NATIVE AND INTRODUCED HYDROIDS (CNIDARIA: HYDROZOA) FROM THE MARINE AND ESTUARINE WATERS OF COOS COUNTY, OREGON

by

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A THESIS

Presented to the Department of Biology
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Science

June 2020

An Abstract of the Thesis of

Jackson T. Hoeke for the degree of Bachelor of Science
in the department of Biology to be taken June 2020

Title: NATIVE AND INTRODUCED HYDROIDS (CNIDARIA: HYDROZOA)

FROM THE MARINE WATERS OF COOS COUNTY, OREGON

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Primary Thesis Advisor

Introduced species are among the greatest environmental threats to biodiversity today. Compounding this threat is the lack of taxonomy and systematics surrounding many invertebrate groups, making identification of non-native species difficult if not impossible. One of these often-understudied taxa is hydroids. Due to their small size, cryptic nature, and perceived difficulties in identification, hydroids are easy to overlook; even when seen, they are often ignored. In this study, 35 species of hydroids from 15 families were collected from the waters in and near Coos County, Oregon and identified to species level. Of these species, 1 was found to be introduced, 2 species were found to be cryptogenic, and 10 species were new records for Oregon waters. These data mark a significant step forward in understanding Oregon's hydroid diversity and in recognizing the scale of bioinvasions occurring in the region and the hazards they pose.

Acknowledgements

I would like to thank Dr. Craig Young for his wonderful support and guidance that made this research project possible, as well as his work editing this thesis. I would also like to thank Dr. Brendan Bohannan and Dr. Daniel Rosenberg for their advice in writing and defending this work. I would like to extend special thanks to Dr. James T. Carlton for his dedicated and invaluable help in researching and writing on invasive species, and Dr. Henry Choong, whose guidance and knowledge on hydroids helped me overcome many hurdles. A special thanks must also be extended to Dr. Dave Bilderback for his generous donation of hydroid specimens as well as his advice and materials that guided me through this project. I would also like to thank the professors at O.I.M.B. that collected and donated specimens, including Dr. Richard Emlet, Dr. Maya Watts, Dt. Svetlana Maslakova, and Nancy Treneman. Additional thanks go to Caitlin Plowman and Lauren Rice for their fantastic guidance while working in the Young Lab. The Robert D. Clark Honors College deserves thanks for providing me the tools to write this thesis. Finally, I would like to thank my friends and family, especially Scottie Albrecht, Fiona Curliss, Anaahat Bala and Sarah Geddry who have supported and helped me during the process and without whom I would not be here now.

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Introduction

Environmental concerns in the marine biosphere include climate change and pollution by nutrients, plastics, pharmaceuticals, and other contaminants. The movement of species to new regions of the world is yet another of these aspects and among the oldest environmental issues that can be attributed to humans. Humans have been transporting species out of their native ranges for millennia (Carlton 1996), but in the present day, species can be transported across the globe in less than 24 hours. Species transported out of their native range are referred to as introduced, non-indigenous, alien, exotic, or non-native species. There are many different vectors that non-native species may use to travel, especially for marine organisms. Marine species can attach themselves to the hulls or other niche areas of ships in port, thereby hitchhiking across the globe. Ballast water is another method of transportation where both the larvae and often adults of marine species can be transported in a safe, enclosed space where they may be free to grow, develop, and reproduce only to be released in a new region thousands of kilometers away (Carlton & Geller 1993).

The many vectors of human-assisted dispersal make introduced species difficult to control, and even more difficult is identifying when a species has invaded (Carlton 1996). Detecting new invasions may be relatively easy if the species in question is large, distinctive, or has a strong and immediate effect on the environment. However, many introduced species do not have these characteristics. They may be small, obscure, and their effect may take many years to recognize. Even if the impact is significant, it

may remain unnoticed even by experts if they are not looking for a certain phenomenon. If an invasion is unrecognized for many years, it may have significant ecological ramifications that can only be inferred from data on the invader in its native range (Carlton & Geller 1993). Further, once an introduced species is established it is often very difficult, if not impossible, to eradicate. This is especially true of marine organisms, which may release hundreds to thousands of larvae into the water, where they may disperse for many kilometers. Even if the adult population is extinguished, larvae and juveniles may simply repopulate the region as soon as the next year. It is of the utmost importance to identify introductions in order to remove them if possible, counteract their ecological damage, and ensure they do not invade other regions (Carlton & Geller 1993).

Literature on Marine Biological Invasions

There has been an eruption of literature regarding introduced species in the last several decades. Work by Carlton and Geller explored the role of ballast water as an invasion mechanism in a study of Japanese ships arriving in Coos Bay. The study recorded 367 distinct taxa within the ballast water that encompassed all major marine trophic groups (Carlton & Geller 1993). In 2012, a Japanese dock torn off from the 2011 Great East Japan Earthquake and Tsunami landed near Newport, Oregon, bringing with it many living non-native species which had made their way across the Pacific. This was only the beginning, as buoys, vessels and many other objects teeming with nearly 400 live Japanese species made their way to the Hawaiian Islands and west coast of North America (Carlton et al. 2018). This event made clear the ability of species to persist through long periods of high disturbance to reach new regions.

Other recent studies include vast checklists of taxa in highly trafficked ports (Amor et al. 2016, Çinar et al. 2014, Mead et al. 2011) that track both cryptogenic and introduced species. These studies work synergistically to bring data together that allows further studies to assess the risk of species and taxa visiting certain ports. Additionally, they can assess which vectors are most likely to introduce them (Hayes et al. 2005). Other studies have built databases that can be managed to track the presence of invasive species both nationally and worldwide (Molnar et al. 2008). However, with the number of introduced species worldwide and the sheer volume of international travel, more data are needed, especially for taxa that tend to go unnoticed when they are introduced, such as diatoms, protists, flatworms, nematodes, hydroids, and many other groups (Carlton & Geller 1993). This problem is compounded by incomplete taxonomy and systematics for many groups, making identification difficult.

Natural History and Invasion Potential of Hydroids

One taxon infamous for marine invasions is the Hydrozoa. Hydroids are a life stage in many species of hydrozoans, a class within the phylum Cnidaria which includes sea anemones, jellyfish, and corals. Hydroids are sessile, often colonial polyps that are attached to hard substrata, such as seaweeds, rock or wood, and use tentacles with stinging cells to capture small plankton or organic material. This class of organisms is incredibly diverse, with differences in reproduction, defense, structure, and feeding (Bouillon et al. 2006). Hydroids are also notorious fouling organisms (Pyefinch 1950, WHOI 1952). They attach to the hulls of boats and are also common hitchhikers in ballast water (Carlton & Geller 1993). Due to these qualities they have a high potential to be transported and introduced, though they are often ignored because of their usually

small size and plant-like appearance. Furthermore, many species are cryptic and not commonly identified, even within the scientific community, because many species look very similar to the untrained eye (Gili and Hughes 1995). These traits lead to a potentially large group of highly effective colonizers that can travel around the world almost entirely undetected.

Although hydroids are relatively understudied, they are well-documented members of epiphytic and epizoic communities often characterized by intense competition for space (Gili & Hughes 1995). Hydroids are among the first organisms to colonize hard abiotic substrata or other living organisms, and they may prevent colonization by other organisms through consumption of larvae (Gili & Hughes 1995). This settlement trend, in addition to the high capture rates recorded in experiments indicates that despite their relative anonymity, they play an important role in marine food webs. Furthermore, hydroids have a significant economic impact, as they can foul docks, ship hulls, and may persist in self-contained aquaculture installations even under high-stress conditions (Gili & Hughes 1995).

Because of their often cryptic nature and the perceived difficulty in identifying them, many hydroid species have been misidentified, overlooked, or even assumed to be native. An example of the difficulties arising from this scenario is presented in a study in which specimens of the hydrozoan genus *Cordylophora* were sampled from introduced populations around the world, including Coos Bay. The number of species of *Cordylophora* had previously been under debate due to conflict in species level classification and the environmental conditions required for the establishment of each species. The study revealed four main lineages, each with a distinct salinity range, but

with some introduced populations containing several different lineages, indicating repeated introductions in some regions (Folino-Rorem, Darling & D'Ausilio 2009). Such complex invasions are just one of many occurrences around the world, including Coos Bay.

History of the Study of Hydrozoa on the Oregon Coast

There have been few studies of Hydrozoa in Oregon, and no comprehensive study of hydroid diversity has ever been undertaken. Fraser (1937, 1948) provided a number of records for hydroid species from the rocky shores and bays, including the first record of the introduced species *Ectopleura crocea*, collected from Coos Bay in 1942 (although Fraser did not mention its non-native status). McCormick (1965), based upon Master's thesis work at Oregon State University, reported 25 species of hydroids from offshore waters of the Oregon coast, to depths of 2099 meters, including 12 new records for Oregon. McCormick (1969), based upon PhD work also at OSU, recorded 11 species of hydromedusae in Yaquina Bay. Since McCormick's studies, very little work has been done on Oregon hydroids over the past 50 years. Goddard (1984) mentioned several species of hydroids from Cape Arago and Coos Bay as the prey of nudibranchs. Carlton and Hodder (1995) reported *Tubularia crocea* (now *Ectopleura crocea*) and *Obelia* sp. From Coos Bay fouling communities. Based upon collections made in 1997 by JT Carlton, Wrobel and Mills (1998) and Mills and Rees (2000) reported the hydromedusae of *Blackfordia virginica* from Coos Bay. Hewitt and Goddard described a new species of anthoathecate hydroid, *Candelabrum fritchmani,* from Cape Arago (2001). Mills et al. (2007) mention in passing records of *Halimedusa typus* and *Eperetmus typus* from Coos Bay, as well as other hydroids on the Oregon

coast, including *Proboscidactyla flavicirrata*, *Euphysa* sp., *Melicertum octocostatum*, *Sertularella fusiformis*, and *Climacodon ikarii* (the latter is regarded as a probable introduction; Carlton JT, personal communication, 2020). Folino-Rorem et al. (2009), reported on the genetics of *Cordylophora lacustris* in Coos Bay. Calder et al. (2014) recorded *Clava multicornis* from the Coos Bay estuary, and, most recently, Zeman et al. 2018 studied the trophic ecology of *Velella velella* on the Oregon coast.

Methods

Collection

This study examined the hydroid species of Coos County and nearby marine waters, describing the biogeographic status of each species found during the study. I collected hydroid specimens from the Coos Bay Area both by hand and by dredging during the spring and summer of 2019. I collected these specimens from nearshore habitats such as the rocky intertidal and docks, as well as offshore habitats using a box dredge. The study sites included South Cove and Middle Cove of Cape Arago, the jetty at Bastendorff beach, Qochyax Island, O.I.M.B. beach property, and F dock of the Charleston Boat Basin Harbor. Subtidal dredging took place at ~30.5 meters depth several kilometers off Cape Arago using a box dredge deployed from the *R/V Pluteus*. In addition to specimens I collected, I also received hydroids from several individuals. Nancy Treneman provided live specimens from Five Mile Point near Bandon, OR in June 2019. Dr. Henry Choong provided *Obelia griffini* specimens preserved in 80% EtOH from the Bastendorff Jetty during June 2019. Drs. Richard Emlet and Maya Watts provided both specimens and opportunities for collection during their Invertebrate

Zoology class in spring 2019. Dr. Svetlana Maslakova provided specimens retrieved from the Bastendorff Jetty after use in her comparative embryology class during spring 2019. Finally, Dr. Dave Bilderback provided both SEM stub mounting supplies and an extensive collection of air-dried specimens collected from the beaches of Bandon, OR, over a period of ~10 years.

Materials and Methods

All hydroid specimens were identified using dichotomous keys in *The Light and Smith Manual, 4th Edition* and Fraser's *Hydroids of the Pacific Coast of Canada and the United States.* These keys were supported by hydroid identification guides in Lamb's *Marine life of the Pacific Northwest*, as well as the website *World Register of Marine Species (WoRMS),* which assisted in supporting taxonomic consensuses found in these works and clarified the current taxonomy for each species.

Specimens were photographed using an iPhone7 camera application to provide an image of the entire specimen and an Flea3 camera attached to a dissection microscope that provided magnified color images. Living specimens or specimens with soft tissue were preserved using formalin, followed by an ethanol dehydration series of 70%, 80%, 95%, 100%, and another 100% EtOH in order to preserve the soft tissue structure for Scanning Electron Microscopy (SEM). After ethanol treatments, specimens were dehydrated using a critical point dryer. Several specimens were not preserved this way, as they were received already air-dried. Dehydrated specimens were prepared for SEM by mounting onto a stub using silver-based paint for high conductivity. Stubs were labeled and coated in a thin gold film for conductivity using a sputter coater before being examined under a Tescan SEM. SEM uses electrons to

produce high-quality images that show the 3-dimensional structure of specimens at hundreds of times magnification, giving a clearer image of many small, defining species characteristics.

All material used in this study has been deposited in the laboratory of Craig Young. Species recorded are treated in detail below. Data includes collection location, systematics, description based both on literature and current specimens, historical records from the northeast Pacific, global distribution, and prior introductions, if any.

Results

Thirty-five species of hydroids in 15 families were identified from Coos County. Of these species, 1 species: *Ectopleura crocea,* was an invasive species, 2: *Coryne eximia* and *Obelia longissima* were cryptogenic, and no fewer than 10: *Schuchertinia milleri, Campanularia denticulata, Clytia paulensis, Halecium speciosum, Halecium washingtoni, Sertularella conella, Symplectoscyphus pinnatus, Abietinaria rigida, Abietinaria thuiarioides,* and *Symplectoscyphus tricuspidatus* were new records for Oregon. Appendix A presents a key to the species found. Appendix B is a detailed treatment of each species, and Appendix C includes figures of Coos County hydroids.

Discussion

Importance of Taxonomic Studies

Many of the new species records for Oregon were retrieved via dredging several kilometers off Cape Arago. This is further striking evidence of the lack of research directed towards subtidal invertebrates of Oregon and of hydroids specifically. Work by

Cottrell (2013) points out that Oregon emphasizes studies on commercially harvested species, and that when publications measuring biodiversity are prepared, they are usually prepared in Washington or California, making their application in Oregon potentially somewhat limited. This trend corresponds with many of the new records in this study, which involve species reported from Washington and/or California. Despite an absence of data from Oregon, they are treated in the literature as continuous populations. This lack of baseline data, not only in subtidal, but in intertidal, estuarine, and fouling populations underscores the lack of baseline data and thus the ability to undertake rigorous biodiversity and management assessments of regions such as Coos Bay. Without an understanding of the baseline biodiversity, it is difficult to track the introduction and establishment of new introduced species.

The identification of native and non-native species contributes to maintaining a taxonomic understanding of regional biotas. An understanding that is in many cases incomplete (Carlton & Geller 1993). Although the apparent minutiae of systematics for many taxa are often underappreciated, it is in fact rigorous taxonomic (including genetic taxonomy) work that has the potential to reveal hitherto unknown populations and assess taxonomic relationships. These kinds of data can provide evidence as to how certain cryptic species complexes are related and how they have historically spread. These range expansions may occur slowly via natural processes, such as the cosmopolitan hydroid *Plumularia setacea* (Schuchert 2014), or rapidly through anthropogenic vectors such as for the hydroids *Cordylophora* spp. (Folino-Rorem, Darling & D'Ausilio 2009) and *Coryne eximia* (Schuchert 2005). Given enough data over time, this type of study may also have the potential to assess how species' ranges

change over time in the wake of climate change (Gravili, Cozzoli & Boero 2017). Such data can highlight shifts in biodiversity that have the potential to alter ecosystems and potentially lead to further invasions (Simberloff & Von Holle 1999).

Ecological effects

Introduced species can damage ecosystems into which they are introduced to by competing with native species and reducing resources available to those species (Dukes & Mooney 1999). Studies on competition between native and introduced sessile organisms such as seagrass and algae have shown that non-native species are often poor competitors with established native species who share the same ecological habitat and resources. However, non-natives tend to be excellent primary colonizers immediately after a disturbance occurs (Bando 2006, Scheibling & Gagnon 2006). In these studies, the introduced species in question were not only able to invade recently disturbed habitat but were also able to successfully reduce settlement by native species in the same habitat which otherwise may have outcompeted them. The invaders then became the dominant species, radically altering the ecosystems they settled in.

Hydroids tend to be excellent primary colonizers (Gili & Hughes 1995), making them ideal invaders. Species such as *Obelia longissima* can impact fouling communities by dominating cover and making settlement difficult for other native organisms (Hayes et al. 2005). The non-native hydroid *Ectopleura crocea*, present in Coos Bay, has been observed to initially dominate fouling surfaces with up to 60% cover. Although larval mussels can settle on *E. crocea* stems, this appears to be a consequence of nudibranch feeding on the hydranths, rendering the hydroid unable to feed (Okamura 1986). Other

studies have shown that if hydranths continue to persist, they can feed on settling mussel larvae, impacting settlement (Fitridge 2013).

These issues are further exacerbated by the effects of climate change. Studies by Sorte, Williams & Zerebecki 2010 indicate introduced species tend to have a resistance to warmer waters, meaning marine fouling communities are threatened by domination of non-native species as ocean temperatures increase. Anthropogenic disturbances such as global warming, pollution, and ocean acidification may critically alter fouling communities such as the ones in Coos Bay, leading to the establishment of new invasions and the resulting inability of native species to settle and compete. These issues are further exacerbated by what has been termed 'invasional meltdown' (Simberloff & Von Holle 1999), where introduced species can facilitate the introduction of other alien species, leading to further invasions and significant changes to the ecosystem. As primary colonizers hydroids can also become food and habitat for secondary colonizers (Gili and Hughes 1995).

Economic effects

In addition to ecological ramifications, introduced hydroids could potentially have severe impacts on local aquaculture such as the commercial oyster farms in Coos Bay. The shells of cultured shellfish, in addition to associated equipment such as ropes, weights, and floats can all be colonized by fouling organisms such as hydroids. These fouling organisms often have characteristics associated with aggressive taxa, often with cosmopolitan distributions and the ability to survive shipping and new locales (Fitridge et al. 2012). Species such as these, spread by anthropogenic means, have been referred to as "neocosmopolitan" species by Darling and Carlton (2018). Hydroids tend to

negatively impact shellfish production by colonizing the surfaces of shellfish such as oysters and preventing the valves from opening and closing properly, which negatively impacts feeding rates (Fitridge et al. 2012).

One of the more widespread non-native species examined in this study, *Ectopleura crocea*, has been studied as a fouling organism in shellfish aquaculture in Australia, where it has been found to significantly impact the survival of the mussel *Mytilus galloprovincialis*. Not only were *E. crocea* colonies found to feed on mussel larvae, impacting settlement rates, but they also severely impacted juvenile mussel growth. Fouling was found to cause 4% reduction in length and a 23% reduction in flesh weight. This can negatively affect young mussels by slowing growth and impacting their ability to produce larvae (Fitridge & Keough 2013). Masses of *Ectopleura crocea* can also increase drag, pulling mussel stock from the culture lines they are grown on and reducing total mussel count when the lines are pulled up to be harvested. These effects have negative consequences on mussel aquaculture in multiple stages of the mussel's life history, significantly impacting aquaculture production over an extended period (Fitridge & Keough 2013). Although the precise effects of *E. crocea* on oysters are not known, it can be inferred that *E. crocea* and similar introduced hydroids are likely to have detrimental effects on oysters and other shellfish aquaculture, making their presence in Coos Bay a potential economic threat.

Unknown impacts

Although it is possible to infer the effects that introduced species will have based on morphology, life histories, and similarities to other non-native species, this can only partially predict the impacts that new or unknown introductions may have (Carlton

& Geller 1993, Carlton 1996). Due to this inability to fully predict consequences, further hydroid introductions to Coos Bay may worsen existing problems such as nonnative competition and fouling, but they may also lead to effects that cannot be predicted, such as facilitating another invasion (Simberloff & Von Holle 1999). Cryptic additions such as *Coryne eximia*, which has been recorded from Oregon as early as 1969 (McCormick), yet not listed as introduced, bring potential risks which may persist for decades without detection.

Directions for Future Study

There are several key directions for future study on the biodiversity of hydrozoans of the Coos Bay region. Estuarine regions of Coos Bay, characterized by high sediment count, warmer temperatures, and low salinity were not sampled. These regions include South Slough and the small sloughs such as Isthmus, Catching, Kentuck and Coal Bank Sloughs, These regions support additional species, such as *Clava multicornis* found in Isthmus Slough (Calder, Carlton & Choong 2014), the hydromedusan *Blackfordia virginica*, also recorded in Isthmus Slough (Wrobels & Mills 1998, Mills & Rees 2000) where it still occurs (JT Carlon, personal communication 2020), and *Cordylophora caspia*, found in Kentuck Slough and documented as “clade 2B” by Folino-Rorem, Darling & D’Ausilio (2009). More broadly, there was no sampling of any kind done outside of Coos County. Comapring the hydrozoan fauna of the Coos Bay – Cape Arago region to other bays and rocky shores of Oregon would be of great value.

An additional aspect deserving of future work is the seasonality of hydroids. Collections of live specimens occurred during the warmer part of the year, between the

months of April and August 2019. Furthermore, an ENSO event occurred that spring and summer, increasing temperatures further (NOAA Climate Prediction Center). Many hydroids are known to be seasonal, and although many seasonal hydroids grow and become reproductive in warm water, there are those which favor cold water (Gili & Hughes 1995). It would be worthwhile to sample during a different collection window such as the winter, or perhaps re-sample the same regions during a summer lacking an ENSO event.

Finally, characterizing the species treated here will be a key future direction. While morphologic identification is often satisfactory, the combined use of morphologic and molecular techniques significantly raises the confidence of positive identifications and creates a more nuanced understanding of systematics. Furthermore, there are many cryptic hydroid taxa in which molecular techniques are all but required to differentiate species, such as *Cordylophora* (Folino-Rorem, Darling & D'Ausilio 2009). The addition of such techniques would have led to a more complete understanding of the taxonomic relationships of the species and populations examined in this study.

Conclusion

Although this study revealed introduced species and new documentation for many native species in Oregon, much work remains to be done. Future studies are likely to record more species, especially subtidal species, which are so poorly documented in Oregon. With the world facing climate change, the impact and threat of introduced species may grow exponentially, especially for busy ports such as Coos Bay. The

assumption that knowledge of marine organisms in surrounding regions is sufficient to understand how biodiversity is changing locally, such as in Coos Bay may lead to erroneous conclusions. Fundamental will be continuing invertebrate biodiversity surveys, with a special focus on abundant but neglected taxa in order to detect new invasions, monitor changes in native populations, and to understand how marine communities are changing.

Figure 1: Collection locations in Coos County, Oregon, USA. Red lines indicate dredging paths, while pins indicate shore collections.

Glossary of General Terms

Anthropogenic: Originating in human activity.

Ballast water: Fresh or saltwater held in the ballast tanks and cargo holds of ships to add weight to the vessel.

Cryptogenic: Of uncertain origin; a species that cannot be confidently assigned to a native or introduced status.

Diatom: Single-celled eukaryotic organism that has a cell wall composed of silica.

Dredging: The operation of excavating material from an aquatic environment.

Fouling organism: Any aquatic organism that attaches to the surface of a material immersed in the water.

Introduced species: Any species reported to become established outside of its native range. Synonymous with alien species, exotic species, nonnative species, and non-indigenous species.

Marine biosphere: All the parts of the ocean where life exists.

Sessile: Fixed in place and unable to move.

Substratum: An underlying layer or substance.

Synergistically: In a cooperative manner.

Taxa: A group of one or several populations that usually has a rank.

Vector: Any process by which a species is transported to a new region.

Glossary of Taxonomic Terms

Abcauline: Facing away from the stem or branch.

Aboral: Opposite to the location of mouth.

Actinula: A larva resembling a polyp and typically having two whorls of tentacles.

Adcauline: Facing towards the stem or branch.

Adnate: Fused together.

Annulation: Ringed constriction of the perisarc, frequently in series.

Campanulate: Bell-shaped.

Capitate: Tentacles which have an enlarged tip.

Coenosarc: A living cellular tube of ectoderm and endoderm connecting polyps of a hydroid colony.

Coenosteum: Stony calcareous exoskeleton secreted by the coenosarc.

Corbula: A protective basketlike structure that encloses several gonothecae and is composed of modified, leaflike hydrocladia.

Cusp: A toothlike projection; usually occurring as a series of prominences on the margin of a hydrotheca or gonotheca.

Cyclosystem: A series of dactylopores surrounding a central gastropore.

Dactylopore: Pore through which the defensive dactylozooid protrudes.

Diaphragm: A flat sheet of tissue at the base of the hydranth.

Erect: A hydroid colony in which upright stems bearing multiple hydranths arise from stolons.

Fascicled: See ‘polysiphonic’.

Filiform: Tentacles which are uniform in diameter or gradually tapering to the tip without knobs or rounded tips.

Gastropore: Pore in which the hydranth resides.

Gastrostyle: Projection that extends into the hydranth from the base of the gastropore.

Gonangium: The entire reproductive unit of a hydroid colony, including the gonotheca and gonophores.

Gonophore: A reproductive structure bearing the gonads.

Gonotheca: An extension of perisarc that protects and encloses the gonophores.

Hydranth: A feeding polyp, usually with a mouth and tentacles.

Hydrocaulus: The main stem of a hydroid.

Hydrocladium: An ultimate branchlet, arising from a stem or branch, and usually bearing one or more hydranths.

Hydrophore: A saucer-shaped hydrotheca that is too small to contain the contracted hydranth.

Hydrorhiza: A structure anchoring a hydroid to its substrate, varying from a system of stolons to an encrusting mat.

Hydrotheca: A cuplike extension of perisarc, usually capable of protecting and enclosing a hydranth.

Hypostome: A part of the hydranth surrounding the mouth.

Internode: A segment of a stem or branch, delimited at either end by a constriction or node, more appropriately called a segment.

Lateral nematotheca: A nematotheca occurring lateral to the hydrothecal aperture; usually occurs in one or more pairs.

Medusa: One of two body forms in the phylum Cnidaria, having a bell-shape with a stalklike manubrium in the center with a mouth on the end.

Monosiphonic: A single hydroid stem, not bundled with others.

Nematophore: A highly modified defensive zooid.

Oral: Referring to the mouth.

Operculum: A chitinous lid that closes the aperture of a hydrotheca or gonotheca; usually composed of one or more valves.

Pedicel: A stalk that supports a hydranth or gonophore.

Perisarc: The chitinous exoskeleton enclosing and protecting the living tissues of a hydroid.

Pinnate: A branching pattern in which branches lie in the same plane and branch in an alternating fashion, giving a fern-like appearance.

Polyps: One of two body forms in the phylum Cnidaria, having a cylindrical shape with a mouth surrounded by tentacles on the oral end, and an aboral end usually attached to substrata. Typically, the basic colony unit in hydroids.

Proboscis: An extensive organ which bears the mouth at its distal end.

Polysiphonic: Composed of two or more united tubes; a composite stem or branch (synonymous with “fascicled”).

Raceme: An unbranched projection bearing multiple reproductive structures.

Rugose: Symmetrically and deeply ridged.

Sporosac: A gonophore that never forms a medusa.

Stem: See “hydrocaulus.”

Stolon: A tube or coenosarc, covered with perisarc; basal stolons usually grow over the substrate and anchor the hydroid to its substrate.

Stolonal: A hydroid colony in which hydranths arise singly from stolons, either with or without a pedicel, and without an upright stem.

Valve: See “operculum.”

Whorl: A concentric circle.

Zooid: The basic unit of a colony.

