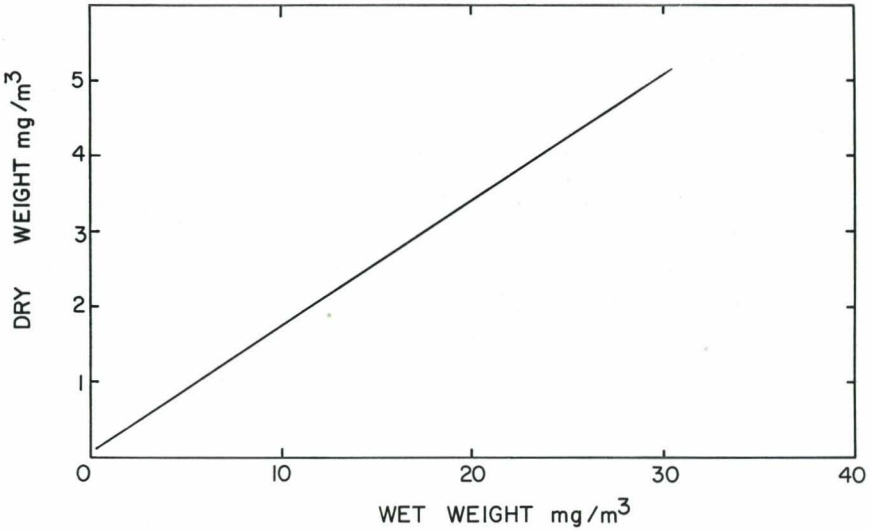


Figure 4. Relationship of wet weight to dry weight of fresh Copepods in the Strait of Georgia.


WET WEIGHT mg/m3
DRY WEIGHT mg/m3
0
10
20
30
40
1
2
3
4
5

[illegible]

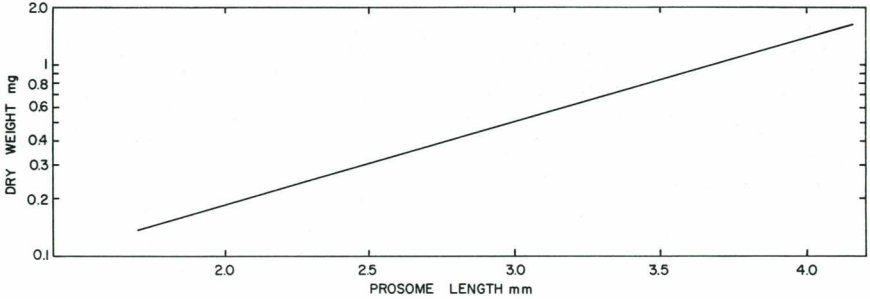


Figure 5. Relationship of Copepod dry weight to prosome length.

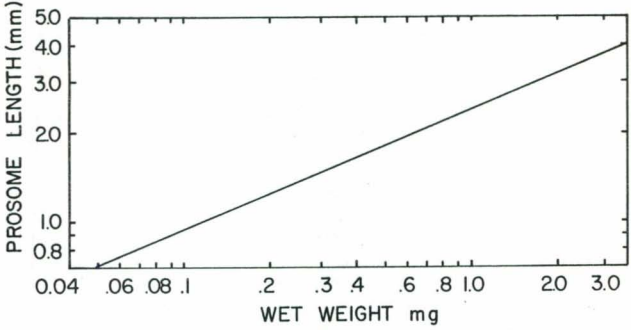


Figure 6. Relationship of Copepod wet weight to prosome length Saanich Inlet, June-July, 1966.

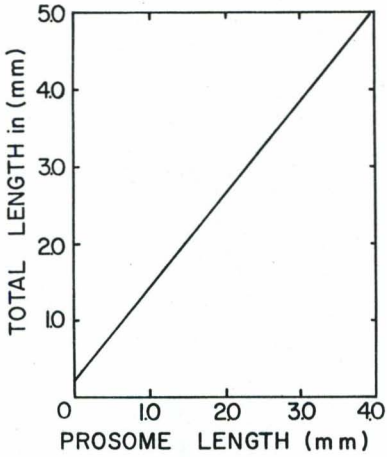


Figure 7. Relationship of Copepod total length to prosome length.

50
40
30
20
10
0
TOTAL LENGTH (mm)
0
10
20
30
40
PROSOME LENGTH (mm)

References to Adult Copepoda

Brodsky, K.A. 1950. Calanoida of the far Eastern and Polar Seas of the USSR. Opred. po Faune SSR, 35: 1-442 (in Russian).

Cameron, F.E. 1957. Some factors influencing the distribution of pelagic Copepods in the Queen Charlotte Island area. J. Fish. Res. Bd. Canada, 14 (2): 165-202.

Campbell, M.H. 1929. A preliminary quantitative study of the zooplankton in the Strait of Georgia. Trans. Roy. Soc. Canada, 23 (5): 1-28

1929. Some free-swimming Copepods of the Vancouver Island region. Trans. Roy. Soc. Canada, 23 (5): 303-332.

1930. Some free-swimming Copepods of the Vancouver Island region. II. Trans. Roy. Soc. Canada, 24 (5): 177-182.

1934. The Life History and Post Embryonic Development of the Copepods, Calanus tonsus Brady and Euchaeta japonica Marukawa. J. Biol. Bd. Canada, 1 (1): 1-65.

Conover, R.J. 1956. The Biology of Acartia clausi and Acartia tonsa. Bull. Bingham Oceanogr. Coll., 15: 156-233.

Davis, C.C. 1943. The larval stages of the Calanoid Copepod Eurytemora hirundoides (Nordquist). Chesapeake Biol. Lab. Publ. No. 58: 1-20.

1949. The pelagic Copepods of the northeastern Pacific Ocean. Univ. Wash. Publ. Biol., 14: 1-118.

Esterly, C.O. 1905. The pelagic Copepoda of the San Diego Region. Univ. of Cal. Publ. Zool., 2 (4): 113-233.

1906. Additions to the Copepod fauna of the San Diego Region. Univ. of Cal. Publ. Zool., 3 (5): 53-92.

1908. The light recipient organs of the Copepod, Eucalanus elongatus. Bull. Mus. Comp. Zool., Harv., 53: 1-55.

1911. Third report on the Copepod fauna of the San Diego Region. Univ. of Cal. Publ. Zool., 6 (14): 313-352.

1913. Fourth taxonomic report of the Copepoda of the San Diego Region. Univ. of Cal. Publ. Zool., 11 (10): 81-196.

1924. Free-swimming Copepoda of San Francisco Bay. Univ. of Cal. Publ. Zool., 26 (5): 81-129.

Fleminger, A. 1967. Taxonomy, distribution and polymorphism in the Labidocera jollae group with remarks on evolution within the group (Copepoda: Calanoida) Proc. U.S. Nat. Mus., 120 (3567): 1-61.

Frolander, H.F. 1962. Quantitative estimations of temporal variations of zooplankton off the coast of Washington and British Columbia. J. Fish. Res. Bd. Canada, 19 (4): 657-675.

Gibbons, S.G. and H.S. Ogilvie. 1933. Developmental stages of Oithona helgolandica and O. spinirostris with a note on the occurrence of body spines cyclopoid nauplii. J. Mar. Biol. Ass. U.K., N.S., 18 (2): 529-550.

