

inspirational
invertebrates

awesome ascidians

a guide to the sea squirts of New Zealand

Version 3, 2019

Mike Page

with Michelle Kelly & Blayne Herr

about this guide

Sea squirts are amongst the more common marine invertebrates that inhabit our coasts, our harbours, and the depths of our oceans.

AWESOME ASCIDIANS is a fully illustrated e-guide to the sea squirts of New Zealand. It is designed for New Zealanders like you who live near the sea, dive and snorkel, explore our coasts, make a living from it, and for those who educate and are charged with kaitiakitanga, conservation and management of our marine realm. It is one in a series of electronic guides on New Zealand marine invertebrates that NIWA's Coasts and Oceans centre is presently developing.

The e-guide starts with a simple introduction to living sea squirts, followed by a colour 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 online.

Each sea squirt species page illustrates and describes features that enable you to differentiate the species from each other. Species are illustrated with high quality images of the animals in life. As far as possible, we have used characters that can be seen by eye or magnifying glass, and language that is non technical. Outlying island groups, banks, platforms and plateaus are shown on the maps as a two-letter code: Ak = Auckland Islands; An = Antipodes Islands; Bo = Bounty Islands and platform; Ca = Campbell Islands and platform; Ch = Chatham Islands and Chatham Rise; Cp = Challenger Plateau; Ke = Kermadec Islands and the Southern Kermadec Ridge; Pb = Puysegur Bank; Sn = Snares Islands and platform. Information is provided in descriptive text and quick reference icons that convey information without words. Icons are fully explained at the end of this document and a glossary explains unfamiliar terms.



Mike Page is New Zealand's only professional sea squirt taxonomist; he has a working interest in taxonomy, systematics, chemical ecology and aquaculture.

For any ID advice on sea squirts you find, please email your photos to mike.page@niwa.co.nz

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



Remember to check the website for updated versions!

a typical species page layout

taxonomic name of species
Ciona intestinalis (Linnaeus, 1767)

taxonomic authority
 person(s) who first described this species

common name of species
 vase sea squirt

species classification
 see species index for arrangement
 Class Ascidiacea Order Phlebobranchia Family Clonidae

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
 4 cm

depth range
 common depth range around New Zealand
 0 to 120 m

information
 details on external and internal characters and habitat

quick identification (ID) icons
 highlighting shape, surface detail, habitat, and environment

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

scale of abundance
 1 to 5

key taxonomic references
 Brewin B.J. (1950) Ascidiaceans of New Zealand. Part IV. Ascidiaceans in the vicinity of Christchurch. Transactions and Proceedings of the Royal Society of New Zealand, 78 (2-3): 344-353.

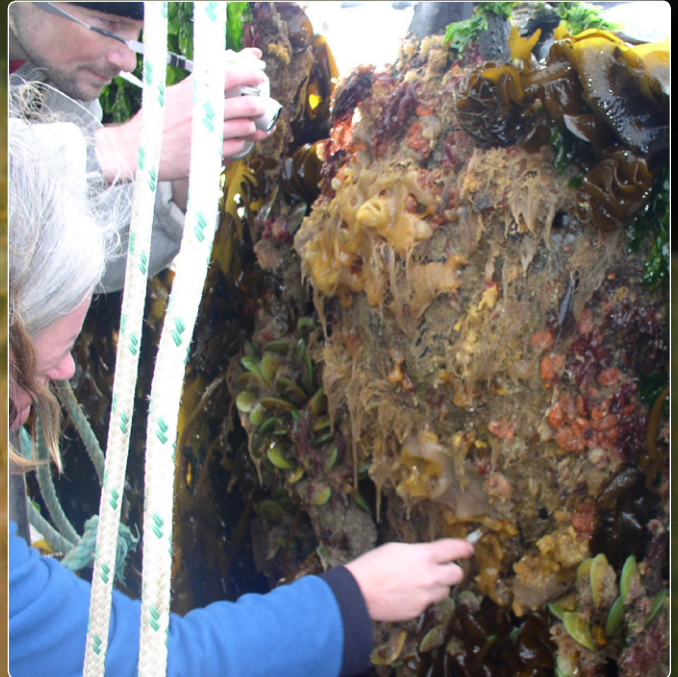
it could also be ...
 some species are difficult to tell apart without more detailed information, so check the other species in the guide listed here to make sure that you have the correct species
Ciona savignyi

body description:
 Two species of *Ciona* are known to co-occur in New Zealand ports and harbours. *Ciona intestinalis* has lemon yellow pigment spots on the siphon rim while *Ciona savignyi* has orange pigment spots on the siphon rim.
 Body elongate, tapering towards two closely spaced siphons. Test is soft, flexible, gelatinous, transparent, with light green pigment at the anterior end, and lemon yellow pigment spots on siphon rim. Gill slits are elongate, not folded, and tentacles are smooth. Six broad longitudinal muscle bands are found on each side of the body wall.
 Often found in high abundance on aquaculture structures, wharf piles and pontoons. This species is widespread throughout New Zealand ports, harbours and sheltered bays. It has a global distribution and the natural range of this species is uncertain.

about sea squirts

Sea squirts (ascidians) are amongst the most common fouling animals in ports and harbours around the world. They settle and grow in great abundance on artificial substrates such as wharf piles, seawalls, ship hulls and aquaculture structures. While most native (endemic) species are found in relatively low numbers in intertidal and most subtidal environments around New Zealand, reefs at the entrance of harbours and estuaries with high tidal flow, and cave walls, often support a rich and diverse fauna.

Introduced (invasive) species are usually highly successful, invading in great abundance and often in densities that preclude other species. They have abundant, highly mobile larvae that settle and grow quickly, competing with other species for food and space. The potential consequences of this biology, for the shellfish aquaculture industry in particular, can be serious.



Fish, flatworms, sea urchins and sea stars are the sea squirts' primary predators, although, in Chile, Japan, Korea, Europe and parts of Aboriginal Australia, some sea squirts are eaten by humans!

Sea squirts are animals that feed by filtering the water through their body via an **inhalant** and **exhalant siphon**. Some are **solitary** animals, and some live in groups (**colonial**), some are **stalked**, and some **encrust** the substrate. Individual animals are enclosed within a leathery or gelatinous test which can be translucent. Fertilisation may be internal or external with embryos brooded in colonial and some solitary species, followed by a very short-lived free-living larval stage before settlement.



solitary sea squirt

Individual animals with an inhalant siphon and an exhalant siphon, often with a thick leathery test that encloses the body of the animal.

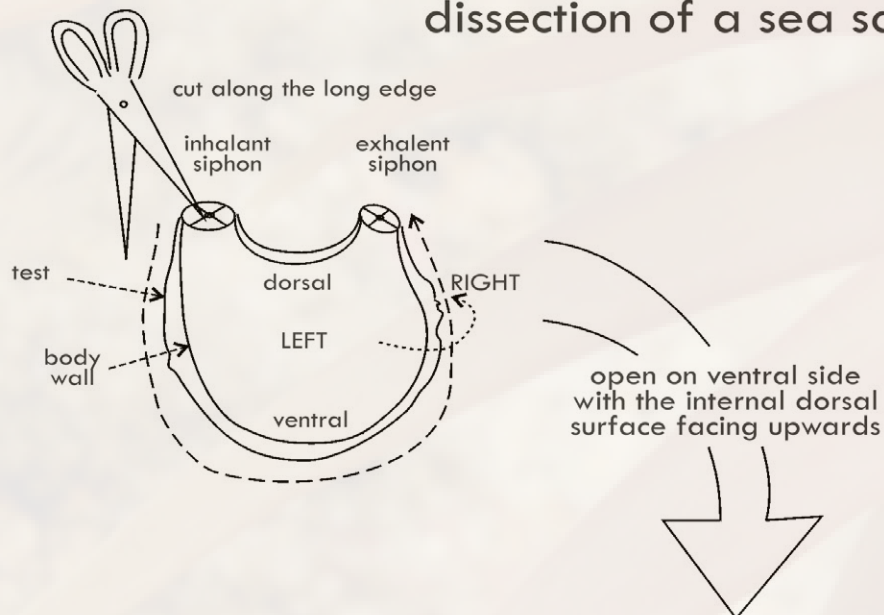


colonial sea squirt

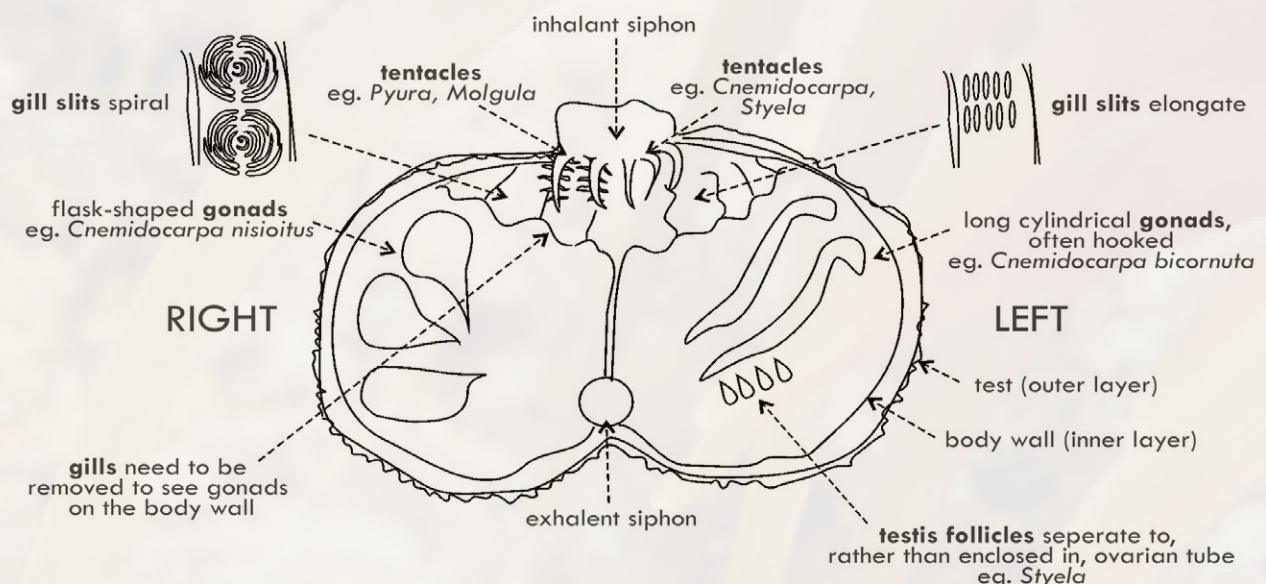
Groups of small animals (zooids) are embedded in a gelatinous test as a colony. Zooids can be arranged in circular or linear systems, sharing common exhalant canals and apertures. Other types can have zooids opening independently or on stalks connected to a common basal test.



dissection of a sea squirt



composite schematic of a solitary sea squirt





Corella eumyota

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Ciona intestinalis

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Ciona savigny

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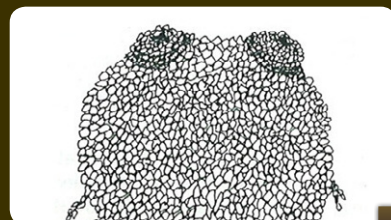
Diplosoma listerianum

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Molgula manhattensis

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Molgula mortenseni

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Ascidella aspersa

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Sycozoa sigillinoides

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Eudistoma circumvallatum

31



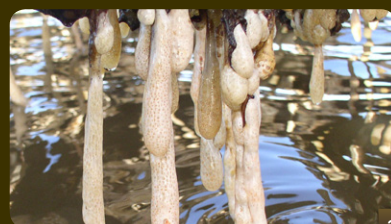
Pseudodistoma cereum

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Didemnum species complex

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Eudistoma elongatum

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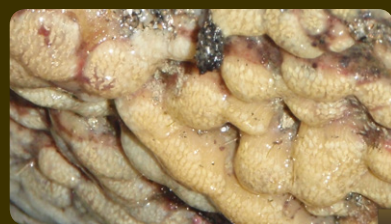
Didemnum vexillum

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Lissoclinum notti

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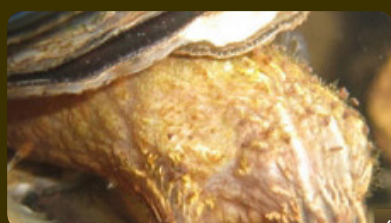
Pseudodistoma opacum

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Pyura pachydermatina

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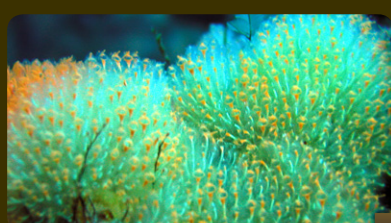
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Clavelina lepadiformis

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Euclavella claviformis

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Pycnoclavella kottae

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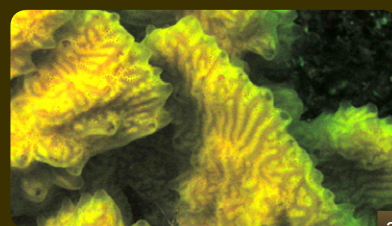
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Pseudodistoma novaezealandiae

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Aplidium powelli

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Cnemidocarpa bicornuta

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Pyura species complex

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Styela plicata

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Pseudodistoma novaezealandiae

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Diplosoma velatum

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Aplidium coronum

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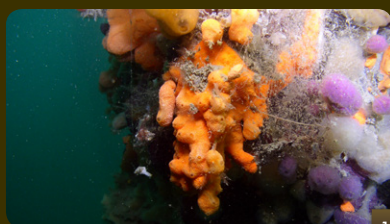
Aplidium sp. (lemon)

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Didemnum densum

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Didemnum sp. (orange peel)

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Didemnum lithostrotum

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Aplidium benhami

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Botryllus schlosseri

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Botryllus tuberosus

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Leptoclinides novaezealandiae

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Microcosmus squamiger

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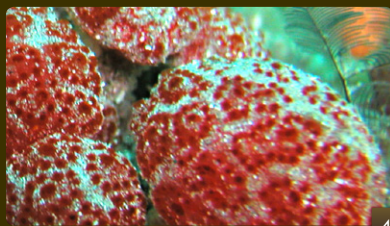
Botrylloides leachii

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Aplidium sp. (brain)

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Synoicum *kuranui*

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Aplidium *knox*i

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Aplidium *powelli*

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Hypsistozoa sp. (red cushion)

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Hypsistozoa *fasmeriana*

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Botrylloides sp.

