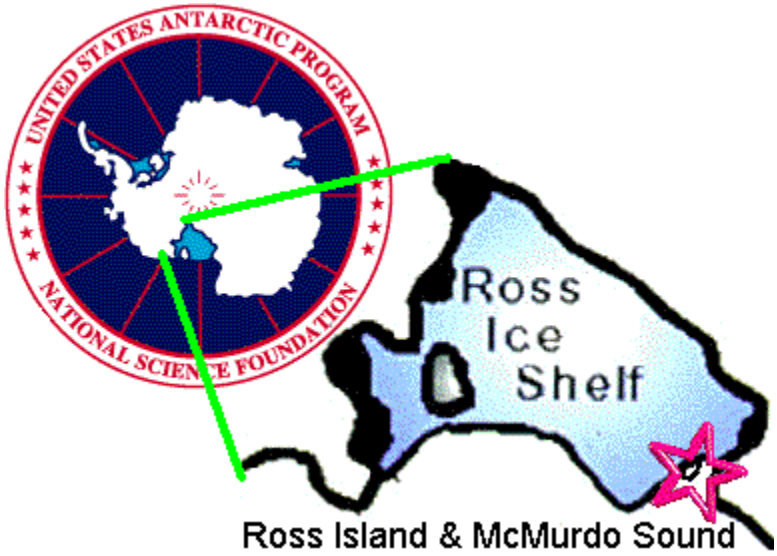
Underwater Field Guide to Ross Island & McMurdo Sound, Antarctica, Volume 3: Mollusca

nudibranchs, pteropods, gastropods, bivalves, chitons, octopus

Peter Brueggeman

Photographs: Steve Alexander, Antarctica New Zealand, Peter Brueggeman, Kirsten Carlson/National Science Foundation, Kathleen Conlan/Canadian Museum of Nature, Paul Dayton, Shawn Harper, Luke Hunt, Henry Kaiser, Mike Lucibella/National Science Foundation, Adam G Marsh, Jim Mastro, Bruce A Miller, Michael Oellermann, Eva Philipp, Mikhail Propp/UCSD Library, Rob Robbins, Steven Rupp, Dirk Schories, M Dale Stokes, and Norbert Wu



Volume covering nudibranchs, pteropods, gastropods, bivalves, chitons, octopus. This Field Guide aims to facilitate underwater/topside field identification from visual characters of organisms seen by scuba divers based on Ross Island, Antarctica. Most organisms were identified from photographs with no specimen collection, so these identifications are to the taxonomic level possible from photographs. 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 is this Field Guide, which builds upon principal photography by Norbert Wu, with photos from other photographers, who are credited on their photographs and above.

Keywords: Antarctic, Antarctica, field guide, marine, Ross Island, McMurdo Sound, nudibranch, sea slug, pteropod, gastropod, snail, bivalve, chiton, octopus, molluscs, mollusc, mollusca

Taxonomic names checked in Zoological Record and World Register of Marine Species: September 2024

dorid nudibranch *Bathydoris hodgsoni*

dorid nudibranch *Doris kerguelenensis*

aeolid nudibranch *Doto antarctica*

aeolid nudibranch *Notaeolidia depressa*

aeolid nudibranch *Cuthona crinita*

aeolid nudibranch, probably *Notaeolidia schmekelae*

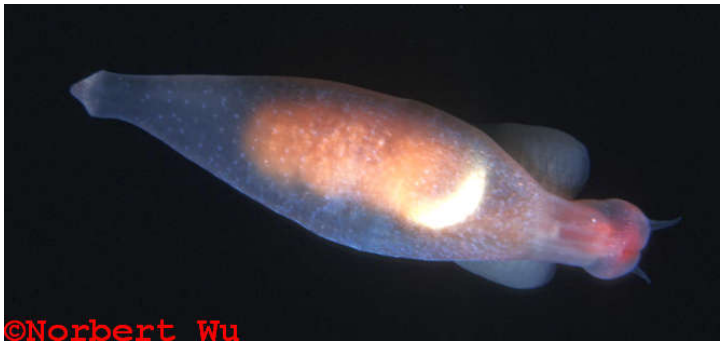
tritoniid nudibranch *Myrella antarctica*

dendronotid nudibranch *Tritoniella belli*

Unidentified cryptic nudibranch on *Zyzzyzus parvula* hydroid

Unidentified cryptic nudibranch on *Corymorpha* sp. hydroid

notaspidean opisthobranch *Bathyberthella antarctica*

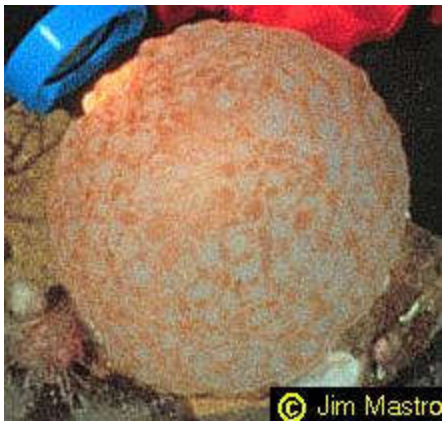


sea butterfly or pteropod *Clione antarctica*

shelled pteropod *Limacina rangii*

lamellarian gastropod *Marseniopsis conica*

lamellarian gastropod *Marseniopsis mollis*



lamellarian gastropod *Marseniopsis syowaensis*

Antarctic whelk *Neobuccinum eatoni*

Eggs of buccinoid gastropod *Antarctodomus thielei*

muricid gastropod *Trophonella longstaffi*

naticid gastropod *Amauropsis rossiana*

capulid gastropod *Cryocapulus subcompressus*

rissoid gastropod *Onoba (Onoba) turqueti*

calliostomatid gastropod *Falsimargarita gemma*

chiton *Nuttallochiton mirandus*

chiton *Callochiton steinenii*

Antarctic scallop *Adamussium colbecki*

Antarctic soft-shelled clam *Laternula elliptica*

file clam *Limatula* (Antarctolima) *hodgsoni*

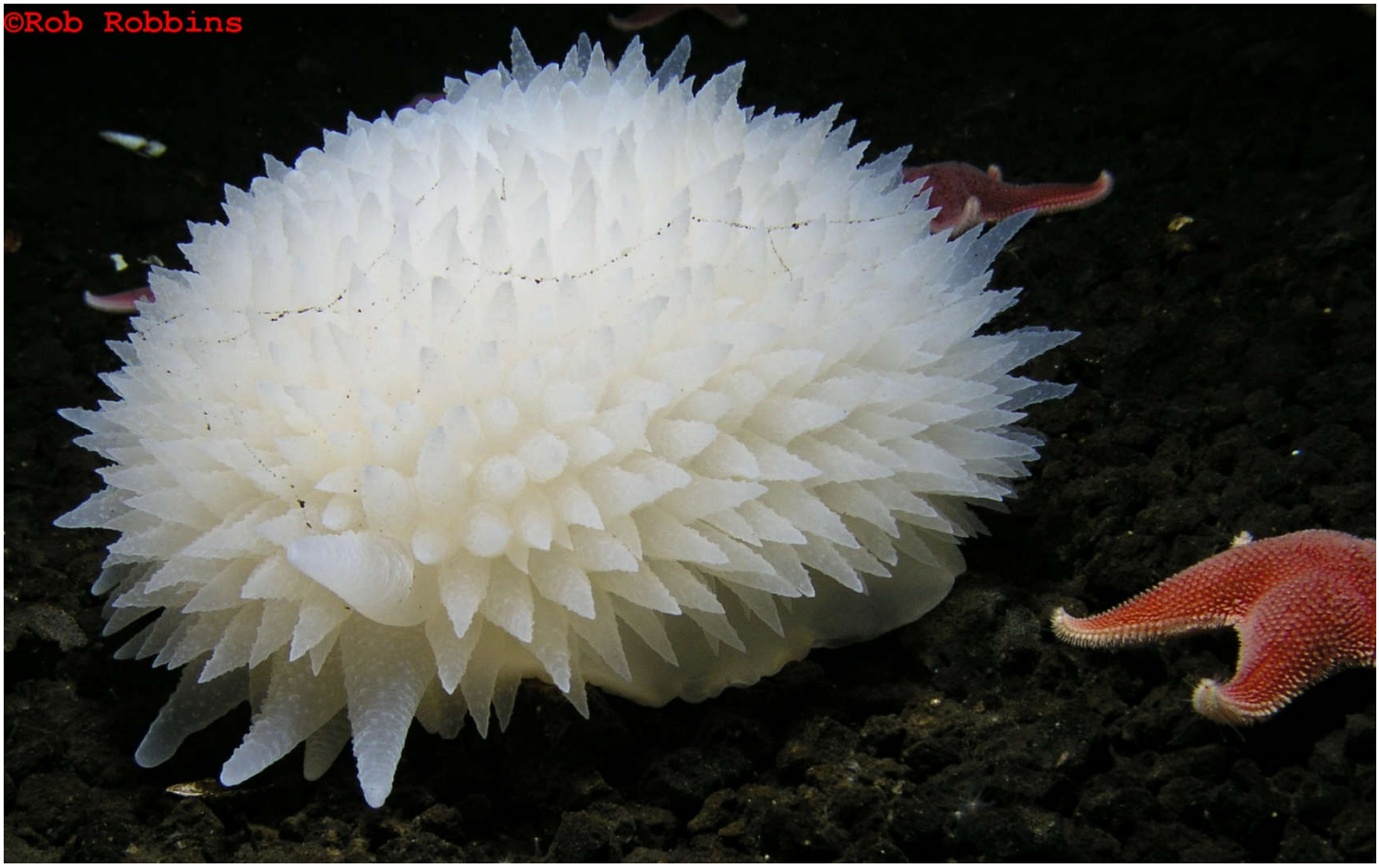
Antarctic yoldia *Aequiyoldia eightsii*

giant Antarctic octopus *Megaleledone setebos*

octopus *Pareledone turqueti*

octopus *Pareledone* sp. (with papillated dorsal mantle)

dorid nudibranch *Bathydoris hodgsoni*



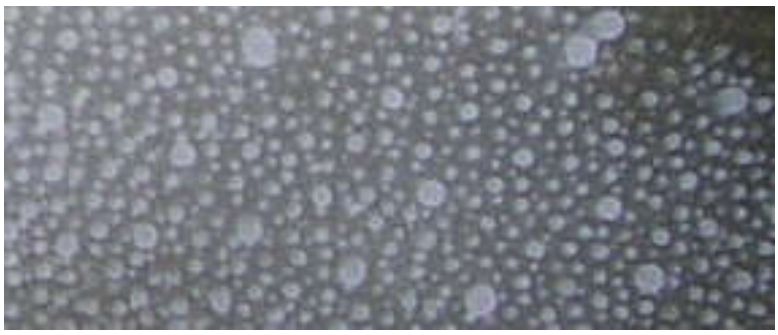
Bathydoris hodgsoni is found in Antarctica, South Orkney Islands, and South Sandwich Islands, from 15 to 2,757 meters depth [1,2,3,4,5,6]. *Bathydoris hodgsoni* is up to twenty centimeters in length [2]. The color of *Bathydoris hodgsoni* can be dirty white to reddish or brownish; collected specimens have been found with more papillae than reported in the descriptive literature [1,2]. Prey items found in its stomach include sponge, crinoids, gorgonarians, alcyonarians, bryozoans, seastars, and bivalves [2].

References: 1: Journal of Molluscan Studies 55(3):343-364, 1989; **2:** Journal of Experimental Marine Biology and Ecology 252:27-44, 2000; **3:** Journal of Molluscan Studies 53(2):179-188, 1987; **4:** Rob Robbins, personal communication, 2005. Fifteen meters @ Cinder Cones; **5:** Marine Biology 164(5):114, 2017; **6:** Canadian Journal of Zoology 80(6):1084-1099, 2002

dorid nudibranch *Doris kerguelenensis*

Doris kerguelenensis is found in Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Georgia Island, Falkland Islands, Shag Rock, Bouvet Island, Kerguelen Island, Crozet Islands, Macquarie Island, New Caledonia, Heard Island, southern Chile, southern Argentina, and near Rio de Janeiro, Brazil at depths from 0 to 1,550 meters [1,2,4,5,10,12,13,17]. The collection off Rio de Janeiro, Brazil at 740 meters depth with a water temperature of 5 degrees Celsius illustrates how Antarctic bottom water extends to the Equator at great depth [5].

The body of *Doris kerguelenensis* can be over twelve centimeters in length, and can be white, pale or bright yellow, orange, or pink, with the gills and rhinophores often slightly darker [1,4,9,14]. Some white *Doris kerguelenensis* have white pigment on the gills [1].



Doris kerguelenensis is covered with tubercles of different size and form [1,4,9].

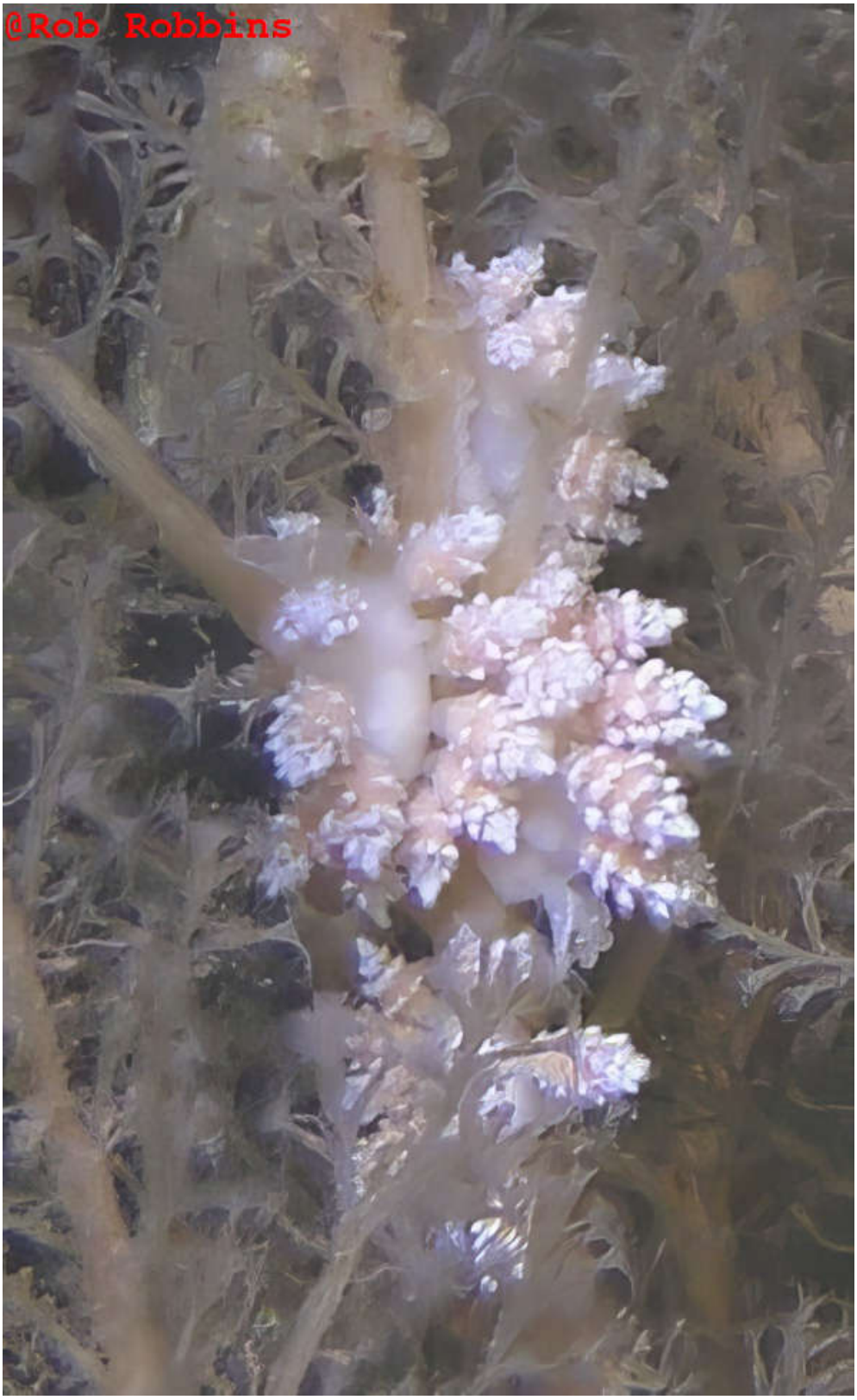
Doris kerguelenensis feeds on rossellid sponges and the sponges *Polymastia invaginata* (shown here), *Anoxycalyx (Scolymastra) joubini*, *Antarctotetilla leptoderma*, *Haliclona scotti*, *Mycale (Oxymycale) acerata*, *Hemigellius fimbriatus*, *Calyx shackletoni*, *Isodictya setifera*, *Ectyodoryx* cf. *ramilobosa*, and *Dendrilla antarctica* [2,3,4,6,7,8].

Taxonomic Note: Analysis of a single locus of mitochondrial DNA claimed 59 species in a species complex for *Doris kerguelenensis*, and morphology doesn't appear to distinguish them [14,15]. Reproductive incompatibility between species was not shown in this work: "Speciation involves the evolution of reproductive incompatibilities between diverging populations, including prezygotic incompatibilities that prevent the formation of hybrids and postzygotic incompatibilities that render hybrids sterile or inviable [16]." A "periodic-like morphological and molecular framework" applied to the *Cadlina* nudibranch genus in the Kuril Islands showed the term "cryptic species"' should be removed from phylogeny and taxonomy, and that different species of this complex varied in molecular phylogenetic distances and morphological distinctness [18].

The genus *Austrodoris* is a synonym for *Doris* [11]. *Austrodoris macmurdensis* is a synonym for *Doris kerguelenensis* [1].

References: 1: Journal of Molluscan Studies 56:163- 180, 1990; **2:** Journal of Molluscan Studies 57:223-228, 1991; **3:** Marine Biology 100(4):439-441, 1989; **4:** Polar Biology 13(6):417-421, 1993; **5:** Journal of Molluscan Studies 53(2):179-188, 1987; **6:** Journal of Molluscan Studies 62(3):281-287, 1996; **7:** 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 (P. Dayton, personal communication, 2015: *Haliclona dancoi* observations are corrected to *H. scotti*; *Gellius tenella* corrected to *Hemigellius fimbriatus*); **8:** Ecological Monographs 44(1):105-128, 1974 (P. Dayton, personal communication, 2015: *Haliclona dancoi* observations are corrected to *H. scotti*; *Gellius tenella* corrected to *Hemigellius fimbriatus*); **9:** Bulletin de l'Institut Royal des Sciences Naturelles de Belgique / Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen. Biologie 66:29-40, 1996; **10:** Malacologia 43(1-2):237-311, 2001; **11:** Zoological Journal of the Linnean Society 136(4):535-636, 2002; **12:** Polar Biology 29(2):83-96, 2006; **13:** Marine Biology 164(5):114, 2017; **14:** Invertebrate Systematics 36(5), 419–435, 2022. doi:10.1071/IS21073; **15:** Ecology and Evolution. 2022;12:e9333. doi.org/10.1002/ece3.9333; **16:** eLife 7:e35468. doi.org/10.7554/eLife.35468; **17:** Frontiers in Ecology and Evolution 12:1455329, 2024. doi: 10.3389/fevo.2024.1455329; **18:** Diversity 2024, 16, 220 doi.org/10.3390/d16040220

aeolid nudibranch *Doto antarctica*



Doto antarctica has been found in Antarctica, South Shetland Islands, and Bouvet Island, from 21 to 500 meters depth [1,2,3,4,6,7].

Doto antarctica has been described as pale yellowish-white, pale brown, or yellowish-brown, with the color intensified in the cerata [1,2,6]. *Doto antarctica* has 6 pairs of cerata with 4-5 circlets of tubercles on each cerata, with each tubercle having white spots [1,2,6]. Cerata pairs are progressively smaller towards the tail [6].

Doto antarctica is up to eleven millimeters in length [1,6].

Several *Doto Antarctica* were found laying egg masses on hydrozoans of the genera *Oswaldella* and *Antarctoscyphus* [7].

Several *Doto antarctica* are shown here on the hydroid *Hydrodendron arboreum*, on which *Doto antarctica* feeds in addition to other hydroids [5,6].

References: 1: Mollusca. IV. Nudibranchiata. C Eliot. National Antarctic Expedition, 1901-1904. Natural History. Volume II. Zoology (Vertebrata: Mollusca: Crustacea). London: British Museum, 1907; **2:** The Nudibranchiata. NHG Odhner. British Antarctic ("Terra Nova") Expedition, 1910. Natural history reports. Zoology. Volume VII. Mollusca. Polychaeta. Chaetognatha. London: British Museum, 1923-1935. pp. 229-309; **3:** Rob Robbins, personal communication, 2005; **4:** Deep Sea Research Part II: Topical Studies in Oceanography 50(10-11):1799-1819, 2003; **5:** Ecological Monographs 44(1):105-128, 1974; **6:** Antarctic Science 18(4):615–631, 2006; **7:** PLoS ONE 11(7):e0157941, 2016

aeolid nudibranch *Notaeolidia depressa*

Notaeolidia depressa has been recorded in Antarctica and the Antarctic Peninsula, South Shetland Islands, South Sandwich Islands, and Bouvet Island, from depths of 0 to 527 meters [1,2,3]. The body of *Notaeolidia depressa* is translucent white, and its brown or red digestive gland shows through the body wall and cerata [1]. *Notaeolidia depressa* has been recorded at lengths up to 6.5 centimeters in fixed specimens [1].

Notaeolidia depressa has one to two longitudinal rows of cerata numbering about one hundred with the larger cerata of being innermost (*Notaeolidia gigas* has at least 3 rows of cerata) [1]. *Notaeolidia depressa* has white pigment on cerata tips, rhinophores and foot margin and sometimes the oral tentacles [1]. The genus *Notaeolidia* is known only from Antarctica [1].