Hebard, J.F. 1956. The seasonal variations of zooplankton in Puget Sound. Univ. of Wash., Dept. Oceanogr., M.S. Thesis.

Herdman, W.A., I.C. Thompson and A. Scott. 1898. On the plankton collected continuously during two traverses of the North Atlantic in the Summer of 1897; with descriptions of new species of Copepoda; and an appendix on dredging in Puget Sound. Trans. Liverpool Biol. Soc., 12: 33-90.

Heron, G.A. 1963. Seven species of Eurytemora (Copepoda) from Northwestern North America. Crustaceana, 7 (3): 199-211.

Johnson, M.W. 1932. Seasonal distribution of plankton at Friday Harbour, Washington. Univ. Wash. Publ. Oceanogr., 1 (1): 1-38.

1934. The life history of the Copepod Tortanus discaudatus (Thompson and Scott). Biol. Bull., 67 (1): 182-200.

1934b. The developmental stages of the Copepod Epilabidocera amphitrites McMurrich. Biol. Bull., 67 (3): 466-483.

1936. Pachyptilus pacificus and Centraugaptilus porcellus, two new Copepods from the North Pacific. Bull. Scripps Inst. Oceanogr., Univ. Cal. Tech. Ser., 4 (8): 65-70.

1938. Concerning the Copepod Eucalanus elongatus Dana and its varieties in the Northeast Pacific. Bull. Scripps Inst. Oceanogr., Univ. Cal. Tech. Ser., 4 (6): 165-180.

1939. The study of species formation in certain Eucalanus Copepods in the North Pacific. Sixth Pac. Sc. Cong., Oceanography and Marine Biology, 3: 565-568.

Lang, K. 1948. Monographie der Harpacticiden. Hakan Ohlssons Boktryckeri, Lund. 1682 pp.

Légaré, J.E.H. 1957. The qualitative and quantitative distribution of plankton in the Strait of Georgia in relation to certain oceanographic factors. J. Fish. Res. Bd. Canada, 14 (4): 521-552.

Marsh, C.D. 1929. Distribution and key to the North American Copepods of the genus Diaptomus, with the description of a new species. Proc. U.S. Nat. Mus., 75 (2785): 1-27.

1933. Synopsis of the calanoid crustaceans, exclusive of the Diaptomidae, found in fresh and brackish waters, chiefly of North America. Proc. U.S. Nat. Mus., 82 (2959): 1-58.

Marukawa, Hisatosi. 1921. Plankton list and some new species of Copepoda from the northern waters of Japan. Bull. Inst. Oceanogr. Monaco, 384: 1-15.

Monk, C.R. 1941. Marine harpacticoid Copepods from California. Trans. Am. Micro. Soc., 60 (1): 75-99.

Mori, T. 1964. The pelagic Copepoda from the neighbouring waters of Japan: (2nd Edition). The Soyo Co. Inc., Tokyo. 310 pp.

Murphy, H.E. 1923. The life cycle of Oithona nana, reared experimentally. Univ. Cal. Publ. Zool., 22: 449-454.

Olson, J.B. 1949. The pelagic cyclopoid Copepods of the coastal waters of Oregon, California and Lower California. Univ. of Cal., Los Angeles, Ph.D. Thesis: 1-208.

Park, T.S. 1965. The biology of a calanoid Copepod, Epilabidocera amphitrites McMurrich. Dissertation Abstracts Vol., 26 (5): 1-320.

1966. A new species of Bradyidius (Copepoda: Calanoida) from the Pacific Coast of North America. J. Fish Res. Bd. Canada, 23 (6): 805-811.

1967. Two new species of Copepods from the Strait of Georgia, British Columbia, Canada. J. Fish. Res. Bd. Canada, 24 (2): 231-241.

1967. Two unreported species and one new species of Monstrilla (Copepoda: Monstrilloida) from the Strait of Georgia. Trans Amer. Microsc. Soc., 86 (2): 144-152.

Poppe, S.A. 1884. Free-living Copepods from the North Pacific Ocean and Bering Sea. Arch. Nat. Urg., 50: 281-304.

Rose, M. 1933. Copepodes Pelagiques. Faune de France 26, pp 374, Paul Lechevalier, Paris.

Shan, Kuo-cheng. 1962. Systematic and Ecological Studies on Copepoda in Indian Arm, British Columbia. M.Sc. Thesis, Univ. of B.C., pp 185.

Sharpe, R.W. 1911. Notes on the Marine Copepoda and Cladocera of Woods Hole and adjacent regions, including a synopsis of the Genera of Harpacticoida. Proc. U.S. Nat. Mus., 38: 405-436.

Tanaka, O. 1936. On some new species of Copepoda from Sagami Bay. Jap. J. Zool., 7: 31-36.

1938. Notes on Calanus cristatus Krøyer. Jap. J. Zool., 7: 599-601

Tanaka, O. 1954. Note on Calanus tonsus Brady in Japanese waters. J. Oceanogr. Soc., Japan, 10 (1): 31-39.

1956a. Further note on Calanus tonsus Brady in Japanese waters. J. Oceanogr. Soc., Japan, 12 (2): 49-52.

1956b. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account I. Publ. Seto. Mar. Biol. Lab., 5 (2): 251-272.

1956c. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account II. Publ. Seto Mar. Biol. Lab., 5 (3): 367-406.

1957a. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account III. Publ. Seto Mar. Biol. Lab., 6 (1): 31-68.

1957b. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account IV. Publ. Seto Mar. Biol. Lab., 6 (2): 169-207.

1957c. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account V. Publ. Seto Mar. Biol. Lab., 6 (3): 327-367.

1960. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account VI. Publ. Seto Mar. Biol. Lab., 8 (1): 85-135.

1961. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account VII. Publ. Seto Mar. Biol. Lab., 9 (1): 139-190.

1962. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account VIII. Publ. Seto Mar. Biol. Lab., 10 (1): 35-90.

1963. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account IX. Publ. Seto Mar. Biol. Lab., 11 (1): 7-55.

Tanaka, O. 1964a. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account X. Publ. Seto Mar. Biol. Lab., 12 (1): 1-37.

1964b. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account XI. Publ. Seto Mar. Biol. Lab., 12 (1): 39-91.

1964c. The pelagic Copepods of the Izu Region, Middle Japan. Systematic Account XII. Publ. Seto Mar. Biol. Lab., 12 (3): 231-271.

Thompson, I.S. and A. Scott. 1903. Supplementary report on the Copepoda to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar. Royal Soc.: 227-307.

Vervoort, W. 1952. Copepoda, Sub-order, Calanoida. Fish. Ident. Zoopl., 44.

Wailes, G.H. 1929. The Marine-Zoo-Plankton of British Columbia. Museum and Art Notes (Vancouver), 4 (4).

Willey, A. 1923. Notes on the distribution of free-living Copepoda in Canadian waters. Part I. Contrib. Can. Biol. N.S., I: 303-334.

Wilson, C.B. 1950. Copepods gathered by the U.S. Fisheries Steamer Albatross from 1887 to 1909, chiefly in the Pacific Ocean. Bull. U.S. Nat. Mus., 199 (4): 141-441.

References to the Nauplii and Copepodite Stages of the Copepoda

Campbell, M.H. 1934. The life history and post embryonic development of the Copepods, Calanus tonsus Brady and Euchaeta japonica Marukawa. J. Biol. Bd. Canada, 1 (1): 1-65.

