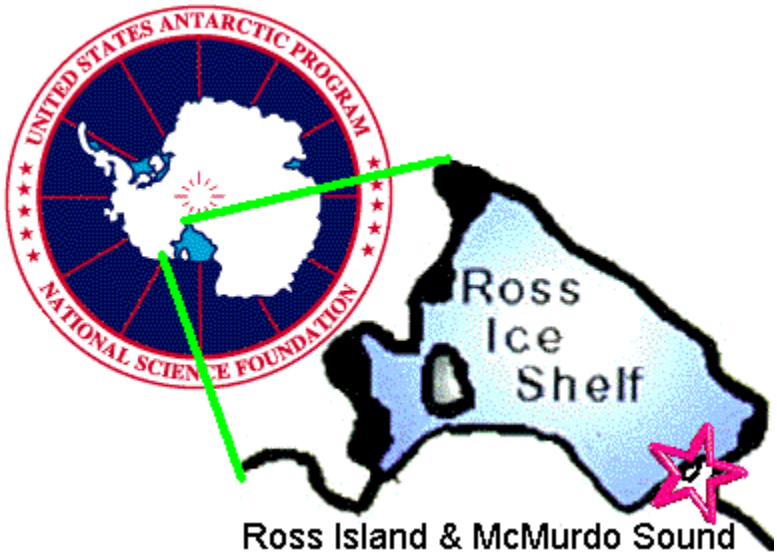
Cnidaria – Hydrozoa: medusae, siphonophores, hydroids

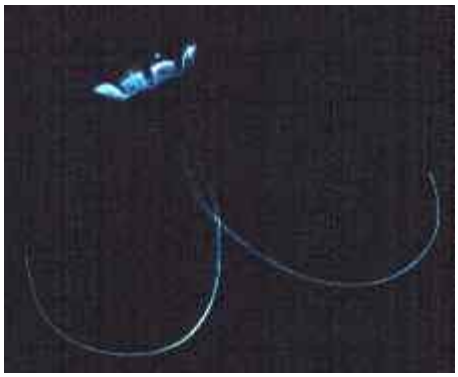
UNDERWATER FIELD GUIDE TO ROSS ISLAND & MCMURDO SOUND, ANTARCTICA

Peter Brueggeman

Photographs: Canadian Museum of Nature (Kathleen Conlan), Luke Hunt, Jim Mastro, Rob Robbins, M. Dale Stokes, & Norbert Wu



The National Science Foundation's Office of Polar Programs sponsored Norbert Wu on an Artist's and Writer's Grant project, in which Peter Brueggeman participated. One outcome from Wu's endeavor is this Field Guide. This Field Guide builds upon principal photography by Norbert Wu, with photos from other photographers, who are credited on their photographs and above. This Field Guide is intended to facilitate underwater/topside field identification from visual characters. Organisms were identified from photographs with no specimen collection. Therefore these identifications are to the taxonomic level possible from photographs, and there can be some uncertainty in identifications solely from photographs.



narcomedusa *Solmundella bitentaculata*

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leptomedusa

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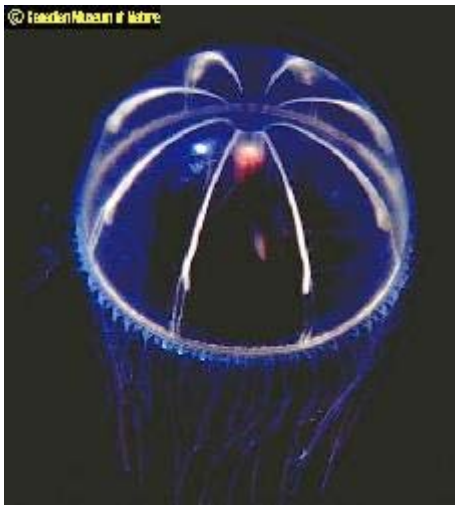

trachymedusa

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physonect siphonophore *Bargmannia* sp.

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physonect siphonophore

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other hydroids

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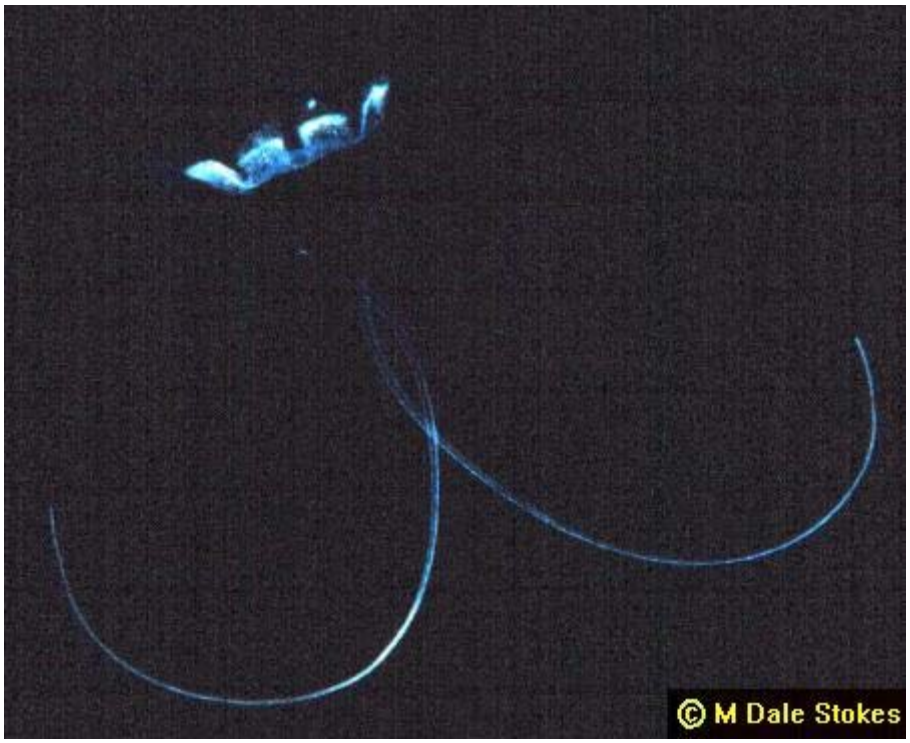
narcomedusa *Solmundella bitentaculata*



Solmundella bitentaculata is found in the Atlantic, Pacific, and Indian Oceans and the Mediterranean and is particularly common in the southern hemisphere; it has been found throughout Antarctica and in New Zealand, southern Australia and Chile [1,3,5]. Found at depths from the surface down to 1,100 meters, *S. bitentaculata* is usually found between 100 and 500 meters [1,3]. *S. bitentaculata* can be up to 7.2 centimeters wide and is higher than wide [1]. *S. bitentaculata* has thick apical jelly and the apex of the bell tends to be sharp-edged and keel-shaped, with the line of the keel between the two long tentacles [3,5].

