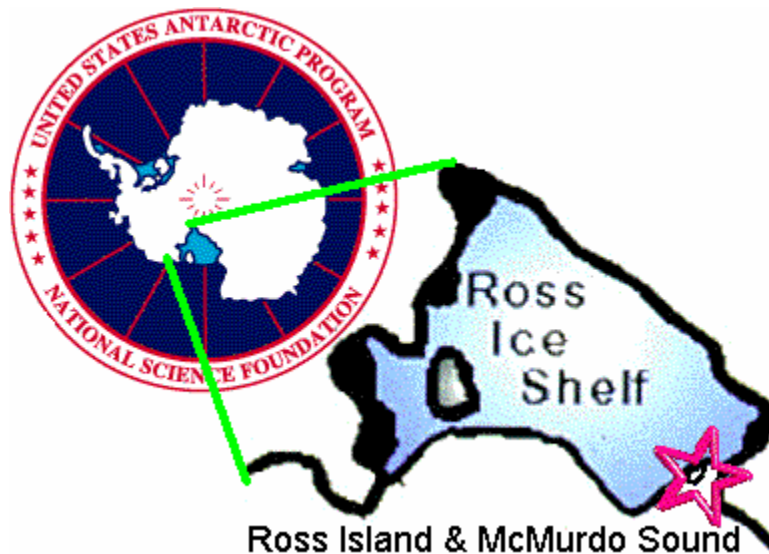


# Porifera – Hexactinellida: glass sponges

## UNDERWATER FIELD GUIDE TO ROSS ISLAND & MCMURDO SOUND, ANTARCTICA

Peter Brueggeman

Photographs: Canadian Museum of Nature (Kathleen Conlan), Bjørn Gulliksen (UWPhoto ANS), Jim Mastro, & 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.

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## volcano sponge *Anoxycalyx (Scolymastra) joubini*



*Anoxycalyx (Scolymastra) joubini* is found throughout Antarctica and South Shetland Islands at depths from 45 to 441 meters [1,3].

*Anoxycalyx (Scolymastra) joubini* can be up to two meters high and 1.4 meters in diameter but is usually smaller and often pear-shaped [3,5]. Color can be pale yellow or white [3,4]. The large excurrent opening (osculum) may be fringed by long spicules [3].



*Anoxycalyx (Scolymastra) joubini* appears to be slow-growing; there was no measurable growth for two sponges for ten years, one for nine years, and four sponges for three years [5]. One sponge increased in diameter from 75 to 77 centimeters in ten years; another increased in diameter from 34 to 37 centimeters in three years [5]. An extract from *A. joubini* has antibacterial, antifungal, and antiyeast activity which indicates promise for drug development [2].



A common predator of *Anoxycalyx (Scolymastra) joubini* is the seastar *Acodontaster conspicuus* (shown at left on *A. joubini*) [4,5]. *Acodontaster conspicuus* leaves deep grooves on the surface of the sponge [4,5]. Observations suggest that a single *Acodontaster conspicuus* does not stay long on *A. joubini* but several accumulate, do not leave, and consume enough of the sponge to kill it [5]. Another *A. joubini* predator is the dorid nudibranch *Doris kerguelenensis* whose predation leaves circular scars and holes [5].



The diver might find fish sheltering within *Anoxycalyx (Scolymastra) joubini*. Many organisms can be found within *A. joubini* including amphipods, isopods, and polychaete worms [6].

**Taxonomic Note:** In 2002 it was synonymized to the genus *Anoxycalyx* with concepts retained in the subgenus *Scolymastra*, but the subgenera of *Anoxycalyx* may be combined in the future [7].