Appendix A

A Key to some Hydroids of Coos County

Key to Genera

1. Hydranths protected by hydrotheca and gonophores protected by gonangia…….……..……Leptothecata 7
- Hydranths and gonophores not definitively enclosed by a chitinous extension of the perisarc……...……...……. Anthoathecata 2
2. Exoskeleton is not chitinous perisarc, but calcareous coenosteum, colored vibrant purple……..…….…….……*Stylantheca*
- Exoskeleton is a chitinous perisarc……..……..3

3. Tentacles are capitate and not in defined whorls……
……...*Coryne*
- Tentacles are filiform……...…….4
4. Colony lacks any perisarc…….……*Schuchertinia*
- Colony with perisarc……...……...…….5
5. Hydranths with a single whorl of tentacles.…….….6
- Hydranths with tentacles in two defined whorls, gonophores borne in grapelike clusters on racemes……*Ectopleura*
6. Proboscis trumpet-shaped……...……...……..*Eudendrium*
- Proboscis cone-shaped…….…….……*Garveia*
7. Hydrotheca reduced to a saucer-shaped hydrophore too small to fully contain a contracted hydranth…….…….……
Halecium
- Hydrotheca not a saucer-shaped hydrophore, able to fully contain a contracted hydranth……..…….8
8. Hydrotheca free from stem or branches……..……..…….……...9
- Hydrotheca sessile and adnate to stem or branch…….……..…….15
9. Hydrotheca tubular……...……...……10
- Hydrotheca campanulate……...…….……..…11
10. Colony stolonate, operculum composed of triangular valves…...…….*Calycella*
- Hydrotheca arising directly from erect or creeping fascicled stem, no operculum……..……...*Lafoea*
11. Colony erect……..
……...12
- Colony stolonal……..
……..….13
12. Stem and branches polysiphonic…….…….
……...…*Rhizocaulus*
- Stem and branches monosiphonic…….……...……*Obelia*
13. Hydrotheca with true diaphragm ……...……...…*Clytia*
- Hydrotheca without true diaphragm, and annular perisarcal thickening near base……...…...14
14. Hydrothecal walls with uniform perisarc…….*Campanularia*
- Hydrothecal walls with variable perisarc……..……*Orthopyxis*
15. Hydrothecae restricted to one side of stem or branches, nematophores are regularly present……..……16
- Hydrothecae are present on two or more sides of stem or branches…..……..17
16. Gonangia protected by corbulae…….…..……..*Aglaophenia*
- Gonangia not protected by corbulae, gonangia are long and ovate..…*Plumularia*
17. Hydrothecae with three to four marginal cusps and operculum of three to four valves……..…….18
- Hydrothecae with less than 3 marginal cusps and valves……...……...…...…20
18. Hydrothecae with 3 marginal cusps and operculum of 3 valves…….....19
- Hydrothecae with 4 marginal cusps and 4 valves……*Sertularella*

19. Gonothecae with spines distributed across at least the distal portion of the surface and marginal cusps……...… *Xingyurella*
- Gonothecae without spines distributed across surface…...……*Symplectoscyphus*

20. Colony relatively pinnate, hydrothecae flask-shaped, operculum of one valve …….. …….*Abietinaria*
- Colony not pinnate…….…….21

21. Colony unbranching, or all branches growing in roughly the same direction…….....*Amphisbetia*
22. Colony branches in various directions…….…..….*Sertularia*

Key to Species

Garveia……...…….*Garveia annulata*

Coryne……..……*Coryne eximia*

Eudendrium……...…….……*Eudendrium californicum*

Schuchertinia……..……*Schuchertinia milleri*

Stylantheca……..……..…*Stylantheca papillosa*

Ectopleura

1. Colony much branching, forming a bushy mass……*Ectopleura crocea*
- Colony very rarely branching…….…..….*Ectopleura marina*

Aglaophenia

1. Corbulae with eight to ten pairs of leaves……..*Aglaophenia latirostris*
- Corbulae with thirteen pairs of leaves……..….*Aglaophenia struthionides*

Campanularia

1. Hydrothecae deeply campanulate, gradually tapering, marginal cusps deep……...*Campanularia denticulata*
- Hydrothecae more tubular than campanulate, walls straight, do not gradually taper, marginal cusps rounded……...……*Campanularia volubilis*

Clytia

1. Hydrocaulus annuated and curved, marginal cusps not divided…*Clytia gregaria*

- Hydrocaulus long and relatively straight, marginal cusps divided into two points…….……....*Clytia paulensis*

Obelia

1. Colony small, less than 5 cm tall……...……...……*Obelia griffini*
- Colony large, up to 60 cm tall……..…..……*Obelia longissima*

Rhizocaulus……..……*Rhizocaulus verticillatus*

Orthopyxis……...……...*Orthopyxis compressa*

Calycella…….……*Calycella syringa*

Halecium

1. Ultimate branchlets and succession of hydrophores.…….*Halecium speciosum*
- Ultimate branchlets not a succession of hydrophores……...……2
2. Proximal portion of branches fascicled……...……*Halecium washingtoni*
- Branches not fascicled……..……*Halecium fraseri*

Lafoea……...……..*Lafoea dumosa*

Plumularia……..…..…*Plumularia setacea*

Sertularella…….…….*Sertularella conella*

Abietinaria

1. Colony strictly pinnate, hydrothecae flask-shaped…….……..……2
- Colony not strictly pinnate, hydrothecae tubular……..*Abietinaria thuiarioides*
2. Gonangia with longitudinal ridges……..*Abietinaria inconstans*
- Gonangia without longitudinal ridges…….……..3
3. Stem slender, gonangia on curved pedicels…….…...…*Abietinaria anguina*
- Stem thick, gonangia not on curved pedicels…….……...…4
4. Hydrotheca with long, curved neck……...…*Abietinaria abietina*
- Hydrotheca with hardly any neck……..…….*Abietinaria rigida*

Amphisbetia

1. Colony much branching in dense tuft…….…….*Amphisbetia greenei*
- Colony rarely branching, if ever……..…...*Amphisbetia furcata*

Symplectoscyphus

1. Cusps on hydrothecal margin equal……...…..*Symplectoscyphus tricuspidatus*
- Cusps on hydrothecal margin unequal…….…*Symplectoscyphus pinnatus*

Xingyurella……..…….*Xingyurella turgida*

Key made using resources from Carlton's *The Light and Smith Manual 4th ed.* (2007), Maronna et al. (2016), Fraser's *Hydroids of the Pacific Coast of Canada and the United States* (1937), and Boullion et al. *Introduction to Hydrozoa* (2006)

Appendix B

Systematic Notes on some Hydroids of Coos County

Order Anthoathecata (Cornelius, 1992)

Family Bougainviliidae (Lütken, 1913)

Garveia annulata Nutting, 1901

(Plate 1)

Systematic Account

Garveia annulata Nutting, 1901: 166-167, pl. 15, fig. 1, 2 (Yakutat and Sitka) [original description]. – Fraser, 1911: 22 [original records]. – United States Fish Commission, 1912 (San Francisco Bay) [original records]. – Fraser, 1914: 117, pl. 3, fig. 6 [original records]. – Fraser, 1935: 143 [original records]. – Fraser, 1936: 123 [original records]. Fraser, 1937: 33-34, pl. 5, fig. 19 [original records]. – Cooper, 1978 (Monterey Bay) [original records]. – Marine Biodiversity Class, 2016 (San Juan Island) [original records]

Bimeria annulata Torrey, 1902: 28, pl. 1, fig. 1, 2, 3 [original records].

Material: USA, Oregon, Coos County, Bastendorff Beach from rocky shore at low tide, colonies with sporosacs, collected May 27, 2019; O.I.M.B. Beach Property from rocky shore at low tide, collected June 3, 2019, Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019

Specimen Location(s)

This hydroid has been hand collected from the end of the south breakwater at Basterdorf Beach at low tide. It was also dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge, where it was found growing on the local gorgonian *Swiftia.* It has also been collected from the beach property of the Oregon Institute of Marine Biology, where it was growing on the exposed jetty at low tide. I was not able to

find this hydroid at Cape Arago South Cove, although it may be present on rocks in the very low intertidal.

Local Habitat

Found from the intertidal to a depth of 30 m. In the intertidal, this species is often found on the underside of rocks exposed only at low tides. Subtidal specimens grow on other substrate, such as the hard skeletons of gorgonians.

Description based upon Literature

Colony grows up to 50 mm in height (Fraser 1937), and the entire colony is a bright orange color (Nutting 1901). The stem is fascicled, “the various parts that go to make it up are more lightly held together than is usual in a polysiphonic stem” (Fraser 1937). Pedicels arise directly from the main stem, and occasionally from branches. The pedicels vary significantly in their length and annulations, which may be regularly annulated or merely wrinkled (Fraser 1937). The hydranths have a conical proboscis and roughly 16 erect tentacles (Nutting 1901). The gonangia are sporosacs are formed on the stem and stolons upon branch-like pedicels. The sporosacs are large, oval, and globular, covered in a thick perisarc (Fraser 1937). Found from a depth

Description of Coos County Material

The current material conforms in all respects with the above description. This hydroid is easily identifiable to the naked eye, as it is a bright orange color, and the specimens are often up to 5 cm in length. This species has a wrinkled or annulated perisarc visible under a microscope on the stem and branches, but not on the hydranths. The hydranths have roughly 16 tentacles and a short proboscis in the center. The stems and branches may have globular sporosacs if the colony is reproductive.

Colonies of *G. annulata* are often covered by the epifaunal hydroid *Campanularia volubilis*, which grows over the colony with creeping stolons.

Northeast Pacific Distribution

This species was originally described by Nutting from Yakutat and Sitka in Alaska (1901). Since that time, it has been reported from as far south as Catalina Island (Torrey 1902) and many locations in between. Fraser recorded this species in many regions along the Pacific Coast, including the Queen Charlotte Islands, Vancouver Island, the San Juan Channel, BC, Friday Harbor, WA, Heceta Head, OR, Dillon’s Beach, and San Francisco Bay, CA (1937). Found at depths of up to 117 m (Fraser 1937).

Global Distribution and Invasions

None reported. This species is sometimes confused with the species *G. franciscana*, which has an uncertain native region and disjunct global distribution, suggesting a possibly long history of invasions. *G. franciscana* can be distinguished from *G.*

annulata on a morphological basis, as it grows up to 300 mm, is horn-colored, and monosiphonic (Fofonoff et al. 2018).

Family Corynidae (Johnston, 1813)

Coryne eximia Allman, 1859

(Plate 2)

Systematic Account

Coryne eximia Allman, 1859: 141-144 [original description]. – Schuchert, 2001b: 773, figs 13A-D, 18B-C [redescription]. – Schuchert, 2005: 194-199 [discussion]. – Farrapeira, 2011: 89 [listed]. – Mead et al., 2011: 2466 [listed]. – Çinar et al., 2014: 679 [listed]. – Amor et al., 2016: 126 [listed].

Sarsia eximia Millard, 1959b, 241-242 [description]. – McCormick, 1969: 92 [listed]. – Brinkmann-Voss, 1989: 687, fig. 5 [original records]. – Hewitt et al., 2004: 192 [listed].

Syncoryne eximia Nutting, 1901: 166, pl. 14, fig. 3, 4 [original records]. – Torrey, 1902: 31 [listed]. Fraser, 1937: 28, pl. 3, fig. 11 [original records]. – Office of Coastal Environment, 1974: Ap. 3 [listed]. – Seapy and Littler, 1993: 282 [listed].

Coryne tenella Farquhar, 1894: 208, pl. 8, fig. 5 [original records].

Syncoryne tenella Bale & Chilton, 1923: 228-229 [original records].

Material: USA, Oregon, Coos County, Bastendorff Beach from rocky shore at low tide, colonies with gonophores, collected July 4, 2019; Charleston, Inner Boat Basin from fouling on floating dock, collected July 8, 2019

Specimen Location(s)

This species was found in the Charleston Boat Basin fouling the docks. It can also be found on the south jetty at Bastendorff Beach. I did not record this species at Cape Arago.

Local Habitat

Found in the intertidal on the sides and undersides of rocks, sometimes on algae or kelp stipes such as *Laminaria*. A common member of the fouling community on the Boat Basin docks in Coos Bay.

Description Based upon Literature

Colonies grow up to 4 inches tall in a tangled mass (Allman 1859). The pale pink stems (Allman 1959) are highly branched, but almost entirely on one side of the stem or branch, with irregular annulations throughout. These annulations may be wrinkles, and do not appear to the same extent at the extremes of the colony (Fraser 1937). The

polyps are up to 1.8 mm high, and a bright pink, with small carmine-colored spots of pigment in the coenosarcal cavity and stomach. They are of a cylindrical, club-like shape, with 20 to 30 capitate tentacles (Fraser 1937). There are 4 to 5 oral tentacles in a regular verticil immediately behind the mouth with the remainder scattered over the rest of the polyp down to the aboral 6th of the polyp (Allman 1859 and Schuchert 2001). The diameter of the capitulum is roughly twice that of the tentacle stalk. The gonophores bud at the upper axils of the lower tentacles on long peduncles with up to 3 per tentacle. Each bud forms an immature medusae, which is released and swims away (Allman 1859 and Schuchert 2001).

Description of Coos County material

The current material conforms in all respects with the above description. Colonies tend to be roughly 2 cm in height. Although they are slightly pink, algae may obscure them, especially in fouling communities. The colony grows in a bushy mass, with the stems branching several times. Under a microscope, the pink hydranths are quite prominent, and are equipped with around 20 short tentacles with very slight annulations and pronounced capitate ends. The gonophores are buds at the base of the hydranths, which may be a pale yellow to salmon-colored and have quadrilateral symmetry. If developed enough, they may begin to contract, and eventually be released as immature medusae and swim away.

Northeast Pacific Distribution

The original description comes from Allman, who reported it from the Firth of Forth (1859). It has been recorded from Juneau (Nutting 1901) and Petersborough in Alaska (Fraser 1937) as well as Pacific Grove (Torrey 1902) and San Francisco Bay, CA (Fraser 1937). Found up to a depth of 33 m (Fraser 1937). McCormick (1969) provides the first identification of the medusae from Yaquina Head, OR. The proposed Sanctuary Grant Award for South Slough in Coos Bay, OR (Office of Coastal Environment 1974) lists the hydroid in South Slough, but with no details and thus this record is difficult to verify. It is been reported from the Channel Islands in Southern California (Seapy and Littler 1993) and Vancouver Island, BC (Brinkmann-Voss 1989).

Global Distribution and Invasions

This species has been reported from the Northern European coast, the east and west coasts of North America, Chile, New Zealand (Farquhar 1894, Bale & Chilton 1923), Western Australia, the Mediterranean, Brazil, and Papua New Guinea (Schuchert 2001) as well as Japan and South Africa (Schuchert 2005). It is considered introduced in Australia (Hewitt et al. 2004), Brazil (Farrapeira 2011), South Africa (Mead et al. 2011), Turkey (Çinar et al., 2014) and Tunisia (Amor et al., 2016). Additionally, genetic sequencing and phylogenetic work on the Corynidae by (Schuchert 2005) demonstrates that *C. eximia* show a low sequence diversity, indicating the same species has global distribution. This suggests that the populations gained a global distibution very recently,

likely due to anthropogenic dispersal. Its common habitat on docks and pilings makes ship fouling and ballast water the most probable vectors.

The history of global records indicates that *C. eximia* is introduced to Coos Bay, and to the Pacific Ocean in general (Carlton JT, personal communication 2020). The native range may be northern Europe.

Family Eudendriidae (Ehrenberg, 1834)

Eudendrium californicum Torrey, 1902

(Plate 3)

Systematic Account

Eudendrium californicum Torrey, 1902: 32, pl. 2 fig. 13, 14 [original description]. – Fraser, 1911: 24 [original records]. – Fraser, 1914: 121, pl. 5, fig. 12 [original records. – Hargitt, 1927: 500, pl. 1, fig. 4 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1937: 39-40, pl. 6, pl. 27 [original records]. – Fraser, 1948: 197 [original records]. – Drury, 1954: 92 [original records].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, air-dried, collected in the last 10 years; Bastendorff Beach from rocky shore at low tide, collected April 23, 2019; Fivemile Point, rocky shore at low tide, collected May 27, 2019.

Specimen Location(s)

E. californicum has been found on the south breakwater at Bastendorff beach at low tide. Nancy Treneman donated specimens collected from Fivemile Point south of Coos Bay, and Dr. Dave Bilderback donated several specimens that had washed up on the beaches of Bandon.

Local Habitat

Found in the rocky intertidal. I collected or received no live specimens subtidally, but the presence of this species washed up on beaches in Bandon indicates colonies likely grow subtidally in parts of Coos County.

Description Based on Literature

Colony grows up to 14 cm and the perisarc is usually dark brown or even black (Torrey 1902). The perisarc is distinctly annulated throughout with very narrow annulations (Torrey 1902 & Fraser 1937). The stem grows from an “encrusting plate-like hydrorhiza” (Torrey 1902 & Fraser 1937). The branches are relatively short compared with the stem, and grow in all planes, making a wide angle to the stem, but distally turning to grow parallel to the stem. The hydranths grow from the branches, and are large and pink, with roughly 20 tentacles per hydranth. The female gonophores are

monothalamic and crowded immediately proximal to the hydranth. Each gonophore contains a single bright orange ovum. The male gonophores are dithalamic in two or three whorls proximal to the hydranth. They are pink with a green spadix (Torrey 1902 & Fraser 1937).

Description of Coos County Material

This species is highly distinct, with long, mostly straight stems up to 8 cm or even more that grow from a hard hydrorhiza plate attached to the rock. Branches grow from all directions, and each branch grows at a wide angle, but turn to grow parallel to the stem. Each branch has several small branches, each of which bears a single hydranth. The perisarc is dark brown or even black at the base and through most of the stem and branches. The ends of the branches tend to lighten to a horn color. The hydranths are pink. Under the microscope, the entire perisarc is covered in narrow annulations, and the hydranths have roughly 20 tentacles. This is a relatively large and easily distinguished species. It is sometimes covered with colonies of *Campanularia volubilis*, and as well as nudibranchs. None of the specimens I collected from March-August had visible gonophores

Northeast Pacific Distribution

Originally described by Torrey (1902) from the entrance to San Francisco Bay, Tomales Bay, and Pacific Grove, CA from "between tides." Clark (1877) referenced a *Eudendrium* species that closely matches the description of *E. californicum* from Santa Cruz, CA. Fraser gave several records of this species on Vancouver Island (1914, 1935), as well as Heceta Head and Bay City, OR, and San Francisco Bay and Pacific Grove, CA (1937, 1948). Found up to a depth of 115 m (Fraser 1937).

Global Distribution and Invasions

No invasions reported. It has been reported from Hong Kong by Hargitt (1927), but this record requires verification. The recorded occurrences limited to the northern Pacific support *E. californicum*'s status as a native species.

Family Hydractiniidae (L. Agassiz, 1862)

Schuchertinia milleri (Torrey, 1902)

(Plate 4)

Systematic Account

Hydractinia milleri Torrey, 1902: 34, pl. 2, fig. 15-20 [original description]. – Fraser 1911: 27 [original records]. – Fraser, 1914: 125, pl. 7, fig. 19 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1937: 47, pl. 8, fig. 37 [original records]. – Fraser, 1948: 199 [original records]. – Jaeckle, 1984: 212 [original records]. – Haderlie, Hand & Gladfelter, 1980: 44 [redescription].

Schuchertinia milleri Miglietta & Cunningham, 2012: 3881 [genus change].

Material: USA, Oregon, Coos County, Bastendorff Beach from rocky shore at low tide, collected April 23, 2019

Specimen Location(s)

Only one specimen of *S. milleri* was received from Dr. Svetlana Maslakova, who collected it from the south breakwater on Bastendorff Beach.

Local Habitat

The low rocky intertidal.

Description Based on Literature

Colony reaching a height of up to 5 mm (Fraser 1937) and pink in color (Haderlie, Hand & Gladfelter 1980). The colony grows from a mat of coenosarcal tissue equipped with smooth spines. The gastrozooids have 8-20 filiform tentacles and are 3-5 cm tall (Torrey 1902), and have a clavate, extensible, proboscis. The tentacles are set in an irregular whorl, but may appear in sets of four (Fraser, 1937). The gonozooids by contrast are roughly half as tall as the gastrozooids and more slender, equipped with only 3-8 tentacles (Torrey 1902). The sporosacs are borne on the hydranth halfway between the base and tentacles. The male sporosacs are spherical, with a small spadix, and are slightly larger than the female sporosacs. The female sporosacs tend to be smaller and slightly elongated, with an extended spadix. Each sporosac carries one ovum (Torrey 1902, Fraser 1937 & Carlton 2007).

Torrey also describes “Spiral zooids at the edge of the colony, about as long as the sterile hydranth, but much more slender, the whole structure resembling a very long tentacle” (1902).

Description of Coos County Material

The specimen I examined was 1 cm in diameter growing from a thick mat, the surface of which was difficult to make out in the midst of the zooids. It was pink in color, and composed of many zooids, which can extend and contract, making their length variable. It is difficult to find by eye, especially when it is out of the water, and contracted into a small pink mass. Under the microscope, it is much easier to identify. There are two types of zooids present. One variety is thick and columnar, with roughly 16 tentacles that narrow distally. The other variety, which tend to be long and skinny, also have about 16 tentacles, but these are long and thin. All the zooids have a rounded proboscis in the center of their tentacles.

Because of the densely packed zooids and lack of reproductive features, this specimen was difficult to identify. However, due to the color, highly extensible zooids, and the distinct differences between the zooid varieties, I am confident in the identification.

Northeast Pacific Distribution

Generally distributed along the Pacific Coast of North America. Torrey (1902) originally described this hydroid from the entrance to San Francisco Bay and Tomales Bay, CA. Fraser documented its presence in Port Renfrew, BC (1911, 1914, 1935) and Point Fermin, CA (1948). Haderlie, Hand & Gladfelter (1980) list its southernmost distribution in Carmel, CA. Jaeckle (1984) noted its presence in Humboldt County, CA as a food source of the nudibranch *Cuthona divae*. This species is a new record for the state of Oregon.

Global Distribution and Invasions

None reported. Well-documented only along the North American Pacific coast.

Family Stylasteridae (Gray, 1847)

Stylantheca papillosa (Dall, 1884)

(Plate 5)

Systematic Account

Allopora papillosa Dall, 1884: 113-114 [original description]. – Fisher, 1938: 527-528, pl. 54, fig. 4, pl. 59, fig. 3

Stylantheca porphyra Fisher, 1931: 395-397, pl. 15, figs 1, 1a, pl. 16, figs 5, 5a-b, pl. 17, figs 6, 6a-c. (cited by Cairns and Lindner). – Boschma 1956: F100, text fig. 81-1a-b; 1960: 426-427 (cited by Cairns and Lindner). – Cairns, 1983b: 430, 481-483, figs 18A-I, 24H, 27G, J. – Wing and Barnard, 2004: 10, 27. – Heifetz et al. 2005: 133 [listed]. – Stone and Shotwell, 2007: 108 [listed]. – Whitmire and Clark, 2007: 154 [listed]. – Jamieson et al., 2007: 224 [listed] (cited by Cairns and Lindner).

Allopora petrograpta Fisher, 1938: 530-531, pl. 54, figs 5, 5a, pl. 59, fig. 4 [original records].

Allopora porphyra Fisher, 1938: 528-530, pl. 59, figs 1-2, pl. 60, pl. 61, figs 1, 1a, pl. 70, figs 2, 2a [original records].

Sylaster (Allopora) porphyrus Broch, 1942: 102 (cited by Cairns and Lindner).

Stylaster (Stylantheca) porphyra Boschma 1951: 39, text fig. 5b (cited by Cairns and Lindner)

Stylantheca petrograpta Cairns, 1983b: 430. – Wing and Barnard, 2004: 10, 27. – Heifetz et al., 2005: 133 [listed]. – Stone and Shotwell, 2007: 108 [listed]. – Whitmire and Clarke, 2007: 154 [listed]. – Jamieson et al., 2007: 224 [listed].

Stylantheca papillosa Cairns 1983b: 430. – Wing and Barnard 2004: 10, 27. – Heifetz et al., 2005: 133 [listed]. – Stone and Shotwell, 2007: 108 [listed]. – Jamieson et al., 2007: 2004 [listed].

Stylaster porphyra Jamieson et al., 2007: 224 [listed].

Material: USA, Oregon, Coos County, Cape Arago: middle cove from rocky shore at low tide, collected May 7, 2019

Specimen Location(s)

Found in the mid to low intertidal in the middle cove of Cape Arago. The rock the specimen was on was chiseled off for collection.

Local Habitat

Low rocky intertidal.

Description Based on Literature

Colony shape is variable, with specimens in high-energy shallow habitats usually being encrusting. Specimens living in deeper water form upright, knobby, branches up to 17 mm tall that originate from the encrusting mat. These branches rarely bifurcate. The colonies can form mats up to 30 cm in diameter. “The coenosteum is reticulate-granular in texture, with strips 50-55 µm wide, separated by slits 12-15 µm. Short, conical papillae (nematophores?) common on coenosteum, each about 0.13 mm in diameter and equally tall. Coenosteum purple, pink, red, and occasionally white, the tips of the clavate branches usually white” (Cairns & Lindner 2011).

The cyclosystems are regularly arranged on all encrustations and branchlets and are 0.9-1.2 mm in diameter. The gastropore tube is highly constricted, with a diameter of about 0.3 mm, and the constriction half that. Just above the constriction, 45 µm papillae form a ringed palisade. The upper portion of the gastropore is spherical to cone-shaped, while the lower portions of the gastropore is spherical and almost completely filled by the gastrostyle. The gastrostyle may be globular, pointed, or triangular and bears 50 µm long spines. There is usually one gastrostyle per cavity, but occasionally two are present (Cairns & Lindner 2011).

A commensal polychaete *Polydora alloporis* can often be found in *S. papillosa* colonies, forming distinctive paired holes in the coenosteum (Carlton 2007, Cairns and Lindner, 2011).

Description of Coos County Material

The current material conforms in all respects with the above description. This hydroid is a thin encrusting coral roughly 1 mm thick that is a vibrant purple in color. The coenosteum is covered in regularly spaced cyclosystems, which have a single gastropore surrounded by 5 to 8 dactylopores. Under a microscope, the surface of the coenosteum is covered in small, round papillae and the texture of the surface overall is rather porous.

Northeast Pacific Distribution

Originally described by Dall (1884) from Coal Harbor in the Shumagin Islands, AK. Fisher (1938) mentioned Dall's specimen from Alaska, but also recorded the synonymous *A. porphyra* from Carmel, CA and *A. petrograpta* from Kyack Island, AK and Monterey Bay, CA. Stone and Shotwell (2007) listed *Stylantheca papillosa* in the Aleutian Islands, *S. porphyra* in the Eastern Gulf of Alaska, and *S. petrograpta* in both. Whitemire and Clarke (2007) listed *S. petrograpta* and *S. porphyra* as intertidal in Oregon.

Cairns and Lindner (2011) compiled several records and found *P. papillosa* to be widespread from the Shumagin Islands, AK to Monterey Bay, CA. They noted it was common in the inner passages of Alaska and British Columbia, though not yet reported from the northern Gulf of Alaska. They also noted the former *porphyra* type material has only been reported from Monterey Bay. *S. papillosa* can be found from the intertidal zone to 27 m in depth.

Global Distribution and Invasions

No invasions reported. A cold-water hydrocoral seems a highly unlikely invader, and its distribution supports this.

Family Tubulariidae (Goldfuss, 1818)

Ectopleura crocea (L. Agassiz, 1862)

(Plate 6)

Systematic Account

Parypha crocea L. Agassiz, 1862: 249-265, pl. 23, fig. 1-26b, pl. 23a, fig. 1-7 [original description].

Tubularia crocea Torrey, 1902: 4, 29, 43 pl. 2, figs 22, 33 [original records]. – Fraser, 1911: 28 [original records]. Fraser 1914: 127, pl. 8, fig. 20 [original records]. – Fraser, 1948: 201 [original records]. – Deevy, 1950: 334, 339 [original records]. – Calder, 1971: 24-25, pl. 1, fig. c [original records]. – Orensanz et al., 2002: 124 [listed].

Pinauay crocea Ruiz et al., 2006: 104 [original records].

Ectopleura crocea Cranfield et al., 1998: 9 [listed]. – Cohen et al., 2005: 11 [listed]. – deRivera et al., 2005 [listed]. – Schuchert, 2010: 357, fig. 6 [redescription]. – Imazu et al., 2014: 422 [distribution]. – Chainho et al., 2015: 203 [listed].

Pinauay ralphi Mead et al., 2011: 2466 [listed].

Material: USA, Oregon, Coos County, Coos Bay, Inner Boat Basin from fouling on floating dock, collected July 8, 2019

Specimen Location(s)

Specimens were collected from the docks at the Charleston Inner Boat Basin. Though the South Slough and other docks in Coos Bay were not sampled, this species is likely found throughout Coos Bay, with especially abundant populations in Isthmus Slough (Carlton JT, personal communication 2020).

Local Habitat

Fouling communities on vessels, docks, and pilings.

Description Based on Literature

Colony grows in bushy tufts up to 15 cm long. The stems may be up to 2 cm and the polyps 1 cm (Rudy & Rudy 1983). The stems are unbranched, arising from stolons, and are crooked with irregular groups of 3 to 7 annulations. The polyps are athecate and sit on disks which are scalloped slightly at the lower edge. Each polyp has an oral whorl of 18-24 filiform tentacles, and an aboral whorl of 22-30, long, thin filiform tentacles (Peterson 1990), although younger polyps have less (Rudy & Rudy 1983).

Red or pink-striped gonophores are formed in small grape-like clusters on racemes in two whorls between the aboral and oral tentacle whorls. Male gonophores usually lack apical processes, while female gonophores have eight laterally flattened crests (Peterson 1990). The actinula larvae produced by the female gonophores are round, with ten long, capitate tentacles.

Description of Coos County Material

The current material conforms in all respects with the above description. This species is easily identified as a large bushy mass, usually up to 8 cm, but sometimes larger. Though the stems are often obscured by other fouling species, the bright pink hydranths are not, and stand out. The stems branch often, leading to the colony's bushy appearance, and are covered in a beige perisarc, which may be annulated irregularly. The hydranths sit on disks and are variable in size and number of tentacles depending on how old they are, but each has a whorl of roughly 25 aboral tentacles, and a whorl of about 20 oral tentacles, both of which are thin, whitish, and filiform.

The gonophores are found between the whorls of tentacles and are borne in grapelike bunches on racemes. Each gonophore is oval-shaped, and is pink or salmon-colored, which a dark stripe in the center. Female gonophores have flattened apical crests, while male gonophores tend not to. The actinula produced by female gonophores are round and white, with about 10 long capitate tentacles. It has been collected along with the nudibranch *Hermissenda crassicornis,* which is often present on it.

Northeast Pacific Distribution

Originally described by L. Agassiz from San Francisco Bay (1862). Reported from the Gulf of Alaska, Port Simpson BC, Friday Harbor WA, San Diego, CA (Fraser 1937) in addition to Coos Bay, OR (Fraser, 1948). Reported from low tide to depths of 33 m (Fraser 1937).

Global Distribution and Invasions

Ectopleura crocea is presumed native to the Atlantic coast of North America, found naturally from Newfoundland to the Gulf of Mexico (Deevey, 1950: 339; Calder 1971: 24-25). *E. crocea* has a long history of invasion, beginning in 1862 when it was described by Agassiz from San Francisco Bay as *Parypha microcephala* and was described as *Tubularia elegans* by Clark in 1875 from a specimen in San Diego. These introductions were likely mediated by ships traveling from the Atlantic to the Eastern Pacific (Carlton, 1979). Records show that this species has invaded nearly the entire Pacific Coast of North America, and though evidence suggests at least some of these invasions began in the 19th century, it is difficult to determine exactly how long *E. crocea* has been entrenched in each invaded region. It has been collected from Coos Bay, Oregon since 1942 (Fraser 1948). Shipping, as well as the importation of Atlantic oysters is considered to have been a significant vector in *E. crocea*'s East Pacific invasions (Carlton 1979).

Ectopleura crocea has been reported as circumglobal in temperate waters (Schuchert 2010). It is considered cryptogenic in Argentina (Orensanz et al. 2002), and introduced in California (Cohen et al. 2005), Oregon (deRivera et al. 2005), Alaska (Ruiz et al. 2006), Portugal (Chainho et al. 2015), New Zealand (Cranfield et al. 1998), Australia (Hewitt et al., 2004), and South Africa (Mead et al. 2011). It has also been reported in the Mediterranean, Red Sea, Japan, and China (Imazu et al., 2014), where it may also be introduced.

