

The Marine Algae of the Coos Bay-Cape Arago Region of Oregon

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PREFACE

The algae of the California coast and the Puget Sound region have been rather extensively studied by workers in the field of marine biology. Setchell and Gardner of the University of California were among the first to make collections. Their publications include records of collections from Coos Bay, Oregon, particularly from Sunset Bay and from near North Bend and Empire within Coos Bay.

Kylin, since 1925, has made studies of the marine forms, especially the Rhodophyceae in Puget Sound,¹ and of the California coast in the vicinity of the Hopkins Marine Station.² Others who have contributed to our knowledge of the marine algae of the Pacific coast of the United States are: DeAlton Saunders and Annie Mae Hurd, Vinnie Pease, George B. Rigg, T. C. Frye, and others who have been associated with the Puget Sound Biological Station at Friday Harbor, Washington.

G. M. Smith has just completed a study of the marine algae of the Monterey Peninsula, California,³ and J. G. Hollenberg has contributed much to our knowledge of the life histories and distribution of certain of the Phaeophyceae and Rhodophyceae that are found in southern California.

The marine algae of the northern and southern regions, possibly because of their locations near large educational institutions, have received much more attention than the algae of the Oregon Coast. It has seemed fitting to the authors that this paper be presented dealing with the algal flora of the Oregon Coast and its relation to that of the northern and southern regions.

The authors express their deep appreciation to those who have assisted with the determination of the specimens, G. J. Hollenberg of the University of Redlands, Wm. Randolph Taylor of Woods Hole and the University of Michigan, W. J. Gilbert of the University of Michigan, and G. M. Smith of Stanford University. The late W. A. Setchell of the University of California gave aid; and the late N. L. Gardner of the University of California gave assistance to the senior author with collections made at an earlier date.

We are greatly indebted to E. L. Packard of Oregon State College who has given kindly criticism and encouragement in the preparation of the manuscript.

All of the drawings of plate IV were made by Miss Elizabeth C. Ellsworth under the direction of the senior author.

¹Kylin, Harald, 1925. *The Marine Red Algae in the Vicinity of the Biological Station at Friday Harbor, Washington.*

²_____, 1941. *Californische Rhodophyceen.*

³Smith, G. M., 1944. *Marine Algae of the Monterey Peninsula, California.* Stanford University Press.

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The senior author was chiefly responsible for the writing of the paper, based on a taxonomic list, completed in 1941, principally by the junior author.

TABLE OF CONTENTS

	Page
Geographic Location and Physical Features	7
Distribution of the Marine Algae of the Coos Bay Area	10
Chlorophyceae	19
Ulotriconales	19
Ulvales	19
Cladophorales	25
Siphonales	26
Phaeophyceae	27
Isogeneratae	27
Ectocarpales	27
Heterogeneratae	27
Chordariales	27
Punctariales	28
Desmarestiales	29
Laminariales	30
Cyclosporeae	32
Fuciales	32
Rhodophyceae	33
Bangioideae	33
Bangiales	33
Florideae	34
Nemalionales	34
Gelidiales	35
Cryptonemiales	35
Gigartinales	37
Rhodymeniales	40
Ceramiales	40
Appendix	47
Bibliography	49
Plates	53
Index	62

The Marine Algae of the Coos Bay-Cape Arago Region, Oregon

GEOGRAPHIC LOCATION AND PHYSICAL FEATURES¹

Coos Bay is centrally located on the western coast of Oregon at a point approximately midway between Puget Sound and the San Francisco-Monterey area of California. Here we find a meeting place of many of the algae from the north and the south, with frequently the southward extension of the range of some species previously reported from Puget Sound stations and Alaska; and again the northern range of species recorded from the Californian beds.

The algae included in this paper have been collected from some stations within Coos Bay and others south along the open ocean to and including Cape Arago, approximately five miles below the mouth of the bay. These regions include stations in which are found varying types of habitat, as mud flats, sandy beaches, rocky reefs, vertical and horizontal rocky areas. The sandy beaches above and below Cape Arago tend to concentrate the elements essential to algal growth, resulting in a heavy growth of algae about the cape.

Within Coos Bay the stations include: (1) the rocks at Coos Head and in the vicinity of the Coast Guard Station; (2) the piles and old dock and the sandy beaches near the Oregon Institute of Marine Biology on the west side of South Slough, a southward extension of Coos Bay; (3) the wharves and docks and mud flats near Charleston, also on the west side of South Slough about three-quarters of a mile beyond the Marine Station; (4) the Old Jetty; (5) Fossil Point and the beaches and mud flats on the east side of South Slough, just across the Slough from the Marine Station; (6) the docks and wharves at (a) North Bend, (b) Marshfield, and (c) Empire on Coos Bay.

Coos Bay is the major harbor between San Francisco and the Columbia River, being the only harbor along this portion of the Pacific coast accessible to large boats. It has approximately twenty miles of waterway inside the bar navigable by coastwise steamers and so presents a relatively large collecting area. Except for the locations near the mouth of the bay this region has not as yet been systematically covered by algal collections.

¹See map between pages 24 and 25.

Two jetties guard the mouth of Coos Bay. These jetties would appear at first sight to be rich collecting grounds, but one is always disappointed after reaching the end. This lack of algal growth may be due to the extremely heavy wave action to which the rock surfaces are exposed and the resulting frequent shifting of the rock masses.

Just within the entrance to the bay, collections were made at the Coast Guard Station or at the base of Coos Head. These locations are subject to moderate wave action, and consist largely of boulders lying on rocky shelves beneath a cliff about forty feet in height. A great many species representing all groups of the algae are to be found here. This station and the jetties are peculiar in the fact that *Fucus*, a littoral form common elsewhere on the Pacific Coast, is rarely seen.

The rocks about the base of the Old Dock in front of the Institute of Marine Biology Station, those forming the Old Jetty, and those at Fossil Point directly across South Slough from the Biology Station support a flora similar to that of the more protected areas along the ocean front. The rocky beaches near the station and the piling in the lower portions of South Slough abound in species of *Ulva* and fine red, green, and brown algae. In the channels farther up South Slough little is found but filamentous red algae that are attached to shells; on the mud flats *Enteromorpha* is found. A mile or so above Charleston, species representing *Monostroma*, *Enteromorpha*, and *Rhizoclonium* are abundant.

The authors have not given much attention in this study to the brackish or fresh water forms; a few of these are listed as a matter of record.

The change from a strictly marine type algal flora to the brackish water type flora along the main channel is interrupted and obscured by the presence of pulp and sawmills at Empire. These mills dump large quantities of commercial refuse into the bay. For several miles along the bay below Empire there is a scarcity of marine life due to the action of these wastes. It is to be expected that the continued practice of dumping waste into the bay will in time cause serious damage to the present marine algal flora above and near these mills.

A very few red algae are to be found above Empire. On the wharves of North Bend and Marshfield are found some of the finer Rhodophyceae, and with these are some small forms such as *Monostroma* and *Enteromorpha* of the Chlorophyceae and *Ilea* of the Phaeophyceae.

Fucus, on the other hand, is quite abundant in some locations in the upper bay.

From Coos Head just within the bay to the Cape Arago region the ocean front is rugged with rocky promontories, small embayments, including

Sunset Bay, and long sandy beaches. Outside the bay the collecting stations are: (1) Bassendorf Beach, (2) Mussel Reef, (3) the Lighthouse (a) Beach and (b) Reef, (4) Squaw Island (an island only at high tide), a jagged rocky formation that is accessible from the mainland at low tides, (5) Sunset Bay, (6) North Bay, (7) Middle Bay, and (8) South Bay. Those collecting stations outside Coos Bay are listed as going south from the mouth of Coos Bay. Some collections have been made at intermediate points also, these collections usually being included with the collections from the station to which the location was nearest.

The long stretch of Bassendorf Beach is composed entirely of sand and is therefore of little interest to the algologist. Mussel Reef, composed of steeply pitching beds striking out to sea, is incised by deep channels extending far shoreward. The Lighthouse Beach is also a sandy stretch. Near the southern end, solid rock ridges protrude through the sand and afford adequate footholds for heavy growths of *Prionitis* and *Laminaria Sinclairii*. This southern part, after each period of rough weather, is often covered with a mass of algae that has been washed ashore, and is consequently a good locality for obtaining sublittoral species.

Lighthouse Reef proper is separated from the mainland by a channel partly exposed at low tide and floored with boulders resting on a rocky surface. The outer portion of this reef is precipitous and the rock surfaces are exposed to heavy wave action.

Squaw Island is an island only at high tide. At low tide it is connected with the mainland by a rocky reef scoured by the tides that remove much of the algal growth. On the outer side of the island there is a boulder field exposed to heavy surf; this area and the jutting rocks beyond abound in algae, several species of which have not been found elsewhere along this portion of the coast.

Sunset Bay behind Squaw Island is shut off from the open ocean on one side by shelving rocks in which large crevices have developed; these crevices abound in algal species found in low shaded locations. The south shore-side of the bay is a sandy beach and the northern side is a mud flat at half tide. The southwestern side of the bay is floored by protected boulder fields and steep-walled or flat-rock surfaces. Bold rocky protuberances at the entrance to the bay break the full force of the swells and these support a restricted flora of *Postelsia*, *Alaria*, and *Constantinea*. Between Sunset Bay and South Bay, a distance of about three miles, are numerous small embayments cut in the rocky cliffs. These embayments are quite inaccessible except at low tide, and have not been visited regularly. Hence the collections from this area are incomplete.

North Bay on the north side of Cape Arago is a vast expanse of protected boulder fields interrupted by solid rock prominences and tidal pools. The boulder field and the rock-floored bottom are interrupted by several deep water channels. This collecting area because of its size has never been thoroughly explored for algae. Such rarities (for this region) as *Faucheia*, *Laminaria cuneifolia*, and *Griffithsia*, however, have been noted.

Middle Bay on the south side of Cape Arago is a boulder field separated from the open ocean by uptilted rocks cut by the surf into three small embayments; this station has yielded deep-growing algae. Much of the Middle Bay area, however, is strewn with huge boulders that together with the solid rock are exposed to the full force of waves, and as a result the vertical surfaces support little but corallines.

South Bay is separated from Middle Bay by jutting rocks and is floored by a boulder field on its west side, a sandy beach at its head, and wave cut terraces in solid rock, the latter cut by numerous small channels. South Bay is approximately five miles from the mouth of Coos Bay.

Vertical rocks exposed to heavy wave action occur at Squaw Island, Lighthouse Reef, Mussel Reef, Sunset Bay, and South Bay. At most of these places relatively large areas of horizontal rock surfaces also occur; some, as at Squaw Island, are exposed only at minus tides. Boulder fields such as are found at Squaw Island, Sunset Bay, Middle Bay, and South Bay are excellent collecting grounds, while on that of the Lighthouse Reef the algal growth is not abundant.

Channels with sandy bottoms having a depth of from 1 to 5 feet and a width of 2 to 4 feet, are found at Sunset Bay, North and Middle bays. The corallines are very abundant in the channels at Middle Bay.

DISTRIBUTION OF THE MARINE ALGAE OF THE COOS BAY-CAPE ARAGO AREA

The records of the northward and southward distribution of the species of algae found in the Coos Bay-Cape Arago region have necessarily been obtained largely from the publications of Gardner, Setchell, Saunders, Kylin, Hollenberg, and Smith.

Many of the species have been previously reported from northern or southern locations, a few of these having been recorded from Coos Bay;

others have been known only from Puget Sound and still others only from central or southern California stations.

This study has shown that the flora of the Coos Bay area comprises three groups of marine algae: (1) those species that range southward from a northern location as in Alaska, British Columbia, or Puget Sound to Coos Bay as the southern limit; (2) those that range northward from a southern location, Mexico, Lower California, southern or central California to Coos

Table 1. PERCENTAGE OF RANGE OF CHLOROPHYCEAE, PHAEOPHYCEAE, AND RHODOPHYCEAE.

Class and order	Number of species	Range northward to Coos Bay	Range southward to Coos Bay	Range north to south	Coos Bay only
I. CHLOROPHYCEAE					
Ulotrichales	3	1	0	2	0
Ulvales	10	1	1	8	0
Cladophorales	11	0	2	9	0
Siphonales	4	0	0	4	0
Total	28	2	3	23	0
Per cent	---	8%	12%	80%	---
II. PHAEOPHYCEAE					
Isogeneratae					
Ectocarpales	8	0	1	7	0
Heterogeneratae					
Chordariales	8	1	2	5	0
Punctariales	7	2	0	5	0
Desmarestiales	4	1	1	2	0
Laminariales	17	1	5	11	0
Cyclosporeae					
Fucales	10	2	3	2	3
Total	54	7	12	32	3
Per cent	---	13%	22%	59%	6%
III. RHODOPHYCEAE					
Bangioideae					
Bangiales	8	1	0	7	0
Florideae					
Nemalionales	3	0	0	3	0
Gelidiales	2	2	0	0	0
Cryptonemiales	21	5	4	12	0
Gigartinales	21	11	0	10	0
Rhodymeniales	5	2	1	2	0
Ceramiales	46	11	11	24	0
Total	106	32	16	58	0
Per cent	---	30%	15%	55%	---
Grand total	188	42	31	113	3
Per cent	---	22%	17%	60%	2%

Table 2. RANGE OF SPECIES IN THIS FLORA.