Here's *Solmundella bitentaculata* taken from above, looking down at its central circular mouth, which opens to the aboral surface. Its two long tentacles issue from near the apex of its umbrella and are up to ten centimeters long [3].

S. bitentaculata swims with those two tentacles held in front of its umbrella, rather than trailing like most medusae.

Here's a line drawing of *Solmundella bitentaculata* to see all of its features [1]. In this drawing *S. bitentaculata* is not in its swimming posture because its two tentacles are trailing behind the umbrella rather than being held in front of the umbrella.

S. bitentaculata can have the hitchhiking hyperiid amphipod *Hyperiella dilatata* on its exumbrella [2]. One prey item of *S. bitentaculata* is the shelled pteropod *Limacina (Limacina) helicina* subspecies *antarctica* [2,4].

References: 1: Guide to the Hydromedusae of the Southern Ocean and Adjacent Waters. David O'Sullivan. ANARE Research Notes 5 (Australian National Antarctic Research Expedition). Kingston, Tasmania, Australia : Australia Dept of Science and Technology, Antarctic Division, 1984; **2:** Polar Biology 11(1):19-25, 1990; **3:** Marine Invertebrates of Southern Australia Part I. SA Shepherd and IM Thomas, eds. Handbook of the Flora and Fauna of South Australia. South Australia: DJ Woolman, 1982; **4:** Antarctic Journal of the United States 23(5):135-136, 1988; **5:** Marine Fauna of New Zealand: Hydromedusae (Cnidaria: Hydrozoa). J Bouillon & TJ Barnett. NIWA Biodiversity Memoir 113, Wellington, NZ : National Institute of Water and Atmospheric Research, 1999

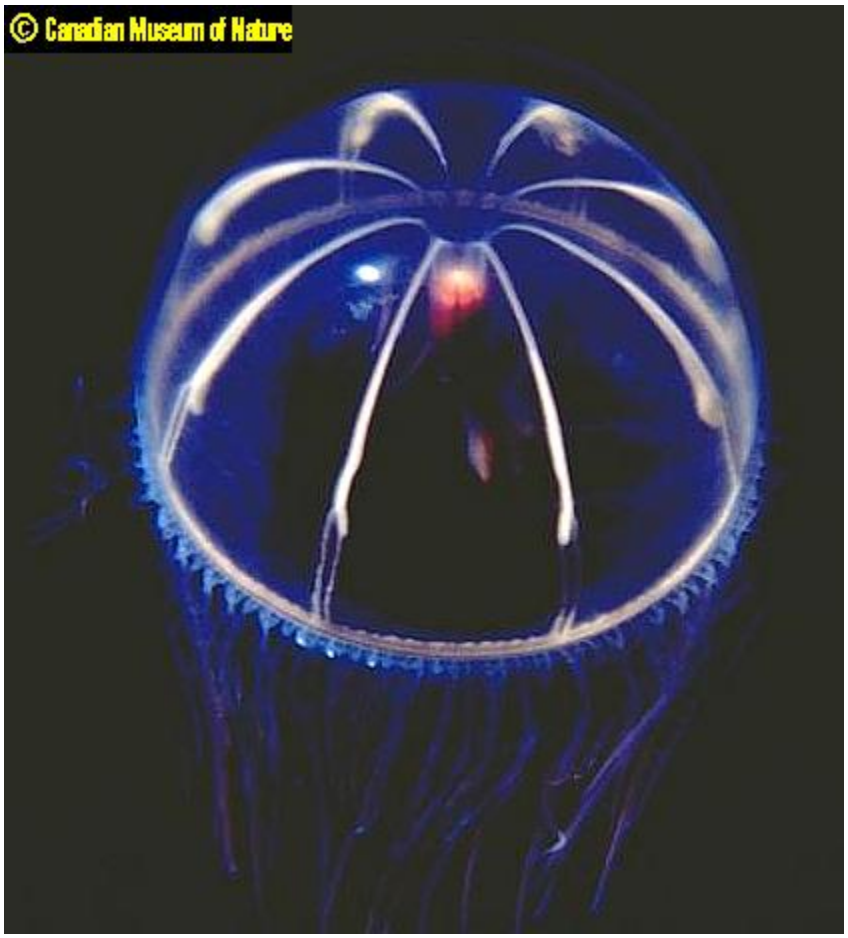
leptomedusa

Leptomedusae have a hemispherical or flattened umbrella and have gonads on radial canals [1].

Gelatinous carnivores are a predominant and sometimes the main component of the macroplankton and nekton community in the Southern Ocean [2]. Gelatinous carnivores are important components of the food web because they are a control mechanism for its structure [3].

References: 1: Guide to the Hydromedusae of the Southern Ocean and Adjacent Waters. D O'Sullivan. ANARE Research Notes 5 (Australian National Antarctic Research Expedition). Kingston, Tasmania, Australia: Australia Dept of Science and Technology, Antarctic Division, 1984; **2:** Annales de l'Institut Oceanographique 73(2):139-158, 1997; **3:** Annales de l'Institut Oceanographique 73(2):123-124, 1997

trachymedusa



Trachymedusae have the margin of their umbrella entire and not divided into lobes, have a thickened marginal nematocyst ring, have radial canals with their gonads usually confined to those radial canals, and have solid or both solid and hollow marginal tentacles [1].