Taxonomic Note: *Notaeolidia rufopicta*, *N. robsoni*, *N. subgigas* (Odhner, 1944), *N. alutacea*, and *N. flava* were synonymized under *Notaeolidia depressa* [1].

References: 1: Zoologica Scripta 19(3):309-330, 1990; **2:** Polar Biology 29(2):83-96, 2006; **3:** Journal of Molluscan Studies 57(3):337-345, 1991

aeolid nudibranch *Cuthona crinita*

Cuthona crinita has been found at Arrival Heights in McMurdo Sound and Queen Mary Land in Antarctica [1].

Specimens of *Cuthona crinita* are up to 45 millimeters long [1].

The background color of *Cuthona crinita* is opaque light grey, with barely visible digestive and reproductive organs [1].

Rhinophores and oral tentacles of *Cuthona crinita* are light grey covered with densely arranged small opaque white spots [1].

Cerata of *Cuthona crinita* are semi-translucent covered one-third at their end with densely arranged white spots, and digestive gland branches are visible in the cerata as greyish-brown tubes [1].

Eggs of *Cuthona crinita*.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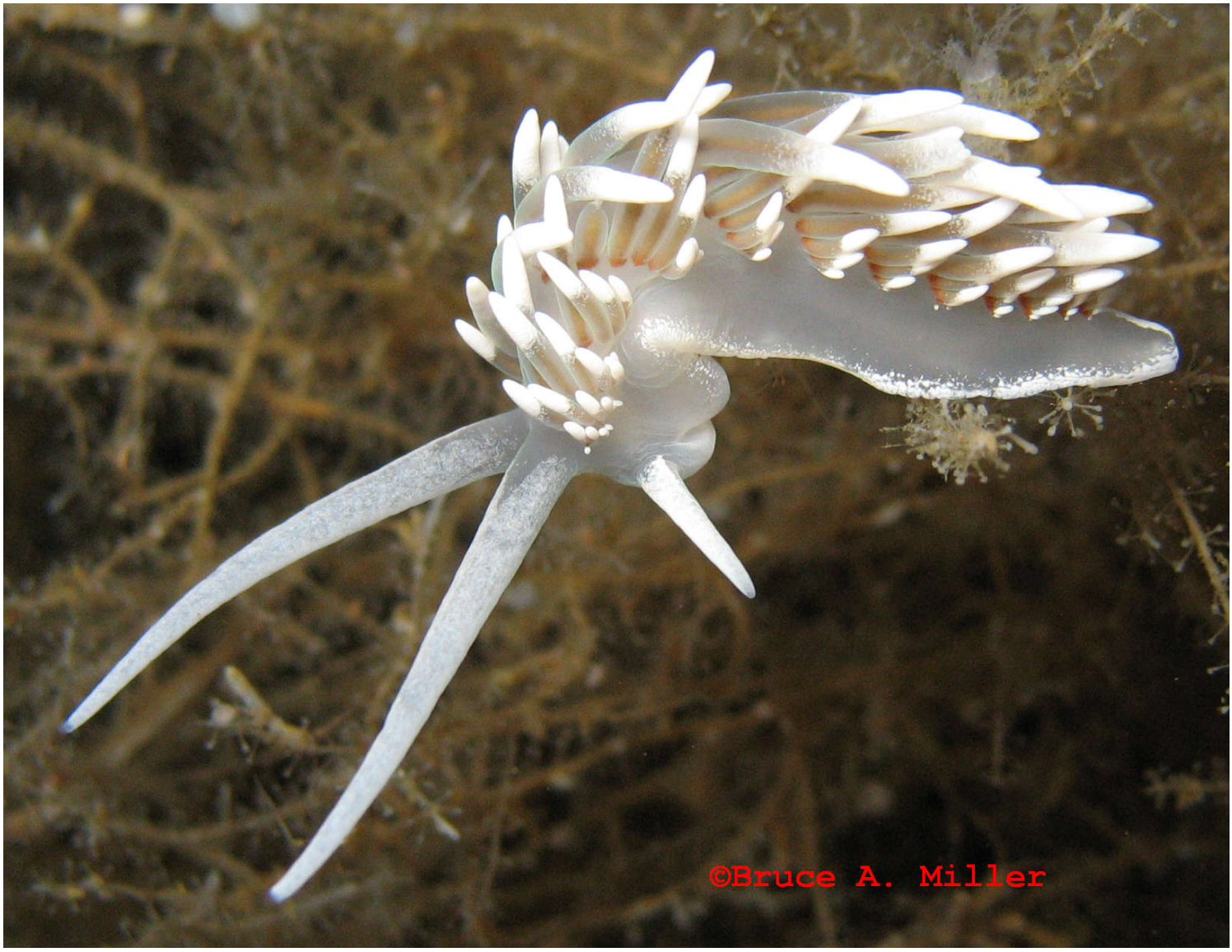
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References: 1: Journal of the Marine Biological Association of the United Kingdom 92(5): 1161-1174, 2012

aeolid nudibranch, probably *Notaeolidia schmekelae*

This large opisthobranch (about ten centimeters long) is probably *Notaeolidia schmekelae* [1]. Typical for *Notaeolidia schmekelae* is large size with only few rather short cerata, and compared to other *Notaeolidia* species, has rather short oral tentacles [1].

Notaeolidia schmekelae is found in the Weddell Sea, at depths from 200 to 481 meters [2]. *N. schmekelae* ranges in length between 4 and 13.5 centimeters, and its body, oral tentacles, and cerata are milky white [2]. *N. schmekelae* lacks a penis; the vas deferens runs into a flaplike structure on its right side, which seems to be part of the genital papilla [1]. Cerata are arranged in two to four longitudinal rows [2]. The rhinophores of *Notaeolidia schmekelae* have a tint of yellow; the cerata tips and oral tentacles have white pigment [2]. A brown digestive gland shows through the skin of the cerata of *Notaeolidia schmekelae* but is less visible in the body [2].

References: 1: H Waegele, personal communications, 1999, 2005; **2:** Zoologica Scripta 19(3):309-330, 1990

tritoniid nudibranch *Myrella antarctica*

Myrella antarctica is found in Antarctica and the Antarctic Peninsula, South Shetland Islands, South Georgia Island, Falkland Islands, and southern Chile and Argentina, at depths from 1 to 600 meters [1,2,3,4,5,6,7,8].

The two white spots on the right side of the body are the genital (upper) and anal (lower) openings [2].

In one study, *Myrella antarctica* was studied at depths from 5 to 36 meters and was most abundant around 7 meters in red algae communities [1]. Specimens of *M. antarctica* have been recorded at lengths up to 6.5 centimeters [2,4].

The color of *Myrella antarctica* is milky white to transparent with no opaque white pigment in the body, sometimes yellowish to pinkish to orange to brownish, with yellowish or rose-colored viscera shining through the body wall [2,6,8].

Opaque white pigment is present on the gills, notal margin, rhinophore tips and sheath margins, velar tentacles, and papillae of the oral veil of *Myrella antarctica* [2]. Small white stripes radiate across the notum from the bases of gills, and gills number up to 30 [2,6].

The oral veil of *Myrella antarctica* has 10-18 digitiform processes with the outermost ones grooved [6]. Zooids of *Cephalodiscus* were observed in the digestive tract of one specimen of *M. antarctica* [2]. *Cephalodiscus* is a worm-like invertebrate (pterobranch hemichordate) living in secreted tubes organized into a colonial structure.

Taxonomic Note: *Tritonia antarctica* was synonymized into *T. challengeriana* in 2004 and changed back to *Tritonia antarctica* in 2021 [2,4,10,11]. *Tritonia antarctica* was renamed *Myrella antarctica* in 2023 [9].

References: 1: Journal of Molluscan Studies 62(3):281-287, 1996; **2:** Zoological Journal of the Linnean Society of London 113(1):21-46, 1995; **3:** Polar Biology 24(2):105-112, 2001; **4:** Sea slugs of southern South America: systematics, biogeography and biology of Chilean and Magellanic Nudipleura (Mollusca, Opisthobranchia). Michael Schrödl. Hackenheim, Germany: ConchBooks, 2003; **5:** Polar Biology 29(2):128-136, 2006; **6:** Marine Benthic Fauna of Chilean Patagonia. V Haussermann, G Forsterra. Puerto Montt, Chile: Nature in Focus, 2009. p. 535; **7:** Antarctic Science 18(4):615–631, 2006; **8:** Polar Biology 44:559-573, 2021; **9:** Zoological Journal of the Linnean Society 199: 445–476, 2023 doi.org/10.1093/zoolinnean/zlad013; **10:** PLoS ONE 15(11), 2020: e0242103.doi.org/10.1371/journal.pone.0242103; **11:** Molecular Phylogenetics and Evolution 162:107209, 2021 doi.org/10.1016/j.ympev.2021.107209

dendronotid nudibranch *Tritoniella belli*

Tritoniella belli is found in Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Georgia Island, Shag Rock, and Kerguelen Island at depths from 7 to 699 meters [1,6,7,8,9].

Tritoniella belli has a longitudinal ridge along its back and can be up to eight centimeters in length [1,10].


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A study noted that *Tritoniella belli* feeds primarily on the stoloniferan soft coral *Clavularia frankliniana*, occasionally eats hydroids and anemones, and probably eats tunicates on which its eggs can be found [2,3,5]. *Tritoniella belli* has been observed feeding on the octocoral *Ascolepis* sp. [6].

Another study found *Tritoniella belli* primarily on bare rock surfaces or upon the hydroid *Hydrodendron arboreum*, with smaller numbers of *Tritoniella belli* found on the bush sponge *Homaxinella balfourensis* and the soft corals *Alcyonium antarcticum* and *Clavularia frankliniana* [7]. This suggests that *Tritoniella belli* is feeding on these organisms and also on growth on rock surfaces; gut contents include benthic diatoms [7].

Egg ribbons of *Tritoniella belli* have been observed on bare rock surfaces, on the hydroid *Hydrodendron arboreum*, and on the bush sponge *Homaxinella balfourensis* [7].

Here *Tritoniella belli* is crawling across the predatory seastar *Odontaster validus*. *Tritoniella belli* mantle tissue is noxious to several seastars, the sea urchin *Sterechinus neumayeri*, and two species of fish [4]. *Odontaster validus* shows feeding deterrence to *Tritoniella belli* mantle tissue and to chimyl alcohol [3]. *Tritoniella belli* probably defends itself chemically against predators using chimyl alcohol that it obtains from the soft coral *Clavularia frankliniana*. Extracts of *Tritoniella belli* and the soft coral *Clavularia frankliniana* have chimyl alcohol in common.

Taxonomic Note: Five new species of *Tritoniella* from the Weddell and Scotia Seas were described in 2022, thus clouding the distribution and morphological types described in preceding publications when *T. belli* was the only species [10,11,12]. *T. belli* differs from the five other newly described *Tritoniella* species by having a broad notum or dorsal surface with sparsely but evenly covered with knobs, a broad central ridge, a smooth notal or dorsal margin, and generally a milky white coloration [10].

A preceding publication when there was only the one species of *T. belli* stated *T. belli* can have two morphological types:

1) tubercle-covered body with a yellow to orange color and a ridged margin; found predominately along the Antarctic Peninsula;

2) milky-white to transparent body with few tubercles and a serrated margin sometimes with small finger-shaped processes; prevails in the Weddell Sea and Signy Island (South Orkney Islands);

and both morphs can be found elsewhere in Antarctica [1].

References: 1: Polar Biology 9(4):235-243, 1989; **2:** Ecological Monographs 44(1):105-128, 1974; **3:** Journal of Chemical Ecology 20(12):3361-3372, 1994; **4:** Polar Biology 11(8):623-629, 1992; **5:** Marine Biology 100(4):439-441, 1989; **6:** Journal of Molluscan Studies 62(3):281-287, 1996; **7:** Marine Biology 132:259-265, 1998; **8:** Tethys 6(3):631-653, 1974; **9:** Polar Biology 24(2):105-112, 2001; **10:** Organisms Diversity & Evolution 22:431–456, 2022. DOI: 10.1007/s13127-022-00541-3; **11:** Molecular Phylogenetics and Evolution 162:107209, 2021 doi.org/10.1016/j.ympev.2021.107209; **12:** Zoological Journal of the Linnean Society 199: 445–476, 2023 doi.org/10.1093/zoolinnean/zlad013

Unidentified cryptic nudibranch on *Zyzzyzus parvula* hydroid

Unidentified cryptic nudibranch on *Corymorpha* sp. hydroid

Those are nudibranch cerata sticking up behind the hydroid's hypostome and its oral tentacles.

notaspidean opisthobranch *Bathyberthella antarctica*

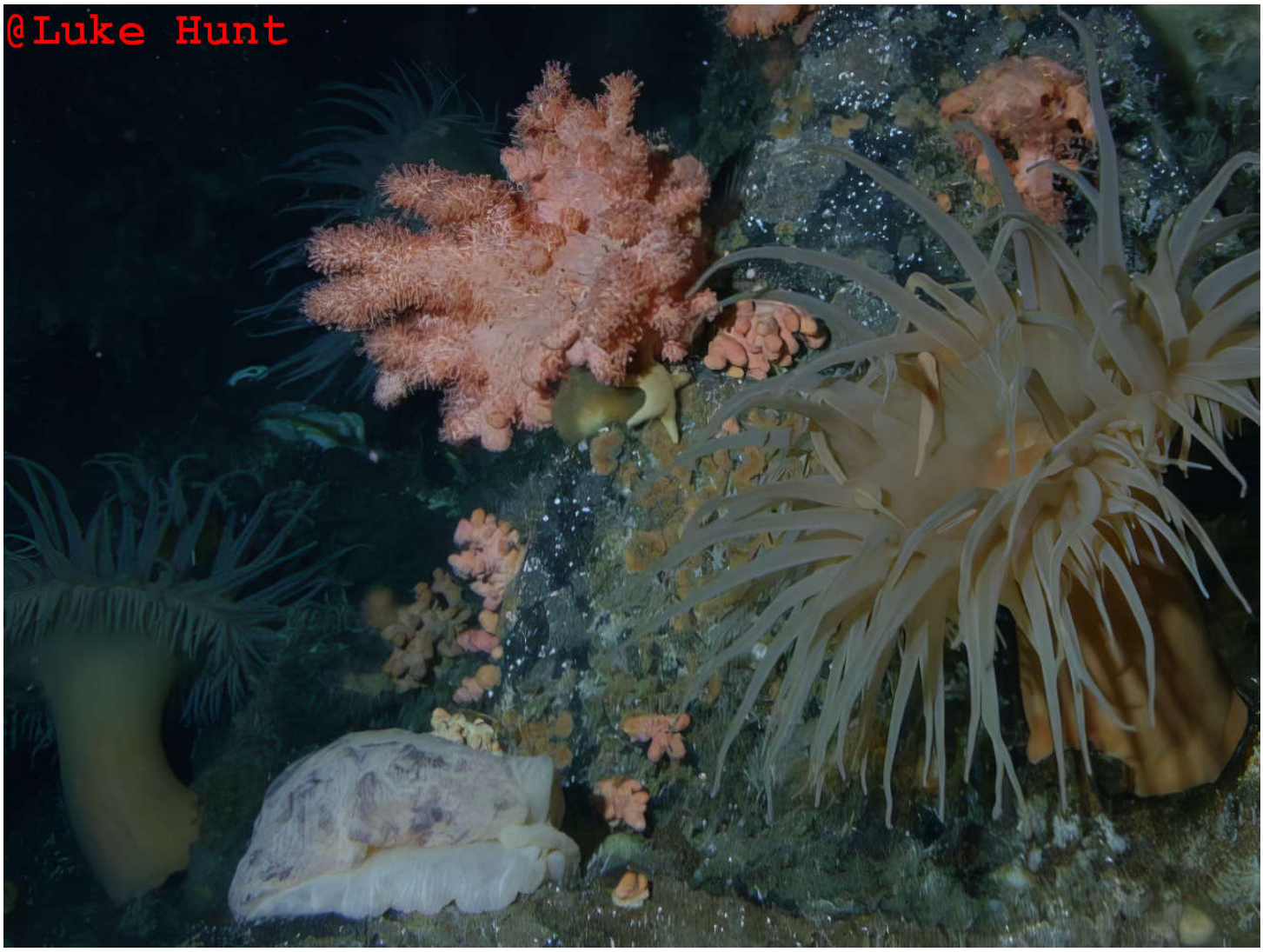
Bathyberthella antarctica is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Sandwich Islands, South Georgia Island, and Bouvet Island at depths from 120 to 2,080 meters [1,2,3,5,6,7,8].

Bathyberthell antarctica has an oval body with a prominent gill on the right side and an internal large oval uncalcified shell covering the visceral mass [1,4].

The mantle/notum of *Bathyberthella antarctica* can be unpigmented or scattered with grey blotches and adults are opaque white, creamy-grey, or dirty white, often with black pigment in depressions [2,4]. The mantle/notal surface of *Bathyberthell antarctica* is smooth or with small groups of low pustules [2].

The foot of *Bathyberthella antarctica* is large and thick with the front margin divided into upper and lower lips [2,4].

Bathyberthella antarctica can be up to seventeen centimeters long [2].



Bathyberthella antarctica has acid secreting epidural glands providing all-over protection against predators and parasites, which is useful since an external shell is lacking [9].

Taxonomic Note: Four Pleurobranchidae species in two genera are found in Antarctic waters with controversy about generic and species identification [10].

References: 1: Bulletin de l'Institut Royal des Sciences Naturelles de Belgique / Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen. Biologie 66:29-40, 1996; **2:** Zoologica Scripta 23(4):313-324, 1994; **3:** Polar Biology 14(4):261-268, 1994; **4:** Veliger 29(3):292-302, 1987; **5:** Fauna der Antarktis. J Sieg & JW Wagele, eds. Berlin: P. Parey, 1990; **6:** US National Museum Polar Invertebrate Catalog at www.nmnh.si.edu/iz/usap/usapdb.html; **7:** Biodiversity and Systematics of Antarctic Deep Water Opisthobranchia. M Schrodl. IN: ANDEEP, Cruise Report ANT- XIX/3 and ANT-XIX/4 (ANDEEP I and II), ANtarctic Benthic DEEP-sea Biodiversity (ANDEEP): Colonisation History and Recent Community Patterns. Zoological Institute and Zoological Museum, University of Hamburg, Germany. pp. 62-63. www.biologie.uni-hamburg.de/zim/niedere2/cruise_report.pdf; **8:** Polar Biology 29(2):83-96, 2006; **9:** Journal of Molluscan Studies 83(4):422-433, 2017; **10:** Zoological Journal of the Linnean Society, 2023, zlad162, doi.org/10.1093/zoolinnean/zlad16

sea butterfly or pteropod *Clione antarctica*

Clione antarctica is found throughout Antarctic and subantarctic waters and can be found northward to about 36 degrees in some areas [5,8].

In McMurdo Sound, *Clione antarctica* is commonly found near the undersurface of the sea ice and is sparse in water deeper than twenty meters [5].

Localized population density down to twenty meters depth may be as high as 300 per cubic meter [7].

Clione antarctica has been observed in breeding swarms in shallow water down to six meters depth, with an average of 7.9 pteropods per cubic meter [10].

Clione antarctica deposits a free-floating, gelatinous egg mass, with spawning taking place from November through January [5].

Clione antarctica is a free-swimming shell-less pteropod mollusc up to 4.2 centimeters long [5]. *Clione antarctica* swims with less than two wing strokes per second and orients itself head up [5]. In Antarctic waters, *Clione antarctica* eats a planktonic shelled pteropod mollusc *Limacina rangii* which it extracts from its shell; further north, it feeds on *Limacina retroversa* as well [5]. Its *Limacina rangii* prey species doesn't have pteroenone so it appears that *C. antarctica* synthesizes it as part of its metabolic processes [6,7].

The medusa *Diplulmaris antarctica* eats *Clione antarctica*, as does the sea spider *Colossendeis megalonyx* [2,3,11].

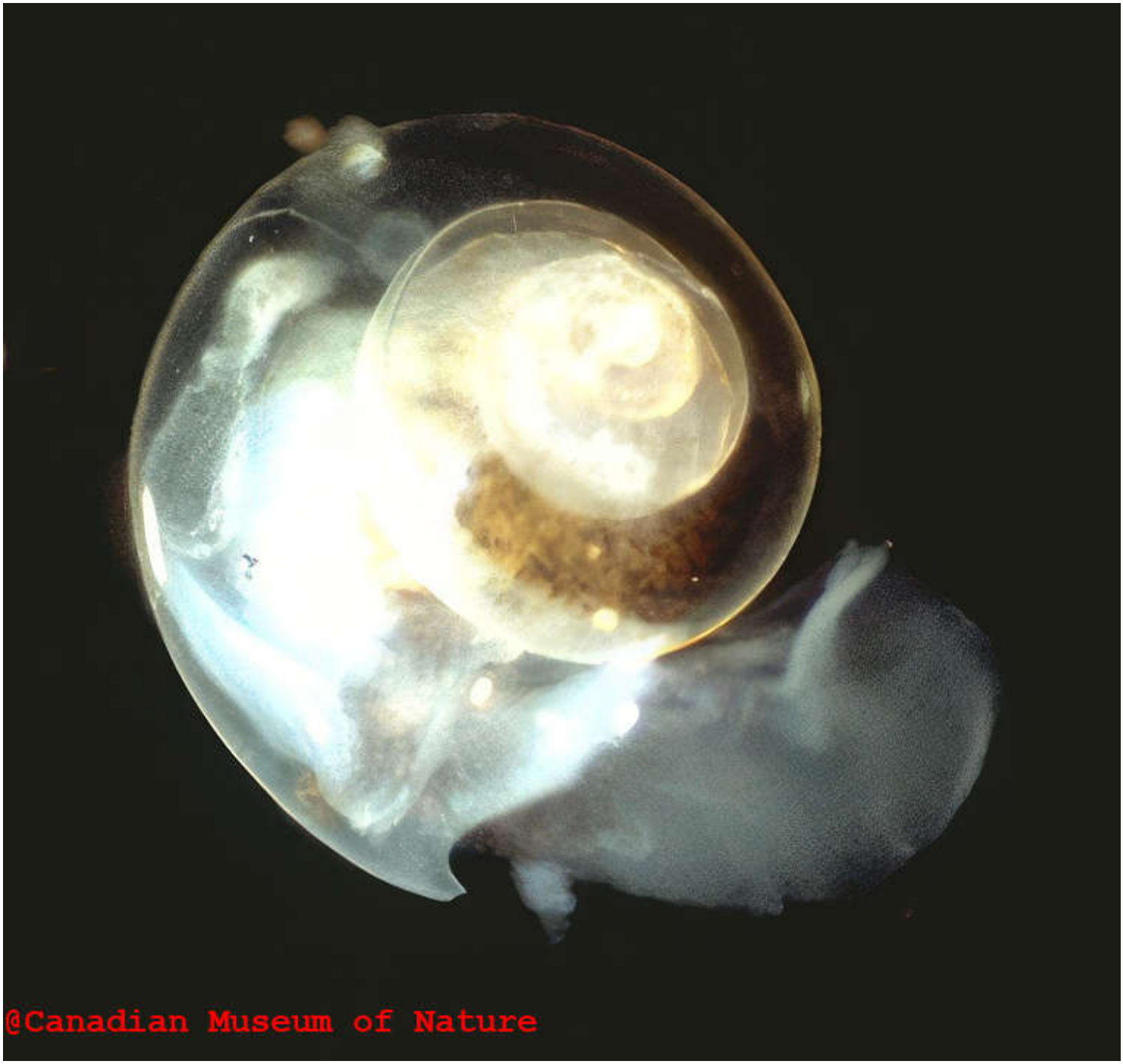
A hyperiid amphipod *Hyperiella dilatata* grabs *Clione antarctica* from the water and holds it to itself as a chemical defense against predation [1,4,7]. Predatory fish won't eat the amphipod / *Clione antarctica* combination or *Clione antarctica* itself which has a chemical, pteroenone, which deters feeding [1,4,6,7].