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Botryllus *stewartensis*

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Lissoclinum sp. (violet)

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Clavelina sp. (bluebells)

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Leptoclinides *marmoreus*

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Botrylloides *leachii*

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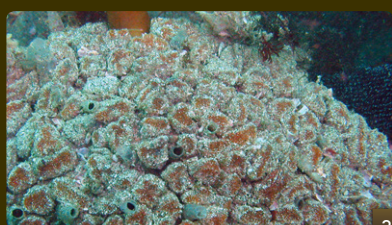
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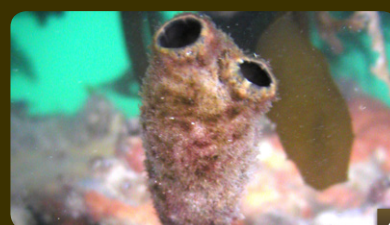
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Synoicum *stewartense*

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species index

PHYLUM	Chordata	SUBPHYLUM	Tunicata	CLASS	Asciacea	ORDER	Phlebobranchia
						</	



1 cm

image: Mike Page

morphology



surface



substrate



habitat



Colonies have a distinctive medusoid shape in which multiple elongate zooids are joined by a thin common basal test and protrude as individual heads opening separately to the outside. Inhalant gill sac and stomach are clearly visible through the transparent test. The endostyle and tentacles are pigmented either white or yellow giving the appearance of a light bulb with a glowing filament.

Fouls the underside of floating moorings, restricted at present to Nelson Harbour. This species is a recent introduction to the Nelson yacht marina. The native range is reported to be from the Shetland Islands, Bergen in Norway, the Bay of Biscay and the Mediterranean. It is now widespread throughout the North Atlantic and North Sea.

It could also be.....

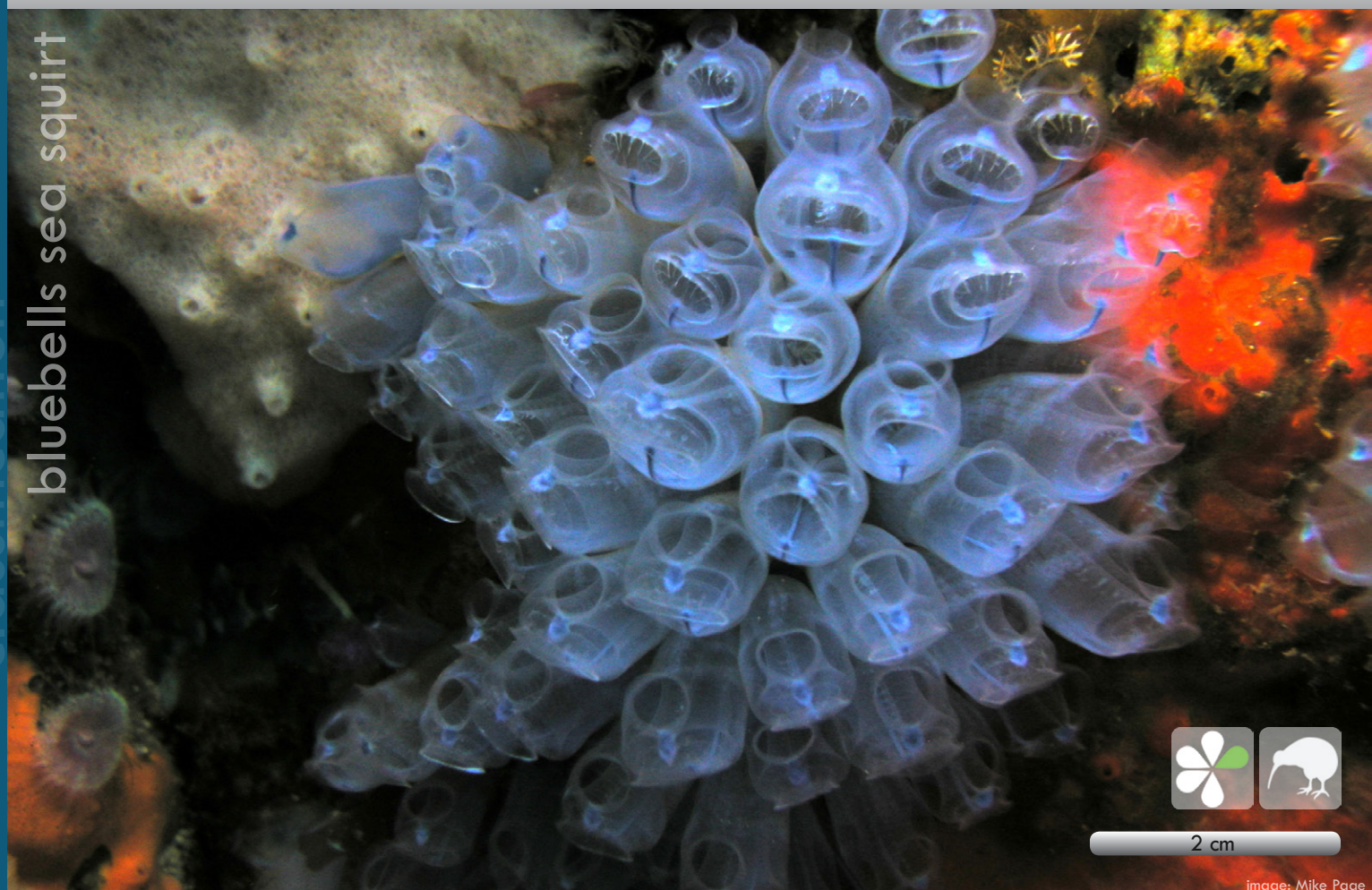
Pycnoclavella kottae



North Atlantic Ocean and Seas



bluebells sea squirt



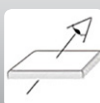
2 cm

image: Mike Page

morphology



surface



substrate



habitat



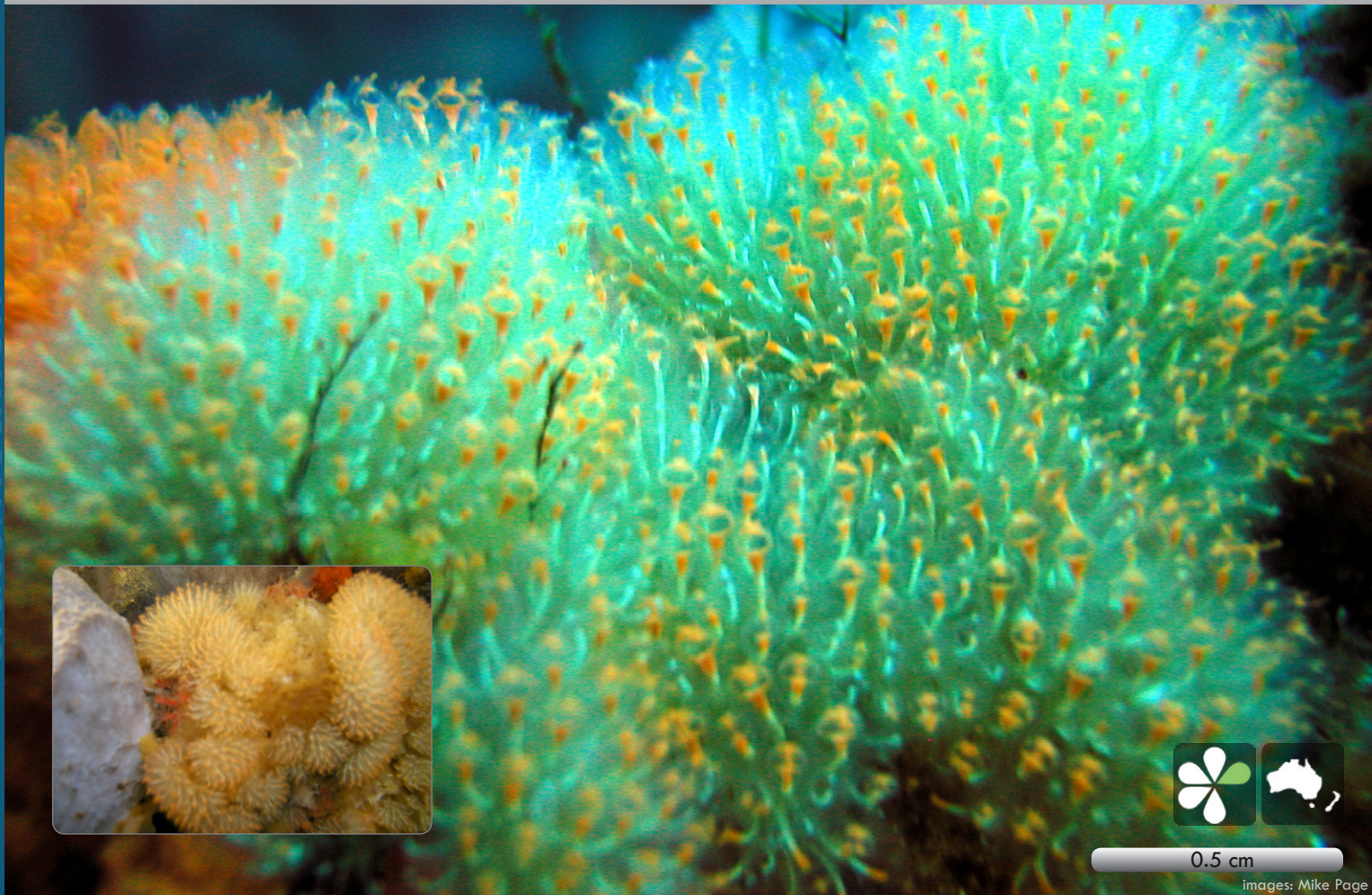
Colonies form masses of delicate flask-shaped zooids connected by a basal mat. The colony is generally sky blue with a transparent test. The texture is gelatinous and there are no systems as each zooid opens separately to the water. The zooids measure 20–30 mm in length with the thorax 10 mm long and 25 mm wide. The blue colouration is concentrated along the endostyle.

This undescribed species is relatively common in open deep reef environments from the Three Kings Islands, Spirits Bay and the Poor Knights Islands.

It could also be.....

Pycnoclavella kottae





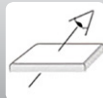
0.5 cm

Images: Mike Page

morphology



surface



substrate



habitat



Colonies are made up of stalked heads or wide lobes. In exposed habitats stalks are reduced to a wide, almost leathery holdfast. Both exhalant and inhalant apertures of the red-brown zooids open separately to the exterior and can be seen clearly through a translucent test. The texture is firm and gelatinous. Individual zooids measure 3–7 mm with the thorax shorter and wider than the abdomen especially in contracted, preserved specimens. Siphons are of approximately equal length, and smooth-rimmed. Gonads are situated in the gut loop posterior to the stomach. Testes made up of a group of many pear-shaped follicles.

Colonies are found in very high energy habitats on the reef edges and guts in clear warm temperate waters from the Bay of Islands to the Three Kings Islands. Also found on the east coast of Australia.



Kott, P. (1990) The Australian Ascidacea II. Aplousobranchia. *Memoirs of the Queensland Museum*, 29: 1–266.

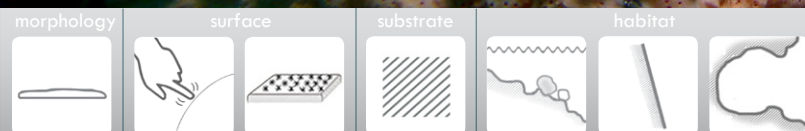
Millar, R.H. (1982) The marine fauna of New Zealand: Ascidacea. *New Zealand Oceanographic Memoir*, 85: 114 p.

Stocker, L.J. (1985) An identification guide to some common New Zealand ascidians, 74 p.



5 cm

image: Mike Page



This orange colonial ascidian is thinly encrusting. It occurs as a group of small discs or as a mat of systems of approximately 40 zooids around a common cloacal aperture, divided by polygonal depressions of the test, at times marked in white. Spicules have sparse short rounded rays and are crowded throughout the colony. Zooids are up to 0.9 mm in length.