Ectopleura marina (Torrey, 1902)

(Plate 7)

Systematic Account

Tubularia marina Torrey, 1902: 46, pl. 3, fig. 24, 25 [original description]. – Fraser 1937: 53, pl. 11, fig. 45. [original records]. Fraser, 1948: 201 [original records]. – Robilliard, 1971: 163 [original records]. – Jaeckle, 1983: 94 [original records]. – Jaeckle, 1984: 210, 211 [original records]. Goddard JHR, 1984: 148, 150, 156, 159 [original records]. – Petersen, 1990: 171-172, fig. 25a-c [original records].

Material: USA, Oregon, Coos County, Cape Arago South Cove from rocky shore at low tide, colonies with gonophores, collected April 21, 2019; Bastendorff Beach from rocky shore at low tide, colonies with gonophores, collected May 27, 2019

Specimen Location(s)

Specimens were collected from South Cove at Cape Arago in the low intertidal under rocks. They were also found at the beach property of O.I.M.B. and the south breakwater at Bastendorff Beach both in the low intertidal on the sides and undersides of rocks.

Local Habitat

Sides and undersides of rocks in the lower intertidal.

Description Based on Literature

Colony grows to a height of up to 5 cm (Torrey 1902 & Fraser 1937). Colony may be a single individual or small groups connected by stolons (Haderlie 1980 & Petersen 1990). The stems are irregularly annulated and wavy, usually in the proximal portion (Fraser 1937). The hydranth is large and has two whorls of tentacles: an oral whorl of about 20 long tentacles, and an aboral whorl of roughly 40 long tentacles. The neck region immediately proximal to the hydranth is longitudinally striated and has a rounded collar which forms an aboral groove that secretes the perisarc (Petersen 1990).

The male gonophores are generated on long pedicels from 10-12 slim, unbranching, racemes that exceed the length of the hydanth. Each male gonophore has four small, rudimentary apical processes. The female gonophores are also generated on pedicel from racemes, but the pedicels are short and stout, and the racemes are irregularly branched. The female gonophores have four long, tapering, apical processes as long as the gonophore, with swollen bases. The female gonophores, once fertilized, develop into actinula larvae (Petersen 1990).

Description of Coos County Material

The current material conforms in all respects with the above description. This species looks similar to *E. crocea* in overall morphology, but the colonies tend to bear a single hydranth or perhaps several, but connected by stolons, and the stems rarely branch. The colonies grow to about 3 cm tall. The stems are wavy and irregularly annulated, and the hydranths are similar in appearance to *E. crocea.* Each hydranth has two whorls of filiform tentacles, the oral whorl about 20, but the aboral whorl up to 40. The gonophores are borne in grape-like clusters on racemes and are pink or salmon-colored with a dark stripe. The male gonophores have no apical processes, and if so, they are small and ill-defined. The female apical processes are distinctive, being as long as the gonophores, and are tapered, being swollen at the base. The female gonophores develop into actinulae.

Although similar in appearance to *E. crocea,* this species does not have a history of invasions, and can often be found on the sides or undersides of rocks in the mid to low intertidal. Its most defining characteristic outside of its habitat is that it grows from stolons in individual stems and does not branch in a bushy mass like *E. crocea*. Although no specimens taken from Coos County had nudibranchs present, they have been recorded as prey for several species of nudibranchs in Cape Arago and in California (Goddard 1984, Jaeckle 1983, 1984).

Northeast Pacific Distribution

Torrey originally described this species from Trinidad, San Francisco, and Pacific Grove, CA (1902). Fraser recorded its presence in Puget Sound, WA (1937) and the San Diego shore, CA (1948). Robillard recorded *E. marina* on San Juan Island and Victoria,

BC as a preferred prey of the nudibranch *Catriona alpha* (1971). Jaeckle (1983, 1984) noted this hydroid's role as prey for *Flabellina trilineata* in Marin County, CA and for *Dendronotus frondrosus* and *Hermissenda crassicornis* in Humboldt County, CA (1984). Goddard continued this trend, recording *E. marina* in Cape Arago, OR as prey for *Catriona columbiana* and *Flabellina trilineata*. Petersen (1990) recorded this species in Friday Harbor, WA and described the range from California to British Columbia. Found from the intertidal zone to 36m (Fraser 1937).

Global Distribution and Invasions

No invasions reported. The range for this species remains consistent from Southern California to British Columbia.

Order Leptothecata (Cornelius, 1992)

Family Aglaopheniidae (Marktanner-Turneretscher, 1890)

Aglaophenia latirostris Nutting 1900

(Plate 8)

Systematic Account

Aglaophenia latirostris Nutting, 1900: 101-102, pl. 22, figs 7-9 [original description]. – Fraser, 1911: 80 [original records]. – Fraser, 1914: 202-203, pl. 34, fig. 130 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 177, pl. 40, fig. 214 [original records]. – Fraser, 1948: 259 [original records]. – McLean, 1962: 99 [listed]. – Chan, 1971: 48, 62, 66, 70, 75 [listed].

Material: USA, Oregon, Coos County, Bastendorff Beach from rocky intertidal at low tide, colonies with corbulae, collected July 4, 2019; Lighthouse Island from rocky intertidal at low tide, colonies with corbulae, collected May 21, 2019; Fivemile Point from low rocky intertidal at low tide, colonies with corbulae, collected May 27, 2019; Bandon washed up on beaches, colonies with corbulae, collected over the past 10 years.

Specimen Location(s)

Specimens collected from Lighthouse beach in the low rocky intertidal, and the south breakwater at Bastendorff Beach in the low rocky intertidal. Specimens from Fivemile Point were donated by Nancy Treneman, and Dr. Dave Bilderback had collected several dried specimens from kelp stipes that had washed up on beaches in Bandon in the last few years. No specimens were collected from the intertidal at Cape Arago.

Local Habitat

Low rocky intertidal to subtidal.

Description Based on Literature

Colony grows to a height of 5 cm and is unbranched. Each hydrocaulus is divided into regular internodes which each bear a hydrocladium in alternating directions. All hydrocladia lie in the same plane, and each hydrocladium is divided into internodes, which each bears a hydrotheca. The hydrothecal margin has 11 cusps, somewhat irregular in shape, but with the median cusp retrorse and the next pair projecting forward. The mesial nematophore is large,0 adnate to the hydrotheca, and projects well beyond the hydrothecal margin with a spout-like shape at the extreme end. The lateral nematophores are small and do not reach the hydrothecal margin (Fraser 1937). The corbula is composed of roughly 8 pairs of leaves. Each leaf has two pairs of nematophores, one on the distal edge and another on the proximal edge. There is an aperture between adjacent leaves, and two hydrotheca between the corbula and stem (Nutting 1900).

Description of Coos County Material

The current material conforms in all respects with the above description. This species grows in colonies of feather-like structures which are often exposed at low tide in the intertidal. The colony may be up to 9 cm in length, though colonies may be much shorter. The color may be horn, beige, brown, orange, or rust-color. Colonies may have corbulae on the hydrocladia if reproductive, which look to the eye as though the branches are swollen. Under the microscope, the stem is divided into internodes which each bear a hydrocladium in an alternating fashion. Each hydrocladium is divided into internodes which each have a single hydrotheca. The hydrothecal margin has 11 sharp cusps, the median cusp retorse. The mesial nematophore is large and projects far forward, becoming spout-like at the distal end. The lateral nematophores are conspicuous and may obscure some of the cusps. The corbula is composed of 8-10 pairs of leaves. Each leaf has two sets of nematophores, one on the distal edge, another on the proximal. There are two hydrotheca between the corbula and the stem.

This species has varying characteristics in height, color, habitat, and number of leaves on the corbula. Many of the features require a microscope, making identification in the field difficult. Although somewhat difficult to positively identify, is not particularly difficult to find. This species is often covered in caprellids.

Northeast Pacific Distribution

Nutting (1900) originally described the species from Brazil. Fraser would later record *A. latirostris* from San Jose, Guatemala (1948) Santa Barbara, CA (1911), San Francisco, CA (1937), the Oregon coast (1911), Puget Sound (1911), and Massett harbor BC (1937). McLean (1962) listed *A. latirostris* as a common species in kelp forests near Carmel, CA, and Chan (1971) listed this species at Point Reyes, CA. Found from the intertidal to 30 meters (Fraser 1937)

Global Distribution and Invasions

None reported. Although the original description of *A. latirostris* from ships and pilings in Brazil (Nutting 1900) raises suspicion, it is most likely a case of a cryptic species complex, including two similar species as opposed to an invasion. Thus, *A. latirostris* as

reported from the Pacific coast may be an undescribed species. *A. latirostris* is found in the rocky intertidal to rocky subtidal, and despite its high presence in Coos County was not found on any of the docks or pilings of Coos Bay.

Aglaophenia struthionides (Murray, 1860)

(Plate 9)

Systematic Account

Plumularia struthionides Murray, 1860: 251-252, pl. 7, fig. 2. [original description].

Aglaophenia struthionides Marktanner-Turneretscher, 1890: 156-255, pl. 6, fig. 21 [description]. – Nutting, 1900: 102, pl. 22, figs 10-12 [original records]. – Torrey, 1902: 73 [original records]. – Fraser, 1911: 80 [original records]. – Fraser, 1914: 203-204, pl. 34, fig. 131 [original records]. – Fraser, 1935: 145 [original records]. – Burde, 1925: 18 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 180-181, pl. 41, fig. 218 [original records]. – Robillard, 1970: 466 [description]. – Johnson and DeWit, 1978: 23, 27 [listed]. – Busch, 1981: 44 [listed]. – Jaeckle, 1984: 211 [description]. – Lees, 1986: 106 [listed].

Material: USA, Oregon, Coos County, Bastendorff Beach from rocky intertidal at low tide, colonies with corbulae, collected July 4, 2019.

Specimen Location(s)

Specimens collected only from the breakwater on Bastendorff Beach at the low intertidal Often found on the stipes of *Laminaria*.

Local Habitat:

Low rocky intertidal.

Description Based on Literature

Colony grows to a height of 10 cm and is usually unbranched. Each stem is divided into regular internodes which each bear a hydrocladium. All hydrocladia lie in the same plane in an alternating fashion. Each hydrocladium is divided into internodes, which each bear a hydrotheca. The hydrothecal margin has 11 cusps, somewhat irregular in shape, but with the median cusp retrorse and the next pair projecting forward. The mesial nematophore is large, adnate to the hydrotheca, but usually does not project beyond the hydrothecal margin. The lateral nematophores are small and do not reach the hydrothecal margin. The corbula is about three times as long as deep and composed of 13 pairs of leaves, which each bear a row of nematophores. There are three hydrothecae between the corbula and stem (Fraser 1937).

Description of Coos County Material

The current material conforms in all respects with the above description. This species resembles a larger version of *A. latirostris*. Colonies may be over 12 centimeters in height, though the colonies share the feather-like appearance and beige to brown color of *latirostris.* The stem is divided into internodes, which each bear hydrocladia in alternating directions. The hydrocladia are divided into internodes, which each contain a single hydrotheca. The hydrothecal margin has 11 cusps, the median one being retorse. The mesial nematophore is long and spout-like. The lateral nematophores do not pass the margin either. The corbula is distinct, with roughly 13 pairs of leaves lined with nematophores, and three hydrotheca between the corbula and stem.

Often covered in caprellid amphipods. Although this species appears similar to *A. latirostris,* the size and number of leaves composing the corbula are identifying features.

Northeast Pacific Distribution

First described by Murray (1860) from San Francisco Bay. A. Agassiz (1865) reported this species from San Francisco, but synonymized it with *Plumularia franciscana,* which Nutting (1900) considered an error and it is not considered synonymous (Schuchert 2020). Marktanner-Turneretscher (1890) recorded *A. struthionides* from Puget Sound, WA and Nutting reported it from Santa Cruz and San Diego, CA. Torrey (1902) reported the species from Puget Sound to San Diego, noting its abundance in southern California. Fraser recorded the species from McArthur reef in Alaska, Queen Charlotte Island, Vancouver Island, and Barkley Sound, BC, Heceta Head and Newport, OR, Point Reyes, San Francisco, Santa Cruz, Santa Monica, and San Diego, CA (1937). The British Columbia Provincial Museum (1925) holds a specimen from Ucluelet, BC. Robillard (1970) recorded it as food for *Dendronotus subramos* in the San Juan Channel, Johnson and Dewit (1978) listed it on the artificial Rincon Island, Busch (1981) noted it from Monterey, CA, and Jaeckle (1984) from Humboldt County, CA as prey of *Doto kya,* and Lees (1986) recorded it from the Hueneme shelf in southern California. Found from low tide to a depth of 155 m (Fraser, 1937).

Global Distribution and Invasions

No invasions reported. This species distribution from Vancouver Island (Fraser 1911) to San Diego (Palmer, cited by Fraser 1937) has remained consistent and makes this species an unlikely invader. This species was reported from Nantucket Island by Verrill (1874), though this is almost certainly a misidentification.

Family Campanulariidae (Johnston, 1836)

Campanularia denticulata Clark, 1877

(Plate 10)

Systematic Account

Campanularia denticulata Clark, 1877: 213, pl. 7, fig. 4 [original description]. – Nutting 1901: 171 [original records]. – Torrey, 1902: 51, pl. 4, fig. 34 [original records]. – Fraser, 1911: 29-30 [original records]. – Fraser, 1914: 132-133, pl. 10, fig. 25 [original records]. – Nutting, 1915: 36, pl. 3, figs 6, 7 [description]. – Fraser, 1937: 60, pl. 12, fig. 50 [description]. – Fraser, 1948: 203 [original records].

Material USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019.

Specimen Location(s)

Dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge. Found growing on *Garveia annulata*.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m growing on *G. annulata*.

Description Based on Literature

Colony consisting of usually smooth stolons growing over other hydroids. The stems given off by the stolons are variable, up to 3 mm long and may be simple, annulated throughout, or annulated to an intermediate degree, although there are usually 3-4 large annulations at the distal end, and smaller, numerous annulations at the proximal end. The hydrothecae are large and campanulate, with a margin bearing 12-16 sharp cusps (Nutting, 1915). The gonophores are borne on either the stems or stolon, and have short, annulated pedicels. They are oblong, with a wide aperture and no collar (Fraser, 1937).

Description of Coos County Material

This hydroid has stems arising from a network of stolons, in the case of this specimen the stolons crept over a specimen of *Garveia annulata.* The stolon tends not to be annulated, but the stem and pedicel may be annulated to variable degrees. The hydrotheca is distinctive, with about 15 deep, tapering cusps that end in sharp points. The campanulate shape of the hydrotheca tapers gradually from the margin to the base. The hydranth has about 17-18 tentacles.

This species is similar in structure and appearance to *C. volubilis.* However, the two species can be distinguished by the degree of annulations on the stem, the depth of the cusps, and the tapering of the hydrotheca. The gonangia are described differently, but none were found on the specimen of *C. denticulata* collected. Fraser describes the gonangia as “oblong-ovate; the distal portion does not narrow to form a collar, the aperture being the full width of the gonangium” (Fraser 1937). Both *C. denticulata* and *C. volubilis* appear to be epifaunal, and both have been observed growing on *G. annulata*.

Northeast Pacific Distribution

First described by Clark (1877) from Port Etches, AK. Nutting (1901) reported this species from Orca, AK, and Torrey (1902) recorded its presence in San Pedro, CA. Fraser reported *C. denticulata* from Departure Bay and the San Juan Islands, BC (1911), and Round Island, in Dodds Narrows off Matia Island, BC (1914). He also reported it from Hueneme, Balboa, Santa Catalina Island, and San Nicholas Island, CA as well Sonora and Tenacatita Bay, Mexico (1948). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. Records restricted to the Northeast Pacific.

Campanularia volubilis (Linnaeus, 1758)

(Plate 11)

Systematic Account

Sertularia volubilis Linnaeus, 1758: 811 [original description]

Sertularia uniflora Pallas, 1766: 121 [original records]

Campanularia urceolata Clark, 1877: 215, pl. 8, fig. 7 [original records]. – Nutting, 1901: 172, pl. 18, fig. 2 [original records]. Fraser, 1911: 33 [original records]. – Fraser, 1914: 140, pl. 12, fig. 36 [original records]. – Nutting, 1915: 40, pl. 4, figs 4-5 [description]. – Fraser, 1935: 144 [original records]. – Fraser, 1936: 123 [original records]. – Fraser, 1937: 67-68, pl. 13, fig. 61 [original records]. – Fraser, 1948: 28, 109, 132, 205 [original records].

Campanularia volubilis Alder, 1857: 125-126, pl. 4, fig. 7 [original records]. – Hincks, 1868: 160-162, pl. 24, fig. 2 [original records]. – Hartlaub, 1901: 352 [listed]. – Torrey, 1902: 54-55, pl. 5, fig. 48 [original records]. – Torrey, 1905: 13-14 [original records]. – Fraser, 1911: 34 [original records]. Fraser, 1914: 141, pl. 13, fig. 38 [original records]. – Nutting, 1915: 31-33, pl. 1, figs 4-6 [description]. Fraser, 1935: 144 [original records]. – Fraser, 1936: 123 [original records]. Fraser, 1937: 69, pl. 14, fig. 63 [original records]. – Schuchert, 2001a: 150, fig. 130A-B [original records].

Material USA, Oregon, Coos County, Bastendorff Beach from rocky shore at low tide, collected July 4, 2019; Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019 Oregon; Bandon, washed up on beach, air-dried, collected in the last 10 years; Fivemile Point, rocky shore at low tide, collected May 27, 2019.

Specimen Location(s)

Found growing on *Garveia annulata* several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge. Also found growing on *G. annulata* and *Eudendrium californicum* at the south breakwater at Bastendorff beach at low tide. Nancy Treneman donated specimens collected from Fivemile Point south of Coos Bay growing on *E. californicum*, and Dr. Dave Bilderback donated several specimens that had washed up on the beaches of Bandon also growing on *E. californicum*.

Local Habitat

The rocky intertidal to subtidal rocky terrain, to a depth of 43 m. Seen commonly growing as epifauna on other hydroids.

Description Based on Literature

Colony grows from a generally smooth stolon, which creeps over other hydroids. The pedicels given off by the stolon are spirally twisted in appearance. The hydrothecae are tubular, about 1.5 times long as it is wide. The hydrothecal margin has about 10 to 18 rounded cusps. The gonophores are borne on the stolon and are flask-shaped with long narrow necks and short annulated pedicels (Nutting 1915, Fraser, 1937).

Description of Coos County Material

The current material conforms in all respects with the above description. The colony grows from a stolon, usually creeping over another hydroid. The stems are spirally twisted or annulated throughout. The hydrotheca is tubular, tapering rapidly at the base. The hydrothecal margin bears about 10 rounded cusps. The gonangia are flask-shaped with a long narrow neck and are generated on short pedicels.

It is easily confused with *C. denticulata*, although *C. volubilis* appears to be much more common in Coos County. The species can be distinguished by the depth of the cusps, and the tapering of the hydrotheca. Every specimen of *C. volubilis* collected in this research was growing on another hydroid. *G. annulata* and *E. californicum* seem to be the preferred species to grow on.

Northeast Pacific Distribution

Originally described by Linnaeus (1758) as *Sertularia volubilis*. This species has been recorded on the North American Pacific coast as early as Clark's (1877) description of the species in Lituya Bay, AK. Nutting (1901) recorded *C. urceolata* from Yakutat Bay, AK. Fraser (1937, 1948) went on to record this species under the name *urceolata* from Sitka, Yakutat, and Kadiak, AK, Queen Charlotte Islands and Vancouver Island, BC, Newport, Charleston, and Heceta Head, OR, Santa Rosa, Dillon's Beach, Point Reyes, San Francisco, Santa Cruz, Monterey, Pacific Grove, Santa Barbara, Santa Monica, and Catalina Island, CA.

Hartlaub reported this species from Bare Island, WA under the name *C. volubilis*. Torrey (1902, 1905) used this name to record it from San Pedro and Tomales Bay, CA. Fraser (1911, 1914, 1935, 1936, 1937) would record this species from Banks Island, Ucluelet, the San Juan Archipelago, Northumberland Channel, Dodds Narrows, Massett harbor, BC, San Pedro and Dillon's Beach, CA. Found from low tide to a depth of 122 m (Fraser, 1937).

Global Distribution and Invasions

No invasions reported. Found on the Atlantic coast of Europe, Mediterranean, Iceland, eastern Greenland, the east coast of Canada down through New England, Arctic seas north of Russia, Sea of Okhotsk, Sea of Japan (Schuchert 2001a). This taxon may be a species complex (Carlton JT, personal communication 2020).

Clytia gregaria (A. Agassiz, 1862)

(Plate 12)

Systematic Account

Oceania gregaria L. Agassiz, 1862: 353 [listed]. – A. Agassiz, 1865: 74, fig. 103 [original description].

Phialidium gregarium Haeckel, 1879: 188 [original records]. Murbach and Shearer, 1903: 179-180 [original records]. – Bedot, 1910: 427 [listed]. – Mayer, 1910, 272 [discussion]. Foerster, 1924: 41 [discussion]. – Kramp, 1962: 25-28 [discussion]. Roosen-Runge, 1970: 203-221 [life cycle]. – Arai and Brinkmann-Voss, 1980: 104-107, figs 59-60 [taxonomy].

Clytia osterudi Strong, 1925: 389, pls 37-39 [development] (cited by Arai and Brinkmann-Voss, 1980).

Clytia gregaria– Bouillon, 1995: 233 [new records]. – Bouillon and Barnett, 1999: 99, fig. 101 [redescription]. – Schuchert, 2017: 370-371, fig. 18 [redescription].

Material: USA, Oregon, Coos County, Charleston, spawned from medusae collected from Inner Boat Basin, collected July 17, 2019

Specimen Location(s)

Not known. The specimen examined was borrowed from a culture that was spawned by medusae collected from the Charleston Boat Basin. Thought to be a fouling organism on the Charleston Boat Basin and other ships and pilings in Coos Bay.

Habitat

Unknown.

Description Based on Literature

Hydroid description in the literature differs and the amount of variability is unknown. The hydroid is generally assumed to be campanulate with several marginal cusps, though the number differs from 5 to 13 marginal cusps. There is most likely several field species of *Clytia* that are synonymous with *C. gregaria,* but this is uncertain (Arai & Brinkmann-Voss 1980). Here the work of Roosen-Runge (1970) is used as a substitute.

The colony is stolonal, with long stems which are usually unbranching. The stems are annulated at the base and top, and smooth to wavy in the intermediate section. The hydrotheca is deeply campanulate, with a given ratio of 2.5-3.0:1. There are 8-13 marginal cusps, and 4 (or rarely, 8) ridges from the rim down through the upper 1/3 of the hydrotheca. The gonothecae are 3 mm long and ovate, with a smooth to slightly undulating shape that gives rise to a distinct collar. They sit on annulated pedicels that are longer (up to 14 annuli) when they grow from the stolon, and shorter (4-8 annuli) when they grow from the stem. The colony may grow anywhere from 1.6 to 10 mm tall (Roosen-Runge 1970).

Description of Coos County Material

Colony small, only 6 mm in height. Colony arising from usually smooth stolons, with long stems that may be annulated to some extent. The hydrotheca is campanulate, tapering gradually at the base. The hydrothecal margin has about 6-7 rounded cusps. There are about 12 tentacles centered around a rounded proboscis. The tentacles are over twice the length of the hydrotheca when fully extended.

This hydroid was not collected in the field but grown from fertilized embryos after spawning the medusae of *C. gregaria* medusae. Because these medusae were collected from the Boat Basin, it is hypothesized that this hydroid is a fouling organism on the ships and pilings of Coos Bay. However, it has likely not been collected due to its small size and inconspicuous nature. This is a fate likely shared by other hydrozoans such as *Aequorea victoria* and *Polyorchis penicilliatus* whose medusae are commonly seen in Coos Bay.

Northeast Pacific Distribution

Originally recorded by L. Agassiz from the Strait of Georgia (1862). Found in the Northeast Pacific from British Columbia to Oregon (Arai & Brinkmann-Voss 1980).

Global Distribution and Invasions

No invasions reported. *C. gregaria* medusae have been reported from New Zealand (Bouillon 1995), but this needs to be confirmed. The hydroid has not been described from the field, only from laboratory settings (Strong 1925, Roosen-Runge 1970).

Invasions

None reported. However, the medusa of this species has been repeatedly confused and compared with *Phialidium languidium* across a variety of morphotypes, which has made the literature confusing (Arai & Brinkmann-Voss 1980). The hydroid stage remains unrecorded from the field.

Clytia paulensis (Vanhöffen, 1910)

(Plate 13)

Systematic Account

Campanularia paulensis Vanhöffen, 1910: 298, fig. 19 a, b [original description]. – Millard, 1966: 481-483, fig. 15 [original records].

Campanularia longitheca Fraser, 1914: 137-138, pl. 11, fig. 32 [original records].

Clytia longitheca Fraser, 1914: 137-138, pl. 11, fig. 32 [original records]. Fraser, 1937: 75-76, pl. 15, fig. 73 [original records]. – Fraser, 1938a: 32 [original records]. – Fraser, 1948: 209 [original records].

Clytia paulensis Stechow, 1919: 45 [original records].

Clytia ulvae Stechow, 1919: 47-48 [original records].

Material: USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019

Specimen Location(s)

Dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m growing on *Abietinaria abietina*.

Description Based on Literature

Colony is stolonate with unbranching slender stems that double as pedicels for the hydranths. There are several annulations at the base of the hydranth and a few at the base of the stem. In some cases, there are 3-5 annulations towards the center. The hydrotheca is long and gradually tapering from margin to base. There are 9-10 marginal cusps which each have two points. The gonangium is attached to the stolon by a short pedicel with three annulations. The gonangium is long and slender, uniform in diameter save for the proximal third which tapers to the base. The distal end is truncate with the opening 1/3 of the diameter. Walls are smooth, and each gonangium contains five medusae (Fraser 1937).

Description of Coos County Material Identification

Colony stolonate, stems unbranched. The base of the stem has roughly 10 annulations and may be curved. The stem itself is long and straight, with several annulations at the base of the pedicel, and occasionally a few in the middle of the stem. The hydrotheca is very long and gradually tapering, with a hydrothecal margin of 9-10 cusps, each of which is divided into two at the distal end. Gonangia not present on specimen.

This species is another epifaunal Campanularid but is distinct due to its long straight stem. This species was only found on *Abietinaria abietina* and no other subtidal species and may prefer *A. abietina* to grow on as opposed to other species.

Northeast Pacific Distribution

Originally described by Vanhöffen (1910). Fraser (1914) recorded the species from Vancouver Island, under the name *longitheca*, believing it was undescribed. Fraser later recorded this species from San Francisco Bay (1937), Tangola-tangola Bay, Mexico (1938), Santa Rosa, Hueneme, Point Fermin, and San Pedro, CA (1948). It was also reported from South Africa by Millard (1966), a distant record that requires confirmation. Found 10-63 fathoms deep (Fraser 1937, 1948). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. This species appears to be strictly subtidal, and not associated with fouling communities, making any invasions unlikely.

Obelia griffini Calkins, 1899

(Plate 14)

Systematic Account

Obelia griffini Calkins, 1899: 357, pl. 4, figs 18 A-C, pl. 6, fig. 18D [original description]. – Mayer, 1910: 252 [description]. – Fraser, 1911: 39 [original records]. – Fraser, 1914: 153, pl. 16, fig. 54 [original records]. – Nutting, 1915: 87, pl. 23, figs 4-5 [description]. – Cornwall, 1928: 11 [discussion]. – Fraser, 1937: 88, pl. 18, fig. 91 [original records]. – Fraser, 1948: 215 [original records]. – Robillard, 1975: 47 [listed]. – Cornelius, 1982: 114 [listed]. – Choong et al., 2018: 64-65 [discussion].

Material: USA, Oregon, Coos County, Bastendorff Beach from large driftwood at low tide, collected June 5, 2019; Cape Arago, North Cove from large driftwood at low tide, collected July 15, 2019

Specimen Location(s)

Found on driftwood washed ashore at the south breakwater at Bastendorff beach and North Cove of Cape Arago.

Local Habitat

Driftwood and floating pelagic debris.

Description Based on Literature

Colony grows to 25-50 mm . Stems are highly branched and grow from creeping stolons. The branches are regularly alternate and amount 0.5 mm apart. The primary stems have 6 annulations at the base and are annulated above the joints to the middle of the internode. The hydrothecae are alternately arranged and borne on short pedicels with about 9 annulations. The hydrothecae are campanulate with a simple margin. The gonangia grow on short annulated pedicels and are roughly uniform in diameter (Calkins 1899). The gonangia are slender and taper gradually from the distal portion to the base. They are smooth or slightly irregular (Fraser 1937). They have a well-defined shoulder and distinct collar around the aperture (Nutting 1915).

Description of Coos County Material

Colony grows to about 3 centimeters in height, and is highly branched, giving a bushy appearance. The stem and branches have 3-5 annulations above the nodes, and just below the campanulate hydrotheca. The hydrothecal margin is entire but may appear rough and jagged.

This species has previously been synonymized with *O. dichotoma,* but recent work on the Japanese tsunami marine debris by Choong et al. (2018) has led to a reassessment of *O. griffini* as a distinct species and a member usually of the open ocean neustonic community. This species is thus native to Coos County in coastal open waters, appearing in (usually deceased) colonies washed ashore on pelagic debris such as logs, often in association with the barnacle *Lepas* spp.

Northeast Pacific Distribution

Originally described by Calkins (1899) from Puget Sound, WA. Fraser recorded this species from Ucluelet, Departure Bay, Dodds Narrows, Gabriola Pass, Porlier Pass, BC, Friday Harbor, Port Townshend, West Seattle, WA, and Cedros Island, Mexico (Fraser, 1911, 1914, 1937, 1948). The details and verification of these earlier records would bear investigation, given its current recognition as a member of the oceanic neustonic community. This species has also been reported recently on debris originating from the 2011 Japanese tsunami that crossed the North Pacific Ocean and washing up in Hawai'i, Washington, Oregon, and California (Calder et al. 2014, Choong et al. 2018).

Global Distribution and Invasions

O. griffini is currently undergoing a shift from a synonym of *O. dichotoma* to its own distinct species as part of the neustonic community. As mentioned above, it would not be considered an invasion.