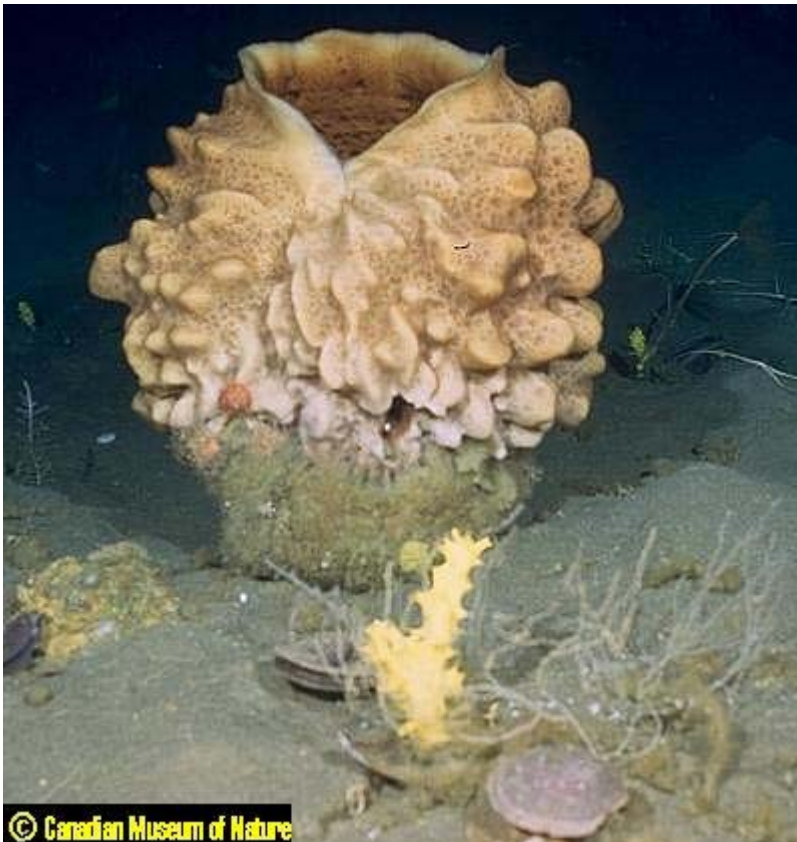
**References:** **1:** Hooper, JNA & Wiedenmayer, F. Porifera. IN: Zoological Catalogue of Australia. Volume 12. Wells, A, ed. Melbourne : CSIRO Australia, 1994; **2:** Antarctic Science 4(2):179-183, 1992; **3:** Antarctic Hexactinellida. Dagmar Barthel & Ole S. Tendal. Champaign, Ill. : Koeltz Scientific Books, 1994. Theses Zoologicae, Volume 23. Synopses of the Antarctic Benthos, Volume 6; **4:** Ecological Monographs 44(1):105-128, 1974; **5:** Biologie des Spongiaires, Sponge Biology. C Levi and N Boury-Esnault, eds. Colloques Internationaux du Centre National de la Recherche Scientifique Number 291. Paris : Centre National de la Recherche Scientifique, 1979. pp.271-282; **6:** Associated Fauna of Selected Sponges (Hexactinellida and Demospongiae) from the Weddell Sea, Antarctica. Kunzmann, K. Berichte zur Polarforschung / Reports on Polar Research 210, 1996; **7:** Systema Porifera. JNA Hooper and RWM Van Soest. New York: Kluwer, 2002

## pipe or chimney sponge *Rossella fibulata*



*Rossella fibulata* is found in Antarctica at depths from 40 to 460 meters [1,2,4].

The body of *R. fibulata* is barrel or broadly vase-shaped, colored dark brown to reddish brown and sometimes pink, and up to eighty centimeters high and seventy centimeters in diameter [2].



The body wall of *Rossella fibulata* is up to eight centimeters thick at the base and the oscule is up to fifty centimeters in diameter and thin-rimmed with a fringe of spicules [2].



This photo of *Rossella fibulata* was taken at 40 meters depth at Couloir Cliffs in Granite Harbor [4].

Smaller specimens of *R. fibulata* are smooth or have only a few small conules; larger specimens have many large conules on the lower body up to six centimeters in height and diameter without spicule tufts [2].

**References:** **1:** Hooper, JNA & Wiedenmayer, F. Porifera. IN: Zoological Catalogue of Australia. Volume 12. Wells, A, ed. Melbourne : CSIRO Australia, 1994; **2:** Antarctic Hexactinellida. Dagmar Barthel & Ole S. Tendal. Champaign, Ill. : Koeltz Scientific Books, 1994. Theses Zoologicae, Volume 23. Synopses of the Antarctic Benthos, Volume 6; **4:** Norbert Wu, personal communication, 1999

## vase sponge *Rossella nuda*



*Rossella nuda* is found in Antarctica and South Georgia Island from 30 to 900 meters depth [1,6]. *R. nuda* can be up to 75 centimeters high and thirty centimeters in diameter [1].



*Rossella nuda* is barrel or vase shaped and its color may be pale brownish-yellow or ochre yellow, greyish or white [1,2,4].