Taxonomic Note: In 1976, van der Spoel arranged *Clione antarctica* as the subspecies *Clione limacina antarctica* [9]. In 1990, it was reestablished by Gilmer & Lalli as a separate species to *Clione antarctica* [5].

References: 1: Journal of Organic Chemistry 60(3):780-782, 1995: **2:** Pelagic Scyphomedusae (Scyphozoa: Coronatae and Semaeostomeae) of the Southern Ocean. Ronald J. Larson. Washington, DC : American Geophysical Union, 1986; **3:** Polar Biology 11(1):19-25, 1990; **4:** Nature 346(6283):462-464, 1990; **5:** American Malacological Bulletin 8(1):67-75, 1990; **6:** Antarctic Journal of the United States 29(5):151-153, 1994; **7:** Marine Biology 122:271-277, 1995; **8:** Journal of Molluscan Studies 64(3):345-354, 1998; **9:** Pseudothecosomata, Gymnosomata and Heteropoda (Gastropoda). S van der Spoel. Utrecht: Bohn, Scheltema & Holkema, 1976; **10:** Invertebrate Reproduction & Development 29(2):143-148, 1996; **11:** Invertebrate Biology, 2018. doi.org/10.1111/ivb.12210

shelled pteropod *Limacina rangii*

Limacina rangii is most abundant in Antarctic waters between Antarctica and the Antarctic Convergence (aka Antarctic Polar Front) and is less common in subantarctic waters of the Antarctic Circumpolar Current (aka West Wind Drift); its northern limit is coincident with the Subtropical Convergence [2,7]. *Limicina rangii* has also been found north to 10°S in the Brazil Current and at 30°S near South Africa [2]. *L. rangii* has continuous spawning and recruitment from November to March and can overwinter as juveniles and adults [14]. *Limacina rangii* is a notable component of the McMurdo zooplankon [9]. *Limacina rangii* filter feeds on phytoplankon [9]. The carnivorous pteropod *Clione antarctica* eats *Limacina rangii* which it extracts from its shell [3,8,9]. Other predators include medusas (*Diplulmaris antarctica*, *Solmundella bitentaculata*) and nototheniid fish (*Trematomus borchgrevinki*, *T. bernacchii*, *T. hansoni*, *T. pennellii*) [4,5,6,8,10,11].



Taxonomic Note: *Limacina helicina* had two Antarctic formas or subspecies, *L. helicina* (f.) *antarctica* Woodward, 1854 and *L. helicina* (f.) *rangii* d'Orbigny, 1835 [1]. The two formas are distinct in range and characters, but there are intermediates between the two formas, and the intermediates are only found between the areas of both formas [1]. Arctic and Antarctic populations of *Limacina helicina* are genetically distinct at a species level, so the southern *Limacina* are a separate species and not a subspecies of *Limacina helicina* [12]. So that makes the older name *Limacina rangii* the valid name for the southern species [13].

References: 1: Euthecosomata. A Group with Remarkable Developmental Stages. (Gastropoda, Pteropoda). S van der Spoel. Gorinchem: J Noorduijn, 1967; **2:** Oceanic Micropalaeontology. ATS Ramsay. London: Academic Press, 1977; **3:** American Malacological Bulletin 8(1):67- 75, 1990; **4:** Environmental Biology of Fishes 36(3):313-318, 1993; **5:** Pelagic Scyphomedusae (Scyphozoa: Coronatae and Semaeostomeae) of the Southern Ocean. RJ Larson. Washington, DC: American Geophysical Union, 1986; **6:** Polar Biology 11(1):19-25, 1990; **7:** Bulletin of Malacology, Republic of China. Bulletin of the Malacological Society of China 5:1-22, 1978; **8:** Antarctic Journal of the United States 23(5):135-136, 1988; **9:** Polar Biology 8(1):41-48, 1987; **10:** Polar Biology 8(1):49-54, 1987; **11:** Antarctic Science 12(1):64-68, 2000; **12:** PLoS One 5(3):e9835. doi:10.1371/journal.pone.0009835, 2010; **13:** Zoosymposia 13:305-346, 2019; **14:** Frontiers in Marine Science 10:1118570, May 11, 2023. doi: 10.3389/fmars.2023.1118570

lamellarian gastropod *Marseniopsis conica*

Marseniopsis conica is found throughout Antarctica, the Antarctic Peninsula, and Macquarie Island from 18 to 860 meters depth [1,3,5]. *Marseniopsis conica* is readily distinguished by a polygonal bumpy outline on its mantle and its reddish-brown coloration [1,5].

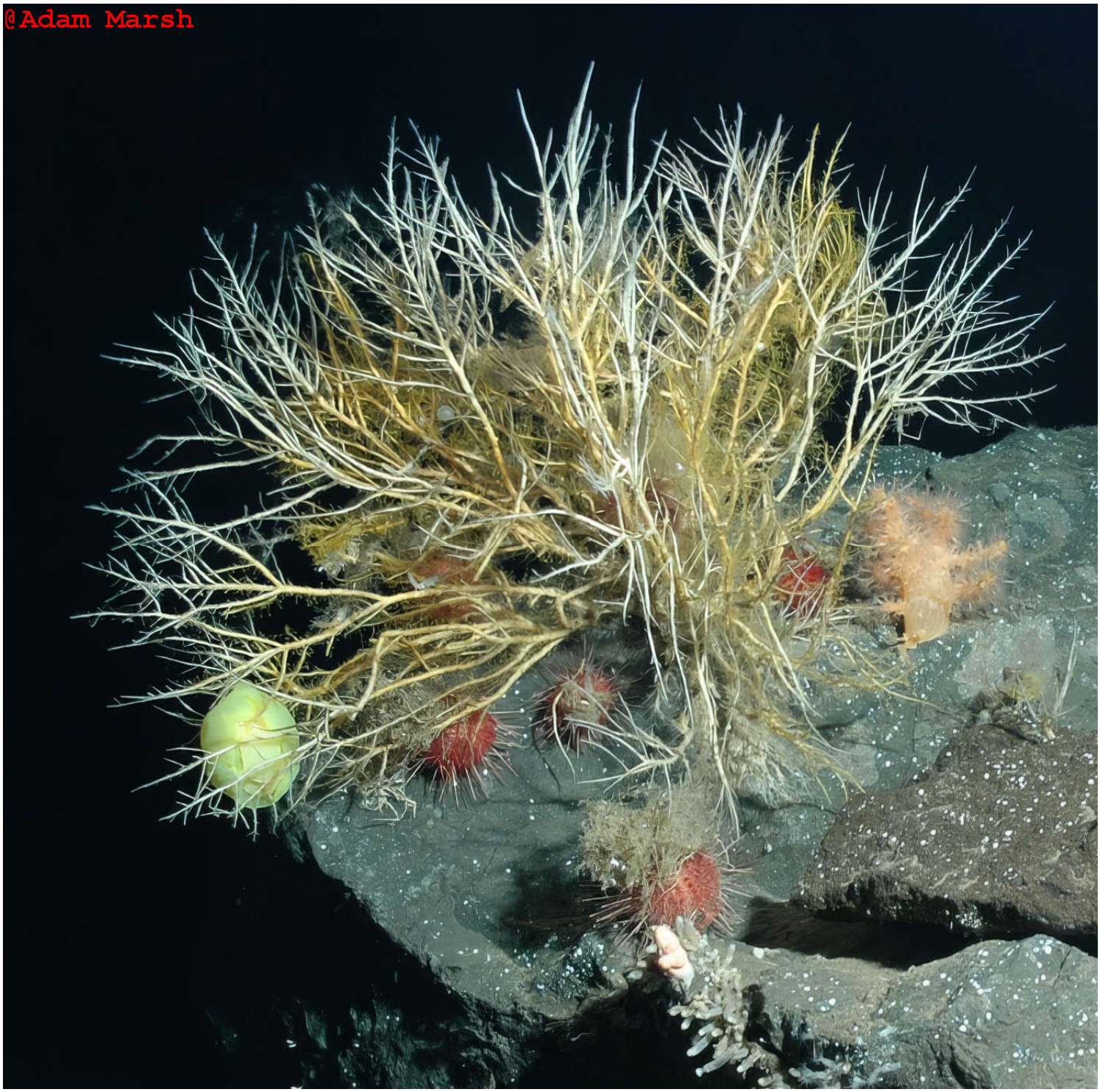
Marseniopsis conica has planktotrophic larvae unique among gastropods, covering their larval shell with a mantle which can change its volume by interaction of body fluid and muscle activity [4]. The shell covering tissue of juveniles and adults is known to produce acidic secretions, which repel predation [4].

Lamellarian species feed on ascidians and sponges [2].

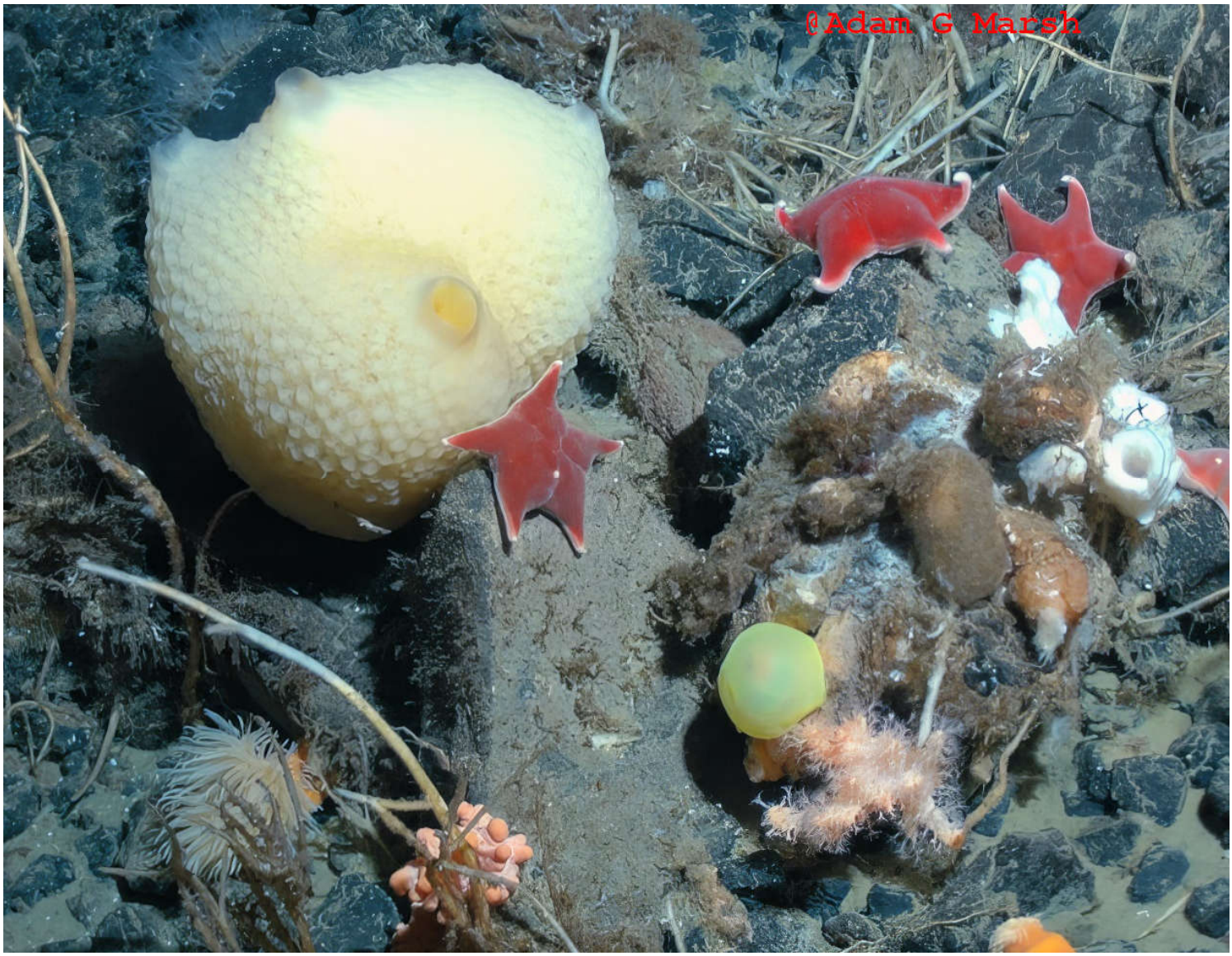
References: 1: Taxonomic Study on Antarctic Gastropods Collected by Japanese Antarctic Research Expeditions. H Numanami. Memoirs of National Institute of Polar Research, Series E (Biology and Medical Science), Number 39. Tokyo: National Institute of Polar Research, 1996; **2:** Proceedings of the NIPR Symposium on Polar Biology 4: 50-68, 1991; **3:** Rob Robbins, personal communication, 2005; **4:** Nautilus 107(1):1-8, 1993; **5:** Iberus 26(2):43-117, 2008

lamellarian gastropod *Marseniopsis mollis*

Marseniopsis mollis is found in Antarctica and the Antarctic Peninsula, Peter I Island, and South Shetland Islands at depths from 1 to 800 meters [3,4,5,6,8,10,11,14]. *Marseniopsis mollis* is the most common species in the genus *Marseniopsis* in Antarctica [3].



Marseniopsis mollis ranges from 1.4 to seven centimeters long [3,4,5].



The mantle covering *Marseniopsis mollis* is translucent lemon yellow and is soft, smooth, elliptical or rounded, thick, and fleshy [4,7,14]. The tail of *Marseniopsis mollis* projects slightly but is not visible from top view [7].

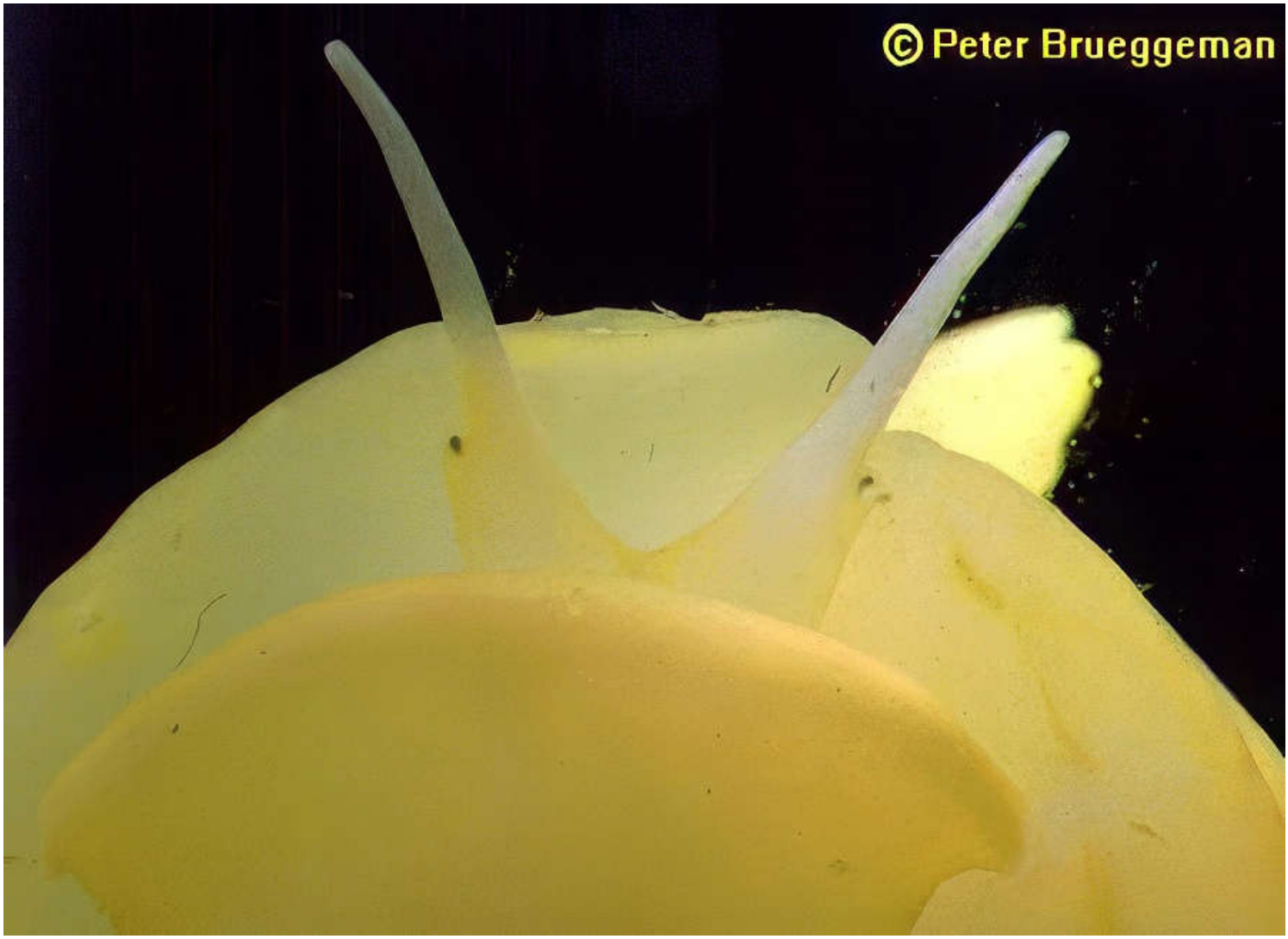
Marseniopsis mollis does not have a shell for protection from predators, though it does have a thin, fragile, transparent, internal shell, which has two to three complete whorls [3,7,11]. *Marseniopsis mollis* has planktotrophic larvae unique among gastropods, covering their larval shell with a mantle which can change its volume by interaction of body fluid and muscle activity [12]. The shell covering tissue of juveniles and adults is known to produce acidic secretions, which repel predation [12].

Marseniopsis mollis has been found in the stomach contents of the fish *Trematomus hansoni* [9].

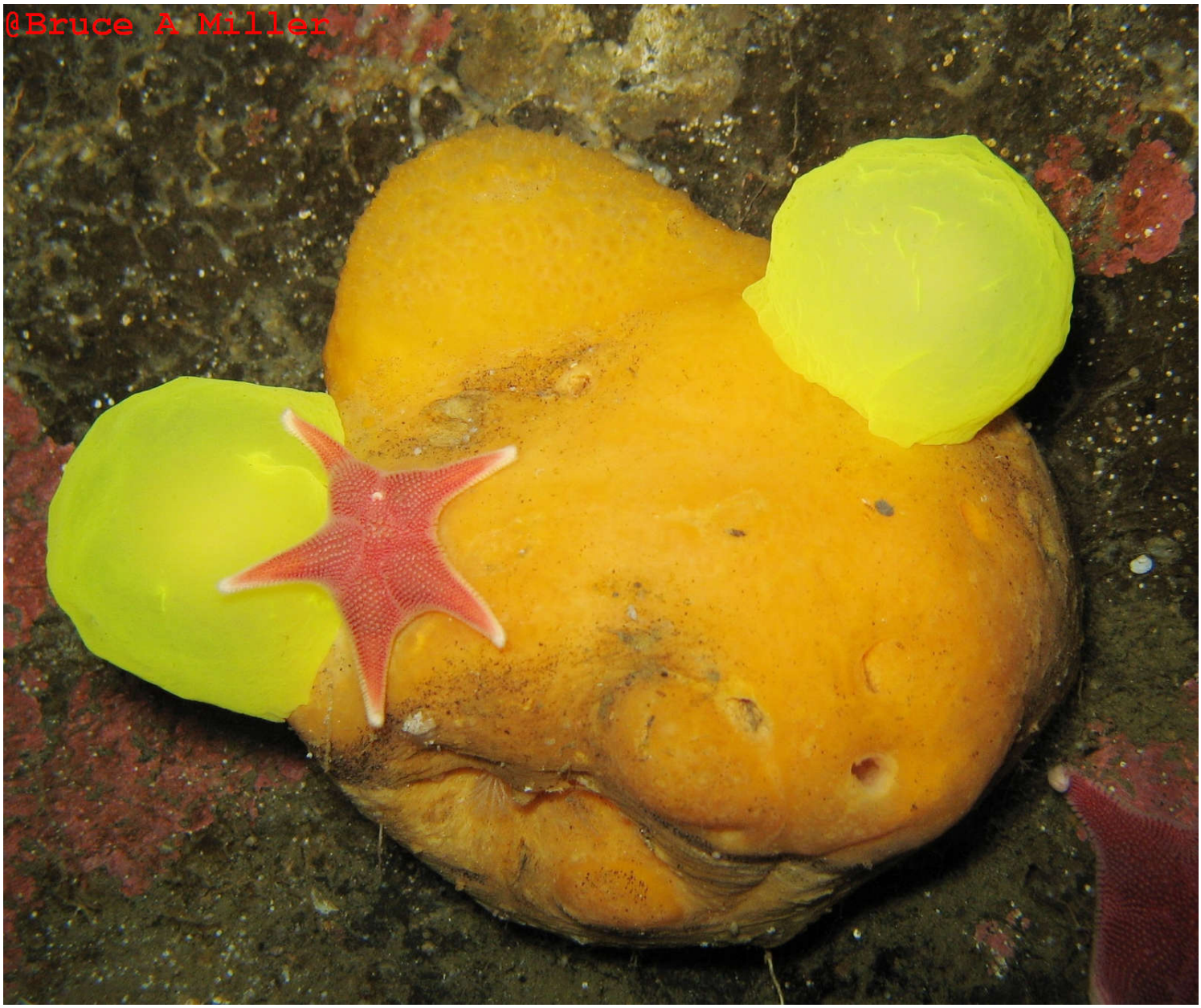
Marseniopsis mollis is the primary predator of the tunicate *Cnemidocarpa verrucosa*, on which it is crawling in this photo [1]. *Marseniopsis mollis* appears to be protected from predation by a chemical, homarine, which deters feeding [1,2].
Marseniopsis mollis appears to obtain its defensive chemical homarine from bryozoans and hydroids growing on the surface of the tunicate *Cnemidocarpa verrucosa* [1,2].