Conover, R.J. 1956. The biology of Acartia clausi and Acartia tonsa. Bull, Bingham Oceanogr. Coll., 15: 156-233.

Davis, C.C. 1943. The larval stages of the Calanoid Copepod Eurytemora hirundoides (Nordquist). Chesapeake Biol. Lab. Publ. No. 58, p. 1-20.

Faber, D.J. 1966. Seasonal occurence and abundance of free-swimming Copepod nauplii in Narragansett Bay. J. Fish. Res. Bd. Canada, 23 (3): 189-205.

Gibbons, S.G. 1938. Early developmental stages of Copepoda: II Metridia lucens Boeck. Ann. and Mag. Nat. Hist., 11 (2): 493-497.

Gibbons, S.G. and H.S. Ogilvie. 1933. Developmental stages of Oithona helgolandica and O. spinitostris with a note on the occurrence of body spines in cyclopoid nauplii. J. Mar. Biol. Ass. U.K., N.S., 18 (2): 529 - 550.

Johnson, M.W. 1934. The life history of the Copepod Tortanus discaudatus (Thompson and Scott). Biol. Bull., 67 (1): 182-200.

1934b. The developmental stages of the Copepod Epilabidocera amphitrites McMurrich. Biol. Bull., 67 (3): 466-483.

1938. Concerning the Copepod Eucalanus elongatus Dana and its varieties in the Northeast Pacific. Bull. Scripps Inst. Oceanogr., Univ. Cal. Tech. Ser., 4 (6): 165-180.

Kogo, F. 1960. The nauplius larvae of Centropages abdominalis Sato. Bull. Japan Soc. Sc. Fisheries, 26 (9): 877-882.

Lebour, M.V. 1916. Stages in the life history of Calanus finmarchicus (Gunnerus), experimentally reared by Mr. L.R. Crawshay in the Plymouth Laboratory. J. Mar. Biol. Ass. U.K., N.S., 11 (1): 1-17.

Murphy, H.E. 1923. The life cycle of Oithona nana, reared experimentally. Univ. Cal. Pub. Zool., 22: 449-454.

Oberg, M. 1906. Die Metamorpose der Plankton Copepoden der Kieler Bucht.. Wiss. Meer. Abt. Kiel, 9: 37-175.

Ogilvie, H.S. 1953. Copepod Nauplii (I) Fich. Ident. Zoopl., 50.

Shan, Kuo-cheng. 1962. Systematic and ecological studies on Copepoda in Indian Arm, British Columbia. M.Sc. Thesis, Univ. of B.C., pp 185.

Wiborg, K.F. 1948. Experiments with the Clarke-Bumpus Plankton Sampler and with a plankton pump in the Lofoten area in Northern Norway. Rep. Norw. Fish. Invest., 9 (2): 1-22.

MYSIDACEA

The mysids of the area have been described by Tattersall (1933) and Banner (1948). More recent revisions are given by Tattersall (1951) and Banner (1954). Although there are only four species in the present collection, all the species recorded from this area are listed, since it is anticipated that more species will be captured when other types of gear are used. The author wishes to thank Mr. O.D. Kennedy, of the Pacific Oceanographic Group, Biological Station, Nanaimo, for identifying the specimens in the present collection.

Gnathophausia gigas Willemöes-Suhm, 1875

Gnathophausia gigas	Tattersall, 1933 Banner, 1948 Tattersall, 1951 *Banner, 1954 Pequegnat, 1965

Remarks: A; Recorded as a common oceanic species.

Eucopia unguiculata Willemöes-Suhm, 1875

Eucopia unguiculata	*Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: A; Oceanic records only.

Boreomysis kinkaidi Banner, 1948

Boreomysis kinkaidi	*Banner, 1948 Banner, 1954

Remarks: A; Oceanic records only.

Boreomysis microps G.O. Sars, 1883

Boreomysis microps	*Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: A; Oceanic records only.

Amblyops abbreviata M. Sars, 1868

Amblyops abbreviata	*Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: A; Oceanic records only.

Pseudomma truncatum S.I. Smith, 1879

Pseudomma truncatum	Tattersall, 1933 *Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: X; Deep; Rare; Recorded from Puget Sound, north of Pender Island, Haro Strait. In the present collection it is common in Haro Strait deep hauls.

Pseudomma berkeleyi Tattersall, 1933

Pseudomma berkeleyi	Tattersall, 1933 *Banner, 1948 Tattersall, 1951 Banner, 1958

Remarks: A; Type locality Indian Arm, Burrard Inlet.

Caesaromysis vanclevi Banner, 1948

Caesaromysis vanclevi	*Banner, 1948 Banner, 1954

Remarks: A; Oceanic records only.

Inusitatomysis serrata Tattersall, 1951

Inusitatomysis sp.	*Banner, 1948
Inusitatomysis serrata	Tattersall, 1951
	Banner, 1954

Remarks: A; Reported from Queen Charlotte Strait.

Stilomysis grandis (Goes, 1863)

Stilomysis grandis	Tattersall, 1933
	*Banner, 1948
	Tattersall, 1951

Remarks: A; Reported from Howe Sound.

Boreomysis californica Ortmann, 1894

Boreomysis californica	*Banner, 1948
	Tattersall, 1951
	Banner, 1954

Remarks: Oceanic records only.

Euchaetomera tenuis G.O. Sars, 1883

Euchaetomera tenuis	*Banner, 1948
	Tattersall, 1951
	Banner, 1954

Remarks: A; Reported from waters surrounding the Queen Charlotte Islands.

Euchaetomeropsis pacifica Banner, 1948

Euchaetomeropsis pacifica	*Banner, 1948
	Banner, 1954

Remarks: A; Reported as an oceanic species off the Queen Charlotte Islands.

Holmsiella anomala Ortmann, 1908

Holmsiella anomala	Tattersall, 1933 *Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: X; Deep; Rare; The most common pelagic mysid in the present collection.

Meterythrops robusta S.I. Smith, 1879

Meterythrops robusta	Tattersall, 1933 *Banner, 1948
Meterythrops microphthalma	Banner, 1948
Meterythrops robusta	Banner, 1954

Remarks: A; Oceanic records only.

Neomysis rayii (Murdoch, 1884)

Neomysis rayii	Tattersall, 1933 *Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: X; Deep; Rare.

Neomysis kadiakensis Ortmann, 1908

Neomysis kadiakensis	Tattersall, 1933 *Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: A; Recorded from Indian Arm.

Acanthomysis pseudomacropsis (Tattersall, 1933)

Neomysis pseudomacropsis	Tattersall, 1933
Acanthomysis pseudomacropsis	*Banner, 1948 Tattersall, 1951 Banner, 1954

Remarks: A; Recorded from Strait of Georgia.

Acanthomysis macropsis (Tattersall, 1932)

Neomysis macropsis	Tattersall, 1933
Acanthomysis macropsis	*Banner, 1948
	Tattersall, 1951
	Banner, 1954

Remarks: A; Recorded from Strait of Georgia.

Acanthomysis nephrophthalma Banner, 1948

Acanthomysis nephrophthalma	*Banner, 1948
	Banner, 1954

Remarks: A; Recorded from Johnson Strait and Hecate Strait.

