

## ANNOTATED PHYLOGENETIC INDEX AND BIBLIOGRAPHY

Of the scattered literature on Pacific coast marine animals, space permits us to mention only the most important taxonomic and natural history references, plus a few otherwise likely to be overlooked, due to publication in an obscure or foreign journal. This incomplete list, however, together with the Johnson and Snook bibliography (hereafter abbreviated as J & S) should serve the seeker after literature at least as a point of departure.

### One. Non-specific books and accounts

#### I. Popular books.

- Arnold, A. F. 1903. The Sea Beach at Ebb Tide. Century. N. Y.
- Cori, Carl, 1928. Die Naturfreunde am Meerestrande. Emil Haim, Vienna. II Ed. Considers very interestingly some 200 Mediterranean and Adriatic animals by type of shore (sand, mud, rock, etc.).
- Crowder, Wm. 1923. Dwellers of Sea and Shore. MacMillan, N. Y. Elementary.
- Crowder, Wm. 1928. A Naturalist at the Seashore. Century, N. Y. Elementary and slightly biased in tone, but probably worth reading at least for his patient work on *Aurelia* life history, the scyphistomae of which he obtained in large quantities.
- Newbigin, M. 1907. The Study of the Seashore. Swann, Sonnenschein, London. So many genera are common to both regions, that by substituting only a few, and bringing the synonymy to conform with modern American usage, this British seashore book could be used very nicely as a Pacific coast manual.

For the tropics and for general zoological interest, the following, but especially the last, are useful and definitely worthwhile:

Alcock, A. W. 1902. A Naturalist in the Indian Seas. John Murray, London.

Beebe, Wm. 1928. Beneath Tropic Seas. Putnam, N. Y.  
(Hai ti).

Yonge, C. M. 1930. A Year on the Great Barrier Reef.  
Putnam, N. Y.

## II. Reference books

Allen, E. J. 1928. Science of the Sea. II Ed. Oxford University Press.

Flattely & Walton. 1922. Biology of the Seashore. Macmillan, London. One of the three indispensable references, and in some ways the best, its principles being universally applicable.

Johnson & Snook. 1927. Seashore Animals of the Pacific Coast. MacMillan, N. Y. The vade mecum of marine biologists of the west coast. Indispensable.

Murray & Hjort. 1912. Depths of the Ocean. MacMillan, London.

Pratt, H. S. 1916. Manual of the Common Invertebrate Animals. McClurg, Chicago.

Russell & Yonge. 1928. The Seas. Fred'k. Warne, London. Indispensable; lacking only the advantage of a more comprehensive bibliography.

## III. Ecological accounts

Allee, W. C. 1923. Studies in Marine Ecology, I and II. Biol. Bull., XLIV:157-253. One of the few comprehensive

ecological treatments of a restricted area in this country. Although concerned with Woods Hole fauna, it pictures a state of affairs that can be expected anywhere.

Gislen, Torsten. 1930. Epibioses of the Gullmar Fjord. II.

Kristin. Zool. Sta. 1877-1927, N:r 4: 1-380.  
(Sweden west coast).

Recognizes and enumerates the plant-animal communities (in a tideless region), starting with above sea-level and working down. This "marine sociology" would seem to be the most correct system of ecological analysis yet devised; but unfortunately not adapted to a popular treatise such as this book, and restricted furthermore to areas better known taxonomically and physically than the Pacific coast of North America.

Gislen, Torsten m/s. A survey of the Marine Associations in the Misaki Region. By the kindness of Dr. Gislen we were able to read this account of the communities of a Japanese area, differing inter-tidally not greatly from Monterey Bay, except in temperature.

MacGinitie, G. E. 1927. Ecological Aspects of Elkhorn Slough. M. A. thesis, Stanford University. Indispensable to the Monterey Bay worker, but unfortunately not readily available.

Shelford & Towler. 1925. Animal Communities of San Juan Channel and Adjacent Waters. Publ. Pug.Sd.Biol.Sta., V:33-74.

Verrill & Smith. 1871-72. Report on the Invertebrate Animals of Vineyard Sound and Adjacent Waters. Report U. S.

Fish Comm. 1871-72: 295-778. Out of date, but still surprisingly useful in principle, and excellent reading. The fauna is divided into forms predominantly inhabiting (1) Bays and sounds; (2) Estuaries, harbors, etc.; (3) Ocean shores (comparable to the classification we employ), and each region is subdivided according to type of bottom, sand, mud, rock, etc.

A good many other ecological accounts of extra-Pacific regions were consulted and found to be profitably readable. The following are also listed in the Shelford & Towler bibliography (pp 70-73) and need not be detailed here:

Davenport, 1903 (Cold Spring Harbor); Hedley, 1915 (New South Wales); Johnston, 1917 (Queensland); King & Russell, 1909 (Scotland); Pearse, 1914 (Massachusetts); Oliver, 1923 (New Zealand); Southern, 1915 (Ireland west coast).

The following, not so listed, were useful:

Allen, Todd, et al. 1900. Fauna of the Salcombe Estuary. Jnl. Mar.Biol.Assn., n.s. VI:151-217.

Allen & Todd. 1902. Fauna of the Exe Estuary. Jnl.Mar.Biol.Assn., n.s. VI:295-343. They divide the region into areas predominantly sandy, muddy, gravelly, etc., and give sample collecting hauls for representative stations.

Allee, W. C. Studies in Animal Aggregations. In Jnl.Exper.Zool., 1926-7-8-9; Biol.Bull., 1927; Ecology, 1929.

Allee, W. C. Animal Aggregations, 1931, University of Chicago Press.  
Batchelder, C. H. 1926. An Ecological Study of a Brackish Water Stream. Ecology, VII:55-71. (New Hampshire).

- Crossland, C. 1927. Expedition to the South Pacific on the S.Y. St. George, Marine Ecology, etc. Trans.Roy.Soc. Edinburgh, LV:531-554. (Panama intertidal and upper subtidal).
- Farran, G. P. 1915. Results of a Biological Survey of Blacksod Bay, County Mayo. Sci.Inves.Dept.Agri.Tech.Inst. Ireland Fisheries, 1914, III:1-72.
- Gersbacher & Denison. 1930. Experiments with Animals in Tidepools. Publ.Pug.Sd.Biol.Sta., VII:209-215.
- Harrington & Griffin. 1927. Notes on the Distribution and Habits of some Puget Sound Invertebrates. Trans.N.Y.Acad. Sci., XVI:152-165.
- Johnson & Yorke. 1915. Relation of Plants to Tide Levels. Publ. Carn.Inst. #206: pp 162.  
Establishes the great importance of the tidal exposure factor on the distribution of shore algae, emphasizing the fact that plants occur in zones through the operation of this factor, and that "the vertical range of a plant common to two localities with different ranges of tide will be found exactly proportional in each place to the local range of tide."
- Klugh, B. 1924. Factors Controlling the Biota of Tidepools. Ecology, V:192-196.
- Matthews, L. H. 1926. The Fauna of the Reef at Pernambuco, Brazil. Bol.Mus.Nac.Rio de Janeiro, II:11-68.
- Molander, A. 1928. Animal Communities on Soft Bottom Areas in the Gullmar Fjord. Kristin.Zool.Sta. 1877-1927, N:r 2:1-90.
- Seurat, L. G. 1927. L'stage intercotidal des cotes algeriennes. Bull. Trav.Publ.Stat.Agric.Peche Castiglione, I:11-33.  
Some of the marine catalogs, notably those of Plymouth (Allen), Triest (Graeffe) and Woods Hole (Sukner, et al) have interesting data, but are not generally useful for our purpose.

IV. Waves, tide, temperature, salinities, etc.

A. General Reference books

- Johnson, D. W. 1919. Shore Processes and Shore-line Development.  
pp 584, etc. John Wiley, N.Y. A comprehensive  
source book, with much ecologically applicable data.
- Johnstone, J. 1908. Conditions of Life in the Sea. Cambridge  
Univ. Press.
- Johnstone, J. 1926. A Study of the Oceans. Arnold, London.
- Marmer, H. A. 1926. The Tide. pp. 282, etc., Appleton, N. Y.
- Marmer, H. A. 1930. The Sea. Appleton, N. Y.