Marseniopsis mollis lays eggs in the tests of *Cnemidocarpa verrucosa* ascidians in the late austral summer and autumn (January to March), which hatch into larvae in the following late winter and early summer (mid-October and mid-December) [13].


@Adam G Marsh



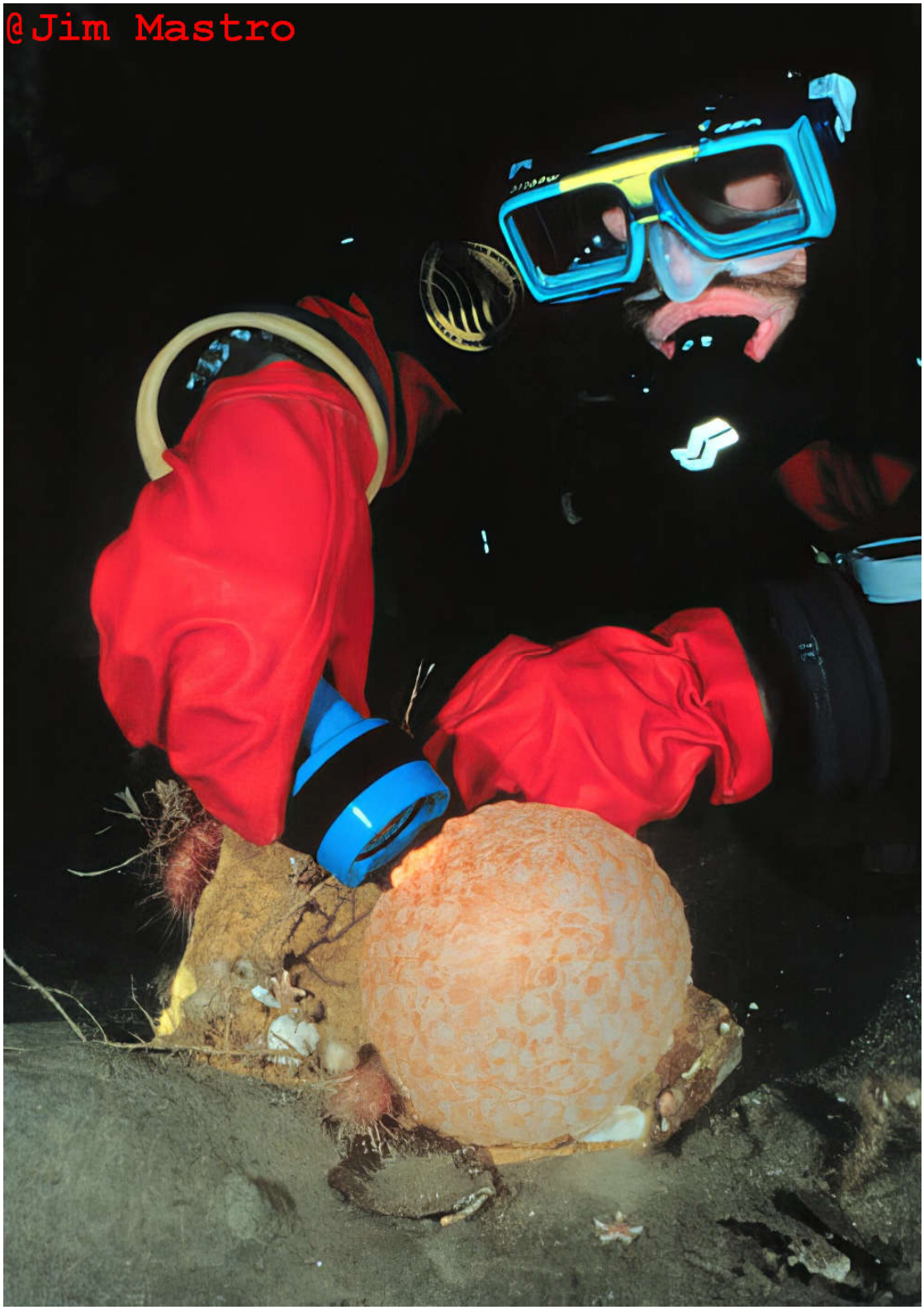
Here's the head of *Marseniopsis mollis* looking at its foot from the underside.



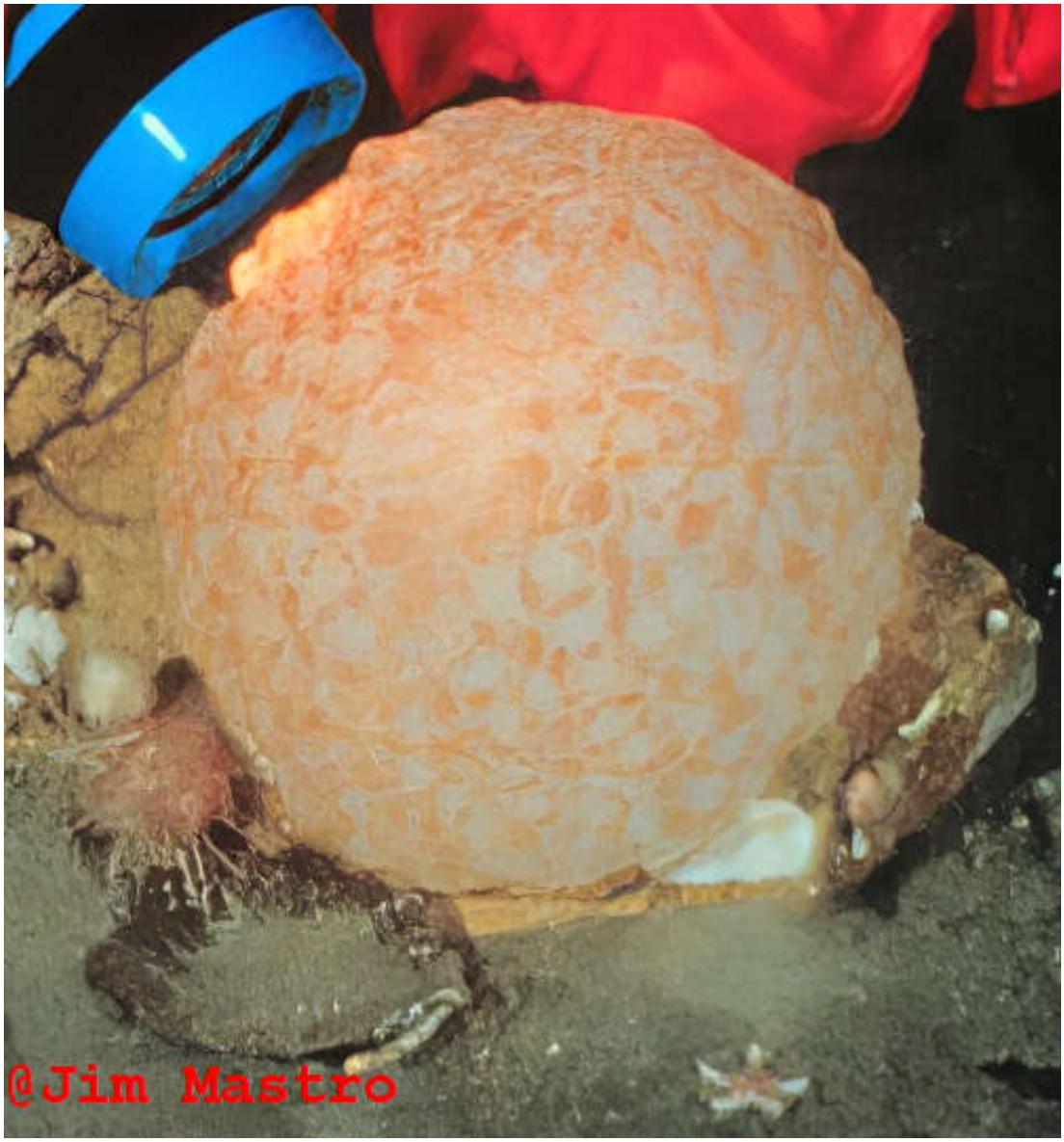
Marseniopsis mollis is probably feeding on this unidentified tunicate.

References: 1: Antarctic Journal of the United States 29(5):151-153, 1994; **2:** Journal of Chemical Ecology 20(10):2539- 2549, 1994; **3:** Proceedings of the NIPR Symposium on Polar Biology 4:50- 68, 1991 (**N**ational **I**nstitute of **P**olar **R**esearch, Tokyo); **4:** Tethys Supplement 4:105-134, 1972; **5:** Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **6:** Records of the Auckland Institute and Museum 5(3,4):117-193, 1960; **7:** British Antarctic "Terra Nova" Expedition, 1910. Natural History Reports: Zoology. Volume 7. Mollusca. Polychaeta. Chaetognatha. London: Trustees of the British Museum, 1923; **8:** Polish Polar Research 7(1-2):25-62, 1986; **9:** Bulletin de l'Institut Oceanographique 66(1368), 1966; **10:** Polar Biology 20(4):229-247, 1998; **11:** Taxonomic Study on Antarctic Gastropods Collected by Japanese Antarctic Research Expeditions. H Numanami. Memoirs of National Institute of Polar Research, Series E (Biology and Medical Science), Number 39. Tokyo: National Institute of Polar Research, 1996; **12:** Nautilus 107(1):1-8, 1993; **13:** Marine Ecology Progress Series 318:213-220, 2006; **14:** Iberus 26(2):43-117, 2008

lamellarian gastropod *Marseniopsis syowaensis*



Marseniopsis syowaensis is found in Antarctica and Peter I Island, from 5 to 126 meters depth [1,2,3,4,5]. *M. syowaensis* is very large compared to other Antarctic lamellariids, up to 11.5 centimeters long [1,3].



This photo of *Marseniopsis syowaensis* was taken at New Harbor at 33 meters depth; it was observed that the mantle surface felt almost smooth but a little bumpy [2].

The mantle of *Marseniopsis syowaensis* can be dome-like in shape, with numerous wrinkles and irregular warts of shrinkage, feeling soft and jelly-like but very thick [1,3,5]. The mantle of *Marseniopsis syowaensis* is colored pale pink with pale brown spots; its ventral underside is only pale pink, and its foot and head tentacles are white [1,3].

Lamellarian species feed on ascidians and sponges [3]. A Weddell seal was observed feeding on *Marseniopsis syowaensis*, and the large size of this mollusc may make it a good food resource for the Weddell seal [3].

The species name *syowaensis* commemorates the Japanese Antarctic Research Expedition's research station *Syowa* [3].

Shown here are egg masses laid by a *Marseniopsis* spp. on a scallop at New Harbor, and a seastar (possibly *Pteraster affinis*) eating them, and probably the scallop too [4].

References: 1: Taxonomic Study on Antarctic Gastropods Collected by Japanese Antarctic Research Expeditions. H Numanami. Memoirs of National Institute of Polar Research, Series E (Biology and Medical Science), Number 39. Tokyo: National Institute of Polar Research, 1996; **2:** Jim Mastro, personal communication, 1999; **3:** Proceedings of the NIPR Symposium on Polar Biology 4: 50-68, 1991; **4:** Paul Dayton, personal communication, 2003 (found one at 160 ft at New Harbor); **5:** Iberus 26(2):43-117, 2008

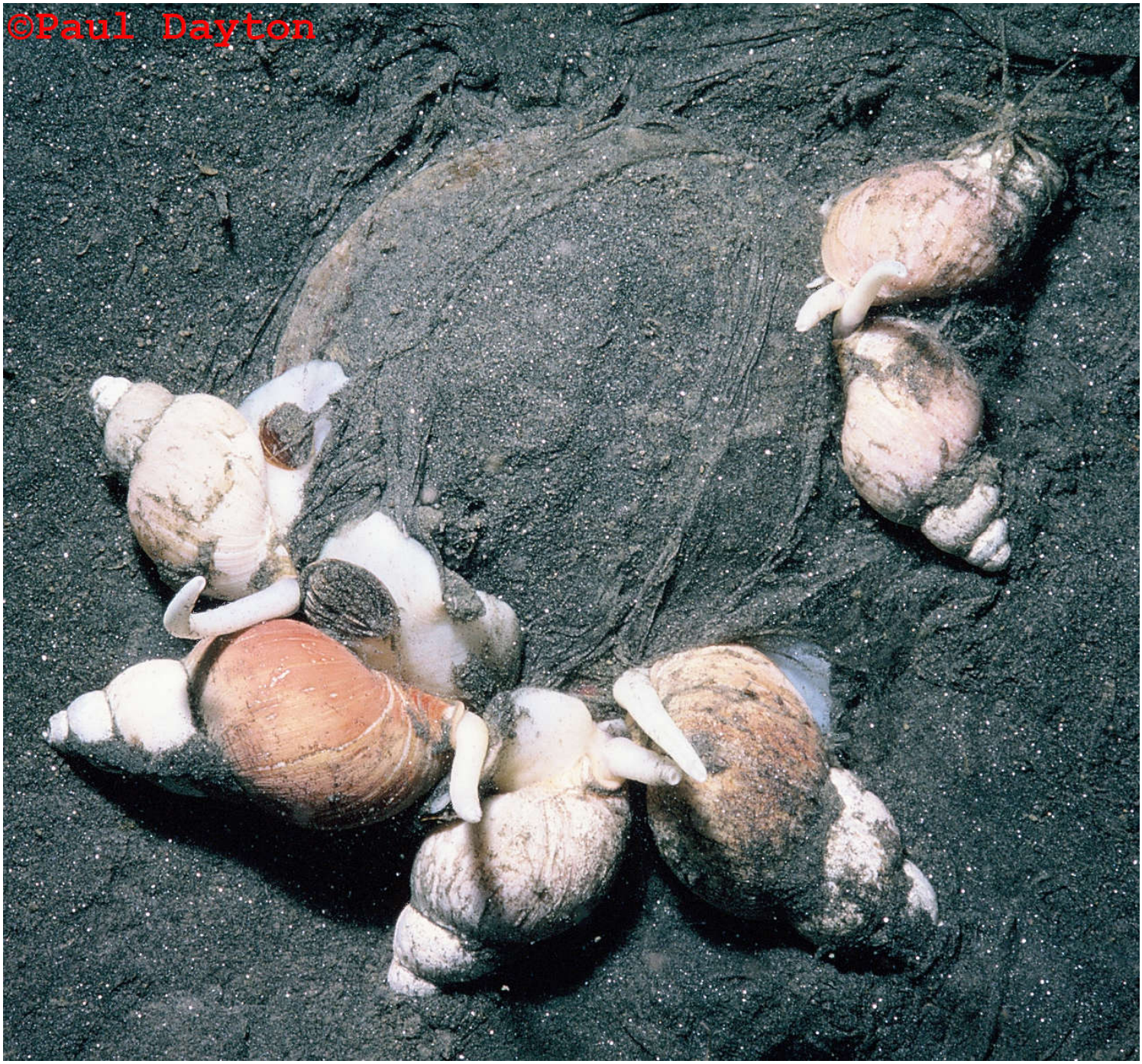
Antarctic whelk *Neobuccinum eatoni*

Neobuccinum eatoni is found throughout Antarctica and the Antarctic Peninsula, Peter I Island, South Shetland Islands, South Orkney Islands, South Sandwich Islands, Kerguelen Island, and Heard Island at depths from 4 to 2,350 meters [2,3,6,8,9,12,13,15,20].

Neobuccinum eatoni is one of the most widely distributed Antarctic molluscs in space and depth [4,5]. Fine wrinkles or growth lines appear on the smooth convex whorls of the shell, with deep sutures between the whorls [5,9,10,12].

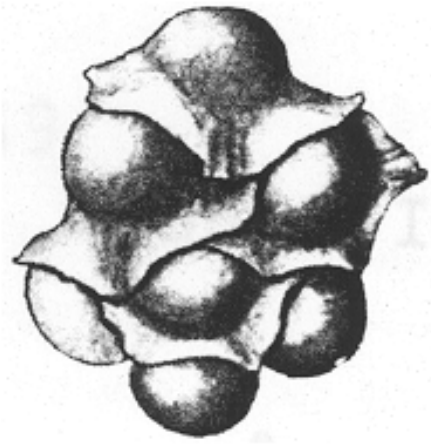
The shell color of *Neobuccinum eatoni* is variable and has been reported as whitish or creamy with a dull brownish yellow or tawny tinge; light bluish-purple; dark purplish-brown; or a dark brown pattern over a gray background [9,10,11,12]. The shell of *N. eatoni* may have a thin straw-colored epidermis when perfect [5]. The spire height of *Neobuccinum eatoni* is variable with deep water specimens usually elongated [4]. Larger shells have been collected at nine centimeters in length [5,13,17]. The operculum is black-brown, chitinous, and semi-ovoid [9].

Boring brown algae of genus *Phaeophyla* can form a complex net of holes and cavities on top of the *Neobuccinum eatoni* shell [19].



Neobuccinum eatoni eats dead animals (necrophagous) and its prey includes the Antarctic scallop *Adamussium colbecki* (above) and damaged *Laternula elliptica* bivalves that become unburied by iceberg scouring [1,15,16]. *Neobuccinum eatoni* has been kept in captivity for over a year on a meat diet of shrimp, bivalve, and fish [7].

Neobuccinum eatoni has been collected from sand with pebble, rock with pebble, sandy mud, and mud [8]. *N. eatoni* has been found in the stomach contents of the fish *Trematomus hansoni* [14].



Neobuccinum eatoni ova (eggs) have been described as occurring singly or massed together, with each capsule a hemispherical orange shape about eight millimeters in diameter, surrounded by a marginal membrane [18].

References: 1: Polar Biology 6(3):139-143, 1986; **2:** Records of the Auckland Institute and Museum 5(3,4):117-193, 1960; **3:** British, Australian, and New Zealand Antarctic Research Expedition Reports. Series B (Zoology and Botany) Volume 6, Part 9, 1957; **4:** British, Australian, and New Zealand Antarctic Research Expedition Reports. Series B (Zoology and Botany) Volume 6, Part 7, 1957. p.132; **5:** Australasian Antarctic Expedition 1911-1914. Scientific Reports. Series C, Zoology and Botany. Volume 4, Part 1. Mollusca. Sydney: David Harold Paisley, 1916; **6:** Archiv fuer Naturgeschichte 45(1-2):129, 1879; **7:** Memoirs of National Institute of Polar Research. Special Issue 32:103-104, 1984; **8:** Memoirs of National Institute of Polar Research. Special Issue 32:105-111, 1984; **9:** Korean Journal of Polar Research 5(2):15-28, 1994; **10:** Annals and Magazine of Natural History: Zoology, Botany, and Geology (Series 4) 16:67-73, 1875; **11:** EA Smith, Report on the Collections of Mollusca Made in Antarctica during the voyage of the "Southern Cross." IN: Report on the Collections of Natural History Made in the Antarctic Regions During the Voyage of the "Southern Cross" Part 7, London: Printed by Order of the Trustees, 1902. page 202; **12:** FAO Species Identification Sheets for Fishery Purposes: Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area) / W Fischer & JC Hureau, eds. Rome: Food and Agriculture Organization of the United Nations, 1985; **13:** Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **14:** Bulletin de l'Institut Oceanographique 66(1368), 1966; **15:** Tethys Supplement 4:105- 134, 1972; **16:** Antarctic Science 10(4):369-375, 1998; **17:** Ross Sea Ecology: Italiantartide Expeditions (1987-1995). FM Faranda, L Guglielmo, A. Ianora, eds. Berlin: Springer, 2000. pp. 503-514; **18:** Reports on the Scientific Investigations: Biology. British Antarctic Expedition (1907-1909). London: W. Heinemann, 1910-1911. Volume II, Part I. Mollusca. Charles Hedley; **19:** Polar Biology 24(10):790-792, 2001; **20:** Iberus 26(2):43-117, 2008

Eggs of buccinoid gastropod *Antarctodomus thielei*

These are the eggs of *Antarctodomus thielei* [1]. *Antarctodomus thielei* is found in Antarctica and the Antarctic Peninsula, Peter I Island, and the South Shetland Islands, from 100 to 695 meters depth [2].