Budding forms of *R. nuda* have been observed, with approx 30% of sponges having 3-5 buds each, with these possibly being propagules for asexual reproduction [7].



*Rossella nuda* may be smooth or have conules with spicule tufts on its surface [1].



That's probably the seastar *Acodontaster conspicuus* (at lower right), munching away on *Rossella nuda*.

Organisms can be found living within *R. nuda* and include amphipods, sea spiders, and polychaete worms [5].

**Taxonomic Note:** *Rossella nuda* was previously synonymized with *Rossella racovitzae* [3] but has been reestablished [1].

**References:** **1:** Antarctic Hexactinellida. Dagmar Barthel & Ole S. Tendal. Champaign, Ill. : Koeltz Scientific Books, 1994. Theses Zoologicae, Volume 23. Synopses of the Antarctic Benthos, Volume 6; **2:** Ecological Monographs 44(1):105-128, 1974; **3:** B.A.N.Z. Antarctic Research Expedition, 1929-1931, under the command of Sir Douglas Mawson, Kt., O.B.E., B.E., D.Sc., F.R.S., Reports -- Series B (Zoology and Botany). Volume 9, part 4. Porifera -- Part 1: Antarctic Sponges. VM Koltun. Adelaide : Mawson Institute for Antarctic Research, University of Adelaide, 1976; **4:** Antarctic Science 4(2):137-150, 1992; **5:** Associated Fauna of Selected Sponges (Hexactinellida and Demospongiae) from the Weddell Sea, Antarctica. K Kunzmann. Berichte zur Polarforschung / Reports on Polar Research 210, 1996; **6:** Antarctic Science 9(4):3921-398, 1997; **7:** Berichte zur Polar- und Meeresforschung 402:52-55, 2001

## root sponge *Rossella racovitzae*



*Rossella racovitzae* is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Georgia Island, Falkland Islands, and Argentina from depths of 18 to 2,000 meters [1,5,7,9]. Here *Dendrilla antarctica* is in the foreground of *R. racovitzae*.

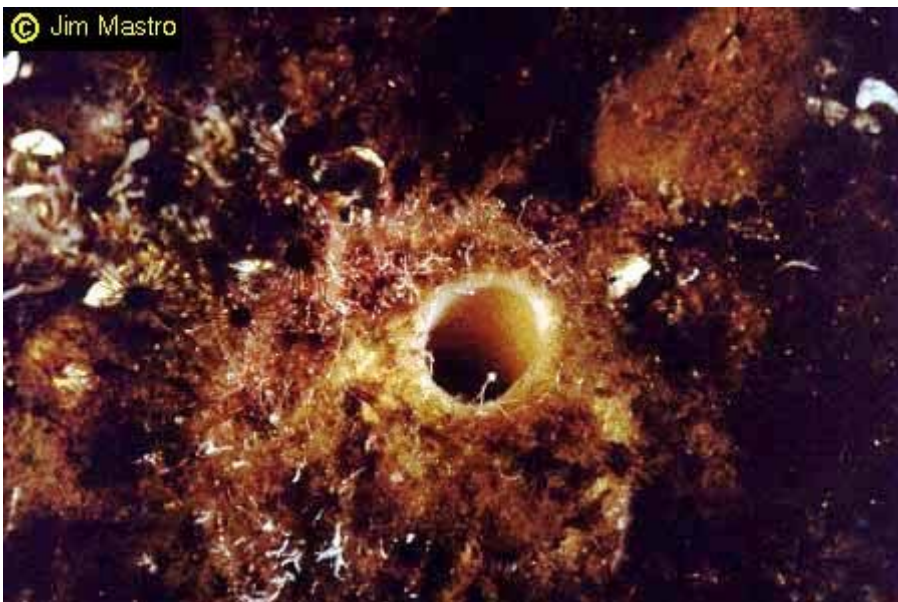
*R. racovitzae* is highly polymorphic and of several types [3,10]:

**Large Type I:** large upright barrel or vase shape; white, yellow or orange color; numerous small conules on surface with long spicule bundles protruding; no basal spicule tuft;

**Large Type II:** large upright barrel or vase shape; white to grey color; small conules on surface but fewer than Type I; few and weaker spicule bundles protruding from conules; very weak basal spicule tuft;

**Budding Type:** small upright vase or egg shape; up to sixteen centimeters high; white to grey color; covered with felt-like mass of short spicules; very small apical oscules; numerous buds.