	Alaskan Peninsula	South- eastern Alaska	British Columbia, Vancouver Island	Puget Sound	Coos Bay	Northern California	Central California	Southern California	Lower California	Mexico
CHLOROPHYCEAE										
<i>Ulothrix flacca</i>										
<i>U. pseudoflacca</i>										
<i>Trentepohlia odorata</i>										
<i>Ulva Lactuca</i>										
<i>U. linza</i>										
<i>U. expansa</i>										
<i>U. fenestrata</i>										
<i>U. taeniata</i>										
<i>Enteromorpha intestinalis</i>										
<i>E. crinita</i>										
<i>E. micrococca</i>										
<i>E. minima</i>										
<i>Monostroma zostericola</i>										
<i>Cladophora trichotoma</i>										
<i>C. microcladioides</i>										
<i>Spongomorpha coalita</i>										
<i>S. arcta</i>										
<i>S. saxatilis</i>										
<i>S. Mertensii</i>										
<i>S. spinescens</i>										
<i>Urospora pencilliformis</i>										
<i>U. Wormskioldii</i>										
<i>Rhizoclonium riparium</i>										
<i>R. tortuosum</i>										
<i>Halicystis ovalis</i>										
<i>Bryopsis corticulans</i>										
<i>Codium Setchellii</i>										
<i>C. fragile</i>										
PHAEOPHYCEAE										
<i>Pylaiella unilateralis</i>										
<i>Ectocarpus confervoides</i>										
<i>E. granulosus</i>										
<i>E. oviger</i>										
<i>E. acutus</i>										
<i>E. siliculosus</i>										
<i>Ralfsia verrucosa</i>										
<i>R. fungiformis</i>										
<i>Leathesia difformis</i>										

Table 2.—Continued

	Alaskan Peninsula	South- eastern Alaska	British Columbia, Vancouver Island	Puget Sound	Coos Bay	Northern California	Central California	Southern California	Lower California	Mexico
<i>Elachistea fucicola</i>										
<i>Haplogloia Andersonii</i>										
<i>Coilodesme californica</i>										
<i>C. bulligera</i>										
<i>Phaeostrophion irregulare</i>										
<i>Myrionema primum</i>										
<i>Compsonema secundum</i>										
<i>Soranthra ulvoidea</i>										
<i>Myelophycus intestinalis</i> f. <i>tenuis</i> ..										
<i>Scytosiphon lomentaria</i> f. <i>typicus</i> ..										
f. <i>cylindricus</i> major.....										
<i>Ilea Fascia</i>										
<i>Colpomenia sinuosa</i>										
<i>Heterochordaria abietina</i>										
<i>Desmarestia latifrons</i>										
<i>D. intermedia</i>										
<i>D. herbacea</i>										
<i>D. munda</i>										
<i>Laminaria saccharina</i>										
<i>L. Sinclairii</i>										
<i>L. Andersonii</i>										
<i>L. cuneifolia</i>										
<i>Pleurophycus Gardneri</i>										
<i>Costaria costata</i>										
<i>Hedophyllum sessile</i>										
<i>H. subsessile</i>										
<i>Nereocystis Luetkeana</i>										
<i>Postelsia palmaeformis</i>										
<i>Macrocystis pyrifera</i>										
<i>M. integrifolia</i>										
<i>Lessoniopsis littoralis</i>										
<i>Pterygophora californica</i>										
<i>Alaria valida</i>										
<i>A. marginata</i>										
<i>Egregia Menziesii</i>										
<i>Fucus furcatus</i> f. <i>typicus</i>										
<i>F. furcatus</i> f. <i>abbreviatus</i>										
<i>F. furcatus</i> f. <i>angustus</i>										

Table 2.—Continued

	Alaskan Peninsula	South- eastern Alaska	British Columbia, Vancouver Island	Puget Sound	Coos Bay	Northern California	Central California	Southern California	Lower California	Mexico
<i>F. furcatus</i> f. <i>elongatus</i>				—	—					
<i>F. furcatus</i> f. <i>luxurians</i>				—	—	—				
<i>F. evanescens</i> f. <i>oregonensis</i>					—					
<i>F. evanescens</i> f. <i>ecostatus</i>					—					
<i>F. evanescens</i> f. <i>cuneatus</i>					—					
<i>Pelvetiopsis limitata</i> f. <i>typica</i>					—					
<i>Cystoseira osmundacea</i>			—		—				—	
RHODOPHYCEAE										
<i>Bangia vermicularis</i>				—			—			
<i>Porphyra perforata</i>				—				—		
<i>P. naiadum</i>				—				—		
<i>P. Nereocystis</i>				—				—		
<i>P. variegata</i>	—	—		—				—		
<i>P. miniata</i> f. <i>cuneiformis</i>				—			—			
<i>P. occidentalis</i>		—			—		—			
<i>Porphyrella Gardnerii</i>					—		—			
<i>Cumagloia Andersonii</i>			—				—			
<i>Gloiophloea confusa</i>			—				—			
<i>Rhodochorton Rothii</i>	—						—			
<i>Gelidium pulchrum</i>					—		—			
<i>G. Coulteri</i>					—		—			
<i>Cryptosiphonia Woodii</i>	—						—			
<i>Farlowia mollis</i>			—				—			
<i>Pikea californica</i>			—				—			
<i>Constantinea simplex</i>				—			—			
<i>Gloiosiphonia verticillaris</i>		—					—			
<i>Gloiopeltis furcata</i>	—				—					
<i>Endocladia muricata</i>	—						—			
<i>Aeodes Gardnerii</i>				—			—			
<i>Grateloupia californica</i>				—			—			
<i>Prionitis Andersonii</i>							—			
<i>P. lanceolata</i>			—				—			
<i>P. Lyallii</i>			—				—			
<i>Cryptonemia ovalifolia</i>					—		—			
<i>Pugetia fragilissima</i>				—	—					
<i>Callophyllis flabellulata</i>			—		—					
<i>C. heanophylla</i>				—	—					
<i>C. megalocarpa</i>					—		—			

Table 2.—Continued

	Alaskan Peninsula	South- eastern Alaska	British Columbia, Vancouver Island	Puget Sound	Coos Bay	Northern California	Central California	Southern California	Lower California	Mexico
<i>C. obtusifolia</i>			
<i>C. marginifructa</i>			
<i>Erythrophyllum delesserioides</i>			
<i>Dilsea californica</i>			
<i>Schizymenia pacifica</i>			
<i>Opuntiella californica</i>			
<i>Iridophycus flaccidum</i>			
<i>I. heterocarpum</i>			
<i>I. lineare</i>			
<i>Gigartina canaliculata</i>			
<i>G. Binghamiae</i>			
<i>G. californica</i>			
<i>G. Agardhii</i>			
<i>G. cristata</i>			
<i>G. corymbifera</i>			
<i>G. volans</i>			
<i>Ahnfeltia concinna</i>			
<i>A. plicata</i>			
<i>Gymnogongrus linearis</i>			
<i>Stenogramme californica</i>			
<i>Gracilaria Sjoestedtii</i>			
<i>Gracilariophila oryzoides</i>			
<i>Plocamium pacificum</i>			
<i>P. violaceum</i>			
<i>Rhodoglossum affine</i>			
<i>Rhodymenia californica</i>			
<i>R. pacifica</i>			
<i>R. pertusa</i>			
<i>R. palmata f. mollis</i>			
<i>Halosaccion glandiforme</i>			
<i>Antithamnion uncinatum</i>			
<i>A. glanduliferum</i>			
<i>A. defectum</i>			
<i>A. cf. tenuissimum</i>			
<i>Callithamnion Pikeanum</i>			
<i>Platythamnion pectinatum</i>			
<i>P. reversum</i>			
<i>P. villosum</i>			

Table 2.—Continued

	Alaskan Peninsula	South- eastern Alaska	British Columbia, Vancouver Island	Puget Sound	Coos Bay	Northern California	Central California	Southern California	Lower California	Mexico
<i>Griffithsia pacifica</i>				—		—	—			
<i>Ceramium Gardneri</i>				—	—	—	—			
<i>C. californicum</i>				—	—	—	—			
<i>C. pacificum</i>			—	—	—	—	—			
<i>C. washingtoniense</i>				—	—	—	—			
<i>C. codicola</i>				—	—	—	—			
<i>C. Eatonianum</i>				—	—	—	—			
<i>Ptilota hypnoides</i>		—								
<i>P. californica</i>					—	—	—			
<i>P. pectinata</i>				—	—	—	—			
<i>P. filicina</i>	—	—	—	—	—	—	—			
<i>Microcladia borealis</i>	—	—	—	—	—	—	—			
<i>Membranoptera dimorpha</i>		—	—	—	—	—	—			
<i>Delesseria decipiens</i>		—	—	—	—	—	—			
<i>Polyneura latissima</i>		—	—	—	—	—	—			
<i>Nienburgia borealis</i>			—	—	—	—	—			
<i>Nitophyllum mirabile</i>				—	—	—	—			
<i>Hymenena flabelligera</i>				—	—	—	—			
<i>Hymenena Setchellii</i>				—	—	—	—			
<i>Cryptopleura crispa</i>				—	—	—	—			
<i>C. lobulifera</i>				—	—	—	—			
<i>C. Ruprechtiana</i>		—	—	—	—	—	—			
<i>C. violacea</i>		—	—	—	—	—	—			
<i>Botryoglossum Farlowianum</i>				—	—	—	—			
<i>Polysiphonia californica</i>				—	—	—	—			
<i>P. Collinsii</i>		—	—	—	—	—	—			
<i>P. Hendryi</i>		—	—	—	—	—	—			
<i>P. pacifica</i>		—	—	—	—	—	—			
<i>Pterochondria Woodii</i>			—	—	—	—	—			
<i>Pterosiphonia bipinnata</i>	—	—	—	—	—	—	—			
<i>P. dendroidea</i>			—	—	—	—	—			
<i>P. gracilis</i>				—	—	—	—			
<i>Herposiphonia grandis</i>				—	—	—	—			
<i>Rhodomela larix</i>	—	—	—	—	—	—	—			
<i>Odonthalia floccosa</i>				—	—	—	—			
<i>O. Lyallii</i>				—	—	—	—			
<i>O. washingtoniensis</i>				—	—	—	—			
<i>Laurencia spectabilis</i>		—	—	—	—	—	—			

Bay as the northern limit; (3) those that have a wide range along the coast from one of the southern locations to one of the northern, such as *Halosaccion glandiforme*, which is found as far north as St. Lawrence Island and as far south as the northwest coast of Mexico.

The coralline algae because of the uncertainty of their determinations are not included in this paper. These algae, which are abundant in many tide pools at the rocky collecting grounds, are represented by species of *Lithothamnion*, *Corallina*, *Melobesia*, and allied types.

The authors realize that there are undoubtedly other species and genera of the algae that may occur but as yet have not been collected. This paper is not offered as a complete record of the marine algal flora of this region.

There are 188 species listed. Table 1 indicates the orders of each of the three classes with the number of species in each, the recorded range of the species, and the per cent of range.

The percentages of the ranges found in the three classes are quite significant. Of the Chlorophyceae, 80 per cent have a wide range in latitude; *Ulva Lactuca*, *Ulva linza*, *Enteromorpha intestinalis*, and *Codium fragile* are four species that are present along the coast of North America from Alaska to the Gulf of California. Of this class only 8 per cent have a northward range to Coos Bay and 12 per cent a southward extension to this area.

The Phaeophyceae, which are algae of the cooler waters, like the Chlorophyceae have a larger percentage that show a southward range to Coos Bay, than a northward range to this area. Of the Phaeophyceae 22 per cent show a range from the north to Coos Bay, 13 per cent a range from the south, and 59 per cent a range from some northern to a southern locality. There are none in this class that have a recorded range from Alaska to Mexico. Among those that are found from Alaska to southern California are the following: *Leathesia difformis*, *Desmarestia herbacea*, *Scytosiphon lomentaria* f. *typica*, *Ilea Fascia*, *Heterochordaria abietina*, *Nereocystis Luetkana*. *Luetkana*.

Among the warmer water Rhodophyceae, there are 30 per cent having a northward range, 15 per cent a southward, and 55 per cent a range from a northern to some southern location. Some of the Rhodophyceae that are to be found from Alaska to southern California are *Endocladia muricata*, *Iridophycus heterocarpum*, *Halosaccion glandiforme*, and *Laurencia spectabilis*.

The range of the various species represented in this algal flora is shown in Table 2. In the table those species whose range has been extended either to the north or to the south, according to the recorded evidence available to the authors, have this extension indicated by a broken line (.....).

Table 3. SUMMARY OF THE RANGE, AS SHOWN IN TABLE 2.

	Species																					
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110
CHLOROPHYCEAE																						
Alaskan Peninsula																						
Southeastern Alaska																						
British Columbia																						
Puget Sound																						
Coos Bay-Cape Arago																						
Northern California																						
Central California																						
Southern California																						
Lower California																						
PHAEOPHYCEAE																						
Alaskan Peninsula																						
Southeastern Alaska																						
British Columbia																						
Puget Sound																						
Coos Bay-Cape Arago																						
Northern California																						
Central California																						
Southern California																						
Lower California																						
RHODOPHYCEAE																						
Alaskan Peninsula																						
Southeastern Alaska																						
British Columbia																						
Puget Sound																						
Coos Bay-Cape Arago																						
Northern California																						
Central California																						
Southern California																						
Lower California																						

The numbers of species in each of the three classes of algae represented in the flora of the Coos Bay region that occur in each of the geographic areas shown in Table 2 are summarized in Table 3.

The distribution of the algal species at the several collecting stations of the Coos Bay region is shown in a check list (Table 4). The stations are indicated by name and by number since they are shown on the map (following page 24) by number. Detailed descriptions of each station may be found in the Appendix.

It is probable that further studies of the algae in this region will result in obtaining some of the species at other stations than those recorded. It has been the experience of the authors that a species present in one location one year may not be found there again for two or three or even more years. This has been particularly true of some of the species of *Desmarestia*. Sometimes a species fairly rare one year will be abundant the next or, as was true of *Gloiosiphonia verticillaris*, which was collected in a small amount one year, further visits and careful search of the same area failed to reveal more specimens.

CHLOROPHYCEAE¹

Order ULOTRICHALES

ULOTHRIX FLACCA (Dillwyn) Thuret, *in* Le Jolis 1863:56

Conferva flacca Dillwyn 1809

South Slough, Mussel Reef, and Squaw Island, on rocks that are usually free from other algal growth.

ULOTHRIX PSEUDOFACCA Wille 1901:22

Mussel Reef, Lighthouse Beach, and Squaw Island, on more or less isolated well-worn rocks that are otherwise bare.

TRENTEPOHLIA ODORATA (Wiggers) Wittrock 1880:16

Near Fossil Point, Bassendorf Beach, Lighthouse Beach, Lighthouse Reef, and Squaw Island, growing largely as felted layers on trees, or sometimes on rocks, at considerable distance from tide levels. The semiaquatic variety *umbrina* of Hariot while reported along our coast has not been found.

Order ULVALES

ULVA LACTUCA Linne 1753:1163

Found at most stations, the most abundant growths being around the wharves at Charleston and at Fossil Point in South Slough and at North

¹The systematic portion of this study was completed in 1941. Since that time further work on the marine algae of Oregon has been published (*Farlowia* vol. 3, 1-65, 1947). The data presented in that work have a bearing on this work and the conclusions drawn herein in some details of nomenclature, but to little extent in regard to the geographical distribution data.

