

Chordata: Tunicata

ascidians / tunicates

UNDERWATER FIELD GUIDE TO ROSS ISLAND & MCMURDO SOUND, ANTARCTICA

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Photographs: Norbert Wu, Steve Alexander, Shawn Harper, Bruce A. Miller,
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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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ascidian *Aplidium* sp., possibly *A. vastum*

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ascidian *Cnemidocarpa verrucosa*

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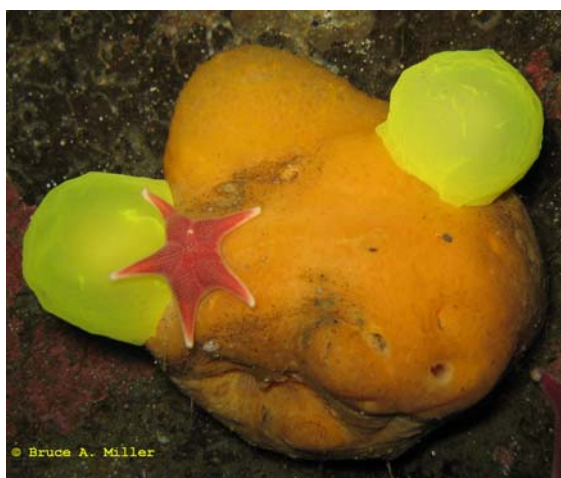
ascidian, probably *Synoicum adareanum*

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ascidian

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ascidian (orange)

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ascidian

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ascidian *Aplidium* sp., possibly *A. vastum*

This ascidian *Aplidium* sp. is a colonial ascidian in the family Polyclinidae and could be *Aplidium vastum* [2].

Aplidium vastum is found throughout Antarctica and the Antarctic Peninsula from 100 to 300 meters depth [1,3].

A. vastum colonies are massive, spherical or egg-shaped, from six to twenty centimeters in diameter [1,4].

The spherical colonies of *A. vastum* have zooids opening all around the surface and their test (covering) may be impregnated with sand [1,4].



This photo of the *Aplidium* sp. colony above shows its size relative to other organisms.

References: **1:** Antarctic Ascidiacea; Monographic Account of the Known Species Based on Specimens Collected under U.S. Government Auspices, 1947-1965. Kott, Patricia. Washington, DC : American Geophysical Union, 1969. Antarctic Research Series. Volume 13; **2:** Patricia (Kott) Mather, personal communication, 1999; **3:** Memoires du Museum National d'Histoire Naturelle. Nouvelle Serie. Serie A, Zoologie 125:1-168, plates, 1983; **4:** Bulletin du Museum National d'Histoire Naturelle. 3e Serie. Number 510. Zoologie 351:3-18, 1978

ascidian *Cnemidocarpa verrucosa*



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Cnemidocarpa verrucosa is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Sandwich Islands, South Georgia Island, Kerguelen Island, Bouvet Island, Crozet Island, Falkland Islands, and Tierra del Fuego from 5 to 761+ meters depth ^[2,7,8,10]. The body shape of *C. verrucosa* may be cylindrical, ovate, or barrel shaped ^[2]. *C. verrucosa* has a thin, tough, flexible, opaque body covering (test) whose surface may be smooth or roughened by furrows, wrinkles, and conical or low wart-like papillae ^[2]. The test of ascidians is an acellular covering secreted by the epidermis; it is largely made of tunicin, a substance allied to plant cellulose and the only cellulose-like substance to occur in the animal kingdom ^[6]. The body wall of *C. verrucosa* is thin and adheres closely to the test ^[2]. *C. verrucosa* may have a short stalk with larger specimens having an expanded jelly-like plate at the stalk's base ^[2].



Cnemidocarpa verrucosa lives at least four years and can be quite large; maximum size has been described as up to twenty centimeters in diameter or as eighteen centimeters long and nine centimeters in diameter ^[1,2,9,10]. The larger incurrent branchial siphon of *C. verrucosa* is curved over with its flared opening facing downward; the smaller excurrent atrial siphon faces upward from the body ^[2].

C. verrucosa color varies among specimens and with age: white, white with a rosy and yellow tinge, bright yellow (a predator *Marseniopsis mollis* is bright yellow), yellowish-brown, orange, brown, or gray and it can be bright yellow around its apertures ^[2,10].

C. verrucosa feeds on diatoms, nanoplankton, bacteria, and detritus ^[13].



C. verrucosa is the largest and most abundant Styelidae ascidian in the Antarctic Ocean ^[9]. *C. verrucosa* is oftentimes attached to cobblestones or boulders and may be clustered with several others of its species; one study site had a *C. verrucosa* population density of 0.4 individuals per square meter at 20 - 30 meters depth ^[1].

C. verrucosa has released gametes for external fertilization in the laboratory in November and their planktonic larvae appear to be yolk-feeders ^[1].

