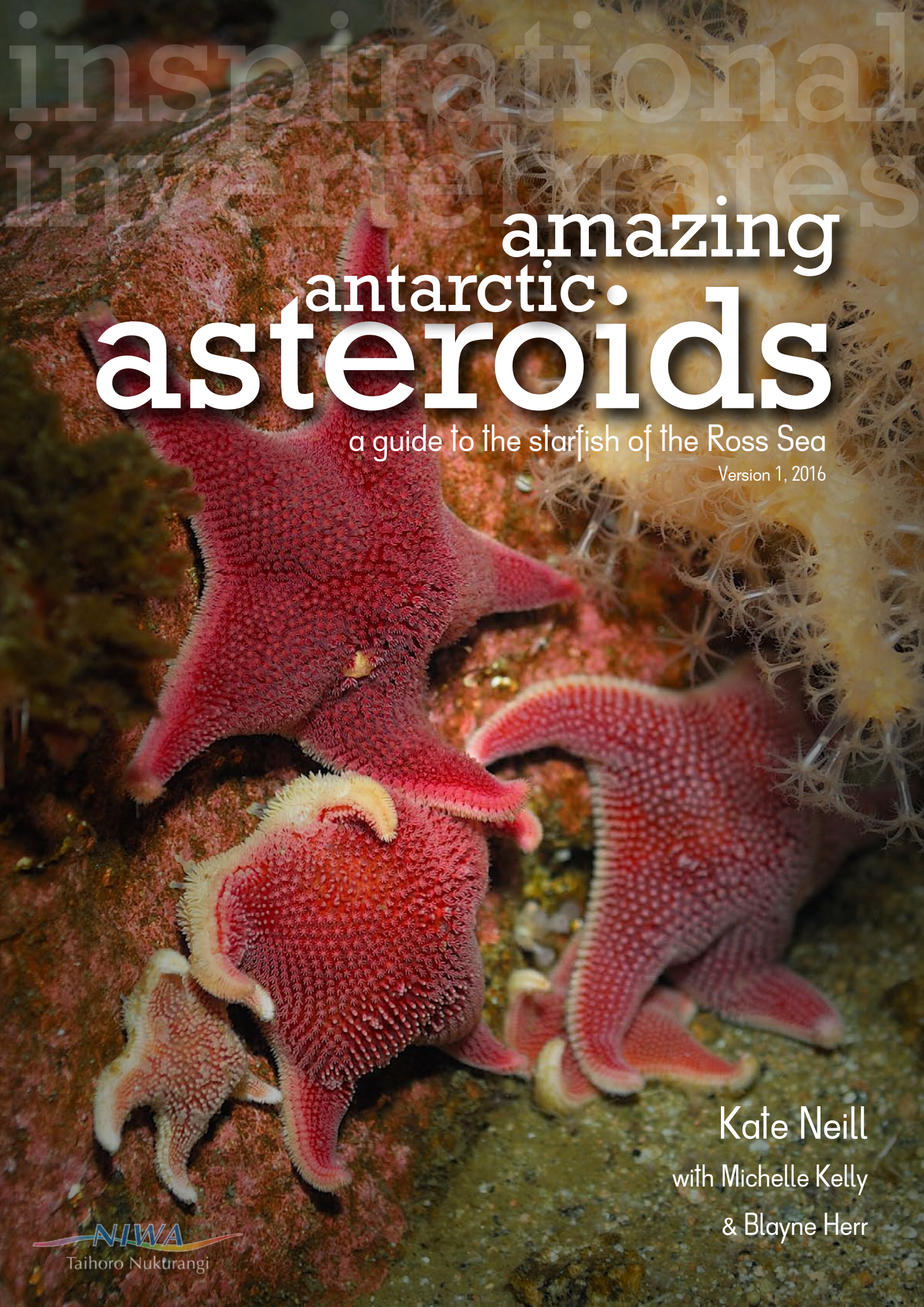

amazing antarctic asteroids

a guide to the starfish of the Ross Sea

Version 1, 2016

Kate Neill
with Michelle Kelly
& Blayne Herr

NIWA
Taihoro Nukurangi

about this guide

Echinoderms (starfish or sea stars, brittle stars, sea cucumbers, sea urchins and feather stars) are found everywhere and are adapted to live in many habitats, from the intertidal zone down to the continental shelf, deep ocean trenches, and abyssal plains, from the tropics and temperate waters to the icy waters of the Arctic and Antarctica.

AMAZING ANTARCTIC ASTEROIDS is a fully illustrated working e-guide to the most commonly encountered sea stars of the Ross Sea and adjacent areas including the Ross Sea shelf and slope, the Balleny Islands, Scott Island and various seamounts. The e-guide is designed for non-specialists who are involved in collection voyages in the Antarctic region, or sorting material brought back from 'the ice.' This is one in a series of e-guides on New Zealand marine invertebrates that NIWA's Coasts and Oceans group is presently developing.

The sea stars of the Ross Sea were first described by H. E. S. Clark (1963) in a New Zealand Oceanographic Institute (NZOI) Memoir which was part of a wider series on the fauna of the Ross Sea. These descriptions were based mainly on material collected during 1959 and 1960 NZOI surveys carried out on the HMNZS Endeavour, and several other smaller collections. Other works have added additional species to the sea star fauna (e.g. Clark 1962, McKnight 1976) and NIWA has more recently carried out several surveys of the Ross Sea, collecting many more sea stars (RV Tangaroa voyages TAN0402 in 2004, voyage TAN0602 in 2006 and voyage TAN0802 in 2008). Additional depth and distribution records have been sourced from the Ocean Biogeographic Information System (OBIS). This e-guide updates Clark (1963) by including more species, taxonomic changes and additional collections from on and off the Ross Sea shelf.

The e-guide starts with a simple introduction to living sea stars, followed by a morphology (shape) index, species index, detailed individual species pages, and finally, icon explanations and a glossary of terms. As new species are discovered and described, new species pages will be added and an updated version of this e-guide will be made available.

Each sea star species page illustrates and describes features that enable you to differentiate the species from each other. Keep in mind that there are additional sea star species in the Ross Sea, but these are quite rare and are not included in this guide. The majority of species in this e-guide were identified from preserved specimens held in NIWA's National Invertebrate Collection (NIC). They are illustrated with high quality images of animals that are no longer living, but where possible, we have included images from life. We have also endeavoured to use characters that can be seen by eye or magnifying glass, and language that is non-technical. Information is provided in descriptive text or quick reference icons that convey information without words. Icons are fully explained at the end of this document and a glossary explains unfamiliar terms.

Kate Neill is a marine biologist based in New Zealand at NIWA's Wellington office. Kate is an emerging starfish taxonomist and has been identifying starfish for 10 years. Kate also works on seaweeds (marine macroalgae) and is the co-author of both the Extraordinary Echinoderms and Stunning Seaweeds guides in this series.

For any advice on Asteroids you find, please email your photos and queries to Kate (kate.neill@niwa.co.nz)

http://www.niwa.co.nz/coasts-and-oceans/marine-identification-guides-and-fact-sheets

Remember to check the websites for updated versions!

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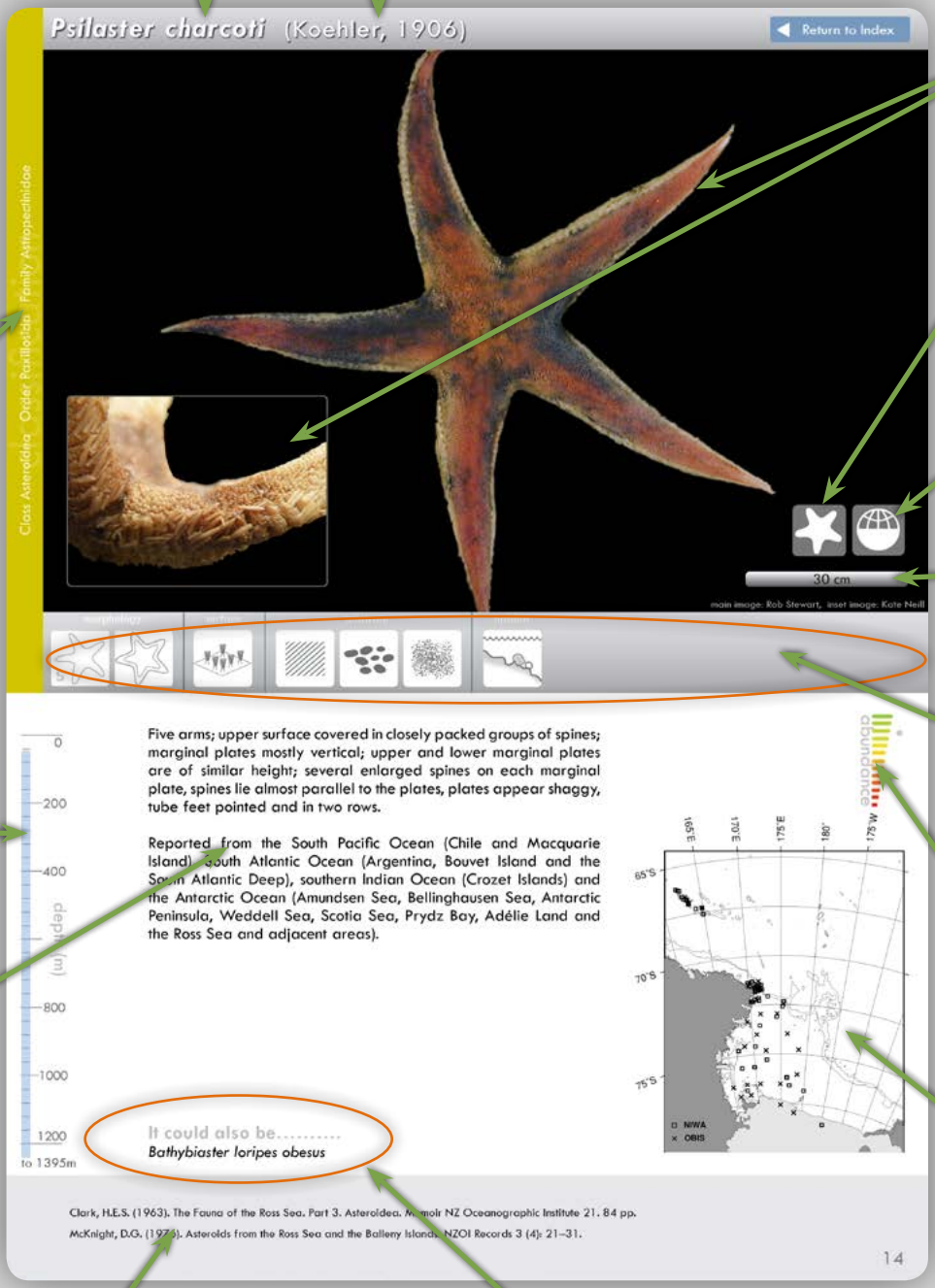
a typical species page layout

taxonomic name of species

taxonomic authority
person(s) who first described this species



species images
inset images show variations and/or closeup detail

body plan icon
highlighting the basic shape, or a special characteristic, that defines a group of these organisms

life history icon
highlighting geographic distribution

scale bar
indicating relative size of organism in the main image

species classification
see species index for arrangement

depth range
common depth range around New Zealand

information
details on external and internal characters and habitat

quick id icons
highlighting shape, surface detail, habitat, and environment

scale of abundance

distribution
section of coastline where species is most commonly found

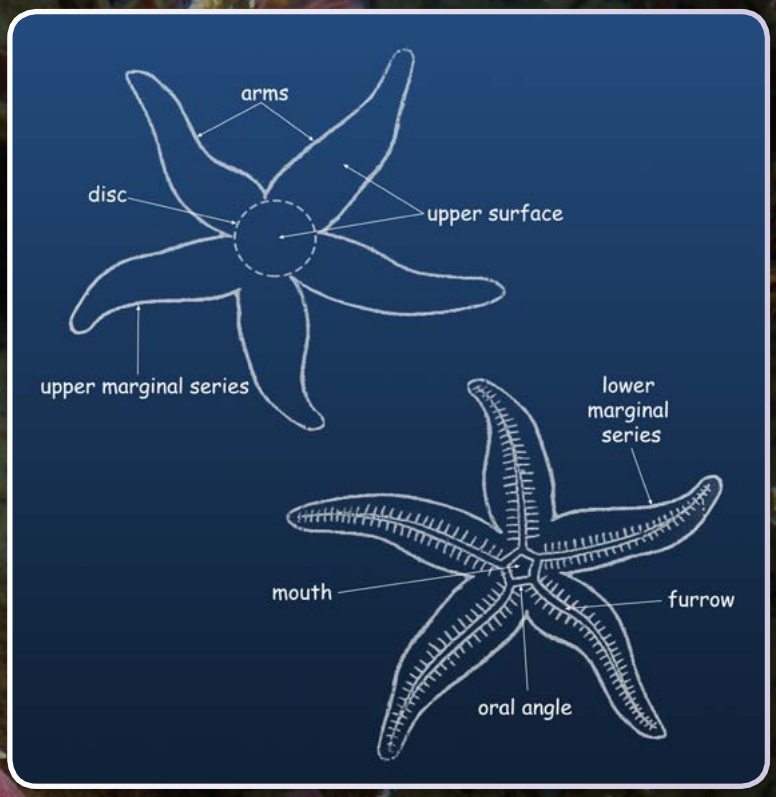
make notes of where you encountered this species and let us know if you find it at a new location

key taxonomic references

it could also be ...
some species are difficult to tell apart without more detailed information, so check the other species in the guide listed here to make sure that you have the correct species

about asteroids
starfish, sea stars

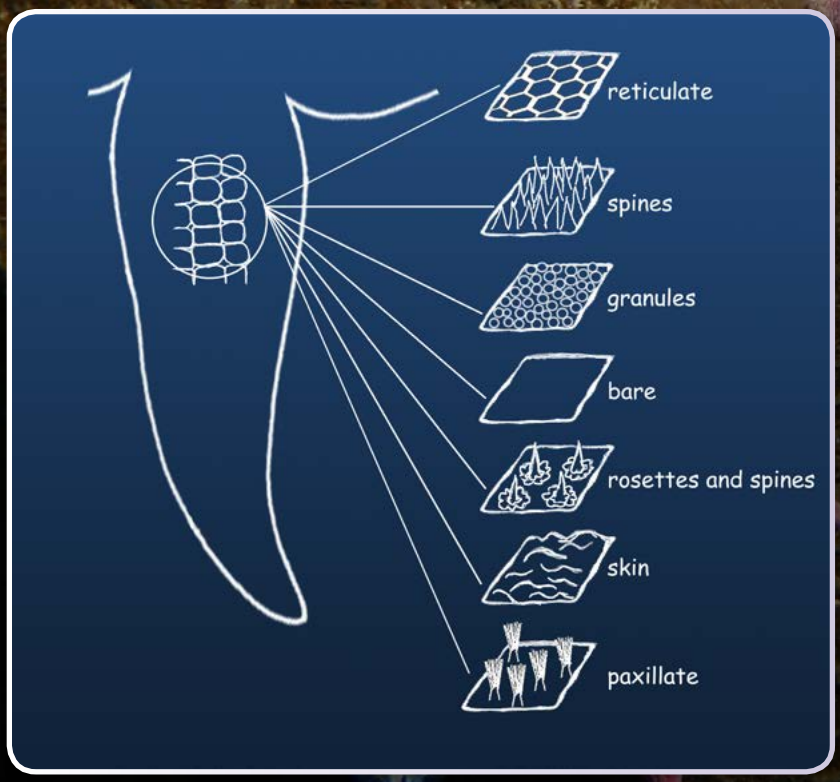
The Asteroidea are the group of echinoderms commonly known as starfish or sea stars. Many are star-shaped with a central disc, and five arms, however there are also many species with more than five arms. Arms may be long or short and the relationship between the sizes of the disc and the arms can be different between species. The bodies of starfish are made up of calcified plates which are either really obvious (like paving) or are partially or totally covered in skin, spines, and granules. Starfish can be distinguished from Ophiuroidea (brittle stars) by the presence of a canal or furrow on the underside of their arms. These furrows contain the tube feet which are usually in rows of two or four.



There are seven orders of starfish; members of six orders are currently included in this guide.

Paxillosida This large group are predominantly found in soft sediment habitats. They lack an anus and their tube feet lack suckers.

Valvatida A very large order of many families, the Valvatida are dominated by species with five arms and two rows of tube feet. They include many biscuit-like starfish with obvious marginal plates but also some longer armed forms.



Notomyotida This small order contains mostly deep sea members. They have flexible arms with internal muscle bands not found in other groups.

Spinulosida This small group lack pedicellariae, have a delicate skeleton and are covered in small spines.

Velatida Members of this order usually have thick bodies, large discs and short arms.

Forcipulatida The Forcipulatida are named after the forceps-like structure of the pedicellariae found in this group.

about Antarctica and the Ross Sea

The Antarctic continent surrounds the South Pole and is almost completely covered in ice. On the ice, human inhabitants of Antarctica are limited to people living on research stations scattered across the region, and animals are dominated by large, well known marine mammals such as penguins and seals. Under the ice however, marine life on the sea floor is rich and surprisingly diverse.

The Ross Sea is 3500 km south of New Zealand and lies in an indentation between west and east Antarctica. On the western side of the Ross Sea, McMurdo Sound is home to both the New Zealand (Scott Base) and American (McMurdo Station) research bases. The southern part of the sea is about 200 km from the South Pole and is covered by the Ross Ice Shelf. North of the ice shelf, the sea floor slopes steeply reaching depths of around 3000 m. There are several seamounts adjacent to the Ross Sea (e.g. Admiralty seamount and seamounts in the Scott Island chain) and also islands, including Scott Island and the Balleny Islands.

The area covered in this guide is approximately 65 to 80° S latitude and between 170 and 160° W longitude. In the distributions maps on each species page the ice shelf is shown in pale grey and the bathymetric lines are at 750 m and 1500 m depth

morphology index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Tremaster mirabilis


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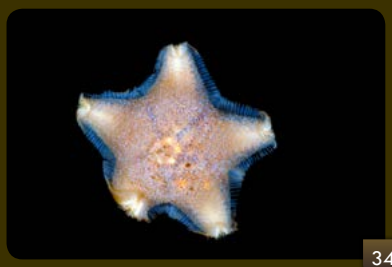
Hymenaster spp.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PHYLUM Echinodermata