B. Pacific Coast References

- Bigelow & Leslie. 1930. Reconnaissance of the Waters and Plankton of Monterey Bay. Bull. Mus. Comp. Zool., LXX:427-581.
- McEwen, G. F. 1916. Summary and Interpretation of Hydrographic Observations made by the Scripps Institution, etc.  
U.C. Publ. Zool., XV:255-356.
- Sumner, Lauderbach, Schmitt and Johnston. 1914. A Report on the Physical Conditions in San Francisco Bay, etc.  
U.C. Publ. Zool., XIV:1-148.
- Thompson, Johnson & Todd. 1928. The Sea Water at the Puget Sound Biological Station from Sept. 1926 to Sept. 1927.  
Publ. Pub. Sd. Biol. Sta., VI:371-391.

Two. Phylogenetic Index, combined with Bibliography  
of Special Accounts

PHYLUM PROTOZOA

Single celled animals, being ordinarily too small for naked eye observance, have been deliberately omitted, except for the inclu-

sion of a few which may add interest.

References:

- Lynch, James E. 1929. Studies on the Ciliates from the Intestine of *Strongylocentrotus*. I. U.C.Publ.Zool., XXXIII:27-56; et seq.
- Stevens, N. M. 1901. Studies on Ciliate Infusoria. Proc. Calif.Acad.Sci., (3) Zool. III:1-42.
- Boveria subcylindrica* Stevens (in *Stichopus*) ..... 91
- B. teredinidi* Nelson. Reference: Pickard, E.A. 1927. The neuromotor apparatus of *Boveria teredinidi* Nelson, a ciliate from the gills of *Teredo navalis*. U.C.Publ.Zool., XXIX:405-428..482
- Ephelota gemmipara* (Hertwig) A suctorian occurring on *Abietinnaria*..... 97
- E. gigantea* Noble. Reference: Noble, A.E., 1929. Two new species of *Ephelota* from Monterey Bay. U.C.Publ.Zool., XXXIII:13-26..462
- Licnophora macfarlandi* Stevens (in *Stichopus*)..... 91
- Trichamoeba schaefferi* Radir. Reference: Radir, Paul I. 1927. *Trichamoeba schaefferi*, a new species of large ameba from Monterey Bay, California. Arch.f.Protis. LIX:289-300..... 78

PHYLUM PORIFERA - SPONGES

References:

- de Laubenfels, M. W. 1927. Red Sponges of California. Ann.Mag. Nat.Hist., (9) XIX: 258-267.
- de Laubenfels, M. W. 1928. Interspecific Grafting, Using Sponge Cells. Jnl.Elisha Mitchell Sci.Soc., XLIV:82-85.
- de Laubenfels, M. W. Thesis - - -
- Lambe, L. M. 1892, 1893, 1894, 1900. Four papers on Canadian and

Alaskan Sponges, see p. 609, J. & S.  
 Parker, G. H. 1914. On the Strength and Volume of the Water  
 Currents Produced by Sponges. *Jnl. Exper. Zool.*, XVI:443-446.  
 Urban, F. 1906. Kalifornische Kalkschwamme. *Arch. f. Naturgesch.*,  
 LXXII:33-76.

<i>Axinella sinapeos</i>	231
<i>Experiopsis rigida</i> Lambe, or similar.....	296
<i>Haliscarca</i> sp.....	313
<i>Leuconia</i> ( <i>Leucandra</i> ) <i>heathi</i> (Urban).....	109
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#### PHYLUM COELENTERATA

#### CLASS HYDROZOA. HYDROIDS AND HYDROMEDUSAE

#### References:

Fraser, C. McL. 1914. Some Hydroids of the Vancouver Island  
 Region. *Trans. Toy. Soc. Canada Biol. Sci.* (3) VIII:99-215.  
 The most useful single work. Bibliography covers such

previous papers as Fraser, 1911; Nutting, 1900, 1904;  
Torrey, 1902, 1904.

Nutting, C. C. 1915. American Hydroids, Pt. III. U.S.N.M.  
Spec.Bull. 4.

Stechow, E. 1923. Zur Kenntniss der Hydroiden fauna des  
Mittelmeers, Amerikas und andere Gebiete, II. Zool.  
Jahr., Abt.f.Syst., XLVII:29-270. Mentions four only  
Monterey and Vancouver forms, one of them new. A  
previous paper, part I, describes a new species of  
Orthopyxis from Vancouver, p. 69.

There is no published account covering the Monterey Bay hydroids.  
Species mentioned in the other papers occur, of course, along the  
central California coast, but an illustrated review of the Monterey  
Bay forms would be very useful.

#### Order Gymnoblastea

<i>Corymorpha palma</i> Torrey, .....	396
Much used for physiological work on polarity, etc.	
See papers by H.B. Torrey and by G.H. Parker, listed on p. 610, J & S, and by C.M. Childs, 1927-28 Biol.Bull.	
<i>Eudendrium californicum</i> Torrey, and other spp.....	93
<i>Garveia annulata</i> Nutting .....	95
<i>Hydractinia milleri</i> Torrey .....	96
<i>Syncoryne mirabilis</i> (Ag.) .....	478
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#### Order Calyptoblastea

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Obelia commissuralis McCrady .....	477
Ob. geniculata (Linn.) .....	372
Ob. longissima (Pallas) .....	452
Orthopyxis compressa (Clark) .....	99
Plumularia setacea (Ellis) .....	92
Sertularella turgida (Trask), S. fusoides Stechow, or similar..... Reference: Stechow, E. 1926. Einige neue Hydroiden, etc., Zool. Anz.: LXVIII:96-108	
Sertularia furcata Trask. Has been considered synonomous with s. pulchella (d'Orbigny) of Paragonia .....	100

Order Calyptoblastea, medusoid scheme (Leptomedusa)

Polyorchis penicillata Ag. .....	470
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Order Hydrocorallina. Hydroid-corals

Stylanthea porphyra Fisher. Reference: Fisher, W.K., 1931, California Hydrocorals. Ann. Mag. Nat. Hist. (10) VIII:391-399 .....	101
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Order Trachomedusae

Gonionemus vertens A Ag. .....	384
Reference: Rugh, R. 1929. Egg Laying Habits of Gonione- mus murbachii in relation to light. Biol. Bull., LVII:261-266	

Order Siphonophora

Velella velella Linn., Equals Velella lata .....	247
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## CLASS SCYPHOZOA - THE SCYPHOMEDUSAE

## Order Stauromedusae

- Halicystus stejnegeri* Kishinouye. Reference:  
Kishinouye, K. 1899. A new species of stalked  
medusae, etc. Proc.U.S.N.M. XXII:125-129 .....374

## Order Discophora

- Aurelia aurita* (Linn.) or similar .....470  
*Aurelia scyphistoma* of. Reference: Galigher, A. E., 1925.  
On the occurrence of the larval stages of Scypho-  
zoa, etc. Amer.Nat. LIX:94-96 .....299

## CLASS ANTHOZOA - SUBCLASS ALCYONARIA

## References:

- Kukenthal, W. 1913. Über die Alcyonarian Fauna  
Californiens, etc. Zool.Jahr.Abt.Syst., XXXV:219-270.\*  
Nutting, C. C. 1909. Alcyonaria of the California Coast.  
Proc.U.S.N.M., XXV:681-727.

## Order Stolonifera. Soft Corals

- Clavularia* so. Identified by Prof. Hickson as a new  
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*Clavularia* sp. This has been considered *Telesto ambigua*  
Nutting (Nininger et al, 1918. Coelenterates from  
Laguna Beach. Pom.Coll.Jnl.Entom.Zool., X:59) .....163

Order Pennatulacea. Sea Pens, Sea Feathers  
and Sea Pansies

- Renilla amethystina* Verrill. References: Three papers  
by G. H. Parker, 1919-20, see p. 610 J & S .....342  
*Stylatula elongata* (Gabb) .....399

\* Corrects and revises Nutting's 1909 paper, of which more  
than half the species are considered falsely named.