Obelia longissima (Pallas, 1766)

(Plate 15)

Systematic Account

Sertularia longissima Pallas, 1766: 119-121 [original description].

Obelia longissima Clark, 1877: 212 [original records]. – Fraser, 1911: 39 [original records]. – Fraser, 1914: 153, pl. 16, fig. 55 [original records]. Nutting, 1915: 85-86, pl. 23, figs 1-3 [redescription]. – Fraser, 1935: 144 [original records]. Fraser, 1936: 124 [original records]. – Fraser, 1937: 88-89, pl. 18, fig. 92 [original records]. – Fraser, 1948: 215 [original records]. – Cranfield et al., 1998: 10 [listed]. – Schuchert, 2001a: – Cohen et al., 2005: 11 [listed]. – Calder et al., 2014: 430-431, fig. 4d [discussion]. – Choong et al., 2018: 53-54 [discussion].

Material: USA, Oregon, Coos County, Coos Bay, Boat Basin from fouling on floating dock, collected July 8, 2019

Specimen Location(s)

Specimens were collected from the docks at the Charleston Boat Basin. Though the South Slough and other docks in Coos Bay were not sampled, this species is likely found throughout Coos Bay.

Local Habitat

Fouling communities on ships and pilings.

Description Based on Literature

Colony grows in a large bush up to 60 cm in length. Stem is filiform and highly branched. Annulated at the base of the stem, above each node and at the start of each branch, and on the pedicels. Hydrotheca are campanulate, with a cusped or wavy margin, but this can be worn down to be nearly indistinct. The gonangia are formed at the axil, and have a long, oval shape with a pronounced collar and small aperture (Fraser 1937). Often confused with the very similar-looking *O. dichotoma.*

Description of Coos County Material

The current material conforms in all respects with the above description. Colony grows in a large bush, some specimens of which exceed 30 cm in length. Stem is highly branched and has about 4 annulations at the base of the stem, above each node and at on the pedicels just below the hydrotheca. The hydrotheca is campanulate, with a cusped or

wavy margin, but this can be worn down to be nearly indistinct. The gonangia are long and ovalular with a protruding collar and small aperture.

This species is easily confused with *O. dichotoma* but differ in that the internodes of *O. dichotoma* are distinctly curved, while in *O. longissima* they are quite straight (Carlton 2007). *O. dichotoma* also only attains a height of up to 2.5 cm, while specimens of *O. longissima* may attain a length of up to 60 cm (Fraser 1937). These small differences are why *O. dichotoma* does not have an entry, since this study took only large specimens, which meant only *O. longissima* was acquired. *O. longissima* is host to a variety of epifauna, most notably caprellids and nudibranchs. The nudibranch *Dendronotus* is common on this hydroid.

Northeast Pacific Distribution

This species was first described by Pallas in 1766. Its first appearance on the North American West Coast was by Clark in 1877 from Unalaska, AK. Fraser (1937, 1948) reported this species from the Queen Charlotte Islands and Vancouver, BC, Puget Sound, WA, Heceta Head, Charleston, OR, San Francisco, Santa Catalina, San Pedro, and Coronado Beach, CA. Calder et al. (2014) note this species as "amphi-Pacific in distribution" and note its presence on both sides of the Atlantic as well. Found from low tide to 128 m (Fraser, 1937).

Global Distribution and Invasions

This species is considered cryptogenic in Coos Bay, possibly introduced via ship fouling (Carlton 2007). Other vectors for introduction may include aquaculture such as the importation of commercial oysters. *O. longissima* has also been reported from debris originating from the 2011 Japanese tsunami that washed up in Washington, Oregon, and California. (Calder et al. 2014, Choong et al. 2018). This species' native region is unknown but hypothesized to be European (Cranfield et al. 1998). This species is reported as introduced in California (Cohen et al. 2005) and New Zealand (Cranfield et al. 1998) but is more widely regarded as cryptogenic due to its cosmopolitan nature.

Rhizocaulus verticillatus (Linnaeus, 1758)

(Plate 16)

Systematic Account

Sertularia verticillata Linnaeus, 1758: 811 [original description]

Campanularia circula Clark, 1877: 213, pl. 7, fig. 3 [original records].

Campanularia verticillata Nutting, 1901: 171 [original records]. – Jäderholm, 1907: 2 [original records]. – Fraser, 1911: 33 [original records]. – Fraser, 1914: 140-141, pl. 13, fig. 37 [original records]. – Nutting, 1915: 29-31, pl. 1, figs 1-3 [redescription]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 123 [original records]. – Fraser,

1937: 68, pl. 14, fig. 62 [original records]. – McCormick, 1965: 142 [listed]. Cornelius, 1981: 209-212 [taxonomy]. Schuchert, 2001: 157 [redescription].

Campanularia fascia Torrey, 1902: 52, pl. 4, fig. 38 [original records].

Material: USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019

Specimen Location(s)

Dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m

Description Based on Literature

The main stem is fascicled throughout, ending abruptly at the apex of the stem. The main branches are also fascicled. The hydranths sit atop long, pedicels that are annulated throughout. The hydrothecae are large, broad for their length, slightly more expanded towards the margin, which bears 12-14 blunt cusps. The gonangium is ovoid, with a tapering neck and small aperture. The ova within are quite large. The gonangia tend to occur in groups around the stem, but not in whorls (Fraser 1937).

Description of Coos County Material

The stem is fascicled and ends in a stump. Colony branches occasionally, with the branches also fascicled. The stem and branches bear pedicels in regular whorls about every 2 mm. The pedicels are long, up to 4 mm, and annulated throughout. The single specimen collected off Cape Arago was missing all its hydrothecae and gonangia. Fraser (1937), however, describes the hydrotheca and gonangia as above.

Northeast Pacific Distribution

Originally described by Linnaeus in 1758 as *Sertularia verticillata*. It was reported from Alaska by Clark (1876) under the name *Campanularia circula.* Nutting (1901) reported this species as *Campanularia verticillata* from Kodiak Island, AK and Torrey (1902) recorded its presence in San Diego under the name *Campanularia fascia.* Jäderholm recorded it from the Bering Sea in 1907 as *C. verticillata*. Fraser reported this species as *Campanularia verticillata* in Alaska, British Columbia, and California. McCormick (1965) listed this species from dredging off the Oregon coast. Schuchert described the Pacific range as the Arctic Ocean down to the Sea of Japan and California (2001). He described the depth as 34-150 m.

Global Invasions

None reported. *R. verticillatus* is a common subtidal hydroid in the Northern hemisphere. It has been recorded from the Arctic Ocean south to Brittany, the Black Sea, Greenland, Iceland, the west Atlantic from the Arctic Ocean to Cape Hatteras (Schuchert 2001a). It may be a species complex.

Orthopyxis compressa (Clark, 1877)

(Plate 17)

Systematic Account

Campanularia compressa Clark, 1877: 214, pl. 8, figs 5, 6 [original description]. – Hartlaub, 1905: 562-563, fig. Ma-b [original records]. – Linko, 1911: 172 (cited by Arai and Brinkmann-Voss 1980). – Behner, 1914: 384-385 [original records]. – Naumov, 1960: 256 (cited by Arai and Brinkmann-Voss 1980).

Campanularia caliculata Calkins, 1899: 351, pl. 2, figs 11, 11a-c, pl. 6, fig. 11b [original records].

Clytia compressa Nutting, 1901: 170 [original records].

Eucopella caliculata Fraser, 1911: 36 [listed]. – Fraser, 1914, pl. 14, fig. 45 [original records]. – Fraser, 1937: 77-78, pl. 15, fig. 76

Eucopella compressa Fraser, 1911: 37 [listed]. – Fraser, 1937: 78, pl. 16, fig. 77 [redescription]. – Fraser, 1948: 211 [original records].

Orthopyxis compressa Bale, 1914: 80-82 [original records]. – Nutting, 1915: 65-66, pl. 15, figs 5-10 [redescription]. – Stechow, 1919: 69 [original records]. – Arai and Brinkmann-Voss: 1980, 101-104, figs 57-58 [original records].

Orthopyxis caliculata Bale, 1914: 74-77, pls 11, 12, fig. 1 [original records]. – Nutting, 1915: 64-65, pl. 15, fig. 4 [redescription].

Orthopyxis pacifica Stechow, 1919: 69-70, fig. W.b. [original records].

Material: USA, Oregon, Coos County, Bandon, washed up on beach on red algae, air-dried, colonies with gonophores, collected in the last 10 years

Specimen Location(s)

Specimens washed up on the beaches of Bandon, OR growing on a red alga.

Local Habitat

Subtidal red algae.

Description Based on Literature

Colony stolonal. Stems are simple and unbranched, with each bearing a single hydrotheca. The hydrotheca is large and campanulate, tapering at the base. The hydrotheca has thick walls, especially near the base where they project inward. There is a single distinct annulation directly below the hydrotheca and usually two or three constrictions below that. No annulations at the base of the stem. The gonangium is sessile or has a short pedicel. It is largest at the distal end, rounded at the base, and highly laterally compressed (Clark 1877).

Description of Coos County Material

The current material conforms in all respects with the above description. Colony stolonal, with long pedicels about 2 mm tall. The pedicel is plain, save for several small waves or annulations just proximal to the cup or bell-shaped hydrotheca, which may have a slight indentation just below the rough hydrothecal margin. The gonangia sit on short pedicels, and have a round, cup-like appearance to them, only slightly taller than wide.

This species is only known from a dried specimen donated in the collection of Dr. Dave Bilderback, which was on a piece of dried red algae. This study has not found any live specimens in or around Coos Bay or Cape Arago.

Northeast Pacific Distribution

First described by Clark in 1877 from the Shumagin Islands, AK as *Campanularia compressa*. Since then, this species has been described by a variety of names in the Pacific. Calkins (1899) recorded it from Puget Sound under the name *Campanularia caliculata.* This is confusing since many of the specimens from the Pacific under this name are currently thought to be synonymous with *Orthopyxis compressa*. However, *Campanularia caliculata* is a synonym for a separate species under the name *Orthopyxis caliculata* (Arai and Brinkmann-Voss 1980). *O. caliculata* is thought to be a cosmopolitan species reported worldwide (Nelson et al. 2020) and may be a species complex. It was found on debris from the 2011 Japanese tsunami (Calder et al. 2014, Choong et al. 2018). The species status of *O. compressa* is uncertain, and the entire genus needs thorough revision (Schuchert 2014, descriptive notes).

Nutting (1901) recorded this species from Alaska as *Clytia compressa.* Fraser's records of *Eucopella compressa and Eucopella caliculata* are likely synonymous, which would mean he recorded this species from Sumner Strait, AK, the San Juan Archipelago, BC, Puget Sound, WA, San Francisco and the Channel Islands (1937, 1948). Found low tide to 73 m (Fraser 1937).

Global Distribution and Invasions

No invasions reported. Hartlaub (1905) recorded a *Campanularia compressa* from Chile, though this record is dubious (Arai & Brinkmann-Voss 1980). Bale (1914) recorded *O. compressa* from Australia, making this species potentially amphi-Pacific. *O. compressa* has not been reported outside the Pacific.

Family Campanulinidae (Hincks, 1868)

Calycella syringa (Linnaeus 1767)

(Plate 18)

Systematic Account

Sertularia syringa Linnaeus, 1767: 1311 [original description].

Calycella syringa Clark, 1877: 217, pl. 12, fig. 25 [original records]. – Calkins, 1899: pl. 4, figs. 20, 20a-c, pl. 6, fig. 20d [original records]. – Nutting, 1901: 176-177 [original records]. – Torrey, 1902, pl. 6, fig. 50 [original records]. – Torrey, 1904: 20 [original records]. – Fraser, 1911: 42, pl. 3, fig. 6 [original records]. – Fraser, 1914: 156, pl. 17, fig. 59 [original records]. – Fraser, 1937: 91-92, pl. 19, fig. 96 [original records]. – Fraser, 1948: 216 [original records]. – Stout, 1970: 68 [listed].

Material: USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019

Specimen Location(s)

Found growing on *Abietinaria abietina* several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m, growing on other hydroids like *A. abietina*.

Description Based on Literature

The colony is formed on creeping stolons that often grow epiphytically over other hydroids. The pedicels that arise from the stolons are annulated throughout. The hydrotheca is tubular, with an operculum of 8-9 triangular segments, giving the distal end of the hydrotheca a cone-like appearance when closed. The gonangia are ovate sporosacs which are generated on the stolon on short annulated pedicels. The sporosacs are extruded into an acrocyst (Fraser 1937).

Description of Coos Bay Material

Colony stolonal, often creeping. Pedicels arising from the stolons are short and either spirally twisted or annulated. The hydrotheca is tubular with a distinctive margin. The operculum consists of 8-9 triangular segments. Reduplication of the margin often occurs. The gonangia, which were absent in the specimen are oval, extruding the sporosac into an acrocyst (Fraser 1937).

Northeast Pacific Distribution

Originally described by Linnaeus (1767) as *Sertularia syringa*, and first recorded from the Northeast Pacific from the Shumagin Islands, AK, by Clark (1877) as *Calycella syringa*. Calkins (1899) recorded it from Puget Sound, Nutting (1901) from the Kodiak Island, AK, and Torrey (1902, 1904) from San Diego. Fraser recorded *C. syringa* from Alaska, British Columbia, Puget Sound, WA, Heceta Head, OR, San Francisco (1937), San Pedro, Santa Catalina, CA and Cedros Island, Mexico (1948). Stout (1970) listed this species in Humboldt County, CA, associated with the gaper clam *Tresus nuttallii*.

Global Distribution and Invasions

No invasions reported. This species is reported as circumglobal in northern hemisphere temperate and cold waters and thus may be an example of a species complex. Reported from Europe as well as the Mediterranean, northern Canada, Greenland, Iceland, Faroes, Spitsbergen, Barents Sea, White Sea, Kara Sea, Laptev Sea, East Siberian Sea, Chukchi Sea, Sea of Okhotsk, and Japan (Schuchert 2001a).

Family Haleciidae (Hincks, 1868)

Halecium fraseri Ralph, 1958

(Plate 19)

Systematic Account

Halecium flexile Fraser, 1914: 165, pl. 20, fig. 71 [original records]. – Fraser, 1937: 104, pl. 21, fig. 111 – Fraser, 1948: 222 [original records].

Halecium fraseri Ralph, 1958: 338 [new name]. – Vervoort and Watson, 2003: 90 [discussion]. – Schuchert, 2005: 630 [reference].

Material: USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019

Specimen Location(s)

Dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m.

Description Based on Literature

Colony is erect with a polysiphonic stem, but with simple branches that are only sometimes fascicled near the proximal portion. The branches are arranged pinnately and

rarely fork again. Each branch is divided into internodes, and from the distal portion of each internode the long, smooth pedicel for the hydrophore is given off. The hydrophore may be reduplicated one or several times, and the margin of the hydrophore is rarely everted. Hydranths are large, with 12-14 tentacles. The male gonangia are broadly club-shaped, with pedicels growing in rows from the branches at the usual point where the pedicels grow (Fraser 1937).

Description of Coos County Material

The main stem is fascicled, growing to a height of at least 4 cm in the specimen examined. The branches are arranged pinnately and regularly. The branches are not fascicled, except occasionally near the proximal portion. The branches usually do not fork, and are divided by internodes, each of which bears a long pedicel at the distal portion. The pedicel ends in a hydrophore, sometimes duplicated several times. The specimen examined lacked gonangia and had few hydranths in good condition. Fraser (1937) notes that the male gonangia are club shaped and appear in rows on pedicels given off by the branches.

Northwest Pacific Distribution

First described by Fraser (1914) from Departure Bay, BC, who believed it to be the *H. flexile* described by Allman from the Challenger Expedition. Fraser (1937) later reported this species offshore from Moresby Island, BC, and Fraser (1948) further reported it from Depoe Bay, OR, the California Channel Islands, and Baja California.

Global Distribution and Invasions

No invasions reported. There have been no other records of this species since Fraser (1948) until now; it is regarded as a native Northeast Pacific species.

Halecium speciosum Nutting, 1901

(Plate 20)

Systematic Account

Halecium speciosum Nutting, 1901: 181, pl. 22, figs 1-2 [original description]. – Fraser, 1937: 109, pl. 22, fig. 122 [original records]. – Calder, 1970: 1510, pl. 2, fig. 4 [original records]. – ? Spracklin, 1982: 247, fig. 114 f-g [original records]. – Schuchert, 2005: 636 [discussion]. – Ronowicz and Schuchert, 2007: 59 [listed].

Material: USA, Oregon, Coos County, Bastendorff Beach from rocky shore at low tide, colonies with gonophores, collected May 28 & July 4, 2019

Specimen Location(s)

Found at the south breakwater at Bastendorff beach in the rocky intertidal at low tide. Often on the underside of rocks.

Local Habitat

Low rocky intertidal.

Description Based on Literature

Colony erect with a short, broad stem giving rise to a few stout branches. Some branches may fork again. The ultimate branchlets consist of a series of hydrophores in succession, each borne from the proximal hydrophore just below. These may have a geniculate pattern but are not all in the same plane nor the same length. The hydrotheca is large and flaring, with a well-marked row of dots (Fraser 1937). Gonangia sit on long annulated pedicels below the hydrophores, usually in the upper part of the colony. Regularly ovoid, and evenly annulated throughout (Nutting 1901). Male gonophores elongate and somewhat asymmetrical, arising just below the hydrothecae from short pedicels. Surface varies from smooth or slightly wavy to distinctly furrowed transversely, being more deeply furrowed on one side (Calder, 1970).

Description of Coos County Material

The current material conforms in all respects with the above description. Very small, some colonies only a centimeter or less. Highly branching, with tertiary branches common. The ultimate branchlets consist of hydrophores in succession, the branch coming off the hydrophore itself. Each successive hydrophore has 3-4 annulations at the proximal portion where it branches off from the last. The hydrophores flare conspicuously and are marked with a ring of dots just below the margin, though these are sometimes difficult to see. The gonangia sit on long annulated pedicels, tending to grow on the upper part of the colony. The gonangia are orange, ovoid, and annulated throughout, with an aperture at the distal end.

Northeast Pacific Distribution

Originally described by Nutting (1901) from Yakutat, AK. Fraser (1937) recorded *H. speciosum* in San Francisco Bay, CA and Kadiak, AK. This species has also been recorded from the Atlantic by Calder (1970) from Hudson Bay and Ronowicz and Schuchert (2007) from Spitsbergen. Intertidal to a depth of 16 m (Fraser 1937). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. Found in the Arctic Ocean, down to Hudson Bay in the Atlantic and Alaska to San Francisco Bay in the Pacific. Spracklin (1982) recorded this species from the Caribbean off Belize, but this record seems dubious, considering all other records note the species in cold waters mostly restricted to arctic or boreal waters. With so few records of this species all restricted to colder waters, this species seems unlikely

to invade. The record from Belize is odd, but is most likely a misidentification, as several other *Halecium* species are very similar in appearance (Schuchert 2005).

Halecium washingtoni Nutting, 1899

(Plate 21)

Systematic Account

Halecium geniculatum Nutting, 1899: 744, pl. 43, figs 1A-D [original description].

Halecium washingtoni Nutting, 1901: 789 [name change]. – Fraser, 1911: 50 [original records]. – Fraser, 1914: 169-170, pl. 22, fig. 80 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1936: 125 [original records]. – Fraser, 1937: 111, pl. 23, fig. 125 [original records]. – Fraser, 1938a: 45 [original records]. – Fraser, 1938c: 133 [original records]. – Fraser, 1948: 226 [original records]. – Sheiko and Stepanjants, 1997: 440 [listed].

Halecium nuttingi Torrey, 1902: 50 [original records].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, air-dried, collected in the last 10 years

Specimen Location(s)

Washed ashore on beaches in Bandon, OR

Local Habitat

Subtidal

Description Based on Literature

Hydrocaulus slightly fascicled proximally, but mostly monosiphonic. Branches irregularly, with branches and branchlets composed of long internodes, each of which gives off a hydrophore at its distal end and has 2-3 annulations at the proximal end. Annulations on the distal end are oblique. The internodes on the ultimate branchlets have a zigzag appearance. Hydrothecae occur either singly or in pairs. Their pedicels are sometimes annulated on the distal parts of the branches, but not on the proximal portion. The hydrophore margin is usually everted and has bright dots. Hydranths are large, with 16-20 tentacles. Gonangia are borne in the axis of the branches, somewhat ovoid with a large terminal aperture (Nutting 1899).

Description of Coos County Material

Colony up to 5 cm tall. Hydrocaulus is fascicled. The primary branches are not arranged in an order, but the secondary branches have an alternating order to them. The ultimate branchlets have 2 or more annulations at the node, while the pedicels tend to be

annulated throughout. Hydrophores are large, with a flaring rim. The specimen examined, while large, was long dead and only air-dried, and structures such as gonangia were not present. Nutting describes these gonangia as generated in the branches, and having a round, but nearly triangular, or “barnacle” shape to them. The aperture is apparently large and terminal (Nutting 1899).

Northeast Pacific Distribution

First described from Puget Sound, WA by Nutting (1899). Fraser (1937, 1938a, 1938c, 1948) reported this species from the Gulf of Alaska, the Queen Charlotte Islands and San Juan Archipelago, BC, Friday Harbor, WA, Santa Rosa, Santa Cruz, and the Channel Islands, CA, Baja California, Mexico, and Costa Rica. Sheiko and Stepanjants (1997) reported *H. washingtoni* from the Commander Islands off the coast of Kamchatka. Found at a depth of 13 to 91 meters (Fraser 1937, 1948). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. This species appears restricted to Northeast Pacific waters.

Family Lafoeidae (Hincks, 1868)

Lafoea dumosa (Fleming, 1820)

(Plate 22)

Systematic Account

Sertularia dumosa Fleming, 1820: 83-84 [original description]. – Nutting, 1899: 747-751 [original records]. – Torrey, 1902: 59 [original records]. – Schuchert, 2015: 332, fig. 6A-B [original records].

Sertularia dumosa Fleming, 1820: 83-84 [original description].

Lafoea dumosa Clark, 1877: 216, pl. 12, fig. 23 [original records]. – Nutting, 1899: 747-751 [original records]. – Nutting, 1901: 177 [original records]. – Torrey, 1902: 59 [original records]. – Fraser, 1911: 51-52 [original records]. – Fraser, 1914: 174-175, pl. 23, fig. 86 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1936: 125 [original records]. – Fraser, 1937: 119, pl. 25, fig. 137 [original records]. – Fraser, 1938b: 110 [original records]. – Fraser, 1948: 229 [original records]. – Calder, 1970: 1524, pl. 5, fig. 3 [original records]. – Schuchert, 2001a: 67-70, figs 54A-D, 55, 56 [taxonomy]. – Watson, 2003: 157-158, fig. 7A-E [original records]. – Schuchert, 2015: 332, fig. 6A-B [original records].

Lafoea fruticosa Clark, 1877: 216, pl. 12, fig. 22 [original records]. – Nutting, 1901: 178 [original records]. – Fraser, 1911: 52 [original records]. – Fraser, 1914: 175, pl. 24, fig. 87 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1936: 125

[original records]. – Fraser, 1937: 120-121, pl. 25, fig. 138 [original records]. – Fraser, 1948: 230 [original records]. – Calder, 1970: 1524, pl. 5, fig. 4 [original records].

Lafoea gracillima Clark, 1877: 216, pl. 12, fig. 24 [original records]. – Nutting, 1901: 177 [original records]. – Torrey, 1902: 59 [original records]. – Fraser, 1911: 52 [original records]. – Fraser, 1914: 175-176, pl. 24, fig. 88 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1936: 125 [original records]. – Fraser, 1937: 121, pl. 25, fig. 139 [original records]. – Fraser, 1939: 155 [original records]. – Fraser, 1948: 230 [original records]. – Calder, 1970: 1525, pl. 5, fig. 5 [original records].

Lafoea pocillum Clark, 1877: 215-216, pl. 11, fig. 21 [original records].

Lafoea tenellula Fraser, 1948: 232 [original records].

Lafoea intermedia Fraser, 1938a: 47 [original records]. – Fraser, 1938c: 134 [original records]. – Fraser, 1948: 231 [original records].

Material: USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, collected August 5, 2019

Specimen Location(s)

Dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m.

Description Based on Literature

The stems are strongly fascicled, and highly branched. Young stems may grow as epiphytes, creeping over other hydroids. The hydrothecae are usually free from the stem, though occasionally near the distal portion of the stem the hydrothecae are adherent. The proximal portion of the hydrothecae passes in the same direction as the stem, the distal portion curving upward. The gonangia grow in a coppinia mass, and as seen from the surface are hexagonal, with a collar and aperture at the center. The elongated hydrothecae emerge at intervals between them (Fraser 1937).

Description of Coos County Material

The current material conforms in all respects with the above description. Distinctive yellow-green coloration of the hydranths and coenosarcal tissue makes this species easy to identify. The stem tends to be strongly fascicled and erect, but some (usually young) specimens may creep over other hydroids, the overall structure appearing stolonate. The hydrothecae are free from the stem, save for the sometimes the most proximal portion. The hydrothecae are tubular, curving outward at the distal potion. The gonangia form a coppinia mass typical of the family Lafoeidae. Under a microscope, each gonangia is

hexagonal, with a central orifice. There are elongated, curling hydrothecae that emerge at intervals between them. Very common off Cape Arago. The yellow-green color makes them difficult to miss, despite their small size.

Global Distribution and Invasions

No invasions reported. Cosmopolitan, found in the Pacific, Atlantic, Indian, Arctic, and Antarctic oceans. Subtidal to depths of 3940 m (Schuchert 2001a, Watson 2003). Considering the extraordinary geographic range, temperatures and depths this species is found in, it appears to be a strong candidate for a species complex, perhaps composed of different clades.

Family Plumulariidae (McCrady, 1859)

Plumularia setacea (Ellis, 1755)

(Plate 23)

Systematic Account

Corallina setacea Ellis, 1755: 19 [original description]

Sertularia setacea Linnaeus, 1758: 824 [redescription]

Plumularia corrugata Nutting, 1900: 64, pl. 6, figs 1-3 [original records]. – Fraser, 1911: 82 [original records]. – Fraser, 1914: 205-206, pl. 35, fig. 133 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1937: 186-187, pl. 42, fig. 225 [original records]. – Fraser, 1938a: 63 [original records]. – Fraser, 1938b: 111 [original records]. – Fraser, 1938c: 136 [original records]. – Fraser, 1948: 276 [original records].

Plumularia palmeri Nutting, 1900: 65, pl. 6, figs 4, 5 [original records]. – Nutting, 1901: 188 [original records]. – Fraser, 1911: 84, pl. 7, figs 3-4 [original records].

Plumularia milleri Nutting, 1906: 951-952 [original records]

Plumularia setacea Lamarck, 1819: 129 [name change]. – Calkins, 1899: 362-363, pl. 5, figs 27, 27A-C [original records]. – Nutting, 1900: 56-57, pl. 1, figs 1, 4 [redescription]. -Fraser, 1911: 84-85 [original records]. – Fraser, 1914: 209, pl. 36, fig. 136 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 191- 192, pl. 44, fig. 231 [original records]. – Fraser, 1938a: 66 [original records]. – Fraser, 1938b: 111 [original records]. – Fraser, 1938c: 136 [original records]. – Fraser, 1948: 287 [original records]. – Schuchert, 2001a: 131, fig. 111 [redescription]. – Schuchert, 2014: 1-9 [systematic analysis].

Material: USA, Oregon, Coos County, Bastendorff beach, washed up, colonies with gonophores, collected July 15, 2019; Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Specimens found washed up attached to kelp stipes on Bastendorff beach and beaches in Bandon, OR.

Local Habitat

Subtidal, often attached to kelp stipes.

Description Based on Literature

Colony attaining height of up to 5 cm (Fraser, 1937). The colony grows in dense, fur-like, tufts, composed of many fine stems (Nutting 1900). The stem is monosiphonic and does not branch. The stem is divided into regular internodes, each one bearing a hydrocladium in alternating directions. The hydrocladium is also divided into regular internodes. The first internode is short and does not bear a theca, and the following segments alternate between theca-bearing internodes and non-thecate internodes. In thecate internodes, the theca tends to be near the distal end of the internode. There are often no internodal septa in specimens, though some specimens do have them.

"There are two supracalycine nematophores, one mesial nematophore to each hydrocladial internode, with the exception of the proximal, one on each cauline internode on the side opposite the hydrocladial process and one in the axil of that process." The gonangia are borne on the hydrocladial processes of the cauline internodes. They are very long, almost pointed, with a long neck and small aperture (Fraser 1937).

Description of Coos County Material

Colony grows as a mass of stems all growing adjacent to one another. May be several centimeters in length, but on average 2-3 cm. The stem is divided into internodes, each of which bears a hydrocladium in alternating fashion. Branching in the stem or hydrocladium is exceedingly rare. On the hydrocladium, the first internode is without a theca, and subsequent internodes alternate between having a hydrotheca and not. Each thecate internode has two lateral nematophores, and a mesial nematophore. There are prominent mamelons directly proximal to the hydrothecae and 2nd median superior nematothecae on the interthecal internodes. This species is fairly common on kelp stipes, and specimens may be found when kelp washes up on beaches.

Northeast Pacific Distribution

Originally described by Ellis (1755) from the British Isles. Reported from the San Juan Archipelago and Ucluelet, BC (Fraser 1914), Puget Sound, WA (Calkins 1899), Heceta Head, OR, San Francisco, CA, Sitka, AK (Fraser 1937), and the California Channel Islands, Baja California, Mexico, and the Galapagos Islands (Fraser 1948).

Global Distribution and Invasions

No invasions reported. Nearly cosmopolitan in tropical and temperate water in the Pacific, Atlantic, and Indian oceans. Subtidal to 206 m (Schuchert 2001a). A study by Schuchert (2014) found that there was great genetic diversity in this species, making anthropogenic introductions unlikely, and a species complex more probable.

Family Sertularellidae (Maronna et al., 2016)

Sertularella conella Stechow, 1920

(Plate 24)

Systematic Account

Sertularella conica Calkins, 1899: 359, pl. 4, figs 22, 22A, 22B [original records]. – Nutting, 1904: 79, pl. 15, figs 1-2 [redescription]. – Fraser, 1911: 68, pl. 6, figs 2-4 [original records]. – Fraser, 1914: 190, pl. 29, fig. 110 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 151, pl. 34, fig. 179 [original records].