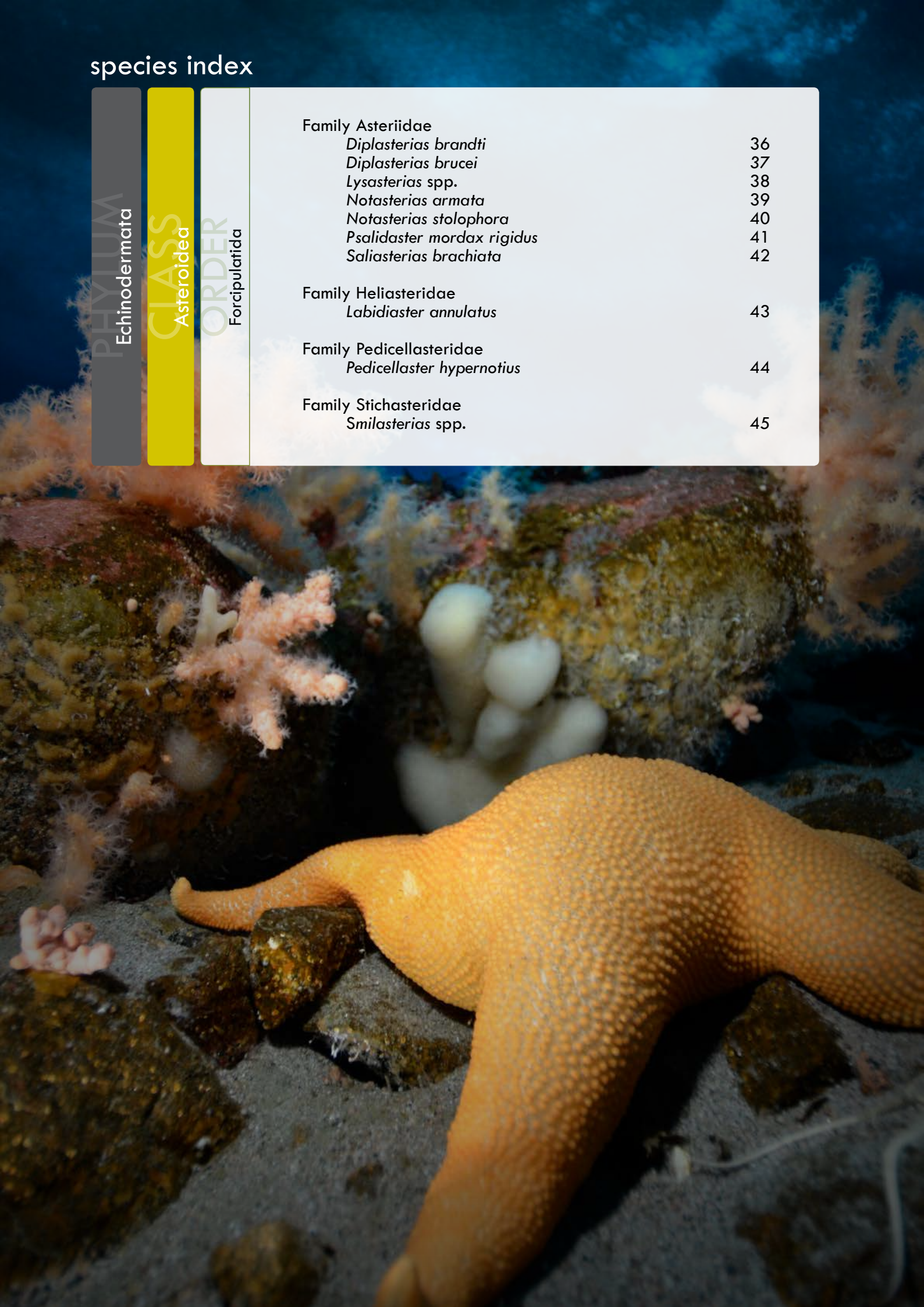
CLASS Asteroidea

species index

PHYLUM Echinodermata

CLASS Asteroidea

ORDER Forcipulatida



Cheiraster (Luidiaster) gerlachei Ludwig, 1903

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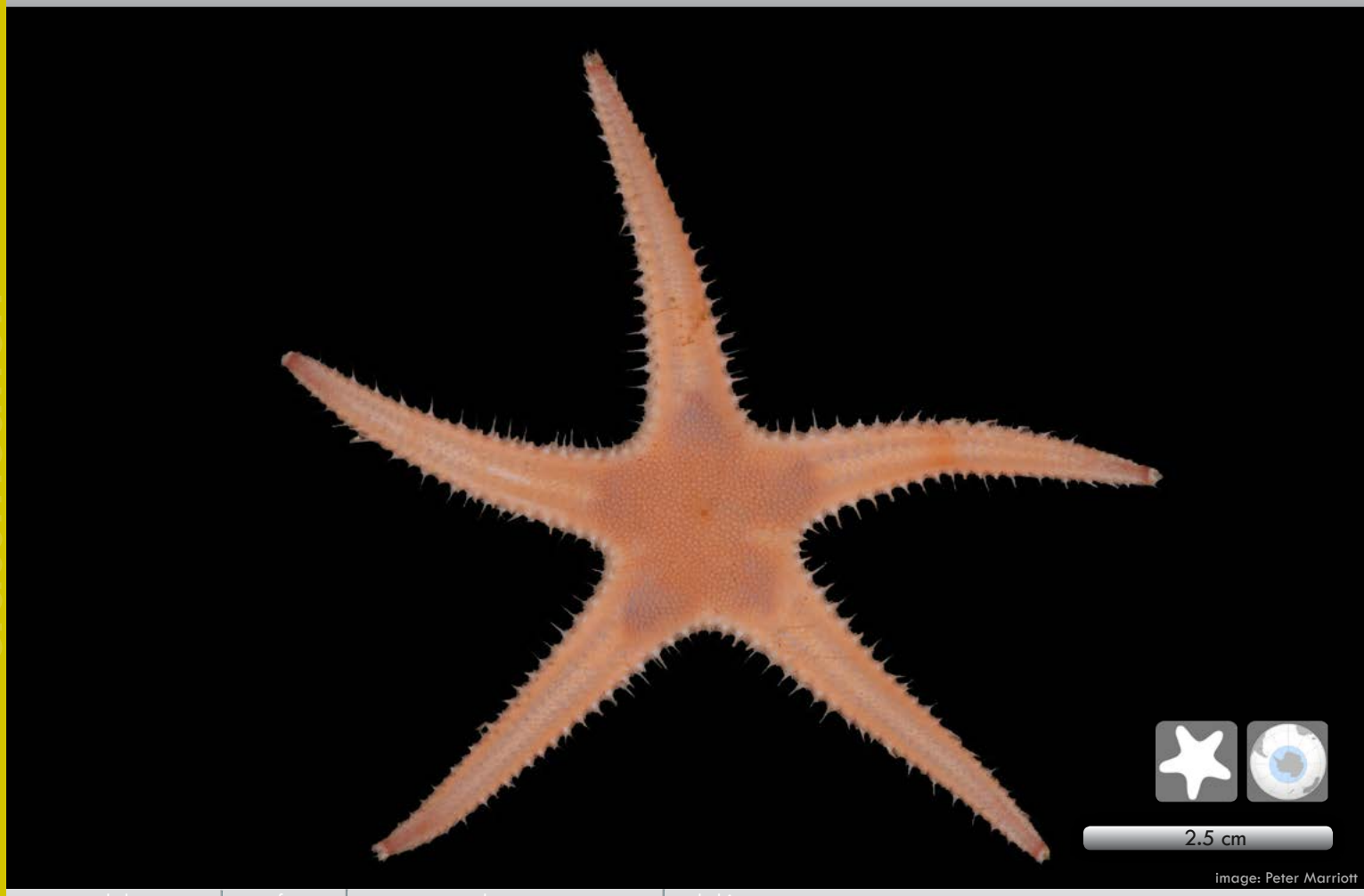
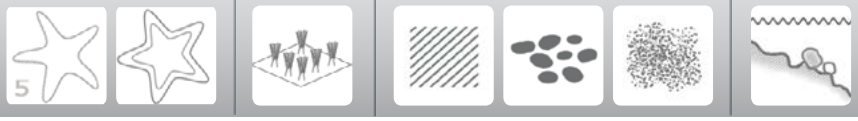
Class Asteroidea | Order Notomyotida | Family Benthopectinidae

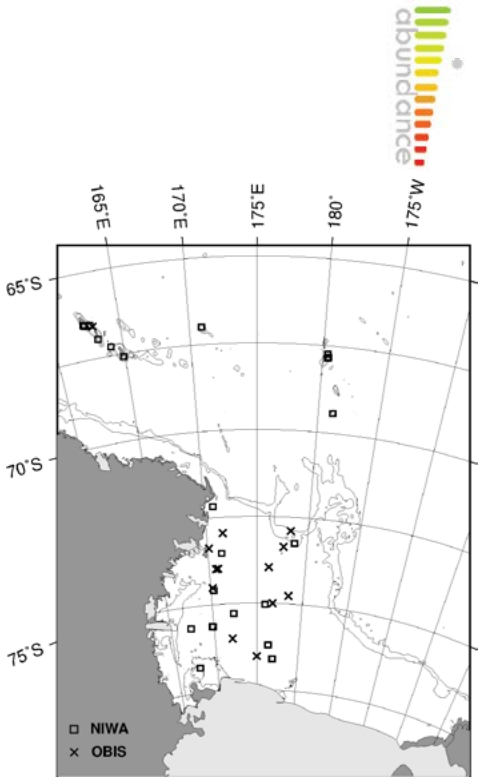


morphology | surface | substrate | habitat



Five arms, tapering evenly from small disc; upper surface covered with small, closely packed bunches of spines; all marginal plates bear enlarged, cone-like spines that sit at right angles to the arm. Tube feet have small suckers and are in two rows.

Reported from the South Atlantic Ocean (Bouvet Island and the Falkland Islands) and the Antarctic Ocean (Bellinghausen Sea, Antarctic Peninsula, Weddell Sea, Scotia Sea, Enderby Land, Prydz Bay, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Lophaster gaini

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Bathybiaster loripes obesus Sladen, 1889

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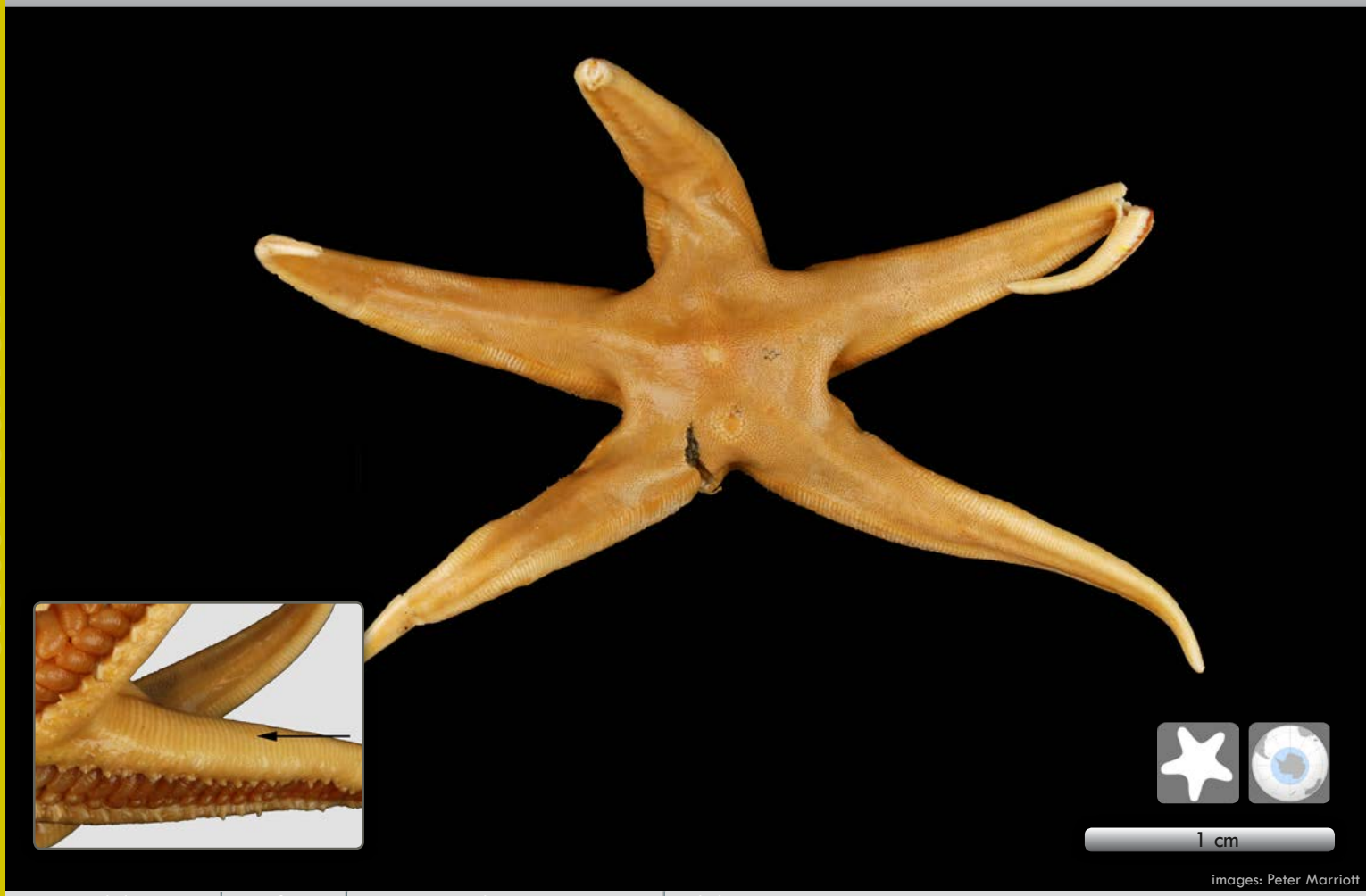
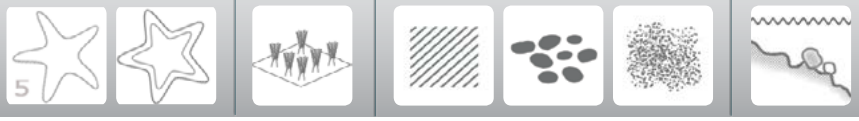


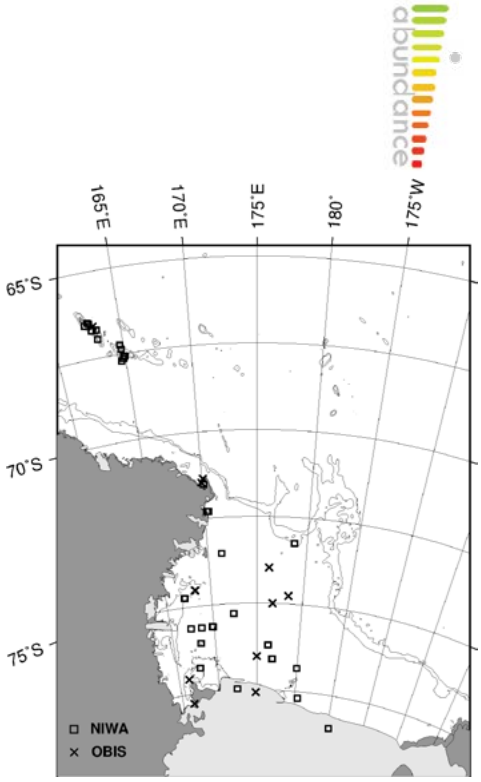
images: Peter Marriott

morphology | surface | substrate | habitat



Five arms, marginal plates mostly vertical; upper and lower marginal plates are a similar size; no obvious enlarged spines on the marginal plates, plates appear smooth. Tube feet are pointed and in two rows.

Reported from the southern Indian Ocean (Kerguelen Islands and Heard & McDonald Islands) and the Antarctic Ocean (South Shetland Islands, South Orkney Islands and the Ross Sea and adjacent areas).



It could also be.....
Psilaster charcoti

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Leptychaster flexuosus (Koehler, 1920)

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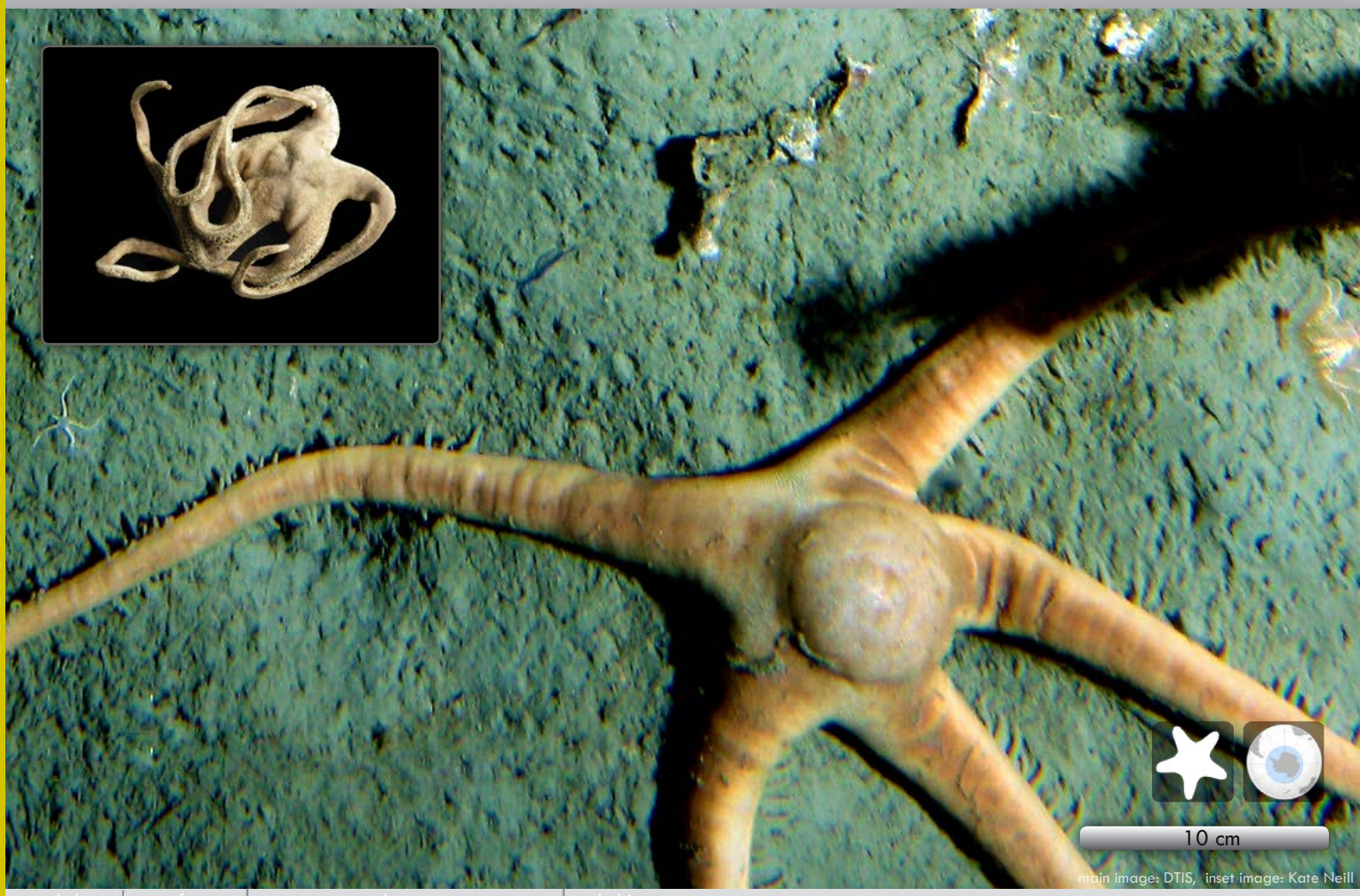
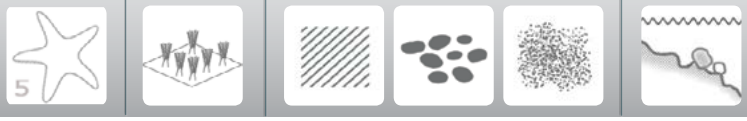
Class Asteroidea Order Paxillosida Family Astropectinidae



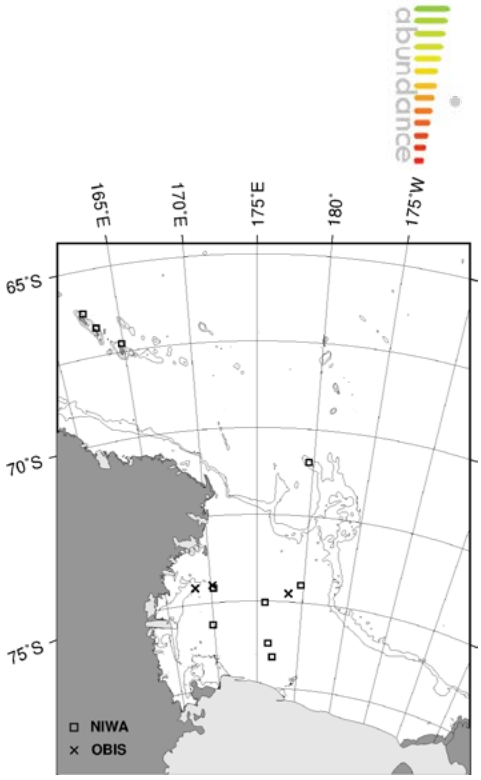
main image: DTIS, inset image: Kate Neill

morphology | surface | substrate | habitat



Five arms; small, rounded disc; arms very long and slender, triangular in cross-section, with blunt tips; marginal plates have no enlarged spines; superomarginal plates smaller than inferomarginal plates. Tube feet pointed and in two rows.

Reported from the South Atlantic Ocean (Bouvet Island), southern Indian Ocean (Kerguelen Islands) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



Clark, H.E.S. (1963). The Fauna of the Ross Sea. Part 3. Asteroidea. Memoir NZ Oceanographic Institute 21. 84 pp.

Macroptychaster accrescens (Koehler, 1920)

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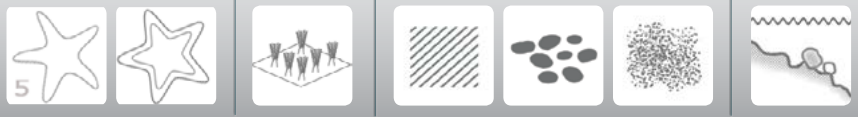
Class Asteroidea Order Paxillosida Family Astropectinidae

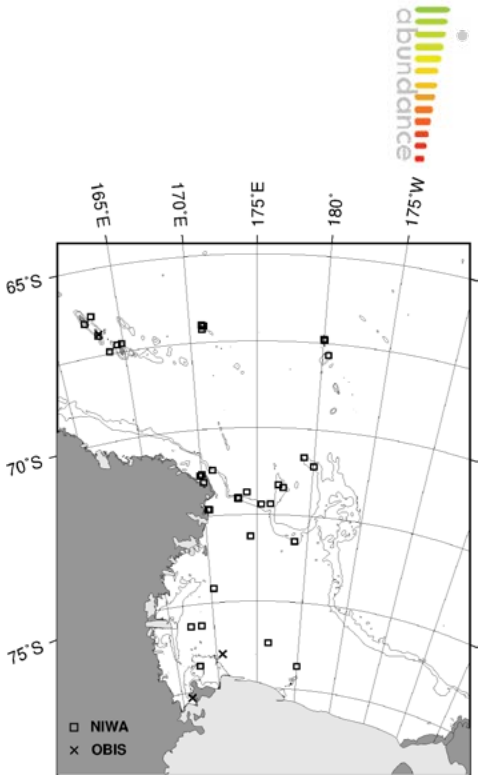
main image: DTIS, inset image: Kate Neill

morphology surface substrate habitat



Large disc; five arms triangular and not well differentiated from disc; marginal plates have no enlarged spines; upper marginal plates smaller than lower marginal plates; in between each arm both marginal series are on bottom surface of the disc. Tube feet pointed and in four rows.

Reported from the South Atlantic Ocean (Bouvet Island), southern Indian Ocean (Kerguelen Islands) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Adélie Land and the Ross Sea and adjacent areas).



Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Psilaster charcoti (Koehler, 1906)

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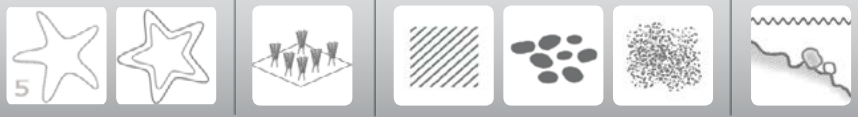
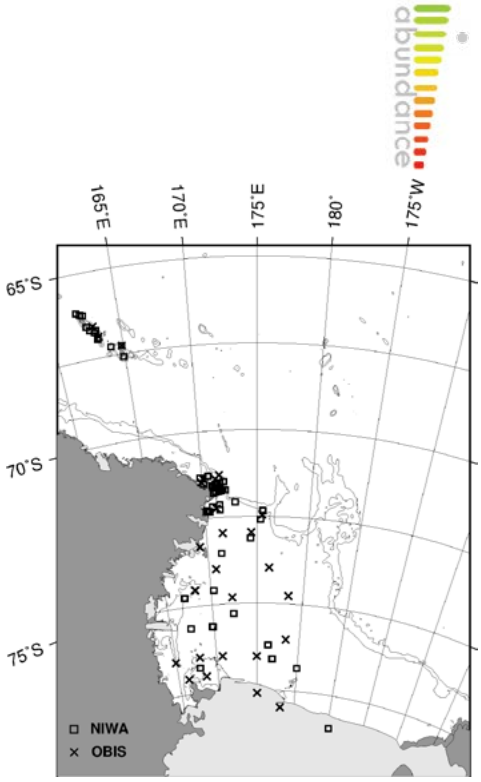
main image: Rob Stewart, inset image: Kate Neill

morphology surface substrate habitat



Five arms; upper surface covered in closely packed groups of spines; marginal plates mostly vertical; upper and lower marginal plates are of similar height; several enlarged spines on each marginal plate, spines lie almost parallel to the plates, plates appear shaggy, tube feet pointed and in two rows.