It occurs in a variety of reef habitats from deep open environments to sheltered gently sloping harbours. It is a common species throughout New Zealand, often associated with sparse kelp beds and urchin barrens.

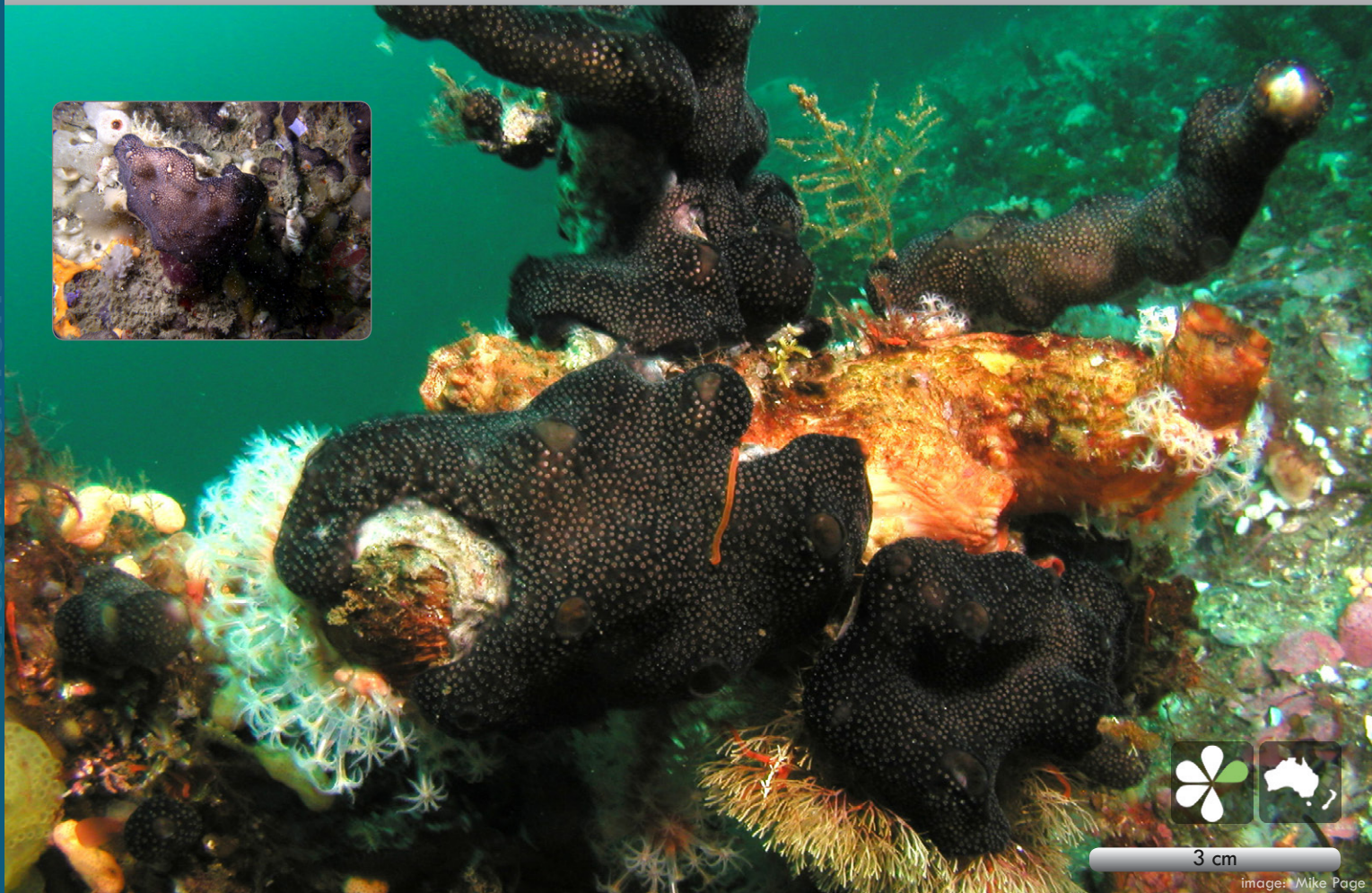
depth (m)



Brewin, B.I. (1951) Ascidians of New Zealand. Part VI. Ascidians of the Hauraki Gulf. Part II. Transactions and Proceedings of the Royal Society of New Zealand, 79(1): 104–113.

Millar, R.H. (1982) The marine fauna of New Zealand: Ascidacea. New Zealand Oceanographic Memoir, 85: 114 p.

Stocker, L.J. (1985) An identification guide to some common New Zealand ascidians, 74 p.



3 cm

image: Mike Page

morphology



surface



substrate



habitat



Colonies are thin and appear highly inflated in life. Texture soft, filmy. Test covered in closely spaced inhalant apertures, occasional common exhalant apertures are visible. Surface layer of the test is coloured dark chocolate brown to black; the cream-coloured interior can be seen below the translucent surface and through exhalant apertures.

Typically encrusts bivalves, solitary ascidians and dead black coral trees. This species has been recorded from Fiordland to Bluff. It was first described from Western and South Australia.

It could also be.....

Lissoclinum notti





10 cm

image: Mike Page

morphology



surface



substrate



habitat

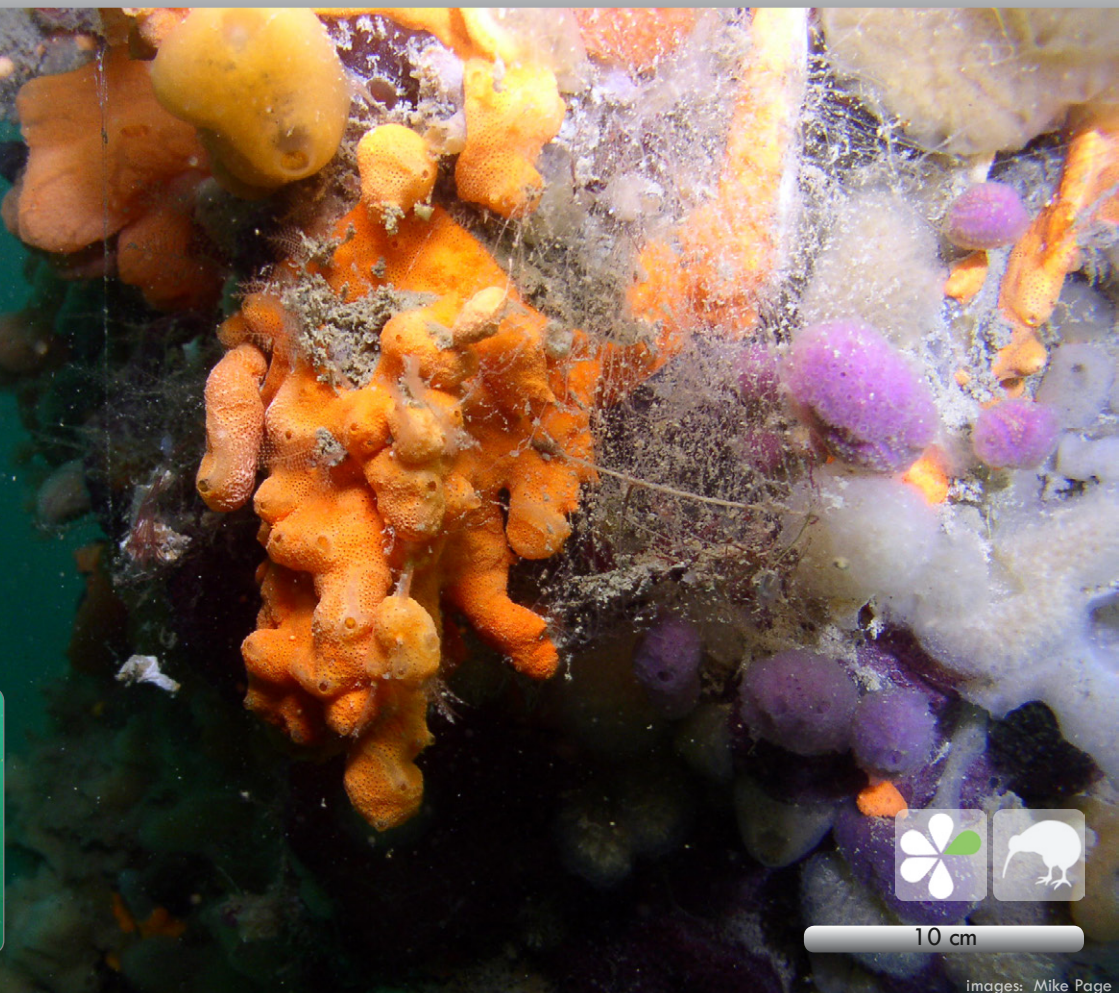


Colonies of this species are pink to orange in colour, very thin (1 mm thick) and often encrusting sessile species such as brachiopods. The test is divided into irregular polygonal areas, each with a central common cloacal aperture. The texture is leathery. Spicules occur throughout the colony, although are more concentrated in a layer near the surface and near the substratum. Calcareous spicules have eight rounded rays in optical cross-section and measure 40–70 μm in diameter.

Didemnum lithostrotum was first described from the Chatham Islands and is known from Fiordland, Stewart Island and the Chatham Rise.



orange peel sea squirt



10 cm

Images: Mike Page

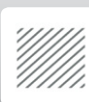
morphology



surface



substrate



habitat



The bright orange colonies of this colonial species have a distinctive microscopic orange-peel surface. Lobate sheets overgrow sponges and hydrozoans on vertical walls. When encrusting flat surfaces, colonies have numerous regular raised lobes with terminal common cloacal apertures, approximately 1 mm in diameter. Subdermal canals are obvious, radiating out from the common cloacal apertures along the lobes. On vertical substrates the lobes can form drooping tendrils several centimetres long. There is no apparent arrangement of zooids into systems.

Colonies are cream in preservative and vary in thickness from between 1.5 mm when encrusting to 6 mm across drooping lobes. Spicule-filled papillae are present between regularly-spaced, stellate six-lobed branchial apertures giving the colony test surface a microscopic orange-peel appearance. Spicules are densely crowded throughout the test forming a layer 0.1 mm thick that overlays extensive primary thoracic canals lined with zooids. The spicules are small and stellate, ranging from 15 µm to 25 µm in diameter.

This species has been recorded from Bluff Harbour, but is likely to be common elsewhere in New Zealand harbours and embayments.



carpet sea squirt



1 cm

images: Mike Page

morphology



surface



substrate



habitat



The test of most species of *Didemnum* is crowded with minute calcite star-shaped structures called spicules. High abundance of spicules can give many species of this genus an opaque appearance.

Colonies of this species form extensive sheets on vertical surfaces. Cylindrical or frond-like outgrowths can often arise off the main colony. These can form extremely long dripping tendrils, sometimes meters long. Colonies overgrow algae, hydrozoans, tube worms and mussels. The colonies are pale yellow to cream coloured and firm yet gelatinous to the touch. Common exhalant openings are obvious at the end of lobes and a fine open network of canals can be seen below the surface. Spicules are sparse throughout most of the test making it more gelatinous than other *Didemnum* species.

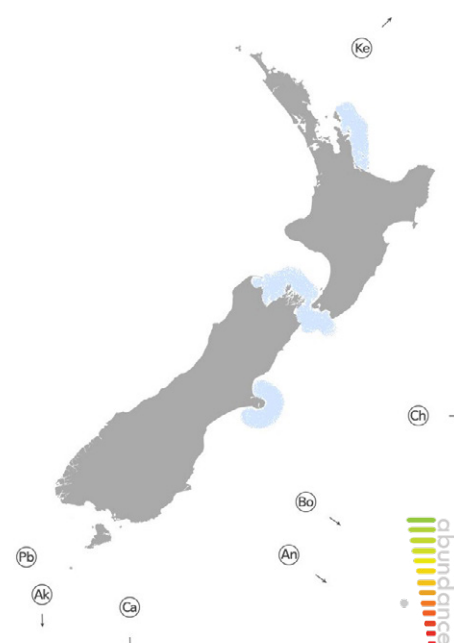
Can be locally abundant, fouling boat hulls, the undersides of floating structures, marine farm lines and sea cages. This species is common throughout the Marlborough Sounds and Nelson, and is present in Wellington and Lyttleton harbours. It was first described from Whangamata on the Coromandel but it is native to Asia and is widespread throughout the North Atlantic and North Pacific coasts.

It could also be.....

another species in *Didemnum* species complex or an encrusting sponge



Northern North Pacific



Kott, P. (2001) The Australian ascidiacea Part 4: Aplousobranchia (3), Didemnidae. *Memoirs of the Queensland Museum*, 47 (1): 1–407.

Kott, P. (2002) A complex didemnid ascidian from Whangamata, New Zealand. *Journal of the marine Biological Association of the United Kingdom*, 82: 625–628.



2 cm

Images: Mike Page

morphology



surface



substrate



habitat



A 'species complex' is a group of closely related species that cannot be easily distinguished in the field due to their physical similarity. Species in the complex may include *Didemnum incanum* (Herdman, 1899), *D. maculatum* (Nott, 1892) and *D. lambitum* (Sluiter, 1900). They often vary by only the smallest details. The test of most species of *Didemnum* is crowded with minute calcite star-shaped structures called spicules. High abundance of spicules can give many species of this genus an opaque appearance.