Table 4. CHECK LIST OF ALGAL SPECIES AT COLLECTING STATIONS OF THE COOS BAY REGION

Algal species	Marshfield	North Bend	Empire	Fossil Point	Old Jetty	Piling and beach front of I.M.B.	Charleston	Coos Head Coast Guard	South Jetty	Bassendorf Beach	Mussel Reef	Lighthouse Beach	Lighthouse Reef	Squaw Island	Sunset Bay	North Bay	Middle Bay	South Bay
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
CHLOROPHYCEAE																		
<i>Ulothrix flacca</i>							X				X			X				
<i>Ulothrix pseudoflacca</i>											X			X				
<i>Trentepohlia odorata</i>				X						X		X		X				
<i>Ulva lactuca</i>				X			X									X		
<i>Ulva linza</i>					X	X	X											
<i>Ulva expansa</i>							X											
<i>Ulva fenestrata</i>					X		X									X		
<i>Ulva taeniata</i>				X			X											
<i>Enteromorpha intestinalis</i>				X		X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Enteromorpha crinita</i>					X	X		X										
<i>Enteromorpha micrococca</i>																		
<i>Enteromorpha minima</i>															X			
<i>Monostroma zostericola</i>											X		X					
<i>Cladophora trichotoma</i>																		
<i>Cladophora microcladioides</i>														X	X			
<i>Spongomorpha coalita</i>				X				X	X			X		X	X	X	X	X
<i>Spongomorpha arcta</i>								X										
<i>Spongomorpha saxatilis</i>								X										
<i>Spongomorpha Mertensii</i>								X										
<i>Spongomorpha spinescens</i>								X										
<i>Urospora penicilliformis</i>								X										
<i>Urospora Wormskioldii</i>								X										
<i>Rhizoclonium riparium</i>						X	X											
<i>Rhizoclonium tortuosum</i>														X	X			
<i>Halicystis ovalis</i>												X					X	
<i>Bryopsis corticulans</i>				X	X						X							
<i>Codium Setchellii</i>											X						X	
<i>Codium fragile</i>				X							X			X	X	X		X
PHAEOPHYCEAE																		
<i>Pylaiella unilateralis</i>															X			
<i>Ectocarpus confervoides</i>					X	X	X											
<i>Ectocarpus granulosus</i>					X	X												
<i>Ectocarpus oviger</i>					X													
<i>Ectocarpus acutus</i>													X					
<i>Ectocarpus siliculosus</i>								X										
<i>Ralfsia verrucosa</i>												X						
<i>Ralfsia fungiformis</i>																	X	
<i>Leathesia difformis</i>				X				X			X			X	X		X	X
<i>Elachistea fucicola</i>																		
<i>Haplogloia Andersonii</i>								X			X				X	X	X	X
<i>Coilodesme californica</i>								X					X	X	X	X	X	X
<i>Coilodesme bulligera</i>																		
<i>Phaeostrophion irregulare</i>												X						
<i>Myrionema primum</i>																		
<i>Compsonea secundum</i>																		
<i>Soranthra ulvoidea</i>								X			X			X	X	X		X
<i>Myelophycus intestinalis</i> f. <i>tenue</i> ...							X											
<i>Scytosiphon lomentaria</i>																		
f. <i>typicus</i>								X	X						X	X		X

Table 4. CHECK LIST OF ALGAL SPECIES AT COLLECTING STATIONS OF THE COOS BAY REGION—Continued

Algal species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Marshfield	North Bend	Empire	Fossil Point	Old Jetty	Piling and beach front of I.M.B.	Charleston	Coos Head Coast Guard	South Jetty	Bassendorf Beach	Mussel Reef	Lighthouse Beach	Lighthouse Reef	Squaw Island	Sunset Bay	North Bay	Middle Bay	South Bay
<i>S. lomentaria</i> f. <i>cylindricus</i> major.....								X				X						X
<i>Ilea</i> <i>Fascia</i>								X			X				X			X
<i>Colpomenia</i> <i>sinuosa</i>											X			X	X	X		X
<i>Heterochordaria</i> <i>abietina</i>											X			X	X	X		X
<i>Desmarestia</i> <i>latifrons</i>														X	X	X		X
<i>Desmarestia</i> <i>intermedia</i>														X	X	X		X
<i>Desmarestia</i> <i>herbacea</i>				X				X					X			X		X
<i>Desmarestia</i> <i>munda</i>					X	X	X							X	X	X		X
<i>Laminaria</i> <i>saccharina</i>					X		X	X							X			X
<i>Laminaria</i> <i>Sinclairii</i>										X		X		X		X		
<i>Laminaria</i> <i>cuneifolia</i>																X		
<i>Laminaria</i> <i>Andersonii</i>														X	X	X	X	X
<i>Pleurophycus</i> <i>Gardneri</i>															X	X	X	X
<i>Costaria</i> <i>costata</i>									X				X	X	X	X	X	X
<i>Hedophyllum</i> <i>sessile</i>										X	X				X	X	X	X
<i>Hedophyllum</i> <i>subsessile</i>															X	X	X	X
<i>Nereocystis</i> <i>Luetkeana</i>					X			X			X		X	X	X	X	X	X
<i>Postelsia</i> <i>palmaeformis</i>													X	X	X	X	X	X
<i>Macrocystis</i> <i>pyrifera</i>												X				X	X	X
<i>Macrocystis</i> <i>integrifolia</i>									X							X	X	X
<i>Lessoniopsis</i> <i>littoralis</i>													X	X	X	X	X	X
<i>Pterygophora</i> <i>californica</i>													X	X	X	X	X	X
<i>Alaria</i> <i>valida</i>								X					X	X	X	X	X	X
<i>Alaria</i> <i>marginata</i>																		X
<i>Egrecia</i> <i>Menziesii</i>					X			X		X	X	X	X		X	X	X	X
<i>Fucus</i> <i>furcatus</i> f. <i>typicus</i>					X													
<i>Fucus</i> <i>furcatus</i> f. <i>abbreviatus</i>		X																
<i>Fucus</i> <i>furcatus</i> f. <i>angustus</i>															X			
<i>Fucus</i> <i>furcatus</i> f. <i>elongatus</i>															X			
<i>Fucus</i> <i>furcatus</i> f. <i>luxurians</i>																		
<i>Fucus</i> <i>evanescens</i> f. <i>oregonensis</i>		X		X		X										X		
<i>Fucus</i> <i>evanescens</i> f. <i>ecostatus</i>																		
<i>Fucus</i> <i>evanescens</i> f. <i>cuneatus</i>			X															
<i>Pelvetiopsis</i> <i>limitata</i> f. <i>typica</i>													X	X	X			
<i>Cystoseira</i> <i>osmundacea</i>											X		X		X			X
RHODOPHYCEAE																		
<i>Bangia</i> <i>vermicularis</i>								X			X		X	X				X
<i>Porphyra</i> <i>perforata</i>						X		X					X	X	X			X
<i>Porphyra</i> <i>naiadum</i>													X	X	X			X
<i>Porphyra</i> <i>nereocystis</i>					X							X	X					
<i>Porphyra</i> <i>variegata</i>														X				
<i>Porphyra</i> <i>miniata</i> f. <i>cuneiformis</i>									X									
<i>Porphyra</i> <i>occidentalis</i>								X										
<i>Porphyrella</i> <i>Gardnerii</i>								X						X				
<i>Rhodochorton</i> <i>Rothii</i>								X										
<i>Cumagloia</i> <i>Andersonii</i>								X						X	X	X		X
<i>Gloioploea</i> <i>confusa</i>																		
<i>Gelidium</i> <i>pulchrum</i>					X							X	X			X		

Table 4. CHECK LIST OF ALGAL SPECIES AT COLLECTING STATIONS OF THE COOS BAY REGION—Continued

Algal species	Marshfield	North Bend	Empire	Fossil Point	Old Jetty	Piling and beach front of I.M.B.	Charleston	Coos Head Coast Guard	South Jetty	Bassendorf Beach	Mussel Reef	Lighthouse Beach	Lighthouse Reef	Squaw Island	Sunset Bay	North Bay	Middle Bay	South Bay
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Gelidium Coulteri</i>					X							X				X		
<i>Cryptosiphonia Woodii</i>															X			
<i>Farlowia mollis</i>															X			
<i>Pikea californica</i>																		X
<i>Constantinea simplex</i>													X		X			
<i>Gloiosiphonia verticillaris</i>														X	X			
<i>Gloiopeltis furcata</i>														X	X			
<i>Endocladia muricata</i>											X	X		X	X			
<i>Aeodes Gardneri</i>														X	X		X	X
<i>Grateloupia californica</i>														X	X	X	X	X
<i>Prionitis Andersonii</i>														X	X	X		
<i>Prionitis lanceolata</i>									X		X	X		X	X	X		X
<i>Prionitis Lyallii</i>					X									X	X			X
<i>Cryptonemia ovalifolia</i>																		X
<i>Pugetia fragilissima</i>													X	X	X			X
<i>Callophyllis flabellulata</i>					X									X				
<i>Callophyllis heanophylla</i>												X		X				
<i>Callophyllis megalocarpa</i>												X		X				X
<i>Callophyllis obtusifolia</i>												X		X				
<i>Callophyllis marginifructa</i>												X		X				
<i>Erythrophyllum delesserioides</i>											X			X	X		X	X
<i>Dilsea californica</i>														X	X		X	X
<i>Schizymenia pacifica</i>											X		X	X	X		X	X
<i>Opuntia californica</i>														X	X	X	X	X
<i>Iridophycus flaccidum</i>											X		X		X		X	X
<i>Iridophycus heterocarpum</i>											X	X			X		X	X
<i>Iridophycus lineare</i>													X		X		X	X
<i>Gigartina canaliculata</i>									X				X		X	X	X	X
<i>Gigartina Binghamiae</i>					X			X						X	X		X	X
<i>Gigartina californica</i>													X		X		X	X
<i>Gigartina Agardhii</i>					X									X	X		X	X
<i>Gigartina cristata</i>														X	X		X	X
<i>Gigartina corymbifera</i>					X						X			X	X		X	X
<i>Gigartina volans</i>												X		X	X		X	X
<i>Ahnfeltia concinna</i>														X				X
<i>Ahnfeltia plicata</i>													X	X	X			X
<i>Gymnogongrus linearis</i>								X		X	X	X		X				X
<i>Stenogramme californica</i>															X			X
<i>Gracilaria Sjoestedtii</i>					X	X									X	X	X	X
<i>Gracilaria oryzoides</i>						X									X			X
<i>Plocamium pacificum</i>							X			X	X		X	X	X	X	X	X
<i>Plocamium violaceum</i>														X	X			X
<i>Rhodoglossum affine</i>														X	X			X
<i>Rhodymenia californica</i>														X		X		X
<i>Rhodymenia pacifica</i>														X				X
<i>Rhodymenia pertusa</i>														X				X
<i>Rhodymenia palmata f. mollis</i>								X		X		X		X	X		X	X
<i>Halosaccion glandiforme</i>														X	X		X	X

Table 4. CHECK LIST OF ALGAL SPECIES AT COLLECTING STATIONS OF THE COOS BAY REGION—Continued

Algal species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Antithamnion uncinatum.....							X								X			X
Antithamnion glanduliferum.....																		
Antithamnion defectum.....	X								X									
Antithamnion cf. tenuissimum.....											X							
Callithamnion pikeanum.....													X					
Platythamnion pectinatum.....	X	X					X								X			
Platythamnion reversum.....							X											
Platythamnion villosum.....												X						
Griffithsia pacifica.....				X	X							X						
Ceramium californicum.....																		
Ceramium pacificum.....																		
Ceramium washingtoniense.....																		
Ceramium Gardneri.....							X											
Ceramium Eatonianum.....																		
Ceramium codicola.....								X									X	
Ptilota filicina.....											X						X	
Ptilota pectinata.....												X						
Ptilota californica.....													X					
Ptilota hypnoides.....											X							
Microcladia borealis.....					X													
Membranoptera dimorpha.....								X										
Delesseria decipiens.....					X		X											
Polyneura latissima.....								X										
Nienburgia borealis.....																		
Nitophyllum mirabile.....						X												
Hymenena flabelligera.....																		
Hymenena Setchellii.....																		
Cryptopleura crispa.....																		
Cryptopleura lobulifera.....																		
Cryptopleura Ruprechtiana.....								X										
Cryptopleura violacea.....																		
Botryoglossum Farlowianum.....																		
Polysiphonia californica.....	X	X			X		X											
Polysiphonia Collinsii.....					X			X			X							
Polysiphonia Hendryi.....												X						
Polysiphonia pacifica.....		X	X				X											
Pterochondria Woodii.....										X								
Pterosiphonia bipinnata.....																		
Pterosiphonia dendroidea.....									X									
Pterosiphonia gracilis.....																		
Herposiphonia grandis.....																		
Rhodomela larix.....											X							
Odonthalia floccosa.....					X						X							
Odonthalia Lyalli.....											X							
Odonthalia washingtoniensis.....																		
Laurencia spectabilis.....																		

Bay. There is much variation in the general habit and form of the plants; it is probable that these variations may represent some of the species of different authors.

ULVA LINZA Linne 1753:1163

Enteromorpha linza J. Agardh 1883:13

Frequent on the rocks and piling at the Old Jetty, those in front of the Institute, and at Charleston.

ULVA EXPANSA Setchell and Gardner 1920a:284

Ulva fasciata f. *expansa* Setchell in Phyco. Bor.-Amer. No. LXXVII

In South Slough near the Charleston Bridge, where large specimens are frequently found.

ULVA FENESTRATA Postels and Ruprecht 1840:21

Large specimens have been obtained beyond the shell beach at North Bay, and small ones near the Old Jetty and at Charleston. This species is readily distinguished from others by the smaller or larger perforations and by the thick heavy fronds.

ULVA TAENIATA (Setchell) Setchell and Gardner 1920a:286

Ulva fasciata f. *taeniata* Setchell in Phyco. Bor.-Amer. No. 862

On the Charleston docks, also at Fossil Point, Coos Head, and Sunset Bay.

ENTEROMORPHA INTESTINALIS (Linne) Link 1820:252

Found on the higher tide rocks bordering tide pools, and covering banks and shores kept moist by springs or inflowing creeks, at the stations along South Slough, those in Coos Bay, and along the open ocean.

ENTEROMORPHA CRINITA (Roth) J. Agardh 1883:144

From the Old Jetty, the piling in front of the Institute, and Coast Guard; attached to wood, shells, or other objects.