Reported from the South Pacific Ocean (Chile and Macquarie Island), South Atlantic Ocean (Argentina, Bouvet Island and the South Atlantic Deep), southern Indian Ocean (Crozet Islands) and the Antarctic Ocean (Amundsen Sea, Bellinghausen Sea, Antarctic Peninsula, Weddell Sea, Scotia Sea, Prydz Bay, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Bathybiaster loripes obesus

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Kampylaster incurvatus Koehler, 1920

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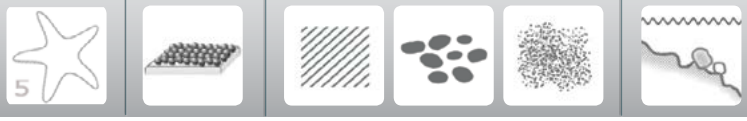
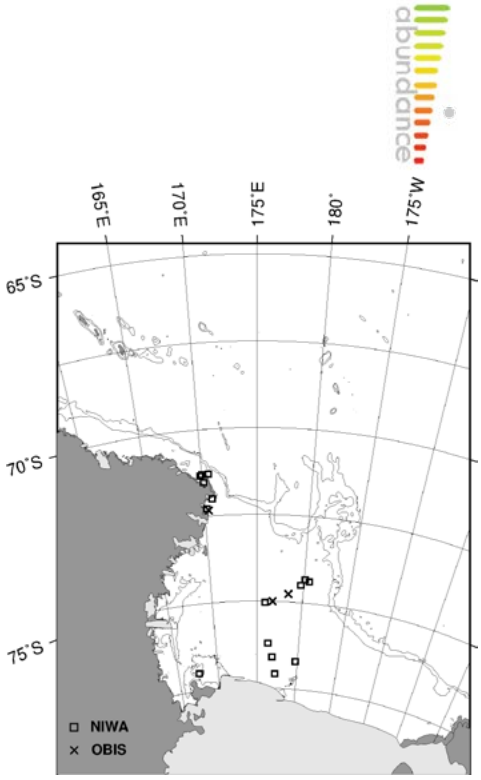
images: Kate Neill

morphology surface substrate habitat



Small bodied starfish, about 2 cm in diameter; disk highly arched; five arms, all very short; upper surface of scale-like plates covered in small granules; lower surface is covered in spines.

Reported from the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Tremaster mirabilis Verrill, 1879

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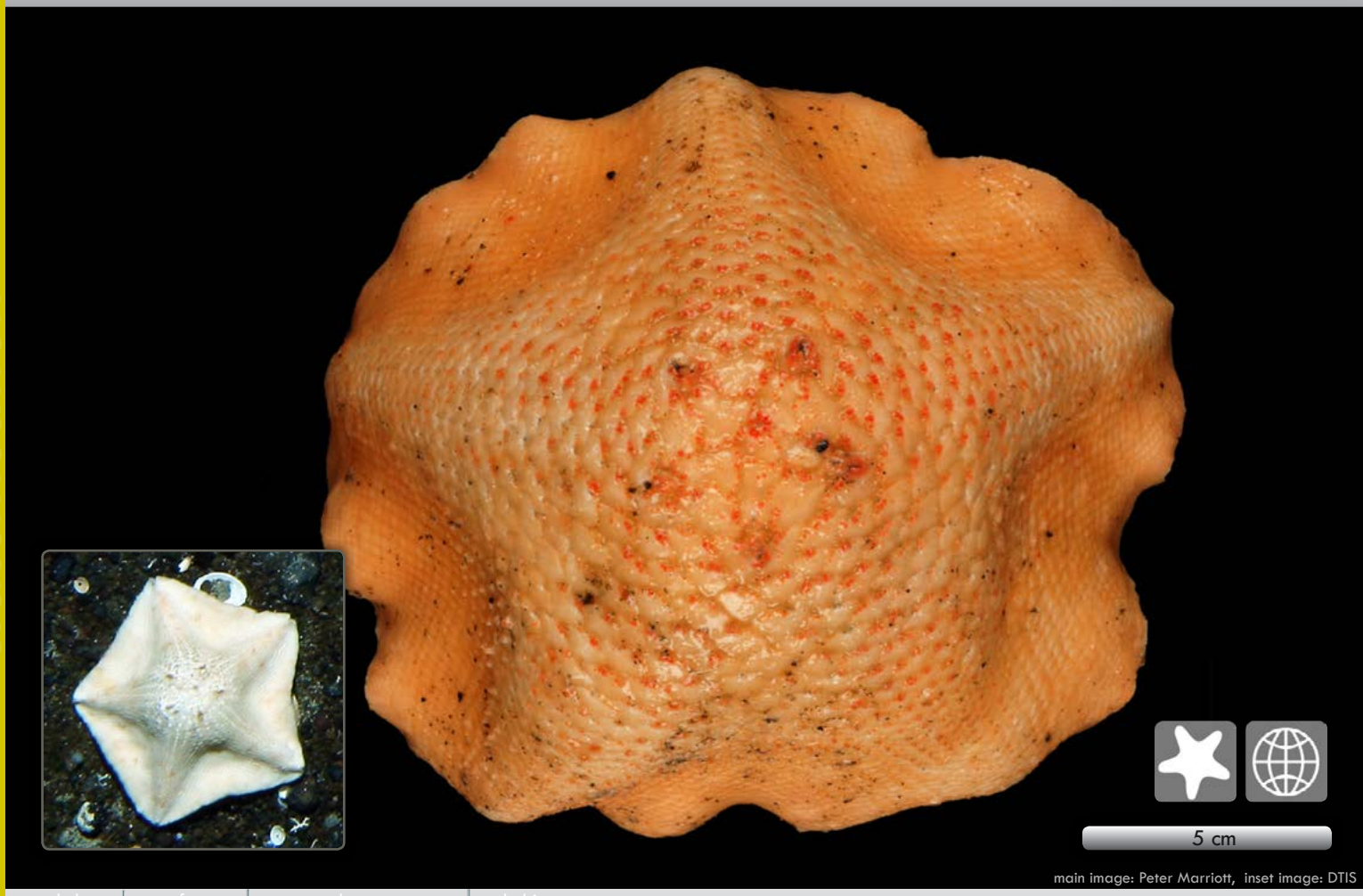
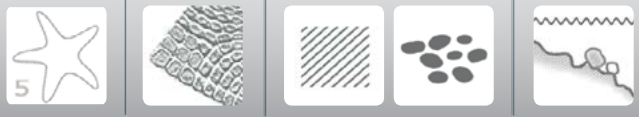


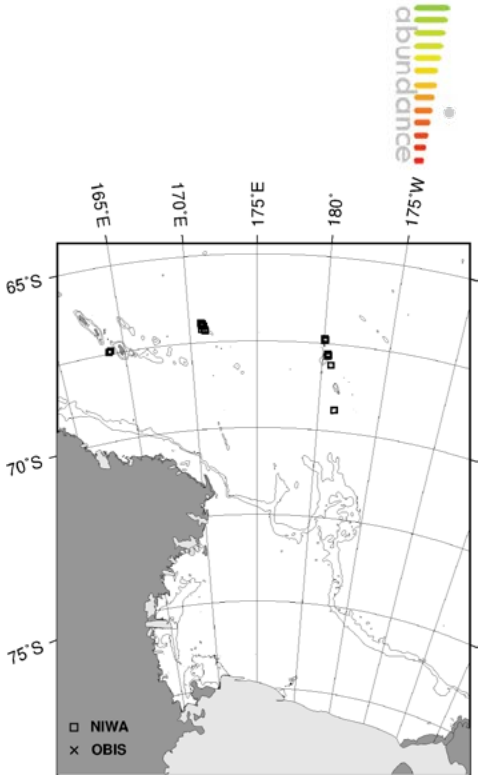
main image: Peter Marriott, inset image: DTIS

morphology | surface | substrate | habitat



Five arms, extremely short and not differentiated from disc; body arched; upper surface with scale-like plates and five slits around centre of disc.

Reported from the Arctic Ocean, Barents Sea, North Atlantic Ocean (Bahamas, Cuba, Caribbean Sea, Greenland, Gulf of Saint Lawrence, Iceland, Kattegat, Labrador Sea, Norway and Nova Scotia), South Atlantic Ocean (Uruguay, Argentina and the Falkland Islands), South Pacific Ocean (Chile, New Zealand EEZ, Macquarie Ridge and the South Pacific Abyssal Province), southern Indian Ocean (Crozet Islands, Kerguelen Islands and Heard Island) and the Antarctic Ocean (Scotia Sea and the Ross Sea and adjacent areas).



McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Cuenotaster involutus (Koehler, 1912)

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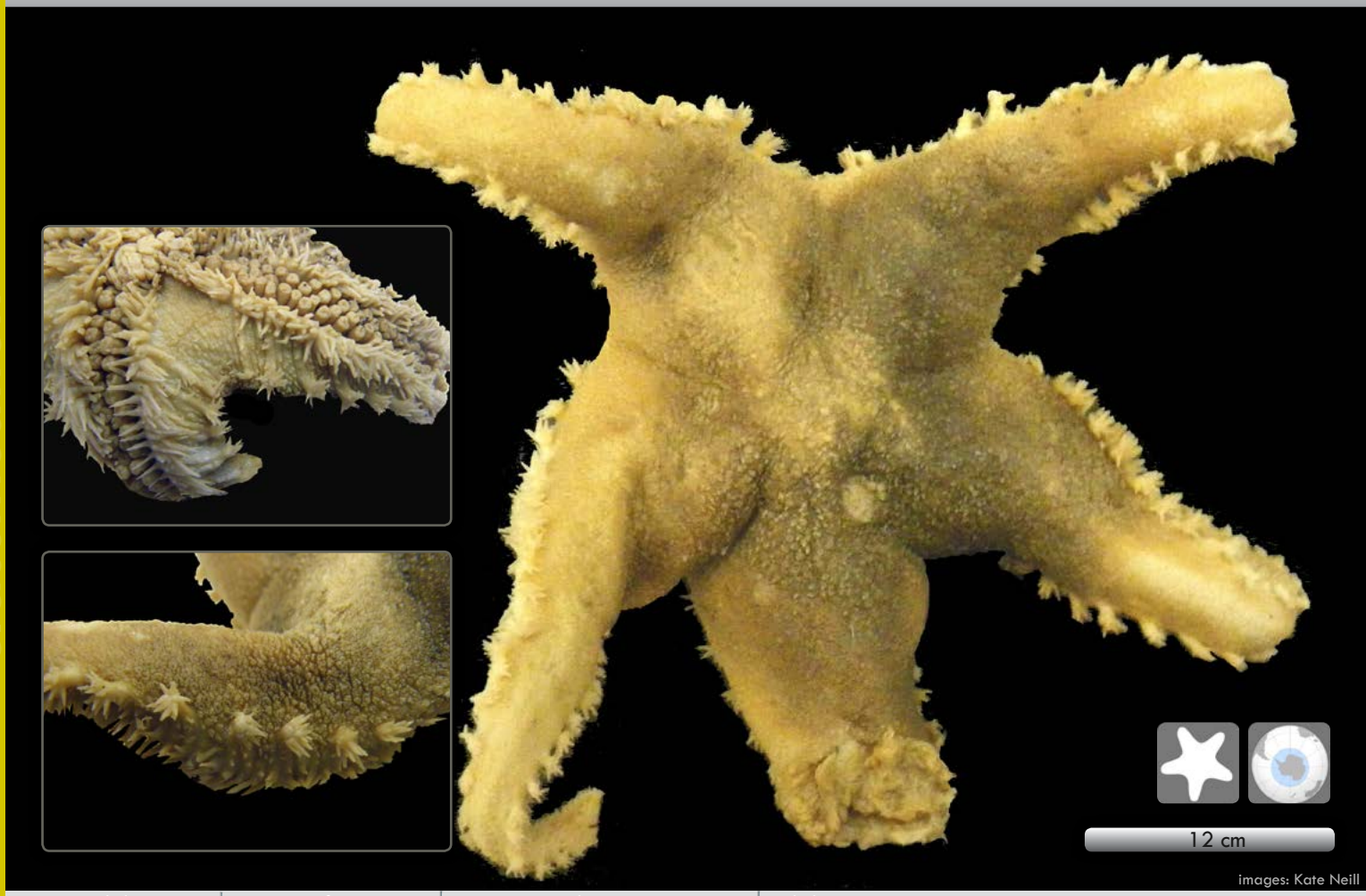
Class Asteroidea Order Valvatida Family Ganeriidae

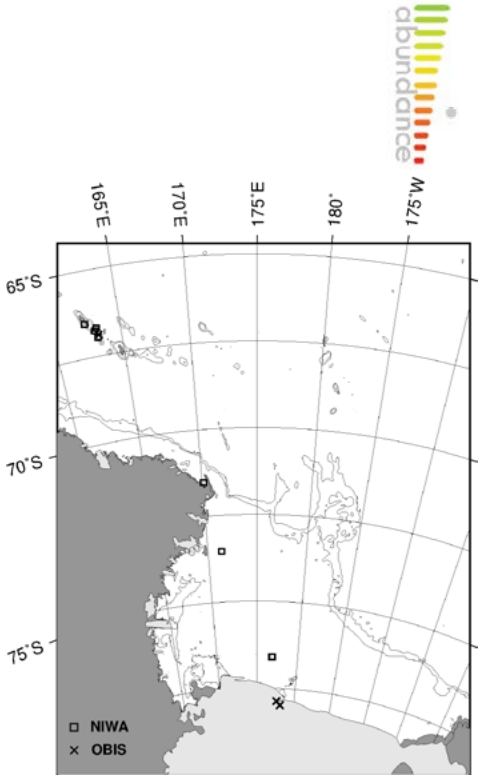


images: Kate Neill

morphology surface substrate habitat

Five arms, no superomarginal plates; inferomarginal plates are well spaced and bear a 'tuft' of spines; tufted plates joined to furrow plates by two distinct ridges. Tube feet have large suckers and occur in two rows.

Reported from the South Atlantic Ocean (Bouvet Island) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Enderby Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Lophaster gaini

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Perknaster spp. Sladen, 1889

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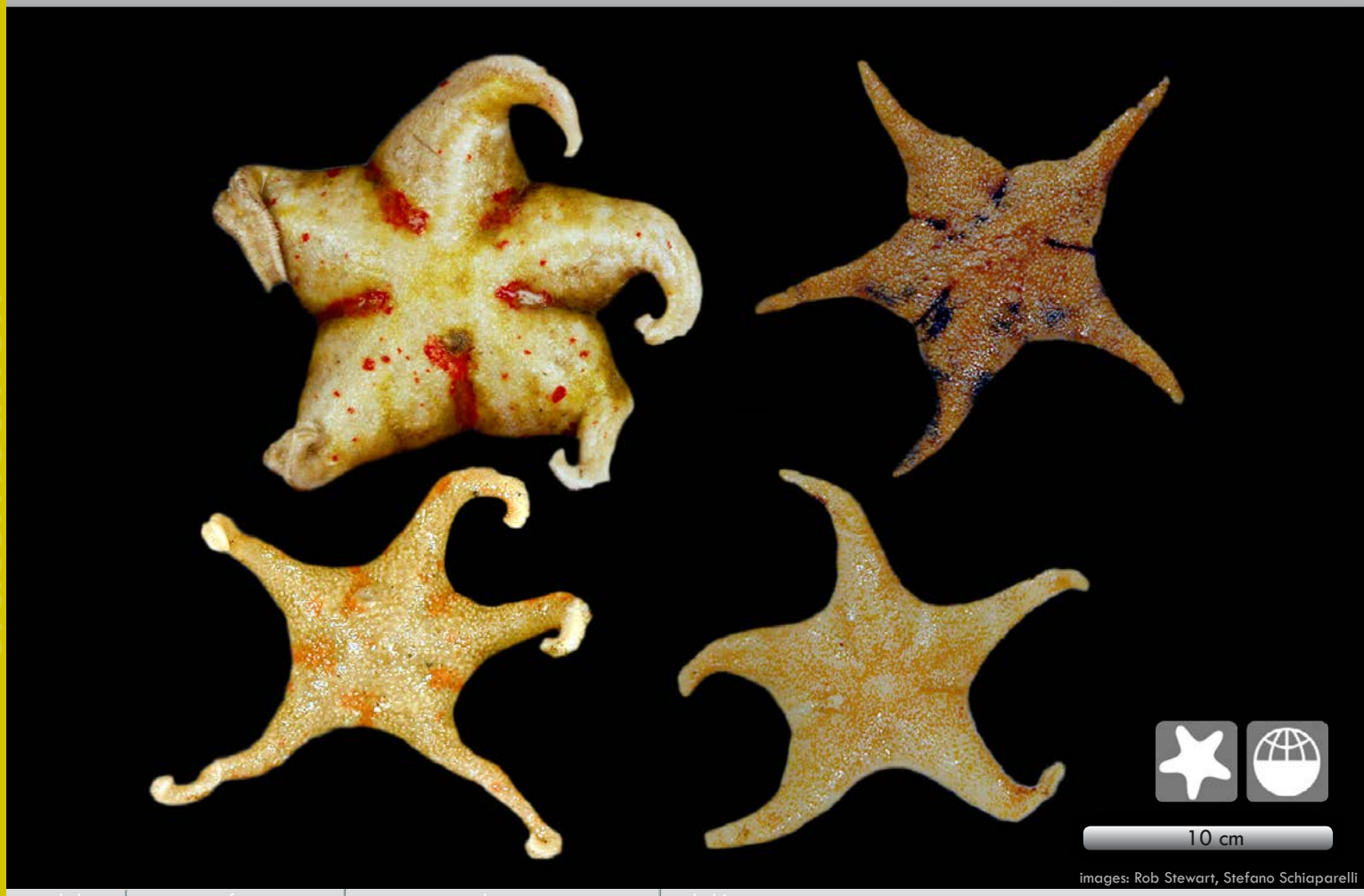
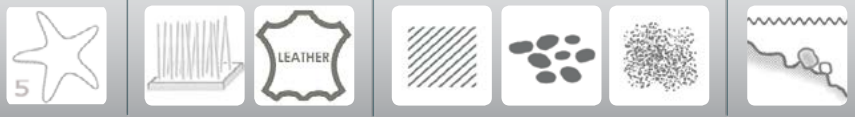


images: Rob Stewart, Stefano Schiaparelli

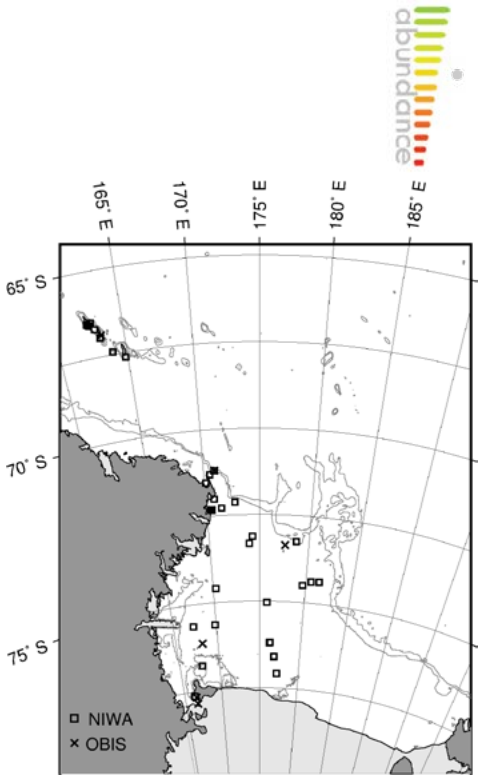
morphology | surface | substrate | habitat



There are four species of Perknaster reported from the Ross Sea (*Perknaster antarcticus*, *P. densus*, *P. sladeni*, and a single record of *P. aurantiacus*). They are difficult to tell apart without a microscope, so characters and distributions below are for the genus.

Upper skeleton reduced with isolated plates, often greatly reduced in larger specimens; five arms; bodies fleshy; spines may be single, grouped or covered in skin; tube feet have a distinct sucking disc and occur in two rows.

Reported from the South Pacific Ocean (Chile), South Atlantic Ocean (Uruguay, Argentina, Bouvet Island and the Falkland Islands), southern Indian Ocean (Crozet Islands, Kerguelen Islands and the Prince Edward Islands) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Enderby Land, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Lysasterias spp.

Clark, A.M. (1962) Asteroidea. British Australian (and) New Zealand (BANZ) Antarctic Research Expedition 1929–1931, B9, 68–70.

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Pergamaster triseriatus H.E.S. Clark, 1963

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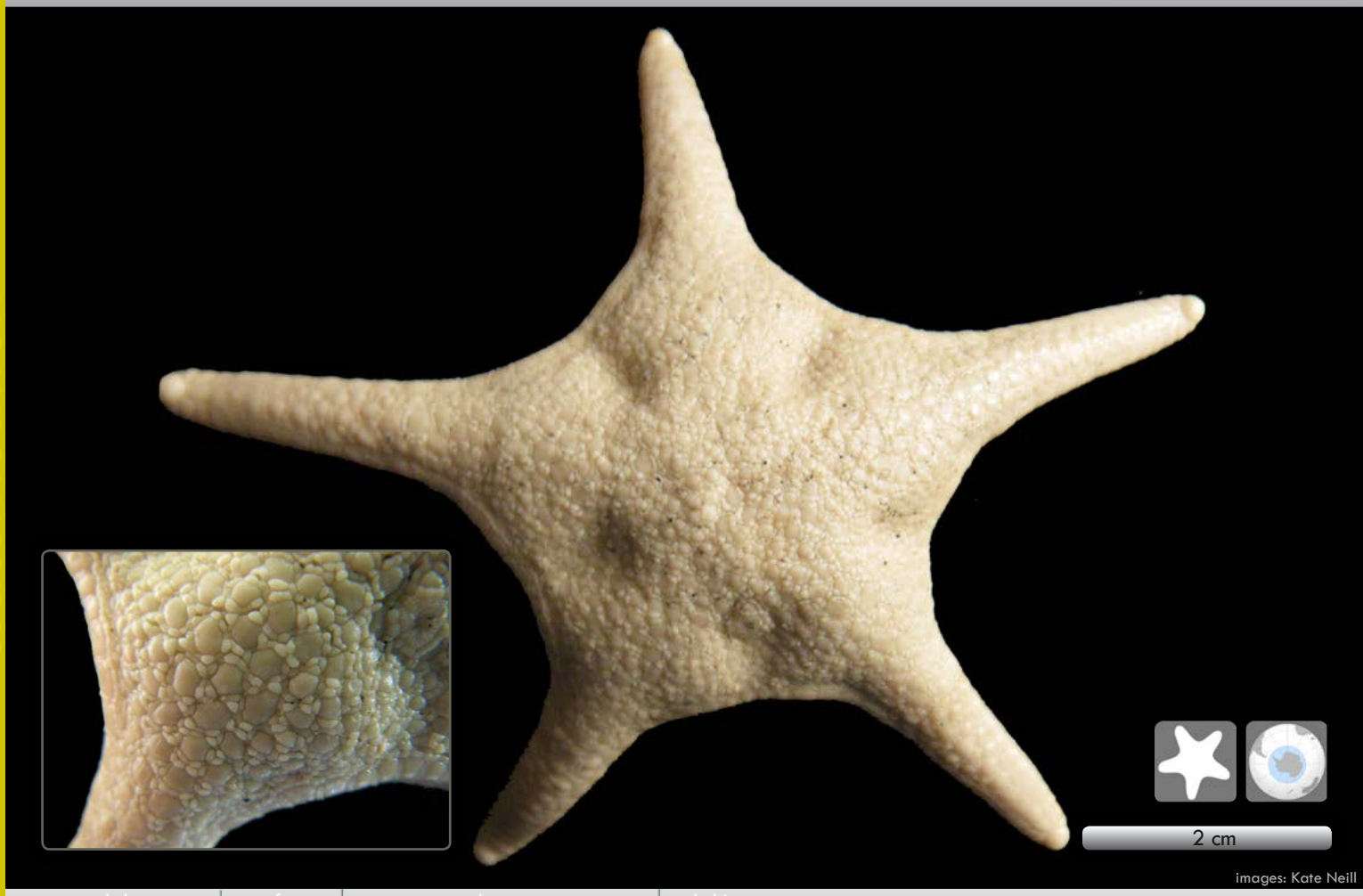
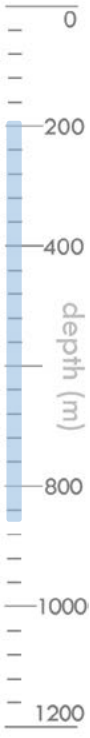


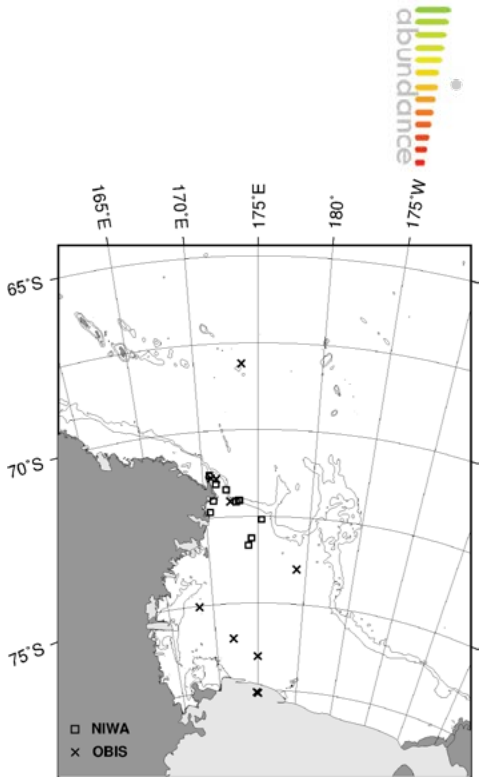
images: Kate Neill

morphology | surface | substrate | habitat



Five arms; hard, flat body; upper surface of flat plates encircled by small plates; lower surface covered in granules. Tube feet in two rows with distinct sucking discs.