The bright yellow prosobranch mollusc *Marseniopsis mollis* is the primary predator of *C. verrucosa*; no seastars or fish have been observed eating *C. verrucosa* ^[3,4]. *Marseniopsis mollis* is shell-less and appears to be protected from predation itself by a chemical, homarine, which deters feeding ^[3]. *M. mollis* appears to obtain its defensive chemical homarine from bryozoans and hydroids growing on the surface of *C. verrucosa* ^[3]. *M. mollis* has been observed drilling into the tunic of *C. verrucosa* to deposit its eggs ^[4]. The gastropod *Phyline antarctica* also deposits its eggs in the tunic of *C. verrucosa* ^[12].

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Younger *Cnemidocarpa verrucosa* are almost cylindrical, attached by their posterior, and are covered with characteristic pointed test protuberances ^[2,5,9].

References: **1:** Journal of Experimental Marine Biology and Ecology 147(2):163-175, 1991; **2:** Antarctic Ascidiacea; Monographic Account of the Known Species Based on Specimens Collected under U.S. Government Auspices, 1947-1965. Kott, Patricia. Washington, DC: American Geophysical Union, 1969. Antarctic Research Series. Volume 13; **3:** Antarctic Journal of the United States 29(5):151-153, 1994; **4:** Ecological Monographs 44(1):105-128, 1974; **5:** Further Zoological Results of the Swedish Antarctic Expedition 1901-1903. Volume 4, Number 4. Ascidiacea Part 2. A Arnback-Christie-Linde. Stockholm: PA Norstedt and Soner, 1950; **6:** Patricia (Kott) Mather, personal communication, 1999; **7:** Biology of the Antarctic Seas 4:11-82, 1971. Antarctic Research Series 17; **8:** Memoires du Museum National d'Histoire Naturelle. Nouvelle Serie. Serie A, Zoologie 125:1-168, plates, 1983; **9:** Bulletin du Museum National d'Histoire Naturelle. 4e Serie. Section A, Zoologie, Biologie et Ecologie Animales 16(1):13-37, 1994; **10:** Tethys 5(4):611-628, 1974; **11:** Polar Biology 20(4):229-247, 1998; **12:** Berichte zur Polarforschung, Reports on Polar Research 286, 1998; **13:** Polar Biology 25:58-64, 2002

Ascidian, probably *Synoicum adareanum*



Synoicum adareanum is found throughout Antarctica and the Antarctic Peninsula, Kerguelen Island, South Shetland Islands, South Orkney Islands, South Sandwich Islands, and South Georgia Island, from 15 to 796 meters depth ^[1,2,3,4,6]. *S. adareanum* colonies consist of large rounded or club-shaped heads with the bottom stalk-like half being wrinkled and leathery and only slightly narrower than the head ^[1]. *S. adareanum* colonies can be up to eighteen centimeters high with a diameter of twelve centimeters ^[1]. *S. adareanum* colonies may be a single head or up to six heads arising from a single stalk ^[1,3,5]. The test (body covering) of *S. adareanum* has been described as firm and cartilaginous or leathery and wrinkled and is semitransparent to glossy ^[1,5]. The head of a *S. adareanum* colony is smooth and less firm than the stalk ^[1]. *Synoicum adareanum* has been described as orange when alive; sand may be embedded into the test which affects color ^[1,5,6]. Zooids are large (twelve to twenty millimeters) and arranged in circular rosette systems of six to ten zooids around a conspicuous common cloaca; these systems are evenly distributed over the colonial head ^[1,5]. One to eight embryos were present in brood pouches in the test of a large collected specimen ^[1].

Taxonomic Note: Sometimes misspelled *Synoicium*

References: 1: Antarctic Ascidiacea; Monographic Account of the Known Species Based on Specimens Collected under U.S. Government

Auspices, 1947-1965. Kott, Patricia. Washington, DC: American Geophysical Union, 1969. Antarctic Research Series. Volume 13; **2:** Patricia (Kott) Mather, personal communication, 1999; **3:** *Biology of the Antarctic Seas* 4:11-82, 1971. Antarctic Research Series 17; **4:** *Memoires du Museum National d'Histoire Naturelle. Nouvelle Serie. Serie A, Zoologie* 125:1-168, plates, 1983; **5:** *Bulletin du Museum National d'Histoire Naturelle. 4e Serie. Section A, Zoologie, Biologie et Ecologie Animales* 16(1):13-37, 1994; **6:** *Tethys* 5(4):611-628, 1974



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unknown ascidian

Specimen about four centimeters high and photographed at 21 meters depth at McMurdo intake jetty [1].



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References: 1: Rob Robbins, personal communication, 2005

unknown ascidian



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These yellow lamellarian gastropods *Marseniopsis mollis* could be feeding on this orange ascidian or could have just mated and are laying eggs. The holes on the ascidian could be from lamellarian feeding.

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ascidian