Sertularella conella Stechow, 1921: 231 [synonymy]. – Choong, 2015: 392, fig. 3 [redescription].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Specimens washed up on beaches in Bandon, OR.

Local Habitat

Subtidal.

Description Based on Literature

Colony stolonate and dense with a simple hydrorhiza. Often an epibiont on bryozoans or the hydroid *Symplectoscyphus tricuspidatus.* Unbranched or small branches, which are monosiphonic. Perisarc 30-120 μm thick. Axis divided into segments of oblique nodes, in a spiral fashion alternating left and right. Hydrothecae are distant, slightly fusiform and narrowing distally, 1070-1300 μm in length; 620-680 μm maximum width. Hydrotheca less than 1/3 adnate, the adnate side being 830-990 μm long. 3-4 annulations are present only on the adcauline side, the abcauline side being smooth. Hydrothecal rim with four cusps. Intrathecal cusps are present, on large abcauline one and two mid-to-small adcauline ones. Gonothecae arise from stem and are ovate, up to 3080 μm long and 1570 μm wide. They are on short pedicels 200 μm long. Gonothecae with 5-6 transverse annulations which span the entire gonotheca with distinct crests. Four cusps surround aperture (Choong 2015).

Description of Coos County Material

The current material conforms in all respects with the above description. Colony has only a few small branches, if any. The hydrothecae alternate and the distal 2/3 are free of the stem. The hydrotheca is slightly swollen, both the distal and proximal portions narrowing. Annulations are present on the hydrothecae, but only on the adcauline side facing the stem. The margin has 4 cusps, and 4 operculum flaps. The gonangia are borne on the stem, with no pedicel. The gonangia are deeply rugose, and the aperture is equipped with 4 stout cusps.

This species may be confused with *S. pinnatus,* as the overall appearance is similar, especially the gonangia. However, the gonangia in *S. pinnatus* have a distinct neck and lack the cusps around the aperture. The hydrothecae are also different, with only three cusps and no annulations.

Northeast Pacific Distribution

Originally described by Stechow (1920), it has been reported from the Queen Charlotte Islands to the San Juan Archipelago in British Columbia (Fraser 1937) as well as Puget Sound, WA (Calkins 1899). This species is a new record for the state of Oregon.

Global Distribution and Invasions

None reported. This species had been repeatedly confused with *S. conica* from the Atlantic (Calder 1983, Choong 2015). Stechow (1920) clarified the error.

Xingyurella turgida (Trask, 1854)

(Plate 25)

Systematic Account

Sertularia turgida Trask, 1854: 101, pl. 4, fig. 1 [original description].

Sertularella nodulosa Calkins, 360, pl. 5, figs 29, 29A, 29B [original records].

Sertularella turgida Torrey, 1902: 64, pl. 7, figs 59-62, pl. 8, figs 63-69 [original records]. – Nutting, 1904: 95, pl. 22, fig. 1 [redescription]. – Torrey, 1905: 29, figs 22-23 [original records]. – Fraser, 1911: 95 [original records]. – Fraser, 1914: 193, pl. 31, fig. 118 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1938a: 53 [original records]. – Fraser, 1948: 248 [original records].

Symplectoscyphus turgidus Vervoort, 1993: 241 [listed].

Xingyurella turgida Song et al., 2018: 1084, fig. 4A-L [genus transfer].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years; Bastendorff Beach from rocky shore at low tide, collected July 4, 2019; Fivemile Point, rocky shore at low tide, collected May 27, 2019.

Specimen Location(s)

Low rocky intertidal at the south wavebreak on Bastendorff Beach and Fivemile Point. Specimens also washed up on beaches in Bandon, OR.

Local Habitat

Rocky intertidal to subtidal.

Description Based on Literature

Colony 25-50 mm tall. Distance between internodes 0.5 mm. Gonotheca up to 1.1 mm in length and 0.35 in diameter (Calkins 1899). Colony small, stem stout and either unbranched or with a few irregularly placed branches similar to the stem. Hydrothecae alternate and about ½ free. Tubular, but swollen near the base. Hydrothecal margin with 3 cusps, 2 of which are stronger than the third. Operculum of 3 flaps. Gonangia borne in a row in the axils. Large, elongated and oval. Margin of aperture with 3-4 spines. Spines also present in varying number on the distal portion of the gonangia (Fraser 1937).

Description of Coos County Material

Colony up to 4 cm tall. The hydrocaulus is stout, and branches are rare. Stem and branches divided into internodes with each internode bearing a hydrotheca in alternating fashion. The hydrothecae are slightly swollen but overall tubular and smooth, with 3 teeth on the margin. Gonangia borne on the stem and branches in rows. Round and ovate, with distinct spines on the proximal half and 3-4 spines on the margin.

This hydroid is common in the Coos County intertidal zone, despite it being absent in some locations such as Cape Arago. The spines on the gonangia of this species make it easy to identify under a microscope.

Northeast Pacific Distribution

Originally described by Trask (1854) from San Francisco Bay. Reported from British Columbia (Fraser 1937), Puget Sound (Calkins 1899), Newport and Heceta Head, OR (Fraser 1937), and San Diego (Torrey 1902) to Baja California (Fraser 1948).

Global Distribution and Invasions

None reported. This species has been reported from the western Pacific (Vervoort 1993) and Japan (Torrey 1905), but these are likely misidentifications and instead other species in the newly described genus *Xingyurella*.

Family Sertulariidae (Lamouroux, 1812)

Abietinaria abietina (Linnaeus, 1758)

(Plate 26)

Systematic Account

Sertularia abietina Linnaeus, 1758: 824 [original description].

Abietinaria abietina Nutting, 1904: 114, pl. 32, figs 1-3 [redescription]. – Fraser, 1911: 57 [original records]. – Fraser, 1914: 178, pl. 25, fig. 90 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1936: 125 [original records]. – Fraser, 1937: 126, pl. 27, fig. 143 [original records]. – Fraser, 1948: 235 [original records]. – McLean, 1962: 99 [listed]. – McCormick, 1965: 142 [listed]. – Calder, 1970: 1525, pl. 5, fig. 6 [original records]. – Vervoort, 1993: 98 [listed]. – Schuchert, 2001: 88, fig. 73 [redescription].

Material: USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, colonies with gonophores, collected August 5, 2019; Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s): Dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge. Specimens also washed up on beaches in Bandon, OR.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m.

Description Based on Literature

Colonies 5-12 cm, erect, and colored amber to honey when living (Schuchert 2001a). Main stem stout and mostly straight, divided into regular internodes. Primary branches arranged pinnately, with 3 hydrothecae between successive branches on the same side of the stem. The primary branches branch occasionally and are also divided into regular internodes. Hydrothecae large and alternate, but occasionally nearly opposite; sometimes more than half the hydrotheca is free from the stem. Large at the base, narrowing above to form a neck and expanding slightly again to form a smooth margin. Margin is horizontal, but oblique compared to the axis of the hydrotheca (Fraser 1937). Hydrothecae are flask-shaped, bulbous below, 1/5 to ½ adnate, about 0.9 mm in depth, angle of opening with branch axis 45-90° (Schuchert 2001a). Gonangia borne on the upper side of branches. Oval with a short collar and wide aperture. They may be smooth or very slightly wrinkled (Fraser 1937). Embryos brooded in acrocyst (Schuchert 2001a).

Description of Coos County Material

The current material conforms in all respects with the above description. The colony branches pinnately, with a stout main stem divided into regular internodes. The primary branches are nearly as large as the stem, and are arranged in an alternating fashion, with three hydrotheca between branches on the same side of the stem. The branches occasionally branch again, and the branches are divided into internodes like the stem. The hydrothecae on the branches and stem grow alternating but may be nearly opposite at times. The hydrotheca is flask-shaped and is quite large at the base but narrows into a distinct neck which curves in the same plane as the branches. The margin is round and opens oblique to the axis of the stem. The gonangia grow perpendicular and on a single side of the "plane" the stem and branches form. They tend to grow on the stem or proximal portion of the branches. The gonangia are oval, with a short collar and wide aperture. They are generally smooth but may be slightly wrinkled or annulated.

This species bears a striking resemblance to other species of *Abietinaria* in Oregon, including *anguina, filicula,* and *rigida.* This species can be distinguished by its generally smooth gonangia, large size, and hydrothecae with curved necks.

Northeast Pacific Distribution

Originally described by Linnaeus (1758). Found from Alaska through British Columbia and Washington in addition to San Francisco through San Diego (Nutting 1904, Fraser 1937, McLean 1962). McCormick (1965) reported this species subtidally off the Oregon coast.

Global Distribution and Invasions

No invasions reported. Reported from the western Pacific (Vervoort 1993) and Japan as well as the Arctic Ocean, northern Atlantic to Madeira, Portugal, as well as Madagascar at depths of 10-630 meters (Schuchert 2001a). The Madagascar record is odd, and may be a misidentification, especially considering this species appears restricted to the northern hemisphere and deeper water, making transport by common vectors such as hull fouling or ballast water less likely.

Abietinaria anguina (Trask, 1854)

(Plate 27)

Systematic Account

Sertularia anguina Trask, 1854: 100, pl. 5, fig. 1 [original description].

Abietinaria coei Nutting, 1904: 117, pl. 33, figs 3-5 [redescription]

Thuiaria coei Nutting, 1905: 185, pl. 26, figs 1-3 [reprint of original records].

Abietinaria anguina Fraser, 1911: 58 [original records]. – Fraser, 1914: 179, pl. 25, fig. 92 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 125

[original records]. – Fraser, 1937: 128, pl. 27, fig. 146 [original records]. – Fraser, 1938: 110 [original records]. – Fraser, 1948: 236 [original records]. – Vervoort, 1993: 98 [listed].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Specimens washed up on beaches in Bandon, OR.

Local Habitat

Subtidal.

Description Based on Literature

Stem slender and strongly geniculate above the lowest branches; straight below these and annulated. Branches are pinnate and do not branch again. One hydrotheca borne in the axil of each branch, and one next to it on the same side. The hydrothecae are nearly opposite, but small and shovel-shaped, with a roughly even margin. Gonangia grow from the upper side of the branches, top-shaped and annulated, with a distinct collar. The annulations are near together proximally, but further apart distally (Fraser, 1937).

Description of Coos County Material

The current material conforms in all respects with the above description. Stem geniculate, slender, and annulated. The branches grow in a pinnate fashion, and branches growing on the same side are separated by three hydrothecae. The stem is separated into internodes, each one bears a branch and a hydrotheca in the axil of that branch just above it. There is a pair of alternate hydrothecae above, before the next annulation. The hydrothecae are alternate, but nearly opposite. They are flask-shaped, and quite large at the base, growing at a 90 degree angle, but tapering sharply and turning to be parallel with the branch or stem. The gonangia are borne on the branches on one side. They are quite swollen and annulated, curving with a notable short collar.

This species is easily confused with other *Abietinaria*, but the slender nature of this species in addition to the curved, annulated gonangia are distinctive.

Northeast Pacific Distribution

First described from San Francisco Bay by Trask (1854). The first record from Oregon was at Heceta Head, recorded by Fraser (1937). This species has been reported from Alaska to Baja California (Fraser 1937, 1948). Found from low tide to 64 m depth (Fraser, 1937).

Global Distribution and Invasions

No invasions reported. Vervoort's (1993) record of this species from the eastern Pacific indicates this species may be amphi-Pacific in distribution. This species is not likely to be introduced anywhere.

Abietinaria inconstans (Clark, 1877)

(Plate 28)

Systematic Account

Sertularia inconstans Clark, 1877: 222, pl. 15, figs 51, 52 [original description].

Abietinaria amphora Nutting, 1904: 119, pl. 34, figs 2-4 [original records]. – Fraser, 1911: 58 [original records]. – Fraser, 1914: 179, pl. 25, fig. 91 [original records]. – Fraser, 1935: 144 [original records]. – Fraser, 1936: 125 [original records]. – Fraser, 1937: 127, pl. 27, fig. 145 [original records]. – Fraser, 1938c: 134 [original records]. – Fraser, 1948: 235 [original records].

Abietinaria costata Nutting, 1904: 122, pl. 34, figs 9-12 [redescription]. – Fraser, 1936: 125 [original records]. – Fraser, 1937: 130, pl. 28, fig. 148 [original records].

Thuiaria costata Nutting, 1905: 187, pl. 26, figs 4-9 [reprint of original records].

Abietinaria inconstans Nutting, 1904: 116, pl. 33, figs 1-2 [redescription]. – Vervoort, 1993: 99 [listed].

Material: USA, Oregon, Coos County, Cape Arago South Cove from rocky shore at low tide, colonies with gonophores, collected April 21, 2019; Qochyax Island from rocky shore at low tide, colonies with gonophores, collected June 6, 2019; Bastendorff Beach from rocky shore at low tide, colonies with gonophores, collected July 4, 2019; Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Found at low tide in the low rocky intertidal at the south wavebreak at Bastendorff beach, the South Cove of Cape Arago, and Qochyax Island. Specimens also washed up on beaches in Bandon, OR.

Local Habitat

Low rocky intertidal to subtidal.

Description Based on Literature

Colony grows to about 8 cm in height. Main stem straight, proximal portion unbranched and divided into internodes, each of which bears a pair of subopposite hydrothecae. The upper part of the main stem is divided into internodes, each of which bear a branch and

two hydrothecae on one side, and one hydrotheca on the other. Branches alternate, sometimes branching several times. Hydrothecae flask-shaped with the distal third free, narrowed to a round aperture pointing upward and inward towards the stem. One-flapped operculum. Chitinous thickening projects down from inner lower corner of each hydrotheca. Gonangia very numerous, borne on both faces of the stem and often on basal parts of the branches. Ovate shape with a small tubular neck and round aperture, sides marked by about five meridional ridges (Nutting 1904).

Description of Coos County Material

The current material conforms in all respects with the above description. Colony is erect. The main stem is slender and divided into internodes. The branches grow pinnately and may branch again, sometimes multiples times. Each internode has a branch and two hydrothecae on one side, and one hydrotheca on the other. The branches have internodes as well, but these are irregular. Hydrotheca alternate, but nearly opposite and flask-shaped, similar to *A. abietina*. The gonangia are borne on the stem and proximal portion of the branches perpendicular the plane of the stem and branches. They are oval, with a small aperture, and have five longitudinal crests.

This species is similar to other *Abietinaria* species but is differentiated by the longitudinal crests on the gonothecae. It is very similar to another species in the region, *A. amphora*, but *amphora'*s branches do not branch again. Although in a specimen that has no secondary branches, identification is difficult.

Northeast Pacific Distribution

First described by Clark (1877) from Alaska. Recorded from Alaska to San Francisco (Nutting 1904, Fraser 1937) including Heceta Head, OR in 1937. It has also been reported from Southern California (Fraser 1948). Found low tide to a depth of 313 m (Fraser 1937).

Global Distribution and Invasions

No invasions reported. Vervoort (1993) reported this species from the eastern Pacific. This species appears to have a similar range to *A. anguina* and is similarly unlikely to be introduced anywhere in its range.

Abietinaria rigida Fraser, 1911

(Plate 29)

Systematic Account

Abietinaria rigida Fraser, 1911: 61, pl. 5, figs 1-3 [original description]. – Fraser, 1914: 182, pl. 26, fig. 98 [original records]. – Fraser, 1936: 125 [original records]. – Fraser, 1937: 134, pl. 29, fig. 155 [original records]. – Vervoort, 1993: 99 [listed].

Material: USA, Oregon, Coos County, Cape Arago, taken via box dredge several kilometers offshore, colonies with gonophores, collected August 5, 2019; Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Locations(s)

Dredged from several kilometers off Cape Arago at 43 18.2015 N, 124 25.6077 W to 43 17.6604 N, 124 25.2621 W from a depth of 34 m and 43 17.2505 N, 124 26. 5803 W to 43 16.7704 N, 124 26.4536 W from a depth of 43 m using a box dredge. Specimens also washed up on beaches in Bandon, OR.

Local Habitat

Subtidal, rocky terrain, from a depth of 34 to 43 m.

Description Based on Literature

Colony grows to over 50 mm in length. Main stem stout, rigid, and straight. Annulations at the base, but very few nodes in the remainder of the stem. Branches with regular pinnate arrangement with a slight angle to the stem and constricted at the base. Some stems are found with no branching, or with branches broken off. Hydrothecae alternate, stout, narrowing gradually towards a circular opening, but with no distinct neck. The even margin opens perpendicular to the axis of the stem or branch. Hydrothecae are only about ¼ free. Gonangia are borne on the upper surface of the branches. Oval and elongate, they have a pedicel and a short collar surrounding a large aperture. Surface is smooth to slightly wrinkled (Fraser 1937).

Description of Coos County Material

The current material conforms in all respects with the above description. The colony is erect, with a stout main stem divided into regular internodes. The primary branches are nearly as large as the stem, and are arranged pinnately, with three hydrotheca between branches on the same side of the stem. The branches occasionally branch again, and the branches are divided into internodes like the stem. The hydrothecae on the branches and stem grow alternating but may be nearly opposite at times. The hydrotheca is flask-shaped, but distinctly not curved. Most of the hydrotheca is immersed within the stem or branches, it narrows gradually with a small, indistinct neck. The margin is even, and the aperture opens vertically. The gonangia are oval, with a short collar and wide aperture. They are generally smooth but may be slightly wrinkled or annulated.

This species is nearly indistinguishable from *A. abietina* at first glance. The hydrotheca of *A. rigida* however, has almost no neck to speak of, which is the key trait that differentiates the two.

Northeast Pacific Distribution

First described from the San Juan Archipelago by Fraser (1911), with other records from the San Juan Islands and Alaska (Fraser 1937). Found from depths of 15 to 439 m (Fraser 1937). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. Vervoort (1993) lists this species from the western Pacific making it potentially amphi-Pacific, but the lack of literature makes this difficult to determine. This species seems unlikely to be introduced.

Abietinaria thuiarioides (Clark, 1877)

(Plate 30)

Systematic Account

Sertularia thuiaroides Clark, 1877: 223, pl. 13, figs 38, 39 [original description].

Thujaria thuiaroides Calkins, 1899: 361 [original records].

Thuiaria thuiarioides Nutting, 1904: 64, pl. 8, figs 1-6 [redescription]. – Nutting, 1905: 204 [reprint or original records]. – Fraser, 1914: 200, pl. 34, fig. 128 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 173, pl. 39, fig. 210 [redescription].

Abietinaria thuiaroides Vervoort, 1993: 99 [listed]. – Schuchert, 2001: 91, fig. 77A-C [redescription].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Specimens washed up on beaches in Bandon, OR.

Local Habitat

Subtidal.

Description Based on Literature

Colony up to 18 cm. Hydrocaulus erect, simple, very slender at the base, largest at distal end. Made up of internodes of various length cut by transverse nodes. Regularly branched, branches sub-erect and short, springing from opposite sides of the stem, but spirally arranged due to stem twisting. Some specimens may have branches which resemble the main stem. Branches are usually short, spreading widely and bearing only a few small subdivisions. Hydrothecae arranged alternately upon the branches, branchlets, and basal part of the stem. On the distal portion of the stem the internodes usually bear one hydrotheca on one side and two hydrothecae and a branch on the other

(Clark 1877). Hydrotheca about 0.4 mm long, the abcauline wall s-shaped to nearly straight, adcauline wall adnate for 4/5 of its length, adnate part convex, free part concave (Schuchert 2001a). Hydrothecae are tubular, deeply immersed with a constriction on the inner side of the distal end. The aperture is semilunar. The gonangia are borne in rows on the upper sides of the branches and branchlets. The gonangia are large and sessile, tapering at the base and with two pointed horns opposite each other on the distal end. The aperture is terminal and discoidal, with a row of cusps projecting into the gonotheca (Clark 1877).

Description of Coos County Material

The current material conforms in all respects with the above description. Main stem stout, branches from all sides. Branches often branch several times, making a dense bushy tuft towards the distal end of the colony. The hydrothecae are alternate, almost opposite. The tubular hydrothecae almost wholly immersed, with only the upward-facing aperture free. The gonangia are borne on the branches and are oblong with two sharp shoulder spines. Often confused with *Sertularia argentea* due to the similar shoulder spines on the gonangia. *A. thuiaroides* though has hydrothecae almost wholly immersed and the margin has no cusps.

Northeast Pacific Distribution

Originally described from Alaska and the Bering Sea by Clark (1877). Specimens reported from Puget Sound (Calkins, 1899) and the west coast of Canada (Fraser 1937). Found from depths of 24-55m (Fraser 1937). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. There are records of this species from the western Pacific (Vervoort 1993) including Japan and the Chukchi Sea in addition to the east coast of northern Canada and Iceland (Schuchert 2001). The records of this species are few and scattered, but it appears to have a subarctic to temperate distribution. This species appears unlikely to be introduced.

Amphisbetia furcata (Trask, 1854)

(Plate 31)

Systematic Account

Sertularia furcata Trask, 1854: 101, pl. 5, fig 2 a-e [original description]. – Clark, 1877: 258, pl. 39, fig. 3 [redescription]. – Torrey, 1902: 66, pl. 8, figs 73, 74, 75 [redescription]. – Fraser, 1911: 72, pl. 6, fig. 5 [original records]. – Fraser, 1914: 194, pl. 31, fig. 119 – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 162, pl. 37, fig. 195 [original records]. Fraser, 1938a: 55

[original records]. – Fraser, 1938b: 110 [original records]. – Fraser, 1938c: 135 [original records]. – Fraser, 1948: 248 [original records]. -

Sertularia pulchella Nutting, 1904: 55, pl. 2, figs 6-7 [redescription].

Amphisbetia furcata Calder et al., 2014: 433, fig. 5c [original records].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, air-dried, collected in the last 10 years; Bastendorff Beach from rocky shore at low tide, collected July 4, 2019; Fivemile Point, rocky shore at low tide, collected May 27, 2019.

Specimen Locations(s)

Specimens on seagrass and algae at the southern breakwater on Bastendorff Beach and Fivemile Point in the low intertidal. Specimens also washed up on beaches in Bandon, OR.

Habitat

Intertidal to subtidal growing on seagrass or algae.

Description Based on Literature

Colony small, often found growing from dense mats of stolons attached to eel-grass, *Fucus*, or other algae. Stems are slender and with few or no branches. Hydrothecae grow strictly opposite, with each pair adnate on one side of the stem, but apart on the other side. They are curved and tubular, with one third of the hydrotheca free of the stem. The margin has two long, very distinct, cusps, one of which is usually longer than the other (Fraser 1937). The gonangia grow from the lower portion of the stem, close to the stolon and just below the hydrotheca. They are large and oval, with a short collar and large aperture. The pedicel is short and curved, and the surface of the gonangia is smooth, or only very slightly wrinkled (Fraser 1937).

Description of Coos County Material

The current material conforms in all respects with the above description. Colony small, generally less than 1 cm. Grows in clumps from stolons with stems that are slender and unbranching. If they branch, it is very rare. The hydrothecae are strictly opposite and tubular in shape, often turning towards the same side of the stem. They are only about 1/3 free of the stem. The margin is equipped with two cusps, one of which may be longer, though it is sometimes difficult to tell. The gonangia tend to grow on the lower stem. They are round and ovate, with a short collar and round aperture about half the dimeter of the smooth gonangium.

This is a fairly distinctive epifaunal species that grows on seagrass and algae, though it may require a close look to spot in the field.

Northeast Pacific Distribution

Originally described from San Francisco Bay by Trask (1854). Reported from Monterey, Santa Cruz, Santa Barbara and San Diego, CA in Clark (1877). Fraser (1937) reported this species from Ucluelet and the Queen Charlotte Islands, BC as well as Baja California (1948). This species was found recently in Oregon on tsunami debris from the 2012 earthquake and tsunami that struck Japan (Calder et al. 2014). Found from low tide to a depth of 44m (Fraser 1937).

Global Distribution and Invasions

No invasions reported. This species can be found from the shores of both the northeastern and northwestern Pacific, and in the northwestern Pacific is often associated with *Amphisbetia pacifica* (Calder et al. 2014).

Amphisbetia greenei (Murray, 1860)

(Plate 32)

Systematic Account

Sertularia tricuspidata Murray, 1860: 250 [original description]

Sertularia greenei Murray, 1860: 504 [name change].

Coutlina greenei Agassiz, 1865: 147 [original records]

Abietinaria greenei Nutting, 1904: 121, pl. 36, figs 1-8 [redescription]. – Fraser, 1911: 61 [original records]. – Fraser, 1914: 181, pl. 26, fig. 96 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 125 [original records]. Fraser, 1937: 132-133, pl. 29, fig. 152 [original records]. – Fraser, 1948: 237 [original records]. – McLean, 1962: 106 [listed]. – Chan, 1971: 62, 66, 70, 75 [original records]. – Vervoort, 1993: 99 [listed].

Material: USA, Oregon, Coos County, Bastendorff beach, washed up, colonies with gonophores, collected July 15, 2019; Fivemile Point, rocky shore at low tide, collected May 27, 2019; Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Collected from the low rocky intertidal from Fivemile Point. Many specimens washed ashore on Bastendorff Beach and other beaches in Bandon, OR.

Local Habitat

Intertidal to subtidal.

Description Based on Literature

Colony grows to roughly 10 cm tall. Colony forms a dense bush of slender, monosiphonic, irregularly branching stems that form an erect colony (Nutting 1904). The branches tend to branch dichotomously at a shallow angle and turn to grow roughly parallel to the stem. The stem is constricted slightly at the base (Fraser, 1937). The stems and branches are divided into internodes, with one pair of alternate, but nearly opposite hydrotheca (Nutting 1904). The proximal half of the hydrotheca is the same diameter throughout. Above this, the hydrotheca narrows to form a neck and margin. There are two cusps on the distal side of the margin. These cusps range from long and distinct to barely noticeable (Fraser 1937). The gonangia grow in long rows on the front of the branches. They grow from small pedicels but expand to form a wide diameter with a small, distal collar that tapers into a circular aperture. The surface of the gonangia is slightly corrugated. The sporosacs grow out of the gonangium into an acrocyst (Fraser 1937).

Description of Coos County Material

The current material conforms in all respects with the above description. Colony grows to roughly 10 cm tall. Colony is composed of slender, irregularly branching stems that form an erect colony in a bushy mass. The stems tend to branch dichotomously at a shallow angle and turn to grow roughly parallel to the stem. The stems and branches are divided into internodes, with one pair of hydrothecae. The hydrothecae may be clearly alternate, or almost opposite depending on the specimen. The hydrotheca is about ½ immersed. In the distal half, the hydrotheca narrows to form a neck and margin, and turns upward. There are two cusps on the distal side of the margin. These cusps range from long and distinct to worn down and nearly unnoticeable. The gonangia grow in long rows on the front of the branches. They grow from small pedicels but expand to form a wide diameter that is capped with a narrow, distal collar with a circular aperture. The surface of the gonangia is corrugated.

This species grows many stems from a small hydrorhiza, creating a dense, bushy colony that is highly distinctive. This is a difficult colony to miss and is very common to find washed up on beaches on the coast of Coos County.

Northeast Pacific Distribution

First described by Murray (1860) from San Francisco Bay. Fraser (1937) recorded this species from the Queen Charlotte Islands and San Juan Archipelago, BC, Friday Harbor, WA, Newport, OR, San Francisco Bay, CA in addition to Point Arguello near Santa Barbara, CA (1948).

Global Distribution and Invasions

No invasions reported. This species appears limited to the Pacific. Vervoort (1993) lists it in the western Pacific hydroids, but does not mention a particular site, making verification necessary. Beyond that, it appears quite frequently on the west coast of North America.

Sertularia fabricii (Levinsen, 1893)

(Plate 33)

Systematic Account

Sertularia fabricii Calkins, 1899: 361, pl. 5, figs 24, 24A, 24B [original records]. – Calder, 1970: 1532, pl. 7, fig. 2 [original records]. – Schuchert, 2001: 105, fig. 89A-D [original records].

Thuiaria fabricii Nutting, 1904: 71, pl. 12, figs 1-2 [redescription]. – Nutting, 1905: 186, pl. 24, figs 4-5 [reprint of original records]. – Fraser, 1911: 76 [original records]. – Fraser, 1914: pl. 33, fig. 124 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 168, pl. 38, fig. 203 [original records]. – Fraser, 1948: 251 [original records].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Specimens washed up on beaches in Bandon, OR.

Local Habitat

Subtidal.

Description Based on Literature

Colony up to 10 cm tall. Stems are rigid, monosiphonic, and zigzag, with the hydrocladia arranged spirally. Basal hydrocladia often broken off, leaving stumps. The stem is divided by transverse nodes forming short segments. Each segment has one hydrocladium and 3 hydrothecae. One in the axil, 2 distal. Hydrocladia branch several times, with nodes present only occasionally. Hydrotheca 0.4-0.5 mm in abcauline length, vasiform to tubular in shape. The adcauline side is adnate for ¾ or the entire length. The walls are straight or slightly curved and the margin is equipped with two lateral cusps. The operculum is composed of two adcauline valves of similar size. Gonothecae borne on the branches, about 1.2 mm long, oblong, and somewhat flattened. Distal end of the gonotheca bears a collar and circular aperture with denticles within. The aperture is often flanked by two long horns which may be up to ½ the length of the gonotheca, but may be absent (Schuchert 2001a).

Description of Coos County Material

The current material conforms in all respects with the above description. The stem is slender, with branches growing from all sides. These branch several times. The hydrothecae are tubular and generally alternate, but this is variable, and they may

appear nearly opposite. The hydrothecae are about 1/3 free and have a margin with two noticeable cusps.

Easily confused with *Abietinaria thuiaroides* due to the similar gonangia with shoulder spines. The hydrothecae in *S. argentea* however are 1/3 free and have two cusps on the margin.

Distribution

Pacific distribution from Alaska (Nutting 1904) down through the Queen Charlotte Islands and San Juan Archipelago, BC, Puget Sound, WA (Fraser 1937), and Coos Bay, OR (Fraser 1948). Found from depths of 27-91m (Fraser 1937).