Proneomysis wailesi Tattersall, 1933

Proneomysis wailesi	Tattersall, 1933
	*Banner, 1948
	Tattersall, 1951
	Banner, 1954

Remarks: A; Recorded from Indian Arm.

Heteromysis odontops Walker, 1898

Heteromysis odontops	Tattersall, 1933
	*Banner, 1948
	Tattersall, 1951
	Banner, 1954

Remarks: A; Recorded from Puget Sound.

Mysidella americana Banner, 1948

Mysidella americana	*Banner, 1948
	Banner, 1951

Remarks: A; Recorded from Queen Charlotte Sound.

References to the Mysidacea

Banner, A.H. 1947. A taxonomic study of the Mysidacea and Euphausiacea (Crustacea) of the Northeastern Pacific. I, Mysidacea, from Family Lophogastridae through Tribe Erythropini. Trans. Roy. Can. Inst., 27 (57): 347-399.

1948. A taxonomic study of the Mysidacea and the Euphausiacea (Crustacea) of the Northeastern Pacific. II. Mysidacea, from Tribe Mysini through Subfamily Mysidellinae. Trans. Roy. Can. Inst., 27 (57): 65-125.

1954. A supplement to W.M. Tattersall's review of the Mysidacea of the United States Museums. Proc. U.S. Nat. Mus., 103 (3334): 575-583.

Pequegnat, L.H. 1965. The bathypelagic Mysid Gnathophausia (Crustacea) and its distribution in the Eastern Pacific Ocean. Pacific Science, 19 (4): 399-422.

Tattersall, W.M. 1933. Euphausiacea and Mysidacea from Western Canada. Contr. Can. Biol. 8 (15): 183-205.

1951. A review of the Mysidacea of the United States National Museum. Bull. U.S. Nat. Mus., 201: 25-32.

CUMACEA

Although the Cumacea are considered to be benthic animals, adults of both sexes are found in surface tows during the spring and early summer. Of the seventeen species recorded from the Vancouver Island Region by Hart (1930), three were found in the present collection. The author wishes to thank J.F.L. Hart of the British Columbia Provincial Museum, Victoria, B.C., for identifying the specimens in the present collection.

Hemilaprops gracilis Hart, 1930

Hemilaprops gracilis Hart, 1930

Remarks: A; Type locality male - Rocky Bay, 160 m
female - Mitlenatch Island, 200 m

Leucon fulvus G.O. Sars, 1865

Leucon fulvus Hart, 1930
N.S. Jones, 1957

Remarks: A

Eudorella pacifica Hart, 1930

Eudorella pacifica Hart, 1930

Remarks: A; Type locality - Deep Cove, Burrard Inlet, 120 m

Eudorella tridentata Hart, 1930

Eudorella tridentata Hart, 1930

Remarks: A; Type locality - Departure Bay

Eudorella emarginata (Krøyer, 1846)

Eudorella emarginata Hart, 1930
N.S. Jones, 1957

Remarks: A

Eudorellopsis biplicata Colman, 1912

Eudorellopsis biplicata Hart, 1930

Remarks: A

Diastylis bidentata Colman, 1912

Diastylis bidentata Hart, 1930

Diastylis koreana Colman, 1912

Diastylis koreana Hart, 1930

Remarks: A

Diastylis paraspinulosa Zimmer, 1926

Diastylis paraspinulosa Hart, 1930

Remarks: A

Diastylis pellucida Hart, 1930

Diastylis pellucida Hart, 1930

Remarks: X; Surface; Rare; Spring; Type locality - Deep Cove, Burrard Inlet, 120 m.

Leptostylis villosa G.O. Sars, 1869

Leptostylis villosa Hart, 1930
N.S. Jones, 1957

Remarks: A

Lamprops carinata Hart, 1930

Lamprops carinata Hart, 1930

Remarks: X; Surface; Rare; Spring; Type locality - Berry Point, Burrard Inlet, 25-50 m.

Lamprops serrata Hart, 1930

Lamprops serrata Hart, 1930

Remarks: A; Type locality - Departure Bay, 20-30 m.

Lamprops fuscata G.O. Sars, 1865

Lamprops fuscata Hart, 1930
N.S. Jones, 1957

Remarks: A

Lamprops quadruplicata S.I. Smith, 1879

Lamprops quadruplicata Hart, 1930

Remarks: A

Cumella vulgaris Hart, 1930

Cumella vulgaris Hart, 1930

Remarks: X; Surface; Rare; Spring; Type locality - male - Parry Bay
female - Brockton Point

Campylaspis rufa Hart, 1930

Campylaspis rufa Hart, 1930

Remarks: A; Type locality - Mitlenatch Island, 200 m.

References to the Cumacea

Hart, J.F.L. 1930. Some Cumacea of the Vancouver Island Region. Contr. Can. Biol. & Fish., N.S., 6: 23-40.

Jones, N.S. 1957. Cumacea. Fich. Ident. Zoopl., 71-76.

AMPHIPODA

Wailes' list (1931) was based on specimens which he sent to Shoemaker for identification. Shoemaker himself did not publish any of his findings. The first systematic account of the amphipods of British Columbia coastal waters was Thorsteinson (1941). Bowman (1953) deals with the Hyperid Amphipods off the California coast. Some North Pacific species not dealt with by Bowman are described by Hurley (1956, 1963). Hart (1961) gives records of three of the larger Hyperids found near Victoria. The systematics of the Gammeriids of the North western Pacific is covered extensively by Gur'janova (1951).

In the present collection there are twelve species of amphipod, two species which are likely new to science.

Hyperia medusarum (Muller, 1776)

Hyperia mudusarum	Wailes, 1931 (Shoemaker) *Bowman, 1953 Dunbar, 1963

Remarks: A

Hyperia spinigera Bovallius, 1889

Hyperia galba Hyperia spinigera	Wailes, 1931 (Shoemaker) Thorsteinson, 1941 *Bowman, 1953 Hurley, 1956 Dunbar, 1963

Remarks: A; Length 7.5 mm collected from a medusae near Friday Harbour, (Thorsteinson, 1941).

Hyperia latreillei Milne-Edwards, 1830

Hyperia latreillei	*Bowman, 1953

Remarks: X; Deep; Rare. See Bowman (1953) for a discussion of the taxonomic status of the genus.

Parathemisto pacifica Stebbing, 1888

Themisto abyssorum	Shoemaker, 1930 (specimens from Nanaimo)
Parathemisto abyssorum	Thorsteinson, 1941
Parathemisto japonica	Bowman, 1953
	Hurley, 1956
Parathemisto pacifica	*Bowman, 1960

Remarks: X; Surface & Mid-depth; Abundant. For a discussion of synonymy and distribution of this species see Bowman (1960).

Hyperoche medusarum Krøyer, 1838

Hyperoche leutkeni ?	Thorsteinson, 1941
Hyperoche medusarum	*Bowman, 1953
	Hurley, 1956
	Dunbar, 1963

Remarks: X; Surface; Common; Summer. This species seems to be associated with the coelenterate Phialidium gregarium.

Hyperoche mediterranea Senna, 1906

Hyperoche leutkeni ?	Thorsteinson, 1941
Hyperoche mediterranea	*Bowman, 1953

Remarks: A; From Thorsteinson's description it is impossible to distinquish between H. medusarum, H. mediterranea and H. leutkeni.