Order Gordonacea. Sea Plumes, Sea Fans

Muricea hebes Verrill .....	289
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SUBCLASS ZOANTHARIA. ANEMONES AND CORALS

Reference: There is no up-to-date general account of Pacific shore Zoantharia; a most obvious need.\*

Torrey, H. B. 1902. Anemones. Harriman Alaska Expedition. Proc. Wash. Acad. Sci.: IV:373-410.

Order Edwardsiidea

Edwardsia sipunculoides (Stimson) .....	322
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Edwardsiella californica McMurrich. Reference: McMurrich, J. P. 1913. A new species of Edwardsiella from Southern California. Proc. U.S. N.M., XVIV: 551-553 .....	400
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Order Cerianthidea

Reference:

Torrey and Kleeberger. 1909. Three species of Cerianthus from Southern California. Univ. Calif. Publ. Zool.; VI:115-125.

Cerianthus aestuari Torrey and Kleeberger .....	350
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Cerianthus sp. .....	350
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Order Hexactiniae

Reference:

McMurrich, J. P. 1901. Report on the Hexactiniae of the Columbia Univ. Exped. to Puget Sd. Ann. N.Y. Acad. Sci.; XIV:1-52.

Cribrina artemisia Pickering. (Usually considered as C. xanthogrammica) .....	352
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C. elegantissima (Brandt) (Usually considered as C. xanthogrammica) .....	26
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\*Many papers by G. H. Parker (see list on p. 610 J & S). We found his 1916 Effector Systems of Actinians, Jnl. Exper. Zool. XXI:461-484 particularly interesting.

C. (*Bunodactis*) *xanthogrammica* (Brandt) (Usually considered as *C. xanthogrammica*) ..... 78

Reference: Gee, W. 1913. Modifiability in  
....*C. xanthogrammica*. *Jnl. Anim. Behav.*; III:305-328.

Torrey, H. B. 1906. The California Shore  
Anemone, etc. *Univ. Calif. Publ. Zool.*;  
III:41-45.

*Corynactis* sp. ..... 43

*Cylistia* (*Sagartia*) *leucolena* (Verrill) ..... 295

*Epiactis prolifera* Verrill ..... 40

*Harenactis attenuata* Torrey ..... 351

*Metridium dianthus* (Ellis) (*M. marginatum*) ..... 460

*Tealia* (*Urticina*) *crassicornis* (Müller) ..... 79

#### Order Madreporaria. Stony Corals

*Balanophyllia elegans* Verrill. Reference: Boschma, H.  
1925. On the feeding reactions and  
digestion in ...*Astrangia*, etc. *Biol.*  
*Bull.*;XLIX:407-439 ..... 42

#### CLASS CTENOPHORA

*Pleurobrachia bachei* A. Ag. ..... 247

#### PHYLUM PLATYHELMINTHES

##### CLASS TURBELLARIA      FLATWORMS, PLANARIANS

###### Order Polycladida, Polyclad Worms

###### References:

Bock, S. 1925. Papers from Dr. Th. Mortensen's Pacific  
Expedition, 1914-16. XXVII:Planarians,  
part IV. *Vidensk. Medd. fra Dansk naturh.*  
Foren., LXXIX:97-184. (Describes *Kra-*  
*burakia excelsa* sp/nov. from Nanaimo  
intertidal, p. 132).

Freeman, Daniel. 1930. Three polyclads from the region of Pt. Fermin, San Pedro, Calif. Trans.Amer.Micros.Soc., XLIX:334-341. Describes Prosthiotomum molle sp.nov. as probably the underdetermined species mentioned and illustrated by J & S.

Heath & McGregor. 1912. New Polyclad worms from Monterey Bay, California. Proc.Acad.Nat.Sci. Phil.;LXIV:455-488.

*Leptoplana acticola* Boone. Reference: Harman & Stebbins, 1928. The maturation and segmentation of the eggs of *Leptoplana* (sp.) Publ. Pug.Sd.Biol.Sta.; VI:239-251. .... 17

*Planocera californica* H. & McG. ..... 3

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*Stylochoplana heathi* Boone ..... 321

#### Order Rhabdocoelida

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*Polychoerus caudatus* Mark. Reference: Gardiner 1895. Early Development of *P. caudatus* Mark. Jnl.Morphol.;XI:155-171 ..... 67

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#### CLASS CESTODA, TAPEWORMS

Tetraphyllid larvae, parasitic in *Schizothaerus* ..... 416

#### CLASS NEMERTEA, RIBBON WORMS

#### References:

Coe, W. R. 1904. Nemerteans. Harriman Alaska Expedition; XI:1-220.

Coe, W. R. 1905. Nemerteans of the West and Northwest Coasts of America. Bull.M.C.Z.; LXVII:1-318.

*Amphiporus bimaculatus* Coe ..... 52

*Cephalothrix major* Coe. Reference: Coe, W. R. 1930. Two new species of Nemerteans belonging to the family Cephalotrichidae. Zool.Anz.; LXXXIX:97-103 ..... 158

Cerebratulus sp., Elkhorn Slough. Reference: Wilson, C. B. 1900. The habits and early development of Cerebratulus lac- teus (Verrill). Quart.Jnl.Micros. Sci., n.s. XLIII:97-198. ....	429
Emplectonema gracile (Johnstone) .....	211
Lineus vegetus Coe. References: Coe, W. R. 1929. Re- generation in Nemerteans. Jnl.Exper. Zool.;LIV:411-460. Coe, W. R. 1931. A new species of nemertean (Lineus vegetus), etc. Zool.Anz.;XCIV:54-60 ..	158
Malacobdella grossa (Müller). Reference: Guberlet, J. E. 1925. Malacobdella grossa from the Pacific Coast of North America. Publ.Pug.Sd.Biol.Sta.; V:1-14 .....	244
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PHYLUM NEMATHELMINTHES

CLASS NEMATODA - ROUNDWORMS

PHYLUM BRYOZOA (POLYZOA)

References:

O'Donoghe, C. H. & E. 1925. List of Bryozoa from the vicinity of Puget Sound. Publ.Pug.Sd. Biol.Sta.; V:91-108	
O'Donoghue, C. H. 1926. Second list of Bryozoa from the Vancouver Island Region. Contr.Can Biol.Fisher.; n.s.III:47-132	
Robertson, A. Four papers on Pacific Coast bryozoa, listed on p. 612, J & S.	
Barentsia sp., probably gracilis var. nodosa (Lomas) .....	452
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A. mytili Dalyell .....	452
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<i>Tubulipora flabellaris</i> (Fabricius) .....	300
<i>Zoobotryon pellucida</i> Ehrenberg .....	300

#### PHYLUM BRACHIOPODA

Reference:

Dall, H. D. 1920. Annotated list of the recent Brachiopoda in the collection of the United States National Museum, etc. Proc. U.S. Natl. Mus., LVII:261-377.

<i>Glottidia albida</i> (Hinds) .....	401
<i>Terebratalia transversa</i> (Sowerby) .....	298

PHYLUM PHORONIDA

## References:

- Hilton, W. A. 1930. Phoronida from the coast of southern California. Jnl. Entom. Zool. XXII:33-35.
- Pixell, H. L. M. 1912. Two new species of the Phoronidea from Vancouver Island. Quart. Jnl. Micros. Sci., n.s. LVIII:257-284.
- Torrey, H. B. 1901. On *Phoronis pacifica* sp.nov. Biol. Bull., II:283-288. Eight specimens from Humboldt Bay and Puget Sound. Apparently not found since.
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| Phoronis sp., (the orange gilled form) ..... | 411 |

PHYLUM ANELIDA (ANNULATA) - SEGMENTED WORMS

## CLASS CHAETOPODA SUBCLASS POLYCHAETA

References: The literature of the Pacific coast polychaeta is widely scattered. Only the most important papers are cited here; see also J & S, p. 617. An illustrated summary of the annelid situation on the Pacific, or even a comprehensive and up-to-date paper on Monterey Bay forms (as Fraser, 1914, for the Vancouver hydroids) would be exceedingly useful.