References: 1: Journal of Molluscan Studies 00:1–8, 2019 doi:10.1093/mollus/eyz015; **2:** Iberus 26(2):43-117, 2008

muricid gastropod *Trophonella longstaffi*

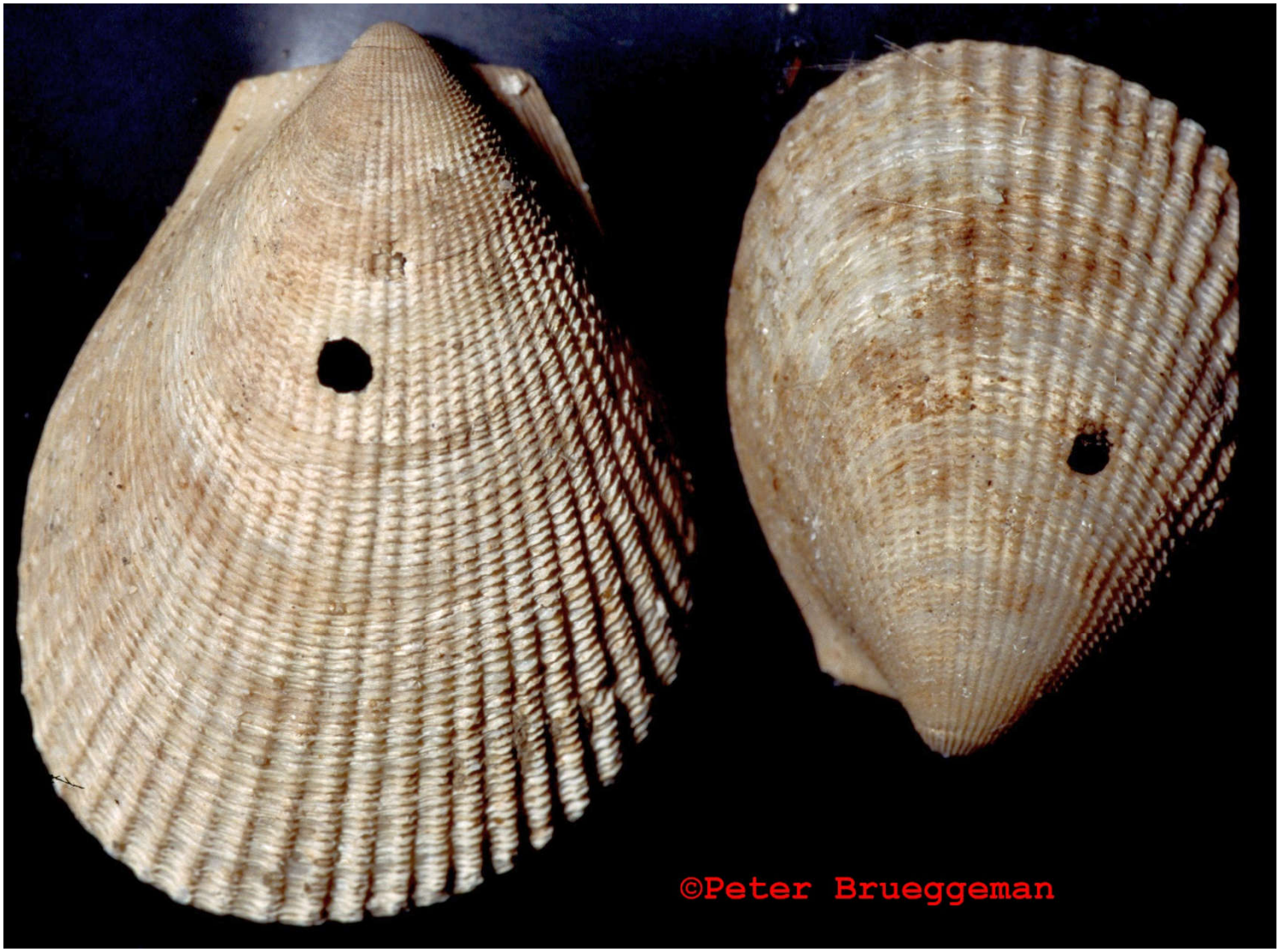
Trophonella longstaffi has been found in Antarctica and the Antarctic Peninsula and Peter I Island, in depths from 5 to 1,080 meters [3,4,5,6,7,8,11]. *T. longstaffi* has been collected up to five centimeters in length with greatest diameter of 2.5 centimeters [2,3,5,8].

The thin, white shell of *Trophonella longstaffi* has six or seven whorls, tapers toward each end, is ovoid with a broader basal end, and has its surface marked with delicate parallel ridges [2].

Here *Trophonella longstaffi* is just behind a juvenile giant Antarctic isopod *Glyptonotus antarcticus*. The last whorl of the shell of *T. longstaffi* produces a short snout [2].

The convex whorls of the shell of *Trophonella longstaffi* are shouldered and separated by a deep suture [2].

Here's the aperture of a *Trophonella longstaffi* shell with the shielding operculum.



Trophonella longstaffi is a predator of the bivalves *Laternula elliptica*, *Limatula hodgsoni* (shown here), and *Aequiyoldia eightsii* and the brachiopod *Liothyrella uva* [1,8]. In attacking prey, *T. longstaffi* drills through the prey shells using secreted chemicals and then uses its radula to eat the prey; *T. longstaffi* also may attack by wedging open a bivalve shell [8]. A drilling attack by *T. longstaffi* has a mean duration of 20-29 days until completion, depending on the prey species [8]. *Trophonella longstaffi* attacks and eats infrequently; in an aquarium study, the mean time between feeding was nine months, with some individuals not feeding for thirty months [8].

The seastar *Diplasterias brucei* is one of the predators of *Trophonella longstaffi* [1].

Taxonomic Note: New genus, with species reassigned to *Trophonella*; genus was formerly *Trophon* [9,10].

References: 1: Antarctic Ecology, Volume 1. MW Holdgate, ed. NY: Academic Press, 1970. pp.244-258; **2:** Mollusca. II. Gastropoda. EA Smith IN: Natural History: Volume II. Zoology (Vertebrata: Mollusca: Crustacea). British National Antarctic Expedition 1901-1904. J Bell, ed. London: British Museum, 1907. p.3; **3:** Tethys Supplement 4:105-134, 1972; **4:** Advances in Marine Biology 10:1-216, 1972; **5:** Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **6:** A Survey of the Marine Fauna in Shallow Coastal Waters of the Vestfold Hills and Rauer Islands, Antarctica. MJ Tucker & HR Burton. ANARE Research Notes 55, 1987; **7:** Taxonomic Study on Antarctic Gastropods Collected by Japanese Antarctic Research Expeditions. H Numanami. Memoirs of National Institute of Polar Research, Series E (Biology and Medical Science), Number 39. Tokyo: National Institute of Polar Research, 1996; **8:** Polar Biology 26(3):208-217, 2003; **9:** Zoologica Scripta 41(6): 596-616, 2012; **10:** Veliger 51(1):85-103, 2008; **11:** Iberus 26(2):43-117, 2008

naticid gastropod *Amauropsis rossiana*

Amauropsis rossiana is found throughout Antarctica and the Antarctic Peninsula and the South Shetland Islands from 9 to 1,335 meters depth [1,4].

Amauropsis rossiana has a globose brownish-olive shell about three centimeters in size, with convex whorls, deep sutures, fine growth lines, and a raised, eroded spire [3].

Here's the aperture of the shell of *Amauropsis rossiana* with its shielding operculum pulled in.

Amauropsis rossiana is common at Cape Armitage in the second benthic zone between 15 - 33 meters depth [2].

Possibly an egg case of *Amauropsis rossiana*

Taxonomic Note: The Antarctic and sub-Antarctic species of *Amauropsis* may be in a new genus *Pseudamauropsis* [5].

References: 1: Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **2:** Peter Brueggeman, personal communication, 1999; **3:** Mollusca. II. Gastropoda. EA Smith IN: Natural History: Volume II. Zoology (Vertebrata: Mollusca: Crustacea). British National Antarctic Expedition 1901-1904. J Bell, ed. London: British Museum, 1907. p.5; **4:** Polar Biology 24(2):105-112, 2001; **5:** Zoologicheskii Zhurnal 86(1):16-29, 2007

capulid gastropod *Cryocapulus subcompressus*

Cryocapulus subcompressus is found in Antarctica and the Antarctic Peninsula, and southern South America, from 33 to 640 meters depth [2,3,4,6]. *Cryocapulus subcompressus* lives on the calcareous tube of the serpulid polychaete worm *Serpula narconensis*, close to the opening of its tube [1].

Cryocapulus subcompressus has a dirty white cap-like smooth shell with an oval opening [1]. Capulids use their gills to entrap food, then passing it to the mouth [4]. *Cryocapulus subcompressus* is also a kleptoparasite, stealing mucous food particles collected by the worm, by extending its pseudoproboscis, which can be seen here sticking out under its shell [1,4].

Juveniles or protoconchs of *Cryocapulus subcompressus* have a Phyrigian cap morphology showing gastropod coiling, which is lost as adults [1].

Taxonomic Note: Genetic analysis showed *Capulus subcompressus* does not belong in the *Capulus* genus [4]. Genus changed to *Cryocapulus* in 2021 [5].

References: 1: Polar Biology 23:11-16, 2000; **2:** Antarctic Invertebrates, Smithsonian Institution of Natural History invertebrates.si.edu/antiz; **3:** Antarctic Science 18(4):615–631, 2006; **4:** Hydrobiologia 761:121-141, 2015; **5:** Molecular Phylogenetics and Evolution 155:1-10, 2021 doi.org/10.1016/j.ympev.2020.107014; **6:** Gayana 72(2):202-240, 2008

rissoid gastropod *Onoba (Onoba) turqueti*

Onoba (Onoba) turqueti is found throughout Antarctica and the Antarctic Peninsula, Peter I Island, South Shetland Islands, South Orkney Islands, Burdwood Bank, South Georgia Island, and Macquarie Island, from 2 to 385 meters depth [1,3,4,6].

The shell of *Onoba (Onoba) turqueti* is elongated, up to 3.1 millimeters long, with about 4 1/2 whorls, with about ten weak flat-topped spiral cords separated by narrow shallow grooves, and colored white to pale yellowish- white [3,6].

Onoba (Onoba) turqueti has been found in the stomach of fish of the genus *Notothenia* [3].

The weak flat-topped spiral cords separated by narrow shallow grooves can be better seen in the photo at left.

Rissoids are small epifaunal gastropods abundant worldwide, feeding on diatoms, microalgae, foraminifers, or deposit feeders [2].

Taxonomic Note: Placed in the *Onoba* genus by Ponder in 1983, previously having been in *Subonoba* and *Rissoia* genera [3]. In 1984, Ponder placed it in a subgenus *Onoba* of the genus *Onoba* [2]. Shells of Antarctica (2012) has it as O*noba turqueti* [7].

Onoba turqueti is synonymized into the genus *Subonoba* in both Molluscabase and World Register of Marine Species, without reference to a publication for that synonymy, nor can it be found published, so this appears to be an invalid change in genus re: the International Code of Zoological Nomenclature [5].

References: 1: Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **2:** A Review of the Genera of the Rissoidae (Mollusca: Mesogastropoda: Rissoacea). WF Ponder. Records of the Australian Museum, Supplement 4, 1985; **3:** Rissoaform Gastropods from the Antarctic and Sub-Antarctic. WF Ponder. British Antarctic Survey Scientific Reports No. 108. Cambridge: British Antarctic Survey, 1983; **4:** Ross Sea Ecology: Italiantartide Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin: Springer, 2000. pp. 530-538; **5:** MolluscaBase eds. (2023). MolluscaBase. *Subonoba turqueti* (E. Lamy, 1906). Accessed through: World Register of Marine Species at: www.marinespecies.org/aphia.php?p=taxdetails&id=876360 on 2024-09-29; **6:** Iberus 26(2):43-117, 2008; **7:** Shells of Antarctica. Winfried Engl. Hackenheim, Germany: ConchBooks, 2012

calliostomatid gastropod *Falsimargarita gemma*

Falsimargarita gemma has been found in Antarctica and the South Shetland Islands [4,5].

Falsimargarita species in the Ross Sea include *gemma* and *thielei* [1]. *Falsimargarita gemma* has an iridescent shell whereas *F. thielei* is less so, and *F. thielei* is more strongly striated on its whorls than *F. gemma* [2,3].

The original description of *Falsimargarita gemma* describes it as “shell turbinate, moderately umbilicated, thin, greenish-iridescent, finely spirally lirate throughout, the threads upon the base below the periphery finer than those above, sculptured also with fine arenate lines of growth, which are coarser towards the suture, giving a somewhat cancellated appearance to the shell at this part; they cross the four or five spirals below the narrowly channeled suture, producing minute sharp points or nodules upon them; whorls 5 ½, the nucleus globose, white smooth, porcellanous; the next whorl with four spirals; the third with seven, not all equal in thickness; the penultimate with eleven; and the last having about fourteen above the periphery and about twenty-five below; the umbilical area is smooth, dirty white; peristome thin, subcircular, interrupted on its junction with the whorl, the columellar margin slightly thickened, expanded upon the whorl and very narrowly reflexed; aperture iridescent and finely sulcate, the grooves corresponding to the external lirae.” [5].

References: 1: Antarctic Invertebrates, Smithsonian Institution of Natural History invertebrates.si.edu/antiz/ ; **2:** Critter of the week: Falsimargarita gemma - the iridescent Antarctic snail. NIWA, New Zealand www.niwa.co.nz/blogs/critteroftheweek/175 ; **3:** Gastropods.com: *F. gemma* www.gastropods.com/1/Shell_9731.shtml *F. thielei* www.gastropods.com/2/Shell_9732.shtml ; **4:** Antarctic and Subantarctic Mollusca: Pelecypoda and Gastropoda. AWB Powell. Discovery Reports 26. Cambridge University Press, 1954. pp. 49-198. *Falsimargarita gemma* on page 93; **5:** Smith, E. A. 1915. Mollusca. Part I. Gastropoda Prosobranchia, Scaphopoda, and Pelecypoda. pp. 61-112, pls. 1-2. IN: British Antarctic ("Terra Nova") Expedition (1910). Natural History Reports. Zoology Volume 2. Collecting Stations, Mollusca, Brachiopoda, and Worms. British Museum (Natural History): London

chiton *Nuttallochiton mirandus*

Nuttallochiton mirandus is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Sandwich Islands, Bouvet Island, Falkland Islands, and Burdwood Bank from depths of 67 to 761+ meters [1,2,4,8,10,11,12].

On its upper surface, *Nuttallochiton mirandus* has eight overlapping valves (plates) surrounded by a tough brownish-tinted girdle; the valves are colored creamy white, with reddish brown flecks [10,11,12]. Some of the valves of *N. mirandus* may be colored red or reddish-brown [1,3,5,11,12].

The length of *N. mirandus* specimens range up to twelve centimeters [2,5].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Chitons use their large foot for movement and clinging; there is a groove containing gills on either side of the foot. Chitons have a file-like radula mouthpart used in feeding; the radula of *Nuttallochiton mirandus* is hard and hooked for destroying bryozoan colonies [7].

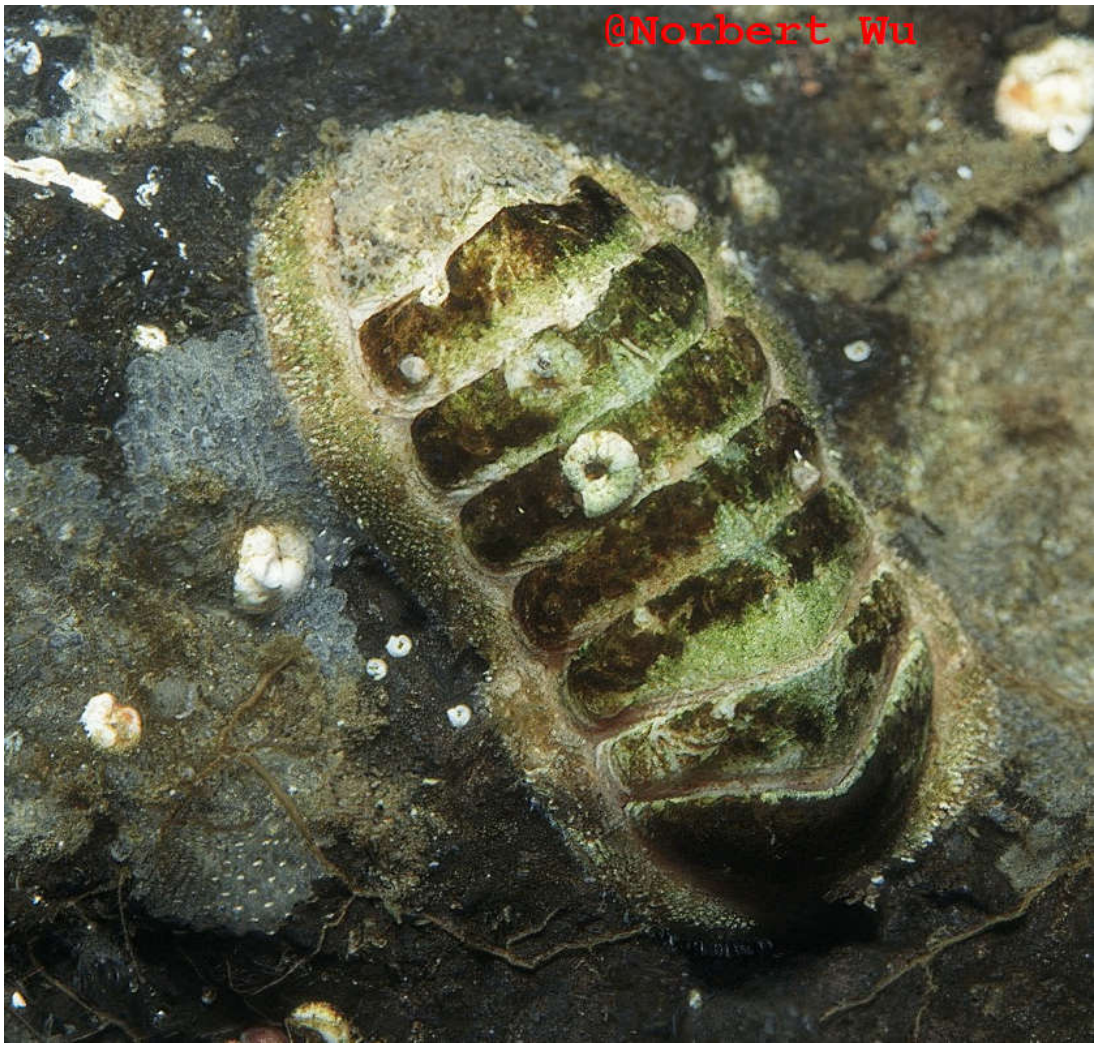
Nuttallochiton mirandus swallows big bryozoan pieces up to 6 - 7 millimeters long [7]. One study found *N. mirandus* with its gut content almost entirely bryozoans; foraminiferans were also ingested while grazing on other food items [6]. Another study found *N. mirandus* with its gut content 70-100% bryozoans, 20-25% greenish mass, and 5% sand and foraminiferans [7].

Males and females of *Nuttallochiton mirandus* spawn synchronously, with the posterior of their bodies bent upward into the water column, releasing sperm and eggs [9].

Taxonomic Note: Genus *Nuttallochiton* is spelled with two L's, though it may appear with one L in various publications [1].

References: 1: Monograph of Living Chitons. Volume 3. P Kaas & RA Van Belle. Leiden: EJ Brill, 1985; **2:** Archiv fur Molluskenkunde 122:171-187, 1993; **3:** Discovery Reports. Volume 33. Issued by the National Institute of Oceanography. Cambridge: University Press, 1966. pp. 95-250; **4:** Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **5:** Australasian Antarctic Expedition 1911-1914. Scientific Reports. Series C, Zoology and Botany. Volume 4, Part 1. Mollusca. Sydney: David Harold Paisley, 1916; **6:** Antarctic Journal of the United States 11(1):24-26, 1976; **7:** Berichte zur Polarforschung, Reports on Polar Research 249:62-65, 1997; **8:** Polar Biology 20(4):229-247, 1998; **9:** Weddell Sea Ecology: Results of EPOS, European "Polarstern" Study. G Hempel, ed. New York: Springer Verlag, 1993. pp. 303-311; **10:** Chitons of the World: an Illustrated Synopsis of Recent Polyplacophora. FJA Slieker. Cupra Marittima, Italy: Mostra Mondiale Malacologia ; Ancona, Italy : L'informatore Piceno, 2000. pp. 44-45; **11:** Moluscos Magallanicos : Guia de los Moluscos de la Patagonia y del Sur de Chile. DO Forcelli. Buenos Aires, Argentina: Vazquez Mazzini, 2000; **12:** Mollusques Amphineures et Gasteropodes. A Vayssiere. Deuxieme Expedition Antarctique Francaise (1908-1910) Commandee par le Dr Jean Charcot. Paris: Masson et Cie, 1917

chiton *Callochiton steinenii*



Callochiton steinenii has been collected in Antarctica and on South Georgia Island from 24 to 1,012 meters depth [1,2,3]. Specimens of *C. steinenii* range in length up to 26 millimeters [1,2].