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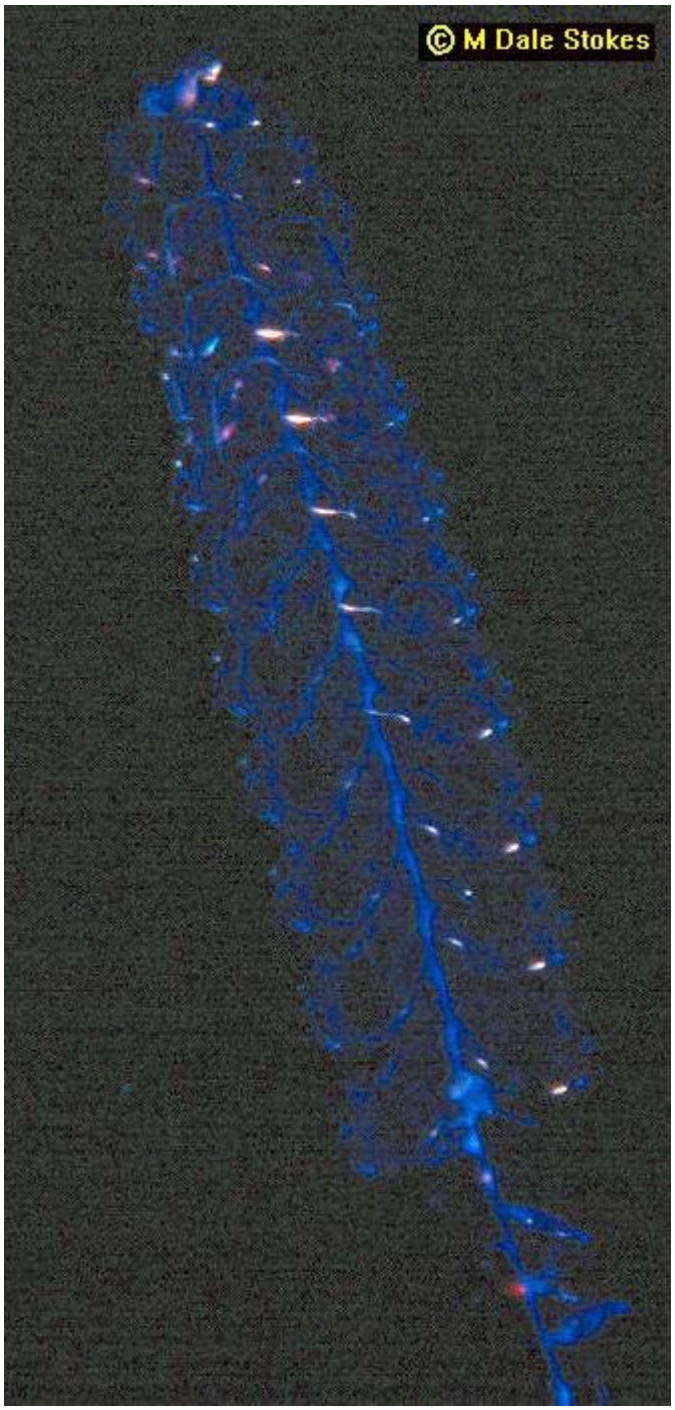
physonect siphonophore *Bargmannia* sp.



Bargmannia species are the only physonect siphonophores with siphosomal (tail-end) tentacles and they also lack dactylozooids (defensive stinging individual zooids) [3].

Siphonophores are swimming/floating colonies consisting of different zooids specialized for feeding, sensing, flotation, and reproduction [1]. Siphonophore colonies bud from a stem whose gastrovascular canal is continuous with the canals of all the zooids in the colony [1].

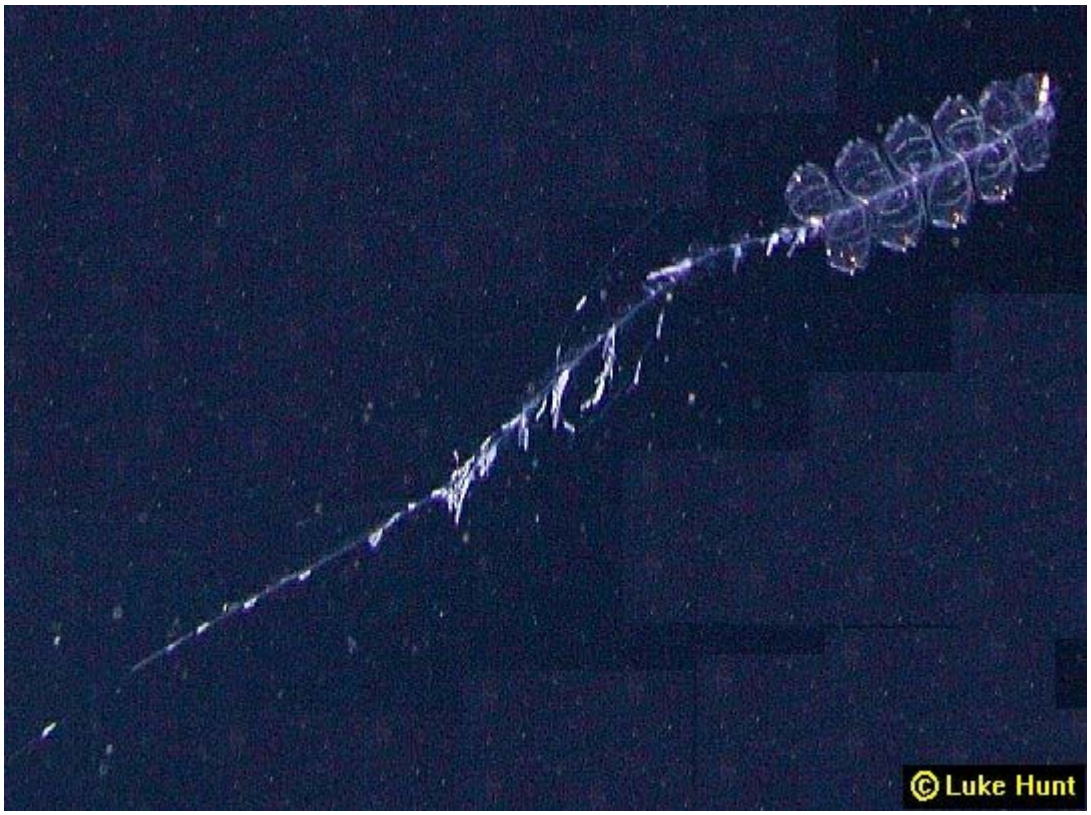
Physonect siphonophores have an apical gas-filled float with a budding zone on either side of the base [1].

Siphonophores occur throughout Antarctica and subantarctic waters, with warm-water species observed in high latitudes during the spring and summer and cold-water species surviving at low latitudes during the winter [2].

Siphonophores are active predators, feeding on other plankton like fish larvae and krill [2].