- Berkeley, E. 1924. Polychaetous annelids from the Nanaimo district. Pt. I: Syllidae to Sigalionidae. Contr. Canad. Biol. Fisher.; n.s. I:317-322.
- Berkeley, E. 1924. Polychaetous annelids from the Nanaimo district. Pt. II: Phyllodocidae to Nereidae. Contr. Canad. Biol. Fisher.; II: 285-294.
- Berkeley, E. 1927. Polychaetous annelids from the Nanaimo district. Pt. III: Leodicidae to Spionidae. Contr. Canad. Biol. Fisher.; n.s. III; 405-422.
- Berkeley, E. 1929. Polychaetous annelids from the Nanaimo district. Pt. IV: Chaetopteridae to Maldanidae. Contr. Canad. Biol. Fisher.; n.s. IV:305-316.

- Berkeley, E. 1930. Polychaetous annelids from the Nanaimo district. Pt. V: Ammochariidae to Myzostomidae, with an appendix on some pelagic forms, etc. Contr. Canad. Biol. Fisher.; n.s. V:65-77.
- Bush, K. J. 1904. Tubicolus annelids. Harriman Alaska Reports; XII:169-298.
- Chamberlain, R. V. 1918. Polychaets from Monterey Bay. Proc. Wash. Biol. Soc.; XXXI:173-180.
- Chamberlain, R. V. 1919. New polychaetous annelids from Laguna Beach. Pom. Jnl. Entom. Zool.; XI:1-23.
- Essenberg, C. 1918. The factors controlling the distribution of the Polynoidae, etc. Univ. Calif. Publ. Zool.; XVIII:171-238.
- Johnson, H. P. 1897. A preliminary account of the marine annelids of the Pacific coast, etc. Proc. Calif. Acad. Sci.; (III) I:153-198.
- Johnson, H. P. 1901. Polychaeta of the Puget Sound region. Proc. Bost. Soc. Nat. Hist.; XXIX:381-437.
- Moore, J. P. 1909. Polychaetous annelids from Monterey Bay and San Diego. Proc. Acad. Nat. Sci. Phil.; LXI:235-295.
- Treadwell, A. L. 1914. Polychaetous annelids of the Pacific coast in the collections of the University of California. Univ. Calif. Publ. Zool.; XIII:175-234.
- Treadwell, A. L. 1929. New species of polychaetous annelids... from...Lower California, etc. Am. Mus. Hist. Novit.; #392:1-13.
- |   |  |       |
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| Arenicola claparedii Levinson             | Lugworm .....  | 427   |
| Audouinia (Cirratulus) luxuriosus (Moore) | .....  | 16    |
| Chaetopterus variopedatus R & C.          | Reference: Berrill,<br>N. J. 1927. The control of the beat<br>of the fan segments in Chaetopterus<br>variopedatus. Nature, CXIX:564-565.   | ..426 |
| Clymenella rubrocincta Johnson            | .....  | 403   |
| Eudistylia polymorpha (Johnson), Sabellid | .....  | 148   |
|   | There is a related form, E. gigantea<br>Bush, notable in that it forms veri-<br>table "groves" of thousands of indi-<br>viduals many square yards in extent<br>and several feet high, on the beach<br>near Vancouver, B.C. See O'Donoghue,<br>C. H. 1924. Contr. Can. Biol. Fisher;<br>n.s. I:441-453. |       |

<i>Eurythoe paupera</i> (Grube) .....	428
Another stinging worm, <i>E. californica</i> Johnson, is said to occur under stones at Pacific Grove and especially at Laguna, but we have not taken it.	
<i>Filograna</i> sp., Serpulid .....	231
<i>Glycera rugosa</i> Johnson, Proboscis worm .....	381
<i>Halosydna californica</i> (Johnson), Scaleworm, polynoid .....	231
<i>H. fragilis</i> (Baird), Scaleworm, polynoid .....	278
<i>H. insignis</i> (Baird), ( <i>H. brevisetosa</i> ), Scaleworm, polynoid ..	53
<i>H. lordii</i> Baird, Scaleworm, polynoid .....	90
<i>H. pulchra</i> (Johnson), Scaleworm, polynoid .....	91
<i>Harmothoe</i> "adventor" Skogsberg. Reference: Skogsberg, T. 1928. A commensal polynoid worm from California. Proc. Calif. Acad. Sci.; (4) XVII:253-265 .....	422
<i>H.</i> sp. Scaleworm, polynoid .....	402
<i>Hemipodia borealis</i> Johnson, Probosis worm .....	309
<i>Lumbrinereis</i> sp., (red, stringlike), probably <i>zonata</i> Johnson .....	403
Another <i>Lumbrinereis</i> , green and more stout, probably <i>erecta</i> Moore, occurs very profusely in <i>Phyllospadix</i> roots, from Monterey at least to Lower California.	
<i>Mesochaetopterus taylori</i> Potts. Reference: Berkeley, C. 1930. The green bodies of the intestinal wall of certain Chaetopteridae. Quart. Jnl. Micros. Sci.; LXXII:465-476 ..	359
<i>Nephthys</i> sp. .....	359
<i>Nereis brandti</i> (Malmgren), Giant clam worm .....	210
<i>N. vexillosa</i> Grube. References: Lillie & Just, 1913. Breeding habits of the heteronereis form of <i>Nereis limbata</i> , etc. Biol. Bull.; XXIV:147-160 .....	209
<i>Nereis</i> sp., probably <i>virens</i> Sars. Reference: Copeland & Weimar, 1924. The chemical sense and feeding behavior of <i>Nereis virens</i> Sars. Biol. Bull.; XLVII:231-238 (mentions previous work of Gross) .....	264

<i>Odontosyllis phosphorea</i> Moore .....	176
<i>Pectinaria brevicoma</i> Johnson. Reference: Watson, A. T. 1928. Observations on the Habits and Life History of <i>Pectinaria</i> . ( <i>Lagis</i> ) <i>koreni</i> Mgr. Proc. & Trans. Liverpool Biol. Soc.; XLII:25-60 .....	382
<i>Phyllochaetopterus prolifica</i> Potts .....	132
<i>Sabellaria californica</i> Fewkes .....	212
<i>Serpula vermicularia</i> Linn. ( <i>S. columbiana</i> Johnson) .....	284
<i>Spirorbis spirillum</i> Linn. Serpulid. Reference: Shively, M. A. 1897. The Anatomy and Develop- ment of <i>Spirorbis borealis</i> . Proc. Acad. Nat. Sci. Phil., 1897:153-160 .....	22
<i>Stylarioides</i> ( <i>Trophonia</i> ) <i>papillata</i> (Johnson) .....	308
<i>Terebella</i> ( <i>Amphitrite</i> ) <i>robusta</i> (Johnson). References: Scott, J.W. 1909. Some Egg Laying Habits of <i>Amphitrite ornata</i> Verrill. <i>Biol. Bull.</i> ; XVII:327-340. Scott, J.W. 1911. Further Experiments on the Methods of Egg Laying in Amphi- trite <i>ornata</i> Verrill. <i>Biol. Bull.</i> ; XX:252-265 .....	59
<i>Thelepus crispus</i> Johnson. Terebellid worm .....	307

PHYLUM SIPUNCULOIDEA GEPHYREANS "PEANUT WORMS"

Reference :

Chamberlain, H. V. 1920. Notes on the Sipunculida of Laguna Beach. <i>Pom. Jnl. Entom. Zool.</i> ; XII:30-31	
... <i>Dendrostoma perimeces</i> Fisher .....	383
<i>D. petraeum</i> Fisher. Reference: Fisher, W. K. 1928. New Sipunculoidea from California. <i>Ann. Mag. Nat. Hist.</i> ; (10) I:194-199 .....	168
<i>Phascolosoma hespera</i> Chamberlain .....	403
<i>Phycosoma agassizii</i> (Keferstein) .....	58
<i>Sipunculus nudus</i> Linn. ....	424
The account by Andrews, E. A. 1890, Notes in the Anatomy of <i>Sipunculus gouldii</i> Pourtales. <i>Stud. Biol. Lab. Johns Hopkins Univ.</i> ; IV:389-, has some interesting natural	

history on a form now called Phascolosoma, apparently similar in habitat and habits to the California race of *S. nudus*.