Reported from the Ross Sea and adjacent areas.



Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Acodontaster capitatus (Koehler, 1912)

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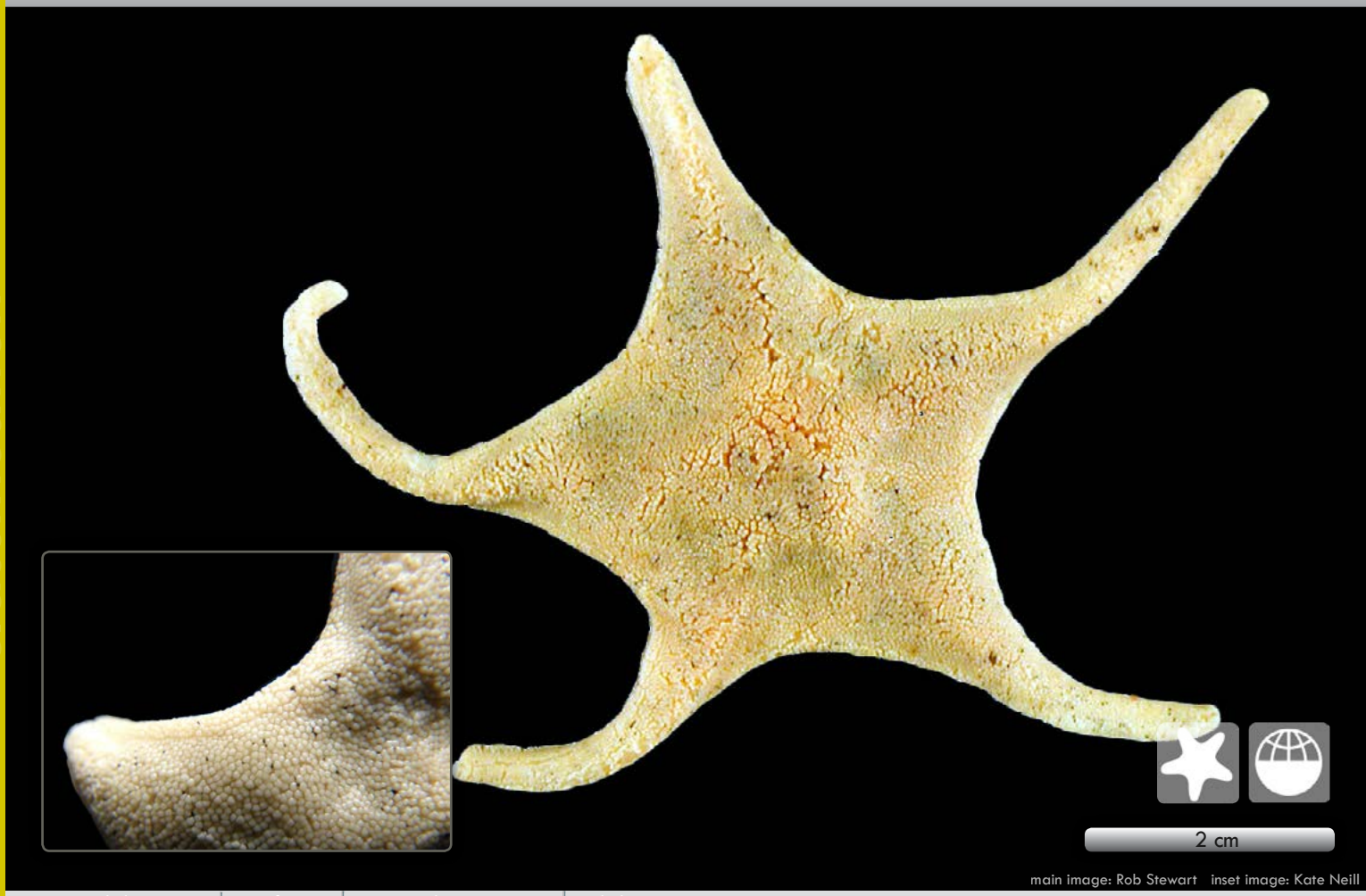
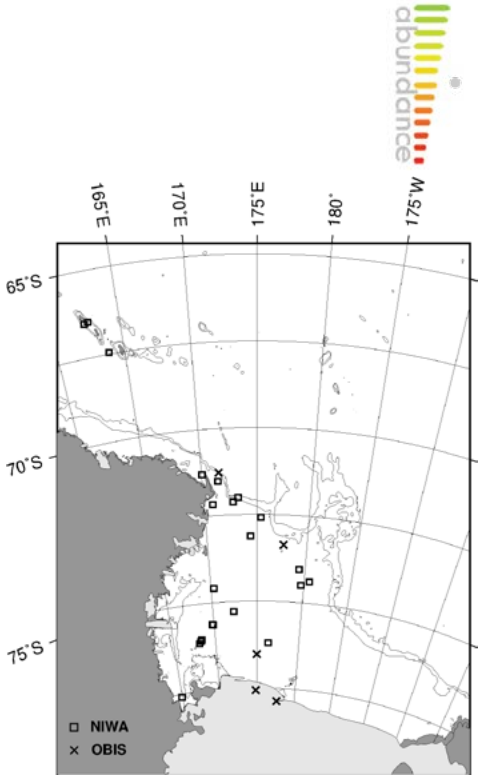


main image: Rob Stewart inset image: Kate Neill

morphology surface substrate habitat

Five arms; marginal plates mostly vertical, only a small part seen from the upper surface; upper surface covered in closely packed stalked granules which obscure the outlines of the plates; a single, large tooth-like spine in the corner of each oral angle; tube feet in two rows with small sucking discs.

Reported from the South Atlantic Ocean (Argentina and Bouvet Island) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Enderby Land, Prydz Bay, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Perknaster spp.

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Acodontaster conspicuus (Koehler, 1920)

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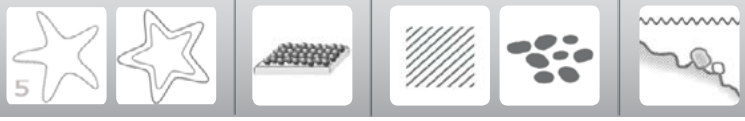
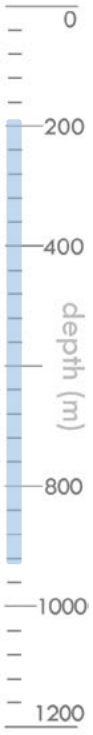
images: Kate Neill

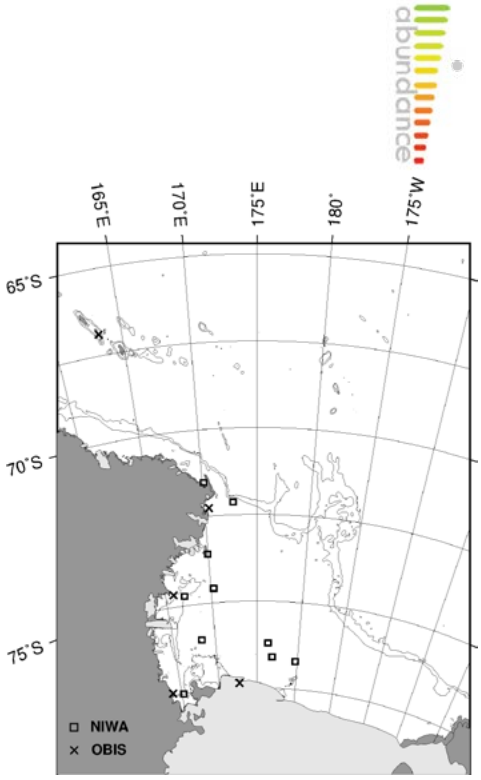
morphology | surface | substrate | habitat





Five arms; upper and lower surface covered in granules; marginal plates mostly horizontal; large, conspicuous, raised three or four-valved pedicellariae present adjacent to the furrow and sometimes on the upper surface; a single, large tooth-like spine in the corner of each oral angle; tube feet in two rows with small, indistinct sucking discs.

Reported from the South Atlantic Ocean (Bouvet Island and the Falkland Islands) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, MacRobertson Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....

Acodontaster hodgsoni
Acondontaster marginatus

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Acodontaster hodgsoni (Bell, 1908)

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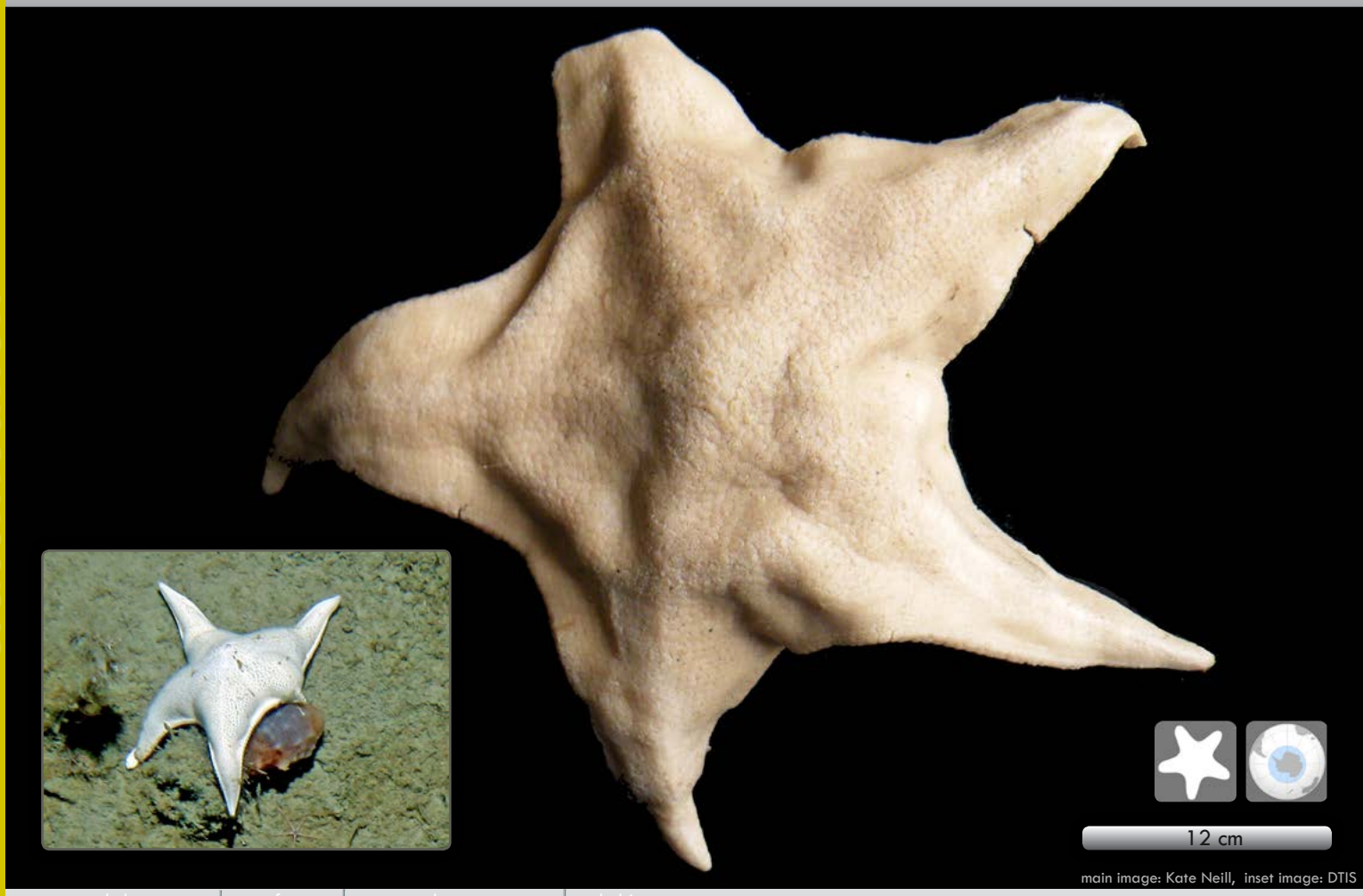
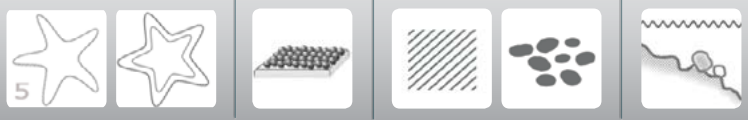


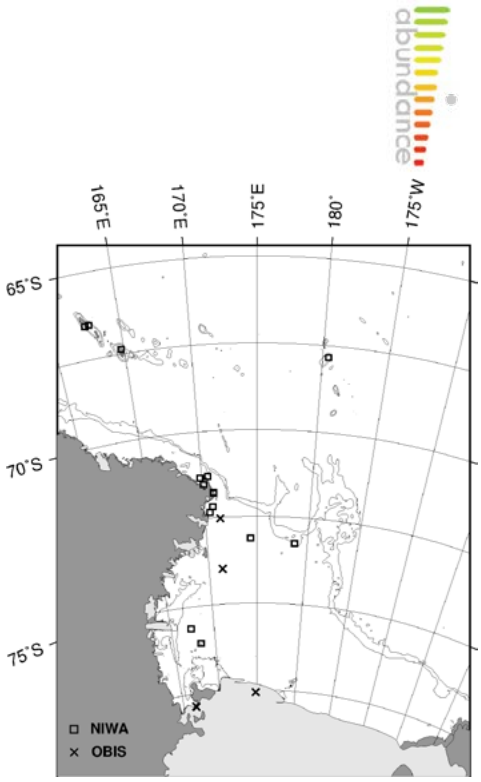
main image: Kate Neill, inset image: DTIS

morphology | surface | substrate | habitat



Five arms; marginal plates mostly horizontal; upper surface covered in granules; lower surface covered in granules, with spines occurring closer to the mouth; pedicellariae only occur on the lower surface, are few and formed from several spines; a single, large tooth-like spine in the corner of each oral angle and one (or two) slightly enlarged spines on either side of the primary oral spine; tube feet in two rows with small sucking discs.

Reported from the southern Indian Ocean (Crozet Islands, Heard Island, Kerguelen Islands and the Prince Edward Islands), South Atlantic Ocean (Bouvet Island) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Enderby Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....

Acodontaster conspicuus
Acodontaster marginatus

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Acodontaster marginatus (Koehler, 1912)

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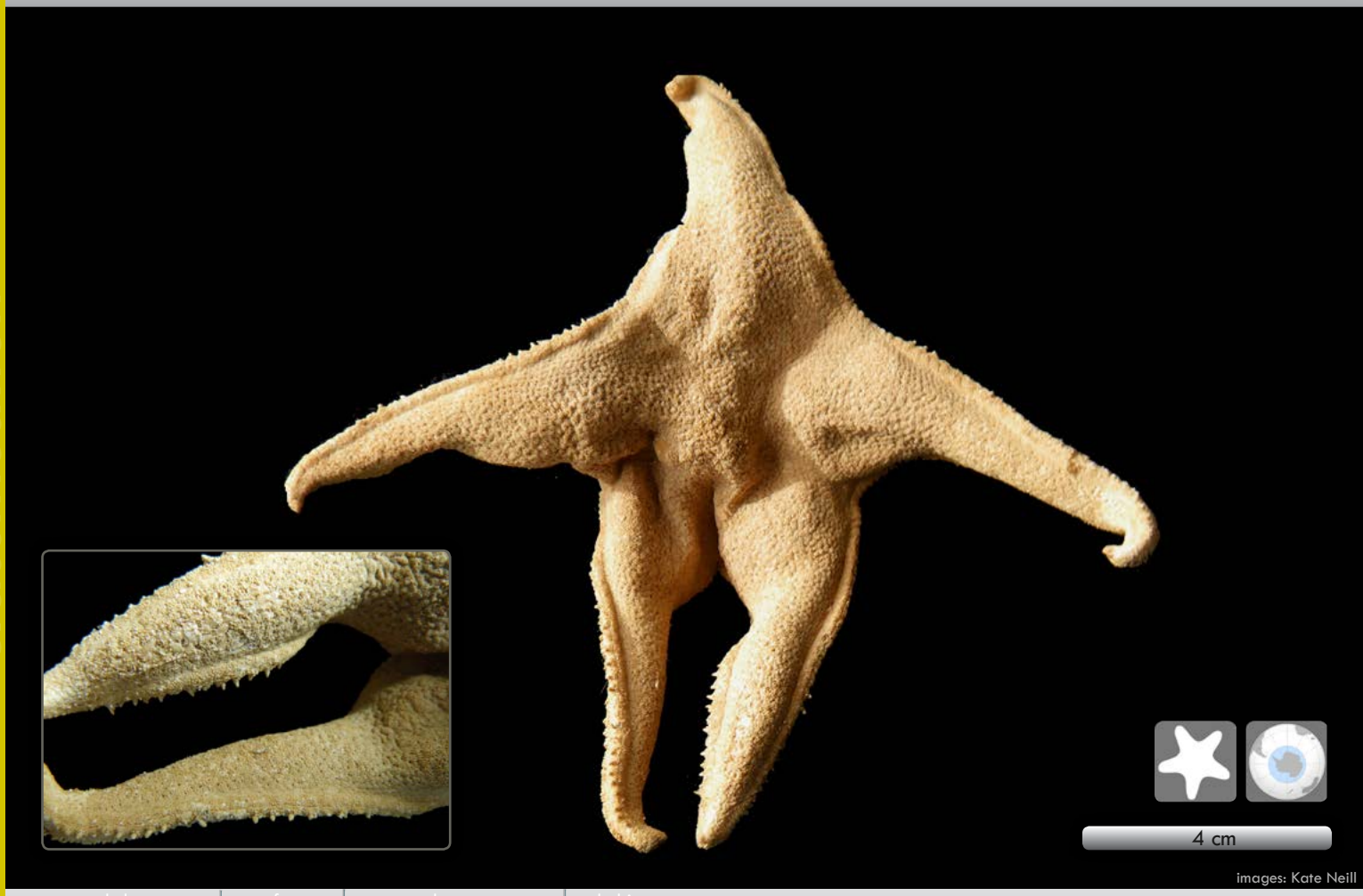
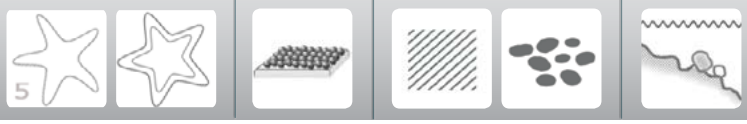


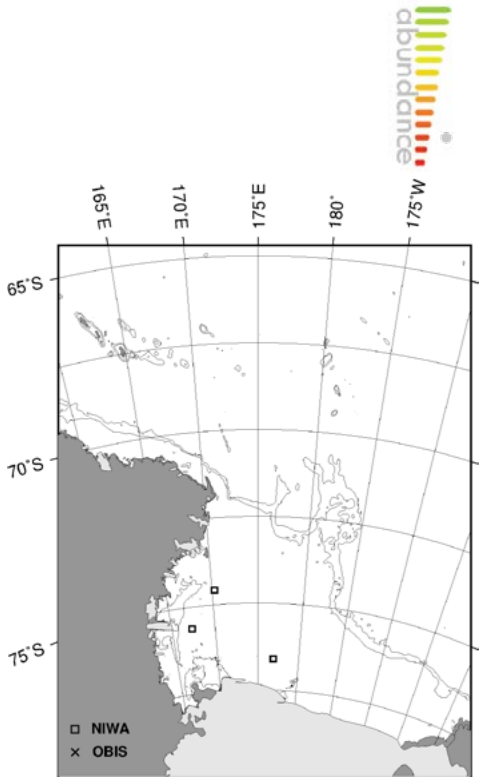
images: Kate Neill

morphology | surface | substrate | habitat



Five arms; upper and lower surfaces covered in granules; marginal plates mostly horizontal; most of the inferomarginal plates have an enlarged spine; a single, large tooth-like spine in the corner of each oral angle; tube feet in two rows with small sucking discs.