References: 1: A General Guide to the Metazoan Zooplankton Groups of the Southern Ocean. D O'Sullivan and G Hosie. ANARE Research Notes 30 (Australian National Antarctic Research Expedition). Kingston, Tasmania, Australia: Australia Dept of Science and Technology, Antarctic Division, 1985; **2:** Antarctic Siphonophores from Plankton Samples of the United States Antarctic Research Program : ELTANIN Cruises for Spring, Summer, Fall, and Winter (Cruises 3-5, 8-23, 25-28, 30, 35, and 38). A Alvarino, JM Wojtan, and MR Martinez. Washington DC: American Geophysical Union, 1990; **3:** Bulletin of the Natural History Museum. Zoology Series 65(1):51-72, 1999

physonect siphonophore



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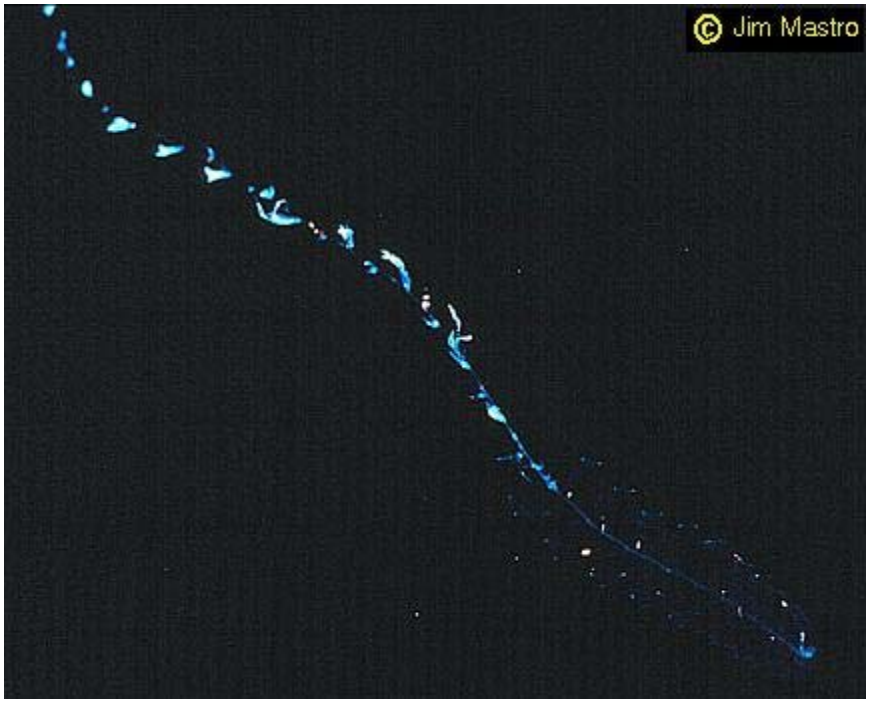

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athecate hydroid *Monocaulus microrhiza*

Monocaulus microrhiza is found in Antarctica at depths from 33 to 761+ meters [1,3,5,6]. *M. microrhiza* is up to eighteen centimeters long [3]. *M. microrhiza* is colored greyish to brown-violet to black with a distinct constriction between its head and caulus (stalk); the caulus (stalk) is tightly covered with a transparent greyish firm perisarc which leaves free the darkened 'neck' region of the caulus, giving it a characteristic split-colored appearance [3,7].

Monocaulus microrhiza has 30-50 longer basal aboral tentacles up to seven centimers long, arranged in one row, and about 100-200 short, densely crowded oral tentacles around the hydroid's mouth [3].

M. microrhiza is a conspicuous organism in Cape Armitage's third benthic faunal zone below 33 meters depth [5].

Here *Monocaulus microrhiza* is living in an ice pocket. *M. microrhiza* has been observed heavily colonizing iceberg scours [3].

M. microrhiza is anchored by root filaments [3,7]. Juveniles of *M. microrhiza* may settle on rooting filaments of adults [3].

The small tentacle-fringed structure rising up in the middle of the gonophores of *Monocaulus microrhiza* is the hypostome with the hydroid's mouth and smaller oral tentacles at the end. The white to greyish beads are the reproductive sex cells (gonophores) which arise in the space between the oral and aboral tentacles [3]. After fertilization, those *Monocaulus* gonophores containing eggs develop free-swimming medusae borne from stalks above the aboral tentacles; the medusae have a pointed apex and apical canal, with one extensile marginal tentacle with beads of sting-cells [4].

Taxonomic Note: Genus was previously *Lampra* or *Corymorpha*, and is now *Monocaulus* [2,3,6,7].

References: 1: British National Antarctic Expedition 1901-1904. Natural History. Volume 3 Zoology and Botany, Part 2 Hydroid Zoophytes. Hickson, SJ & Gravely FH. London : British Museum, 1907; **2:** Gidroidi Pribrezhnikh vod Moria Deivtssa po Materialam XI Sovetskoi Antarkticheskoi Ekspeditsii 1965/1966 gd. [Hydroids of Coastal Waters of the Davis Sea from the Materials of the 11th Soviet Antarctic Expedition]. SD Stepanjants. Rezultaty Biologicheskikh Issledovanii Sovetskoi Antarkticheskoi Ekspeditsii , 5. [Biological Results of the Soviet Antarctic Expeditions, 5] Issledovaniia Fauny Morei 11 (19). [Explorations of the Fauna of the Seas 11 (19)]. Leningrad, Academy of Sciences of the USSR, 1972. pp. 56-80.; **3:** Marine Ecology 22(1-2):53-70, 2001 (has *in situ* color photos); **4:** Monograph on the Hydroida of Southern Africa. NAH Millard. Annals of the South African Museum 68, 1975; **5:** Antarctic Ecology, Volume 1. MW Holdgate, ed. NY: Academic Press, 1970. pp. 244-258; **6:** Polar Biology 20(4):229-247, 1998; **7:** Proceedings of the Zoological Institute, Russian Academy of Sciences, Volume 281. Zoological Sessions, Annual Reports 1998, St. Petersburg, Russia : Zoological Institute, 1999. pp. 47-54

athecate hydroid *Monocaulus parvula*

Monocaulus parvula is found in Antarctica from depths of 3 to 450 meters [1,8,10]. *M. parvula* is solitary, and has been collected at lengths up to sixteen centimeters [10]. *M. parvula* is white or orange reddish in color with faintly violet oral tentacles, and has a distinct constriction between its head and hydrocaulus (stalk) [10,12]. Rooting filaments appear at the base of the hydrocaulus (stalk) of *M. parvula* [10,12].