Invasions

No invasions reported. This species is boreal to temperate in distribution and has been reported from Alaska and the northeastern Pacific in addition to Greenland and Iceland (Schuchert 2001). Calder (1970) reported it from Newfoundland.

Family Symplectoscyphidae (Maronna et al., 2016)

Symplectoscyphus pinnatus (Clark, 1877)

(Plate 34)

Systematic Account

Sertularella pinnata Clark, 1877: 226, pl. 12, figs 28, 29 [original records]. – Nutting, 1904: 94, pl. 21, figs 10-12 [redescription]. – Fraser, 1911: 70 [original records]. – Fraser, 1914: 191, pl. 30, fig. 112 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 155, pl. 35, fig. 186 [original records]. – Calder, 1970: 1528, pl. 6, fig. 2 [original records].

Symplectoscyphus pinnatus Vervoort, 1993: 241 [listed]. Sheiko & Stepanjants, 1997: 440 [listed].

Material: USA, Oregon, Coos County, Bandon, washed up on beach, colonies with gonophores, air-dried, collected in the last 10 years

Specimen Location(s)

Specimens washed up on beaches in Bandon, OR.

Local Habitat

Subtidal.

Description Based on Literature

Colony grows to a height of 35 mm. Hydrocauli occur in dense clusters. Hydrocaulus erect, simple, straight, much and pinnately branched. Hydrocaulus divided into short internodes by transverse joints. Each internode bears a branch, which are are usually short, suberect, and not all in the same plane. They incline towards one another on the upper side of the stem and are divided into short internodes. Hydrothecae are arranged alternately, with one to each intrenode, and one on each axil on the hydrocaulus. Hydrothecae are short, tubular, and widemouthed, the margin bearing 3 large cusps. 2 of these are abcauline. Gonangia borne in rows in the axils on the proximal portion of the hydrocaulus. Gonangium ovate, with about 8 distinct transverse ridges and a terminal, discoidal aperture (Clark 1877).

Description of Coos County Material

The current material conforms in all respects with the above description. Colony grows in a much-branching mass. The stem and branches are divided into internodes that each bear a hydrotheca in an alternating fashion. There is often an additional constriction or two marking an internode or hydrotheca. The hydrotheca is angled outward from the stem or branch and is at least halfway free of the stem if not more. It is generally smooth and tubular, only slightly swollen, and bears 3 distinct cusps on the margin. The gonangium is borne on the branches and is ovular and very rugose. The collar noticeably small and short.

This species may be confused with *S. conica*, due to similar appearance. However, the hydrotheca of *S. conica* are annulated on the adcauline side and there are four cusps on the hydrothecal margin. The gonangia have four teeth surrounding the aperture.

Northeast Pacific Distribution

Originally described from Alaska by Clark (1877). Reported from the San Juan archipelago, BC, Friday Harbor, WA, and San Francisco Bay. Found from the intertidal to 205 m (Fraser, 1937). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. Listed from the western Pacific by Vervoort (1993) the Commander Islands off Russia by Sheiko and Stepanjants (1997), and Hudson Bay by Calder (1970).

Symplectoscyphus tricuspidatus (Alder, 1856)

(Plate 35)

Systematic Account

Sertularia tricuspidata Alder, 1856: 356, pl. 8, figs 1, 2 [original description]. –

Sertularella tricuspidata Clark, 1877: 224, pl. 12, figs 26, 27 [original records]. – Calkins, 1899: 360, pl. 4, figs 21, 21A, 21B, 21C [original records]. – Nutting, 1904: 100, pl. 25, figs 3-7 [redescription]. – Nutting, 1905: 183 [reprint of original records]. – Fraser, 1911: 71 [original records]. – Fraser, 1914: 193, pl. 31, fig. 117 [original records]. – Fraser, 1935: 145 [original records]. – Fraser, 1936: 126 [original records]. – Fraser, 1937: 159, pl. 36, fig. 191 [original records]. Fraser, 1948: 246 [original records]. – Calder, 1970: 1531, pl. 6, figs 7, 8 [original records].

Symplectoscyphus tricuspidatus Cornelius, 1979: 301, fig. 28a-b [synonymy]. – Schuchert, 2001: 112, fig. 96A-B [original records].

Material: USA, Oregon, Coos County, Bastendorff Beach from rocky shore at low tide, colonies with gonophores, collected May 28 & July 4, 2019

Specimen Location(s)

Low rocky intertidal on the south breakwater at Bastendorff Beach.

Local Habitat

Low rocky intertidal.

Description Based on Literature

Colony erect, 2-10 cm tall. Monosiphonic and geniculate, hydrothecae generated at the bends. Branches irregularly with secondary branching often present. The branches and stem are identical in structure, and more or less regularly segmented by transverse to oblique nodes. Hydrothecae in two rows, alternating in direction. Hydrotheca 0.3-0.5 mm in depth. Cylindrical, and straight to slightly curved with the adcauline side adnate for the first 1-2 proximal thirds. The aperture is at a 60° to the axis of the branch or stem segment and the margin bears 3 cusps. The operculum is formed of 3 valves of roughly equal size, though renovations are frequent. The gonotheca is elongate and oval, about 1 mm long. 7-9 strongly exsert transverse folds, which form collars. Aperture at distal end sometimes flaring (Schuchert 2001a).

Description of Coos County Material

Greenish coenosarcal tissue. Stem branches in a generally, though not strictly alternate fashion. Stem and branches are divided into internodes, with a single branch or hydrotheca per internode, with roughly 5 mm space between hydrothecae. The hydrothecae are alternate and tubular, only slightly swollen. The hydrothecal margin has 3 cusps and an operculum of 3 flaps, though it may initially look like 2. No gonangia were found on the specimens collected. However, Fraser (1937) describes them as numerous when apparent on the stem and branches. They are supposedly rugose, with a small tubular neck bearing the aperture.

Northeast Pacific Distribution

Originally described by Alder (1856) from Northumberland, England. Reported from the eastern Pacific from Alaska (Clark 1877), the Queen Charlotte Islands and San Juan Archipelago, BC (Fraser 1937), Puget Sound (Calkins 1899), the Washington coast (Nutting 1905), and the Californian Channel Islands to Baja California (Fraser 1948). Depth of 13-622 m (Schuchert 2001a). This species is a new record for the state of Oregon.

Global Distribution and Invasions

No invasions reported. Circumpolar distribution, found in arctic and boreal waters of the Pacific and Atlantic (Schuchert 2001a).

Appendix C

Plates of Coos County’s Hydroids

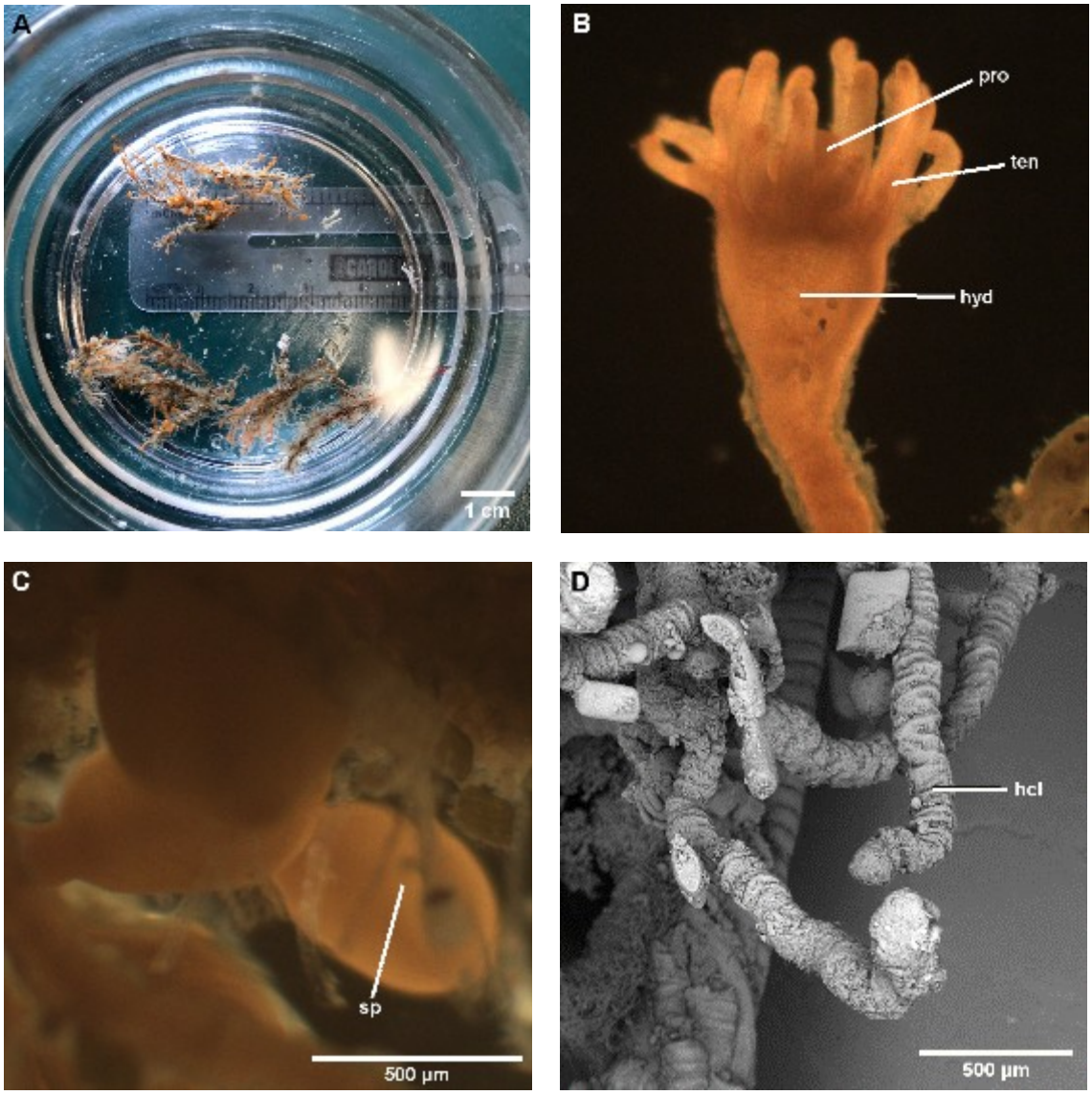
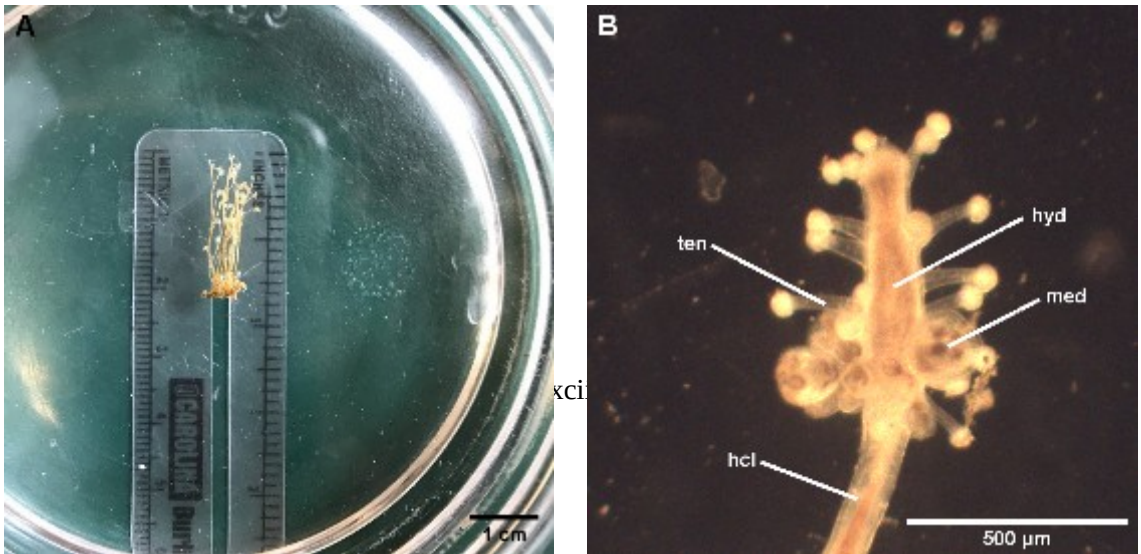
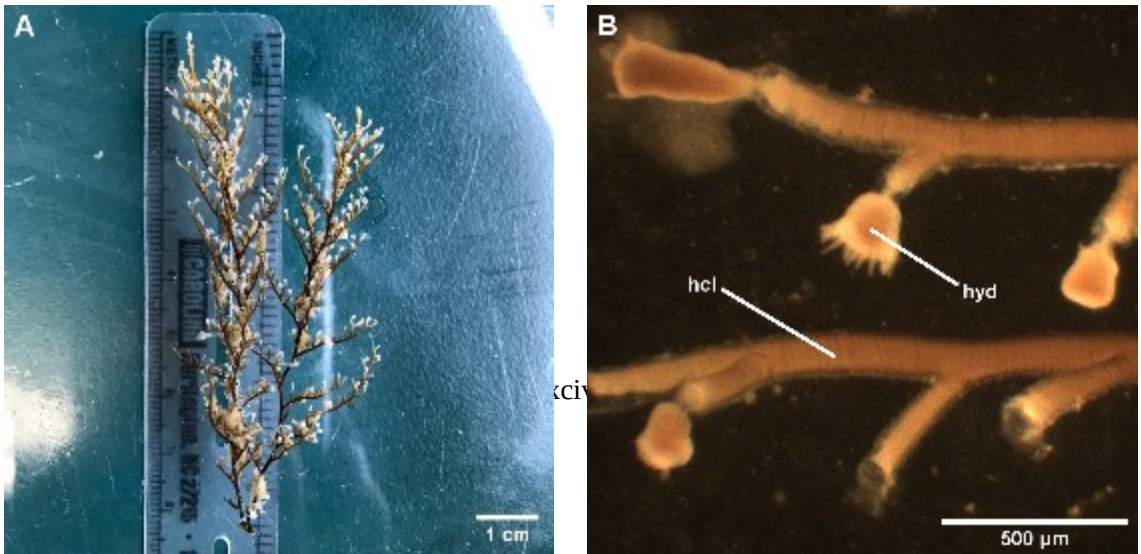


Plate 1: *Garveia annulata.* A.Colonies as they appear to the naked eye, covered in *C. volubilis.* B. Hydranth (hyd), with conical proboscis (pro) and tentacles (ten) showing. C. Portion of colony with several sporosacs (sp). D. Enlarged hydrocladia (hcl) with distinctly wrinkled perisarc.



xci


A
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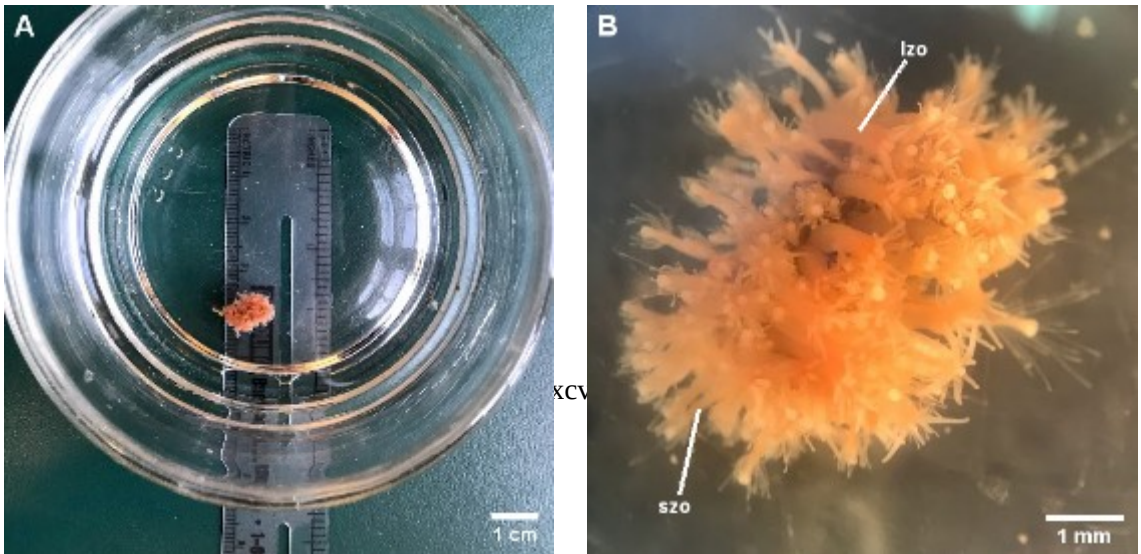
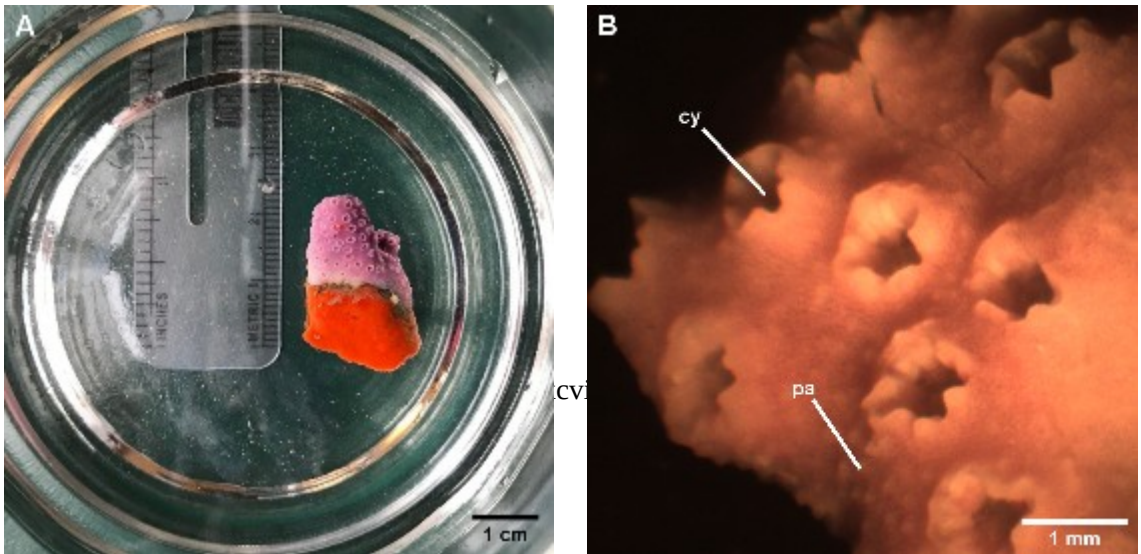
500 µm


A
1 cm
B
lzo
szo
1 mm


A
1 cm
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1 mm

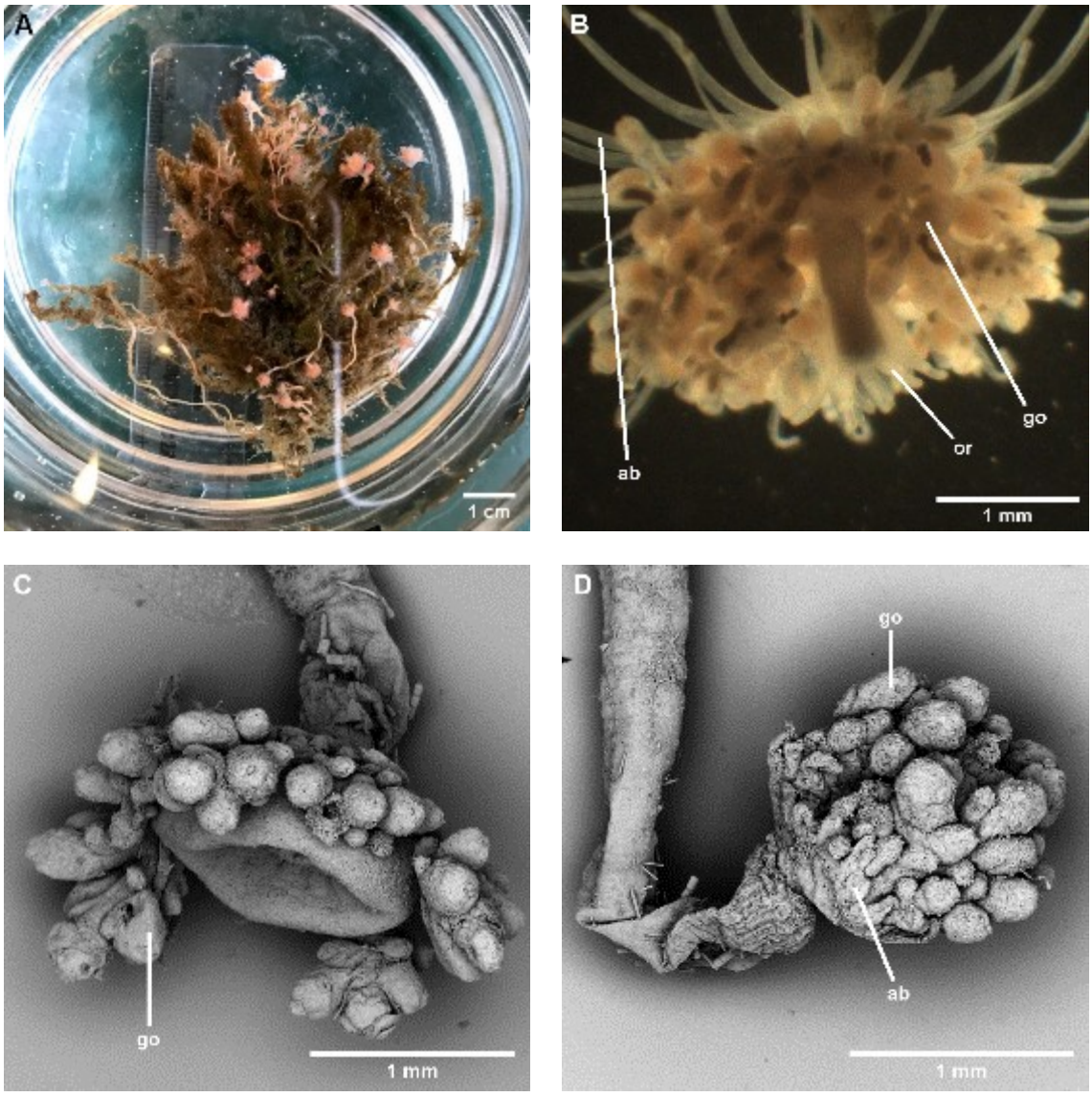
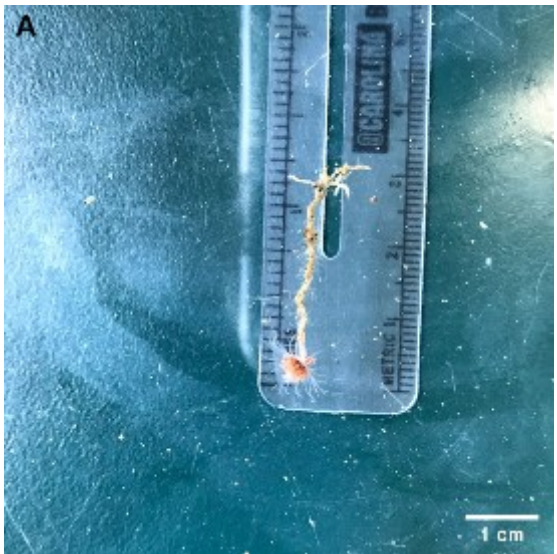
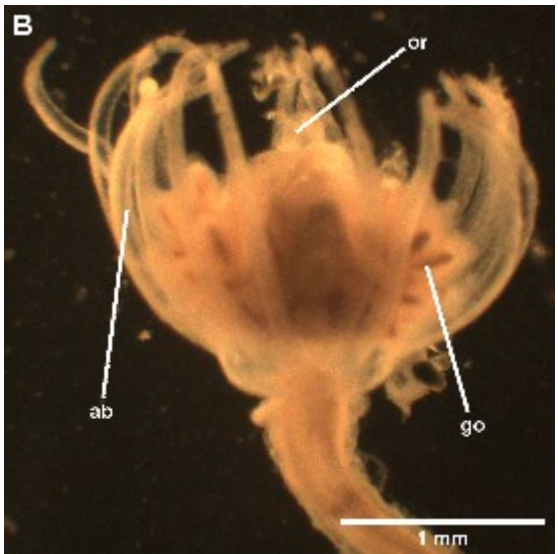
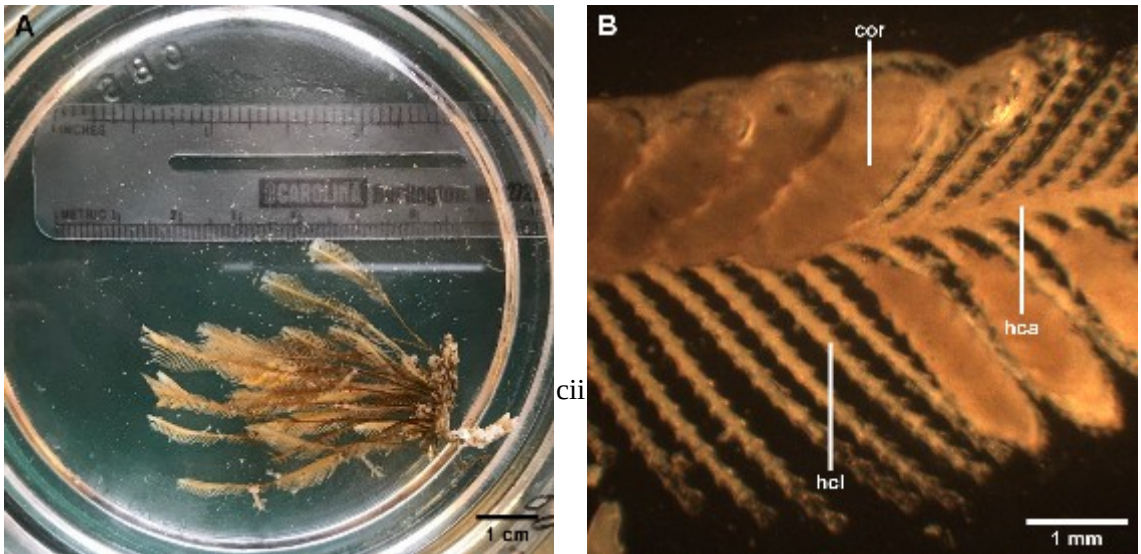


Plate 6: *Ectopleura crocea.* A. Colony as it appears to the naked eye, covered in algae. B. Hydranth, with gonophores (go) between the oral (or) and aboral (ab) tentacles. C. Preserved hydranth with visible gonophores (go). D. Preserved hydranth with visible gonophores (go) and the remains of the aboral tentacles (ab).