Reported from the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Prydz Bay and the Ross Sea).



It could also be.....

Acodontaster conspicuus
Acodontaster hodgsoni

Janosik, A.M., Halanych, K.M. (2013) Seeing stars: a molecular and morphological investigation into the evolutionary history of Odontasteridae (Asteroidea) with description of a new species from the Galapagos Islands. Marine Biology, 160, 821–841.

Odontaster meridionalis (E. A. Smith, 1876)

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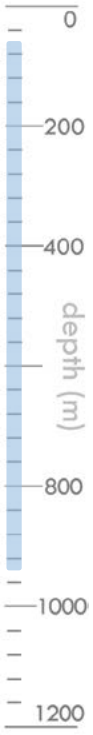
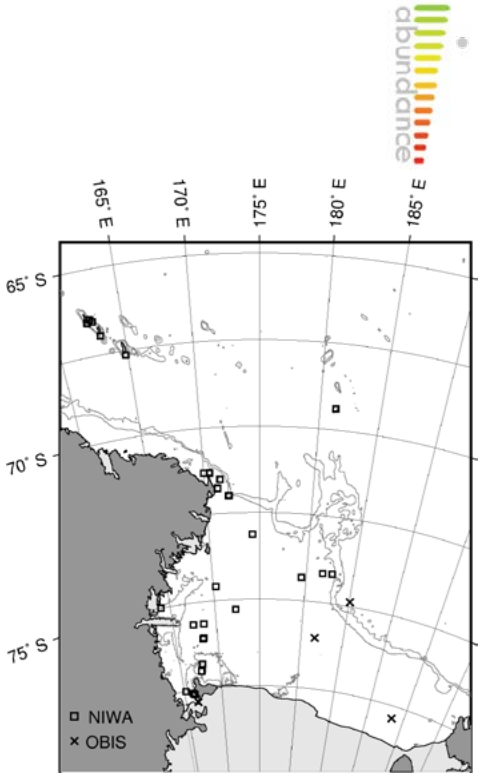
morphology | surface | substrate | habitat



Five arms; plates on upper and marginal surfaces bearing several blunt, club-shaped spines grouped on small, raised columns; marginal plates obvious and mostly vertical in position; one large, glassy-tipped spine on each oral plate, pointing away from the mouth; tube feet in two rows.

Reported from the southern Indian Ocean (Crozet Islands, Heard Island, Kerguelen Islands and the Prince Edward Islands), South Atlantic Ocean (Bouvet Island) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Prydz Bay, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Odontaster validus

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Odontaster penicillatus (Philippi, 1870)

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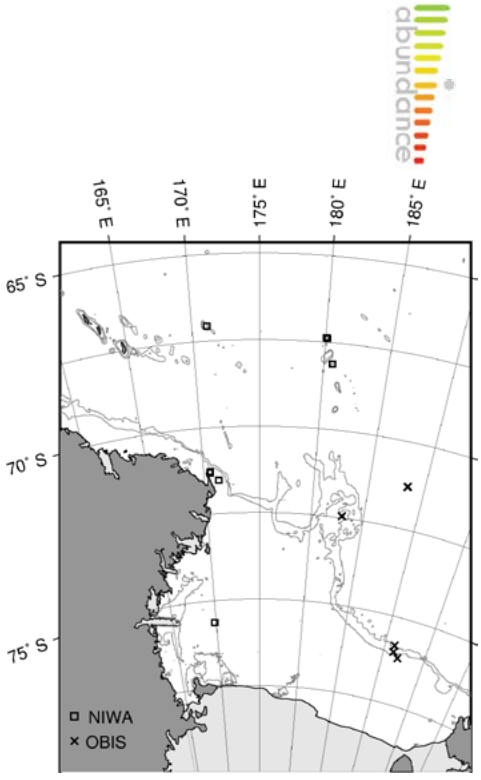
images: Peter McMillan

morphology | surface | substrate | habitat

Five short arms; body pentagonal; plates on upper and marginal surfaces bearing several pointed spines grouped on small, raised columns; marginal plates very obvious and horizontal in position; one large, glassy tipped spine on each oral plate, pointing away from the mouth; tube feet in two rows.

Reported from the South Pacific Ocean (Chile, New Zealand EEZ and Macquarie Ridge), southern Indian Ocean (Crozet Islands, Kerguelen Islands and the Prince Edward Islands), South Atlantic Ocean (Uruguay, Argentina, Bouvet Island and the Falkland Islands) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Adélie Land and the Ross Sea and adjacent areas).



Clark, A.M. (1962) Asteroidea. British Australian (and) New Zealand (BANZ) Antarctic Research Expedition 1929–1931, B9, 68–70.

Odontaster validus Koehler, 1906

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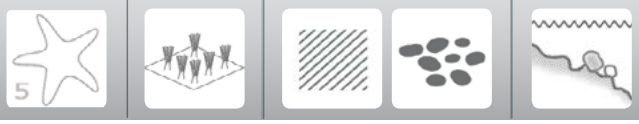
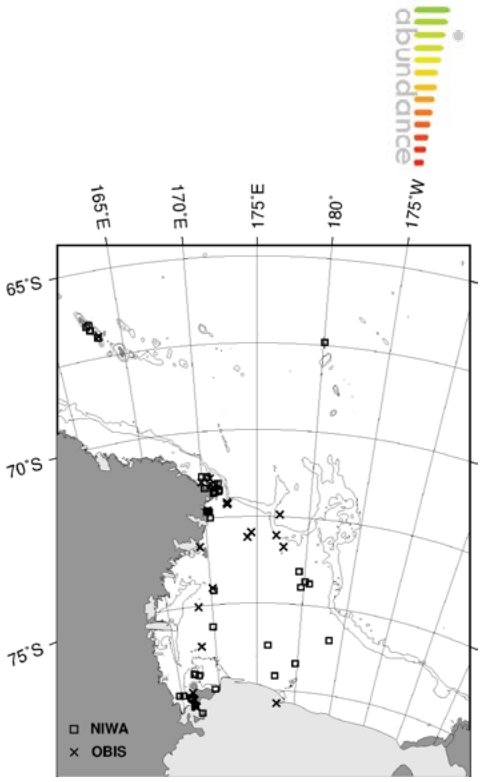
main image: Rob Budd, inset image: Kate Neill

morphology | surface | substrate | habitat



Five arms; plates on upper and marginal surfaces bearing several pointed spines grouped on small, raised columns; marginal plates only slightly obvious and vertical in position; one large, glassy tipped spine on each oral plate, pointing away from the mouth; tube feet in two rows.

Reported from the South Pacific Ocean (Chile), southern Indian Ocean (Crozet Islands, Heard Island and the Prince Edward Islands), South Atlantic Ocean (Argentina, Bouvet Island and the Falkland Islands) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Odontaster meridionalis

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Glabraster antarctica (E.A. Smith, 1876)

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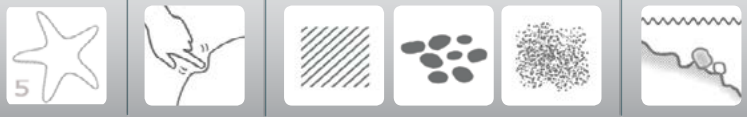
(Previously known as *Porania antarctica glabra*)

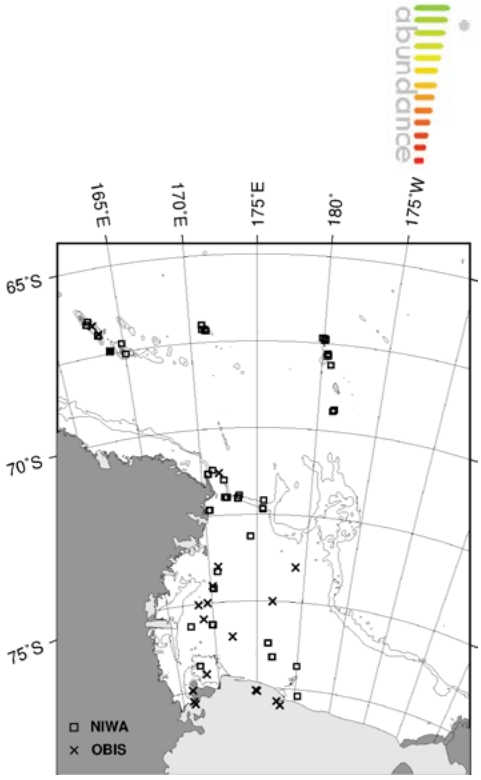
main image: DTIS, inset image: Stefano Schiaparelli

morphology | surface | substrate | habitat



Five short arms; large fleshy rounded body; upper surface may carry some enlarged spines; enlarged spines on margins; lower surface fleshy with no spines; tube feet occur in two rows and have sucking discs.

Reported from the South Pacific Ocean (Chile and Macquarie Island), southern Indian Ocean (Crozet Islands, Kerguelen Islands and Heard Island), South Atlantic Ocean (Argentina, Bouvet Island and the Falkland Islands) and the Antarctic Ocean (Amundsen Sea, Bellinghausen Sea, Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Enderby Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Lophaster gaini Koehler, 1912

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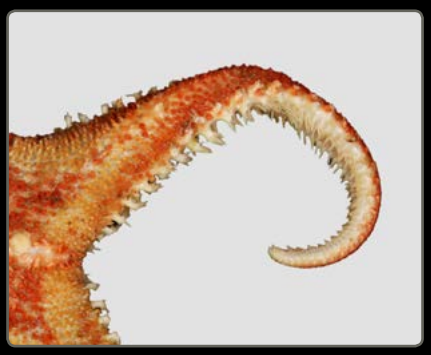


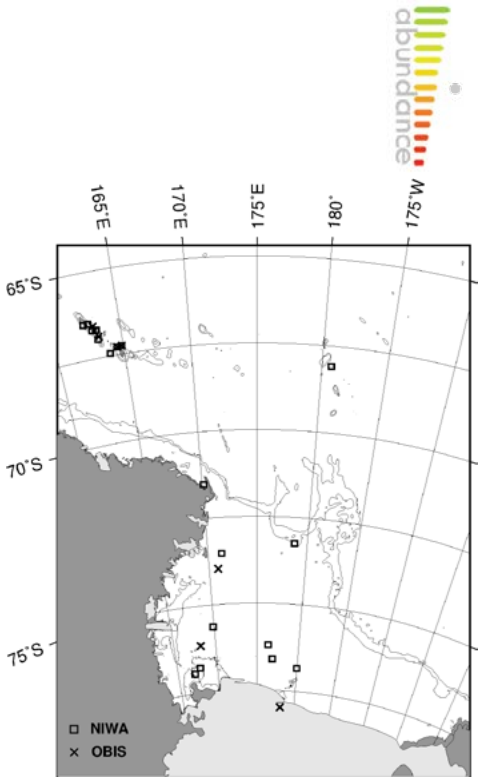
4 cm

main and upper inset image: Peter Marriott, lower inset image: Kate Neill

morphology | surface | substrate | habitat

Five arms; both series of marginal plates with 'tufts' of spines, superomarginal ones smaller than inferomarginal ones, but definitely larger than the 'tufts' of the plates of the upper surface; furrow spines in two series, one parallel to the furrow, the other series at an angle to it.

Reported from the Antarctic Ocean (Weddell Sea, Scotia Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....

Cuenotaster involutus

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976). Asteroids fro m the Ross Sea and the Balleny Islands. NZOI Records 3 (4): 21–31.

Paralophaster antarcticus (Koehler, 1912)

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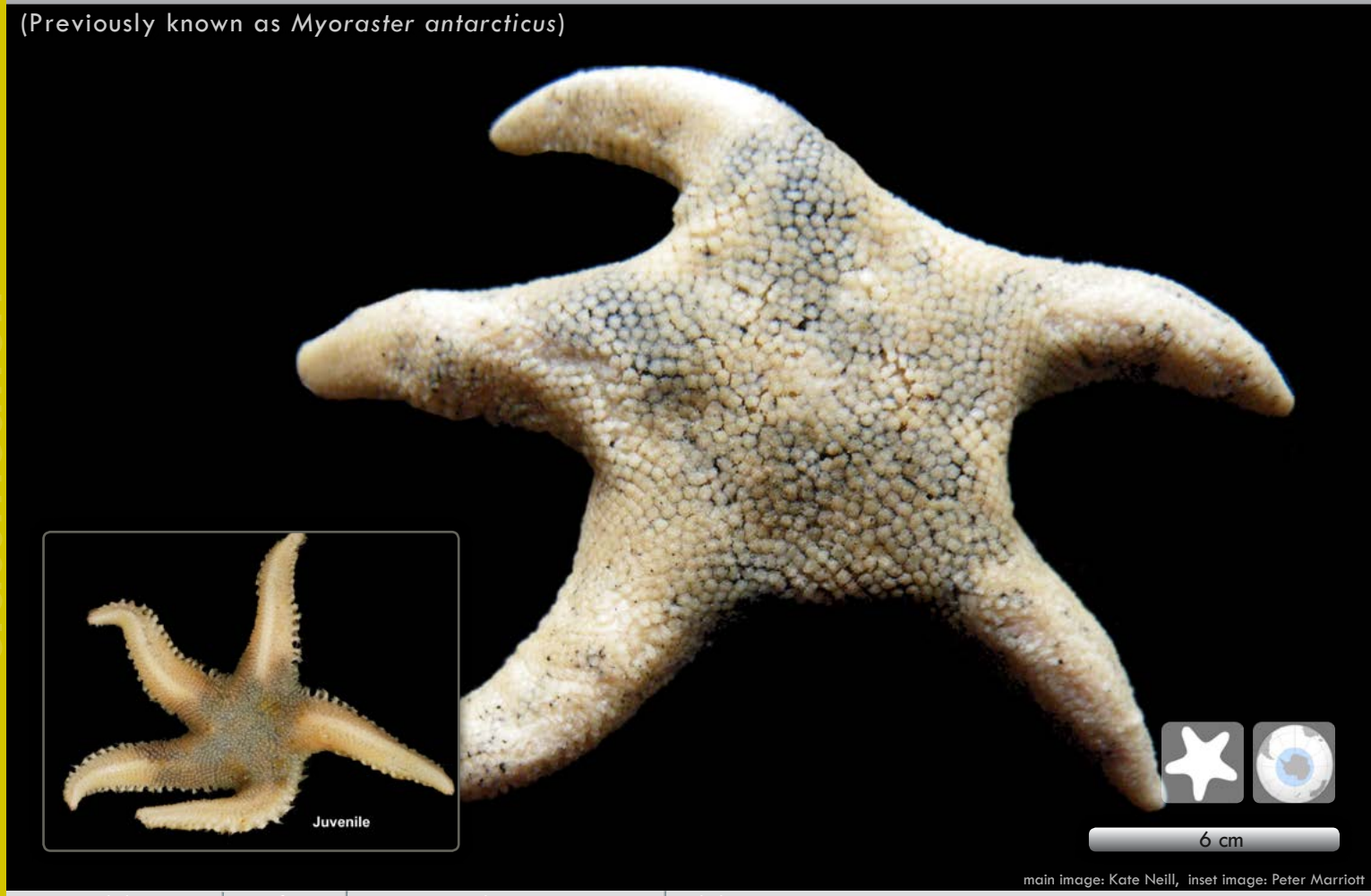
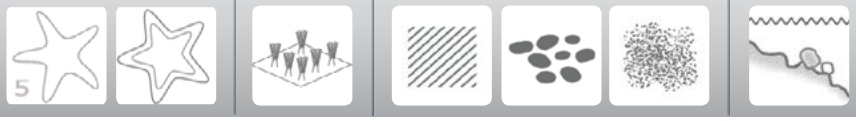
(Previously known as *Myoraster antarcticus*)

Class Asteroidea Order Valvatida Family Solasteridae



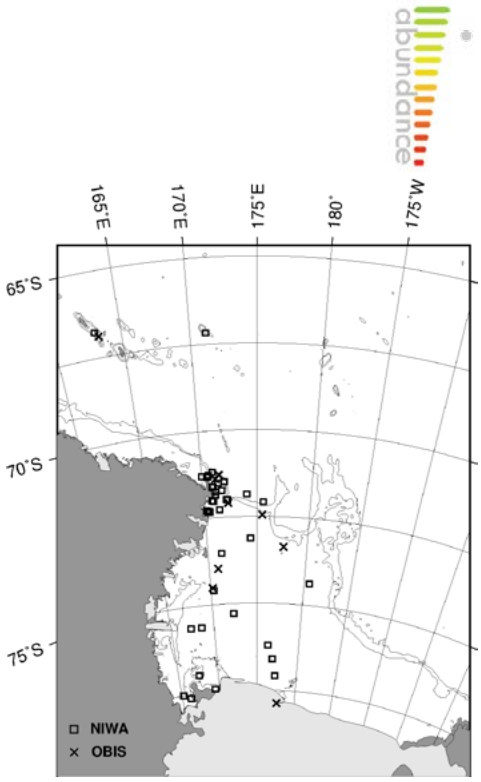
main image: Kate Neill, inset image: Peter Marriott

morphology surface substrate habitat



Five arms; plates with small columns bearing 30–40, small, closely packed spines; plates of upper marginal series slightly larger than those of the upper surface; plates of lower series the largest. Tube feet in two rows with sucking discs.

Reported from the Southern Indian Ocean (Crozet Islands, Kerguelen Islands and Heard Island), South Atlantic Ocean (Argentina and Bouvet Island) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....

Paralophaster godfroyi asperatus

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Paralophaster godfroyi asperatus (Koehler, 1920)

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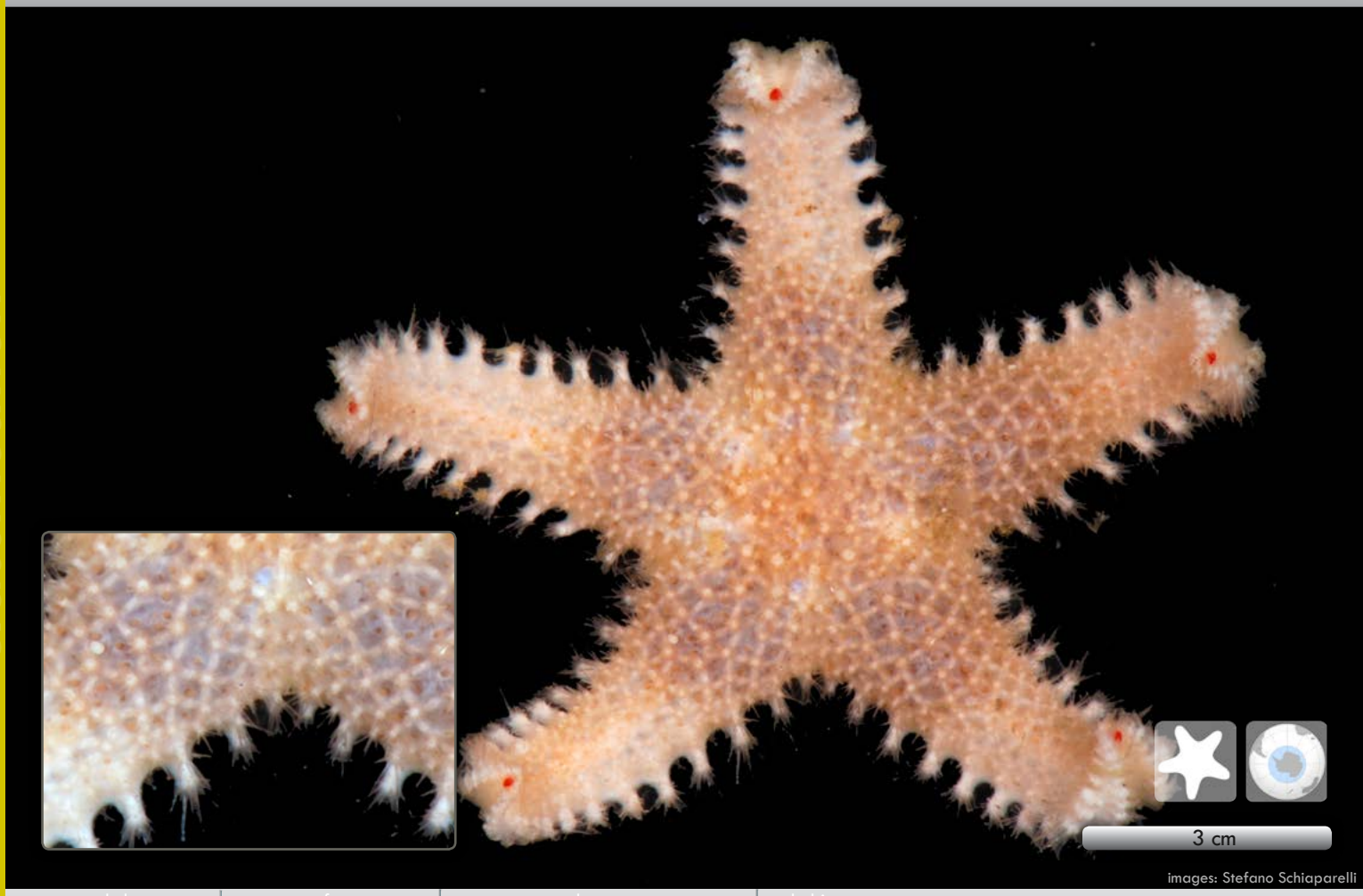
Class Asteroidea Order Valvatida Family Solasteridae

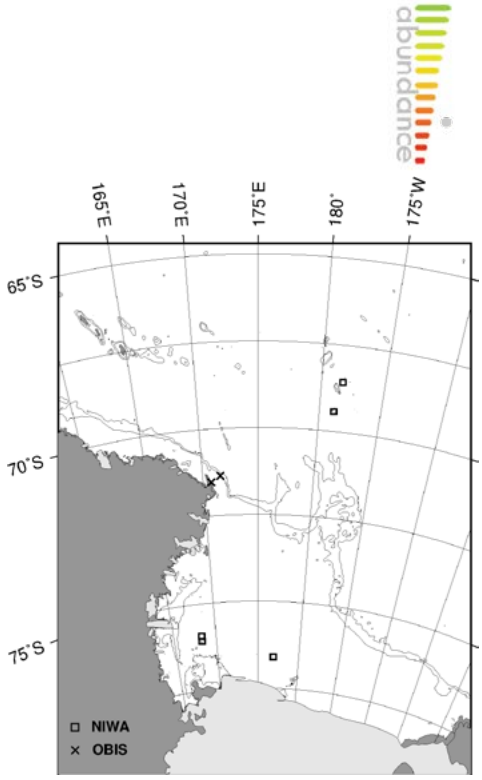


images: Stefano Schiaparelli

morphology surface substrate habitat

Five arms; plates on the upper surface spaced apart in a net-like pattern; spines on upper marginal series about 20 per plate and needle-shaped; plates of upper marginal series are the same size as those on the upper surface and smaller than the lower marginal series. Tube feet in two rows.