ENTEROMORPHA MICROCOCCA Naegeli in Kuetzing 1856:11

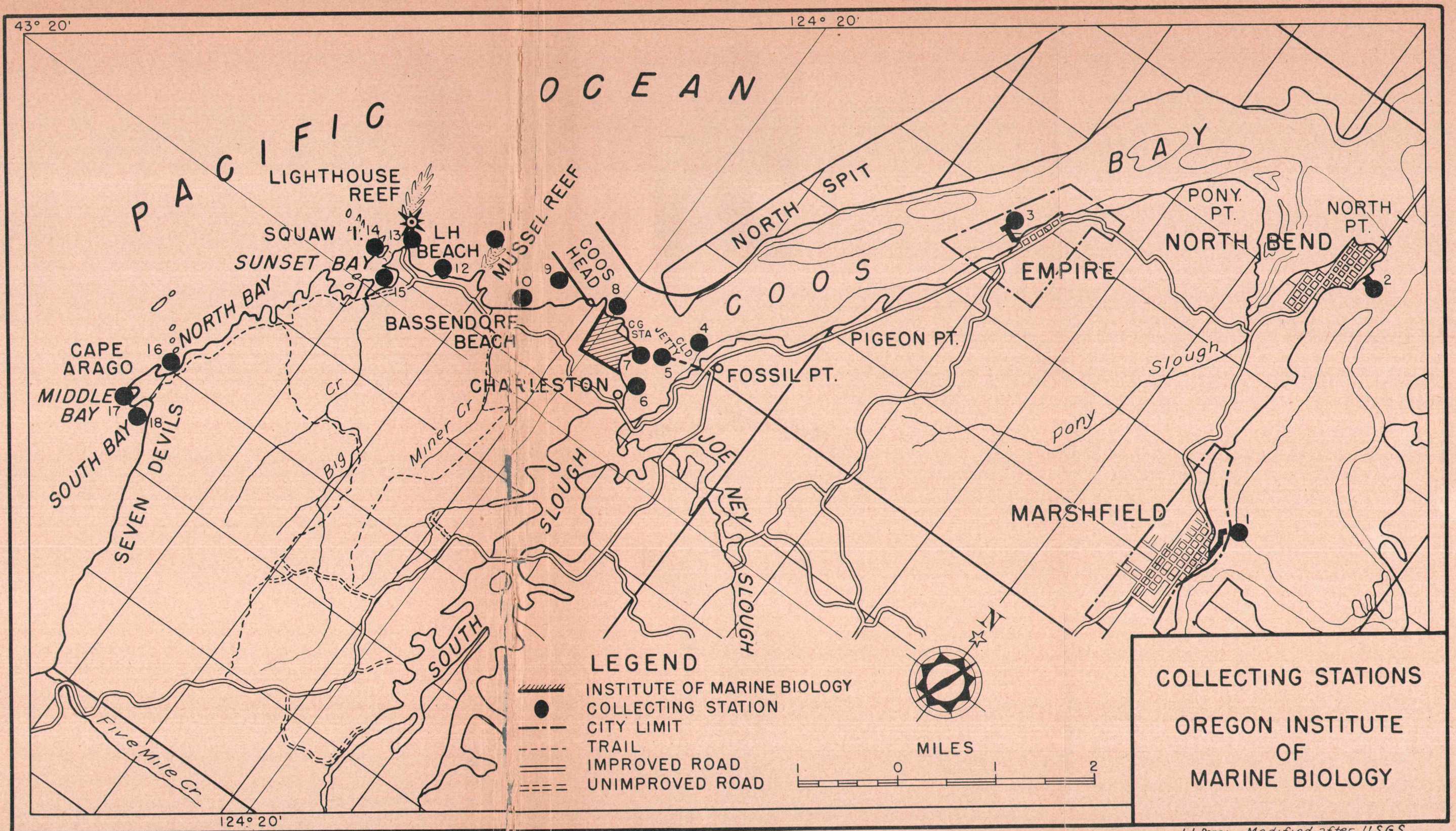
South Bay, on rocks at the high tide levels.

ENTEROMORPHA MINIMA Naegeli in Kuetzing 1849:482

At Sunset Bay, growing in small tufts on rocks at high tide level.

MONOSTROMA ZOSTERICOLA Tilden 1900, No. 388

Common on *Phyllospadix* at Bassendorf Beach, Lighthouse Beach, and Lighthouse Reef. There is some doubt concerning this species; the fronds



have the habit and size of *M. zostericola* Tilden, but the grouping of the cells suggests *M. aerolatum* Setchell and Gardner (1925; Plate 26, Figure 2) or is even more *Prasiola*-like in its cell arrangement. The fronds are about 12 to 15 microns in thickness, the cells being from 3 to 5 microns in diameter.

Order CLADOPHORALES

CLADOPHORA TRICHOTOMA (Agardh) Kuetzing 1849:414

Abundant at Sunset Bay, and in greater or lesser amounts at Squaw Island and South Bay. On rocks in tide pools.

CLADOPHORA MICROCLADIODES Collins 1909:17

At Squaw Island, on rocks in a midlittoral tide pool.

SPONGOMORPHA COALITA (Ruprecht) Collins 1909:361

In practically all tide pools at the rocky collecting stations: Coast Guard, South Bay, Lighthouse Reef, Squaw Island, Sunset Bay.

SPONGOMORPHA ARCTA (Dillwyn) Kuetzing 1849:417

From the rocks of Coos Head near Coast Guard Station. This location extends the range of the species south from Puget Sound. The plants of this location are apparently smaller than is typical.

SPONGOMORPHA SAXATILIS (Ruprecht) Collins 1909:360

At South Bay, in the higher rocky expanses, where it forms small green cushions.

SPONGOMORPHA MERTENSII (Ruprecht) Setchell and Gardner 1920b:228

On rocks at Coos Head, growing in soft green patches at the high tide levels.

SPONGOMORPHA SPINESCENS Kuetzing 1854:16

On the rocks at Coos Head, near the Coast Guard Station, where it is found in the midlittoral zone. Setchell and Gardner (1920b:229) reported this species from Coos Bay.

UROSPORA PENICILLIFORMIS (Roth) Areschoug 1866:16

Hormiscia penicilliformis (Roth) Fries 1835:327

Found on rocks in the lower littoral belt at South Bay, and on piling near high tide level on the Coast Guard rocks.

UROSPORA WORMSKIOLDII (Mertens) Rosevinge 1893:290

Hormiscia Wormskioldii (Mertens) Fries 1835:328

On rocks at Coos Head, near Coast Guard Station, at relatively high

intertidal levels. No zoospores or zoosporangia have been obtained in the collections made in June, July, and August. The two species are distinct, and have been tentatively referred to these two listed, which are known to range through Oregon.

RHIZOCLONIUM RIPARIUM (Roth) Harvey 1849:238

Free floating and caught about piling at Charleston and in front of Institute of Marine Biology.

RHIZOCLONIUM TORTUOSUM (Dillwyn) Kuetzing 1845:205

Infrequent in shallow tide pools at Squaw Island and Sunset Bay. The crisply coiled, dark green filaments form woolly masses in the pools.

Order SIPHONALES

HALICYSTIS OVALIS (Lyngbye) Areschoug 1850:447

Middle Bay and Lighthouse Beach, where found on vertical and under overhanging rock surfaces at the low tide levels. This species is usually in association with coralline algae.

BRYOPSIS CORTICULANS Setchell 1899. Phyco. Bor.-Amer. No. 626

Hanging from the undersurface of rocks, and erect in sandy tide pools about the Old Jetty and Fossil Point within Coos Bay. Also from tide pools at Mussel Reef.

CODIUM SETCHELLII Gardner 1919:489

At Squaw Island, Mussel Reef, and Middle Bay on the vertical sides of rocks, at about low tide level, and usually where protected from the light.

CODIUM FRAGILE (Suring) Hariot 1889:32

Codium mucronatum J. Agardh 1887:44

In tide pools and on rocks at low tide level at Sunset Bay, South Bay, Squaw Island, Mussel Reef, and North Bay, and at Fossil Point within Coos Bay.

PHAEOPHYCEAE

ISOGENERATAE

Order ECTOCARPALES

PYLAIELLA UNILATERALIS Setchell and Gardner 1922d:386

"Growing on rocks in shallow pools near high tide limit. Sunset Beach, near mouth of Coos Bay, Oregon" Setchell and Gardner 1925:405. This

species has not, to the knowledge of the writers, been collected later in this region.

ECTOCARPUS CONFEROIDES (Roth) Le Jolis 1863:75

Found in South Slough on wharves, rocks, and larger algae. This is apparently a southward extension of the range of this species.

ECTOCARPUS GRANULOSUS (J. E. Smith) C. Agardh 1828:45

In South Slough; epiphytic on several of the Laminariales.

ECTOCARPUS OVIGER Harvey 1862:167

Growing on *Nereocystis Luetkeana* at Lighthouse Reef, and the Old Jetty.

ECTOCARPUS ACUTUS Setchell and Gardner 1922e:404

Growing on *Zostera* at the Lighthouse Reef.

ECTOCARPUS SILICULOSUS (Dillwyn) Lyngbye 1819:131

In 1940, found abundantly, floating in Coos Bay. This record extends the range north from San Francisco Bay.

RALFSIA VERRUCOSA (Areschoug) J. Agardh 1848:62

From the Lighthouse Beach, usually on large, well rounded rocks in the upper littoral zone. A species ranging from Alaska to Monterey Bay, California.

RALFSIA FUNGIFORMIS (Gunnerus) Setchell and Gardner 1924:11

From Middle Bay. Only sterile plants have been obtained during the collecting periods in June and July. This location is an extension southward of the recorded range of this species.

HETEROGENERATAE

Order CHORDARIALES

LEATHESIA DIFFORMIS (Linne) Areschoug 1846:154

At Sunset Bay, South Bay, Middle Bay, Squaw Island, Mussel Reef, Coast Guard Rocks, and Fossil Point, on rocks, and spreading over crustose forms and on the larger algae, largely in the littoral zone.

ELACHISTEA FUCICOLA (Vellay) Areschoug 1842:235

This species is reported by Setchell and Gardner (1925:503) as "grow-

ing on different species of *Fucus* in the lower littoral belt. Sitka, Alaska to Central Oregon (Coos Bay)." No collections of it have been made by the writers.

HAPLOGLOIA ANDERSONII (Farlow) Levring 1939:50

Myriogloia Andersonii (Farlow) Kuckuk 1922:19

Mesogloia Andersonii Farlow 1889:9

In June and July, often common, in nearly every high-tide pool, at the Coast Guard rocks, Mussel Reef, Sunset Bay, North Bay, Middle Bay, and South Bay.

COILODESME CALIFORNICA (Ruprecht) Kjellman 1889:4-8

Epiphytic on *Cystoseira osmundacea* at South Bay, Middle Bay, North Bay, Sunset Bay, Squaw Island, Lighthouse Reef, and Coast Guard rocks.

COILODESME BULLIGERA Strömfelt 1886:173

Not common, growing on rocks at the low tide level. Setchell and Gardner (1925:58) report this species as "growing on rocks in lower littoral belt, Shumagin Islands, Alaska, to Coos Bay, Oregon."

PHAEOSTROPHION IRREGULARE Setchell and Gardner 1924:10

Collected only once, at the Lighthouse Reef under the bridge to the Cape Arago Lighthouse on rocks in the littoral belt. This is reported by Setchell and Gardner (1925:586) as "growing on rocks in pools in the middle of the littoral belt, mouth of Coos Bay, Oregon and Bolinas Bay, California."

MYRIONEMA PRIMARIUM Setchell and Gardner 1922a:334

The only record of this in the Coos Bay region is from Setchell and Gardner, as follows: "Growing on the outer edge of the young blade of *Costaria costata* in the lower littoral and upper sublittoral belts. Oregon (Coos Bay) to central California."

COMPSONEMA SECUNDUM Setchell and Gardner 1922b:361

Reported by Setchell and Gardner (1925:484) as "Growing on the pneumatocysts of *Nereocystis Luetkeana*. West coast of Washington (Moclips) to central California (Carmel Bay)."

Order PUNCTARIALES

SORANTHERA ULVOIDEA Postels and Ruprecht 1840:19

Common in tide pools at the Old Jetty, the Coast Guard rocks, Mussel Reef, Lighthouse Reef, Squaw Island, Sunset Bay, North Bay, and South Bay. Epiphytic on *Odonthalia* and *Rhodomela*.

MYELOPHYCUS INTESTINALIS Saunders f. *TENUE* Setchell and Gardner, in Gardner 1917:385.

Recorded by Setchell and Gardner (1925:528) as from "Coos Bay, Oregon to central California." The authors have seen specimens that seem to have been correctly referred to this species. One of these was collected from the wharf at Charleston.

SCYTOSIPHON LOMENTARIA (Lyngbye) J. Agardh 1848:126

Forma *TYPICUS* Setchell and Gardner 1925:533

This form has been found growing on rocks in tide pools in the littoral belt at the Coast Guard Station, the South Jetty, Sunset Bay, North Bay, and South Bay.

Forma *CYLINDRICUS MAJOR* Setchell and Gardner 1925:533

This form has been obtained from rocks at the high tide levels at the Coast Guard Station in November, and at Middle Bay in late August.

ILEA FASCIA (Mueller) Fries 1835:321

At Coast Guard, Mussel Reef, Sunset Bay, and South Bay; usually in small patches on rocks or about the margins of tide pools. The narrow forms are relatively common in the upper littoral belt.

COLPOMENIA SINUOSA (Roth) Derbes and Solier 1856:11

Growing on flat rocks at North Bay and Sunset Bay and along the southeastern boundary of South Bay. Frequently in association with *Leathesia difformis* in lower portion of the *Ulva* association.

HETEROCHORDARIA ABIETINA (Ruprecht) Setchell and Gardner 1924:6

Growing in the upper littoral belt at Mussel Reef, Squaw Island, Sunset Bay, and South Bay, all stations outside of Coos Bay.

Order DESMARESTIALES

DESMARESTIA LATIFRONS (Ruprecht) Kuetzing 1859:40

Washed in at North Bay, South Bay, and Sunset Bay, attached to small stones or shells. This species is recorded by Setchell and Gardner (1925:563) as "growing on rocks in the lower littoral and upper sublittoral belts. Central Oregon (Coos Bay) to central California (Point Sur)."

DESMARESTIA INTERMEDIA Postels and Ruprecht 1840:13

Washed ashore at Sunset Bay. This location extends its recorded range south from Puget Sound.

DESMARESTIA HERBACEA (Turner) Lamouroux 1813:25

The most abundant species of *Desmarestia* and found at Fossil Point, Coast Guard, Lighthouse Reef, North Bay, and South Bay. A considerable quantity of this species was taken from the stomach of a specimen of *Aspocotis bison*, which was caught in Coos Bay during the summer of 1938.

DESMARESTIA MUNDA Setchell and Gardner 1924:7

Found floating or attached to shells and stones buried in the mud flats near the Old Jetty, the piling near the Institute, and Charleston; also at Squaw Island, Sunset Bay, and South Bay.

Order LAMINARIALES

LAMINARIA SACCHARINA (Linne) Lamouroux 1813:22

Found at the Old Jetty, near Charleston dock, Coos Head, Sunset Bay, and South Bay. This species is undoubtedly represented by different forms, the heaviest of which are found at the collecting stations within Coos Bay.

LAMINARIA SINCLAIRII (Harvey) Farlow 1877-1889. Alg. Exisca. Amer-Bor., No. 118

Growing at Bassendorf Beach, Lighthouse Beach, Squaw Island, and North Bay, on flat rocks in the lower littoral and sublittoral belts, where exposed to rather strong wave action.