#### PHYLUM ECHIUROIDEA - ECHIURID WORMS

##### Reference :

Wilson, C. B. 1900. Our North American Echiurids.  
Biol.Bull.; I:163-178.

Echiurus pallasii Guerin .....	422
Thalassema sp. .....	423
Urechis caupo Fisher & MacGinitie. References: Fisher & MacGinitie, 1928. A New Echiurid Worm from California. Ann.Mag.Nat. Hist.; (10) I:199-203. Fisher & MacGinitie, 1928. The Natural History of an Echiurid Worm. Ann.Mag. Nat.Hist.; (10) I:204-213. Urechis is being used extensively for embryological and physiological work; see Tyler, A., 1931. Biol. Bull.; LX:187-211, et seq. ....	422

#### PHYLUM ECHINODERMA

##### References:

Bush, M. 1921. Revised Key to the Echinoderms of Friday Harbor, Washington. Publ. Pug.Sd.Biol.Sta.; III:65-77.

Clark, H. L. 1913. Echinoderms from Lower California. Bull.Am.Mus.Nat.Hist.; XXXII:185-236.

Hilton, W. A. 1918. Some Echinoderms of Laguna Beach. Pom.Jnl.Entom.Zool., X:78.

#### CLASS ASTEROIDEA - STARFISH

##### References:

O'Donoghue, C. H. 1924. On the Summer Migration of Certain Starfish in Departure Bay, British Columbia. Contrib.Canad. Biol.Fisher.; n.s. I:455-472.

Fisher, W. K. 1911, 1928 & 1930. Asteroidea of the North Pacific, Pt. 1, 1911; Pt. 2, 1928; & Pt. 3, 1930. Bull.U.S.Mus.; No. 76.

- Paine, V. L. 1929. The Tube Feet of Starfishes as Autonomous Organs. Amer.Nat., LXIII:517-529.
- Astrometis sertulifera* (Xantus) Reference: Jennings, H. S. 1907. Behavior of the Starfish *Asterias forreri* de Loriol. Univ.Calif.Publ.Zool.; IV:53-185 ..... 86
- Astropecten armatus* Gray ..... 344
- Dermasterias imbricata* (Grube) ..... 282
- Evasterias troschelii* (Stimpson) ..... 278
- Henricia leviuscula* (Stimpson) ..... 83
- H. sanguinolenta* forma *tumida* Verrill ..... 282
- Leptasterias aequalis* (Stimpson) ..... 82
- L. hexactis* (Stimpson) Reference: Osterud, H. L. 1918.  
Preliminary Observations on the  
Development of *Leptasterias hexactis*.  
Publ.Pug.Sd.Biol.Sta.; II:1-15 ..... 281
- L. pusilla* Fisher ..... 33
- Linckia columbiae* Gray Reference: Monks, S. P. 1904.  
Variability and Autotomy of *Phataria*.  
(*Linckia*). Proc.Acad.Nat.Sci.Phil.;  
LVI:596-600 ..... 85
- Orthasterias koehleri* (de Loriol), (*O columbiana*) ..... 279
- Patiria* (*Asterina*) *miniata* (Brandt) Reference: Newman,  
H. H. 1925. An Experimental Analysis  
of Asymmetry in the Starfish  
*Patiria miniata*. Biol.Bull.;  
XLIX:111-138. ..... 29
- Pisaster brevispinus* (Stimpson) f. *paucispinus* (Stimpson) .280
- P. giganteus* (Stimpson) ..... 201
- P. giganteus capitatus* (Stimpson) the Southern California  
subspecies ..... 161
- P. ochraceous* forma *ochraceus* (Brandt) of surf swept  
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Pycnopodia helianthoides (Brandt) .....	80
Solaster dawsoni Verrill .....	81
S. stimpsoni Verrill .....	81

CLASS OPHIUROIDEA - BRITTLE STARS SERPENT STARS

References:

Berkeley, A. 1927. Preliminary list of the Ophiurans of the Nanaimo District. Contra. Canad.Biol.Fisher.; n.s. III:319-322.

Clark, H. L. 1911. North Pacific Ophiurans. Bull.U.S. Nat.Mus.; No. 75.

May, R. M. 1924. Ophiurans of Monterey Bay. Proc.Calif. Acad.Sci.; (4) XII:261-303.

McGlendon, J. F. 1909. Ophiurans of the San Diego Region. Univ.Calif.Publ.Zool.; VI:33-64.

Amphiodia barbara (Lyman) Reference: Hilton, W. A. 1918. The Central Nervous System of a Long Armed Serpent Star. Pom.Jnl.Entom.Zool.; X:75 .....	357
A. occidentalis (Lyman) .....	48
Amphipholis pugetana (Lyman) .....	19
Ophioderma panamensis Lütken .....	140
Ophionereis annulata LeConte .....	140
Ophiopholis aculeata (Linn) var kennerlyi (Lyman) .....	141
Ophioplacus esmarki Lyman .....	49
Ophiopteris papillosa (Lyman) .....	143
Ophiothrix spiculata LeConte. Radial shields spiny; the related O. rudis Lyman has bare radia shields .....	142

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Echinorachnius parma (Lamark) .....	340

Lovenia cordiformis A. Ag.	341
Lytechinus anamesus A. Ag. & H. L. Clark	370
L. pictus (Verrill)	287
Strongylocentrotus dröbachiensis (Müller). Reference: Weese, A. O. 1926. Food and Digestive Processes of Strongylocentrotus drö- bachiensis. Publ. Pug. Sd. Biol. Sta.; V:165-179.	283
S. franciscanus (A. Ag.)	87
S. purpuratus (Stimpson)	222

The three species of *Strongylocentrotus* have been the subject of embryological and physiological experiment for many years; there are certainly dozens, possibly hundreds of scattered papers relating to them. J. Loeb's pioneer work on parthenogenesis was done with Monterey Bay urchins.

#### CLASS HOLOTHUROIDEA - SEA CUCUMBERS, SEA SLUGS

##### References:

- Clark, H. L. 1901. Holothurians of the Pacific Coast of North America. Zool. Anz.; XXIV:162-171.
- Deichmann, E. Personal communication based on m/s on the Holothurians of the Pacific Coast, the publication of which is anticipated in the Bull. Mus. Comp. Zool.
- Heding, S. G. 1928. Papers from Dr. Th. Mortensen's Pacific Expedition, 1914-16. XLVI: Synaptidae. Vidensk. Meddel. Dansk. Naturh. For. LXXXV:105-323. Describes four new species of Lep-tosynapta and three of Chiridota from Nanaimo and La Jolla.
- Wells, W. W. 1924. New Species of Holothurians from Monterey Bay. Ann. Mag. Nat. Hist.; (9) XIV:113-121.
- Chiridota albatrossii Edwards ..... 60

<i>Cucumaria quinquisemita</i> Selenka (C. chronhjelmi Theel) ..	310
<i>C. curata</i> Cowles. Reference: Cowles, R. P. 1907, <i>Cucumaria curata</i> sp.nov. Johns Hopkins Univ.Cir.#195:2 pp. ....	224
<i>C. lubrica</i> H. L. Clark .....	224
<i>Cucumaria miniata</i> (Brandt) .....	310
Hall, A. R. 1927. Histology of the Retractor Muscle of <i>Cucumaria miniata</i> , Publ. Pug.Sd.Biol.Sta.; V:205-219.	
<i>C. sp.</i> .....	310
<i>Leptosynapta inhaerens</i> (O. F. Müller) .....	60
<i>Molpadia arenicola</i> (Stimpson) .....	358
<i>Psolus chitonoides</i> Clark .....	297
<i>Stichopus californicus</i> (Stimpson) .....	91
Courtney, W. D. 1927. Fertilization in <i>Stichopus</i> <i>californicus</i> . Publ.Pug.Sd.Biol.Sta.; V:257-260.	
<i>S. parvimensis</i> H.L. Clark .....	91
<i>Thyonepsolus nutriend</i> Clark .....	160

#### PHYLUM ARTHROPODA

#### CLASS CRUSTACEA

##### Reference:

Baker, C. F. 1912. Notes on the Crustacea of Laguna Beach. First Ann.Rpt.Laguna Marine Lab., 100-117. A Mysis is mentioned, a new cumacean is described, a new copepod and two new marine ostracods.