Colonies can vary greatly in shape from lobate forms overgrowing other fouling organisms to thin encrustations. Test is opaque due to a heavy coating of calcareous spicules. The spicules can be found just in the surface layer of tests with a gelatinous centre, or throughout, giving the colony a very crisp, friable consistency. The zooids are usually small (< 2.0 mm) long and can be very difficult to remove from the surrounding test. There are usually canals or cavities below the surface of the test that connect the zooids to a common water circulation system. Common fouling boat hulls, undersides of floating structures, marine farm lines, sea cages and wharf piles around New Zealand.

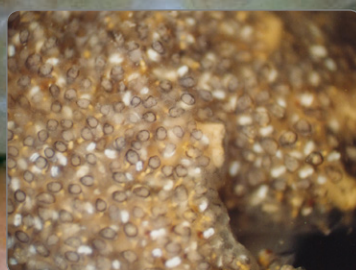
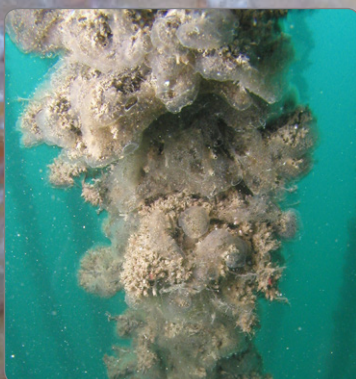
It could also be.....

Didemnum vexillum

Lissoclinum notti

encrusting sponges



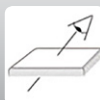


3 cm

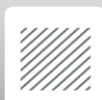
morphology



surface



substrate



habitat



Colony forms extensive thin gelatinous sheets in which individual zooids can be seen as white or grey spots densely crowded around large common exhalent apertures. Test is transparent with small (<2 mm) zooids. Zooids are easily removed from the test by hand, colonies removed from the substratum as a slimy film.

Encrusts a variety of submerged surfaces including shellfish, algae and barnacles. This species is found throughout New Zealand coasts and harbours. It was first described from Europe and has spread worldwide.

It could also be.....
Botrylliodes leachii



Cosmopolitan



main image: Floor Anthoni



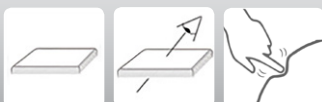
5 cm

Images: Mike Page

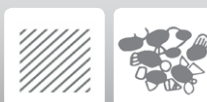
morphology



surface



substrate



habitat



Colonies form irregular lobed fleshy sheets with large common cloacal apertures up to 10 mm diameter at the terminal ends of lobes. Groups of zooids supported by connective test can be seen inside the colony through the common cloacal apertures. The test is generally an opaque orange colour in colonies exposed to light. Colonies collected from low-light conditions such as at the head of Crooked Arm, Fiordland, are cream. The test is soft and slimy and colonies collapse when removed from water. About 8–10 zooids are grouped in test connectives with clear spaces, these can be seen through the test.

Diplosoma velatum was first described from Australia and is known from the Fiordland, east coast of the South Island, South Australia, Western Australia and Victoria.

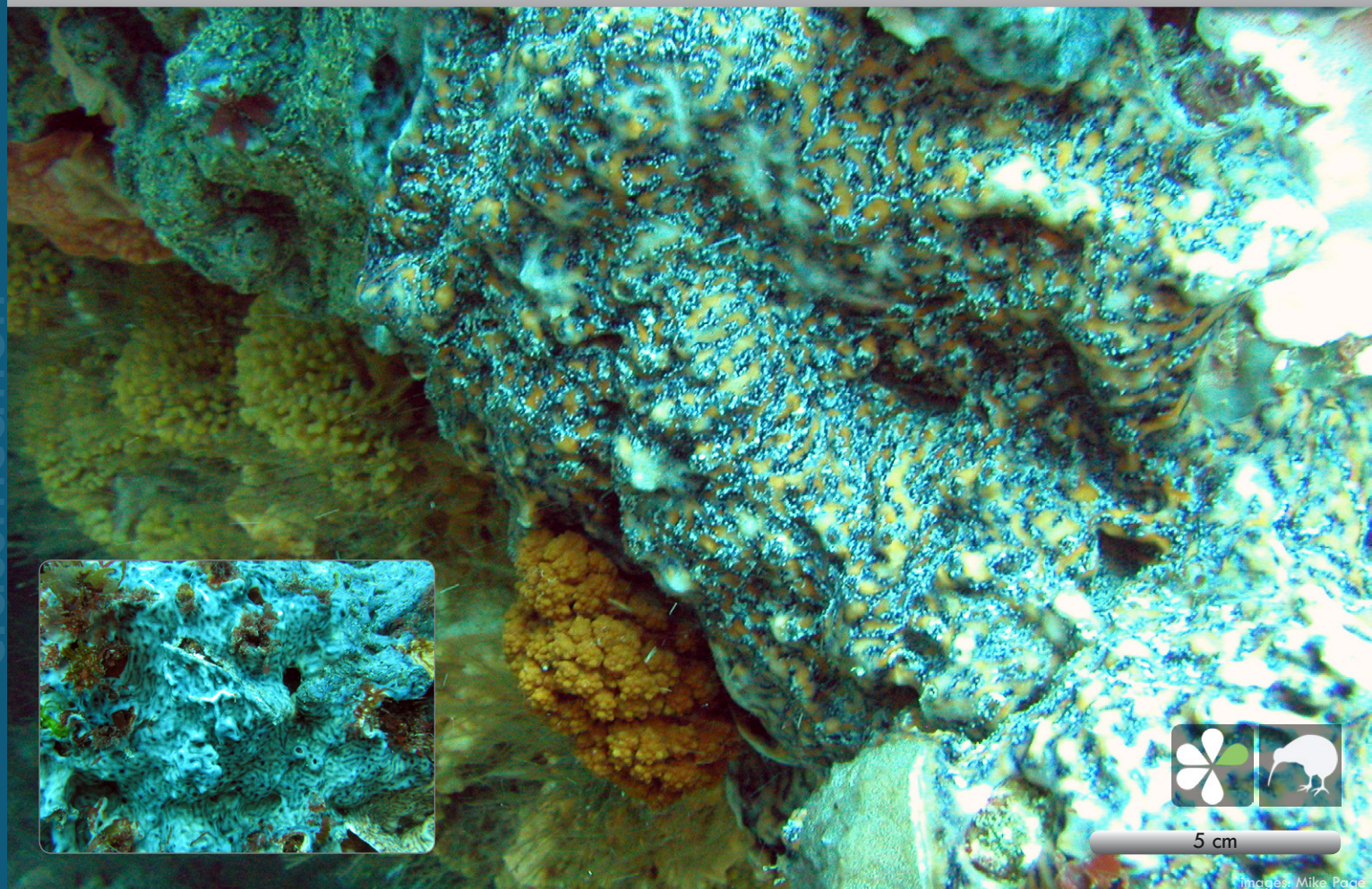
depth (m)

0
20
40
80
100
120



Kott, P. (2001) The Australian ascidiacea Pt 4, Didemnidae. *Memoirs of the Queensland Museum*, 47 (1): 1–410.

Page, M., Willis, T., Handley, S. (2014) The colonial ascidian fauna of Fiordland, New Zealand with a description of two new species. *Journal of Natural History*, 48 (27–28): 1653–1688.



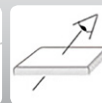
5 cm

Images: Mike Page

morphology



surface



substrate



habitat

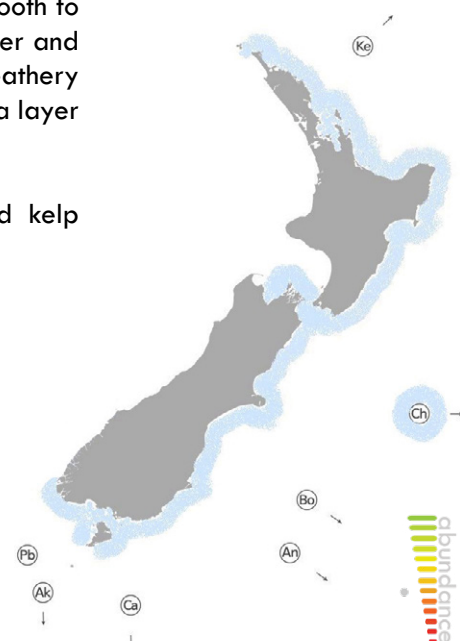


An encrusting compound ascidian with a marbled appearance and an uneven surface, frequently having a rounded edge. It is light grey in colour with streaks of speckled darker grey, blue and white or brown and white. The test is leathery but smooth to touch. Systems are elongate with common cloacal apertures 1 mm in diameter and approximately 0.5 mm apart. Much of the test is free of zooids. It is tough, leathery to touch and difficult to remove from the substratum. Spicules are confined to a layer beneath a soft gelatinous layer of test.

Widely distributed, being mainly found in shallow subtidal reefs around kelp holdfasts.

It could also be.....

Leptoclinides novaezelandiae





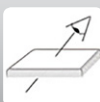
3 cm

Image: Ashleigh Watts

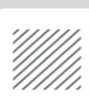
morphology



surface



substrate



habitat



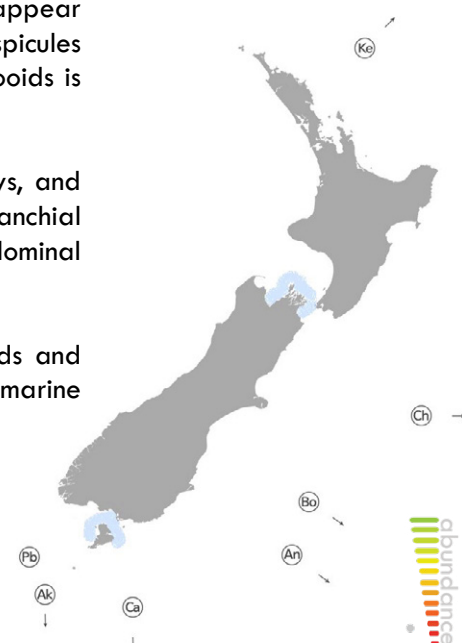
Colonies are green or orange globular masses or encrusting sheets up to 4 mm thick. The surface of the test has a distinctive mottled appearance where pigment cells are concentrated in a reticulated pattern around branchial apertures. Zooids appear to form meandering elongate systems. The test is firm, but gelatinous and spicules sparsely and unevenly invested on the surface. The basal test below the zooids is spicule-free, but opaque with small test cells.

Spicules are stellate and of three different types, often with irregular rays, and range in size from 20 – 70µm. The zooids are 1.5 mm in length with long branchial and atrial siphons, the atrial siphon directed posteriorly into posterior abdominal cavities. There are three to four follicles with five coils of the vas deferens.

Commonly found in sheltered waters in Stewart Island, Marlborough Sounds and Tasman Bay. It often encrusts other ascidians and overgrows sessile fauna on marine farms.

It could also be.....

Leptoclinides marmoreus





3 cm

images: Mike Page

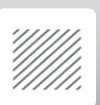
morphology



surface



substrate



habitat



Colonies are characteristically thin and encrusting, <2 mm thick and fragile. Zooids are not in marked systems, but there are relatively large, common exhalant apertures evenly distributed throughout the colony or on the apex of lobes. Spicules are found in two layers; at the surface and at the base of the colony, and have distinctive burr-shaped ends. Test is papery and easily torn. Colour in life is opaque cream or brown, sometimes purple.

Common on shallow subtidal reefs, wharf piles and aquaculture structures. This species was first recorded from the Cook Strait region and is now known to occur in the Hauraki Gulf. It is found in Fiordland, in Emelius Arm, Charles Sound, and Sunday Cove at the entrance to Breaksea Sound and is common in most NZ ports and harbours.

This species is distinguished from *Lissoclinum* sp. (violet) by having only one testis follicle, more complex burred spicules and no spicule-free halos around the common cloacal apertures.

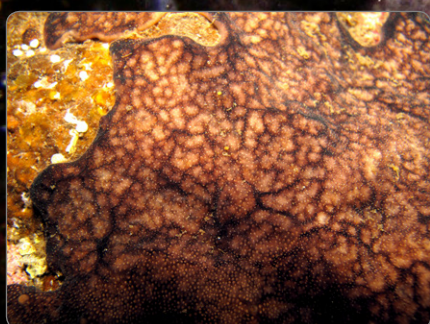
It could also be.....

Didemnum spp.