LAMINARIA CUNEIFOLIA J. Agardh 1867:10

Growing at North Bay, in the sublittoral belt. This location is a southward extension of the recorded range of this species from Puget Sound.

LAMINARIA ANDERSONII Farlow in Anderson 1891:220

Growing at South Bay, North Bay, Sunset Bay, and Squaw Island in the upper sublittoral belt, in active waters.

PLEUROPHYCUS GARDNERI Setchell and Saunders in Saunders 1901:427

Growing at North Bay in association with *Macrocystis integrifolia* at depths below minus four feet. Also washed ashore at South Bay.

COSTARIA COSTATA (Turner) Saunders 1895:57

Common in the lower littoral and sublittoral belts, at the South Jetty, Sunset Bay, Lighthouse Reef, Squaw Island, South Bay, and North Bay.

HEDOPHYLLUM SESSILE (Agardh) Setchell 1899. Phyco. Bor.-Amer. Fasc. A, No. 8

Found on littoral rocks at Bassendorf Beach, Mussel Reef, Sunset Bay,

North Bay, and South Bay. These plants are frequently conspicuous in the *Fucus* zone.

HEDOPHYLLUM SUBSESSILE (Areschoug) Setchell 1901. Phyco. Bor.-Amer., Fasc. B, No. 27

A form approaching this species has been obtained from North Bay and Sunset Bay. If it is this plant, it is entirely out of the reported range. Setchell and Gardner (1925:619) record *H. subseessile* as "growing on rocks in exposed localities in the middle littoral belt. Known in Bering Sea and possibly extends for some distance south along the coast of Alaska."

NEREOCYSTIS LUETKEANA (Mertens) Postels and Ruprecht 1840:9

South Bay, North Bay, Sunset Bay, Squaw Island, Lighthouse Reef, Coos Head, Mussel Reef, and the Old Jetty; growing just off rocky shores from the low tide level to waters of ten or more meters in depth. Mature dwarf plants are often found in the larger tide pools.

POSTELSIA PALMAEFORMIS Ruprecht 1852:19

Squaw Island, Sunset Bay, South Bay, and Lighthouse Reef, where high steep rock surfaces are exposed to a heavy surf from the ocean.

MACROCYSTIS PYRIFERA (Linne) C. Agardh 1820:47

Growing abundantly in the sublittoral kelp beds of North Bay, and frequently washed ashore at the other stations along the open ocean, such as the Lighthouse Beach and Bassendorf Beach.

MACROCYSTIS INTEGRIFOLIA Bory 1826, 10:9

The *Macrocystis* of the upper sublittoral kelp beds and large tide pools at North Bay and washed ashore at the South Jetty.

LESSONIOPSIS LITTORALIS (Farlow and Setchell) Reinke 1903:23-28

At the Lighthouse Reef, Sunset Bay, North Bay, and South Bay, where are found the higher exposed rocks; growing below or in association with *Postelsia*.

PTERYGOPHORA CALIFORNICA Ruprecht 1852:17

On the rocky shores of Squaw Island, Lighthouse Reef, Sunset Bay, North Bay, Middle Bay, and South Bay, where with *Laminaria Andersonii* it forms rather extensive offshore beds in turbulent waters.

ALARIA VALIDA Kjellman and Setchell in Setchell and Gardner 1903:278

Coos Head, Lighthouse Reef, Squaw Island, Sunset Bay, North Bay,

and South Bay. In some areas this alga is the major component of the intertidal kelp beds. This is a southward extension of the recorded range of *Alaria valida*.

ALARIA MARGINATA Postels and Ruprecht 1840:11

Collected frequently at South Bay.

EGREGIA MENZIESII (Turner) Areschoug 1878:66

Coos Head, Old Jetty, Bassendorf Beach, Mussel Reef, Lighthouse Reef and Beach, Squaw Island, Sunset Bay, North Bay, and South Bay, where it is frequently found in the lower littoral and sublittoral belts of both rocky and sandy strata.

CYCLOSPOREAE

Order FUCALES

FUCUS FURCATUS Agardh f. *TYPICUS* Gardner 1922:16

On the large boulders, the remains of the Old Jetty, and at Lighthouse Reef.

It appears to the writers that the Cape Arago region, with its wide variety of habitats favorable for the growth of *Fucus* spp., may be a focal point for the many forms of this genus.

FUCUS FURCATUS Agardh f. *ABBREVIATUS* Gardner 1922:19

On floating objects at North Bend in Coos Bay.

FUCUS FURCATUS Agardh f. *ANGUSTUS* Gardner 1922:18

Recorded by Gardner (1922:18) "Type, Gardner, No. 2788 (Herb. Univ. Calif., No. 201188), Sunset Beach, near mouth of Coos Bay, Oregon, May 1914." Its range is given from "San Juan Co., Washington and the central coast of Oregon," Setchell and Gardner (1925:673).

FUCUS FURCATUS Agardh f. *ELONGATUS* Gardner 1922:21

One collection has been tentatively referred to this form. Gardner (1922:21) reports as follows: "Type, Gardner, No. 2793 (Herb. Univ. Calif. No. 201178) Sunset Beach, Oregon, May 1914." Setchell and Gardner (1925:667) give the range as "South end of San Juan Island, Washington, and Sunset Beach, near the mouth of Coos Bay, Oregon."

FUCUS FURCATUS Agardh f. *LUXURIANS* Gardner 1922:22

This form was collected by Mr. Paul Freed at North Bay, July, 1941.

FUCUS EVANESCENS Agardh f. OREGONENSIS Gardner 1922:40

This form is not uncommon at the stations within Coos Bay. Gardner (1922:40) records it as follows: "Growing on floats, piles, stones, etc. in the middle and upper littoral belts. East side of Coos Bay, opposite North Bend, Oregon."

FUCUS EVANESCENS Agardh f. ECOSTATUS Gardner 1922:39

"Growing on sandstone, wooden floats, etc., in the upper littoral belt, Coos Bay, Oregon." (Setchell and Gardner 1925:697.)

FUCUS EVANESCENS Agardh f. CUNEATUS Gardner 1922:39

Gardner says (1922:39): "Growing on sandstone in the upper littoral region. Near Empire, Coos Bay, Oregon."

PELVETIOPSIS LIMITATA (Setchell) Gardner f. TYPICA Gardner 1910:127

Squaw Island, Sunset Bay, Lighthouse Reef, on rocks in the middle and upper littoral belts. Setchell and Gardner (1925:703) give the range of this form as from Vancouver Island to central California.

No collections of *Pelvetia fastigiata* (J. Agardh) De Toni, 1895:215, have been made by the writers, or their assistants. It may be that the range of this species was established on *Pelvetia fastigiata* f. *limitata*, which is now known as *Pelvetiopsis limitata* (Setchell) Gardner. Setchell and Gardner (1925:701) record it as "always growing on rocks, in the middle of the littoral belt. Extending from Coos Bay, Oregon to the West Coast of Lower California (Ensenada)."

CYSTOSEIRA OSMUNDACEA (Menzies) C. Agardh 1820:69

Common at the lower littoral or upper sublittoral levels of Mussel Reef, Lighthouse Reef, Sunset Bay, and South Bay. The range of this species (Setchell and Gardner, 1925:709) is from central Oregon (Coos Bay) to Lower California (Ensenada).

RHODOPHYCEAE

Order BANGIALES

BANGIA VERMICULARIS Harvey 1858:55

On rocks and piling at South Bay, Squaw Island, Lighthouse Reef, Mussel Reef, and the Coast Guard rocks.

PORPHYRA PERFORATA J. Agardh. 1882:69

Frequently covering the highest littoral rocks; present at Sunset Bay,

South Bay, Squaw Island, Lighthouse Reef, Coos Head, and rocks on beach in front of the Marine Station.

PORPHYRA NAIADUM Anderson *in* Blankinship and Keeler 1892:148

Epiphytic on leaves of *Zostera* and *Phyllospadix* in upper sublittoral zone, and in larger tide pools at South Bay and Lighthouse Reef.

PORPHYRA NEREOCYSTIS Anderson *in* Blankinship and Keeler 1892:149

Pyropia californica J. Agardh 1899:153

A widely distributed, but usually not abundant, species. In 1939, it was plentiful on *Nereocystis* at South Bay, Lighthouse Reef and Beach, and at Fossil Point.

PORPHYRA VARIEGATA Kjellman, *in* Hus 1900:69

On rocks in the upper sublittoral zone at Squaw Island and Sunset Bay.

PORPHYRA MINIATA f. CUNEIFORMIS Setchell and Hus *in* Hus 1900:68

Collected from the South Jetty at the entrance to Coos Bay, on the minus one foot rocks. Also obtained from the stomach of a common fish (*Aspocotus bison*) of the region.

PORPHYRA OCCIDENTALIS Setchell and Hus *in* Hus 1900:69

Coos Head, on rocks at mouth of a cave, two feet below low tide level.

PORPHYRELLA GARDNERI Smith and Hollenberg 1943:215

Epiphytic on tips of *Laminaria Andersonii* at Squaw Island.

Order NEMALIONALES

RHODOCHORTON ROTHII (Turton) Naegeli 1862:356

Setchell and Gardner (1919:34) record this species as "Growing—on rock ledge along the high tide level and above, Cape Arago, at the entrance to Coos Bay." This form should perhaps be recorded as *R. tenue* Kylin (1925:44) since *R. Rothii* is an Atlantic species, which is close to *R. tenue*.

CUMAGLOIA ANDERSONII (Farlow) Setchell and Gardner *in* Gardner 1917:399

Nemalion Andersonii Farlow 1877:240

Hanging over the edges of rocks and boulders in the upper portions of the intertidal zone, and occasionally along edges of the larger tide pools. Found at South Bay, North Bay, Sunset Bay, Squaw Island, and the Coast Guard rocks.

GLOIOPLOEA CONFUSA Setchell 1914:118

This species has not been collected at the Coos Bay-Cape Arago areas. Setchell says (*loc. cit.*): "Its distribution along the western coasts of North America . . . extends from the southern boundary of the United States to Vancouver Island."

Order GELIDIALES

GELIDIUM PULCHRUM Gardner 1927b:279

On the lower rocks of Lighthouse Reef and at North Bay and the Old Jetty within Coos Bay. Also washed ashore at the Lighthouse Beach.

GELIDIUM COULTERI Harvey 1853:117

North Bay; growing in hemispherical tufts in tide pools.

Order CRYPTONEMIALES

CRYPTOSIPHONIA WOODII J. Agardh 1876:251

Pikea Woodii J. Agardh 1872:15

Sunset Bay, Old Jetty, and the Lighthouse Beach. Found on rocks at plus one to minus one foot tide levels.

FARLOWIA MOLLIS (Harvey and Bailey) Farlow and Setchell. Phyco. Bor-Amer. No. 898

In tide pools among the rocks surrounding Sunset Bay, where it is usually abundant; rare in the summer of 1941.

PIKEA CALIFORNICA Harvey 1853:246

South Bay; growing in the tide pools.

CONSTANTINEA SIMPLEX Setchell 1901:127

At Squaw Island, Lighthouse Reef, and Sunset Bay on rocks in somewhat protected areas in the intertidal zone.

GLOIOSIPHONIA VERTICILLARIS Farlow 1889:3

Hanging from rocks in the intertidal zone at Sunset Bay. This species was collected once in 1939, by O. R. O'Neal. During May and June this species is abundant along the coast of central California; it becomes rare in July. It perhaps may be more frequent along the Oregon coast in the earlier months.

GLOIOPELTIS FURCATA (Postels and Ruprecht) J. Agardh 1852:235

At Squaw Island and Sunset Bay, growing in the high intertidal zone in association with *Endocladia* and *Pelvetiopsis*.

ENDOCLADIA MURICATA (Harvey) J. Agardh 1847:10

The dominant member of the highest algal association at the Mussel Reef, Lighthouse Beach, Squaw Island, Sunset Bay, Middle Bay, and South Bay stations.

AEODES GARDNERI Kylin 1925:17

Sunset Bay, Middle Bay, and North Bay at the low tide line.

GRATELOUPIA CALIFORNICA Kylin 1941:9

North Bay, South Bay, and the large tide pool at the west end of Sunset Bay.

PRIONITIS ANDERSONII Eaton in Farlow 1877:242

In sand around bases of rocks in the low tide zone at North Bay, Sunset Bay, and Lighthouse Reef.

PRIONITIS LANCEOLATA Harvey 1853:197

Common to all rocky shores of the open ocean, Mussel Reef, Lighthouse Reef and Beach, Squaw Island, South Bay, South Jetty, and within Coos Bay.

PRIONITIS LYALLII Harvey 1862:173

Growing just above the low tide level at Squaw Island, Sunset Bay, and the Old Jetty.

CRYPTONEMIA OVALIFOLIA Kylin 1941:11

South Bay; growing on the lower surfaces of overhanging rocks along the east side of the bay.

PUGETIA FRAGILISSIMA Kylin 1925:31

At Squaw Island, Sunset Bay, South Bay, and the Lighthouse Reef; growing on vertical rocks from minus one to minus one and one-half foot levels. Cystocarpic plants in July.

CALLOPHYLLIS FLABELLULATA Harvey 1862:171

A great deal of variation is found in the collections of this species, obtained from the Old Jetty in Coos Bay and from Squaw Island.

CALLOPHYLLIS HEANOPHYLLA Setchell 1923:401

Washed ashore at Lighthouse Beach.

CALLOPHYLLIS MEGALOCARPA Setchell et Swezy in Setchell 1923:401

Squaw Island, South Bay, and washed ashore at Lighthouse Beach.

CALLOPHYLLIS OBTUSIFOLIA J. Agardh 1851:297

Callophyllis furcata Farlow. Phyco. Bor.-Amer. No. 883

Squaw Island and washed ashore at the Lighthouse Beach.

CALLOPHYLLIS MARGINIFRUCTA Setchell et Swezy in Setchell 1923:395

Frequently washed ashore on the beaches near the lighthouse and at North Bay.

ERYTHROPHYLLUM DELESSERIOIDES J. Agardh 1872:10

On rocky ledges along the outer limits of Mussel Reef, Squaw Island, Sunset Bay, Middle Bay, and South Bay.

DILSEA CALIFORNICA (J. Agardh) Schmitz 1897:520

Sarcophyllis californica J. Agardh 1876:265*S. californica* f. *pygmaea* Setchell. Phyco. Bor.-Amer. 8, No. 396*Dilsea pygmaea* Setchell 1901:126*S. pygmaea* Setchell and Gardner 1903:355

On rocks in the lower littoral belt, Sunset Bay, Middle Bay, and South Bay.