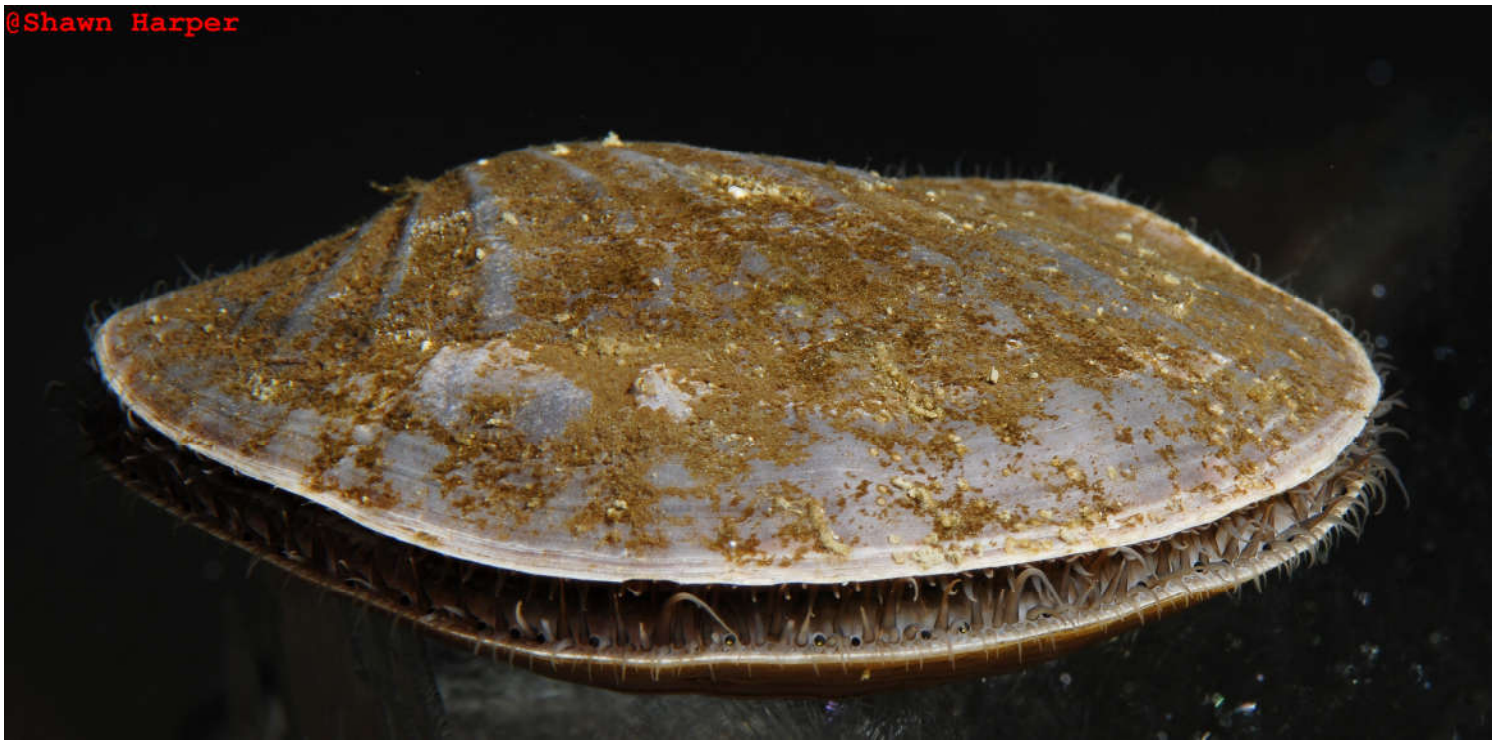
On their upper surface, chitons have eight overlapping plates surrounded by a tough girdle. Chitons use their large foot for movement and clinging; there is a groove containing gills on either side of the foot. Chitons have a file-like radula mouthpart which is used to scrape algae and other food from surfaces.

References: 1: Monograph of Living Chitons. Volume 2. P Kaas & RA Van Belle. Leiden: EJ Brill, 1985+; **2:** Archiv fur Molluskenkunde 122:171-187, 1993; **3:** Discovery Reports. Volume 33. Issued by the National Institute of Oceanography. Cambridge: University Press, 1966. pp.95-250 (also see *C. gaussi* description)

Antarctic scallop *Adamussium colbecki*

Adamussium colbecki is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, and South Sandwich Islands at depths from 0 to 1,500 meters [3,7,8,22].

Adamussium colbecki is a free-living scallop or attached by byssum in nearshore rocky substrate [4,8,22]. *A. colbecki* has a thin, fragile, sometimes flexible shell with 15 to 22 radial ribs, fine concentric striations, and small ears [4,8]. A thin shell like that of *A. colbecki* is found globally in pectinids living in deep waters off continental shelves, which are not subject to wave action [22].



Adamussium colbecki has a maximum recorded length of twelve centimeters [3]. The shell of *Adamussium colbecki* is plum to reddish-purple to brown [8,9].

Adamussium colbecki are ice-free in shallow waters (less than 20 meters depth) where anchor ice is prevalent [27]. The scallop's shell has a microscopic ridge structure which reduces adhesion of ice to the shell [27]. Scallops colonized by the bush sponge *Homaxinella balfourensis* in the same shallow waters can have anchor ice growing on the sponge; with further ice growth, the scallops will float up to the underside of the sea ice where they freeze in and die [27].

The whitish calcareous foraminiferan *Cibicides refulgens* is often found living on the shell of *Adamussium colbecki* and looks like white nodules on the shell [2]. *Cibicides refulgens* has three feeding modes useful for survival in a food-scarce (oligotrophic) and seasonal environment: (1) grazing algae and bacteria living on the surface of the scallop shell; (2) suspension feeding through a pseudopodial net deployed from a superstructure of agglutinated tubes extending from the foram's calcareous test; and, (3) parasitism by eroding through the scallop shell, and using free amino acids from the scallop's extrapallial cavity [2].

Adamussium colbecki is under attack by the seastar *Notasterias armata*.

Adamussium colbecki predators include the seastars *Notasterias armata*, *Lophaster gaini*, and *Odontaster validus*, the brittle star *Ophiosparte gigas* [above], the proboscis worm *Parborlasia corrugatus*, the Antarctic whelk *Neobuccinum eatoni*, and the fish *Trematomus bernacchii* (*T. bernacchii* preys on the scallop size range 25-64 millimeters) [1,6,10,13,14].

Adamussium colbecki has a swimming escape response to predators and disturbances and has been observed swimming twenty meters above the bottom [2,5,14]. Swimming duration time can be over ten seconds long, covering up to 45 centimeters, with level swimming speeds between 12 and 23.5 centimeters per second [14].

Adamussium colbecki is a filter-feeder eating benthic diatoms, foraminifera, algae, and organic matter in the sediment [6,26].

Adamussium colbecki makes shallow depressions in the seafloor; this digging re-suspends limited bottom detritus in the quiet sub-ice conditions for filter feeding, whereas other scallops clap to avoid predators [4,6,23].

Adamussium colbecki of all sizes may attach with byssal threads to hard rocky substrates [4,6,14,22]. Though *A. colbecki* can be seen in abundance in some locations (60-80 per square meter in Terra Nova Bay), it grows much more slowly than scallops in temperate water (an order of magnitude more slowly) [3,4,17].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Small *Adamussium colbecki* specimens (less than fifty millimeters in shell length) grow at a rate of ten millimeters per year, while larger specimens grow at a rate of 0.8 millimeters per year [19].

Based on growth curves, *Adamussium colbecki* that are 8 centimeters in shell length are estimated to be 14-18 years old, so *A. colbecki* is long lived [19]. Other studies estimate that *A. colbecki* that are eight centimeters in shell length are about 12 years old and that it may live up to 20 years of age [3,4]. Relatively low-level fishing could cause the collapse of *A. colbecki* populations [3].

In scallops over five centimeters in size, boring brown algae of genus *Phaeophyla* form horizontally spreading perforations and a dense mat beneath the scallop's periostracum, giving a greenish-brown color to the shells [25].

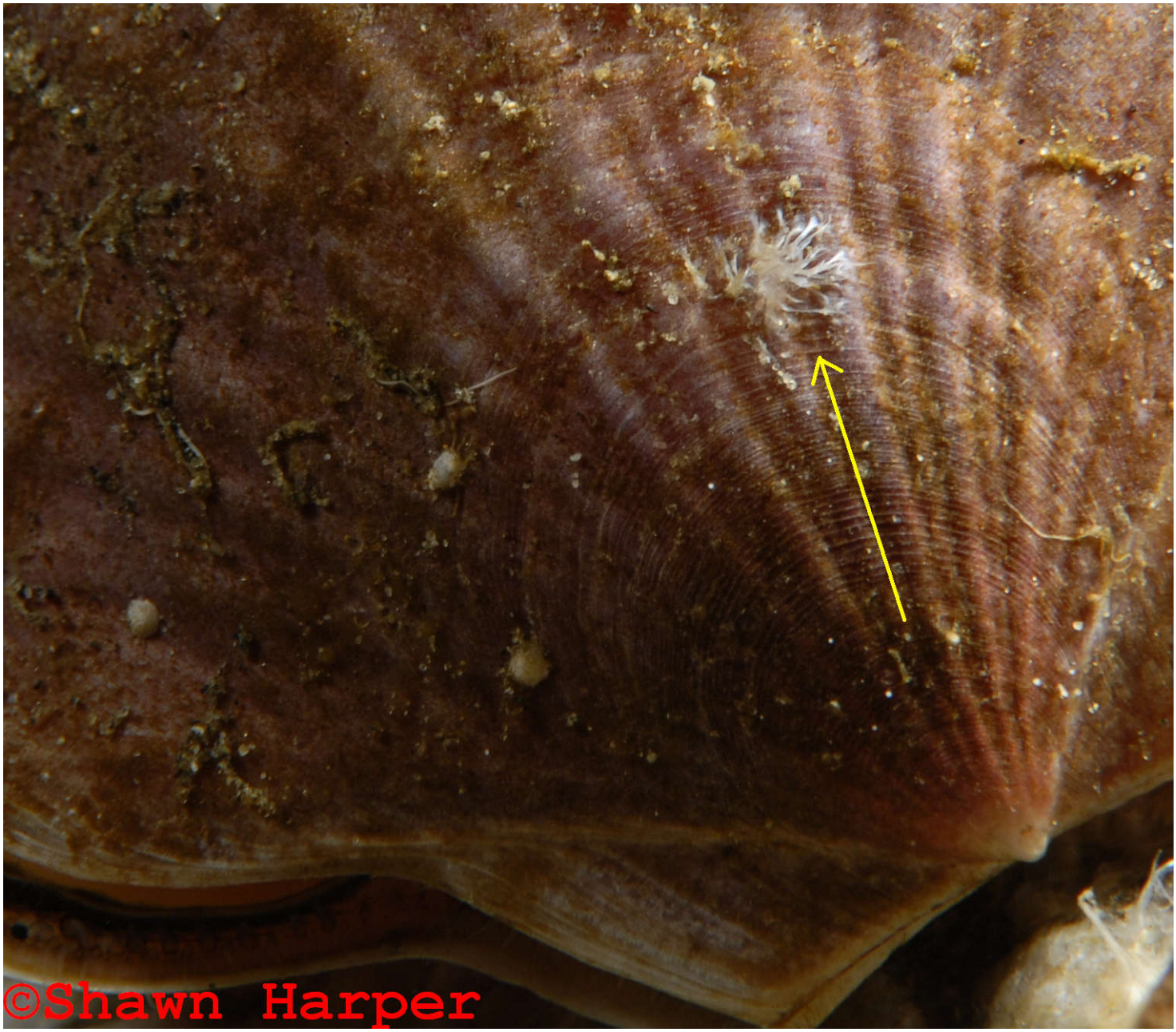
Adamussium colbecki spawns and fertilizes in September, producing unprotected larvae in the water where they feed on plankton, living as larvae possibly for more than 100 days [2,20]. Juvenile *A. colbecki*, up to 5 cm in size, are oftentimes attached by byssus threads to the upper shell of larger scallops [14,15]. This survival enhancement for juvenile *A. colbecki* gives them a better position for filter feeding in the water column where they can take advantage of water flow generated by adults as well as near-bottom currents [6]. Attachment of juvenile *A. colbecki* scallops to adults helps juveniles escape predation, both by avoiding predators that target only small prey and by taking advantage of much faster and stronger swimming escape response of the adults [13]. The most vulnerable life stage may be after the growing juvenile detaches from an adult [13,14,15].

Adamussium colbecki may have the bush sponge *Homaxinella balfourensis* attached [6,11].

Homaxinella balfourensis is found on scallops larger than seven centimeters, with the sponge up to fourteen centimeters in height [6].

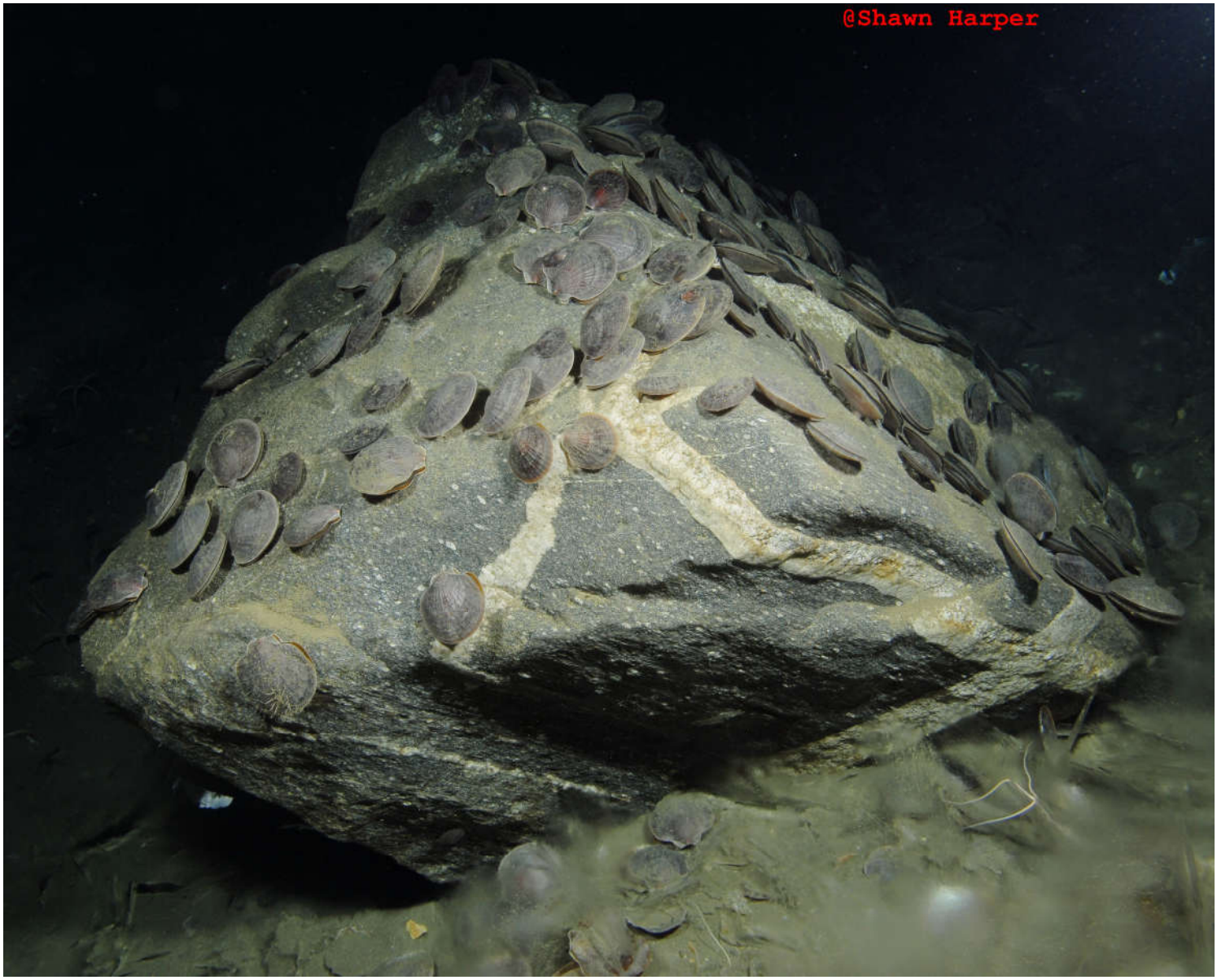
The usual position of *Homaxinella balfourensis* on the scallops is near the shell's peripheral margin, suggesting that the sponge is seeking the water flow over the scallop shell to facilitate its own filter feeding [6].

Twenty-eight sponge species were found on scallops with the most common being *Homaxinella balfourensis, Myxilla (Myxilla) asigmata, Lissodendoryx (Ectyodoryx) nobilis, Iophon unicorne, Iophon radiatum*, and *Haliclona* sp.; the scallops increase the dispersal of the sponges by being "islands" of suitable habitat [24].



Adamussium colbecki may be colonized on either shell by small hydroids *Hydractinia angusta* [16,21]. *H. angusta* hydroids eat tube feet and pedicellariae of sea urchins including *Sterechinus neumayeri*, which grazes on the algal film growing on the surface of the scallop's shell but is not a predator of the scallop [16]. *A. colbecki* shells are very thin and such urchin grazing may damage the shell; thus, the hydroids act in defense of the scallop [16].

Hydractinia angusta hydroids eat the film (includes agglutinated diatoms) it can remove with its tentacles from the scallop shell, as well as bottom sediment exposed to it due to clapping activity of the scallop [16]. *H. angusta* hydroids also reduce the settling of young *Adamussium colbecki* scallop larvae onto the shells of adult scallops, competing successfully for shell space with the young scallops [18].



References: 1: Antarctic Science 6(1):61-65, 1994; **2:** Antarctic Science 3(2):151-157, 1991; **3:** Antarctic Ecosystems: Ecological Change and Conservation. KR Kerry & G Hempel, eds. Berlin: Springer- Verlag, 1990. pp. 281-288; **4:** Marine Biology 78(2):171-178, 1984; **5:** Marine Biology 94:479-487, 1987; **6:** Ecology of the Circumpolar Antarctic Scallop, Adamussium colbecki (Smith, 1902). Paul Arthur Berkman. Ph. D. Dissertation, University of Rhode Island, 1988; **7:** Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **8:** FAO Species Identification Sheets for Fishery Purposes: Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area). W Fischer & JC Hureau, eds. Rome: Food and Agriculture Organization of the United Nations, 1985; **9:** EA Smith, Report on the Collections of Mollusca Made in Antarctica during the Voyage of the "Southern Cross." IN: Report on the Collections of Natural History Made in the Antarctic Regions During the Voyage of the "Southern Cross" Part 7, London: Printed by Order of the Trustees, 1902. page 212; **10:** Polar Biology 16(5):309-320, 1996; **11:** Tethys Supplement 4:9-24, 1972; **12:** Biological Bulletin 173(1), 136-159, 1987; **13:** Antarctic Science 12(1):64-68, 2000; **14:** Antarctic Science 10(4):369-375, 1998; **15:** Scientia Marina 61 (Supplement 2):15-24, 1997; **16:** Polar Biology 23(7):488-494, 2000; **17:** Scientia Marina 63(Supplement 1):113- 121, 1999; **18:** Polar Biology 24(8):577-581, 2001; **19:** Polar Biology 26(6):416-419, 2003; **20:** Polar Biology 26(11):727-733, 2003; **21:** Zootaxa 3321:1-21, 2012; **22:** Deep Sea Research Part II 53:912-920, 2006; **23:** Palaios 31(6):280-290, 2016; **24:** Polar Biology 32(7):1067-1076, 2009; **25:** Polar Biology 24(10):790-792, 2001; **26:** Nature Scientific Reports 14:12333, 2024 doi.org/10.1038/s41598-024-62644-5; **27:** Nature Communications Biology 5, 83, 2022. doi.org/10.1038/s42003-022-03023-6

Antarctic soft-shelled clam *Laternula elliptica*

Laternula elliptica is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Sandwich Islands, South Georgia Island, Kerguelen Island, Marion and Prince Edward Islands at depths from 0 to 458+ meters [3,5,10,11,12,14,15,19].

The shell of *Laternula elliptica* can be up to twelve centimeters in length and grows to nine centimeters in 12 - 13 years [1,17]. The shell color of *Laternula elliptica* is white with a pinkish or greenish shell covering (periostracum) when alive [12].

The shell of *Laternula elliptica* is elongated with coarse growth lines and a brownish edge along the margin [11].

The primary predator of unburied *Laternula elliptica* is the seastar *Odontaster validus*; 12% of its diet can be *L. elliptica* [2,9].

Predators of damaged *Laternula elliptica* that have been unburied by iceberg scouring include the seastar *Cryptasterias turqueti*, the nemertean *Parborlasia corrugatus*, the Antarctic whelk *Neobuccinum eatoni*, and amphipods [9]. Other predators include the fish *Trematomus bernacchii* and the muricid gastropod *Trophonella longstaffi* [16,18].

Laternula elliptica bury themselves in the seafloor so that only their sparkling greenish siphon pairs show above the bottom.

Laternula elliptica lives buried in gravelly or soft mud (infaunal) with a large siphon that cannot be fully retracted into its shell; there is a large gape where the two valves do not close. *L. elliptica* filter feeds through these siphons and its food includes benthic diatoms [13]. Its fecal material creates a sediment of organic and terrigenous mineral particles which enriches the benthic environment [6]. *L. elliptica* can burrow into the sediment over fifty centimeters [9].

Laternula elliptica siphons have sensory tentacles at their tips, some of which have eyes [20].

Laternula elliptica has a protected mode of development where its embryo develops through larval stages within a protective capsule which facilitates dispersal in the environment [8].

Laternula elliptica is considered to have been a member of an earlier Antarctic fauna when the climate was more genial; it is a common fossil found in beach formations in Antarctica [3,5].

L. elliptica is found in greatest density in water shallower than thirty meters [5,10]. Population density ranges up to 140 individuals per square meter [4,5,12]. In shallower depths where its food is more plentiful, the deep burrowing of *L. elliptica* keeps it safe from seafloor scouring by pack ice and icebergs and, secondarily, from predation [5,13]. *L. elliptica* can re-burrow itself when exposed and is unusual among burrowing bivalves because it is capable of surface movement powered by its siphon muscles and by siphon water jetting [7]. Surface mobility combined with the ability to re-burrow are adaptations by this deep burrowing bivalve to periodic natural environmental disturbances like ice scouring [7].

The *Laternula* genus is widely distributed in the subtropical and tropical Indo-Pacific. Its deep burrowing lifestyle may have given a warm-water mollusc sufficient insulation to adjust to a cold-water habitat [3].