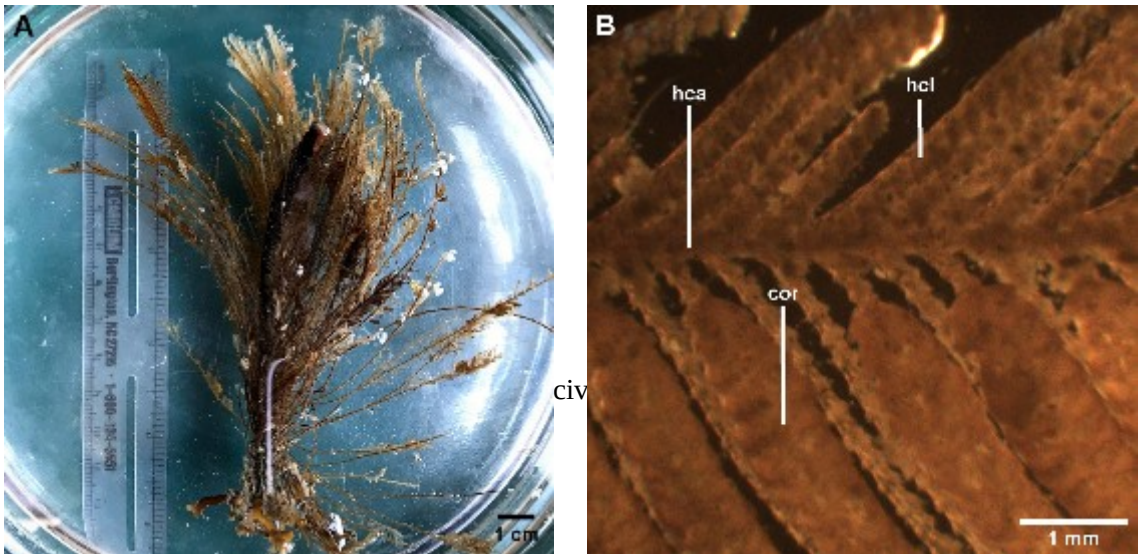


C

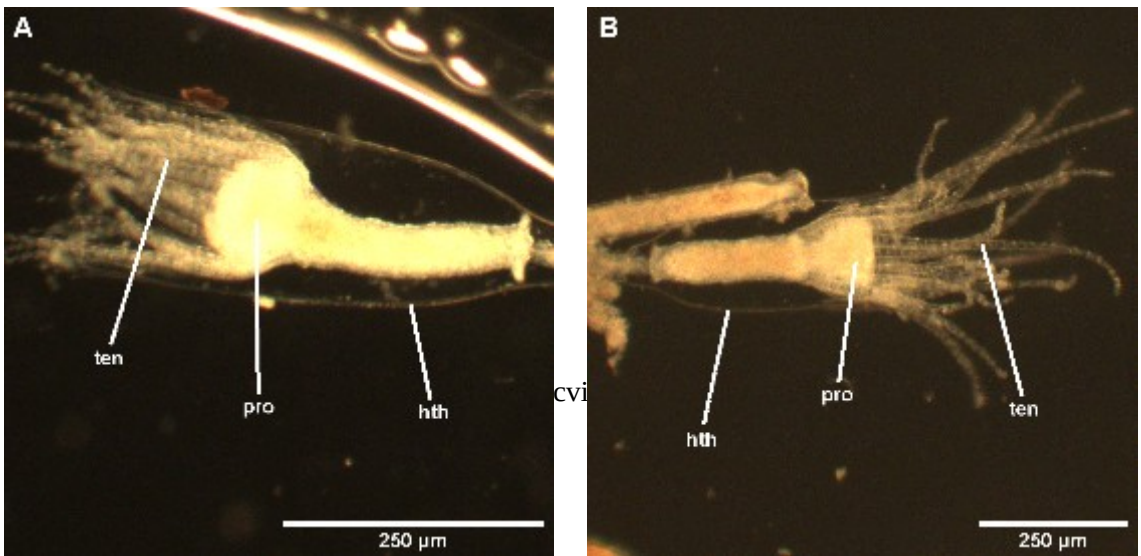




cii



civ


A
ten
pro
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250 µm
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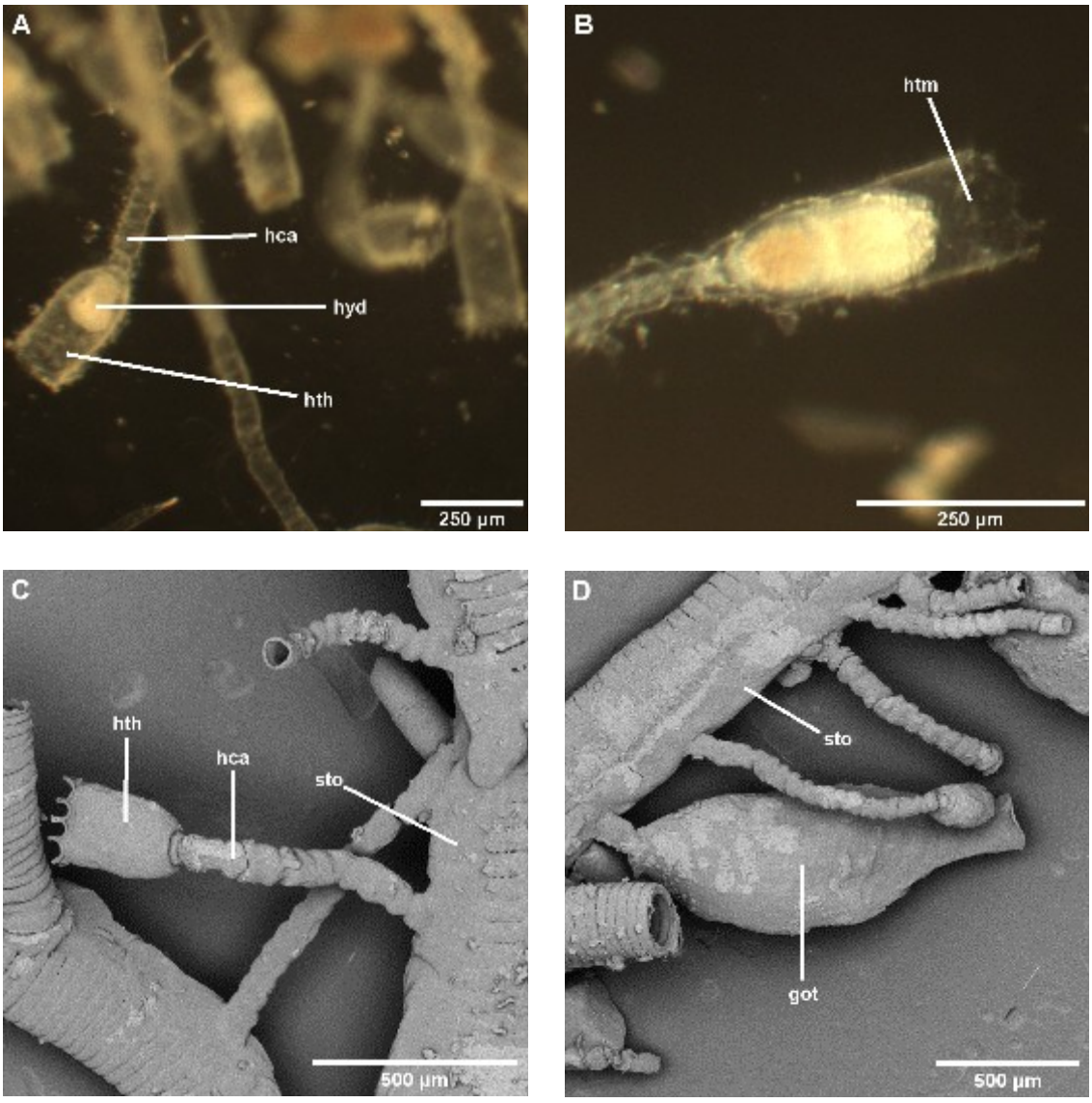
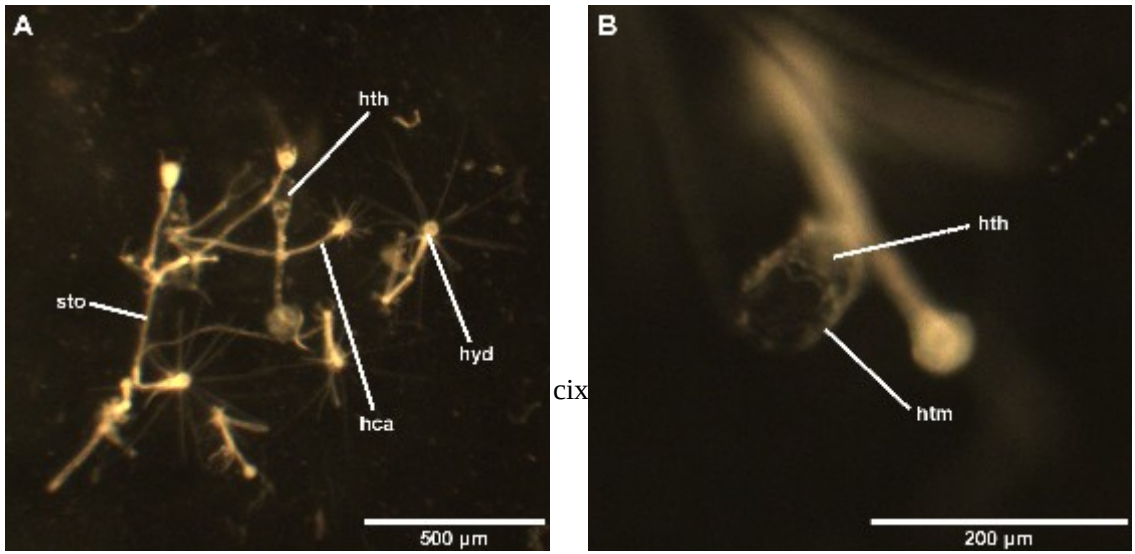
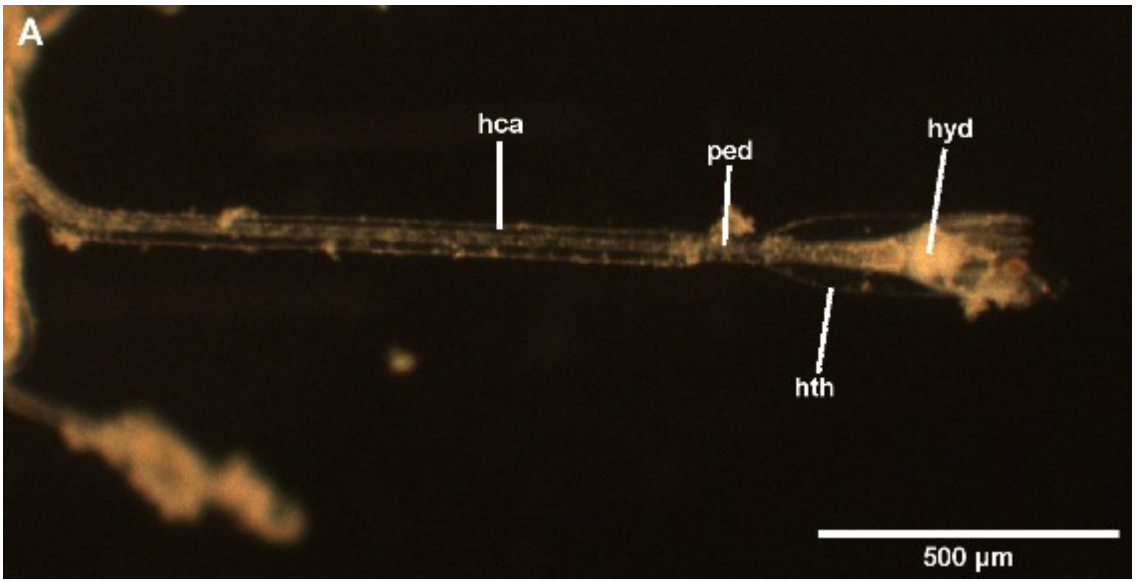
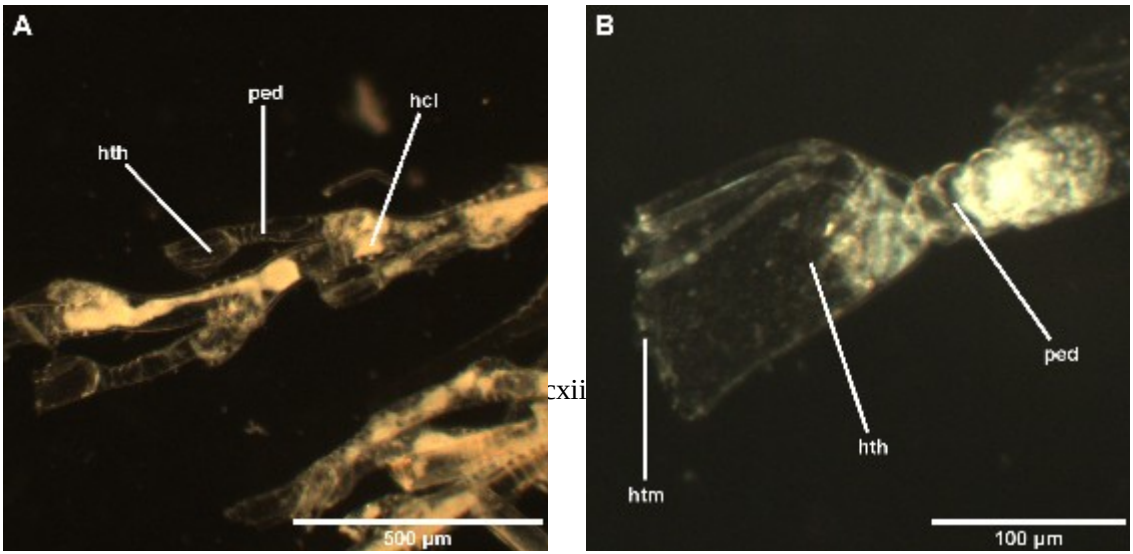


Plate 11: *Campanularia volubilis.* A. Portion of colony showing the hydrocauli (hca), hydrothecae (hth) and the remains of the hydranth (hyd). B. Enlarged hydranth with a clearly cusped hydrothecal margin (htm). C. Enlarged portion of colony growing over *Eudendrium californicum* with a network of stolons (sto) with prominent hydrocaulus (hca) and hydrotheca (hth). D. Enlarged portion of colony growing over *Eudendrium californicum* with prominent stolon (sto) and gonotheca (got).



cix


A
hca
ped
hyd
hth
500 µm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B
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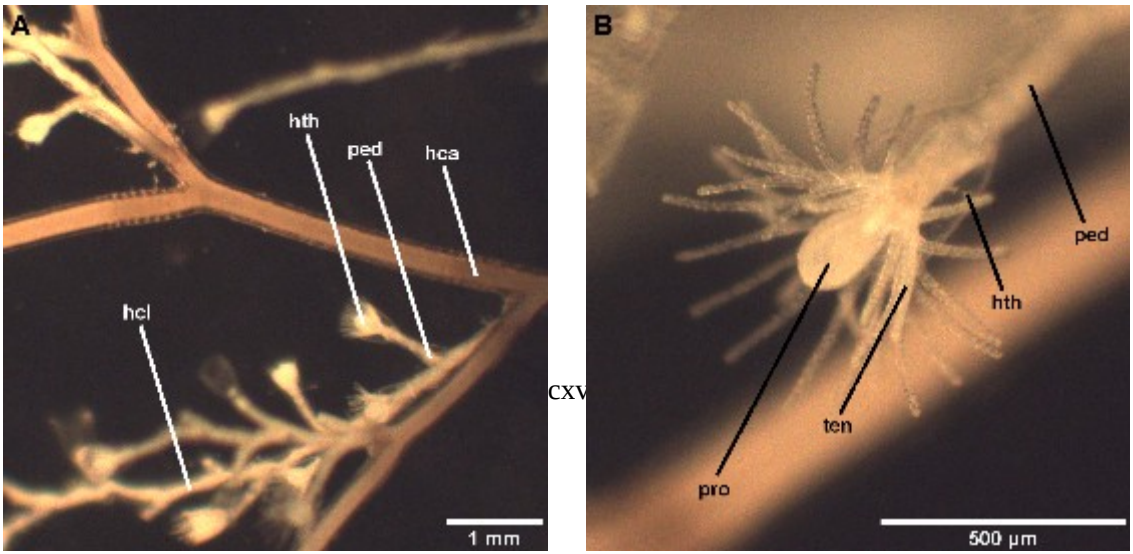
100 µm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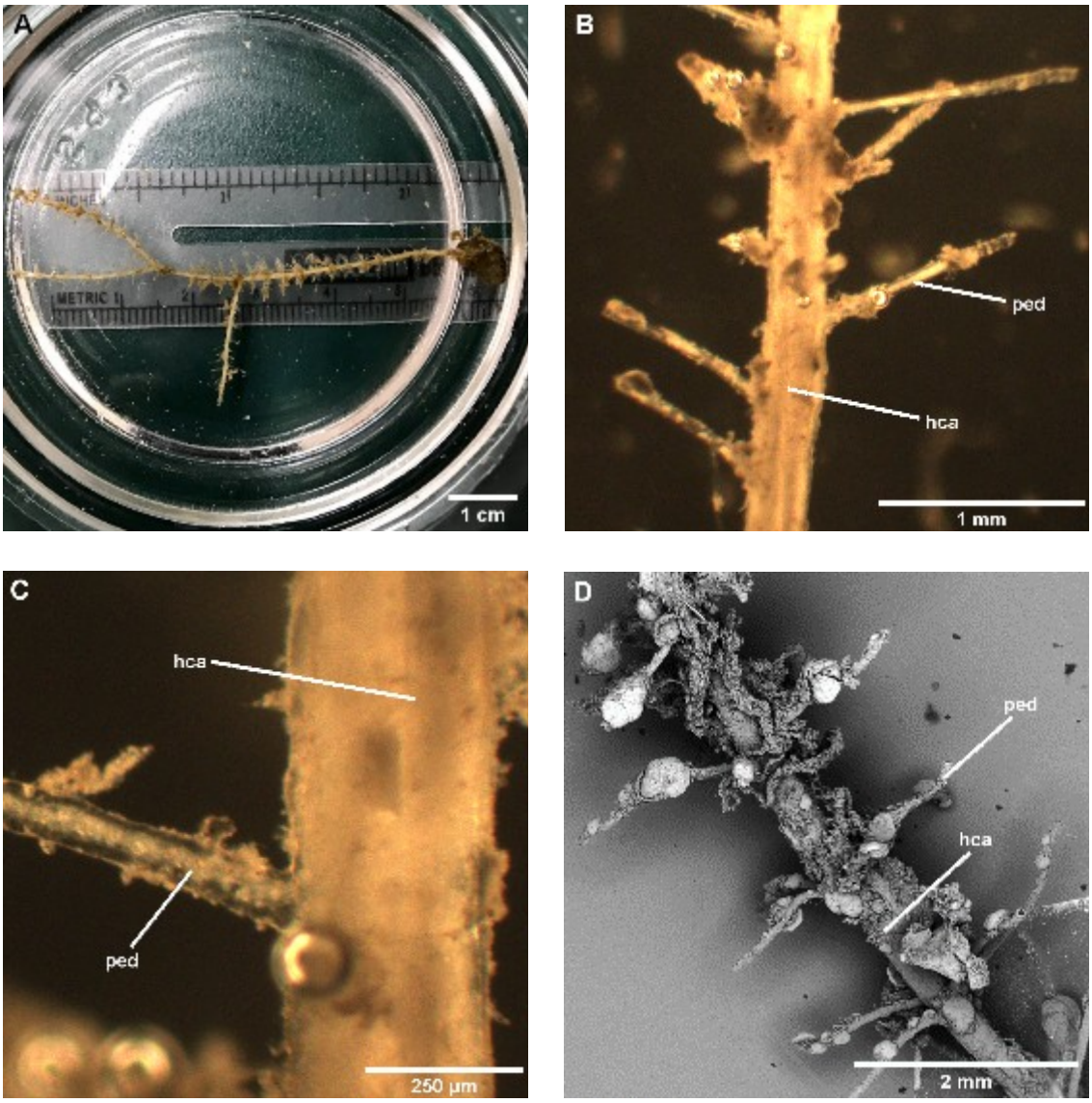
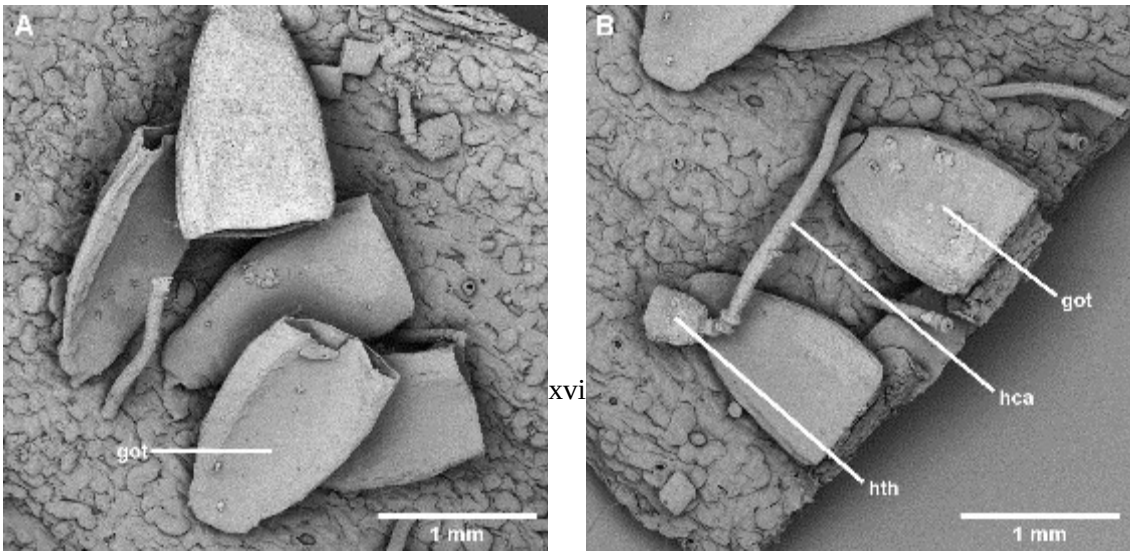


Plate 16: *Rhizocaulus verticillatus.* A. View of colony as it appears to the naked eye. B. Portion of colony with polysiphonic hydrocaulus (hca) with long annulated pedicels (ped). C. Enlarged portion of colony with polysiphonic hydrocaulus (hca) and annulated pedicel (ped). D. Preserved colony with polysiphonic hydrocaulus (hca) and pedicels (ped).


A
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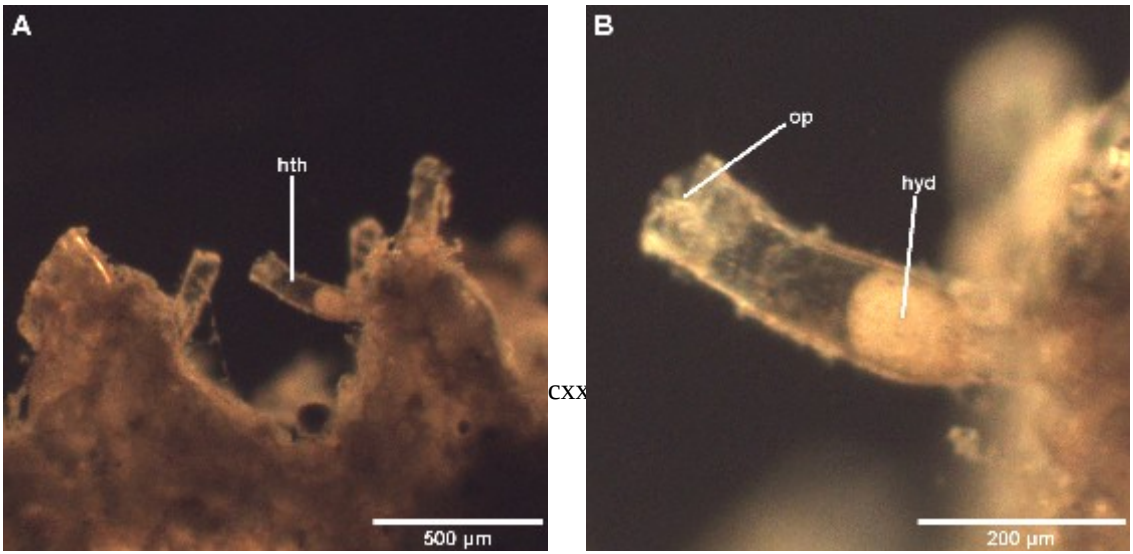
1 mm
B
got
hca
hth
1 mm


A
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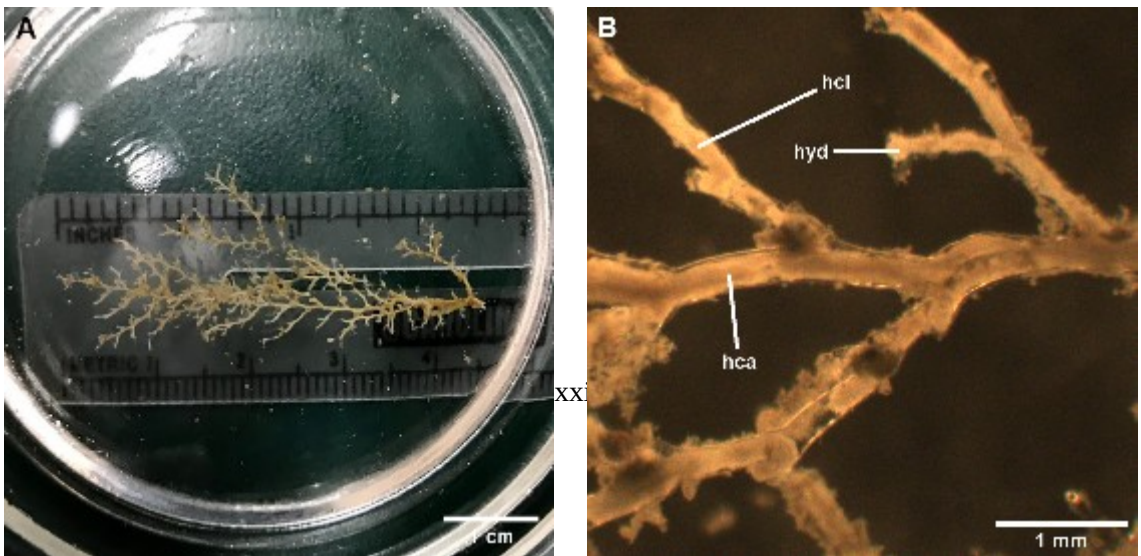
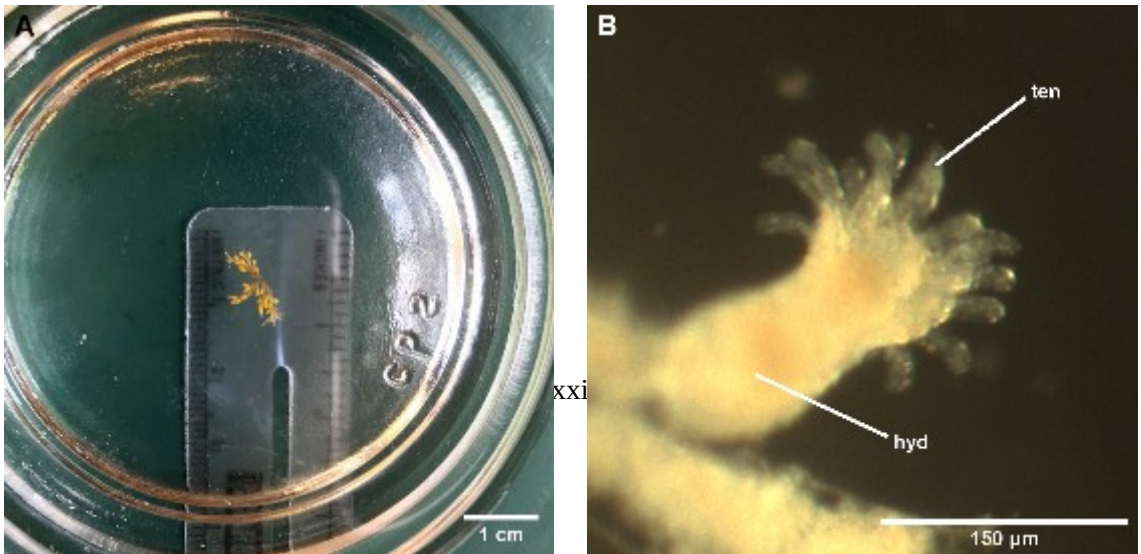
500 µm
B
op
hyd
200 µm


A
1 cm
B
hcl
hyd
hca
1 mm


A
1 cm
B
ten
hyd
150 µm

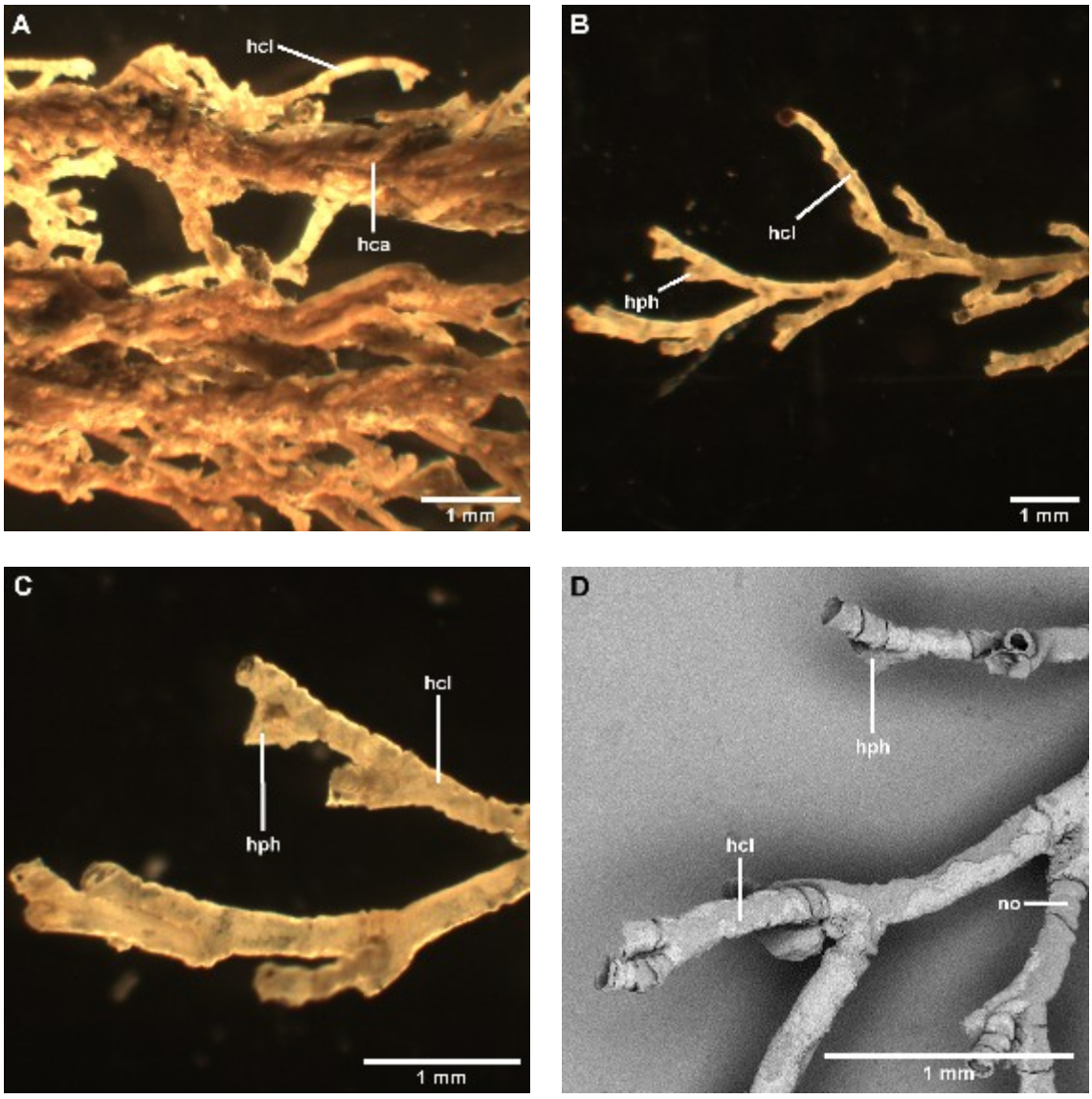
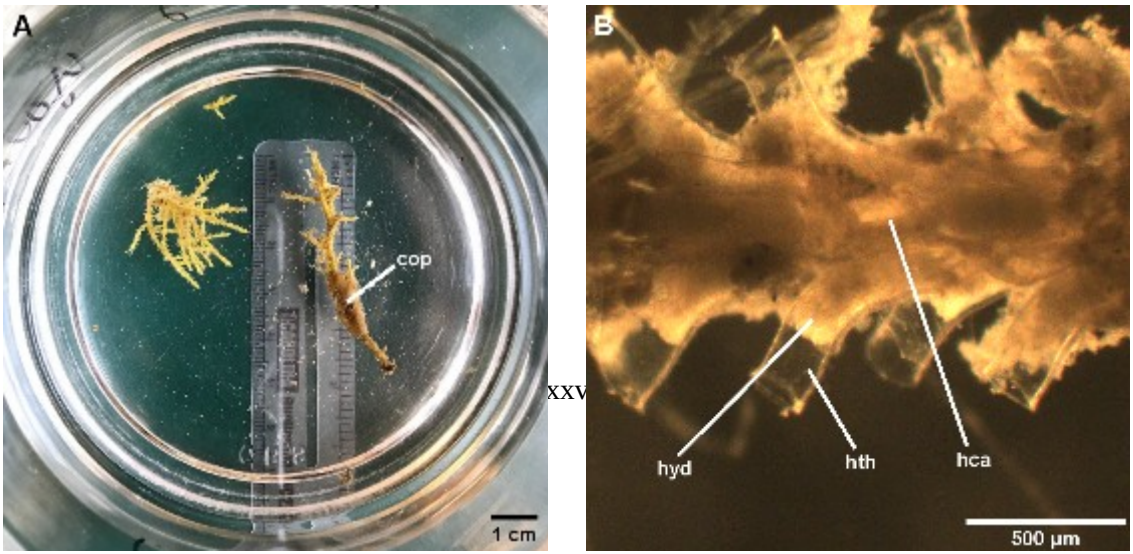