Order GIGARTINALES

SCHIZYMENIA PACIFICA Kylin 1932:10

Turnerella pacifica Kylin 1925:21*Sarcophyllis californica* Setchell and Gardner 1903:354

Common at the rocky stations, as South Bay, Middle Bay, Sunset Bay, Squaw Island, Lighthouse Reef, and Mussel Reef.

OPUNTIELLA CALIFORNICA (Farlow) Kylin 1925:23

Callymenia californica Farlow 1877:241*Callymenia phyllophora* Setchell and Gardner 1903:308 (Not J. Agardh 1872:9)

On flat rock surfaces that are exposed to wave action during the lowest tides. Squaw Island, Sunset Bay, Middle Bay, and South Bay.

IRIDOPHYCUS FLACCIDUM Setchell and Gardner 1937:171

Mussel Reef, Lighthouse Reef, and Sunset Bay where often crowded on the rocks and rocky beaches, at the plus five foot level. Tetraspores in June and July.

IRIDOPHYCUS HETEROCARPUM (Postels and Ruprecht) Setchell and Gardner 1937:170

Iridaea heterocarpa Postels and Ruprecht 1840:18

Cystocarpic and tetrasporic plants are found at the rocky stations, as Mussel Reef, Lighthouse Beach, Sunset Bay, Middle Bay, and South Bay, in June and July.

IRIDOPHYCUS LINEARE Setchell and Gardner 1937:171

Iridaea linearis (Setchell and Gardner) Kylin 1941:23

Lighthouse Reef, Sunset Bay, Middle Bay, and South Bay. Cystocarpic plants collected in July.

GIGARTINA CANALICULATA Harvey 1841:490

Covering rocks, the areas about 1 square meter, at the plus two foot tide level at Lighthouse Reef, Sunset Bay, and North Bay, and found to some extent at most of the other rocky stations.

GIGARTINA BINGHAMIAE J. Agardh 1899:33

Found at most stations along the open ocean, South Jetty, Squaw Island, Sunset Bay, Middle Bay, and at the Old Jetty within Coos Bay.

GIGARTINA CALIFORNICA J. Agardh 1899:39

Gigartina radula f. *typica* Setchell 1903:302

Coast Guard rocks, Lighthouse Reef, Sunset Bay, Middle Bay, and South Bay.

GIGARTINA AGARDHII Setchell and Gardner 1933:290

Gigartina papillata f. *dissecta* Setchell 1899. Phyco. Bor.-Amer. No. 427

Grows in clusters, a foot or more in diameter, at the Old Jetty, Sunset Bay, Middle Bay, and South Bay. Many cystocarpic plants in June.

GIGARTINA CRISTATA (Setchell) Setchell and Gardner 1933:289

Gigartina papillata f. *cristata* Setchell 1898. Phyco. Bor.-Amer. No. 426

Gigartina mamillosa f. *cristata* Setchell 1903:301

This species, often growing in clusters not unlike *G. Agardhii*, is sometimes found in the same levels at Sunset Bay and Squaw Island. There seems to be some intergrading of the two species; however, the mature cystocarpic plants are usually quite distinct.

GIGARTINA CORYMBIFERA (Kuetzing) J. Agardh 1876:202

Mastocarpus corymbiferus Kuetzing 1847:21

Gigartina exasperata Harvey and Bailey 1851:162

Gigartina radula f. *exasperata* (Harvey and Bailey) Setchell 1903:303

Common at the low tide level at the Old Jetty, and the collecting grounds along the open ocean, Mussel Reef, Sunset Bay, and Middle Bay.

GIGARTINA VOLANS (Agardh) J. Agardh 1846

Collected at South Bay, Middle Bay, and Squaw Island. It has been washed ashore occasionally at the Lighthouse Beach.

AHNFELTIA CONCINNA J. Agardh 1847:12

Ahnfeltia gigartinoides J. Agardh 1847:12

Along the outer reef at Squaw Island, at the minus one foot levels.

AHNFELTIA PLICATA (Hudson) Fries 1835:310

Fucus plicatus Hudson 1762:470

Sterrocolax decipiens. Phyco. Bor.-Amer. No. 382

Sunset Bay in high tide pools that are well filled with shell fragments; Lighthouse Reef and South Bay on rocks exposed at low tide.

GYMNOGONGRUS LINEARIS (Turner) J. Agardh 1851:325

Fucus linearis Turner 1819:220

Found at most rocky stations, the Coast Guard rocks, Mussel Reef, Lighthouse Reef, Squaw Island, and South Bay, and frequently well out on the Lighthouse Beach and Bassendorf Beach. Cystocarps in July and August.

STENOGRAMME CALIFORNICA Harvey 1841:408

Stenogramme interrupta Harvey 1853:163

Collected at Sunset Bay, where it had been washed in.

GRACILARIA SJOESTEDTII Kylin 1930:55

Sunset Bay, North Bay, Middle Bay, South Bay, the Old Jetty, and South Slough. Cystocarpic plants are quite abundant during the summer at the Coos Bay stations, the Old Jetty and at low tide on the sandy beaches within South Slough; these plants are usually attached to sticks, shells, or small stones that are buried in the sand.

GRACILARIOPHILA ORYZOIDES Wilson and Setchell in Wilson 1910:81

Epiphytic on *Gracilaria Sjoestedtii*. Found on plants collected from piling in South Slough.

PLOCAMIUM PACIFICUM Kylin 1925:42

Plocamium coccineum Harvey 1853:153.

Epiphytic on *Nereocystis* at Squaw Island, Sunset Bay, North Bay, Middle Bay, and Mussel Reef; also attached to the Charleston wharves, and on rocks at the Lighthouse Reef and Bassendorf Beach. Tetraspores and cystocarps in June and July.

PLOCAMIMUM VIOLACEUM Farlow 1877:240

Found at rocky collecting stations, Squaw Island, Sunset Bay, and South Bay.

RHODOGLOSSUM AFFINE (Harvey) Kylin 1928:49

Chondrus affinis Harvey 1853:181.

This species has been collected only at Squaw Island.

Order RHODYMENIALES

RHODYMENIA CALIFORNICA Kylin 1931:21.

Plate I, Figures 3, 4, 5.

Squaw Island and North Bay, growing on the sides of boulders that are overhung with larger algae, as *Odonthalia* and *Iridophycus*.

RHODYMENIA PERTUSA (Postels and Ruprecht) J. Agardh 1852:376.

Plate I, Figures 1, 2.

Porphyra pertusa Postels and Ruprecht 1840:20

Squaw Island; cystocarpic and tetrasporic plants both have been found in abundance two alternate years. These plants were suspended from an overhanging rock ledge along the outer part of the island reef, where the plants were growing at a minus tide level.

RHODYMENIA PACIFICA Kylin 1931:21

Plate II

South Bay; only sterile specimens have been obtained.

RHODYMENIA PALMATA f. **MOLLIS** Setchell and Gardner 1903:315

Plate III

Fucus palmata Linne 1753

Found at many of the rocky stations, e.g., South Bay, Middle Bay, Sunset Bay, and Lighthouse Beach, of the open coast. No fertile plants have been obtained.

HALOSACCION GLANDIFORME (Gmelin) Ruprecht 1851:279

Halosaccion hydrophora J. Agardh 1852:358

Sterile specimens are common at Coos Head, Squaw Island, Sunset Bay, North Bay, and Middle Bay, in June and July, in the middle to low littoral zone.

Order CERAMIALES

ANTITHAMNION UNCINATUM Gardner 1927e:408

Ropy and fasciculate in habitat. Growing epiphytically on the Lamnariales, especially on *Nereocystis Luetkeana* at Sunset Bay and South Bay.

ANTITHAMNION GLANDULIFERUM Kylin 1925:47

On the wharf at Charleston.

ANTITHAMNION DEFECTUM Kylin 1925:46

Tetrasporic plants have been collected in July from the South Jetty at the entrance to Coos Bay where they were growing among hydroids. Some specimens have been washed in on the beach in front of the Marine Station.

ANTITHAMNION cf. TENUISSIMUM Gardner 1927d:377

On wharves at Marshfield in July 1939. The specimens here referred to this species are, in the opinion of G. J. Hollenberg, most like this but still seemingly distinct.

CALLITHAMNION PIKEANUM Harvey 1853:230

Ceratothamnion Pikeanum J. Agardh 1892:35

Hanging from large rocks and overhanging rock shelves at the higher tide levels (plus three to plus five foot zone) at practically every rocky station, e.g., South Bay, Sunset Bay, Squaw Island, Mussel Reef, and Lighthouse Reef.

PLATYTHAMNION PECTINATUM Kylin 1925:53

Platythamnion heteromorphum Setchell. Phyco. Bor.-Amer. No. 343.

On wharves in Coos Bay, and tide pools at Sunset Bay. Tetrasporic material from Coos Bay stations in July; other material sterile at this time.

PLATYTHAMNION REVERSUM (Setchell and Gardner) Kylin 1925:54

Platythamnion heteromorphum f. *reversum* Setchell and Gardner 1903:345

On wharf at Charleston.

PLATYTHAMNION VILLOSUM Kylin 1925:51

Platythamnion heteromorphum f. *typicum* Setchell and Gardner 1903:344

Callithamnion subulatum Harvey 1862:175

Lighthouse Beach, Sunset Bay, on Laminariales, which had been washed ashore.

GRIFFITHSIA PACIFICA Kylin 1925:58

Sunset Bay and North Bay at minus one foot levels on walls of tide pools.

CERAMIUM GARDNERI Kylin 1941:29 Plate IV, Figures 4, 5.

On the wharf at Charleston, and on wave-swept rocks with and below *Lessoniopsis* at Sunset Bay and South Bay.

CERAMIUM CALIFORNICUM J. Agardh 1894:45 Plate IV, Figures 1, 2, 3.

On *Gracilaria Sjoestedtii* in Coos Bay, at Fossil Point and the Old Jetty, and washed ashore on Lighthouse Beach.

CERAMIUM PACIFICUM (Collins) Kylin 1925:61 Plate IV, Figures 6, 7.

Ceramium rubrum var. *pacificum* Collins. Phyco. Bor.-Amer. No. 893.

On rocky sides of tide pools at Sunset Bay, South Bay, and Squaw Island.

CERAMIUM WASHINGTONIENSE Kylin 1925:62

In the higher tide pools at Sunset Bay and at North Bay.

CERAMIUM EATONIANUM (Farlow) DeToni, 1903:1493

In some tide pools at Sunset Bay.

CERAMIUM CODICOLA J. Agardh 1894:23

Plate IV, Figure 8.

Abundant on *Codium fragile* at Middle Bay.

PTILOTA PECTINATA (Gunner) Kjellman 1889:32

Frequent on rocks at the plus four foot level, at Mussel Reef, Lighthouse Beach, Squaw Island, and South Bay.

This name was first published by Harvey (Bot. Beechey voyage 1833:165) who later (Ner. Bor. Amer. 1853:219) recognized it as a synonym of *Ptilota densa* C. Agardh (Sp. Alg. 1822:387). *Ptilota pectinata* (Gunner) Kjellman (Om Beringhafvets Algflora. Kongl. Sv. Vet.-Akad. Handl., 1889. Vol. 23, no. 8, page 32) is thus a homonym. If the entity to which it was attached is distinct and still unnamed, it must be given a new name. The authors tentatively are considering this element present in our flora pending further investigation.

PTILOTA CALIFORNICA Ruprecht in Harvey 1853:222

Collected once at North Bay.

PTILOTA FILICINA (Farlow) J. Agardh 1876:76

The most common *Ptilota* in our region, to be found at the Coast Guard rocks, Squaw Island, Middle Bay, South Bay, and Sunset Bay on minus one to minus two foot rocks and epiphytic on certain of the larger red algae.

PTILOTA HYPNOIDES Harvey 1833:164

Washed ashore at North Bay and collected from crustose corallines on minus one foot vertical rocks at Lighthouse Beach.

MICROCLADIA BOREALIS Ruprecht 1851:259

Found in tide pools and on vertical rock faces at South Bay, Sunset Bay, Lighthouse Reef, Mussel Reef, Coast Guard rocks, and the Old Jetty.

MEMBRANOPTERA DIMORPHA Gardner 1926:211

Delesseria quercifolia var. *linearis* Collins 1902. Phyco. Bor.-Amer. No. 938.

South Bay and Coast Guard rocks, where found hanging from vertical and overhanging rocks in places more or less sheltered in the lower littoral zone to the minus one foot tide level. With cystocarps in July.

DELESSERIA DECIPIENS J. Agardh 1872:58

Apoglossum decipiens J. Agardh 1876:194

South Bay, Sunset Bay, Squaw Island, and Coast Guard rocks. Usually pendant from rocky ledges, at plus two to plus three foot tide levels.

POLYNEURA LATISSIMA (Harvey) Kylin 1924:37

Nitophyllum latissima J. Agardh 1876:464

From Old Jetty, Coos Head, rocks near the Charleston wharf, Lighthouse Reef, Squaw Island, and South Bay. Tetrasporic and cystocarpic plants in June and July.

NIENBURGIA BOREALIS (Kylin) Kylin 1935:1

Heteronema boreale Kylin 1924:49

This species has been collected only once at Sunset Bay, where it was found growing on the sides of boulders at about the minus one foot level. Fronds simple, all sterile in July.

NITOPHYLLUM MIRABILE Kylin 1925:64

Washed ashore at Lighthouse Beach. Cystocarpic plant in July.

HYMENENA FLABELLIGERA (J. Agardh) Kylin 1924:83

Nitophyllum flabelligera J. Agardh 1876:699

Found at Squaw Island, Sunset Bay, and South Bay, growing at the minus one foot levels. Also washed ashore on beach near Institute of Marine Biology. Antheridial and tetrasporic plants collected in June and July.

HYMENENA SETCHELLII Gardner 1927a:245

Hymenena Fryeana (Farlow) Kylin 1924:81

Nitophyllum Fryeanum Farlow 1878, in Farlow, Anderson, and Eaton.
No. 69. Not *Nitophyllum Fryeanum* Harvey 1858:128
From Sunset Bay.

CRYPTOPLEURA CRISPA Kylin 1924:90

From Sunset Bay and South Bay.

CRYPTOPLEURA LOBULIFERA (J. Agardh) Kylin 1924:90

Cryptopleura brevis Gardner 1927a:241

Neuroglossum lobuliferum J. Agardh 1898:121

In the lower littoral belt at Sunset Bay, North Bay, and South Bay.

CRYPTOPLEURA RUPRECHTIANA (J. Agardh) Kylin 1924:93

Nitophyllum Ruprechtiana J. Agardh 1892:51

Hymenena fimbriata Postels and Ruprecht 1840:15

Cryptopleura stenoglossum Kylin 1924:92

Coos Head, (Coast Guard rocks) South Bay, and Sunset Bay growing
on *Cystoseira*.