References: 1: Marine Biology 42(2):171-175, 1977; **2:** Ecological Monographs 44(1):105-128, 1974; **3:** Biogeography and Ecology in Antarctica. J Van Mieghem and P va Oye, eds. The Hague: W. Junk, 1965. Monographiae Biologicae. Volume 15. pp. 333-380; **4:** Report of the Underwater Association 4:91-95, 1969; **5:** Holocene Environmental Changes in Antarctic Coastal Areas: Proceedings of International Workshop held at the National Institute of Polar Research, Tokyo, October 20-22, 1993. PA Berkman and Y Yoshida, eds. Tokyo: National Institute of Polar Research, 1994. Memoirs of National Institute of Polar Research. Special Issue, no. 50. pp. 1-10; **6:** Journal of Experimental Marine Biology and Ecology 171(1):75-90, 1993; **7:** Journal of Molluscan Studies 63(1):109-111, 1997; **8:** Journal of Molluscan Studies 63(2):285-286, 1997; **9:** Polar Biology 6(3):139-143, 1986; **10:** Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **11:** Korean Journal of Polar Research 5(2):15-28, 1994; **12:** FAO Species Identification Sheets for Fishery Purposes: Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area). W Fischer & JC Hureau, eds. Rome: Food and Agriculture Organization of the United Nations, 1985; **13:** Antarctic Communities: Species, Structure, and Survival. B Battaglia, J Valencia, and DWH Walton, eds. Cambridge: Cambridge University Press, 1997; **14:** South African Journal of Antarctic Research 21(1):45-64, 1991; **15:** Polar Biology 20(4):229-247, 1998; **16:** Polar Biology 13:291-296, 1993; **17:** Ross Sea ecology: Italiantartide Expeditions (1987- 1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin: Springer, 2000; **18:** Polar Biology 26(3):208-217, 2003; **19:** Polar Biology 40(1):227-230, 2017; **20:** PeerJ 10:e14380 doi 10.7717/peerj.14380

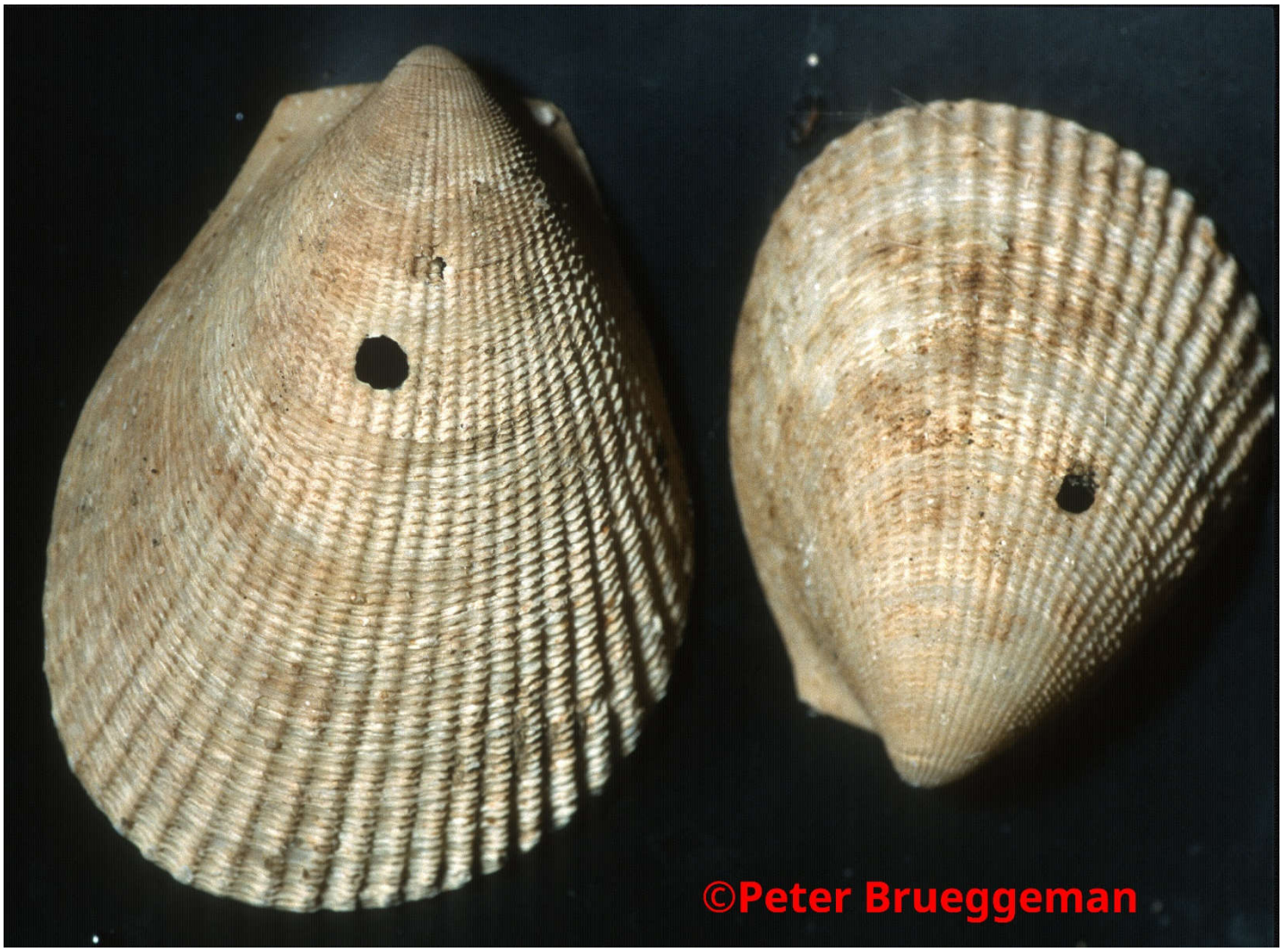
File clam *Limatula* (Antarctolima) *hodgsoni*

Limatula hodgsoni is found in Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Sandwich Islands, South Georgia Island, Shag Rocks, Bouvet Island, Macquarie Island, and off Cape Horn, from 6 to 1,180 meters depth [6,8,9,13]. *Limatula hodgsoni* is very abundant in the Ross Sea from 6 to 695 meters depth and can be found in the sponge spicule surface mat [6,10]. The shell of *Limatula hodgsoni* is white translucent, can be up to 35 millimeters high, and looks like a cockle [1,2,13]. The *L. hodgsoni* shell is rather thin, roundly oval and swollen in appearance, with no gaping opening [1,7]. The *L. hodgsoni* shell is radially ribbed to the ears, with 27 to 36 ribs rounded in profile, and crossed with concentric lamellae [1,2,13].

The mantle tissue of *Limatula hodgsoni* is bright white, and the thick tentacles may reach a length of two centimeters [13].

The sponges *Isodictya setifera* and *Leucascus leptoraphis* may be found attached to the valves of *Limatula hodgsoni* [5].

Limatula hodgsoni is presumed to spawn their eggs by broadcasting them into the water where they develop into larvae [3].



The gastropod *Trophonella longstaffi* (at left) drills into the shell of *Limatula hodgsoni* to eat it [4,5]. Other predators of *L. hodgsoni* include the seastars *Diplasterias brucei* and *Odontaster validus*, and probably the sea spider *Colossendeis scotti* [5,12].

Taxonomic Note: *Limatula hodgsoni* was assigned to the subgenus *Antarctolima* in 1990, and reaffirmed by genetic analysis in 2002 [6,11]. Earlier, *Limatula hodgsoni* was given the genus *Antarctolima* in 1977 [1] and given the subgenus *Squamilima* in 1978 [2], with precedence going to the subgenus *Antarctolima* [11]. Without explanation or citation, the World Register of Marine Species has it as *Limatula hodgsoni* without the subgenus [14].

References: 1: Venus, Japanese Journal of Malacology 36(3):105-107, 1977; **2:** Journal of the Royal Society of New Zealand 8(1):17-91, 1978; **3:** Antarctic Journal of the United States 20(5):138- 139, 1985; **4:** Antarctic Ecology, Volume 1. MW Holdgate, ed. NY: Academic Press, 1970. pp. 244-258; **5:** Ecological Monographs 44(1):105-128, 1974; **6:** Antarctic Mollusca: with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ : Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **7:** ARION 20(2):133-141, 1995; **8:** Records of the Auckland Institute and Museum 5(3,4):117-193, 1960; **9:** Scientia Marina 63(Supplement 1):399-407, 1999; **10:** Polar Biology 23(3):173-182, 2000; **11:** Polar Biology 25(11):818-826, 2002; **12:** Invertebrate Biology, 2018. doi.org/10.1111/ivb.12210; **13:** Hain, S. (1990): Die beschalten benthischen Mollusken (Gastropoda und Bivalvia) des Weddellmeeres, Antarktis = The benthic seashells (Gastropoda and Bivalvia) of the Weddell Sea, Antarctica, Berichte zur Polarforschung (Reports on Polar Research), Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 70, 180 p. doi:10.2312/BzP_0070_1990; **14**: MolluscaBase. *Limatula (Antarctolima) hodgsoni* (E. A. Smith, 1907). Accessed through: World Register of Marine Species at: https://www.marinespecies.org/aphia.php?p=taxdetails&id=876612 on 2024-09-29

Antarctic yoldia *Aequiyoldia eightsii*

Aequiyoldi eightsii is found in Antarctica, the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Sandwich Islands, South Georgia Island, Kerguelen Islands, Argentina, Chile, and Falkland Islands at depths from intertidal to 824 meters [1,2,3,4,5,8,11,12,14]. *Aequiyoldi eightsii* is most common shallower than 100 meters depth [5].

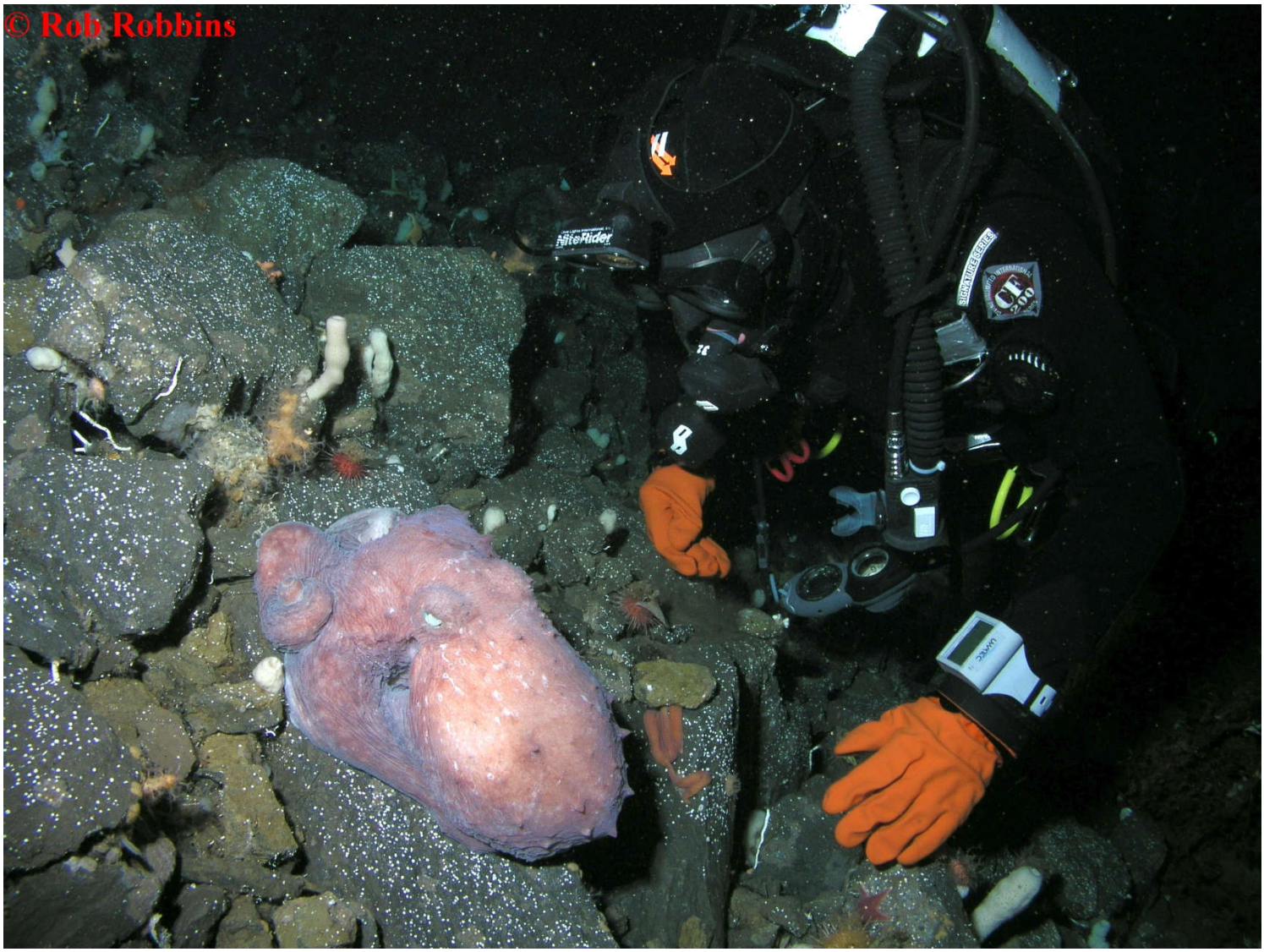
The shell covering (periostracum) of *Aequiyoldi eightsii* is glossy yellow-olive or brown with well-defined brown growth rings between small yellow or orange zones; it may be dark brown in larger animals [3,9,12]. Shell size of *Aequiyoldi eightsii* can reach 4.65 centimeters [3]. Using growth rate calculations, *Aequiyoldi eightsii* at 3.5 centimeters in length are about 65 years old; those at 4.5 centimeters are about 150 years old [4,7].

Aequiyoldi eightsii is found in soft sediment and burrows relatively shallow compared to its relatives, adopting a more horizontal shell orientation when burrowed [4,6]. *A. eightsii* is both a deposit feeder on mud and a suspension feeder on diatoms [6]. The muricid gastropod *Trophonella longstaffi* is a predator of *Aequiyoldi eightsii* [13]. The brittle star *Ophiosparte gigas* has been found with *A. eightsii* in its gut contents [10].

Taxonomic Note: Its first publication as *Nucula eightsii* referenced a preceding appearance as *Nucula eightsii* in an unpublished meeting presentation at the Lyceum of Natural History, New York [3,17]. Renamed to *Yoldia (Aequiyoldia) eightsi* in 1979; this article references the original and subsequent spellings of *eightsii* and the later spellings of *eightsi* but does not address these two spellings or its preference for *eightsi* [3]. Renamed *Aequiyoldia eightsii* in 2015 [16]. *A. eightsii* may have at least five cryptic species, plus *A. eightsii* in the Falkland Islands has a different morphology with a V-shaped pallial sinus instead of U-shaped elsewhere [18].

References: 1: FAO Species Identification Sheets for Fishery Purposes: Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area). W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **2:** Antarctic Journal of the United States 11:94):222-225, 1976; **3:** Journal of Natural History 13(2):161-183, 1979; **4:** Marine Biology 117(2):235-241, 1993; **5:** Bulletin of the Royal Society of New Zealand 27:1-311, 1990; **6:** Proceedings of the Royal Society of London 232(1269):431-442, 1988; **7:** Marine Biology 117(2):243-250, 1993; **8:** Antarctic Mollusca : with Special Reference to the Fauna of the Ross Sea. RK Dell. Wellington, NZ: Royal Society of New Zealand, 1990. Bulletin 27, Royal Society of New Zealand; **9:** Biogeografia de la Peninsula Antartica, Archipielagos y Mares Adyacentes. N Bellisio & A Tomo. Buenos Aires: Servicio de Hidrografia Naval, 1974; **10:** Polar Biology 16(5):309-320, 1996; **11:** Scientia Marina 63(Supplement 1):399-407, 1999; **12:** Moluscos Magallanicos : Guia de los Moluscos de la Patagonia y del Sur de Chile. DO Forcelli. Buenos Aires: Vazquez Mazzini, 2000; **13:** Polar Biology 26(3):208-217, 2003; **14:** Shells of Antarctica. W Engl. Hackenheim: ConchBooks, 2012; **15:** Compendium of bivalves. M Huber. Hackenheim: ConchBooks, 2010; **16:** Compendium of bivalves 2. M Huber. Harxheim: ConchBooks, 2015; **17:** A catalogue of shells, arranged according to the Lamarckian system; together with descriptions of new or rare species, contained in the collection of John C. Jay, M.D. John C. Jay. 3rd ed. Wiley & Putnam, New York, 1839, third edition. See page 113, and plate 1 figures 12-13 www.biodiversitylibrary.org/item/54059; **18:** Progress in Oceanography 174:44-54, 2019 doi.org/10.1016/j.pocean.2018.09.004

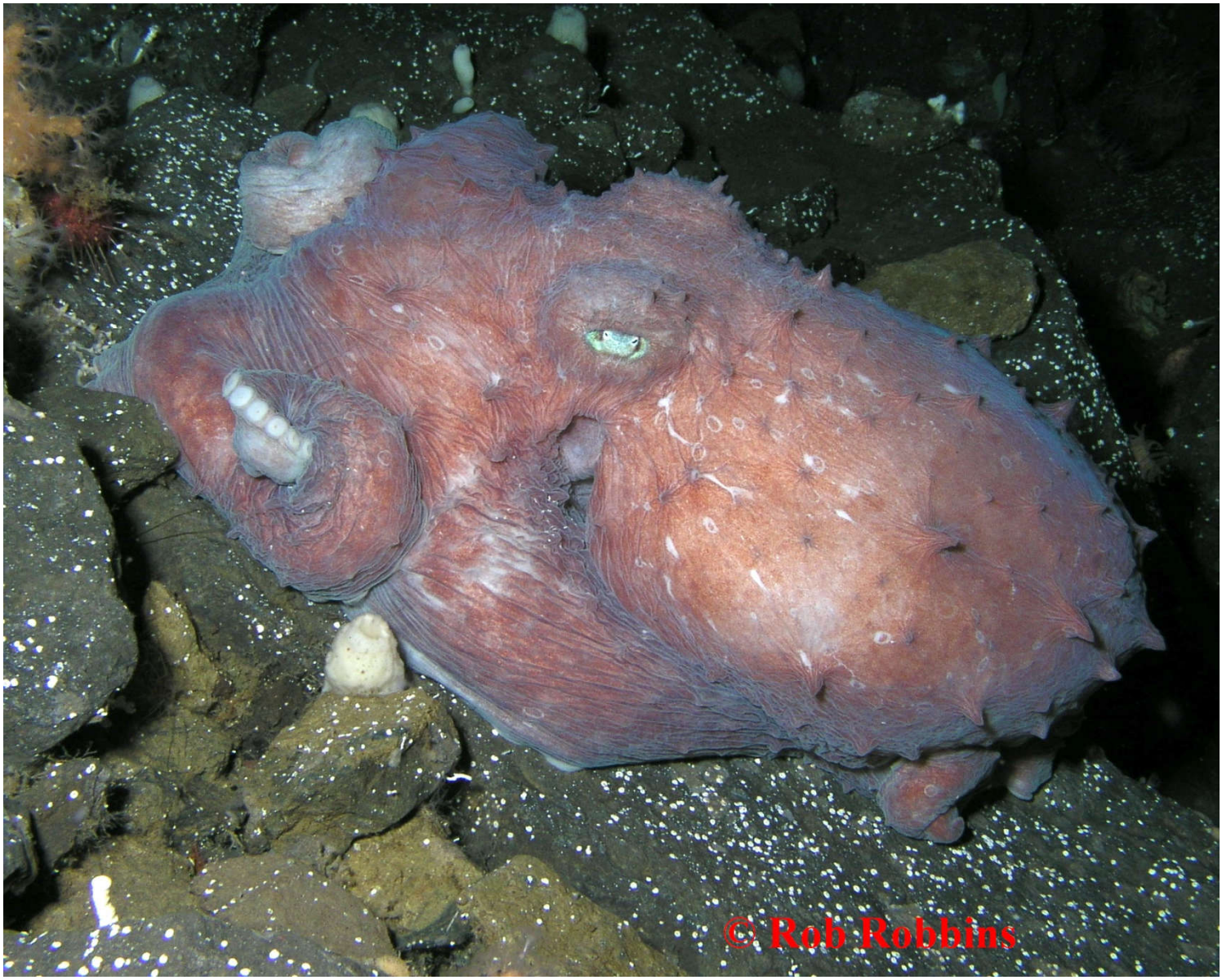
giant Antarctic octopus *Megaleledone setebos*



An incirrate octopus lacks paired fins on its mantle, has a well-developed internal shell, and doesn't have webbed arms [1]. There are three genera of shallow water incirrate octopus in the Southern Ocean: *Pareledone*, *Adelieledone*, and *Megaleledone* [2,3]. The sole species of *Megaleledone* is the giant Antarctic octopus *Megaleledone setebos*, which can be over one meter in length [2,3].