Western South Pacific





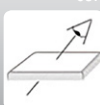
5 cm

Images: Mike Page

morphology



surface



substrate



habitat



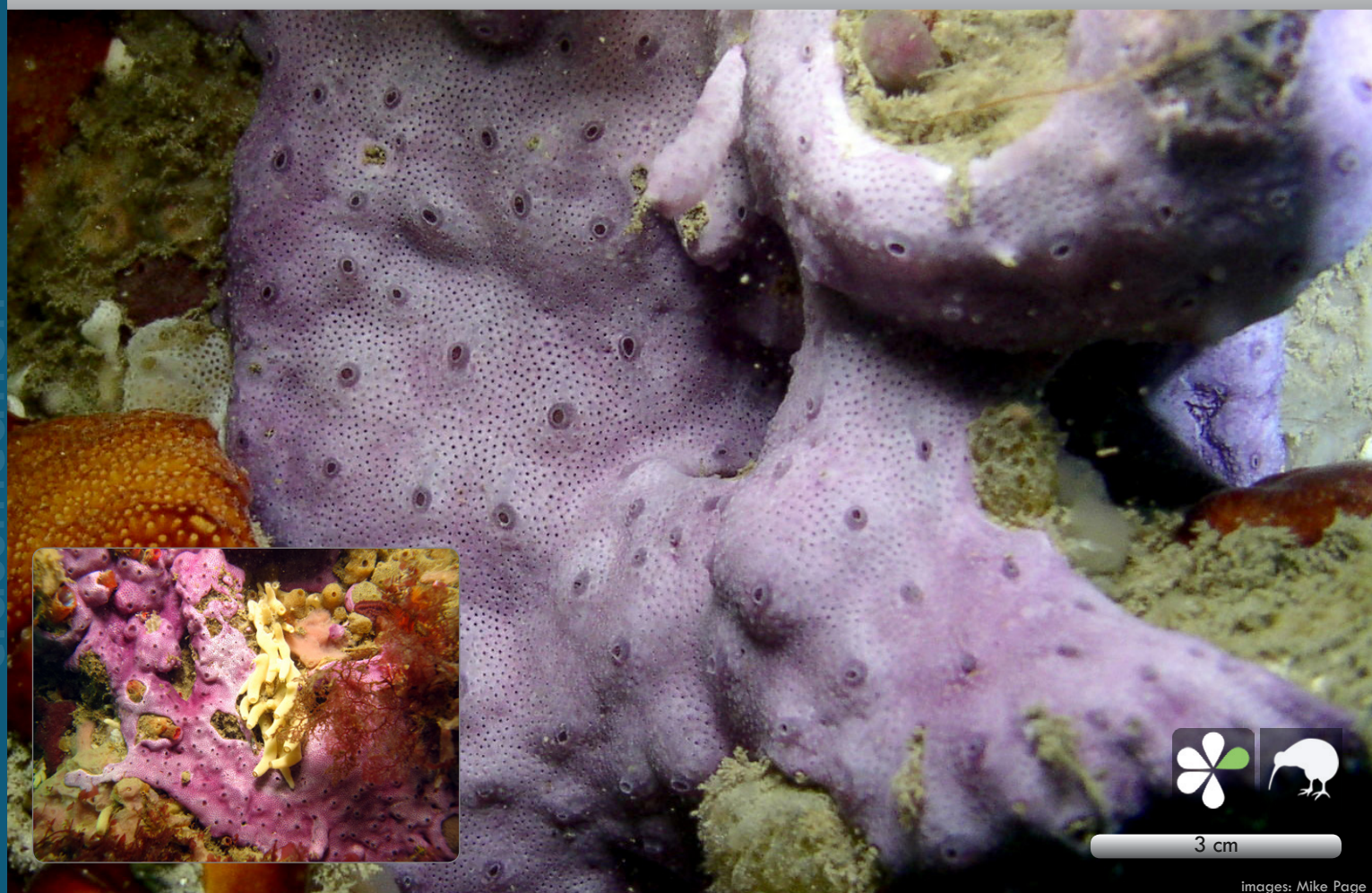
Colony forms a thin encrustation that overgrows brachiopods and other sessile species on rock walls. The test is brown to charcoal in colour with mottling and is smooth yet tough to the touch. The canals between the zooid systems can be seen through the test as an underlying meandering and reticulated pattern. Common cloacal apertures and zooids are not obvious, but the yellow inclusions in the test are developing larvae.

Colonies can be found on subtidal rock walls in high current areas. This species has only been recorded so far in Fiordland, from Nine Fathom Passage, Dusky Sound and from Waterfall Cove, Charles Sound.

It could also be.....

Didemnum jucundum





3 cm

images: Mike Page

morphology



surface



substrate



habitat



Vivid purple to rose-coloured thin encrusting colonies that overgrow solitary ascidians and other fouling taxa on wharf piles. The pigment is distributed unevenly in patches in a thin layer of spicule-free test overlaying a densely crowded spicule layer. Preserved colonies are tan coloured, fading to white over time. Small stellate branchial apertures are evenly distributed over the colony surface, showing no apparent arrangement of systems. Large common cloacal apertures approximately 1 mm in diameter are numerous and distributed regularly over the colony.

The cloacal aperture rims raised above the colony surface by 1 mm are sparsely invested with spicules conferring the apertures a distinctive halo-like appearance. Spicules are densely packed in a thin layer in the surface test, they are lightly scattered in the test surrounding the zooids, and moderately concentrated in basal test. They are small (15–30 μm in diameter) and burr-like with 13–15 subtly divided, short club-shaped rays. This species is distinguished from *Lissoclinum notti* by the morphology of the common cloacal apertures, spicule morphology and number of testis follicles.

Lissoclinum violaceum is only known from wharf piles on Tiwai point, Bluff.



abundance



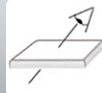
5 cm

Images: Mike Page

morphology



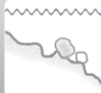
surface



substrate



habitat



The species forms irregularly-shaped hollow cushions with common cloacal apertures up to 5 mm diameter at the end of the lobes. The colony collapses on removal from water. Colonies are peach-coloured with characteristic clusters of red pigment cells scattered randomly throughout the test. The texture is gelatinous with zooids regularly packed around the outside edge and sparse spicules concentrated in a layer around zooid branchial apertures. Spicules are of two shapes and sizes; star-shaped spicules with seven conical rays (30–75 μm) and small fine spicules with delicate needle-like rays (15–40 μm).

Trididemnum shawi was first described from Fiordland and has not been recorded elsewhere. It may be endemic to the region.

depth (m)

0

20

40

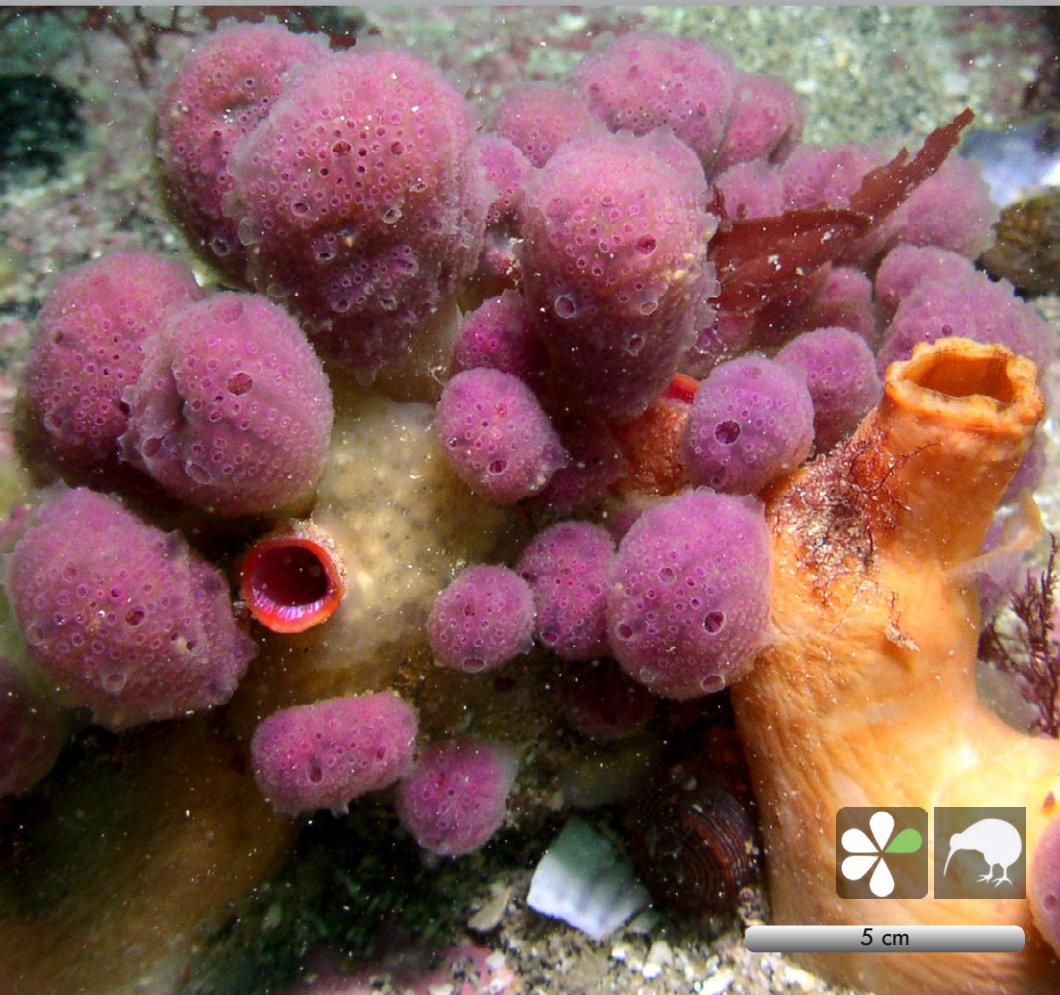
60

80

100

120



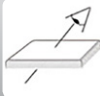


5 cm

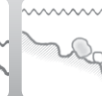
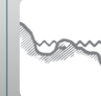
morphology



surface



substrate



habitat



Colony consists of a short fleshy stalk topped with a much larger ovoid body, attached individually to the substrate. Body is often button or mushroom-shaped. Stalks are often not visible. Soft and gelatinous to the touch. Zooids are in parallel systems around numerous large exhalant apertures, systems linear and scattered over the body. Colonies can often occur in patchy groups 20–30 cm in diameter. Colour in life is usually fuchsia pink to violet.

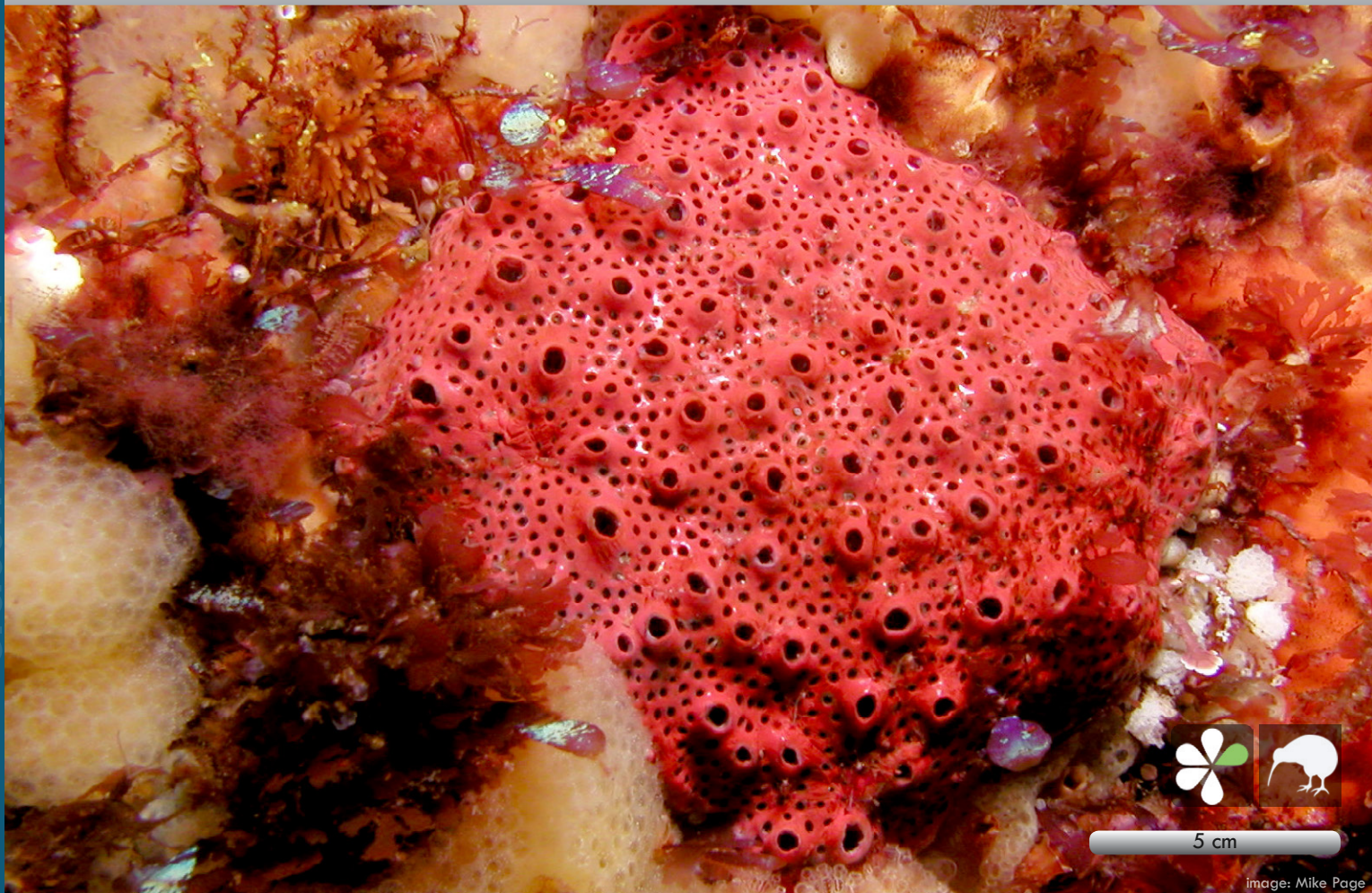
Most common in shallow coastal reefs and on artificial structures in open harbours with high tidal flow. Colonies can be found down to 20 m depth in areas of moderate exposure. This species is widespread throughout New Zealand.