Euprimno abyssalis Bowman, 1953

Primno macropa (?)	Thorsteinson, 1941
Euprimno abyssalis	*Bowman, 1953

Remarks: X; Mid-depth and deep; Common. According to Bowman, Thorsteinson's description and figures of the female Primno macropa were undoubtedly based on Euprimno abyssalis. He goes on to say that it is impossible to ascertain from her account whether or not she also had Euprimno macropa. Both species as described by Bowman occur in the present collection but E. abyssalis is the most common.

Euprimno macropa Guerin, 1836

Euprimno macropus	Wailes, 1931 (Shoemaker)
Primno macropa ?	Thorsteinson, 1941
Euprimno macropa	*Bowman, 1953
	Hurley, 1956

Remarks: X; Mid-depth; Rare. The validity of the record of this species in B.C. Coastal waters was under question (Bowman, 1953). However, this species occurs in the present collection.

Phronima sedentaria (Forskal, 1775)

Phronima sedentaria	Thorsteinson, 1941 (Gulf of Alaska)
	Hurley, 1956
	Hart, 1961
	*Shih & Dunbar, 1963

Remarks: X; Mid-depth; Rare. Hart's record (1961) is of two specimens found intertidally in the vicinity of Victoria. The one specimen in the present collection was captured in a trawl at a depth of 64 meters in the waters of Juan de Fuca Strait off Victoria.

Cystisoma pellucidum (Willemöes-Suhm, 1873)

Cystisoma pellucidum	Thorsteinson, 1941 (Gulf of Alaska)
	Hurley, 1956
	*Hart, 1961

Remarks: A; Length, 67 mm; Found on the beach near Victoria.

Cystisoma fabricii Stebbing, 1888

Cystisoma fabricii	Hurley, 1956
	*Hart, 1961

Remarks: A; Length 45 mm; Found on the beach near Victoria.

Scina borealis (Sars, 1882)

Scina borealis	Thorsteinson, 1941
	*Hurley, 1956

Remarks: X; Deep; Common.

Cyphocaris challengeri Stebbing, 1888

Cyphocaris challengeri	Wailes, 1931 (Shoemaker)
	Thorsteinson, 1941
Cyphocaris kincaidi	Thorsteinson, 1941
Cyphocaris challengeri	Bernard, 1958
	*Gur'janova, 1951
	Hurley, 1963

Remarks: X; Mid-depth & deep; Abundant.

Orchomenella obtusa (Sars, 1890)

Orchomenella affinis ?	Holmes, 1908
Orchomenella obtusa	Gur'janova, 1951
	Bernard, 1958
	*Hurley, 1963

Remarks: X; Mid-depth & deep; Common. This species is common in Saanich Inlet and Burke Channel. See Hurley (1963) for a discussion of the genera on the coast of North America.

Calliopius laeviusculus (Krøyer, 1838)

Calliopius laeviusculus	Wailes, 1931 (Shoemaker)
	Gur'janova, 1951
	Bernard, 1958

Remarks: X; Surface; Common; Spring.

Melphidippa sp.

Melphidippa (?) goesi	Wailes, 1931 (Shoemaker)

Remarks: X; Deep; Rare. The specimens in the present collection most nearly resemble M. goesi but there seem to be sufficient differences to establish a new species. This amphipod has been consistently found at one station in Haro Strait.

Stilipes distincta Holmes, 1909

Stilipes distincta ?	Holmes, 1909

Remarks: X; Deep; Rare. The specimens in the present collection belong to the genus as described by Holmes but with sufficient difference to be a new species.

Pelagic Amphipods from "off the British Columbia Coast" identified by Shoemaker and listed by Wailes (1931) which do not occur in the present collection.

Ampelisca macrocephala	Lillj.	Nicippe tumida	(Bruzelius)
Eurystheus tenuicornis	(Holmes)	Opisa eschrichti	Krøyer
Eusirus leptocarpus	Sars ?	Oxycephalus clausi	Bov.
Harpina affinis	Holmes ?	Pontogenia inermis	Krøyer
Harpina oculata	Holmes	Rhachotropis inflata	(Sars)
Maera dubio	Calman	Rhachotropis helleri	(Boeck)
Melita palmata	(Mont. ?)	Westwoodilla caecula	Bate
Monoculodes carinatus	Bate		

Table 4

Key to the Pelagic Amphipods - Strait of Georgia

1)	Compound eye usually covering the entire head region. Head segment usually as large or larger than first body segment.	
	(A) Longer than 7 mm, body pigmented or opaque	
	(a) fifth leg prominently chelate	*Euprimno* sp.
	adult longer than 10 mm	*E. abyssalis*
	adult shorter than 10 mm	*E. macropa*
	(b) fifth leg not chelate, first and second legs subchelate	*Hyperia*
	(B) Longer than 7 mm, body transparent	
	(a) fifth leg prominently chelate	*Euprimno*
	(b) legs not chelate	*Cystisoma*
	(C) Smaller than 7 mm, body pigmented or opaque	
	(a) fifth leg prominently chelate	*Euprimno*
	(b) fifth leg not chelate; legs 5-7 longer than 3 and 4	*Parathemisto*
	(c) fifth leg not chelate; legs 5-7 not longer than 3 and 4; first 2 legs chelate	*Hyperoche*
2)	Compound eyes not covering the entire head region.	
	(A) Head segment as large or larger than first body segment.	
	(a) longer than 15 mm, head bulbous	*Stilipes*
	(b) shorter than 15 mm, vaulted forehead when viewed laterally	*Cyphocaris*
	(c) antennae projecting like "horns" when viewed dorsally	*Scina*

(B) Head segment smaller than first body segment

(a) first two legs chelate, last five segments of body produced as dorsal spines — Melphidippa

(b) first two legs chelate, no dorsal spines — Calliopius

(c) first two legs subchelate, body usually bright orange — Orchomenella

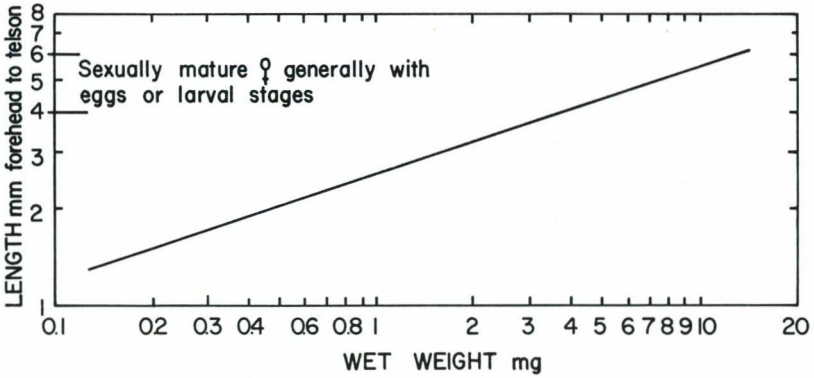


Figure 8. Relationship of length to wet weight for Parathemisto from Saanich Inlet, June-July, 1966.

LENGTH mm torpedo to target
WET WEIGHT mg
edge of larval stages
shown in micron ( ) depth

References to the Amphipoda

Barnard, J.L. 1954. Marine Amphipoda of Oregon. Oregon State Monographs, Studies in Zoology No. 8: 1-103.