Plate 21: *Halecium washingtoni.* A. Portion of colony with polysiphonic hydrocauli (hca) and several hydrocladia (hcl). Portion of colony with hydrocladia (hcl) and hydrophores (hph). C. Enlarged terminal hydrocladia (hcl) and hydrophores (hph). D. Portion of colony with hydrocladia (hcl) with visible nodes (no) and hydrophores (hph).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1 cm
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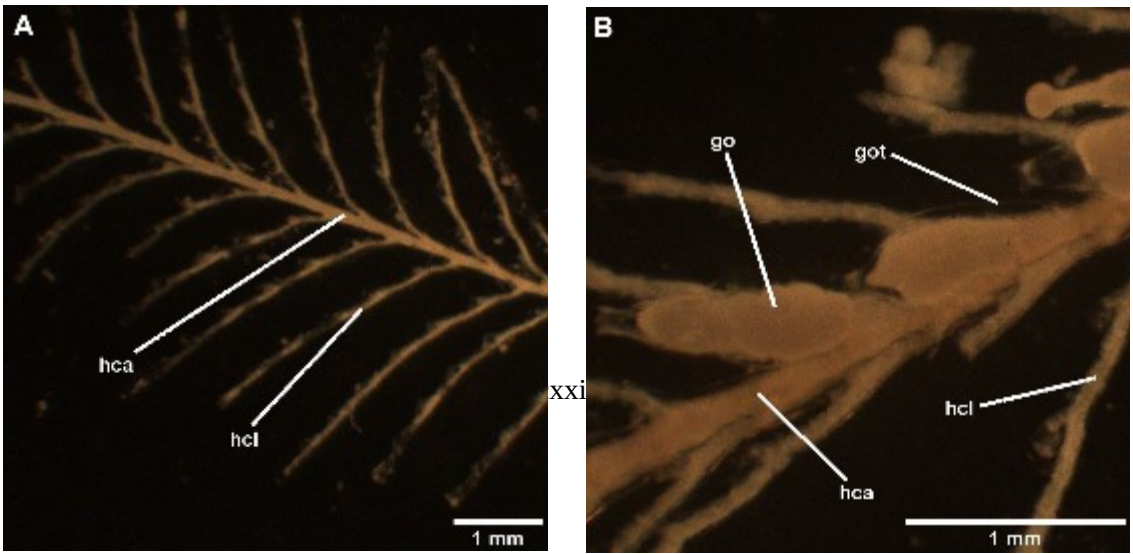
500 µm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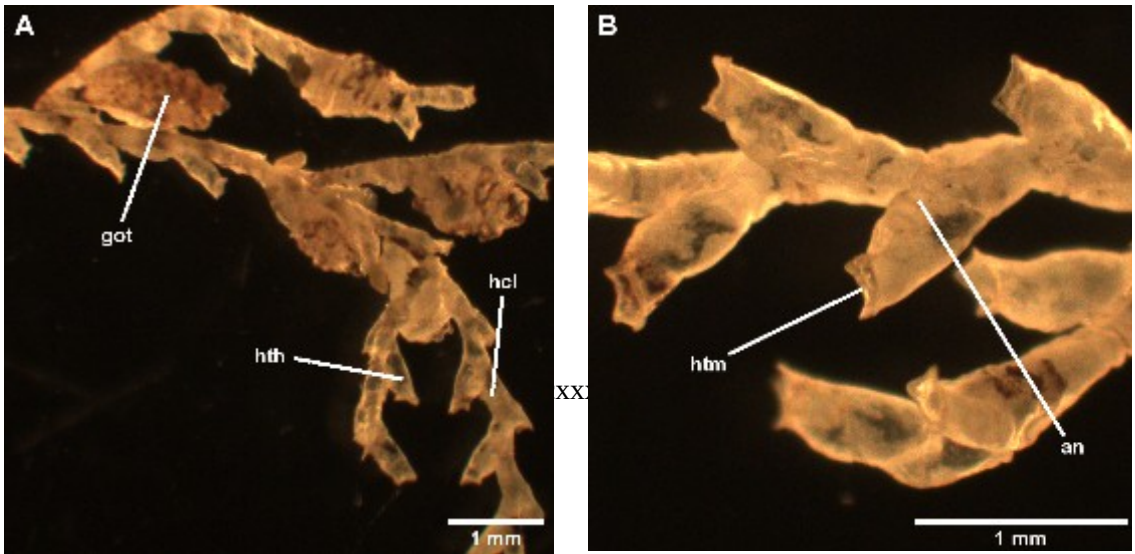
hcl
1 mm
B
go
got
hcl
hca
1 mm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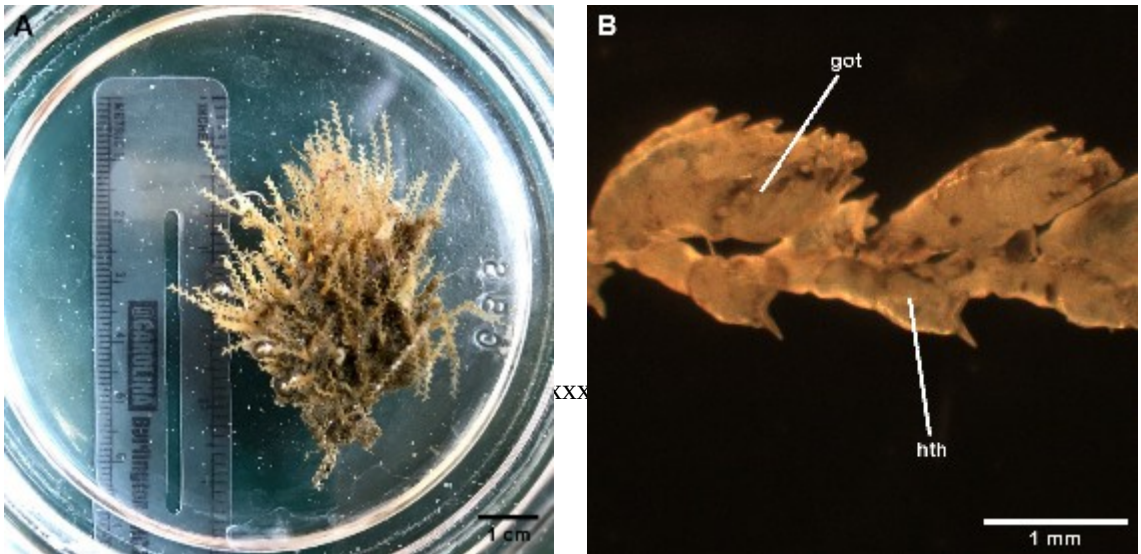
1 mm


A
1 cm
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got
hth
1 mm

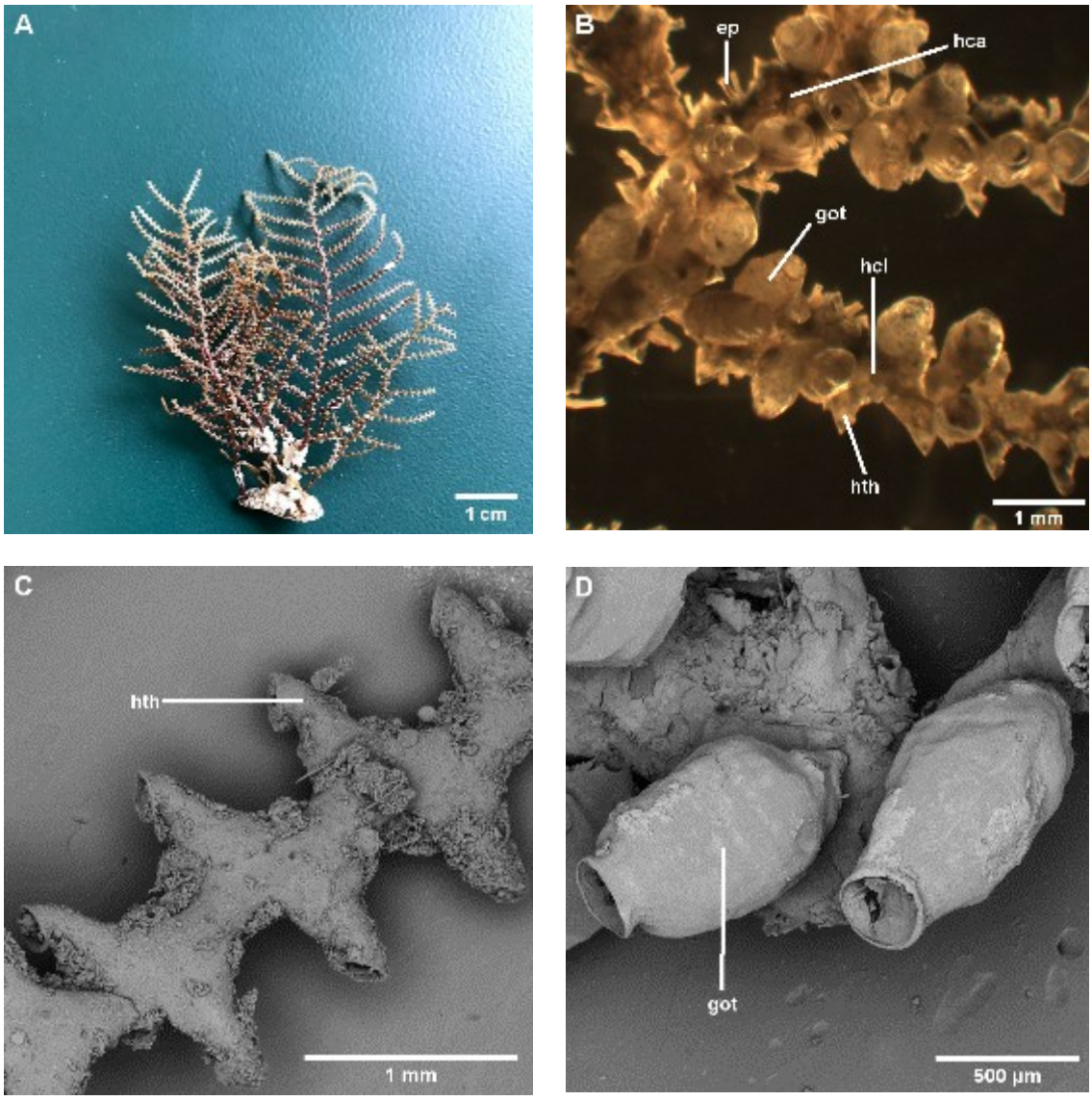
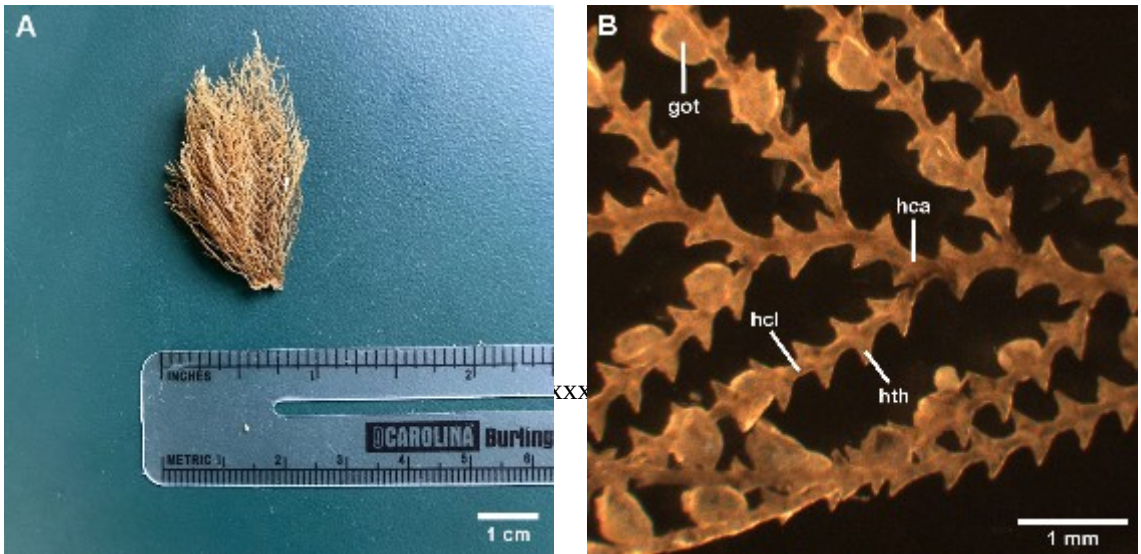
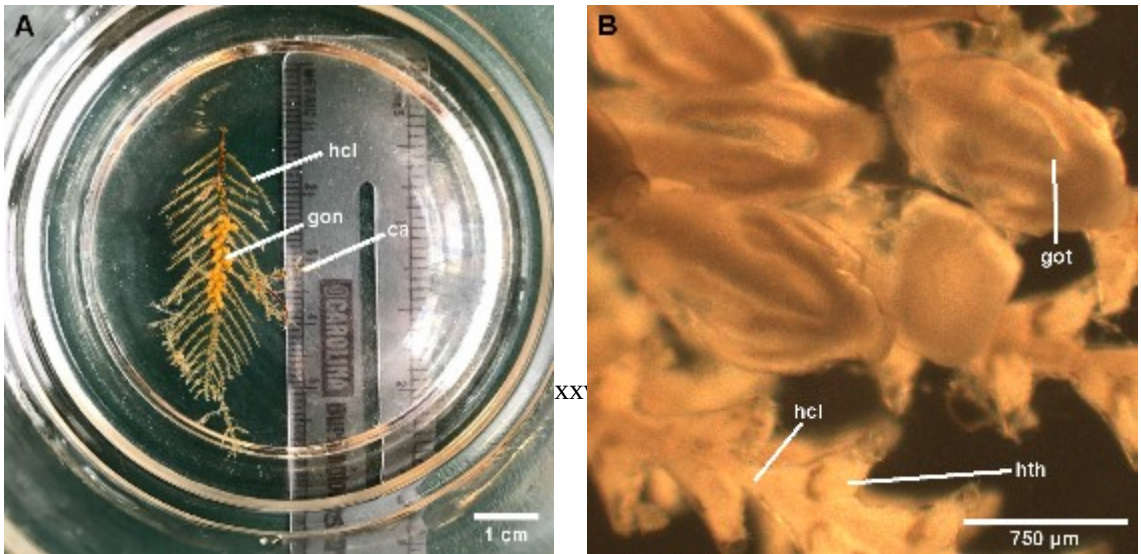


Plate 26: *Abietinaria abietina.* A. View of colony as it appears to the naked eye. B. Portion of colony with hydrocaulus (hca), hydrocladia (hcl), gonothecae (got), hydrothecae (hth), and covered in the epizoic hydroid *L. dumosa* (ep). C. Enlarged, alternately arranged hydrothecae (hth). D. Enlarged gonothecae (got).


A
INCHES
CAROLINA Burling
METRIC
1 cm
B
got
hca
hcl
hth
1 mm


A
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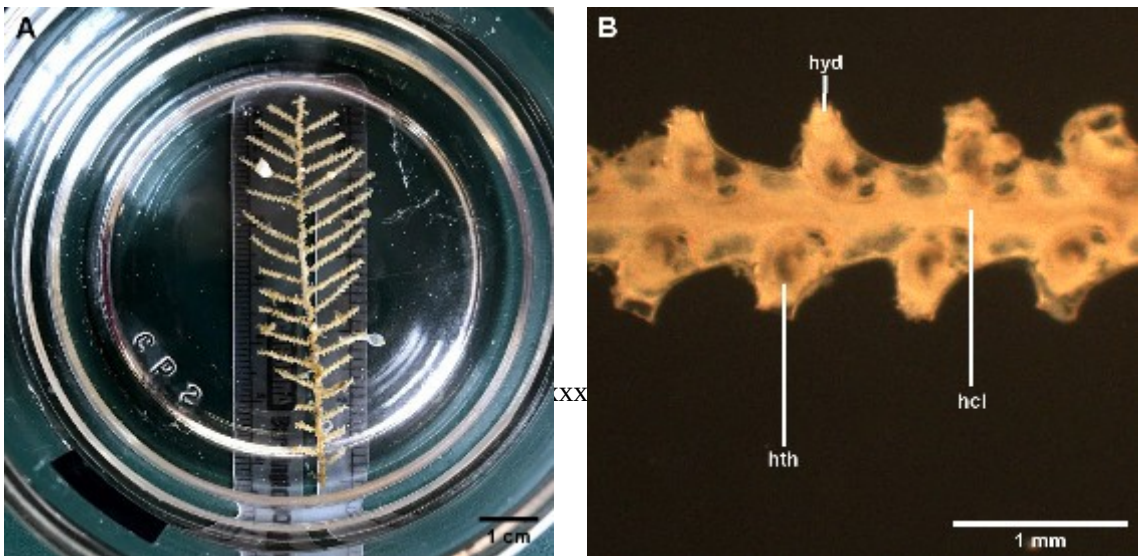
gon
ca
1 cm
B
got
hcl
hth
750 µm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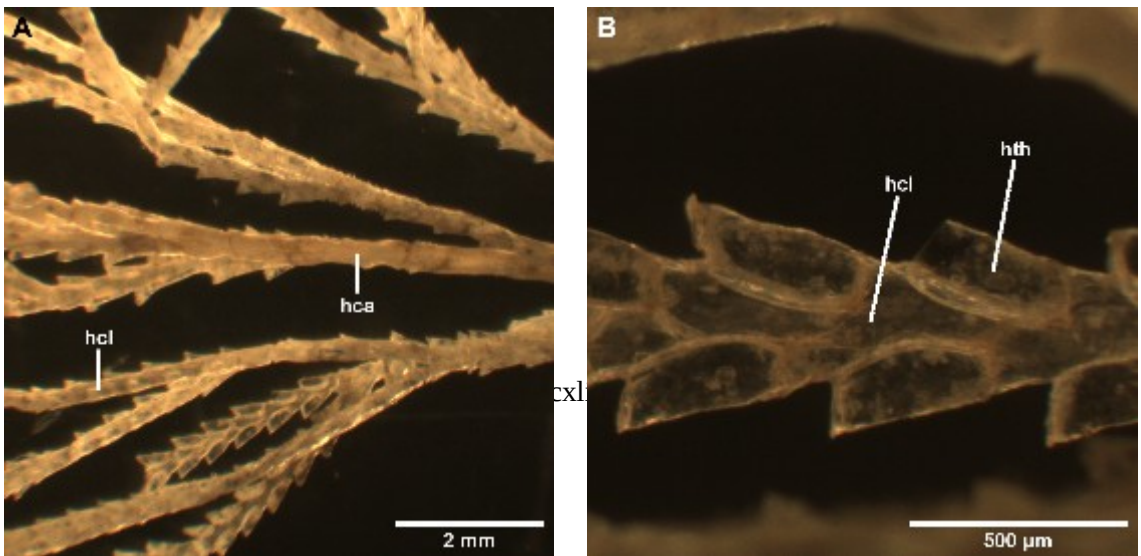

A
hca
hcl
2 mm
B
hth
hcl
500 µm

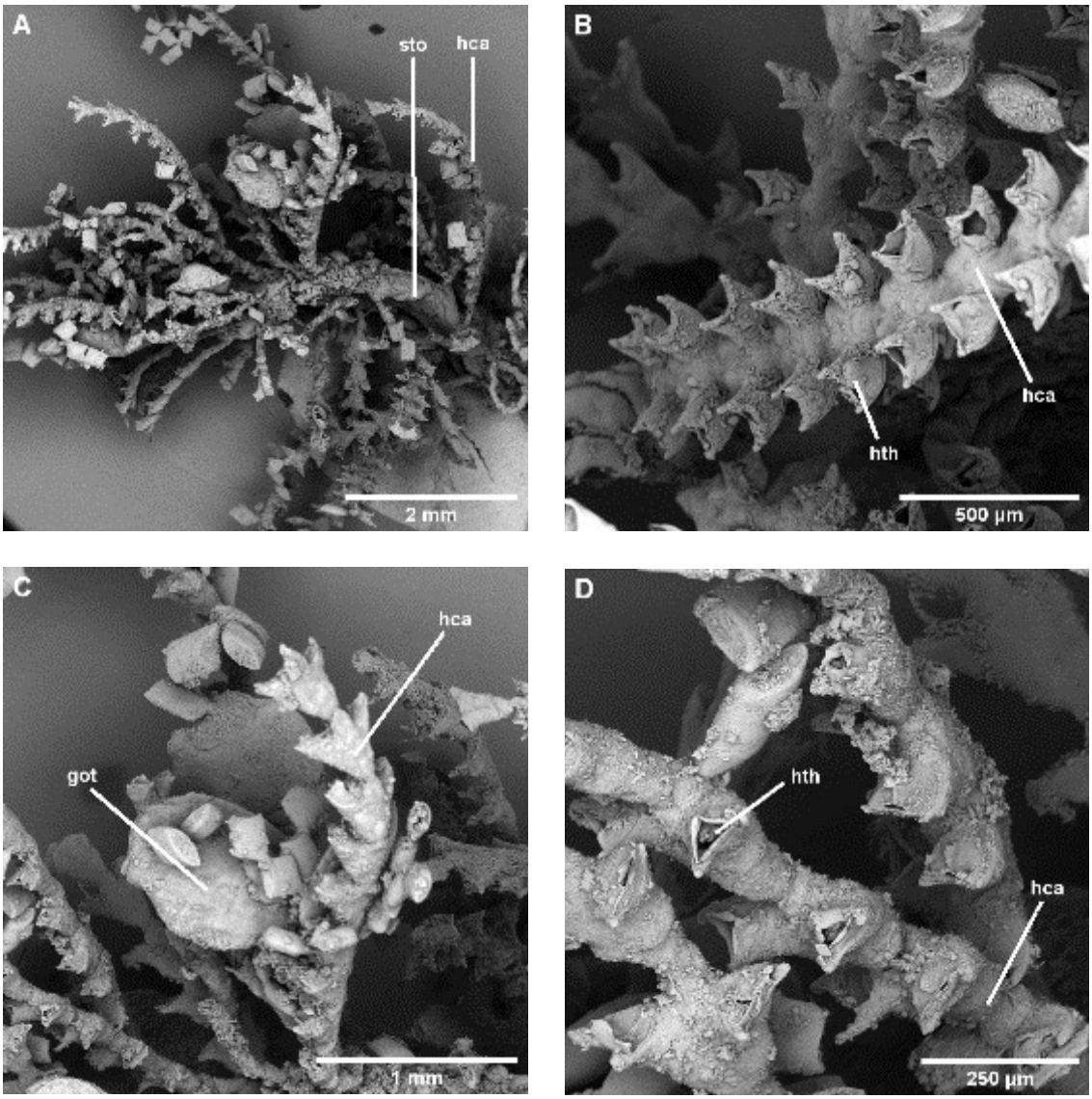
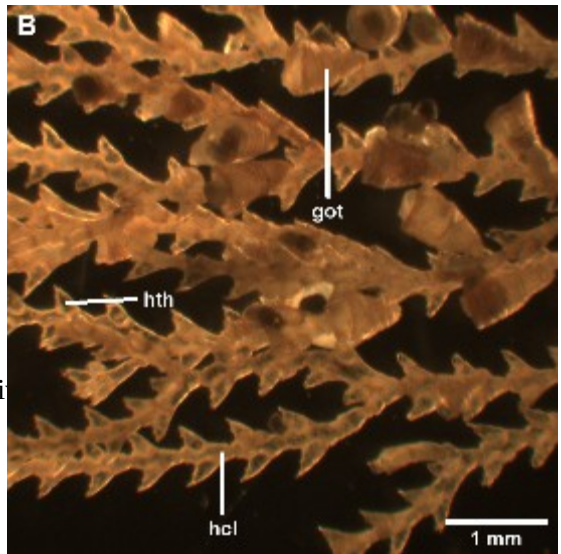
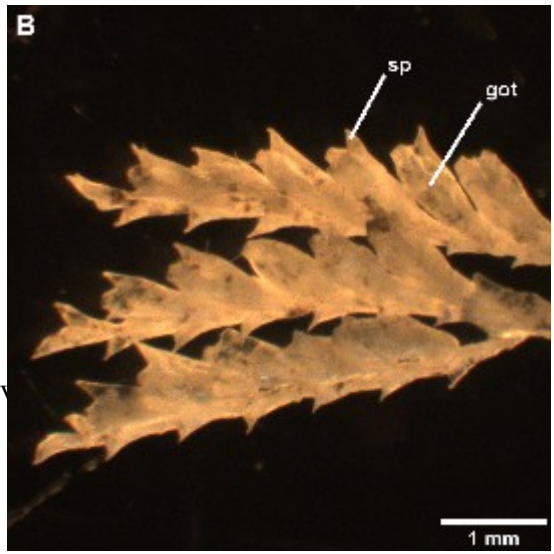


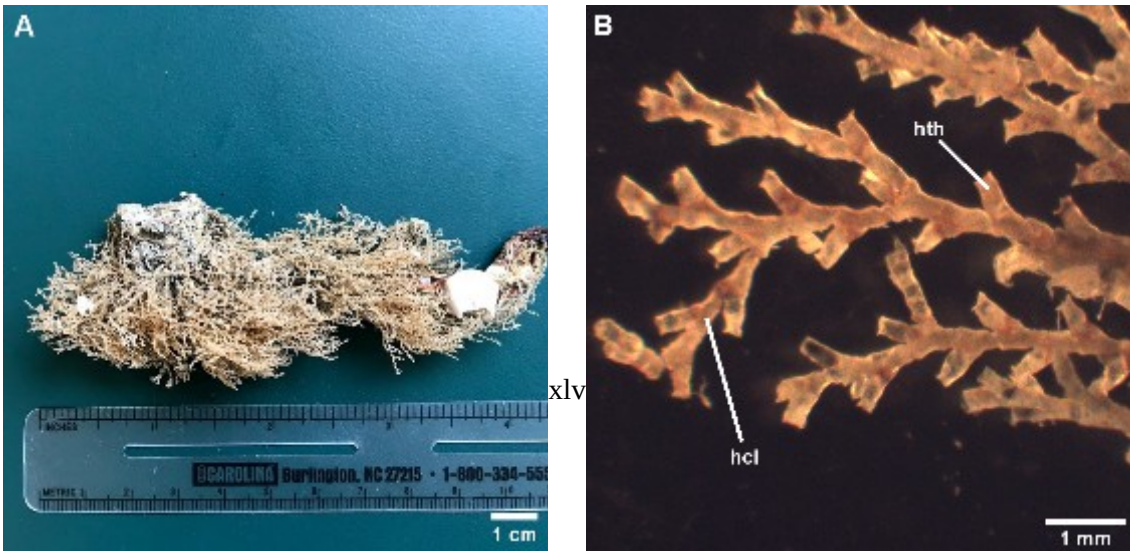
Plate 31: *Amphisbetia furcata.* A. Portion of colony with hydrocauli (hca) borne from stolons (sto). B. Enlarged portion of hydrocaulus (hca) with oppositely arranged hydrothecae (hth). C. Portion of colony with gonothecae (got) and hydrocaulus (hca). D. Enlarged hydrocauli (hca) and hydrothecae (hth).

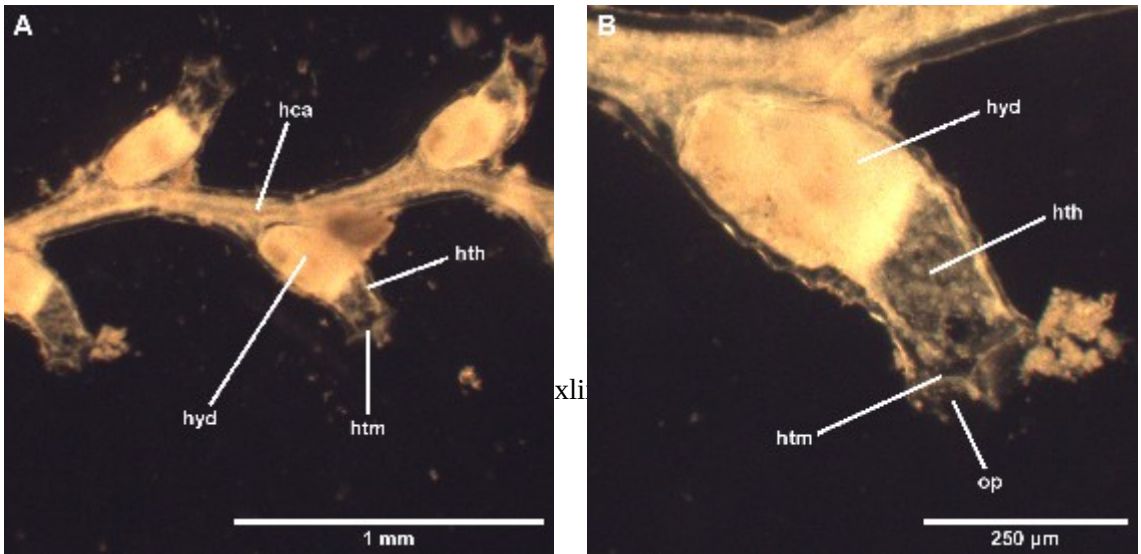

A
CAROLINA Burlington, NC 27215
1 cm


B
got
hth
hcl
1 mm


A
1 cm


B
sp
got
1 mm


A
1 cm
B
hth
hcl
1 mm


A
hca
hth
hyd
htm
1 mm
B
hyd
hth
htm
op
250 µm

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