It could also be.....
Aplidium benhami



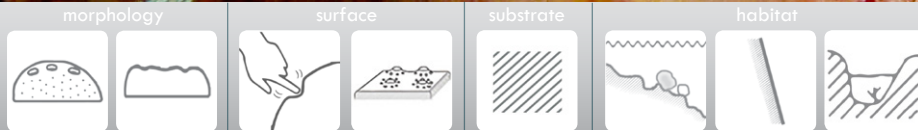
Brewin, B.I. (1946) Ascidiaceans in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

Millar, R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.



5 cm

image: Mike Page



Colonies form large bright red cushions up to 150 mm in diameter and 50 mm thick. The test is gelatinous, but firm. Zooids appear to be in circular systems around regularly spaced, raised, common cloacal apertures. The colonies are found in highly exposed surge areas on boulder faces and walls in relatively shallow water.

This species is closely related to *Hypsistozoa fasmeriana*. However, the size of the colonies, arrangement of the zooid systems and preferred habitat confirms that it is not the same species.

This species has been recorded on the outer coast of Doubtful Sound (Hare's Ears) and the outer side of the entrance to Port Pegasus, Stewart Island.

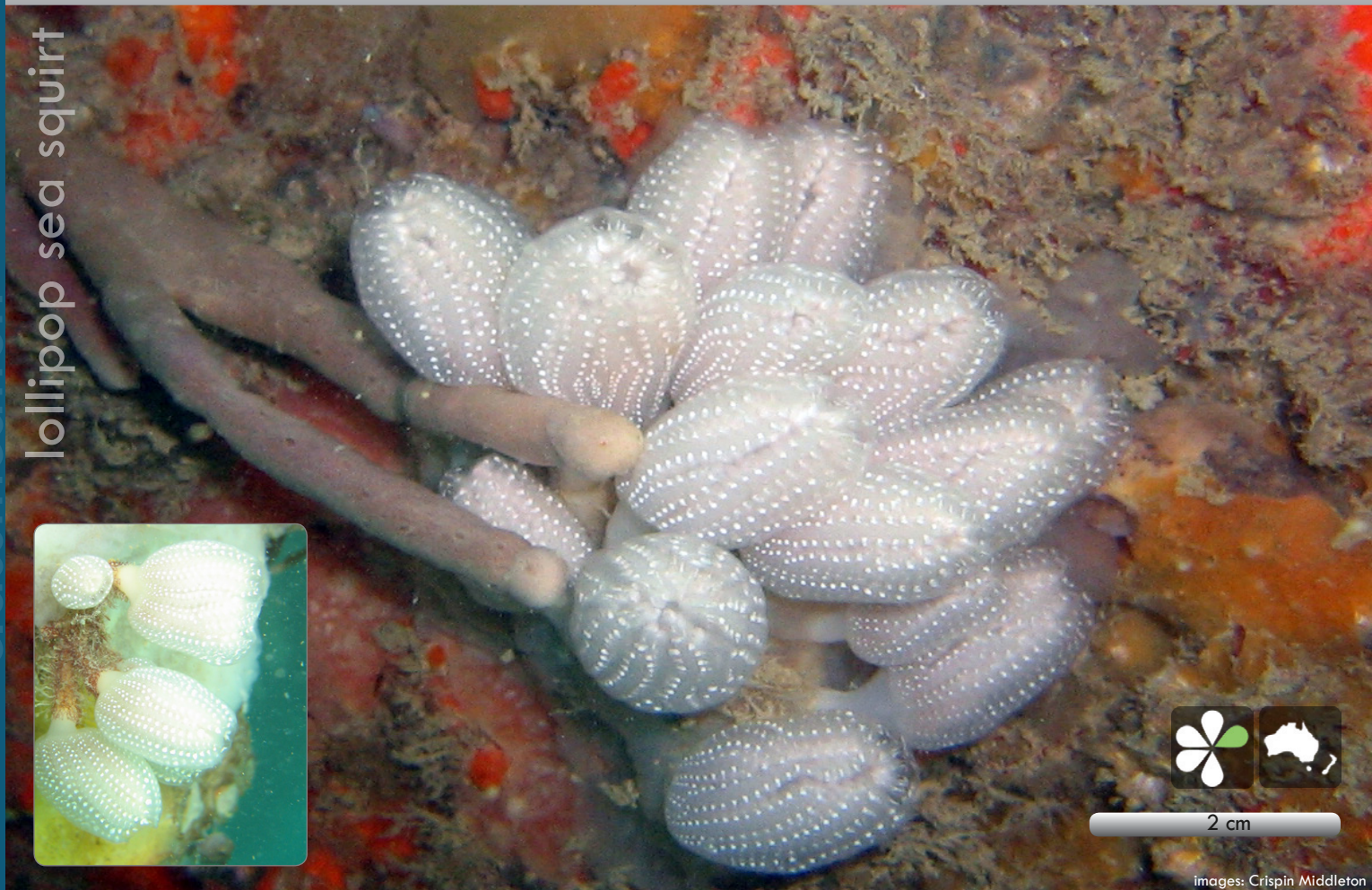
It could also be.....
Hypsistozoa fasmeriana



Brewin, B.I. (1956) The growth and development of a viviparous compound ascidian, *Hypsistozoa fasmeriana*. *Quarterly Journal of Microscopical Science*, series 3, 97 (3): 435–454.

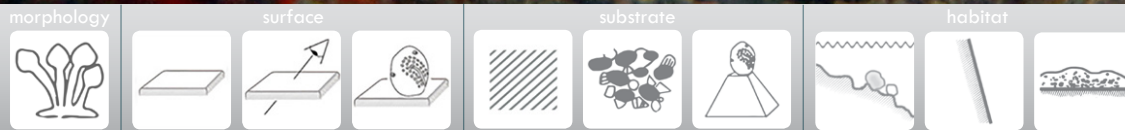
Brewin, B.I. (1959) An account of larval budding in the compound ascidian *Hypsistozoa fasmeriana*. *Quarterly Journal of Microscopical Science*, series 3, 100 (4): 575–589.

lollipop sea squirt



2 cm

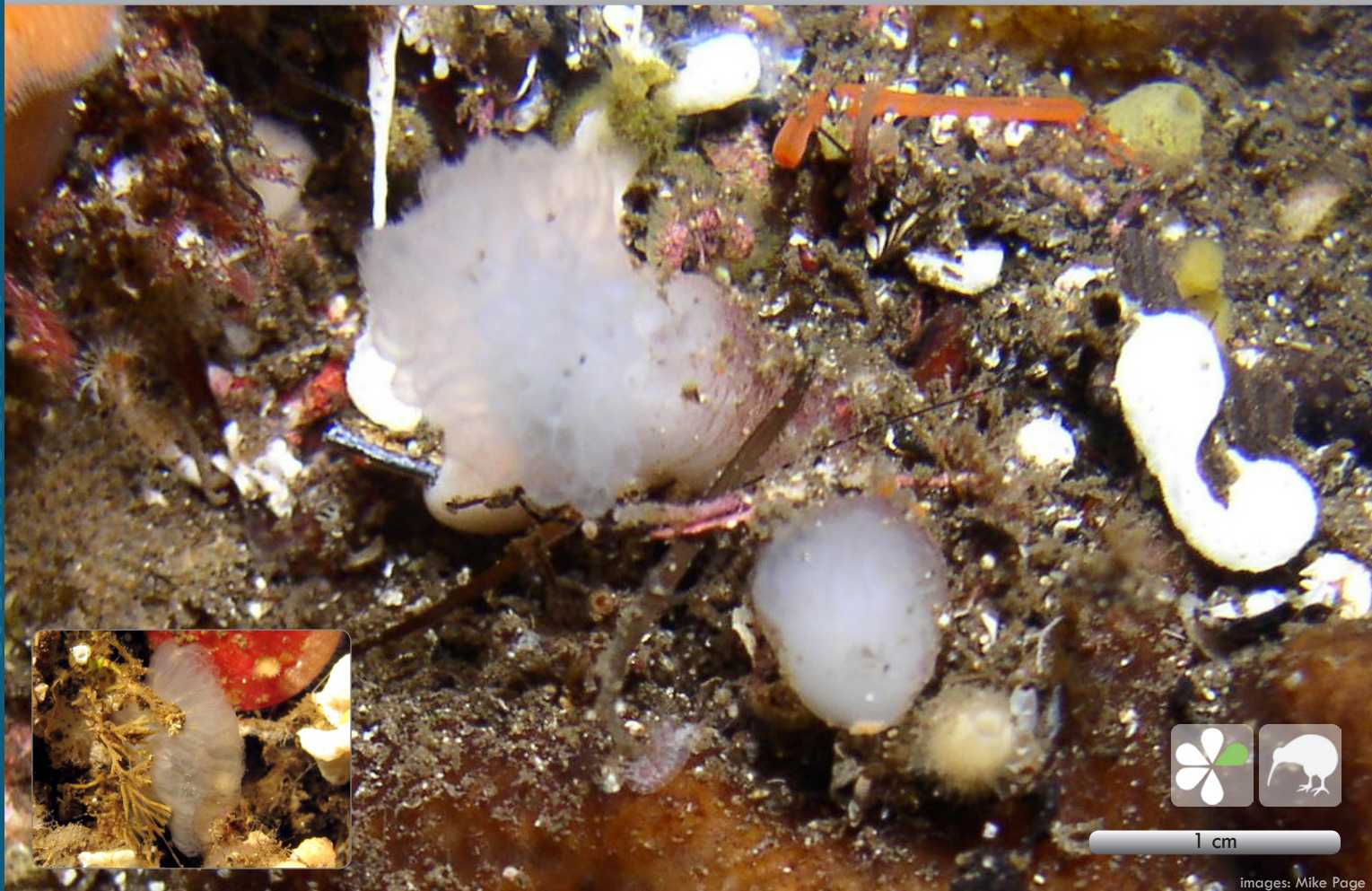
Images: Crispin Middleton



Elongate ovoid heads on flexible stalks. Texture soft, gelatinous. Zoids can be seen through the test as linear double rows of inhalant apertures visible as white dots, connecting to a single common exhalant aperture at the top of the colony. Colour in life translucent cream to white with white dots.

This species has a wide geographic range within New Zealand. It has been recorded from Auckland, Whangarei, Napier and the Chatham Islands. Published records elsewhere include Antarctica and the subantarctic islands.





1 cm

Images: Mike Page

morphology



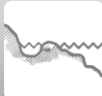
surface



substrate



habitat



Species forms small gelatinous, button-shaped colonies, 10 mm high, on a short stalk, and usually occur in isolated groups. They are cream to light yellow and transparent; the zooids can be seen through the test. Zooids do not form systems, with inhalant and exhalant siphons opening directly to the surface of the colony.

Colonies can be found in intertidal pools to deeper subtidal rock walls and boulders. This species was first recorded from the Cook Strait region and is now known to occur from the Hauraki Gulf to Fiordland.

It could also be.....

Pseudodistoma cereum

Sycozoa sigilliniodes



Brewin, B.I. (1946) Ascidiens in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the New Zealand Institute*, 76: 87–131.

Page, M., Willis, T., Handley, S. (2014) The colonial ascidian fauna of Fiordland, New Zealand with a description of two new species. *Journal of Natural History*, 48 (27–28): 1653–1688.