CRYPTOPLEURA VIOLACEA (J. Agardh) Kylin 1924:89

Nitophyllum violaceum J. Agardh 1876:700

North Bay; one collection made in 1939.

BOTRYOGLOSSUM FARLOWIANUM (J. Agardh) DeToni 1900:676

Nitophyllum Farlowianum J. Agardh 1898:95

Botryoglossum platycarpus Harvey 1853:100

This species is found in greater or less abundance at North Bay, Sunset Bay, and the Lighthouse Reef. Tetrasporic plants obtained from the minus one foot tide levels on rocks and epiphytic on *Cystoseira*.

POLYSIPHONIA CALIFORNICA Harvey 1853:48

Polysiphonia atrorubescens Harvey 1862:168

Polysiphonia tenuistriata. Phyco. Bor.-Amer. No. 1850.

Found in pools at the Old Jetty, Squaw Island, and North Bay and on the docks at Charleston, North Bend, and Marshfield. Antheridia, cystocarps, and tetraspores in July.

POLYSIPHONIA COLLINSII Hollenberg 1944:481

Polysiphonia Sancti-Petri Collins. Phyco Bor.-Amer. No. 2247

On rocks at plus eight foot levels at Middle Bay and Lighthouse Reef.

POLYSIPHONIA HENDRYI Gardner 1927f:101

Epiphytic on *Egregia Menziesii* at the Old Jetty, Coast Guard rocks, Mussel Reef, Lighthouse Beach, Squaw Island, Sunset Bay, North Bay, and South Bay.

POLYSIPHONIA PACIFICA Hollenberg 1942:777

Collected from wharves at Charleston and North Bend, and from logs and stones at Empire, all stations within Coos Bay.

PTEROSIPHONIA WOODII (Harvey) Hollenberg 1942:533

Pterosiphonia Woodii (Harvey) Falkenberg 1901:274

Polysiphonia Woodii Harvey 1853:52

Found at South Bay, North Bay, Sunset Bay, Lighthouse Beach, Bassendorf Beach, growing epiphytically on various members of the Laminariales, but most frequent on *Cystoseira*. Cystocarpic plants in June, July, and August.

PTEROSIPHONIA BIPINNATA (Postels and Ruprecht) Falkenberg 1901:273

Polysiphonia bipinnata Postels and Ruprecht 1840:22

Pterosiphonia robusta Gardner 1927f:102

Found at South Bay, North Bay, and Sunset Bay.

PTEROSIPHONIA DENDROIDEA (Montagne) Falkenberg 1901:268

Polysiphonia dendroidea Montagne 1837:353

Lighthouse Beach and Sunset Bay; only sterile plants collected.

PTEROSIPHONIA GRACILIS Kylin 1925:72

Tunnel Point, at the south end of Bassendorf Beach, and South Bay are the only stations from which this species has been collected.

HERPOSIPHONIA GRANDIS Kylin 1925:74

Pterosiphonia dendroidea Collins, Holden, and Setchell. Phyco. Bor.-Amer. No. 1146.

Pterosiphonia plumula Collins, Holden, Setchell. Phyco. Bor.-Amer. No. 1798

Collected only at Sunset Bay.

RHODOMELA LARIX (Turner) C. Agardh 1822:376

Fucus larix Turner 1819:23

At Mussel Reef, Squaw Island, Sunset Bay, North Bay, and South Bay; often conspicuous on flat rocks above beds of *Zostera* or *Phyllospadix*; also found hanging from higher rocks in somewhat sheltered positions.

ODONTHALIA FLOCCOSA (Esper) Falkenberg 1901:607

Fucus floccosa Esper 1797-1802:115.

Common to many stations, as Middle Bay, Squaw Island, Lighthouse Beach, and Mussel Reef, hanging from rocks at plus three to plus five foot levels.

ODONTHALIA LYALLII (Harvey) J. Agardh 1852:894

Rhodomela Lyallii Harvey 1862:168

Although not abundant, found at South Bay, Squaw Island, Lighthouse Reef, Lighthouse Beach, and Mussel Reef. Sometimes in association with *Odonthalia floccosa*.

ODONTHALIA WASHINGTONIENSIS Kylin 1925:76

Odonthalia semicostata Setchell and Gardner 1903:336

At South Bay, Middle Bay, North Bay, and Sunset Bay, where it grows at low tide level and in the larger tide pools.

LAURENCIA SPECTABILIS Postels and Ruprecht 1840:16

Laurencia californica Kuetzing 1849:857

Frequent in tide pools or on exposed rocks in the lower littoral zone at South Bay, Middle Bay, Sunset Bay, Squaw Island, and the Lighthouse Reef.

APPENDIX

COLLECTING STATIONS IN THE COOS BAY AREA

LOCATION No. 1

Docks at Marshfield, Oregon, near the head of Coos Bay and the entrance to Coos River.

LOCATION No. 2

The docks at North Bend, Oregon, about three miles from those at Marshfield.

LOCATION No. 3

Docks and wharves at Empire.

LOCATION No. 4

The Old Jetty that extends into the bay from near Fossil Point. The boulders that made up the jetty are now scattered and are exposed at minus tides. Among them are found many tide pools.

LOCATION No. 5

Fossil Point is a rocky projection extending into Coos Bay, near the entrance of South Slough. At low tide a sandy beach with scattered boulders is exposed.

LOCATION No. 6

Beach and piling in front of the Institute of Marine Biology. The piling is the remains of the support of the tracks used for conveying materials when the first jetties were under construction. The algal flora here is similar to that obtained from the wharves at Empire and Charleston. A large number of specimens are washed in on the beach.

LOCATION No. 7

The Charleston wharves and mud flats are on the west side of South Slough.

LOCATION No. 8

Coos Head is a rugged promontory, with a small sandy beach partly covered with talus boulders that vary in size from one foot to five or six feet in diameter. Near the rugged vertical rocks is an area of horizontal rocks, on which occur many tide pools. Coos Head is a rich collecting station.

LOCATION No. 9

The South Jetty of Coos Bay is composed of frequently shifting large rock masses that are exposed to the action of the open sea. This jetty has recently (1942) been rebuilt.

LOCATION No. 10

Bassendorf Beach is a broad sandy beach, extending southward from Tunnel Point to Mussel Reef. A small stream enters the ocean at the southern end of the beach.

LOCATION No. 11

Mussel Reef. A rocky promontory extending from the rugged coast line into the ocean. There are many tide pools and crevices that afford excellent collecting areas. The south side of the reef is exposed to heavy wave action.

LOCATION No. 12

Lighthouse Beach. The Lighthouse Beach extends southwesterly from Mussel Reef to the rocks in the immediate vicinity of the Cape Arago Lighthouse. This is a wide beach at low tide, with a few boulders at both the northern and southern limits; the

boulders at the southern limit are an extension of the rocks and boulders comprising the Reef. Great numbers of algae are washed onto the beach and after a storm this station is a very rich collecting ground.

LOCATION No. 13

Lighthouse Reef. This station comprises the boulders, some very large, in the region of the bridge crossing from the mainland to the lighthouse. There are some horizontal rocky surfaces, with tide pools, crevices, and channels; the vertical rocks at the outer limit of the reef are exposed to heavy wave action.

LOCATION No. 14

Squaw Island. This is a rocky island except at low tide; the surface toward the ocean is exposed to heavy surf, and on these rocks is found *Postelsia*.

LOCATION No. 15

Sunset Bay. At the southern boundary of the bay is an area of horizontal rocks with tide pools, crevices, and channels. There is a vertical rocky promontory that extends outward. Bounding the flat surfaces is another promontory, which on its outward face is exposed to heavy wave action.

LOCATION No. 16

North Bay lies north of the tip of Cape Arago. The collecting area is a vast field of boulders with interspaced tide pools and rocky beaches often bounded by ledges and deep water. The whole is protected from rough water by distant inaccessible ledges.

LOCATION No. 17

Middle Bay. On the south side of Cape Arago, this station is formed by a reef with three breaks in its seaward face, and is composed of small embayments, each about 50 to 100 feet across at the lowest tides.

LOCATION No. 18

South Bay is one of the best collecting stations. At low tide there is a wide rocky area exposed on which are many boulders. The horizontal area is somewhat tiered, the upper levels exposing tide pools of relatively large size. This area extends to a rugged vertical wall.

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PLATES

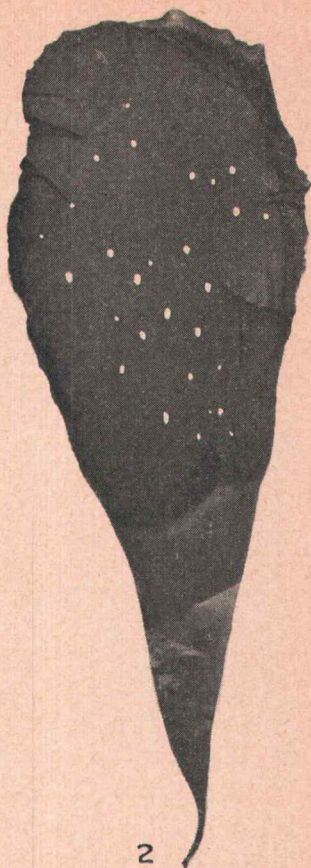
PLATE I

Figures 1, 2. *Rhodymenia pertusa* (Postels and Ruprecht) J. Agardh. X $\frac{3}{2}$

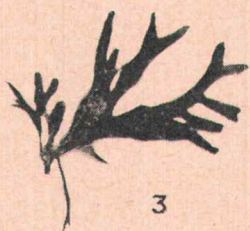
Figures 3, 4, 5. *Rhodymenia californica* Kylin. X $\frac{3}{2}$



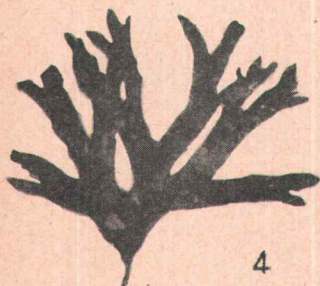
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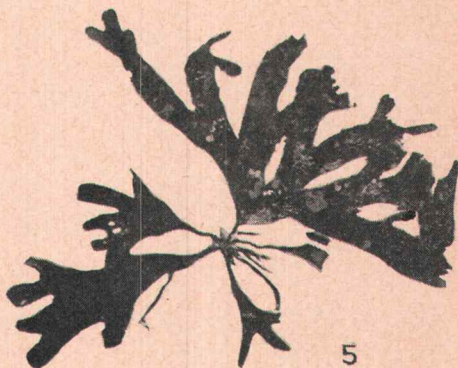
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PLATE II

Figures 1-5. *Rhodymenia pacifica* Kylin. X 8



PLATE III

Figures 1-5. *Rhodymenia palmata* f. *mollis*. Setchell and Gardner. X $\frac{3}{2}$

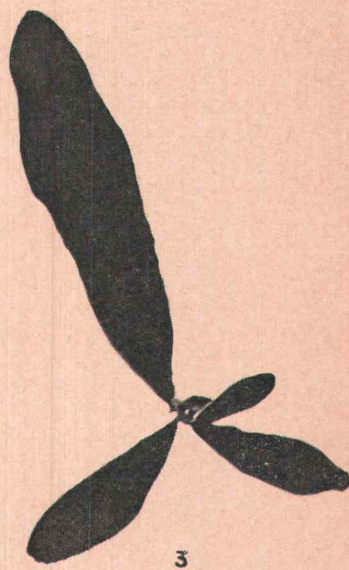
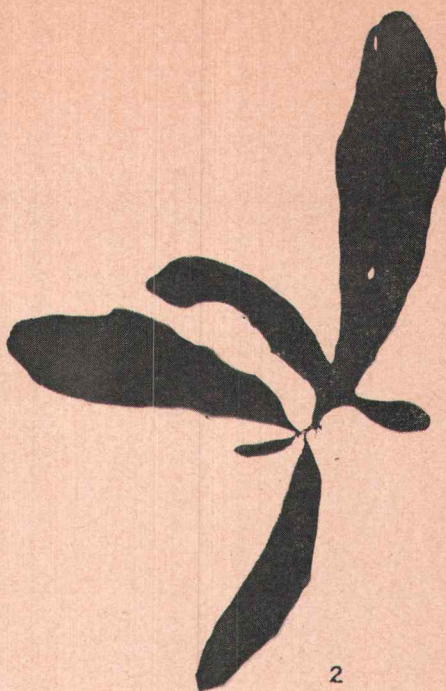
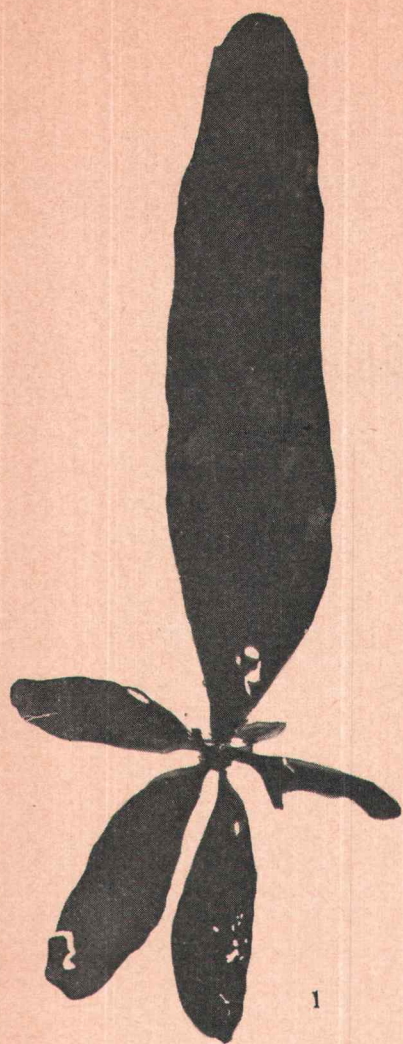


PLATE IV.

Figures 1, 2, 3. *Ceramium californicum* J. Agardh.

Fig. 1. Tip of branch X 80.

Fig. 2. Section below upper forking with cystocarp. X 90

Fig. 3. Nodes from lower part of plant. X 45

Figures 4, 5. *Ceramium Gardneri* Kylin

Fig. 4. Branching tip of plant. X 100

Fig. 5. Nodes from lower part of plant. X 55

Figures 6, 7. *Ceramium pacificum* (Collins) Kylin.