The size of *R. racovitzae* is up to fifteen centimeters high for the Budding Type and up to forty-six centimeters for the Large Type [8,10]. One observer notes the Budding Type occurring on very soft bottoms and the Large Type occurring on spicule mats and soft bottoms as well [10]. The isopod fish parasite *Caecognathia calva* may spend its adult life in the suboscular space of the Budding Type *R. racovitzae* and is not found in the Large Type *R. racovitzae* [8].



Here is the Budding Type morph of *Rossella racovitzae*; light gray in color, it can be found buried in the sponge spicule mat anchored by long spines and with its osculum (openings) extending above the surface [2,4]. Budding from stem specimens may be evident [2]. It has been observed that the spicules on *R. racovitzae* buds increase flotation so that buds are carried away by currents [4]. Burial in the sponge spicule mat shields *R. racovitzae* from predation [4]. *R. racovitzae* is

eaten by the seastars *Odontaster meridionalis*, *Odontaster validus*, *Acodontaster conspicuus*, and *Acodontaster hodgsoni* and the dorid nudibranch *Doris kerguelensis* [2].



Here is the budding type of *Rossella racovitzae* with the hydroid *Corymorpha microrhiza* covering it.

*R. racovitzae* has been reported as the most abundant member of the Cape Armitage sponge community being 41.8 percent cover of the benthic surface and 70.9 percent of the sponge biomass [2]. Small *R. racovitzae* may increase their volumes almost 300% in three years [4]. In ten years time, specimens of *R. racovitzae* elongated as follows: five grew 11 centimeters, two grew

13 centimeters, one grew 14 centimeters, two grew 15 centimeters, and three grew 16 centimeters [4].

Many organisms can be found within *R. racovitzae* including polychaete worms, amphipods, isopods, pantopods, gastropods, nudibranchs (*Doris kerguelensis*), and brittle stars [6]. *R. racovitzae* spicules act as natural optical fibers and shade-adapted diatoms adhere to its spicules, living inside the sponge, using the light channeled down the spicules for photosynthesis [12]. Many benthic diatoms live within the sponge spicule mat on the seafloor; the sponge spicules create a dimensional matrix in the sediment in which the diatoms live, as well as act as optical fibers channeling light a short distance (five centimeters) into the mat, thus enhancing benthic diatom photosynthesis [11,12].

**Taxonomic Note:** Barthel & Tendal suggest that the budding type of *R. racovitzae* may be an independent taxon [7].

**References:** **1:** Hooper, JNA & Wiedenmayer, F. Porifera. IN: Zoological Catalogue of Australia. Volume 12. Wells, A, ed. Melbourne : CSIRO Australia, 1994; **2:** Ecological Monographs 44(1):105-128, 1974; **3:** Antarctic Science 4(2):137-150, 1992; **4:** Biologie des Spongiaires, Sponge Biology. C Levi and N Boury-Esnault, eds. Colloques Internationaux du Centre National de la Recherche Scientifique Number 291. Paris : Centre National de la Recherche Scientifique, 1979. pp.271-282; **5:** B.A.N.Z. Antarctic Research Expedition, 1929-1931, under the command of Sir Douglas Mawson, Kt., O.B.E., B.E., D.Sc., F.R.S., Reports -- Series B (Zoology and Botany). Volume 9, part 4. Porifera -- Part 1: Antarctic Sponges. VM Koltun. Adelaide : Mawson Institute for Antarctic Research, University of Adelaide, 1976; **6:** Associated Fauna of Selected Sponges (Hexactinellida and Demospongiae) from the Weddell Sea, Antarctica. Kunzmann, K. Berichte zur Polarforschung / Reports on Polar Research 210, 1996; **7:** Antarctic Hexactinellida. Dagmar Barthel & Ole S. Tendal. Champaign, Ill. : Koeltz Scientific Books, 1994. Theses Zoologicae, Volume 23. Synopses of the Antarctic Benthos, Volume 6; **8:** Verhandlungen Deutsche Zoologische Gesellschaft 85(2):271-276, 1992; **9:** Issledovaniia Fauny Morei 19:49-55, 1972; **10:** Ophelia 36(2):111-118, 1992; **11:** Scientia Marina 63(Supplement 1):113- 121, 1999; **12:** Nature 383(6599):397-398, 1996