1958. Index to the Families, Genera and Species of the Gammaridean Amphipoda (Crustacea). Allan Hancock Foundation Pub., occasional paper No. 19. University of Southern California Press, Los Angeles, Cal.: 145 pp.

1964. Some Bathyal Pacific Amphipoda collected by the U.S.A. Albatross. Pacific Science, 18 (3): 315-335.

Bowman, T.E. 1953. The Systematics and Distribution of Pelagic Amphipods of the Families Vibiliidae, Paraphoronimidae, Hyperiidae, Dairellidae, and Phrosinidae from the Northeastern Pacific. Ph.D. Thesis, University of California, Los Angeles: 430 pp.

1960. The Pelagic Amphipod Genus Parathemisto (Hyperiidea: Hyperiidae) in the North Pacific and adjacent Arctic Ocean. Proc. U.S. Nat. Mus., 112 (3439): 343-92.

Dunbar, M.J. 1963. Amphipoda - Sub-order: Hyperiidea. Fich. Ident. Zoopl., 103.

Gur'janova, E.F. 1951. Amphipods of the Seas of the USSR and Surrounding Waters (in Russian). Zool. Inst., Akad, Nauk S.S.S.R., Opred. po faune S.S.S.R., 74: 440 pp.

Holmes, S.J. 1908. The Amphipoda collected by the U.S. Bureau of Fisheries Steamer "Albatross" off the West Coast of North America, in 1903 and 1904, with descriptions of a new family and several new genera and species. Proc. U.S. Nat. Mus., 35 (1654): 489-543.

Hurley, D.E. 1956. Bathypelagic and other Hyperiidae from California waters. Allan Hancock Fdn. Occ. paper No. 18. 1-25.

Sars, G.O. 1895. An Account of the Crustacea of Norway. I. Amphipoda.

Shih, Chang-Tai and M.J. Dunbar. 1963. Amphipoda Sub-order: Hyperiidea. Fich. Ident. Zoopl., 104.

Shoemaker, C.R. 1930. The Amphipods of the Cheticamp Expedition of 1917. Contrib. Can. Biol. and Fish., N.S. 5 (10): 221-359.

1955. Amphipoda Collected at the Arctic Laboratory, Office of Naval Research, Point Barrow, Alaska, by G.E. MacGinitie. Smithsonian Misc. Coll., 128 (1): 1-78.

Thorsteinson, E.D. 1941. New or Noteworthy Amphipods from the North Pacific Coast. Univ. Wash. Publ. Oceanogr. 4 (2): 50-96.

Wailes, G.H. 1931. Amphipoda from British Columbia. Museum and Art Notes (Vancouver), 6 (1): 40-41.

EUPHAUSIACEAE

The euphausiids of the Northeastern Pacific were fist described by Banner (1949). A more recent description of the euphausiids of the North Pacific is given by Boden, Johnson, and Brinton (1955). The zoogeography of the group is discussed by Brinton (1962).

Euphausia pacifica Hansen, 1911

Euphausia pacifica	Tattersall, 1935 Banner, 1949 *Boden, Johnson and Brinton, 1955 Brinton, 1962

Remarks: X; Mid-depth to surface; Very abundant.

Thysanoëssa longipes Brandt, 1851

Thysanoëssa armata	Marukawa, 1928
Thysanoëssa longipes	Tattersall, 1933 Banner, 1949 *Boden, Johnson and Brinton, 1955 Brinton, 1962

Remarks: X; Mid-depth to surface; Abundant.

Thysanoëssa inermis Krøyer, 1846

Thysanoëssa inermis	Banner, 1949 *Boden, Johnson and Brinton, 1955 Brinton, 1962

Remarks: X; Deep; Rare.

Thysanoëssa raschii M. Sars, 1864

Thysanoëssa raschii	Tattersall, 1933 Banner, 1949 *Boden, Johnson and Brinton, 1955 Brinton, 1962

Remarks: X; Mid-depth to surface; Rare.

Thysanoëssa spinifera Holmes, 1900

Thysanoëssa spinifera	Tattersall, 1933 Banner, 1949 *Boden, Johnson & Brinton, 1955 Brinton, 1962

Remarks: X; Mid-depth to surface; Rare.

Nematoscelis difficilis Hansen, 1911

Nematoscelis difficilis	Esterly, 1914 Banner, 1949 *Boden, Johnson & Brinton, 1955 Brinton, 1962 McLaughlin, 1965

Remarks: X; Deep; Rare.

Tessarabrachion oculatus (Hansen, 1911)

Tessarabrachion oculata	Hansen, 1911
Tessarabrachion oculatum	Banner, 1949
Tessarabrachion oculatus	*Boden, Johnson & Brinton, 1955 Brinton, 1962

Remarks: X; Rare; Deep.

Table 5

Key to the Euphausiids - Strait of Georgia

1) Rostral spine

(A) Eyes round or oval

(a) Dorsal abdominal spines, largest on 4th segment; maximum length to 24 mm — *Thysanoëssa spinifera*

(b) Dorsal abdominal spine on last segment only; maximum length to 16 mm — *Thysanoëssa inermis*

(c) No abdominal spines; maximum length to 25 mm — *Thysanoëssa raschii*

(B) Eyes constricted

(a) Dorsal abdominal spines, largest on 3rd segment — *Thysanoëssa longipes*

(b) No abdominal spines — *Nematoscelis difficilis*

2) No rostral spine

(A) Eyes round or nearly round — *Euphausia pacifica*

(B) Eyes constricted, rostral keel — *Tessarabrachion oculatus*

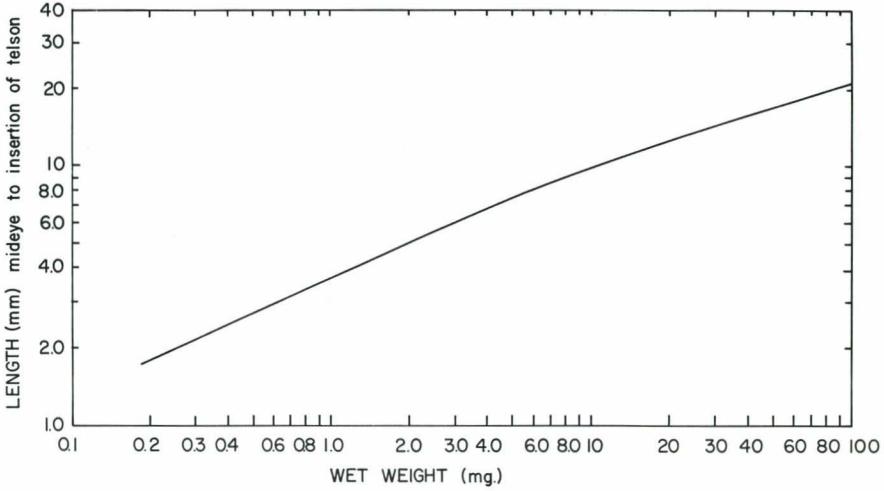


Figure 9. Relationship of length to wet weight for Euphausiids found in Saanich Inlet, June-July, 1966 (length from eye stalk to tip of telson).

References to the Euphausiacea

Banner, A.H. 1949. A taxonomic study of the mysidacea and the euphausiacea (crustacea) of the Northeastern Pacific. III. Euphausiacea. Trans. Roy. Can. Inst., 29 (58): 1-63.