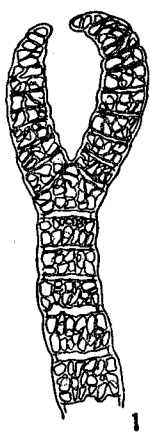
Fig. 6. Tip of a more slender branch. X 40

Fig. 7. Tip of branch with broader branches. X 50

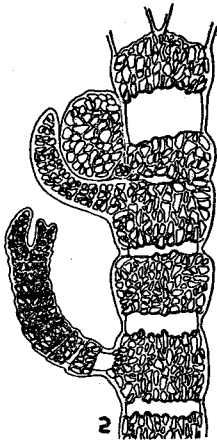
Figure 8. *Ceramium codicola* J. Agardh

Tips of branches. X 80

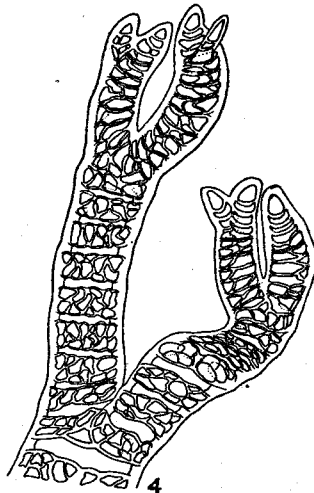
—The drawings made by Miss Elizabeth Ellsworth—



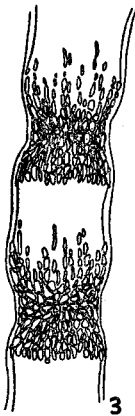
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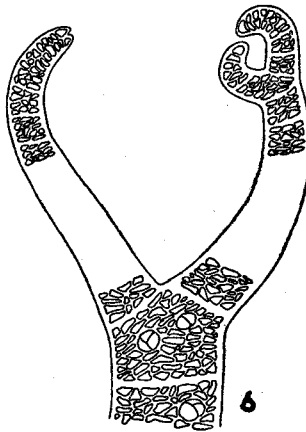
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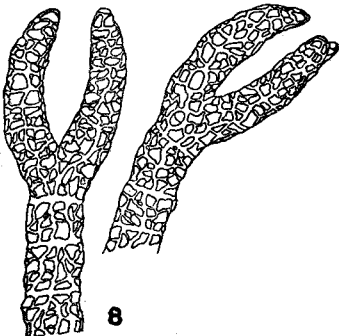
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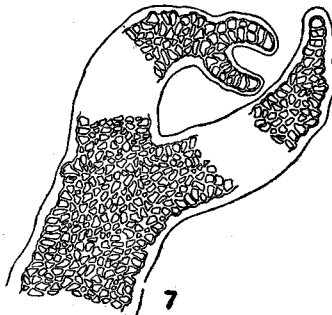
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6



8



7

INDEX

Synonyms are printed in *italics*.

	Page		Page
Aeodes Gardneri	14, 22, 36	Gardneri	16, 23, 42, 62-63
Ahnfeltia		pacificum	16, 23, 42, 62-63
concinna	15, 22, 39	<i>rubrum</i> var. <i>pacificum</i>	42
<i>gigartinoides</i>	39	<i>washingtoniense</i>	16, 23, 42
plicata	15, 22, 39	Ceratothamnion Pikeanum	41
Alaria	9, 47	Chlorophyceae	11, 12, 17, 18, 19
marginata	13, 21, 32	Chondrus affinis	40
valida	13, 21, 31, 32	Chordariales	11, 27
Antithamnion		Cladophora	
cf. tenuissimum	15, 23, 41	microcladioides	12, 20, 25
defectum	15, 23, 41	trichotoma	12, 20, 25
glanduliferum	15, 23, 41	Cladophorales	11, 25
uncinatum	15, 23, 40	Codium	
Apoglossum decipiens	43	fragile	12, 17, 20, 26, 42
Bangia		<i>mucronatum</i>	26
vermicularis	14, 21, 33	Setchellii	12, 20, 26
Bangiales	11, 33	Coilodesme	
Botryoglossum Farlowianum	16, 23, 44	bulligera	13, 20, 28
Bryopsis		californica	13, 20, 28
corticulans	12, 20, 26	Colpomenia sinuosa	13, 21, 29
Callophyllis		Compsonema secundum	13, 20, 28
flabellulata	14, 22, 36	Conferva flacca	19
<i>furcata</i>	36	Constantinea	9
heanophylla	14, 22, 36	simplex	14, 22, 35
marginifructa	15, 22, 37	Costaria	
megalocarpa	14, 22, 36	costata	13, 21, 28, 30
obtusifolia	15, 22, 36	Cryptonemia ovalifolia	14, 22, 36
Callithamnion		Cryptonemiales	11, 35
Pikeanum	15, 23, 41	Cryptopleura	
<i>subulatum</i>	41	<i>brevis</i>	44
Callymenia		<i>crispa</i>	16, 23, 44
californica	37	lobulifera	16, 23, 44
<i>phyllophora</i>	37	Ruprechtiana	16, 23, 44
Ceramium		<i>stenoglossum</i>	44
californicum	16, 23, 42, 62-63	violacea	16, 23, 44
codicola	16, 23, 42, 62-63	Cryptosiphonia Woodii	14, 22, 35
Eatonianum	16, 23, 42		

INDEX—Continued

Page	Page
Cumagloia Andersonii14, 21, 34	Fucales11, 32
Cyclosporeae32	Fucus8, 28, 31, 32
Cystoseira44, 45	evanescens f. cuneatus14, 21, 33
osmundacea14, 21, 28, 33	evanescens f. ecostatus14, 21, 33
Delesseria	evanescens f. oregonensis14, 21, 33
decipiens16, 23, 43	floccosa46
quercifolia var. linearis43	furcatus f. abbreviatus13, 21, 32
Desmarestia19, 30	furcatus f. angustus13, 21, 32
herbacea13, 17, 21, 30	furcatus f. elongatus14, 21, 32
intermedia13, 21, 29	furcatus f. luxurians14, 21, 32
latifrons13, 21, 29	furcatus f. typicus13, 21, 32
munda13, 21, 30	larix46
Desmarestiales11, 29	linearis39
Dilsea	palmata40
californica15, 22, 37	plicatus39
pygmaea37	Gelidiales11, 35
Ectocarpales11, 26	Gelidium
Ectocarpus	Coulteri14, 22, 35
acutus12, 20, 27	pulchrum14, 21, 35
confervoides12, 20, 27	Gigartina
granulosus12, 20, 27	Agardhii15, 22, 38
oviger12, 20, 27	Binghamiae15, 22, 38
siliculosus12, 20, 27	californica15, 22, 38
Egregia47	canaliculata15, 22, 38
Menziesii13, 21, 32, 45	corymbifera15, 22, 38
Elachistea fucicola13, 20, 27	cristata15, 22, 38
Endocladia35	exasperata38
muricata14, 17, 22, 35	mamillosa f. crista38
Enteromorpha8, 47	papillata f. crista38
crinita12, 20, 24	papillata f. dissecta38
intestinalis12, 17, 20, 24	radula f. exasperata38
linza24	radula f. typica38
micrococca12, 20, 24	volans15, 22, 38
minima12, 20, 24	Gigartinales11, 37
Erythrophyllum delesserioides15, 22, 37	Gloiopeltis furcata14, 22, 35
Farlowia mollis14, 22, 35	Gloiophloea confusa14, 21, 34
Fauchea10	Gloiosiphonia verticillaris14, 19, 22, 35
	Gracilaria
	Sjoestedtii15, 22, 39, 42
	Gracilariophila oryzoides15, 22, 39

INDEX—Continued

	Page		Page
Grateloupia californica	14, 22, 36	Laminaria	
Griffithsia	10	Andersonii	13, 21, 30, 31, 34
pacifica	16, 23, 41	cuneata	10
Gymnogongrus		cuneifolia	13, 21, 30
linearis	15, 22, 39	saccharina	13, 21, 30
tenuis	39	Sinclairii	9, 13, 21, 30, 48
Halicystis ovalis	12, 20, 26	Laminariales	11, 30
Halosaccion		Laurencia	
glandiforme	15, 17, 22, 40	californica	46
hydrophora	40	spectabilis	16, 17, 23, 46
Haplogloia Andersonii	13, 20, 28	Leathesia difformis	12, 17, 20, 27, 29
Hedophyllum	48	Lessoniopsis	42
sessile	13, 17, 21, 30	littoralis	13, 21
subsessile	13, 21, 31	Macrocystis	31
Herposiphonia grandis	16, 23, 45	integrifolia	13, 21, 30, 31
Heterochordaria abietina	13, 17, 21, 29	pyrifer a	13, 21, 31
Heterogeneratae	27	Mastocarpus corymbifera	38
Heteronema boreale	43	Membranoptera	
Hormiscia		dimorpha	16, 23, 43
penicilliformis	25	Mesogloia Andersonii	28
Wormskioldii	25	Microcladia borealis	16, 23, 43
Hymenena		Monostroma	8
fimbriata	44	aerolatum	25
flabelligera	16, 23, 43	zostericola	12, 20, 24-25
Fryeana	54	Myelophycus intestinalis f. tenue	13, 20, 29
Setchellii	16, 23, 43	Myriogloia Andersonii	28
Ilea	8	Myrionema primarium	13, 20
Fascia	13, 17, 21, 29	Nemalionales	11, 34
Iridaea		Nemalion Andersonii	34
heterocarpa	37	Nereocystis	34, 39
linearis	38	Luetkeana	13, 17, 21, 27, 28, 31, 41
Iridophycus	40	Neuroglossum lobuliferum	44
flaccidum	15, 22, 37	Nienburgia	
heterocarpum	15, 17, 22, 37	borealis	16, 23, 43
lineare	15, 22, 38		
Isogeneratae	26		

INDEX—(Continued)

	Page		Page
<i>latissima</i>	43	Polysiphonia	
<i>Nitophyllum</i>		<i>atrorubescens</i>	44
<i>Farlowianum</i>	44	<i>bipinnata</i>	45
<i>flabelligera</i>	43	<i>californica</i>	16, 23, 44
<i>Fryeanum</i>	44	<i>Collinsii</i>	16, 23, 45
<i>latissima</i>	43	<i>dendroidea</i>	45
<i>mirabile</i>	16, 23, 43	<i>Hendryi</i>	16, 23, 45
<i>Ruprechtiana</i>	44	<i>pacifica</i>	16, 23, 45
<i>violaceum</i>	44	<i>Sancti-Petri</i>	45
<i>Odonthalia</i>	28, 40	<i>senticulosa</i>	44
<i>floccosa</i>	16, 23, 46	<i>tenuistriata</i>	44
<i>Lyallii</i>	16, 23, 46	<i>Woodii</i>	45
<i>semicostata</i>	46	Porphyra	
<i>washingtoniensis</i>	16, 23, 46	<i>miniata</i> f. <i>cuneiformis</i>	14, 21, 34
<i>Opuntia</i> <i>californica</i>	15, 22, 37	<i>naia</i>	14, 21, 34
<i>Pelvetia fastigiata</i>	33	<i>Nereocystis</i>	14, 21, 34
<i>Pelvetiopsis</i>	35	<i>occidentalis</i>	14, 21, 34
<i>limitata</i> f. <i>typica</i>	14, 21, 33	<i>perforata</i>	14, 21, 33
<i>Phaeophyceae</i>	11, 12-14, 17, 18, 26	<i>pertusa</i>	40
<i>Phaestrophion irregulare</i>	13, 20, 28	<i>Porphyrella Gardnerii</i>	14, 21, 34
<i>Phyllospadix</i>	34	<i>Postelsia</i>	9, 31, 48
<i>Pikea</i>		<i>palmaeformis</i>	13, 21, 31
<i>californica</i>	14, 22, 35	<i>Prionitis</i>	9
<i>Woodii</i>	35	<i>Andersonii</i>	14, 22, 36
<i>Platythamnion</i>		<i>lanceolata</i>	14, 22, 36
<i>heteromorphum</i>	41	<i>Lyallii</i>	14, 22, 36
<i>heteromorphum</i> f. <i>reversum</i>	41	<i>Pterochondria Woodii</i>	16, 23, 45
<i>heteromorphum</i> f. <i>typicum</i>	41	Pterosiphonia	
<i>pectinatum</i>	15, 23, 41	<i>bipinnata</i>	16, 23, 45
<i>reversum</i>	15, 23, 41	<i>dendroidea</i>	16, 23, 45
<i>villosum</i>	16, 23, 41	<i>gracilis</i>	16, 23, 45
<i>Pleurophycus Gardneri</i>	13, 21, 30	<i>plumula</i>	45
<i>Plocamium</i>		<i>robusta</i>	45
<i>coccineum</i>	39	<i>Woodii</i>	45
<i>pacificum</i>	15, 22, 39	<i>Pterygophora californica</i>	13, 21, 31
<i>violaceum</i>	15, 22, 39	Ptilota	
<i>Polyneura latissima</i>	16, 23, 43	<i>californica</i>	16, 23, 42
		<i>densa</i>	42
		<i>filicina</i>	16, 23, 42
		<i>hypnoides</i>	16, 23, 43
		<i>pectinata</i>	16, 23, 42

INDEX—(Continued)

	Page		Page
Pugetia fragilissima	14, 22, 36	lomentaria f. typicus	13, 17, 20, 29
Punctariales	11, 28	Siphonales	11, 26
Pylaiella unilateralis	12, 20, 26	Soranthera ulvoidea	13, 20, 28
Pyropia californica	34	Spongomorpha	
Ralfsia		arcta	12, 20, 25
fungiformis	12, 20, 27	coalita	12, 20, 25
verrucosa	12, 20, 27	Mertensii	12, 20, 25
Rhizoclonium	8	saxatilis	12, 20, 25
riparium	12, 20, 26	spinescens	12, 20, 25
tortuosum	12, 20, 26	Stenogramme	
Rhodochorton		californica	15, 22, 39
Rothii	15, 23, 40	interrupta	39
tenue	40	Sterocolax decipiens	39
Rhodomela	28	Trentepohlia odorata	12, 19, 20
larix	16, 23, 46	Turnerella pacifica	37
Lyallii	46	Ulothrix	
Rhodophyceae	11, 14-16, 17, 18, 33	flacca	12, 19, 20
Rhodymenia		pseudoflacca	12, 19, 20
californica	15, 22, 40, 56-57	Ulotrichales	11, 19
palmata f. mollis	15, 22, 40, 60-61	Ulva	29
pacifica	15, 22, 40, 58-59	expansa	12, 20, 24
pertusa	15, 22, 40, 56-57	fasciata f. expansa	24
Rhodymeniales	11, 40	fasciata f. taeniata	24
Sarcophyllis		fenestrata	12, 20, 24
californica	37	Lactuca	12, 17, 20, 23
californica f. pygmaea	37	linza	12, 17, 20, 24
pygmaea	37	taeniata	12, 20, 24
Schizymenia pacifica	15, 22, 37	Ulvaes	11, 19
Scytosiphon		Urospora	
lomentaria f. cylindricus major		penicilliformis	12, 20, 25
.....	13, 21, 29	Wormskioldii	12, 20, 25
		Zostera	34