#### Order Ostracoda

##### Reference:

Skogsberg, T. 1928. Studies on Marine Ostracods II. Occ.Papers Calif.Acad.Sci., XV:1-154.

We list none of these almost microscopic bivalved crustacea. Skogsberg records five intertidal species of Cythereis from calcareous algae and roots of eel grass at Monterey, but they are not taken frequently.

Order Copepoda

Pseudomolgus navanaci Wilson .....	408
Tigriopus fulvus Sars .....	8
Parasitic copepods occurring in <i>Renilla</i> polyps .....	342

Order Cirripedia - Barnacles

References:

- Bohart, R. M. 1929. Observations on the attachment of *Balanus crenatus* Brugiere, found in the waters of Puget Sound. Amer. Nat., LXIII:353-361.
- Boschma, H. 1930-31. Papers from Dr. Th. Mortensen's Pacific Expedition, 1914-16. LV. Rhizocephala. Vidensk. Medd. fra Dansk Naturh. Foren., LXXXIX:297-380.
- Cornwall, I. W. 1925. Review of the Cirripedia of the Coast of British Columbia. Contr. Canad. Biol. Fisher.; n.s. II:469-502.
- Pilsbry, H. A. 1907. The Barnacles (Cirripedia) Contained in the collections of the U.S. National Museum. Bull. U.S. Nat. Mus.; No. 60: pp. 122.
- Pilsbry, H. A. 1916. Sessile Barnacles (Cirripedia) Contained in the Collections of the U.S. National Museum. Bull. U.S. Nat. Mus.; No. 93: pp. 366.
- Pilsbry, H. A. 1921. Barnacles of the San Juan Islands, Washington. Proc. U.S. Nat. Mus.; LIX:111-115.
- For ecological data in connection with barnacle communities, note a series of papers by Shelford, Towler, Worley, and Rice, 1930, in Vol. VII, Publ. Pug. Sd. Biol. Sta.
- |  |     |
|--|-----|
| Balanus balanoides (Linn) .....  | 450 |
| B. cariosus (Pallas) .....   | 260 |
| B. glandula Darwin .....   | 4   |
| B. hesperius Pilsbry vorma laevidomus Pilsbry. Mostly, if not entirely, subtidal; commonly on dredged Polinices shells at Monterey ..... | 4   |

B. nubilis Darwin .....	453
B. tintinnabulum (L) californicus Pilsbry .....	453
Chthamalus dalli Pilsbry .....	260
Ch. fissus Darwin. Reference: Monterosso, B. 1930. Studi cirripedologici, VI, Reactions of C. stellatus under Experimental conditions. Known only through Biol. Abstracts (V. #15577, May, 1931) .....	5
Mitella polymerus (Sowerby) .....	204
M. polymerus echinata Broch .....	204
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Sacculina sp. .....	467
Tetraclita squamosa rubescens Darwin .....	214

Order Amphipoda - Beach Hoppers,  
Sand Fleas, Skeleton Shrimps, etc.

References:

- Holmes, S. J. 1904. Amphipod Crustacea. Harriman Alaska Exped.; X-231-246.
- La Follette, R. Caprellidae from Laguna Beach,  
I. Pom.Jnl.Entom.Zool.
- La Follette, R. 1915. Caprellidae from Laguna Beach,  
II. Pom.Jnl.Entom.Zool.; VII:55-60.
- Shaw, M. 1916. Caprellidae from Laguna Beach. Pom. Jnl.Entom.Zool.; VIII:86-87.
- Stout, V. R. 1912. Studies in Laguna Amphipoda, I. First Ann.Rpt., Laguna Mar.Lab., 134-149.
- Stout, V. R. 1913. Studies in Laguna Amphipoda, II. Zool.Jahr.Abt.f.Syst.;XXXIV:633-659.
- Amphithoe sp. .... 45
- Atylopsis sp. .... 45

<i>Caprella acutifrons</i> Latrielle .....	103
<i>C. kennerlyi</i> Stimpson .....	103
<i>C. scaura</i> Templeton .....	373
<i>Elasmopus rapax</i> Costa .....	211
<i>Melita palmata</i> (Montagu) .....	20
<i>Orchestia</i> sp. .....	54
<i>O. traskiana</i> Stimpson .....	2
<i>Orchestoidea benedicti</i> Shoemaker. Reference: Shoemaker, C. 1930. Descriptions of two new amphipod crustaceans (Talitridae) from United States. <i>Jnl. Wash. Acad. Sci.</i> ; XX:107-114 .....	181
<i>O. californiana</i> (Brandt) .....	240
<i>O. corniculata</i> Stout .....	180
There is a complete account of an Atlantic beach hopper reasonably comparable to Pacific <i>Orchestoidea</i> s in form and probably in habits in: Smallwood, M. E. 1903. The Beach Flea, <i>Talorchestia longicornis</i> , etc., Cold Spring Harbor Monograph No. 1, pp. 27, Brooklyn Inst. Arts Sci.	
<i>Polycheria osborni</i> Calman. Reference: Skogsberg & Vansell, 1928. Structure and be- havior of the amphipod <i>Polycheria</i> <i>osborni</i> . <i>Proc. Calif. Acad. Sci.</i> ; (4) XVII:267-295 .....	114

Order Isopods - Pillbugs, etc.

References:

Fee, A. R. 1926. Isopoda of Departure Bay, etc.,  
*Contr. Canad. Biol. Fisher.*; n.s.  
III:15-46.

Richardson, H. 1905. Isopods of North America.  
*Bull. U.S. Nat. Mus.*; No. 54.

Stafford, B. E. 1913. Studies in Laguna Beach  
Isopoda, II, and IIB, *Pom. Jnl.*  
*Entom. Zool.*; V:161-171; and  
V:182-188.

Stafford, B. E. 1912. Studies in Laguna Beach  
Isopods, First Ann. Rpt., Laguna  
Mar. Lab., 18-33.

Alloniscus perconvexus Dana	
Cirolana harfordi (Lockington) .....	21
Exosphaeroma oregonensis	.....264
Idothea rectulinea Lockington .....	50
I. urotoma Stimpson .....	272
Ligyda occidentalis (Dana). Reference: Hilton, W. A. 1915. Early Development of Ligyda, etc. Pom.Jnl.Entom.Zool.; VII:211-227.	
L. pallasii (Brandt .....	206
Limnoria lignorum (Rathke) .....	469
Pentidotea resecata (Stimpson) .....	272
P. stenops (Benedict) .....	206
P. wosnesenskii (Brandt) .....	206
Sphaeroma pentodon Richardson .....	481
Synidotea ritteri Richardson, among the spines of urchins.	

Order Euphausiacea (Mydidacea) - Opossum Shrimps, etc.

Mysis sp., probably costata Holmes .....	69
Callomysis maculate Holmes .....	242
Reference: Cannon, H. G. 1927. On the feeding mechanism of a mysid crustacean. Trans.Roy.Soc.Edinb.; LV:219-254.	

Order Nebaliacea

Nebalia sp., possibly bipes Fabr. ....	271
References: Cannon, H. G. 1927. On the feeding mechanism of Nebalia bipes. Trans. Royal Soc.Edinb.; LV:355-369.	
La Fallotte, R. 1914. A Nebalia from Laguna Beach. Pom.Jnl.Entom.Zool. VI:204-206.	

Order Stomatopoda

Reference:

Bigelow, R. P. 1894. Report upon the Crustacea of the order Stomatopoda, etc.  
Proc. U.S. Natl. Mus., XVII:489-550.

*Pseudosquilla lessonii* (Guerin) ..... 169

Order Cumacea

None of these sometimes common, but usually small, ( $\frac{1}{2}$ "') grotesque, shrimp-like crustaceans are treated here. Two species are fairly common inshore in the region involved, and there are many northward from southeastern Alaska.