Reported from the Antarctic Ocean (Enderby Land, Queen Mary Land and the Ross Sea and adjacent areas).



It could also be.....

Paralophaster lorioli (not common, not covered in this guide)
Paralophaster antarcticus (particularly juveniles)

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Solaster regularis subarcuatus Sladen, 1889

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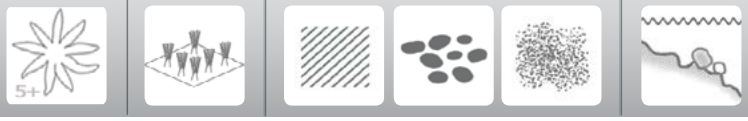
(Previously known as *Crossaster canopus*)

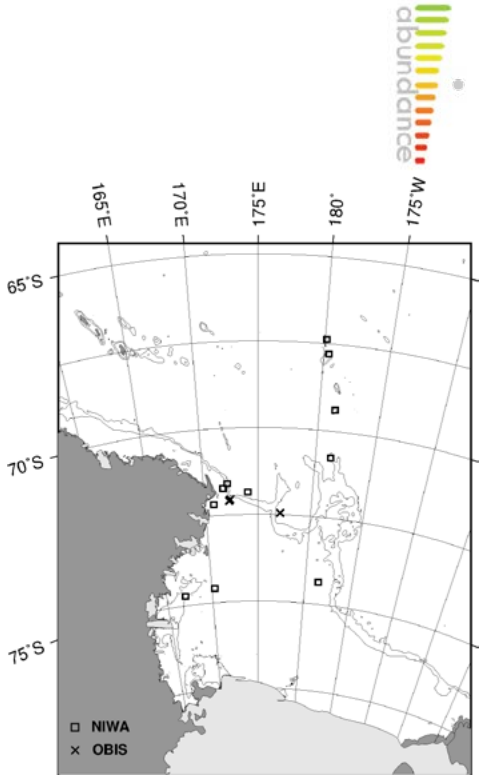
main image: DTIS, inset image: Peter McMillan

morphology surface substrate habitat



Eight (sometimes ten) arms; plates on upper surface spaced apart, they bear bunches of spines on small columns; the marginal plates also bear slightly larger bunches of spines on small columns; tube feet in two rows with small, sucking discs.

Reported from the Southern Indian Ocean (Kerguelen Islands) and the Antarctic Ocean (Ross Sea and adjacent areas).



It could also be.....

Solaster longoi (not common, not covered in this guide)
Crossaster pencillatus (not common, not covered in this guide)

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Peribolaster macleani Koehler, 1920

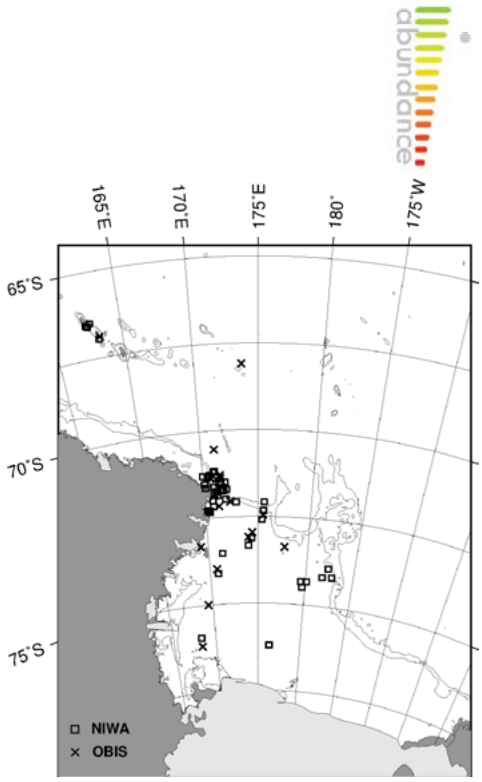
Return to Index

images: Peter McMillan

morphology | surface | substrate | habitat

Five arms, very short; upper surface covered with a membrane that bears bundles of spines that are webbed together into little cone-like structures; tube feet in rows of four.

Reported from the Antarctic Ocean (Weddell Sea, Queen Maud Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



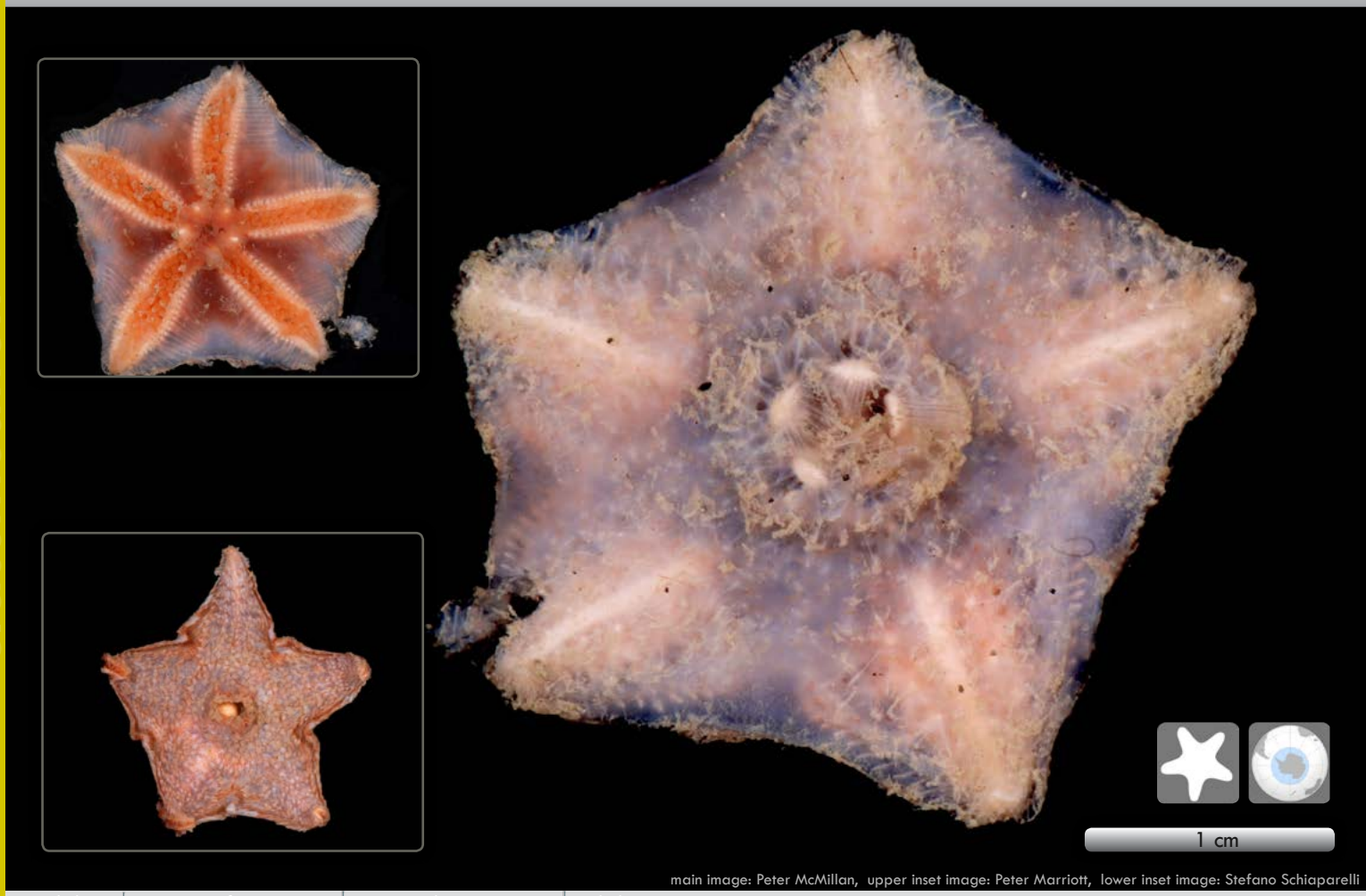
It could also be.....
Pteraster stellifer

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Hymenaster spp. Thomson, 1873

Return to Index



main image: Peter McMillan, upper inset image: Peter Marriott, lower inset image: Stefano Schiaparelli

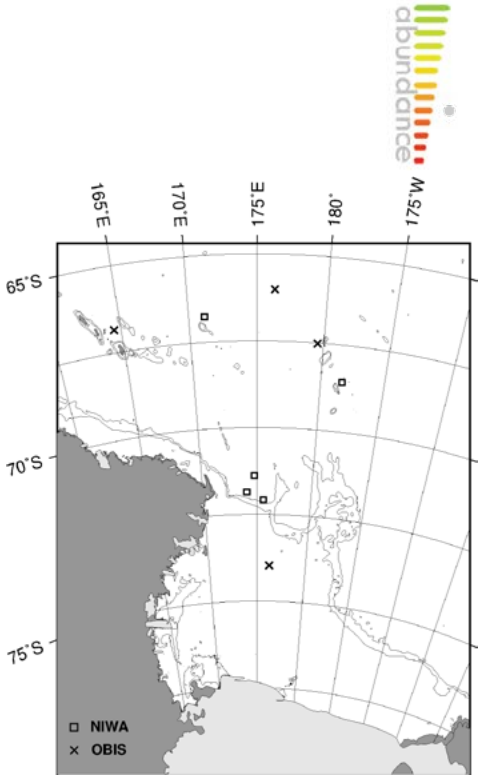
morphology | surface | substrate | habitat

Geographical and depth distributions described here are based on available data for *Hymenaster caelatus, H.crucifer, H. edax, H. sacculatus* (OBIS) and *Hymenaster* sp. They are similar in appearance, and the diagnostic characters given below are for the genus.

Five arms, short; disc large and flat; disc covered in membrane which is carried above the surface of the disc on the tips of spines; hole in centre of disc surrounded by flaps of skin; furrows wide, tube feet in rows of four.

Reported from the South Pacific Ocean (South Pacific Abyssal Province), South Atlantic Ocean (South Atlantic Deep) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Adélie Land and the Ross Sea and adjacent areas).

The depth range of this species is from 1620 – 3380 m (OBIS: 581 – 3514 m).



It could also be.....

Pteraster stellifer

Clark, A.M. (1962) Asteroidea. British Australian (and) New Zealand (BANZ) Antarctic Research Expedition 1929–1931, B9, 68–70.

Pteraster stellifer Sladen, 1882

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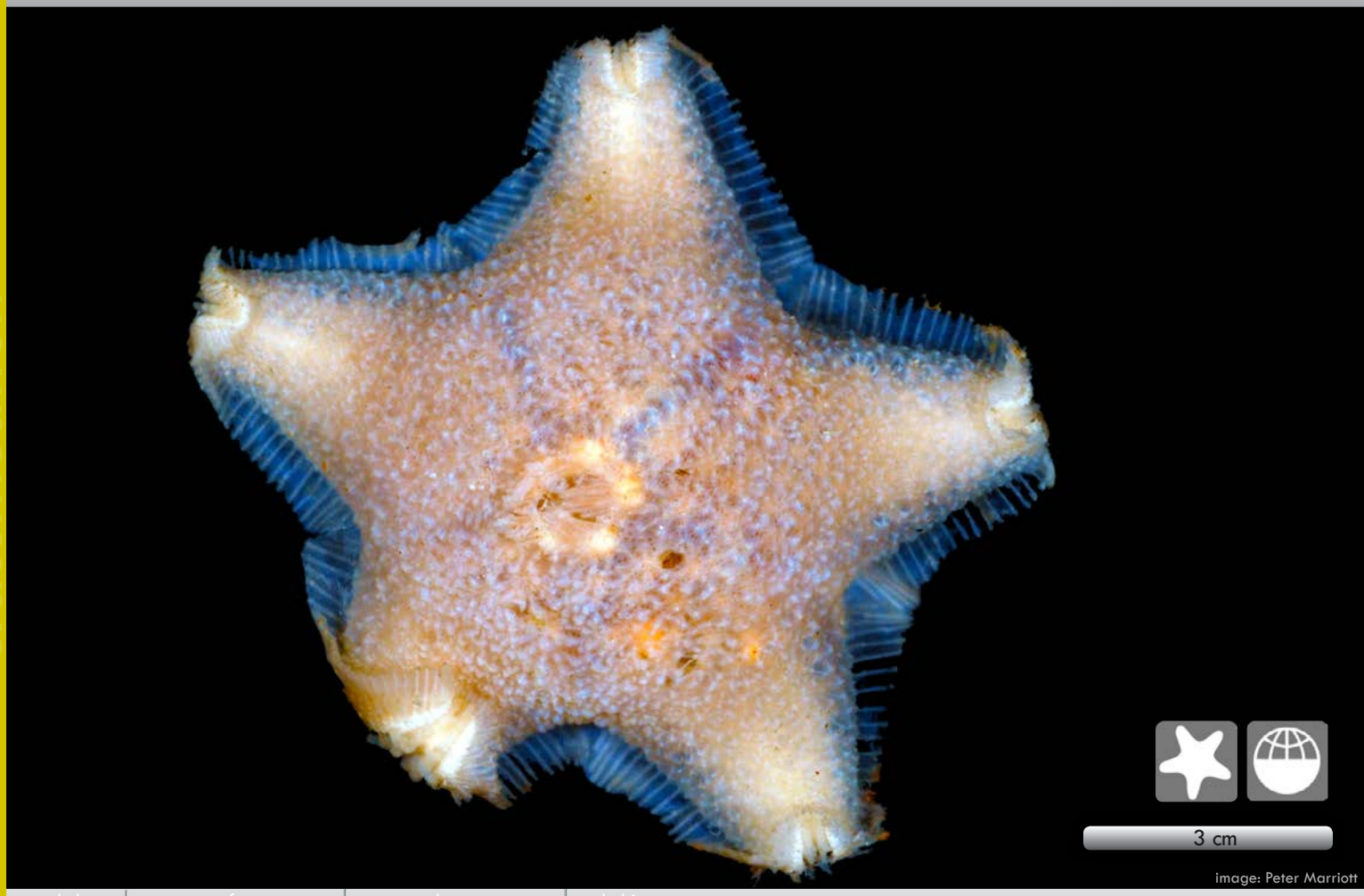


image: Peter Marriott

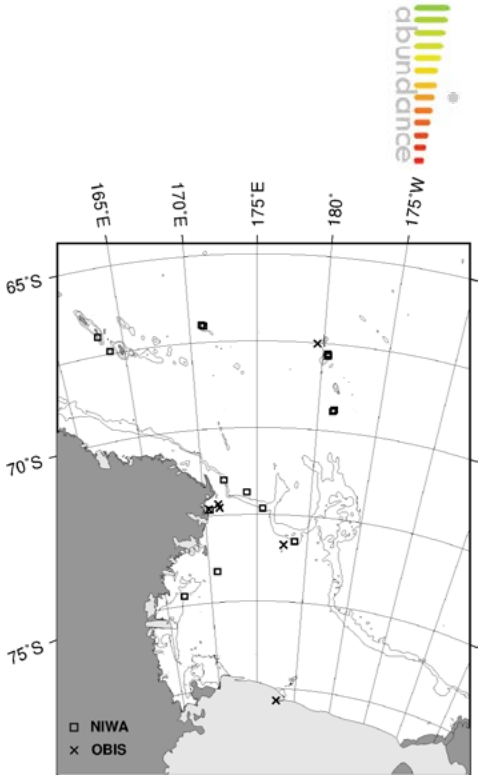
morphology | surface | substrate | habitat

to 1990m

Five arms, short; disc cushion-like; disc covered in membrane which is carried above the surface of the disc on the tips of spines; hole in centre of disc surrounded by flaps of skin; furrows wide, tube feet in rows of four.

Reported from the South Pacific Ocean (Chile, Macquarie Island and the South Pacific Abyssal Province), South Atlantic Ocean (Uruguay, Argentina, Bouvet Island and the Falkland Islands) and the Antarctic Ocean (Amundsen Sea, Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).

Also known as *Pteraster* (*Apterodon*) *stellifer*.



It could also be.....

Hymenaster spp.

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Echinasteridae spp. Verrill, 1870

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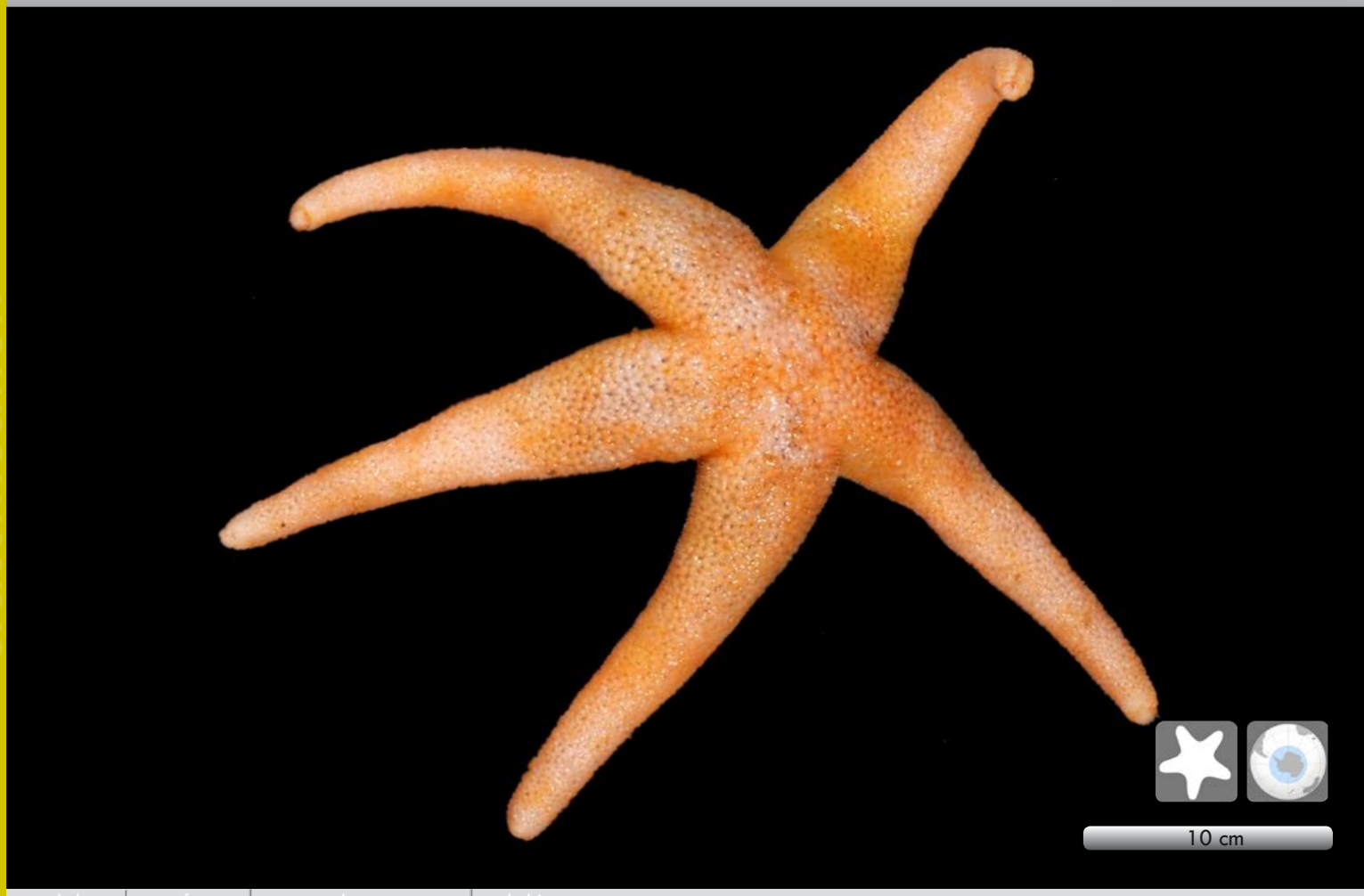
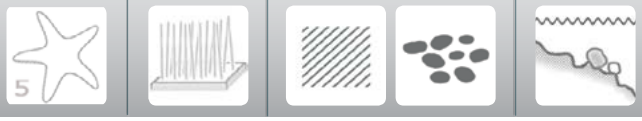


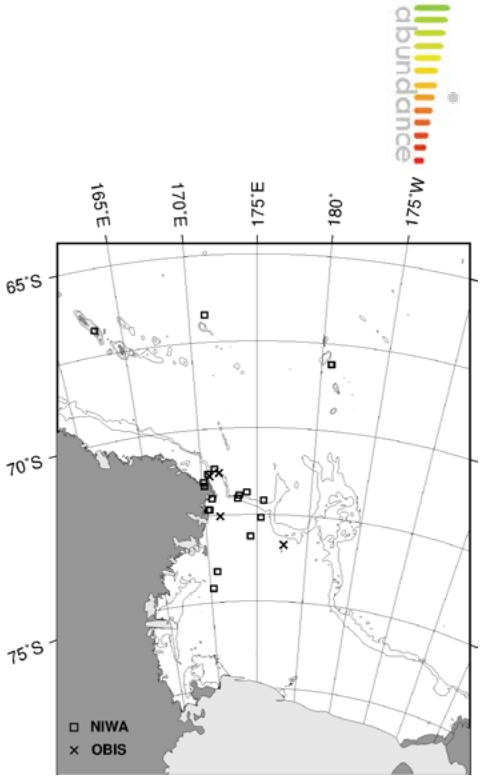
morphology | surface | substrate | habitat



Geographical and depth distributions described here are based on available data for *Henricia smilax*, *Henricia* sp. and *Rhopiella hirsuta*. They are very similar in appearance, and the diagnostic characters given below are for the family.

(Ross Sea Echinasteridae) Disc small; arms five, elongate with bluntly rounded tips; spines or spinelets small and all of a similar size, often partially buried in skin; furrow narrow and the plates lining it often have angular margins; papulae widely distributed; tube feet in two rows; no pedicellariae.

Reported from the Southern Indian Ocean (Crozet Islands, Kerguelen Islands and Heard Island), South Atlantic Ocean (South Atlantic Deep) and the Antarctic Ocean (Antarctic Peninsula, Scotia Sea, Queen Maud Land, Prydz Bay, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....

Pedicellaster hypernotius
Smilasterias spp.

Clark, A.M. (1962) Asteroidea. British Australian (and) New Zealand (BANZ) Antarctic Research Expedition 1929–1931, B9, 68–70.