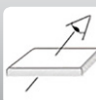
6 cm

main image: Sean Handley

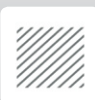
morphology



surface



substrate



habitat

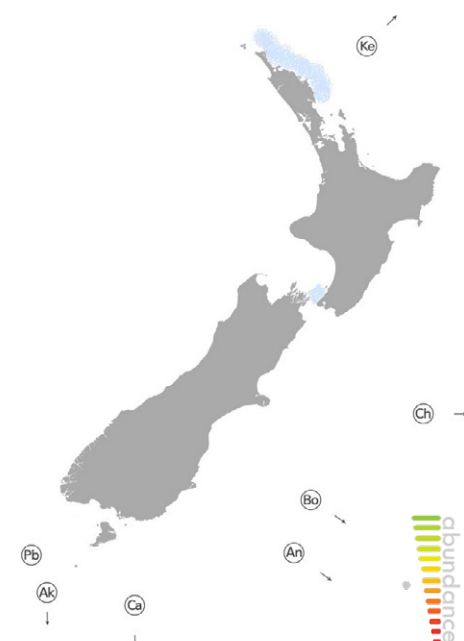


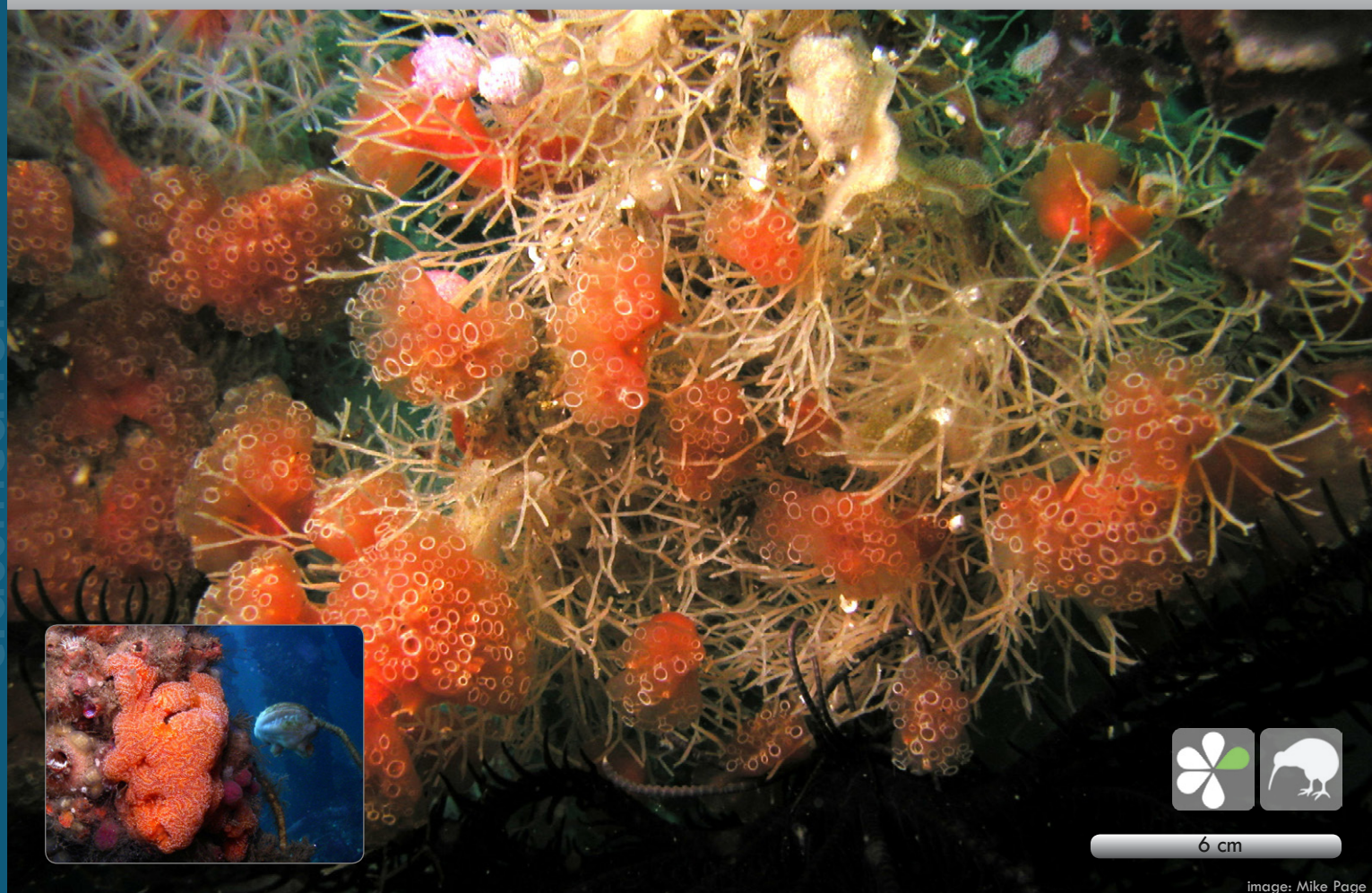
Long cylindrical pendulous colonies tapering to a smooth stalk, sometimes with short wart-like side processes. Test is smooth and gelatinous to touch, firm overall. Zooids appear as light brown specks, each with two tiny apertures opening separately to the outside. When reproductive, the zooids become orange with developing embryos. Colonies regress and over-winter as small (c. 10 mm) cream buds, re-growing the following spring to larger colonies.

This species occurs locally in high abundance in sheltered bays, growing on oyster racks, mangrove roots, rocky shoreline and on shells embedded in mud. Found in the far north of New Zealand at Parengarenga, Hohoura and Ranganu harbours and the Bay of Islands. Reported from Wellington. First described from Australia at Port Jackson, Sydney and has now been recorded from New South Wales and Queensland.



Australia





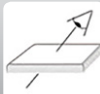
6 cm

image: Mike Page

morphology



surface



substrate



habitat



Colonies stalked with cauliflower-shaped heads containing zooids in star-shaped to circular systems. Rims of inhalant siphons have a distinctive white ring that is visible in the animals in life. Larger, more lobate specimens have been observed on wharf piles in areas of high tidal flow. Colour in life, deep reddish orange to brilliant crimson.

Lives on the undersides of intertidal rocks, overgrows bryozoans, seaweed fronds and holdfasts in the subtidal. Can be found on wharf piles. Locally abundant on intertidal and shallow subtidal reefs down to 10 m. This species is found around Cook Strait, Kaikoura, Portobello Peninsula, Chatham Islands, Stewart Island and Fiordland.

It could also be.....

Hypsistozoa fasmeriana



Brewin, B.I. (1946) Ascidiacea in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

Millar R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.

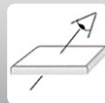


Images: Mike Page

morphology



surface



substrate



habitat



This species forms massive lobed colonies that are peach to white coloured and fleshy. The colour appears to depend on exposure to light. In the shaded upper reaches of fiords such as Crooked Arm, the colonies are white. The zooids are arranged in parallel double rows on each side of large common cloacal canals. The canals branch and radiate out from numerous large (5 mm diameter) terminal common cloacal apertures at the end of conical lobes. The test is soft, gelatinous and transparent. There are small tunic cells measuring 15 μ m in maximum diameter scattered throughout the test.

Aplidium coronum was first described from Fiordland. It is also known to occur from Bluff to Dunedin on the east coast of the South Island.

It could also be.....

Aplidium knoxi

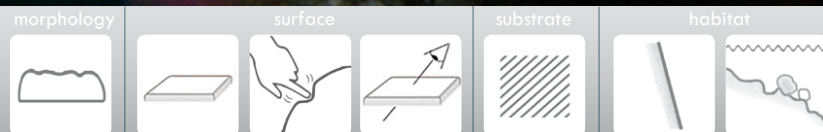
Aplidium phortax





5 cm

images: Mike Page



Pink colonies of *Aplidium knoxi* have randomly scattered common cloacal apertures with thin transparent raised rims. There are no apparent systems, zooids are evenly distributed throughout the colony. The test is very soft, gelatinous and invested with numerous test and granular cells, and some incorporated sediment.

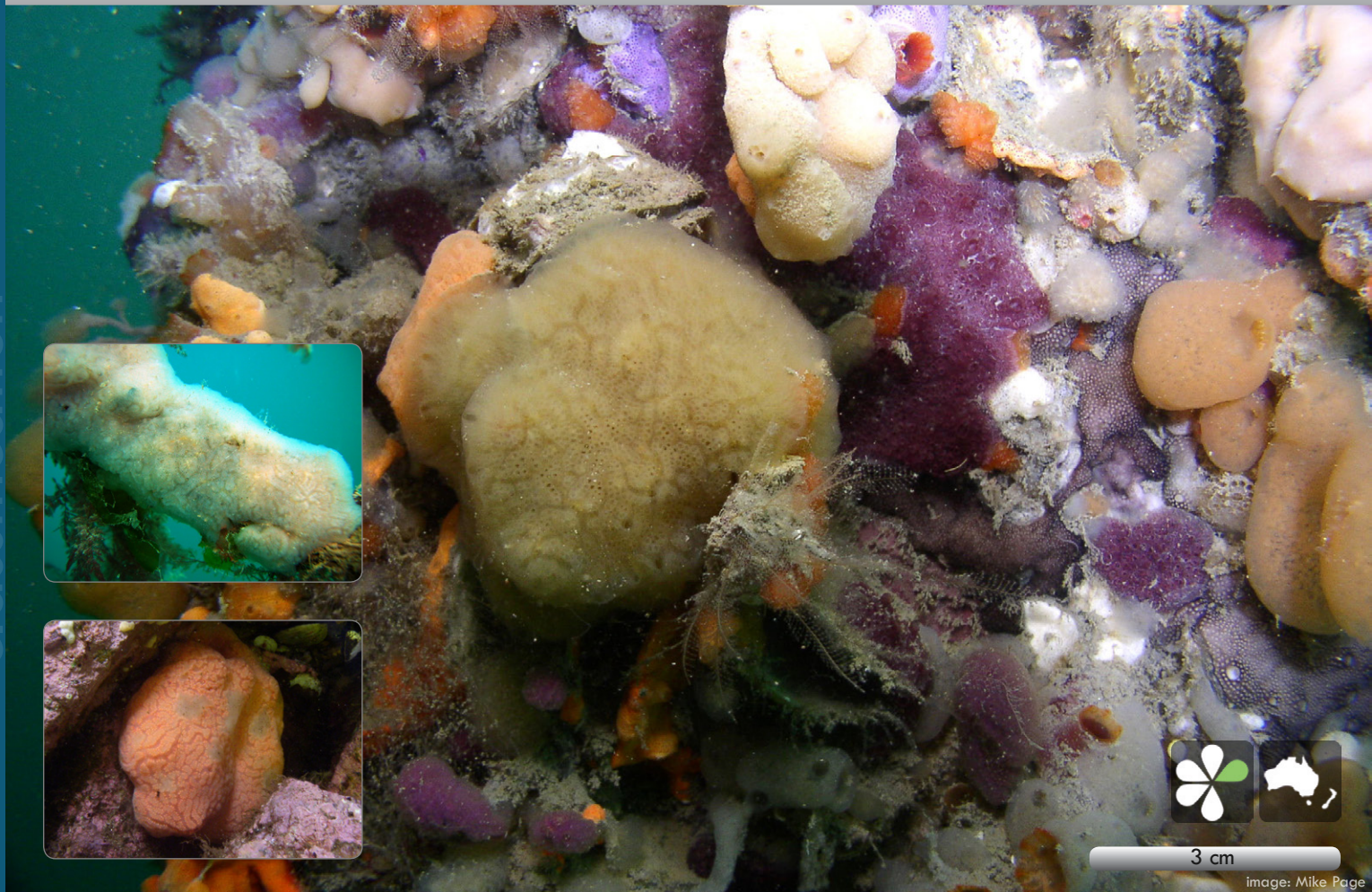
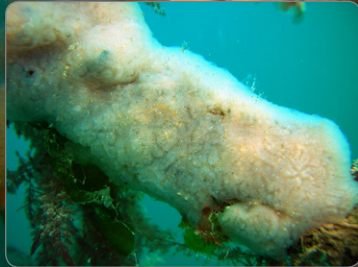
Aplidium knoxi was first described in the Chatham Islands and has been recorded from Kaikoura, Banks Peninsula Stewart Island and Bluff.

It could also be.....
Aplidium coronum



Brewin, B.I. (1956) Ascidiaceans from the Chatham Islands and the Chatham Rise. Transactions and Proceedings of the Royal Society of New Zealand, 84 (1): 121-137.

Stocker, L.J. (1985) An identification guide to some common New Zealand ascidiaceans.: 74 p.



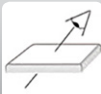
3 cm

image: Mike Page

morphology



surface



substrate



habitat



Large spherical, fleshy, firm, gelatinous colonies. Zooids form meandering double-rowed, at times branching systems, along obvious subsurface canals. Common exhalant apertures are indistinct, but are often situated on the apex of lobes on the colony. Colour in life varies from translucent cream, to light tan, to pink.

Very common species fouling wharf piles and aquaculture structures in ports, bays, and harbours. This species occurs throughout New Zealand. It has been recorded from Tauranga, D'Urville Island, Marlborough Sounds, Wellington and Lyttleton harbours, Otago, Chatham Islands, Stewart Island and Fiordland.

It could also be.....
Aplidium powelli



Brewin, B.I. (1946) Ascidiens in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

Millar R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.



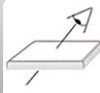
8 cm

image: Mike Page

morphology



surface



substrate



habitat



Grows in large, fleshy, multi-lobed colonies up to 10 cm high. Gelatinous yet firm to the touch. Easily distinguished by the many common exhalant apertures and the distinctive branched pattern of zooid inhalant apertures visible through the outer test. Colour in life usually light pink, but can also be yellow and translucent.

Most common on sheltered deep reefs down to 30 m depth on the north eastern coastline of the North Island. This species was first described from the Hauraki Gulf and has now been recorded from North Cape to Karikari Peninsula.

It could also be.....
Aplidium phortax





3 cm

image: Mike Page

morphology



surface



substrate



habitat



Colonies are composed of closely packed flat-topped heads in a large mound approximately 60 mm high. The test is heavily invested with sand; the tops of the heads less so, revealing dull orange zooids beneath the surface. No systems or common exhalant apertures are visible in the colony in life. Colonies are often associated with polychaete worm cases that protrude between the colony heads.

This species is relatively common on the sandy seafloor between rocky reefs, but is often overlooked because of its cryptic habitat in the sand. This species was originally recorded from Little Barrier Island. It is now known to occur at Cape Karikari, in the Hauraki Gulf, Chatham Island, Stewart Island, and Fiordland.