Here's a closeup of the hydranth (head) of *Monocaulus parvula*. The small pale orange beads are the reproductive sex cells (gonophores) which arise in the space between the oral and aboral tentacles [10]. The pink tentacle-fringed conical structure rising up in the middle of the gonophores is the hypostome with the hydroid's mouth and smaller oral tentacles surrounding the mouth. *M. parvula* has 50-200 oral tentacles, and 20-50 aboral tentacles (the outer tentacles) arranged in one row [10]. After fertilization, those *Monocaulus* gonophores containing eggs develop free- swimming medusae borne from stalks above the aboral tentacles; the medusae have a pointed apex and apical canal, with one extensile marginal tentacle with beads of sting-cells [6].

Perched on the polychaete sponge *Isodictya erinacea*, this might be *Monocaulus parvula* or a *Tubularia* sp.

M. parvula is a conspicuous member of McMurdo Sound's third benthic faunal zone (the sponge dominated community) below 33 meters depth, and is a conspicuous member of Cape Armitage's second benthic faunal zone between 15 and 33 meters depth, where its distribution is patchy [7].

M. parvula preys on benthic species, primarily diatoms, but also amphipods, copepods, nematodes, invertebrate eggs, sea urchin juveniles, and hydrozoans [8].

Taxonomic Note: Genus was previously *Lampra* or *Corymorpha*, and is now *Monocaulus* [2,4,9,10,12].

References: 1: Hydroids of the Antarctic and Subantarctic Waters. SD Stepanjants. Rezultaty biologicheskikh issledovanii Sovetskoi antarkticheskoi ekspeditsii , 6. [Biological Results of the Soviet Antarctic Expeditions Volume 6]. Issledovaniia fauny morei 20(30). [Explorations of the Fauna of the Seas 20(30)]. Academy of Sciences of the USSR, Zoological Institute. 1979; **2:** Gidroidi pribrezhnikh vod moria Deivtssa po materialam XI Sovetskoi antarkticheskoi ekspeditsii 1965/1966 gd. [Hydroids of coastal waters of the Davis Sea from the materials of the 11th Soviet Antarctic Expedition]. SD Stepanjants. Rezultaty biologicheskikh issledovanii Sovetskoi antarkticheskoi ekspeditsii , 5. [Biological Results of the Soviet Antarctic Expeditions, 5] Issledovaniia fauny morei 11 (19). [Explorations of the Fauna of the Seas 11 (19)]. Leningrad, Academy of Sciences of the USSR, 1972. pp. 56-80; **3:** British National Antarctic Expedition 1901-1904. Natural History. Volume 3 Zoology and Botany, Part 2 Hydroid Zoophytes. Hickson, SJ & Gravely FH. London : British Museum, 1907; **4:** Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening 111:183-215, 1949 (*C. parvula* corrected from *Lampra parvula* on page 201 ?); **5:** Proceedings of the Royal Society of Edinburgh 33(pt. 1 no. 2):9-34, 1913; **6:** Monograph on the Hydroida of Southern Africa. NAH Millard. Annals of the South African Museum 68, 1975; **7:** Antarctic Ecology, Volume 1. MW Holdgate, ed. NY: Academic Press, 1970. pp.244-258; **8:** Berichte zur Polar- und Meeresforschung 402:41-46, 2001; **9:** Biologicheskie Soobshchestva Pribrezhnykh Raionov Moria Deivisa (po Rezul'tatam Vodolaznykh Nabliudenii. YN Gruzov, MV Propp, AF Pushkin. Informatsionnyi Biulletin Sovetskoi Antarkticheskoi Ekspeditsii 65:124-141, 1967 (translated in: Soviet Antarctic Expedition Information Bulletin 6(6):523-533, 1968); **10:** Marine Ecology 22(1-2):53-70, 2001 (has *in situ* color photos); **11:** Polar Biology 20(4):229-247, 1998; **12:** Proceedings of the Zoological Institute, Russian Academy of Sciences, Volume 281. Zoological Sessions, Annual Reports 1998, St. Petersburg, Russia : Zoological Institute, 1999. pp. 47-54

athecate hydroid, *Tubularia* sp.

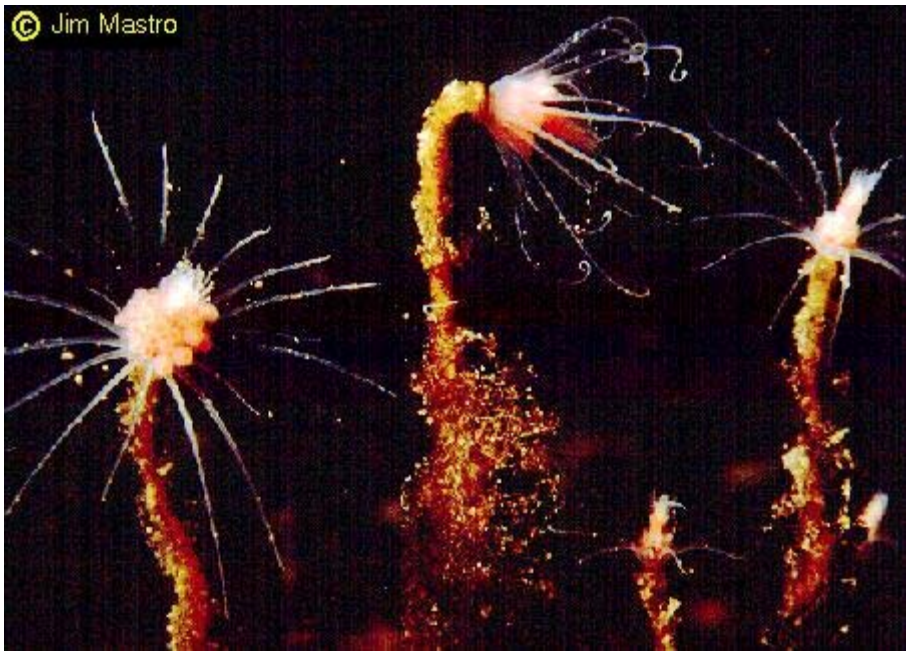
Tubularia hydroids are colonial, have long stalks with a thickened perisarc covering, and are attached to the substrate by stolons [1,2,4]. *Tubularia* hydroid colonies do not anchor by rooting filaments as do the solitary *Corymorpha* hydroids [1,2,3].

Tubularia has two sets of filiform tentacles (long, slender tentacles with stinging cells scattered along their length): the short, numerous, and densely crowded oral tentacles and the longer basal aboral tentacles in a single whorl [1,2,3].