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Diplasterias brandti (Bell, 1881)

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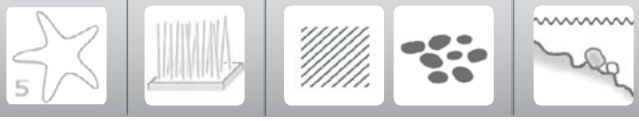
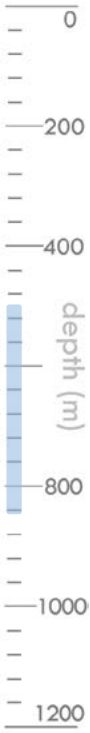
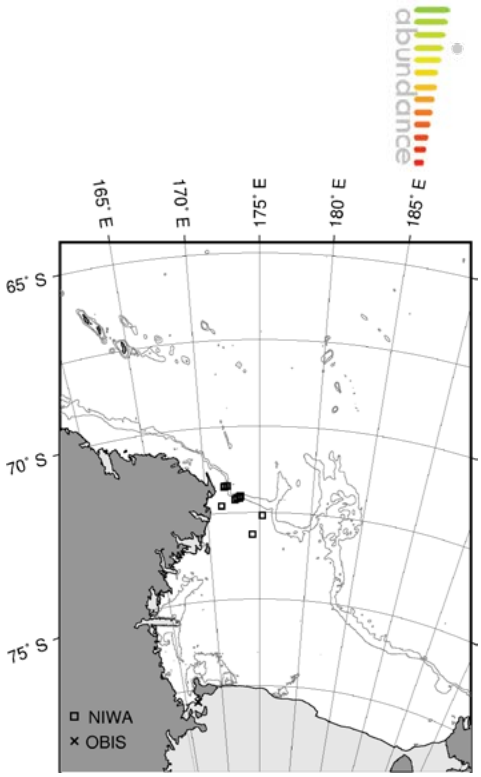
morphology surface substrate habitat





Five arms; arms usually chubby; small disc; upper surface covered in similar sized spines that may not be obvious; a wide, fleshy channel between the upper and lower marginal plates; tube feet in four rows.

Reported from the South Pacific Ocean (Chile), South Atlantic Ocean (Uruguay, Argentina, Bouvet Island, Falkland Islands and the South Atlantic Deep) and the Antarctic Ocean (Bellinghausen Sea, Antarctic Peninsula, Scotia Sea, Queen Maud Land, Prydz Bay, Adélie Land and the Ross Sea).



It could also be.....
Diplasterias brucei

Clark A.M. (1962). Asteroidea. B.A.N.Z. Antarctic Research Expedition 1929-1931, B9: 68-70.

Diplasterias brucei Verrill, 1870

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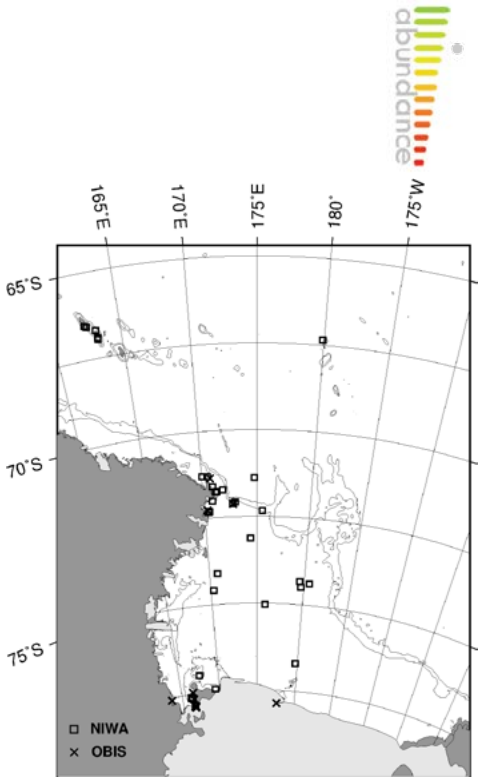
7 cm

upper inset images: DTIS, main and lower inset image: Rob Stewart

morphology | surface | substrate | habitat

Five arms; small disc; clear series of carinal plates running down the centre of the upper surface of each arm; upper and lower marginal plates all bear prominent spines; a wide, fleshy channel between the upper and lower marginal plates; some larger specimens become very fleshy.

Reported from the South Pacific Ocean (Chile), southern Indian Ocean (Crozet Islands, Heard Island and the Prince Edward Islands), South Atlantic Ocean (Argentina) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Enderby Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea).



It could also be.....
Diplasterias brandti

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Lysasterias spp. Fisher, 1908

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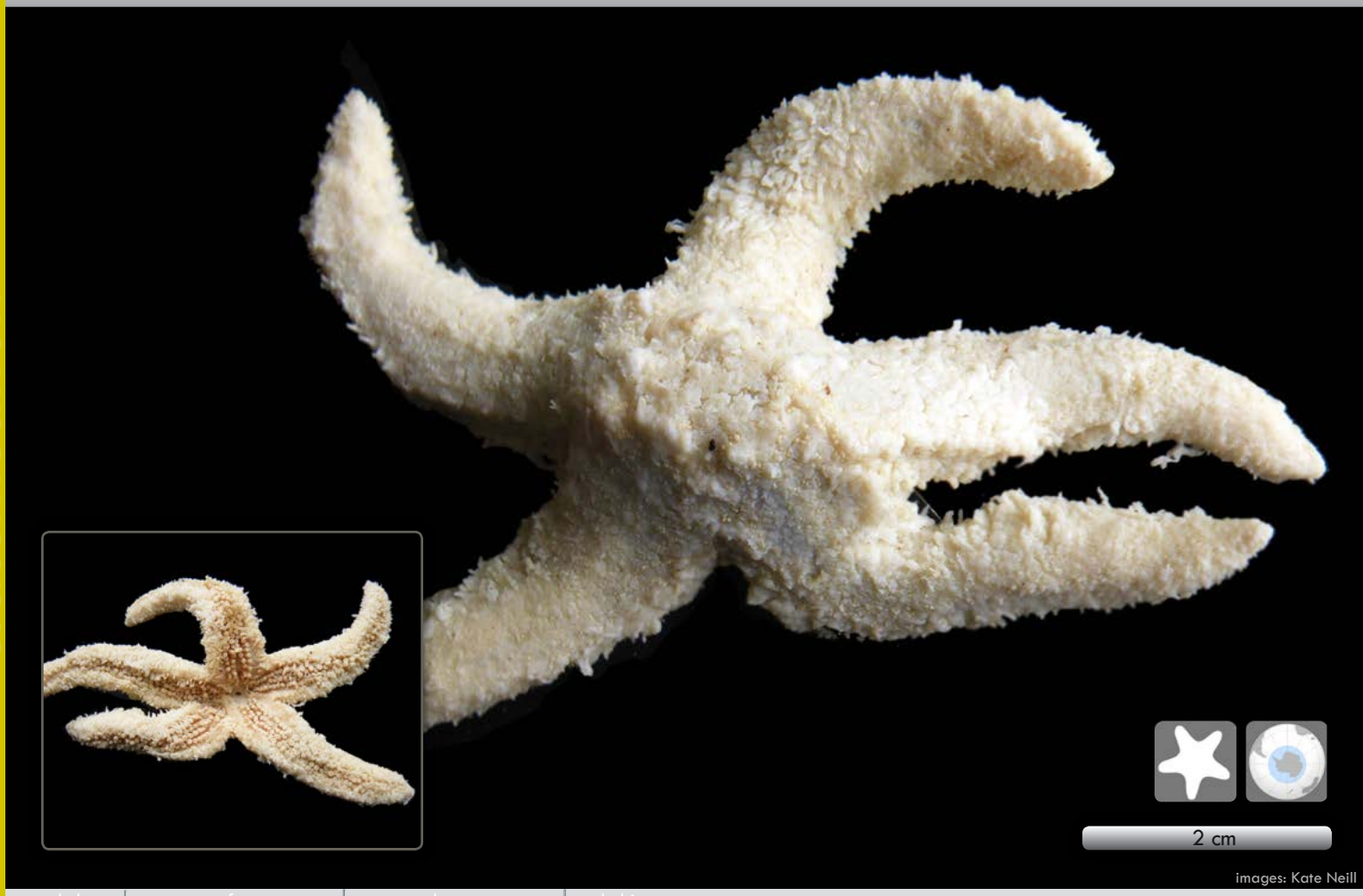
Class Asteroidea Order Forcipulatida Family Asteriidae



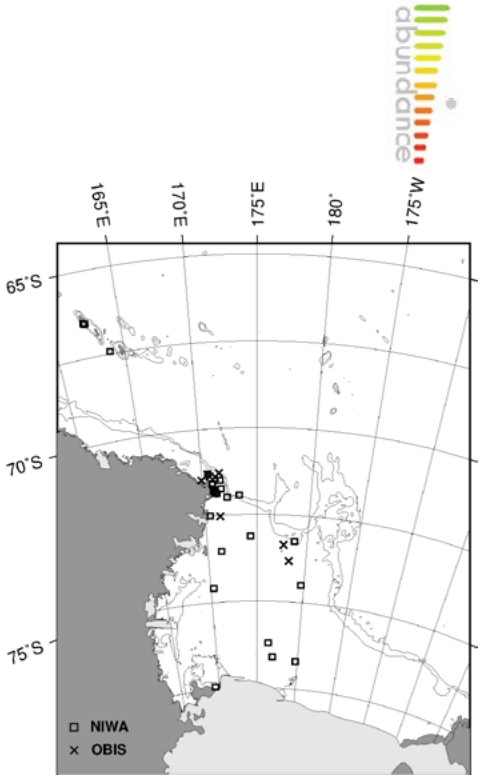
images: Kate Neill

morphology surface substrate habitat

There are three species of *Lysasterias* reported from the Ross Sea (*L. adeliae*, *L. joffrei* and *L. perrieri*). They are difficult to tell apart without a microscope, so characters and distributions below are for the genus.

(Ross Sea *Lysasterias*) Upper skeleton reduced with very few plates; five arms; upper surface covered in thick, pustular skin; enlarged spines sometimes present on side of arms, but not obvious; tube feet have distinct sucking discs and occur in four rows.

Reported from the South Atlantic Ocean (Bouvet Island) and the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Prydz Bay, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Perknaster spp.

Clark, A.M. (1962) Asteroidea. British Australian (and) New Zealand (BANZ) Antarctic Research Expedition 1929–1931, B9, 68–70.

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Notasterias armata (Koehler, 1911)

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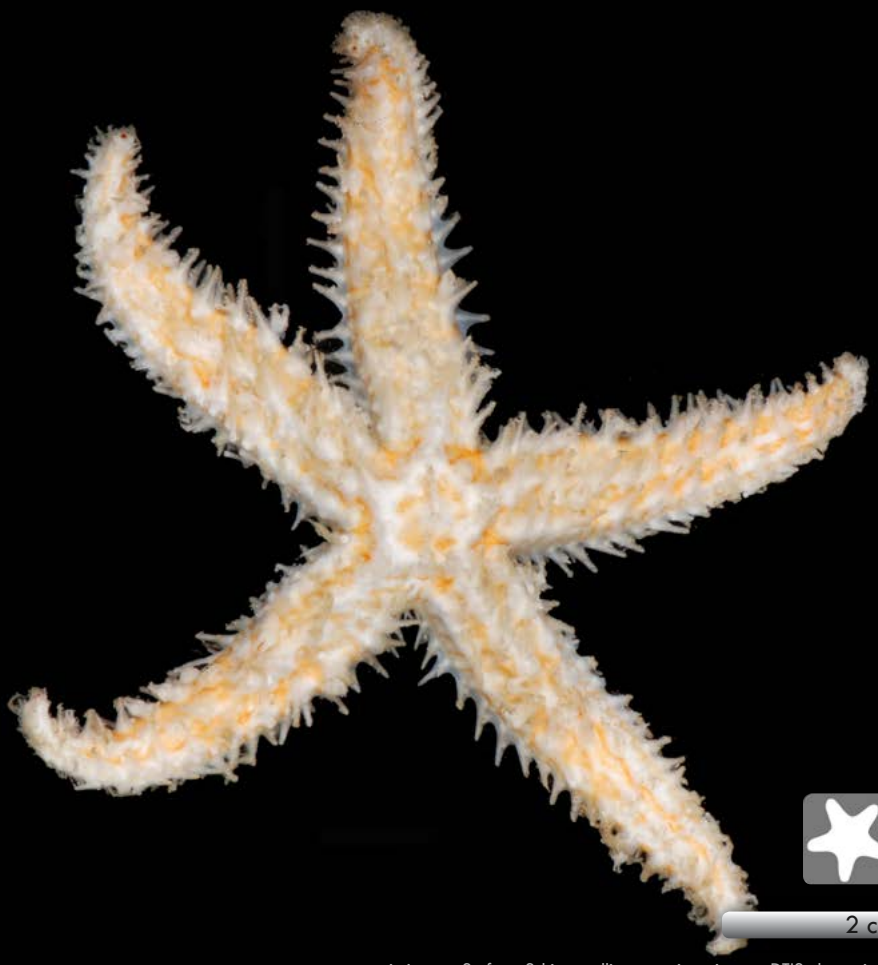
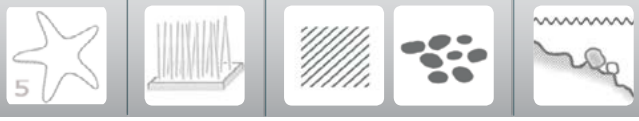
Class Asteroidea Order Forcipulatida Family Asteriidae



2 cm

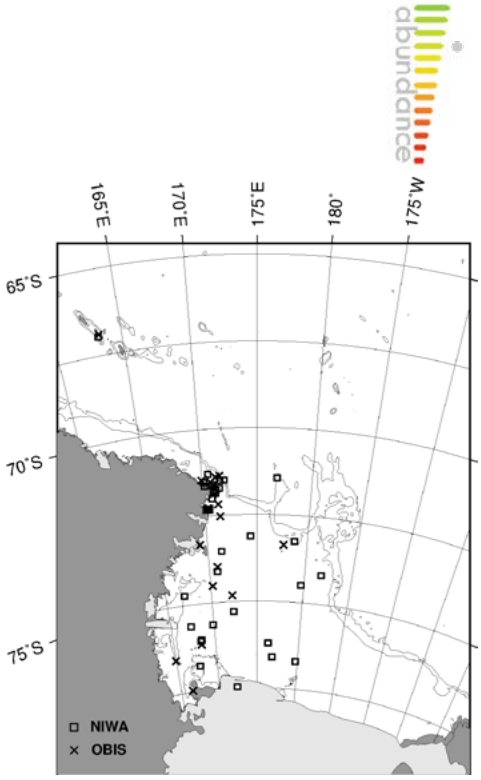
main image: Stefano Schiaparelli, upper inset image: DTIS, lower inset image: Kate Neill

morphology | surface | substrate | habitat



Five arms; enlarged spines in rows on upper surface; large, crossed pedicellariae can often be seen with the naked eye and have a single tooth on each jaw.

Reported from the Southern Indian Ocean (Kerguelen Islands), South Atlantic Ocean (Bouvet Island) and the Antarctic Ocean (Amundsen Sea, Antarctic Peninsula, Queen Maud Land, Enderby Land, Prydz Bay, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....

Notasterias stolophora

Notasterias bongrainii (not common, not covered in this guide)

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976). Asteroids from the Ross Sea and the Balleny Islands. NZOI Records 3 (4): 21-31.

Notasterias stolophora Fisher, 1940

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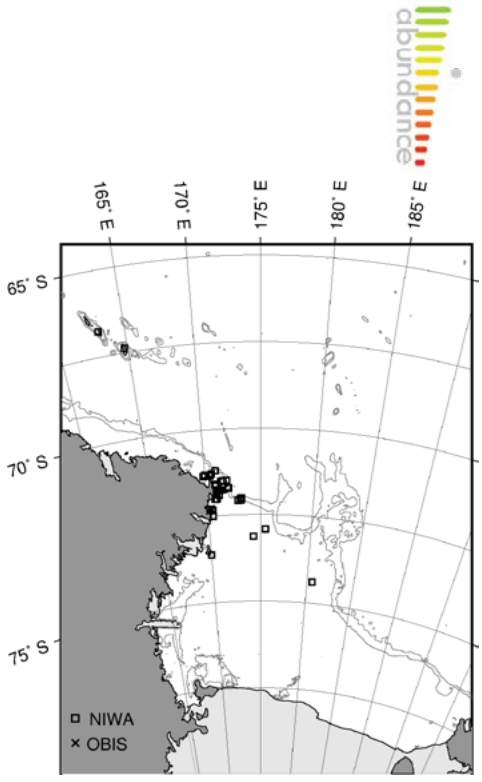
5 cm

images: Rob Stewart

morphology | surface | substrate | habitat

Five arms; enlarged spines in rows on upper surface; similar in appearance to *Notasterias armata*, but crossed pedicellariae are much smaller; tube feet in four rows with sucking discs.

Reported from the Antarctic Ocean (Antarctic Peninsula, Weddell Sea, Scotia Sea, Queen Maud Land, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....

Notasterias armata

Notasterias bongrainii (not common, not covered in this guide)

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976). Asteroids from the Ross Sea and the Balleny Islands. NZOI Records 3 (4): 21-31

Psalidaster mordax rigidus A.M. Clark, 1962

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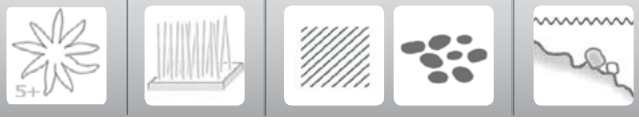
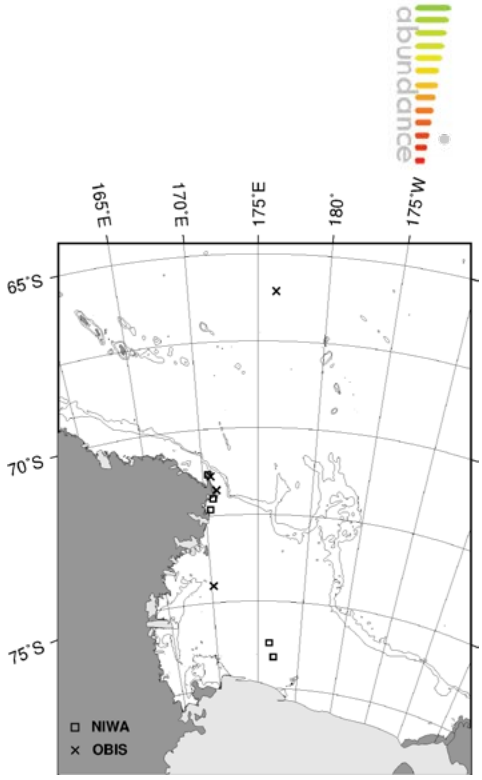
images: Kate Neill

morphology surface substrate habitat



Eleven arms (sometimes 10–12); small disc; upper surface with single spines; these spines with one or two large pedicellariae at the base; pedicellariae have a large, strong base and two interlocking teeth; tube feet with distinct sucking discs occur in two rows in a wide furrow.

Reported from the Antarctic Ocean (MacRobertson Land and the Ross Sea and adjacent areas).



It could also be.....
Saliasterias brachiata

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Saliasterias brachiata Koehler, 1920

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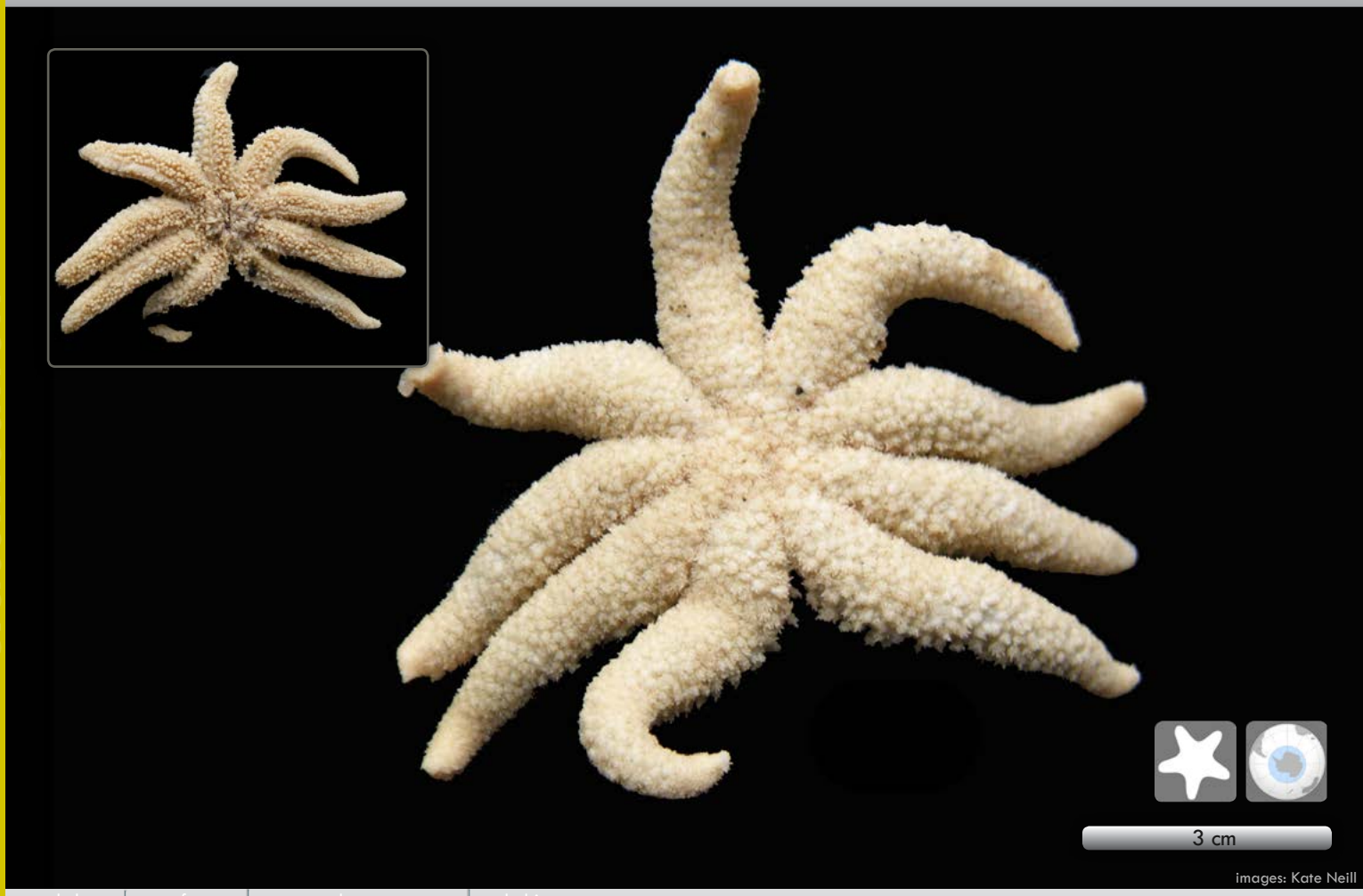
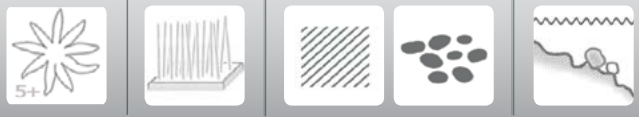
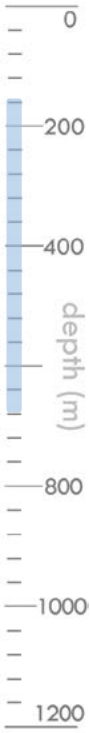


images: Kate Neill

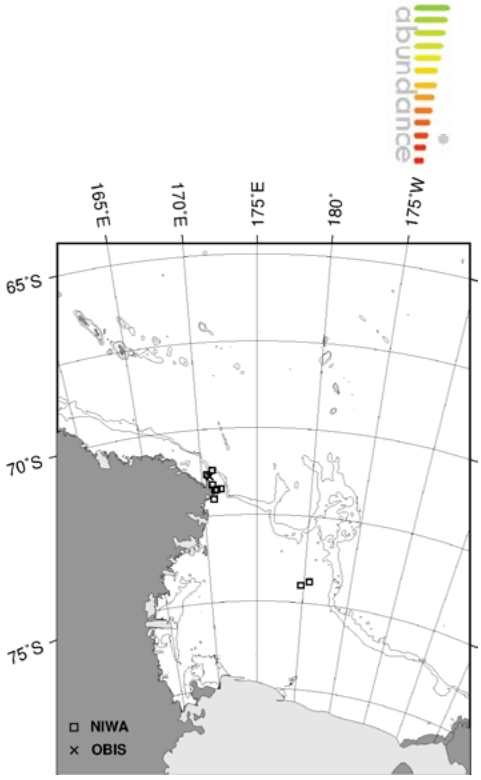
morphology surface substrate habitat





Nine (sometimes 10) arms; plates of the upper surface have three to six spines wreathed with skin and rosettes of small pedicellariae; marginal plates not very distinct; tube feet in two rows close to the disc, sometimes four rows closer to the arm tips.