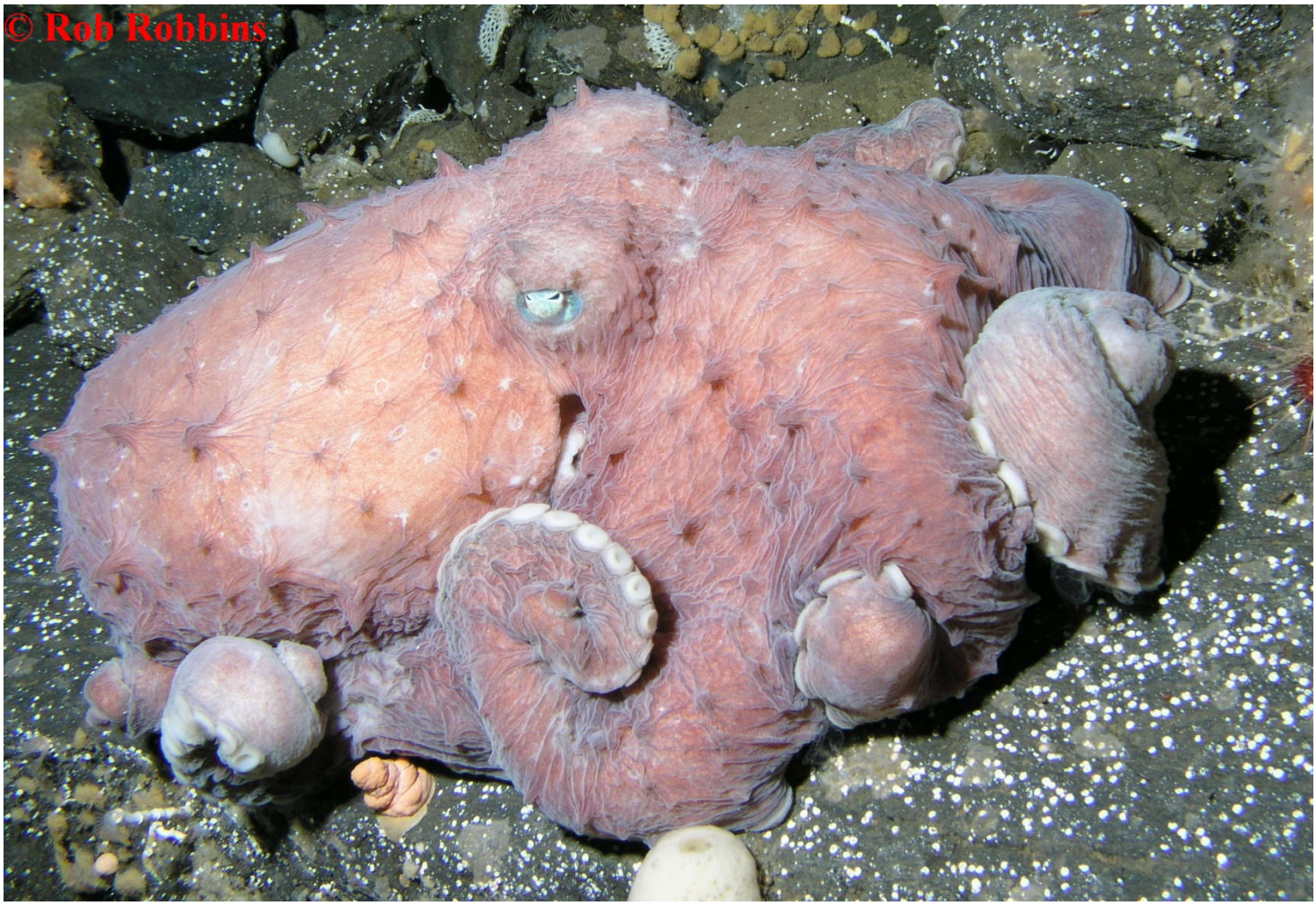
Megaleledone setebos is found in Antarctica, the Antarctic Peninsula, South Shetland Islands, and the South Orkney Islands, from 20 to 880 meters depth [5,6,9,10,11].

This *Megaleledone setebos* was photographed at the McMurdo Station jetty at 20-21 meters depth on October 12, 2006 [9].



Megaleledone setebos is colored pink-cream to gray-pink, and has been found up to 27 kilograms in weight [11].

The tentacles of *Megaleledone setebos* are thick-limbed and unequal in length, and reach two to three times the length of the mantle, with the dorsal arms being shorter [11].



Megaleledone setebos feeds on large shelled molluscs into which it drills a small hole, injecting its poisonous saliva [11].

Predators of *Megaleledone setebos* include Weddell seals and southern elephant seals [10].

Megaleledone setebos has an estimated life span up to four years [6].

Here Alexander Pushkin is holding a captured *Megaleledone setebos* [over 8 kilograms, caught at 20 meters depth] near Mirny Station in the Davis Sea in February 1966 [6,7,8].

Megaleledone setebos was first found as a mangled and decayed specimen in a rock pool at Cape Evans on Scott's Terra Nova Expedition [4,10].

References: 1: Advances in Marine Biology 50:191-265, 2006; 2: Polar Biology 30(7):883-893, 2007; 3: Marine Biology 167: 56, 2020; **4:** A monograph of the recent Cephalopoda based on the collections in the British Museum (Natural History). Part II. The Octopoda. Robson, C.G. London, 1932; **5:** Biogeographic atlas of the Southern Ocean. Claude deBroyer & Philippe Koubbi, eds. Cambridge UK: The Scientific Committee on Antarctic Research, Scott Polar Research Institute, 2014; **6:** PLoS ONE 14(7):e0219694, 2019 doi.org/10.1371/journal.pone.0219694; **7:** Nesis KN, Propp M. The largest octopus of Antarctica. In: Sweeney MJ, editor. Selected English translations of publications on Cephalopods by Kir N Nesis. Washington, DC: Smithsonian Institution Libraries; 2003. pp. 11–26; **8:** Mikhail V. Propp Negatives. SMC 187. Special Collections & Archives, UC San Diego Library. library.ucsd.edu/dc/collection/bb4952648m; **9:** Rob Robbins, personal communication, 2022; **10:** Journal of the Marine Biological Association of the U.K. 83:319-328, 2003; **11:** Buring, Tobias. Feeding Ecology of Antarctic Octopods. Masters Thesis. GEOMAR Helmholtz-Centre for Oceanography Deepsea Ecology, 2019

octopus *Pareledone turqueti*

Pareledone turqueti has a smooth dorsal mantle, and the other species of *Pareledone* have papillated dorsal mantles [4,6,10,12,13,14,15,16,19].

Here *Pareledone turqueti* is moving over the Antarctic scallop *Adamussium colbecki*.

An incirrate octopus lacks paired fins on its mantle, has a well-developed internal shell, and doesn't have webbed arms [11]. There are three genera of shallow water incirrate octopus in the Southern Ocean: *Pareledone, Adelieledone*, and *Megaleledone* [16,17].

*Pareledon*e and *Adelieledone* are the most abundant and widespread genera in shallow Antarctic water, with other genera of incirrate octopus typically found deeper [11].

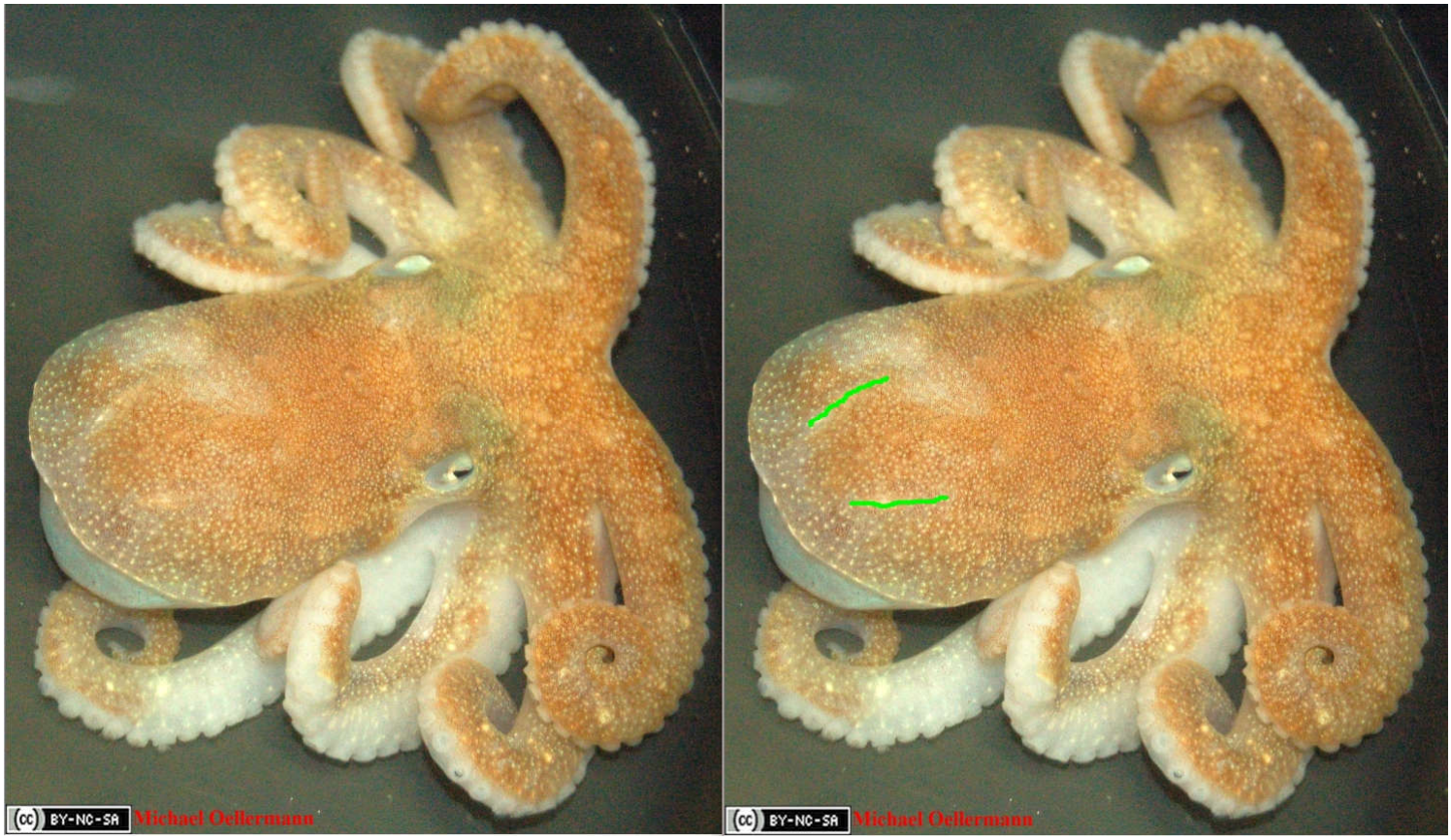
The genus *Pareledone* has the most species and is the most widespread cephalopod genus in the Southern Ocean's shallow water [11]. *Pareledone* species are considered an important part of the Antarctic benthic food web and are important top predators along with fish [1,3].

Pareledone turqueti octopus prey includes crustaceans, amphipods, isopods, cephalopods, polychaetes, molluscs, and fish [5].

Predators of Antarctic octopus including *Pareledone* species include the Weddell seal, southern elephant seals, blue-eyed shags, and the black-browed albatross [1,3,7,8,9,10].

As mentioned, there are three genera of shallow water incirrate octopus in the Southern Ocean: *Pareledone, Adelieledone*, and *Megaleledone* [16,17].

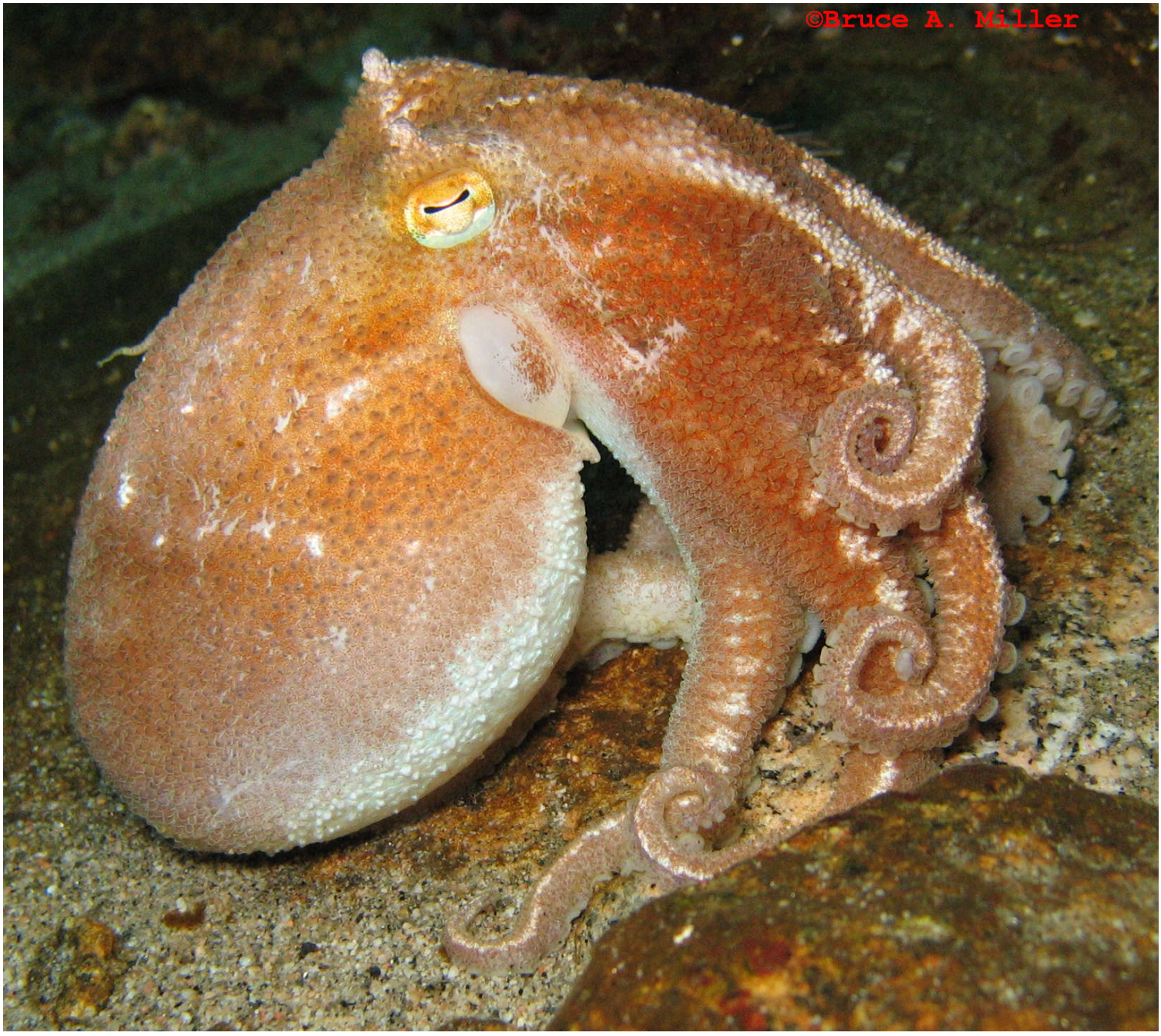
The genus *Adelieledone* is separated from the genus *Pareledone* by various features including its hectocotylus, lower beak, salivary glands, absence of stylets, and by skin sculpture, **especially by the presence of two longitudinal integumentary ridges on the posterior dorsal mantle (seen below with *A. polymorpha*)** [10,15].



Adelieledone adelieana has been collected in depths from 139 to 680 meters in the Ross Sea and eastern Antarctica [19].

References: 1: Antarctic Science 6(2):205-214, 1994; **2:** Polar Biology 13(5):347-354, 1993; **3:** Malacologia 29(1):89-100, 1988; **4:** Marine Biology 140:129-135, 2002; **5:** Buring, Tobias. Feeding Ecology of Antarctic Octopods. Masters Thesis. GEOMAR Helmholtz-Centre for Oceanography Deepsea Ecology, 2019; **6:** Memoirs of the Museum of Victoria 54:221-242, 1994; **7:** Polar Biology 18(6):371- 375, 1997; **8:** Polar Biology 13:373-376, 1993; **9:** Polar Biology 24:832-838, 2001; **10:** Antarctic Science 15(4):415-424, 2003; **11:** Advances in Marine Biology 50:191-265, 2006; **12:** Deep-Sea Research II 58:242-249, 2011; **13:** PLoS ONE 14(7):e0219694, 2019. doi.org/10.1371/journal.pone.0219694; **14:** Zoological Journal of the Linnean Society 143:75-108, 2005; **15:** Cephalopods of Australia and Sub-Antarctic Territories. Amanda Reid. CSIRO Publishing, 2016 DOI: 10.1071/9781486303946; **16:** Polar Biology 30(7):883-893, 2007; **17:** Marine Biology 167: 56, 2020; **18:** A monograph of the recent Cephalopoda based on the collections in the British Museum (Natural History). Part II. The Octopoda. Robson, C.G. London, 1932; **19:** Biogeographic atlas of the Southern Ocean. Claude deBroyer & Philippe Koubbi, eds. Cambridge UK: The Scientific Committee on Antarctic Research, Scott Polar Research Institute, 2014

octopus *Pareledone* sp. (with papillated dorsal mantle)



*Pareledon*e and *Adelieledone* are the most abundant and widespread genera in shallow Antarctic water, with other genera of incirrate octopus typically found deeper [11]. The genus *Pareledone* has the most species and is the most widespread cephalopod genus in the Southern Ocean's shallow water [11]. *Pareledone turqueti* has a smooth dorsal mantle, and **the other species of *Pareledone* have papillated dorsal mantles** [4,6,10,12,13,14,15,16,17].

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Papillated *Pareledone* species recorded from the Ross Sea include *P. aequipapillae*, *P. albimaculata*, and *P. panchroma* [14,17].

There are many distinguishing anatomical features, and looking at their color while alive, *Pareledone aequipapillae* is a rich brown color, *P. albimaculata* is mottled pink and white, and *P. panchroma* is deeply purple [14].

Pareledone octopus species are considered an important part of the Antarctic benthic food web, and are important top predators along with fish [1,3].

Prey for a *Pareledone* octopus includes amphipods, isopods, the giant Antarctic isopod *Glyptonotus antarcticus*, crustaceans, polychaetes, molluscs, ophiuroids (brittle stars), sea urchin *Sterechinus neumayeri*, and fish [2,5,10].

Predators of Antarctic octopus including *Pareledone* species include the Weddell seal, southern elephant seals, blue-eyed shags, and the black-browed albatross [1,3,7,8,9,10].


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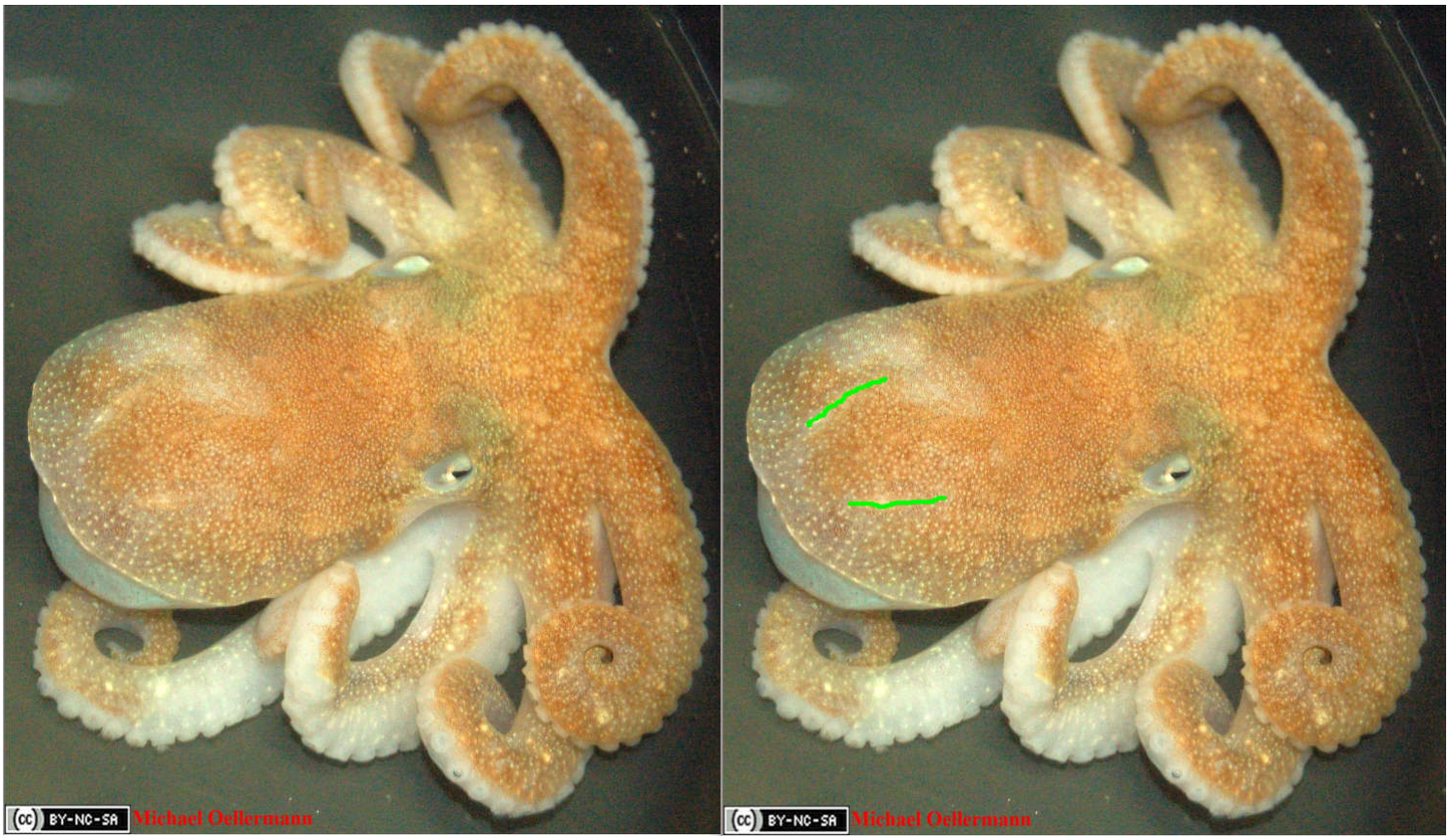
As mentioned, *Pareledon*e and *Adelieledone* are the most abundant and widespread genera in shallow Antarctic water [11]. The genus *Adelieledone* is separated from the genus *Pareledone* by various features including its hectocotylus, lower beak, salivary glands, absence of stylets, and by skin sculpture, **especially by the presence of two longitudinal integumentary ridges on the posterior dorsal mantle (seen below with *A. polymorpha*)** [10,15].



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