Here's a closer view of the hydranth (head) of these *Tubularia* hydroids. The small beaded area between the oral and aboral tentacles are the reproductive sex cells (gonophores). The tentacle-fringed conical structure rising up in the middle of the gonophores is the hypostome with the hydroid's mouth and smaller oral tentacles at the end.

A prominent McMurdo hydroid is *Tubularia ralphii* (with *T. hodgsoni* synonymized under *T. ralphii* in 1979) [5,6].

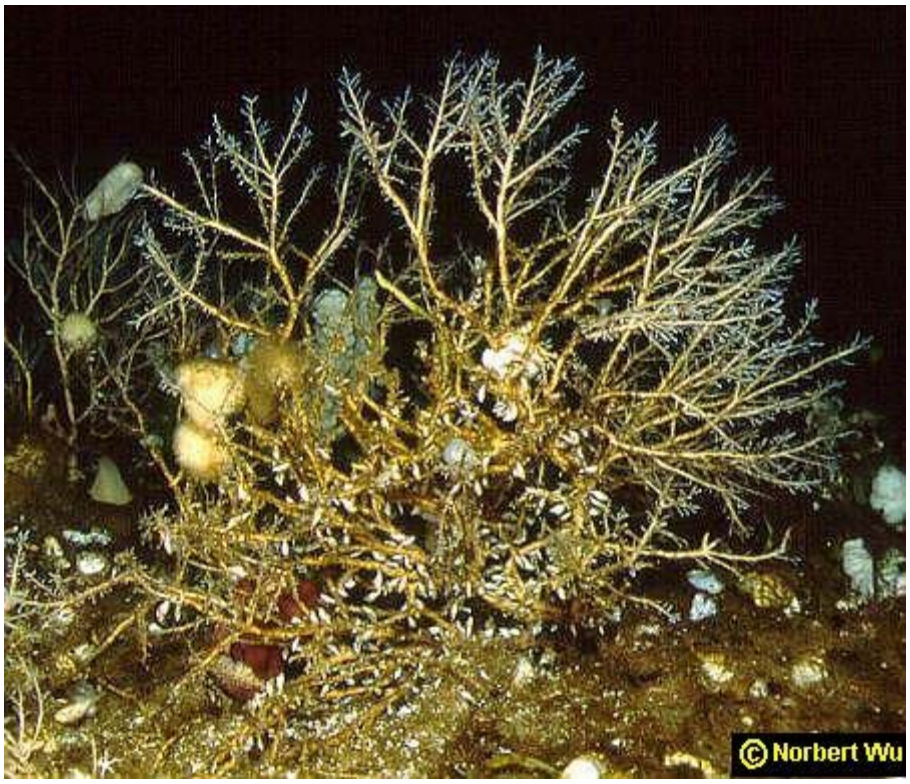
T. ralphii is colonial, with a few to several hundred mostly smooth stems arising from a mat [9]. *T. ralphii* is found at depths from 0 to 234 meters and has been collected up to seventeen centimeters in length [6,7,8.9]. *T. ralphii* has white or greenish stems, orange red hydranth and gonophores, and white tentacles [9]. *T. ralphii* can form creeping colonies on stones [10]. *T. ralphii* has a diet dependent on the water column, capturing planktonic prey like copepods and invertebrate eggs [10].



Hydroids have a complex life cycle -- a sexual reproduction stage involving medusae or is medusoid in character, and an asexual reproduction stage, often colonial, involving asexual budding.

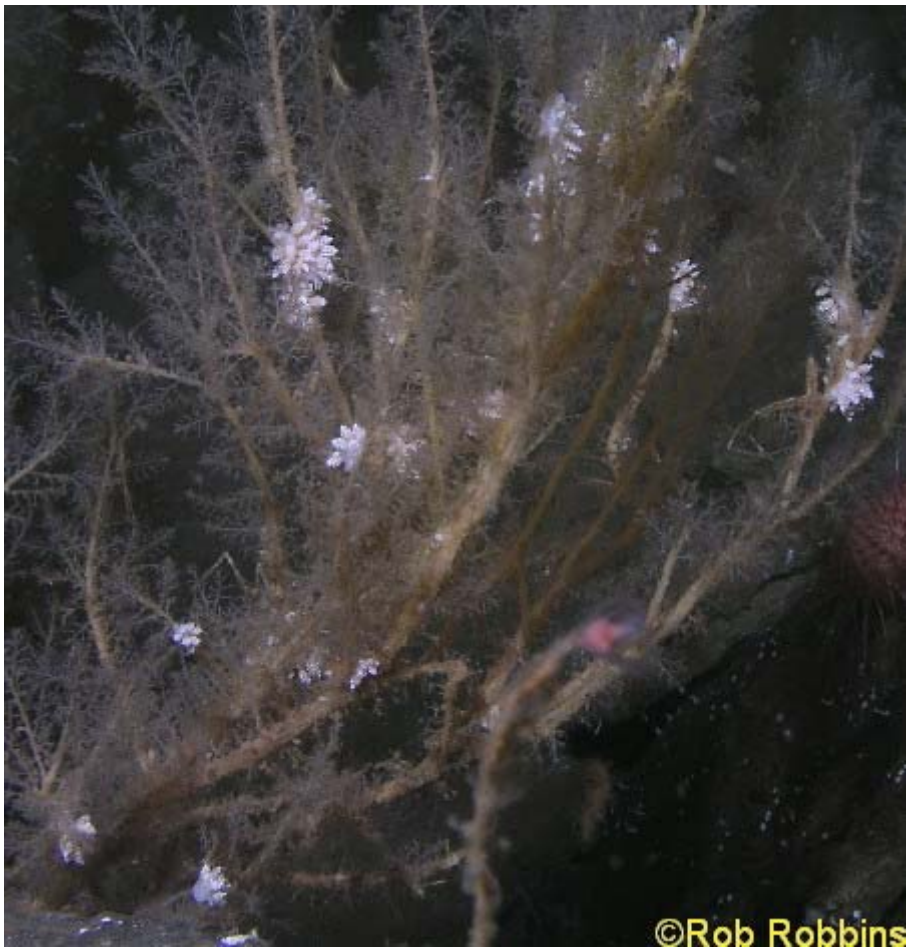
References: 1: Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening 111:183-215, 1949; **2:** Monograph on the Hydroida of Southern Africa. NAH Millard. Annals of the South African Museum 68, 1975; **3:** South African Journal of Antarctic Research 23(1-2):3-24, 1993; **4:** Hydroids and Hydromedusae of the USSR. (Gidroidy i Gidromeduzy Morskikh, Solonovatovodnykh i Presnovodnykh Basseinov SSSR). DV Naumov. Jerusalem: Israel Program for Scientific Translations / NTIS. 1969; **5:** Ecological Monographs 44(1):105-128, 1974; **6:** Hydroids of the Antarctic and Subantarctic Waters. SD Stepanjants. Rezultaty biologicheskikh issledovanii Sovetskoi antarkticheskoi ekspeditsii , 6. [Biological Results of the Soviet Antarctic Expeditions Volume 6]. Issledovaniia fauny morei 20(30). [Explorations of the Fauna of the Seas 20(30)]. Academy of Sciences of the USSR, Zoological Institute. 1979; **7:** Some Ecological Peculiarities of the Hydroid Tubularia ralphii Bale, 1884, in Antarctic Waters (from the Material of the 16th Soviet Antarctic Expedition) [Nekotorye osobennosti ekologii gidroida Tubularia ralphii Bale, 1884 v priantarkticheskikh vodakh (po materialam XVI Sovetskoi antarkticheskoi ekspeditsii)]. Stepaniants, SD. IN: Teoreticheskoe i prakticheskoe znachenie kishechnopolostnykh (Theoretical and Practical Significance of Coelenterates) edited by D.B. Naumov and S.D. Stepaniants: Leningrad, 1980. pp.109-113; **8:** Antarctic Hydroids. Broch, H. Scientific results of the Norwegian Antarctic Expeditions, 1927-1928. Number 28. Oslo, I Kommisjon hos J. Dybwad, 1948; **9:** Marine Invertebrates of Southern Australia, Part 1. SA Shepherd & IM Thomas. Adelaide, South Australia: DJ Woolman Government Printer, 1982; **10:** Polar Biology 24(8):620-627, 2001