Boden, B.P., M.W. Johnson and E. Brinton. 1955. The euphausiacea (crustacea) of the North Pacific. Bull. Scripps Inst. Ocean., Univ. Cal., 6 (8): 287-400.

Brinton, E. 1962. Variable factors affecting the apparent range and estimated concentration of euphausiids in the North Pacific. Pacific Science, 16 (4): 374-408.

1962. The distribution of the Pacific euphausiids. Bull. Scripps Inst. Oceanogr., 8 (2): 51-270.

Hansen, H.J. 1911. The genera and species of the order euphausiacea, with an account of remarkable variation. Bull. Inst. Ocean. Monaco, 210: 1-54.

McLaughlin, P.A. 1965. A redescription of the euphausiid crustacean Nematoscelis difficilis Hansen, 1911. Crustaceana, 9 (1): 41-44.

Marukawa, H. 1928. Uber neue 5 Arten der Schizopoden. Annot. Ocean. Research, Tokyo, 2 (1): 1-6.

DECAPODA

The systematics of the decapods of the coast of North America has been done by Rathbun (1899, 1902, 1904), Benedict (1903) and Schmitt (1921).

There are five species of decapods in the present collection. Two of them, Pasiphaea pacifica and Sergestes similis, are pelagic throughout their life cycle. The other three were identified from late juvenile forms that were sufficiently developed for positive identification.

Pasiphaea pacifica Rathbun, 1902

Pasiphaea pacifica

Rathbun, 1902
*Rathbun, 1904
Schmitt, 1921
Butler, 1964
Kennedy et al, 1966

Remarks: X; Deep; Rare; Pelagic throughout life history.

Sergestes similis Hansen, 1903

Sergestes similis

*Schmitt, 1921
Butler, 1964
Barraclough & Herlinveaux, 1965
Pearcy & Forss, 1966

Remarks: X; Mid-depth; Rare; Specimens in the present collection were captured in a large pelagic trawl.

Spirontocaris sica Rathbun, 1902

Spirontocaris sica

Rathbun, 1902
*Rathbun, 1904
Butler, 1964
Barraclough & Herlinveaux, 1965

Remarks: A; Reported as present in a scattering layer in Saanich Inlet by Barraclough & Herlinveaux (1965).

Crago communis (Rathbun, 1899)

Crangon communis	*Rathbun, 1904
Crago communis	Schmitt, 1921
	Butler, 1955

Remarks: X; Deep; Rare; Juveniles only in the present collection.

Munida quadrispina Benedict, 1903

Munida quadrispina	*Benedict, 1903
	Rathbun, 1904
	Schmitt, 1921

Remarks: X; Mid-depths; Common; Type locality: Off Cape Beal, Vancouver Island, 66 fm. Juveniles are common in the Strait of Georgia and in Saanich Inlet during the fall.

References to the Decapoda

Barraclough, W.E. and R.H. Herlinveaux. MS, 1965. Exploratory Studies of the Echo Scattering. Fish. Res. Bd. Canada, MS Rept., Oceanogr. and Limnol., No. 199: 1-42.

Benedict, J.E. 1903. Descriptions of a New Genus and Forty-six New Species of Crustaceans of the Family Galatheidae, with a List of the Known Marine Species. Proc. U.S. Nat. Mus., 26: 243-334.

Butler, T.H. 1955. Re-discovery of the Parasitic Cirripede, Mycetomorpha vancouverensis Potts, in British Columbia waters. J. Parasitology, 41 (3): 321.

1964. Records of Shrimps (order Decapoda) from British Columbia. J. Fish. Res. Bd. Canada, 21 (2): 419-421.

Kennedy, O.D., W.E. Barraclough and T.H. Butler. MS, 1966. Distribution and Parasitism of the Shrimp, Pasiphaea pacifica Rathbun, in the Strait of Georgia. Fish. Res. Bd. Canada, MS Rept. Oceanogr. & Limnol., No. 213: 1-21.

Pearcy, W.G. and C.A. Forss. 1966. Depth distribution of Oceanic Shrimps (Decapoda: Natantia) off Oregon. J. Fish. Res. Bd. Canada, 23 (8): 1135-43.

Rathbun, M.J. 1902. Descriptions of New Decapod Crustaceans from the West Coast of North America. Proc. U.S. Nat. Mus., 24: 885-905.

1904. Decapod crustaceans of the Northwest Coast of North America. Harriman Alaska Expedition, 10: 1-210.

Schmitt, W.L. 1921. The Marine Decapod Crustacea of California. Univ. Calif. Publ. Zool., 23: 1-470.

CHAETOGNATHA

The systematics of the Chaetognaths of this region were done by Lea (1955). Her work includes a key for local species. The distribution of chaetognaths in the Pacific is given by Bieri (1959). A more recent revision of the entire group is given by Alvarino (1965).

Sagitta elegans Verill, 1873

Sagitta elegans
- *Lea, 1955
- Hida, 1957
- Légaré, 1957
- Bieri, 1959
- LeBrasseur, 1959
- Alvarino, 1965

Remarks: X; Surface and Mid-depth; Abundant; All year.

Sagitta scrippsae Alvarino, 1962

Sagitta lyra
- *Lea, 1955
- Légaré, 1957
- Bieri, 1959
- Sund, 1959
- LeBrasseur, 1959

Sagitta scrippsae
- Alvarino, 1962
- Alvarino, 1965

Remarks: X; Mid-depth and deep; Rare; Spring.

Sagitta decipiens Fowler, 1905

Sagitta decipiens
- *Lea, 1955
- Hida, 1957
- Bieri, 1959
- LeBrasseur, 1959
- Alvarino, 1965

Remarks: A; One specimen recorded by Lea from Bute Inlet.

Sagitta zetestios Fowler, 1905

Sagitta planktonis
*Lea, 1955
Hida, 1957
Biere, 1959
Sagitta zetestios
Alvarino, 1965

Remarks: A; One specimen recorded by LeBrasseur from Bute Inlet off British Columbia West Coast in summer months.

Eukrohnia hamata Mobius, 1875

Eukrohnia hamata
*Lea, 1955
Hida, 1957
Légaré, 1957
Bieri, 1959
LeBrasseur, 1959
Alvarino, 1965

Remarks: X; Deep; Rare; Spring and summer.