Reported from the Antarctic Ocean (Scotia Sea, Davis Sea, Adélie Land and the Ross Sea and adjacent areas).



It could also be.....
Psalidaster mordax

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Labidiaster annulatus Sladen, 1889

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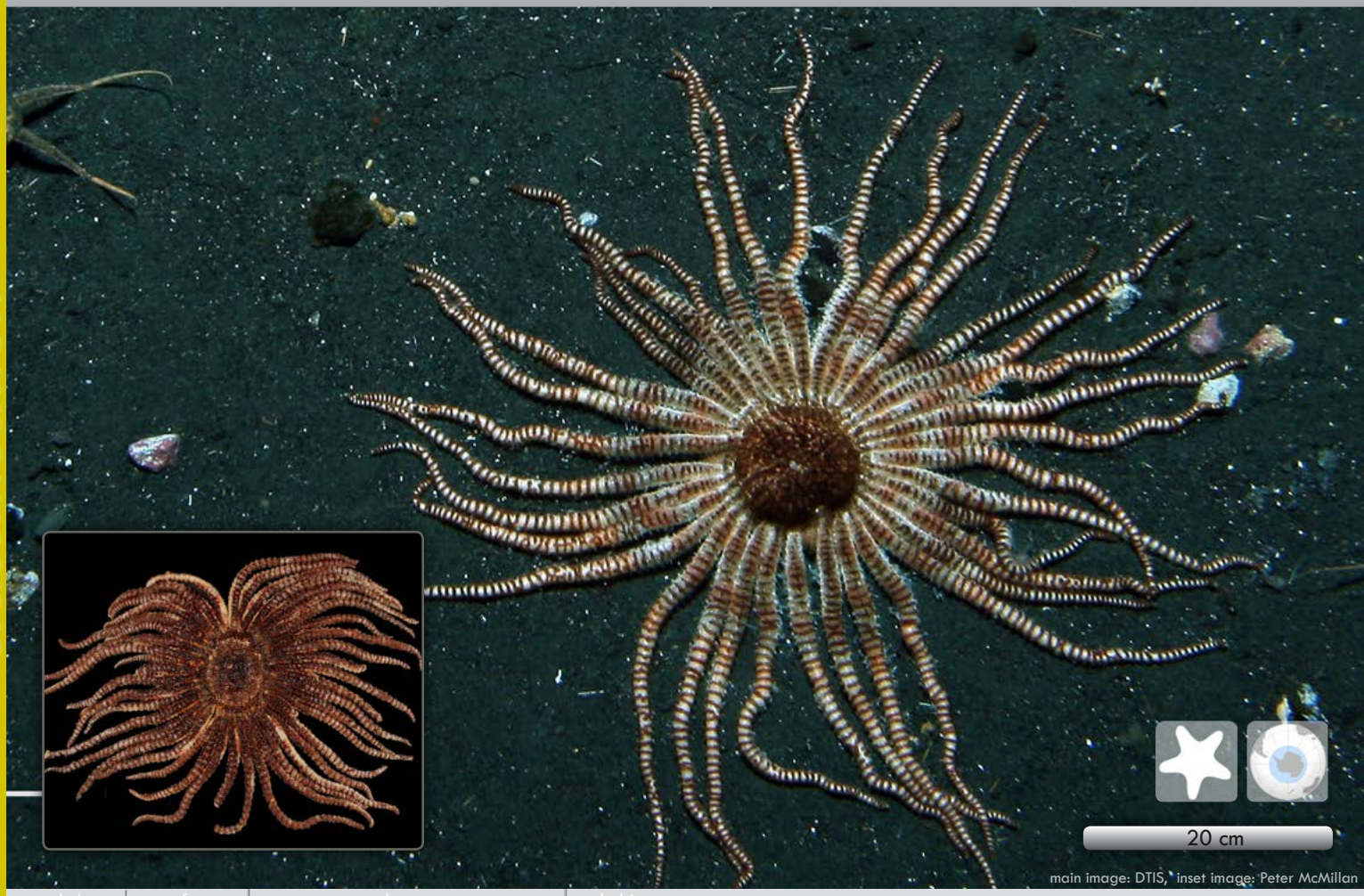
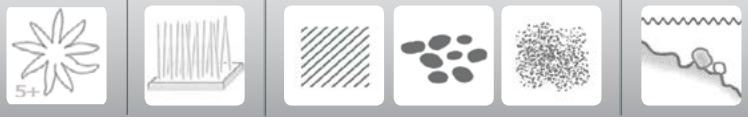


main image: DTIS, inset image: Peter McMillan

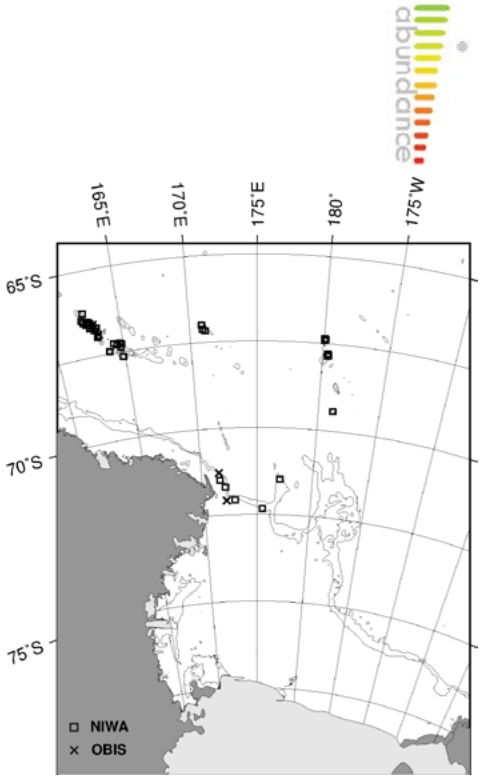
morphology surface substrate habitat



to 1395m

Large, about 48 arms, arms distinct from disc, and regularly banded with raised rings.

Reported from the Southern Indian Ocean (Crozet Islands, Kerguelen Islands and Heard Island), South Atlantic Ocean (Bouvet Island and the Falkland Islands) and the Antarctic Ocean (Weddell Sea, Scotia Sea, Davis Sea, Adélie Land and the edge of the Ross Sea and adjacent areas).



McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Pedicellaster hypernotius Sladen, 1889

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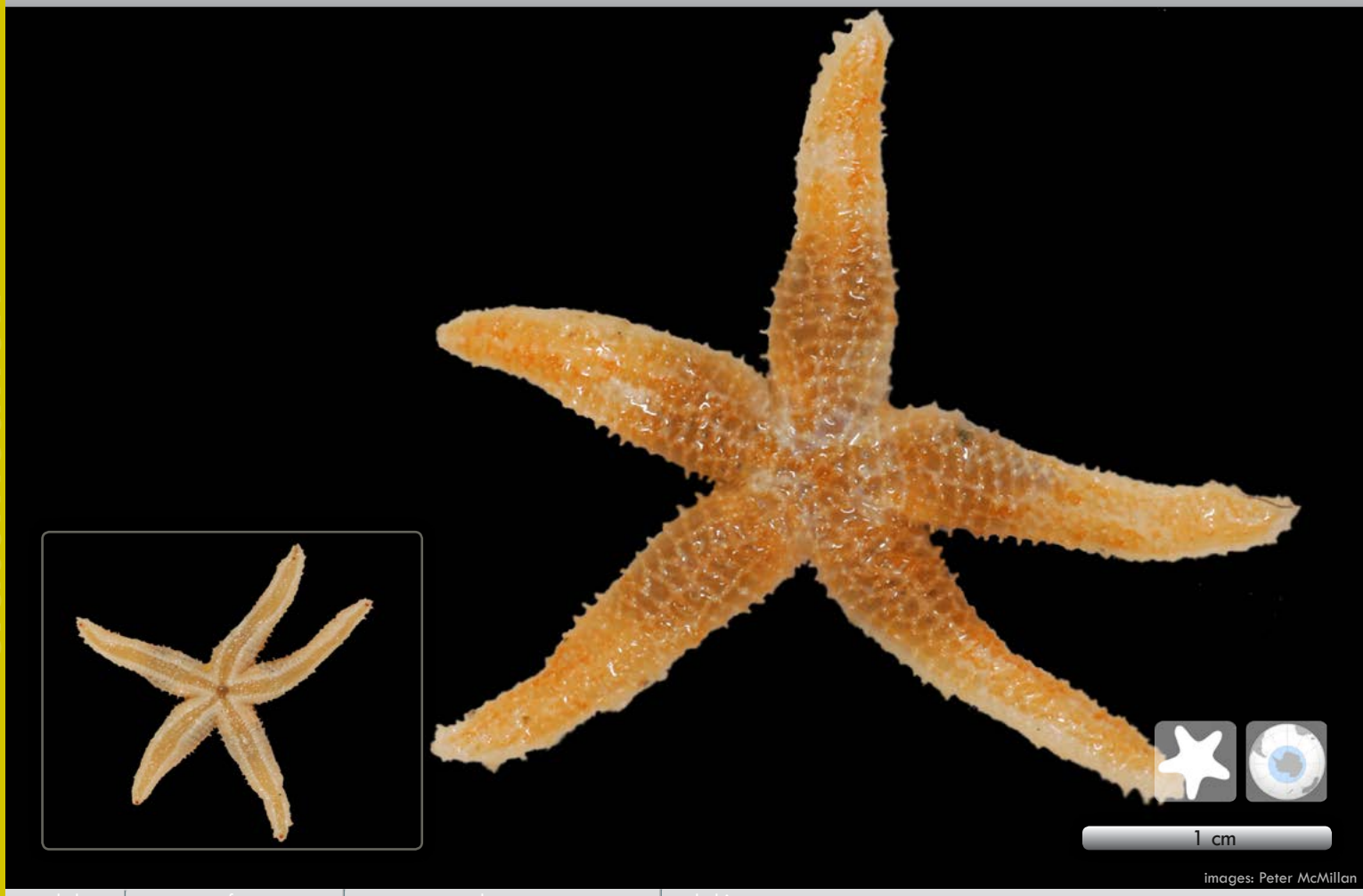
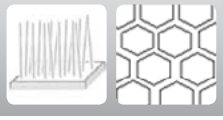


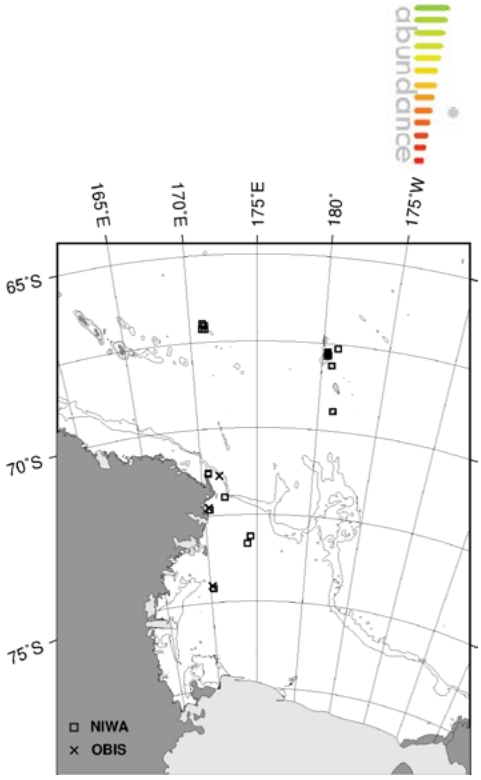
images: Peter McMillan

morphology | surface | substrate | habitat



Five arms; small, with diameter less than five cm; upper surface is a grid of small plates and membranous areas; upper surface covered in small (< 1 mm) pedicellarie; slightly enlarged spines on lower marginal series. Tube feet in two rows with distinct sucking discs.

Reported from the Southern Indian Ocean (Kerguelen Islands), South Atlantic Ocean (South Atlantic Deep) and the Antarctic Ocean (Amundsen Sea, Bellinghausen Sea, Antarctic Peninsula, Weddell Sea and the Ross Sea and adjacent areas).



It could also be.....
juvenile *Smilasterias* spp.

Clark, H.E.S. (1963) The Fauna of the Ross Sea. Part 3. Asteroidea. New Zealand Oceanographic Institute Memoir 21, 84 pp.

McKnight, D.G. (1976) Asteroids from the Ross Sea and the Balleny Islands. New Zealand Oceanographic Records, 3(4), 21–31.

Smilasterias spp. Sladen, 1889

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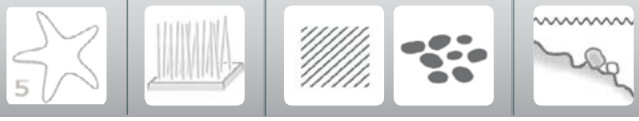
8 cm

main image: Peter McMillan, inset image: DTIS

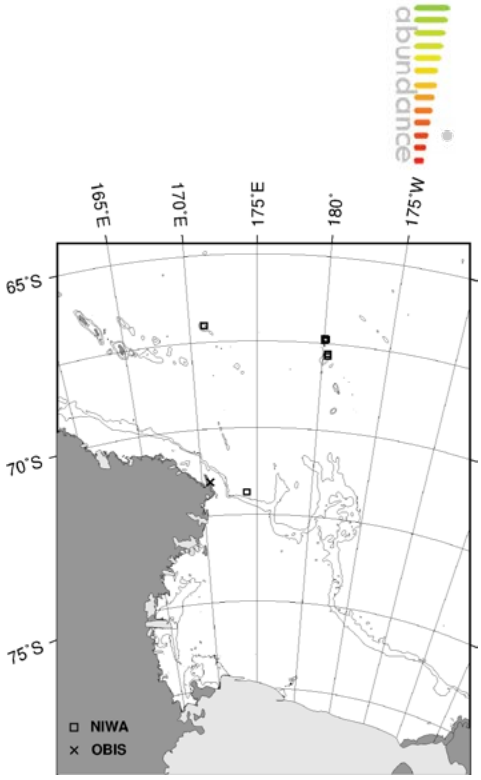
morphology | surface | substrate | habitat



Geographical and depth distributions described here are based on available data for *Smilasterias* sp. and a single specimen of *Smilasterias triremis* from OBIS. They are very similar in appearance, and the diagnostic characters given below are for the genus.

Five arms, distinct from disc and constricted at base adjacent to disc; disc small; upper surface with rows of small spines; furrows wide, tube feet in rows of two.

Reported from the South Pacific Ocean (Macquarie Island and the South Pacific Abyssal Province), southern Indian Ocean (Crozet Islands, Kerguelen Islands and Heard Island) and the Antarctic Ocean (Antarctic Peninsula, Scotia Sea and the edge of the Ross Sea and adjacent areas).



It could also be.....

Echinasteridae spp.
Pedicellaster hypernotius

Clark, A.M. (1962) Asteroidea. British Australian (and) New Zealand (BANZ) Antarctic Research Expedition 1929–1931, B9, 68–70.

icons

body plan

starfish	asteroid echinoderm, sea star

life history

Antarctic	Ross Sea and the Southern Ocean at latitudes less than approximately 55 degrees south
widespread	
Southern hemisphere	

morphology

margins	an obvious series of marginal plates which may or may not bear spines
5+ arms	> 5 arms, may be between 6 and 12
5 arms	5 long or short arms, sometimes 4 or 6 if damaged

surface

granular	surface covered in small-medium granules
leathery	thick skin, tough, flexible, slightly elastic
paxillate	surface carries paxillae which are small pillar-like projections with a cluster of spines on top
plates	bony units layered on the outer body wall
reticulate	a network of plates and fleshy areas
soft	soft to the touch, easily compressible, elastic
spiney	prickly bundles of spicules projecting from the body
spined	surface covered in spines
transparent	gelatinous and see-through, translucent
warty	bearing small flattened bumps or tubercles

substrate

mud	very fine muddy and silty sediments derived from terrigenous rocks, soils and clays
rock	hard substrate such as mudstone, sandstone, basalt, compressed carbonates
rubble	shell, stone, and pebble rubble

habitat

subtidal	exposed shoreline zone between high and low tides, including rock flats, pools, overhangs, crevices, organisms exposed to wave action, temperature extremes, full illumination, and desiccation

glossary

antipodean	naturally occurring in New Zealand and Australia, and may include seamounts and ridges to the north
asteroidea	scientific name for a a starfish or sea star
banded	stripes of two or more colours
bank	seabed raised into a bank of compacted rubble and other carbonate materials including shell, kina and asteroid hash; associated organisms are exposed to wave surge and currents, and subdued illumination
blunt	not sharp, rounded ends
carinal plates	the row of plates that runs down the center of the upper surface of each arm, may be prominent and bear spines
covered rock	sand and rubble spread over underlying hard substrata; associated organisms are attached to basement rock susceptible to inundation and scouring from wave surge and currents, and subdued illumination
diameter	the distance across the widest point of a circle
discoid	circular in shape, distinctively flattened
endemic	naturally occurring in New Zealand, but not elsewhere
environment	physical, chemical, ecological, behavioural and other conditions experienced by an organism
eurybathic	can live or be found at many depths
firm	requires some pressure to compress
fleshy	feels like skin or edam cheese, dense
furrow	the channel on the underside of starfish arms that contains the tube feet
glassy-tipped spine	spine with a shiny, translucent tip resembling glass
gonad	reproductive structure
granular	surface covered in small- to medium-sized rounded or angular granules, giving a sand-papery texture owing to calcareous or siliceous minerals in or on the surface of an organism
habitat	the environment and local situation in which an organism lives
hard	solid to the touch, not compressible, rigid
indents	underwater caves, shelves and overhangs, organisms that live there may experience wave surge, subdued illumination, or near darkness
interstices	the gaps and spaces between things, e.g. rocks, sand-grains or seaweed holdfasts
intertidal	exposed shoreline zone between high and low tides, including rock flats, pools, overhangs, crevices; organisms that live there are exposed to wave action, temperature extremes, full illumination, and desiccation
introduced	species first described beyond New Zealand waters, now occurring in New Zealand and other locations, invasive, adventive
jaw	the oral plate
lateral	side of an animal
leathery	thick, tough, flexible, slightly elastic
marginal plates	usually two series of plates that run around the margins of a starfish, the upper marginal series (superomarginal plates) and the lower marginal series (inferomarginal plates)
margins	edge of a surface
morphology	form and structure, shape
mottled	variable, blotchy, patterning of several colours
mud	very fine silty sediments derived from terrigenous rocks, soils and clays
naked	surface unadorned by spines or granules, usually smooth
native	naturally occurring in New Zealand, but may also occur naturally elsewhere
oral	related to the mouth of an animal
oral plate	the plate that occurs in the angle of the mouth, where two furrows meet
pustular skin	skin covered in small swellings similar to blisters or pimples
pedicellariae	small pincer-like structures found on starfish; thought to have a defensive function
radius	distance between the edge and centre of a circle
range	extension since first described in New Zealand, this species has been recorded elsewhere
refuge	safe place to hide from predators
reticulate	net-like or has a lacy framework of thickened calcified skeleton
rock	hard substratum such as mudstone, sandstone, basalt, compressed carbonates
rough	irregularly pitted and ridged surface, often tough
rubble	shell, stone, and pebble rubble
sand	small coarse grains of worn silica, rock, and shell
seabed	composed of a variety of sedimentary substrata including coarse gravels, shell hash and sands to finer sand, mud, and silts; associated organisms are susceptible to inundation and scouring from wave surge and currents, and subdued illumination
soft	easily compressible, elastic
spined, spinose	surface covered with spines (echinoderms)
stellate	star-shaped

subtidal	zone below the low tide, including rock flats, slopes, walls, crevices, overhangs, boulder fields; associated organisms are exposed to wave surge, currents and subdued illumination
surface	patterning or ornamentation on the surface of the body of an animal
translucent	lets light through body wall or surface of organism, but not enough to perceive distinct details through it
`transverse	across the short axis of the body wall
tube feet	small, flexible appendages that are found in the furrow and are involved in starfish locomotion
ventral	lower surface or underside of an animal
wall	underwater cliff or slope; associated organisms are exposed to wave surge, currents and subdued illumination
warty	bearing small flattened bumps or tubercles
widespread	species recorded globally

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