athecate hydroid *Ophiodes arboreus*



Ophiodes arboreus is found throughout Antarctica and Bouvet Island, Kerguelen Island, Marion and Prince Edward Islands, and Patagonia at depths from 18 to 558 meters [3,4,5,9,10,13]. *Ophiodes arboreus* is found in shrubby colonies with thick fascicled stems and irregular branching in different planes, reaching up to 35 centimeters high [3,4,7,10,13]. Color is typically light greenish-brown but may be darker [7]. The center of the colony may have a mass of sex cells with developing larvae, clustered on a specialized branch, that are 15-25 millimeters in diameter [6,10]. *O. arboreus* is a conspicuous organism in Cape Armitage's third benthic faunal zone below 33 meters depth and is also found scattered around in the second benthic faunal zone between 15 and 33 meters depth [8].

Hydroids feed on plankton suspended in the water. During the Antarctic winter, it is dark for four months and plankton is greatly reduced though still present during that period; Antarctic suspension feeders may continue to feed at a low level or suspend their feeding activity for a few months centered on July [2].



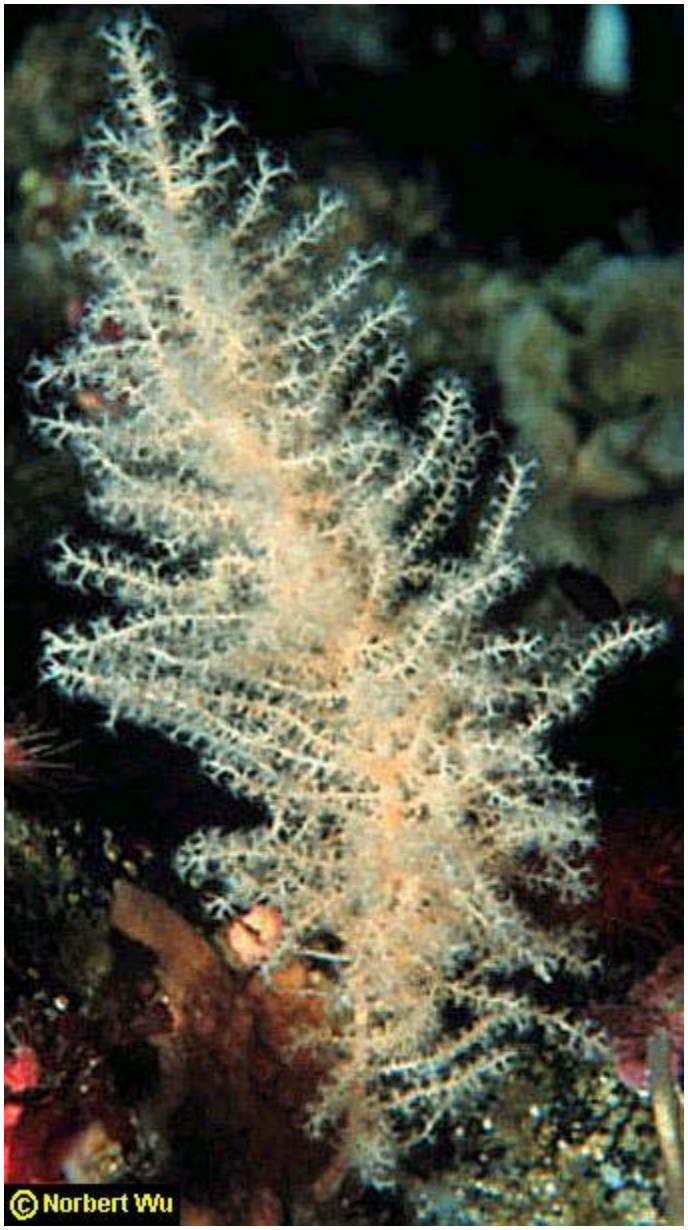
Several *Doto antarctica* nudibranchs are shown here on *Ophiodes arboreus*.

O. arboreus is preyed upon by the seastar *Odontaster validus*, the nudibranch *Doto antarctica*, and two unidentified aeolid nudibranchs (possibly *Eubranchus* sp. and *Coryphella* sp.) [1].