Reference: Calman, W. T. 1912. The Crustacea of the order Cumacea in the collection of the United States National Museum. Proc. U.S. Natl. Mus., XLI:603-676.

Order Decapoda - Shrimps, Lobsters and Crabs

References:

Schmitt, W. M. 1921. Marine Decapod Crustacea of California. Univ. Calif. Publ. Zool.; XXIII: 1-470.

Way, W. F. 1917. Brachyura and crab-like Anamura of Friday Harbor, Washington. Publ. Puget Sd. Biol. Sta.; I:349-396.

Also see under Tribes.

Suborder Natantia - Shrimps and Prawns

Betaeus harfordi (Kingsley)	.....	466
B. longidactylus Lockington	.....	50
Crago (Crangon) nigricauda (Stimpson) and C. nigromaculata (Lockington) similar in appearance and habitat	.....	348
Crangon bellimanus (Lockington)	.....	379

<i>C. (Alpheus) dentipes</i> (Guerin) .....	162
<i>Hippolysmata californica</i> Stimpson .....	153
<i>Hippolyte californiensis</i> Holmes .....	305
<i>Spirontocaris brevirostris</i> (Dana) .....	175
<i>S. cristata</i> (Stimpson) .....	175
<i>S. palpator</i> (Owen) .....	175
<i>S. paludicola</i> (Holmes) .....	379
<i>S. picta</i> (Stimpson) .....	70
<i>S. prionota</i> (Stimpson) .....	175

Suborder Reptantia

Tribe Palinura Spiny Lobsters

<i>Panulirus interruptus</i> (Randall) Reference: Allen, B. J. 1916. Notes on the Spiny Lobster. Univ.Calif.Publ.Zool.; XVI:139-152 ....	173
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Tribe Anomura - Hermit Crabs, Ghost and Mud  
Shrimps, Porcelain Crabs, etc.

References:

Stevens, B. A. 1925. Hermit Crabs of Friday Harbor,  
Washington. Publ.Pug.Sd.Biol.Sta.;  
III:273-310.

Stevens, B. A. 1928. Callianassidae from the West  
coast of North America. Publ.Pug.  
Sd.Biol.Sta.; VI:315-369.

<i>Blepharipoda occidentalis</i> Randall .....	241
<i>Callianassa affinis</i> Holmes .....	62
<i>C. californiensis</i> Dana .....	402
<i>C. longimana</i> Stimpson .....	430
<i>Cryptolithodes sitchensis</i> Brandt .....	151

*Emerita analoga* (Stimpson). Reference: Mead, H. T.  
1917. Notes on the Natural History  
and Behavior of *Emerita analoga*  
(Stimpson). Univ. Calif. Publ. Zool.;  
XVI: 431-438.

Weymouth, F. W. 1919. Notes on the  
Habits and Use of the Small Sand  
Crab (*E. analoga*). Calif. Fish &  
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Tribe Brachyura - The True Crabs (Pea Crabs,  
Spider Crabs, Shore Crabs, Fiddler Crabs, etc.)

Reference:

Wells, W. W. 1928. Pinnotheridae of Puget Sound.  
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References:

- Cole, L. J. 1904. Pycnogonida of the West Coast.  
Harriman Alaska Expedition; X:247-330.
- Hall, H. V. W. 1912. Studies in Pycnogonida, I. First  
Annual Report, Laguna Marine Labora-  
tory; 91-99.
- Hall, H. V. W. 1913. Pycnogonida from the Coast of  
California. Univ.Calif.Publ.Zool.;  
XI:127-142.
- Hilton, W. A. 1915. Pycnogonids collected during the  
Summer of 1914 at Laguna Beach, Pom.  
*Jnl.Entom.Zool.*; VII:67-70.
- Hilton, W. A. 1915. Pycnogonids collected during the  
Summer of 1915 at Laguna Beach, Pom.  
*Jnl.Entom.Zool.*; VII:201-206.
- Hilton, W. A. 1918. Pycnogonids collected during the  
Summer of 1917 at Laguna Beach, Pom.  
*Jnl.Entom.Zool.*; X:77.

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#### PHYLUM MOLLUSCA

##### References:

- Berry, S. S. 1907. Molluscan fauna of Monterey Bay.  
Nautilus, XXI:17-22, 34-36, 39-47  
and 51-52.
- Berry, S. S. 1908. Miscellaneous notes on California  
mollusks. Nautilus, XXII:37-41.  
(comprising an annotated list of some  
400 species of Monterey Bay mollusks,  
mostly littoral).
- Dall, H. D. 1921. Summary of the Marine Shell Bearing  
Mollusks of the Northwest Coast of  
America. Bull.U.S.Nat.Mus. #112.
- Oldroyd, I. S. 1924. Marine Shells of Puget Sound  
and Vicinity. Publ.Pug.Sd.Biol.  
Sta.; IV:1-272.
- Oldroyd, I. S. 1924, 1927. Marine Shells of the West  
Coast of North America. Stan.Univ.  
Publ., Univ.Ser., Geol.Sci., I & II  
(pts. 1-3).
- Packard, E. L. 1918. Molluscan Fauna from San Francisco  
Bay. Univ.Calif.Publ.Zool., XIV:199-452.
- Rogers, J. E. 1908. The Shell Book. Doubleday Page &  
Co., New York.

#### CLASS AMPHINEURA

Order Polyplacophora - The Chitons, Sea Cradles

## References:

- Berry, S. S. 1917 & 1919. Notes on West American Chitons I, and Notes on West American Chitons II. Proc. Calif. Acad. Sci., (4) VII:229-248; and Proc. Calif. Acad. Sci., (4), IX:1-36.
- Heath, H. 1905. Breeding Habits of Chitons of the California Coast. Zool. Anz. XXIX:390-393.
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- I. magdalenensis* (Hinds). Reference: Heath, H. 1899. Development of Ischnochiton. Zool. Jahr., Abt. f. Ont., XII:?(90 pp thesis) .. 146
- I. mertensii* (Middendorff) ..... 147
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Order Docoglossa - the true limpets

## Reference:

Orton, J. H. 1928. Observations on *Patella vulgata*.  
 Pt. II. Rate of Growth of Shell.  
*Jnl. Mar. Biol. Assn.*, XV:863-874. Also  
 see previous paper on *Patella*, a  
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Palmer, C. F. 1907. The Anatomy of California Haliotidae. <i>Proc. Acad. Nat. Sci. Phil.</i> , LIX:396-407.	
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The terrestrial tendencies of Littorina have made it the subject of much observation and experimentation. The following are the most interesting of the recent accounts, the last on Puget Sound forms, the others on Atlantic specimens: Gowanloch & Hayes, 1926. Contribution to the study of marine gastropods. I, Littorina. Contr. Canad. Biol. Fisher., III:135-166.

Hayes, F. R. 1929. Contribution to the study of marine gastropods. III. The Development, growth and behavior of Littorina. Contr. Canad. Biol. Fisher., VI:415-430.

Humphrey & Macy. 1930. Observations on some of the probable factors controlling the size of certain tidepool snails. Publ. Pug. Sd. Biol. Sta., VII:205-208.

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Order Gymnoglossa. The Pyramidellids,  
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Reference: Dall & Bartsch. 1909. Monograph of West American Pyramidellid Mollusks. Bull. U.S. Nat. Mus., #68.

None of these very common, minute snails are mentioned in this account.