Table 6

Key to the Chaetognatha - Strait of Georgia

1) Anal opening anterior to tail septum - *Sagitta scrippsae*

2) Anal opening at tail septum

A) No pigment in eyes - *Eukrohnia hamata*

B) Eyes pigmented

(a) collarette extending from head to ventral ganglion - *Sagitta planktonis*

(b) no collarette

(i) hooks 5-7 *Sagitta decipiens*

(ii) hooks 8-13 *Sagitta elegans*

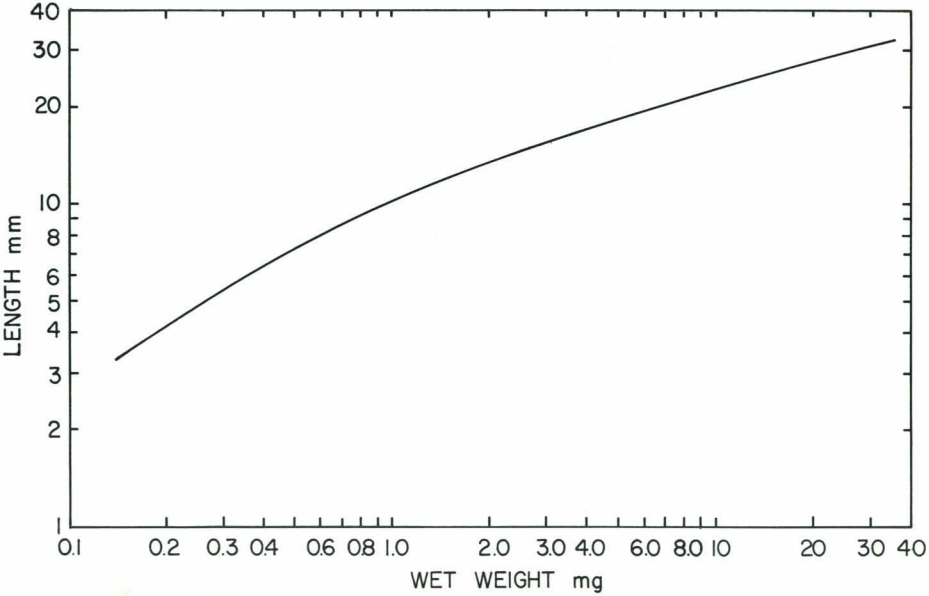


Figure 10. Relationship of length to wet weight for Chaetognaths (after Miller, 1966).

References to the Chaetognatha

Alvarino, A. 1962. Two new Pacific Chaetognaths. Bull. Scripps Inst. Oceanogr. Tech. Ser., 8: 1-50.

1965. Chaetognaths. Oceanogr. Mar. Biol. Ann. Rev., 3, Harold Barnes, Ed., Publ. Geo. Allen and Unwin Ltd., London: 115-194.

Aron, W. 1962. The distribution of animals in the eastern North Pacific and its relationship to physical and chemical conditions. J. Fish Res. Bd. Canada, 19(2): 271-314.

Bieri, R. 1959. The distribution of the Planktonic Chaetognatha in the Pacific and their relationship to the water masses. Limnol. Oceanogr. 4 (1): 1-28.

Hida, T.S. 1957. Chaetognaths and Pteropods as biological indicators in the North Pacific. Spec. Sci. Rept. U.S. Fish and Wildlife Serv., Fish, No. 215: 1-13.

Lea, H. 1955. The Chaetognaths of Western Canadian Coastal Waters. J. Fish. Res. Bd. Canada, 12 (4): 593-617.

LeBrasseur, R.J. 1959. Sagitta lyra, a biological indicator species in the subarctic waters of the eastern Pacific Ocean. J. Fish. Res. Bd. Canada, 16 (6): 795-805.

Miller, J.K. 1966. Biomass determinations of selected zooplankters found in the California Co-operative Oceanic Fisheries Investigation. S.I.O. Ref. 66-15.

Sund, P.N. 1959. The distribution of Chaetognatha in the Gulf of Alaska in 1954 and 1956. J. Fish. Res. Bd. Canada, 16 (3): 351-361.

PTEROPODA

There has been no work done on the pelagic mollusca of this area. McGowan (1963) discusses the distribution and variations of Limacina in the open ocean. Hida (1957) discusses distribution of some pteropods in the north central Pacific in relation to the water masses.

Clione limacina	Phipps, 1774
Clione elegantissima	Dall, 1871
Clione kincaidi	Agersborg
Clione limacina	LaRocque, 1953
	*Morton, 1957

Remarks: X; Deep; Common.

Limacina helicina	Phipps, 1774
Limacina pacifica	Dall, 1872
Limacina helicina	*Tesch, 1947
	Hida, 1957
	LaRocque, 1953
	McGowan, 1963

Remarks: X; Deep; Abundant.

References to the Pteropoda

Aron, W. 1962. The distribution of animals in the eastern North Pacific and its relationship to physical and chemical conditions. J. Fish. Res. Bd. Canada, 19 (2): 271-314.

Hida, T.S. 1957. Chaetognaths and Pteropods as biological indicators in the North Pacific. Spec. Sci. Rept. U.S. Fish and Wildlife Serv., Fish, No. 215: 1-13.

LaRocque, A. 1953. Catalogue of the Recent Mollusca of Canada. Nat. Mus. Canada, Bull. No. 129: 406 pp.

McGowan, J.A. 1963. Geographical variation in Limacina helicina in the North Pacific. Systematics Association Pub. No. 5. Speciation in the Sea, 109-128.

Morton, J.E. 1957. Opisthobranchia, Order: Gymnosomata, Family: Clionidae. Fich, Ident. Zoopl., 80.

Tesch, J.J. 1947. Pteropoda Thecosomata. Fich. Ident. Zoopl., 8.

TUNICATA

The systematics of the pelagic Tunicates of British Columbia waters have never been reported. The Thaliacea listed by Wailes (1929) are endemic to oceanic waters, likely of transitional waters rather than of subarctic waters. They are included here only because they were listed by Wailes. The Larvacea of the North Pacific are discussed by Tokioka (1960) and the Thaliacea are discussed by Tokioka and Berner (1958).

(A) Larvacea

Oikopleura dioica Fol, 1872

Oikopleura dioica	McMurrich, 1916 Wailes, 1929 *Buckman, 1945 Tokioka, 1960

Remarks: X; Surface; Common; Spring.

Oikopleura vanhoffeni Lohmann, 1896

Oikopleura vanhoffeni	*Buckmann, 1945 Tokioka, 1960

Remarks: A

Oikopleura labradoriensis Lohmann, 1892

Oikopleura labradoriensis	*Buckmann, 1945 Tokioka, 1960

Remarks: A

Fritillaria borealis f. typica Lohmann, 1900

Fritillaria borealis f. typica	*Tokioka, 1940 Tokioka, 1960

Remarks: X; Surface; Common; Spring.

(B) Thaliacea

Salpa maxima Forskal, 1775

Salpa maxima		Wailes, 1929
		*Fraser, 1947

Remarks: A

Salpa aspera Chamisso, 1819

Salpa aspera		Wailes, 1929
Salpa fusiformis	f. aspera	*Fraser, 1947
Salpa aspera		Foxton, 1961

Remarks: A

Thalia democratica Forskal, 1775

Salpa mucronata	Wailes, 1929
Thalia democratica	*Fraser, 1947

Remarks: A

References to the Tunicata

Buckmann, A. 1945. Appendicularia I-III. Fich. Indent. Zoopl., 7.

Foxton, P. 1961. Salpa fusiformis Cuvier and Related Species. Discovery Rept. 32: 1-32.

Fraser, J.H. 1947. Thaliacea I. Fich. Ident. Zoopl., 9.

Tokioka, T. 1940. Some additional notes on the Japanese Appendicularian Fauna. Records of Oceanographic Works in Japan, 11 (1): 1-26.

1960. Studes on the distribution of Appendicularians and some Thaliceans of the North Pacific with some Morphological notes. Publ. Seto Mar. Biol. Lab., 8 (2): 351-443.

Tokioka, T. and L. Berner. 1958. On certain Thaliacea (Tunicata) from the Pacific Ocean, with descriptions of two new species of doliolids. Pacific Science, 12 (4): 317-326.

Wailes, G.H. 1929. Marine-Zoo-Plankton of British Columbia. Mus. and Art Notes (Vancouver), 4 (4): 159-165.