Taxonomic Note: Genus was *Halecium arboreum* in 1966 [3], then changed to *Hydrodendron arborea* in 1977 [4], followed by a change to *Ophiodes arboreus* in 1979 [5]. Several subsequent authors have used the *Hydrodendron* genus and *Hydrodendron arboreum* [6,10,11,12,13]

References: 1: Ecological Monographs 44(1):105-128, 1974; **2:** Polar Biology 15(5):335-340, 1995; **3:** Hydroidea (Thecaphora) Collected by the Soviet Antarctic Expedition on the M/V "Ob", in Antarctic and Subantarctic Waters. DV Naumov and SD Stepaniants. IN: Biological reports of the Soviet Antarctic Expedition, 1955-1958 (Rezultaty biologicheskikh issledovanii Sovetskoi antarkticheskoi ekspeditsii, 1955-1958). Volume 1. EP Pavlovskii, ed. Jerusalem: Israel Program for Scientific Translations. 1966. pp.68-106; **4:** Annals of the South African Museum 73(1):1-47, 1977; **5:** Hydroids of the Antarctic and Subantarctic Waters. SD Stepanjants. Biological Results of the Soviet Antarctic Expeditions Volume 6. Explorations of the Fauna of the Seas 20(30). Academy of Sciences of the USSR, Zoological Institute. 1979; **6:** Fauna der Antarktis. J Sieg & JW Wagele, eds. Berlin : P. Parey, 1990; **7:** Hydroida. EA Briggs. Australasian Antarctic Expedition 1911-1914, Scientific Reports. Series C, Zoology and Botany. Volume 9, Part 4. Sydney : David Harold Paisley, Government Printer, 1938; **8:** Antarctic Ecology, Volume 1. MW Holdgate, ed. NY: Academic Press, 1970. pp244-258; **9:** Proceedings of the Royal Society of Edinburgh 33(part 1 number 2):9-34, 1913; **10:** South African Journal of Antarctic Research 23(1-2):3-24, 1993; **11:** Scientia Marina 63(Supplement 1):209-218, 1999; **12:** Polar Biology 27(12):767-774, 2004; **13:** Polar Biology 29(9):764-771, 2006

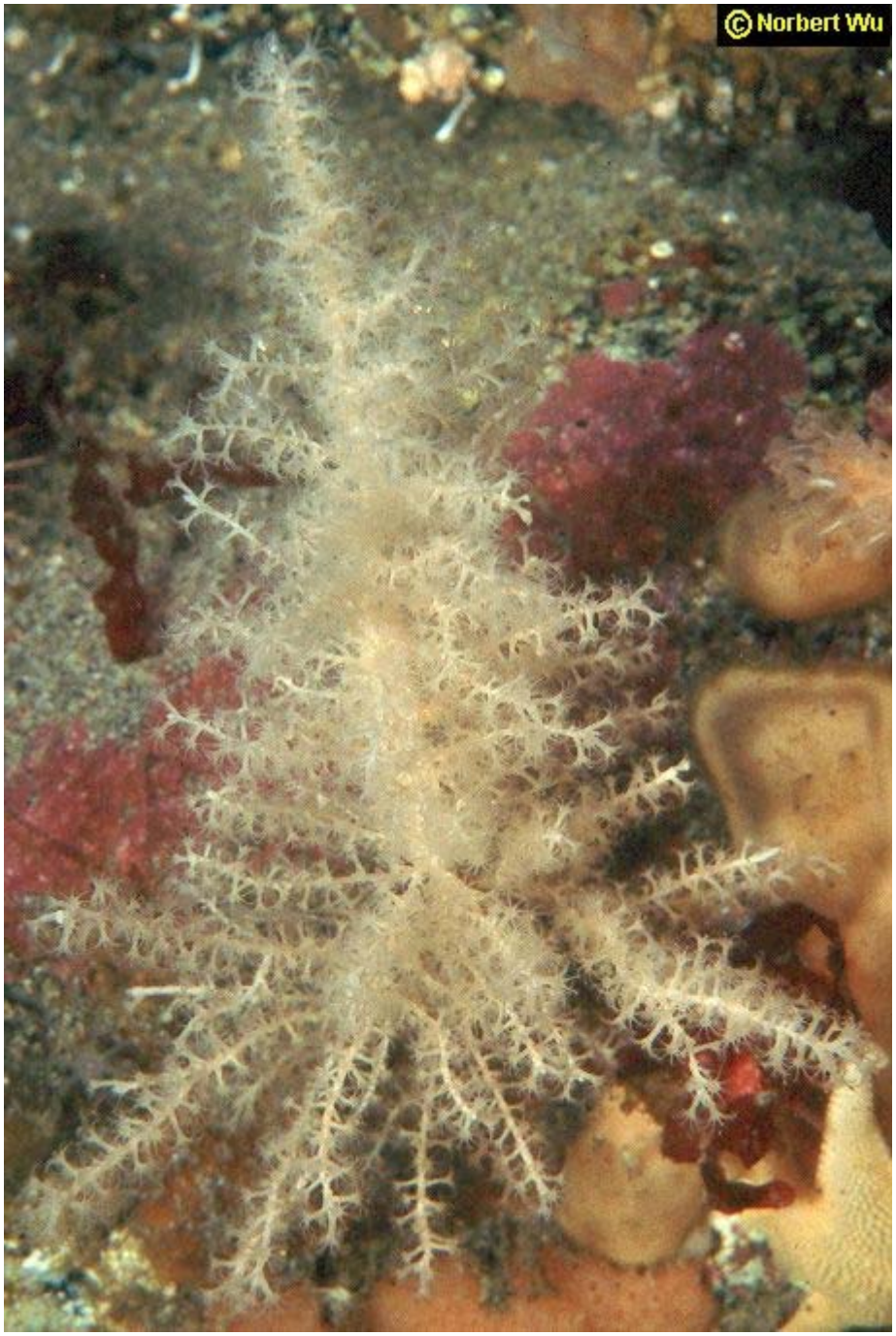
other hydroids



Hydroids have three stages in their life-cycle: a tiny free-swimming worm-like larva, which settles and grows into an attached animal, usually a branched colonial animal with individual hydroid polyps as shown here, which then releases jellyfish-looking medusae. Through evolution, many hydroids retain the medusa on the attached colony. Each individual hydroid polyp has a tubular body with a terminal mouth, surrounded by tentacles. The polyps are joined from their base to a common living tube running throughout the colony, which allows for food exchange of food among individuals. Reproductive polyps occur on the colony, releasing either worm-like larvae or medusae, depending on the species. Most hydroids inhabit marine environments.

Sea spider crawling on hydroid.

Sea spiders are also called pycnogonids and sometimes whip scorpions. Adult sea spiders either suck the juices from soft-bodied invertebrates, or browse on hydroids and bryozoans.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