Order Stenoglossa (Rachiglossa). Olives, purples,  
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Alectriion (Nassa) fossatus (Gould). Reference: Dimon, A. C. 1905. The mud snail, Nassa obsoleta. Cold Spring Har. Monogr., #5, 48 pp. ....	394
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## SUB-CLASS OPISTHOBRANCHIATA

## Order Nudibranchiata

## References:

- McFarland, F. M. 1906. Opisthobranchiate Mollusca from Monterey Bay. Bull. Bur. Fisheries, XXV:109-151.
- McFarland, F. M. 1912. The nudibranchiate family Dironidae. Zool. Jahr., Suppl. XV, I:515-536.
- McFarland, F. M. 1923. Morphology of the nudibranch genus Hancockia. Jnl. Morphol. XXXVIII:65-92.
- McFarland, F. M. 1923. Acanthodoridae of the California coast. Nautilus, XXXIX:1-27.
- McFarland, F. M. 1929. Drepania, a genus of nudibranchiate mollusks new to California. Proc. Calif. Acad. Sci., (4) XVIII: 485-496.
- O'Donoghue, C. H. 1926. A list of the nudibranchiate Mollusca recorded from the Pacific coast of North America. Trans. Roy. Canad. Inst., XV:199-247.
- O'Donoghue, C. H. 1926. Notes on the nudibranchiate mollusca from the Vancouver Island region, in several issues of Trans. Roy. Canad. Inst., XIV, XV & XVI.
- O'Donoghue, C. H. 1927. Notes on a collection of nudibranchs from Laguna Beach. Pom. Jnl. Entom. Zool., XIX:77-117.
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CLASS PELECYPODA. CLAMS, COCKLES, MUSSELS, SCALLOPS, etc.

References:

Edmondson, C. G. 1922. Shellfish Resources of the West Coast of United States. Bur. Fisheries, Doc. #920.

Hill & Kofoid. 1927. Marine borers of the Pacific coast. Final.Rpt., S.F.Bay Mar. Pil.Cttee.

Kellog, J. L. 1910. Shellfish Industries. H. Holt Co., New York.

Rankin, E. P. 1918. Mussels of the Pacific coast. Calif.Fish & Game, IV:113-117.

Weymouth, F. W. 1920. Edible Clams, Mussels and Scallops of California. Fish Bulletin, Calif.F. & G.Comm.#4.

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Fraser & Smith. 1928. Notes on the ecology of the butter clam, <i>Saxidomus</i> <i>giganteus</i> D. Trans. Roy. Soc. Canada, Biol., XXII:271-286.	
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Reference: Weymouth, McMillin & Holmes. 1925. Growth and age at maturity of the Pacific razor clam, <i>Siliqua patula</i> (Dixon). Bull. Bur. Fish., XLI:201-236. An excellent report; does for <i>Siliqua</i> what Weymouth and Herrington have done for the Pismo clam.	
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#### CLASS CEPHALOPODA

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Berry, S. S. 1910. Review of the cephalopods of western North America. Bull.Bur. Fisher., XXX:269-336.

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*P. apollyon* Berry. References: Fisher, W. K. 1923. Brooding habits of a Cephalopod. Ann.Mag.Nat.Hist. (9) XII:147-149; Fisher, W. K. 1925. On the habits of an octopus. Ann.Mag. Nat.Hist. (9) XV:411-414.

#### PHYLUM CHORDATA

##### SUBPHYLUM HEMICHORDATA (ENTEROPNEUSTA)

##### References:

Ritter & Davis. 1904. Studies on the ecology, morphology and speciology of the young of some Enteropneusta of western North America. Univ.Calif.Publ. Zool., I: 171-210.

Ritter, W. E. 1902. The movements of the Enteropneusta and the mechanism by which they are accomplished. Biol.Bull., III:255-261.

Hilton, W. A. 1918. *Dolichoglossus pusillus* Ritter. Pom.Jnl.Entom.Zool., X: p 76.

*Dolichoglossus pusillus* Ritter. Ms. recently described (p. 154); see Horst, C. J. van der, 1930. Papers from Dr. Th. Mortensen's Pac. Exped. 1914-16. II. Observations on some Enteropneusta. Vidensk. Medd.Dansk.Naturh.Foren. LXXXVII: 135-200 (apparently a MS.species) ....360

SUBPHYLUM UROCHORDATA (TUNICATA)  
Sea Squirts, Compound Ascidians, etc.

There is a large literature on Pacific coast tunicates, and probably most of the species have been described, except for a few from the central California coast, but the references are scattered. There is no Monterey Bay literature. A summation of the situation, with good colored illustrations, preferably from living specimens, would be very acceptable.

References:

- Huntsman, A. G. 1911. Ascidians from the coast of Canada. *Trans.Roy.Canad.Inst.*, 1911: 111-
- Huntsman, A. G. 1912. Holosomatous ascidians from the coast of western Canada. *Contrib. Canad.Biol.*, 1906-1910:103-185.
- Ritter, W. E. 1900. Some ascidians from the Puget Sound collections of 1896. *Ann.N.Y. Acad.Sci.*, XIII:589-616.
- Ritter, W. E. 1913. The simple ascidians from the northeast Pacific in the collections of the U.S.National Museum. *Proc. U.S.Nat.Mus.*, XLV:427-505.
- Ritter & Forsyth. 1917. Ascidiants of the littoral zone of southern California. *Univ.Calif. Publ.Zool.*, XVI:439-512.
- Amaroucium californicum Ritter & Forsyth. Reference:  
Grave, B. H. 1920. Amaroucium pellucidum form constellatum. I. The activities and reactions of the tadpole larvae. *Jnl.Exp.Zool.*, XXX:239-257 .....113
- Botrylloides diegensis Ritter & Forsyth .....480
- Clavellina sp. .....115
- Ciona intestinalis (Linn.) .....480
- Euherdmania claviformis (Ritter) .....116
- Glossophorum planum Ritter & Forsyth .....117
- Halocynthia haustor (Stimpson) (considered to be Pyura haustor (Stimpson) by Huntsman 1912) ..287

SUBPHYLUM CEPHALOCHORDATA - LANCELETS

*Branchiostoma californiense* Cooper ..... 360

SUBPHYLUM CRANIATA (VERTEBRATA)

## CLASS PISCES FISHES

Consideration of the fishes has been deliberately omitted, as in the case of the protozoa, except where it was thought that the mention of a few of the most obvious forms would add to the interest or usefulness of the account.

## References:

- Hubbs, Carl L. 1926. Notes on the blennioid fishes of western North America. *Papers Mich. Acad. Arts, Sci. Let.*, VII:351-394.
- Jordan & Evermann. 1896. The fishes of north and middle America. *Bull. U.S. Nat. Mus.*, No. 47.
- Starks, E. C. 1921. A key to the families of marine fishes of the west coast. *Fish Bull., Calif. F. & G. Comm.*, No. 5, 16 pp.
- Walford, L. A. 1931. Handbook of common commercial and game fishes of California. *Fish Bull., Divn. F. & G. Calif.*, No. 28, 183 pp. An excellently illustrated and popular account in which some of the shore fishes are mentioned, and a few invertebrates. One could wish heartily that an account of this type might sometime soon be devoted to the tide-pool fish.

<i>Cauliarchus meandricus</i>	Clingfish	71
<i>Clevelandia ios</i> (Jordan & Gilbert)	Mud goby	422
<i>Epigeichthys atro-purpureus</i> (Kittlitz)	Blenny	71
<i>Galichthys mirabilis</i> Cooper	- Sand goby	360
<i>Gibbonsia elegans</i> (Cooper)	- Blenny	71
<i>Hypsypops rubricundus</i> (Girard)	Garibaldi	174
<i>Leuresthes tenuis</i> (Ayres)	Grunion, Top Smelt. Reference: Clark, F. N. 1925. The life history of <i>Leuresthes tenuis</i> , an atherine fish with tide controlled spawning hab- its. <i>Fish Bull., Divn. F. &amp; G. Calif.</i> No. 10, 51 pp.	

<i>Myliobatis californicus</i>	Eagle Ray, California Sting Ray	
<i>Oligocottus maculosus</i>	Sculpin, Tidepool Johnny .....	174
<i>Porichthys notatus</i> Girard	Midshipman, Grunter .....	314
Raja several spp., skates		
<i>Typhlogobius californicus</i> Steindacher	Blind .....	63
<i>Xiphister mucosus</i> (Girard)	Blenny .....	71

#### PLANTS

Plants have been mentioned only incidentally. An ideal treatment would have been to consider them along with the animals, but it was not practical to do so in this case.

#### Reference:

Setchell & Gardner. 1919-20-25. Marine Algae of the Pacific Coast of North America.  
Pts. I, II, and III. Univ. Calif. Publ. Botany, VIII:1-898, and in progress.