It could also be.....

Botryllus stewartensis



Michaelsen W. (1924) Ascidiæ Krikobanchiæ von Nueseeland den Chatham- und den Auckland- Inseln. *Videnskabelige Meddelelser fra Dansk naturhistorisk Forening i Kobenhavn*, 77: 263–434.

Millar R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.



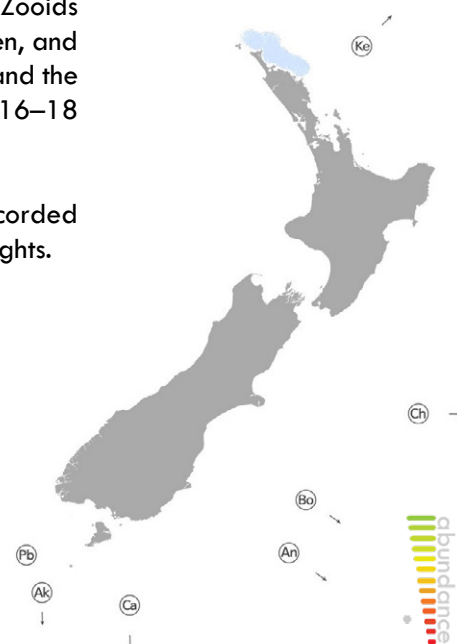
3 cm

Images: Mike Page



A colonial species that grows as a cushion or plate-like mat. The colour is a uniform lemon yellow. The test is firm and gelatinous. Systems are irregularly elongate or circular around large sometimes tear-drop shaped common cloacal apertures. Zooids are up to 7 mm long and typically, the thorax a little longer than the abdomen, and the post-abdomen half the total length. The branchial aperture has six lobes and the atrial aperture is surmounted by a simple or split atrial tongue. Pharynx has 16–18 rows of stigmata. The stomach has six to seven folds.

Found in caves and on vertical walls where there is great water movement. Recorded from the Three Kings Islands, Spirits Bay and the eastern side of the Poor Knights.

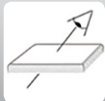
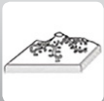




7 cm

Images: Mike Page

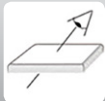
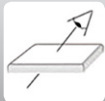
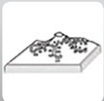
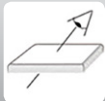
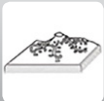
morphology



surface

substrate

habitat



A massive to hemispherical compound ascidian which looks distinctly like a brain. It is very white with pink or red depressions. Pale orange colonies have also been seen. The test feels cartilaginous and the animal is firmly gelatinous to the touch. Circular systems are up to 7 mm in diameter and 10 mm apart comprising on average 10–11 zooids. Common cloacal apertures are produced into a short siphon surrounded by a groove. The central bulk of colony is a gelatinous mass devoid of functional zooids. Zooids up to 15 mm are highly contractile and often tangled together within the test.

This species is common on shallow subtidal reefs from the Three Kings Islands down the east coast of the North Island to Wellington. It may be closely related to *Aplidium peruvianum* Sanamyan & Schories, 2004.

depth (m)

80

100

120



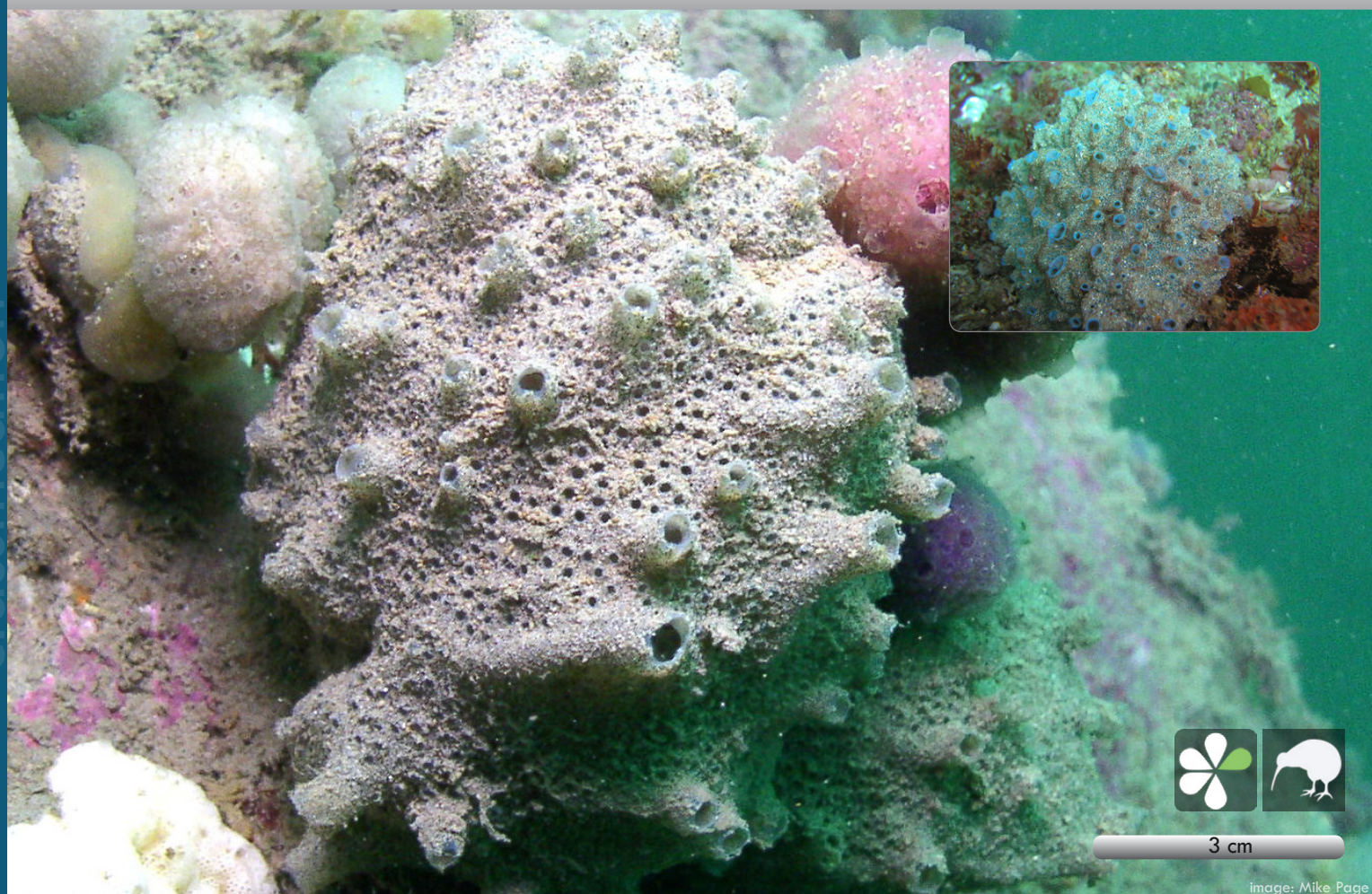
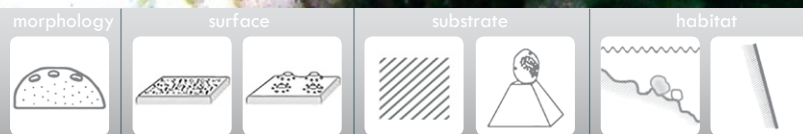


image: Mike Page

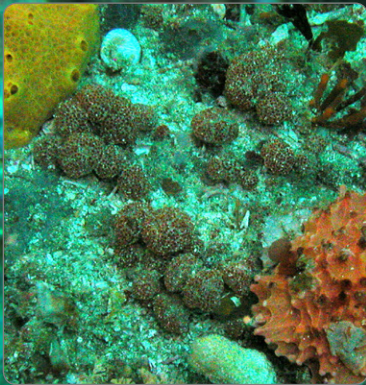
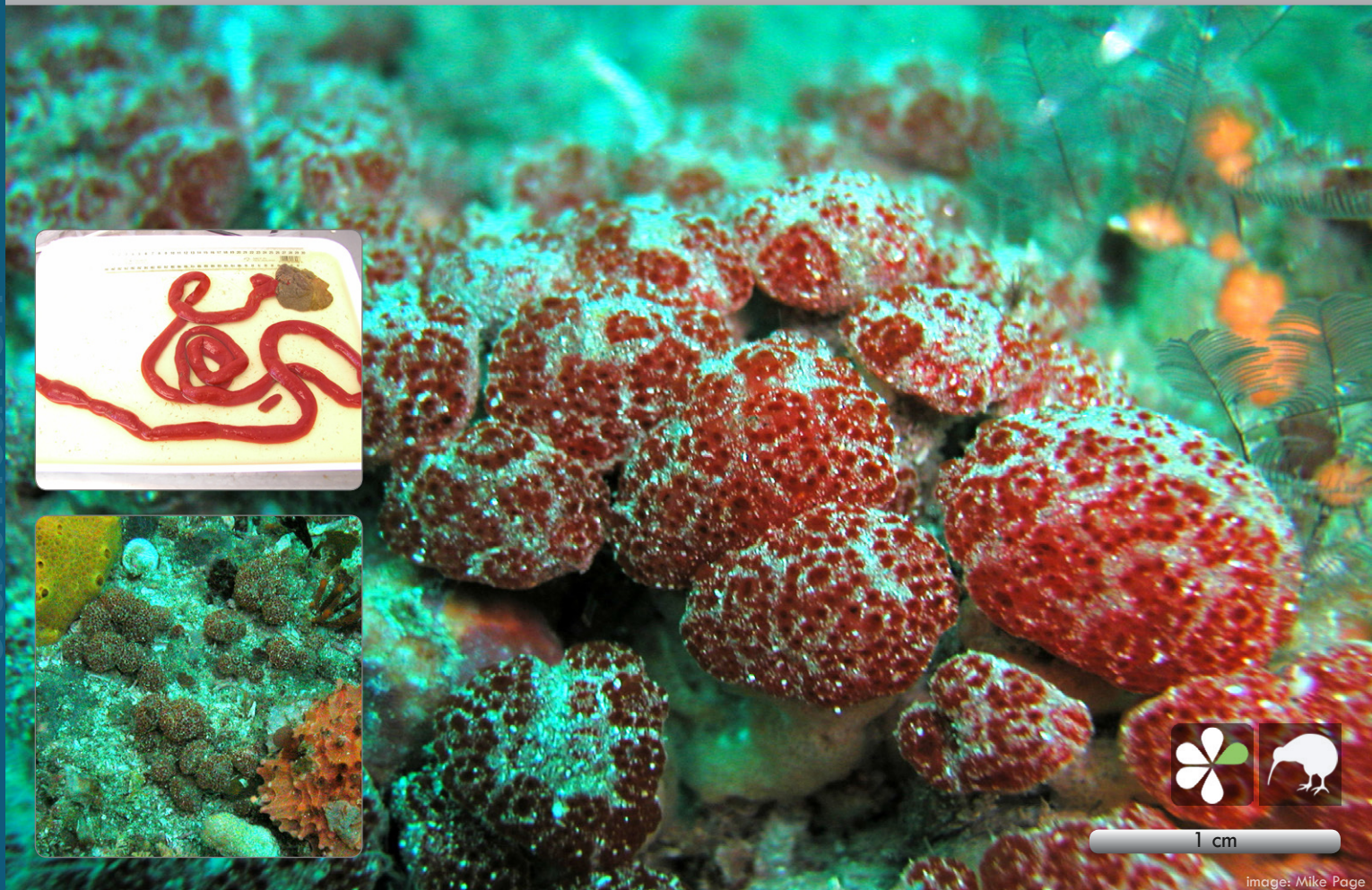


Distinctive, often large cushion-shaped colonies with numerous raised turret-shaped common exhalant siphons interspersed with small but obvious inhalant apertures. The surface is lightly coated with sand and the inside soft and gelatinous. Colour in life is gray to lilac-gray; the inside of the common siphons is an iridescent blue.

Found in sheltered, sandy subtidal environments growing on natural and artificial substrata. This species was first recorded from Foveaux Strait. It is now known to occur in the far north of New Zealand at Karikari Peninsula, North Cape, and Whangaroa Harbour.

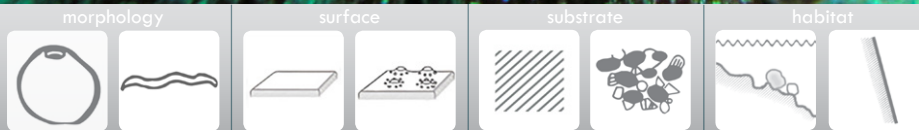
It could also be.....
Aplidium scabellum





1 cm

image: Mike Page



Mushroom to button-shaped colonies without an obvious stalk, commonly occurs in clusters of up to a dozen colonies. Colonies are smooth and gelatinous, however at times overlain with sand. Up to eight zooids are arranged in circular systems around common exhalant apertures. In areas of high tidal flow colonies may grow into long sausages up to 1.2 m long.

Locally abundant on low sandy deep reefs and in sheltered harbours with high tidal flow, down to 40 m. This species was first recorded from Great Barrier Island. It is now known from North Cape, Whangaroa Harbour, Whangarei and Fiordland.

It could also be.....
Hypsistozoa fasmeriana



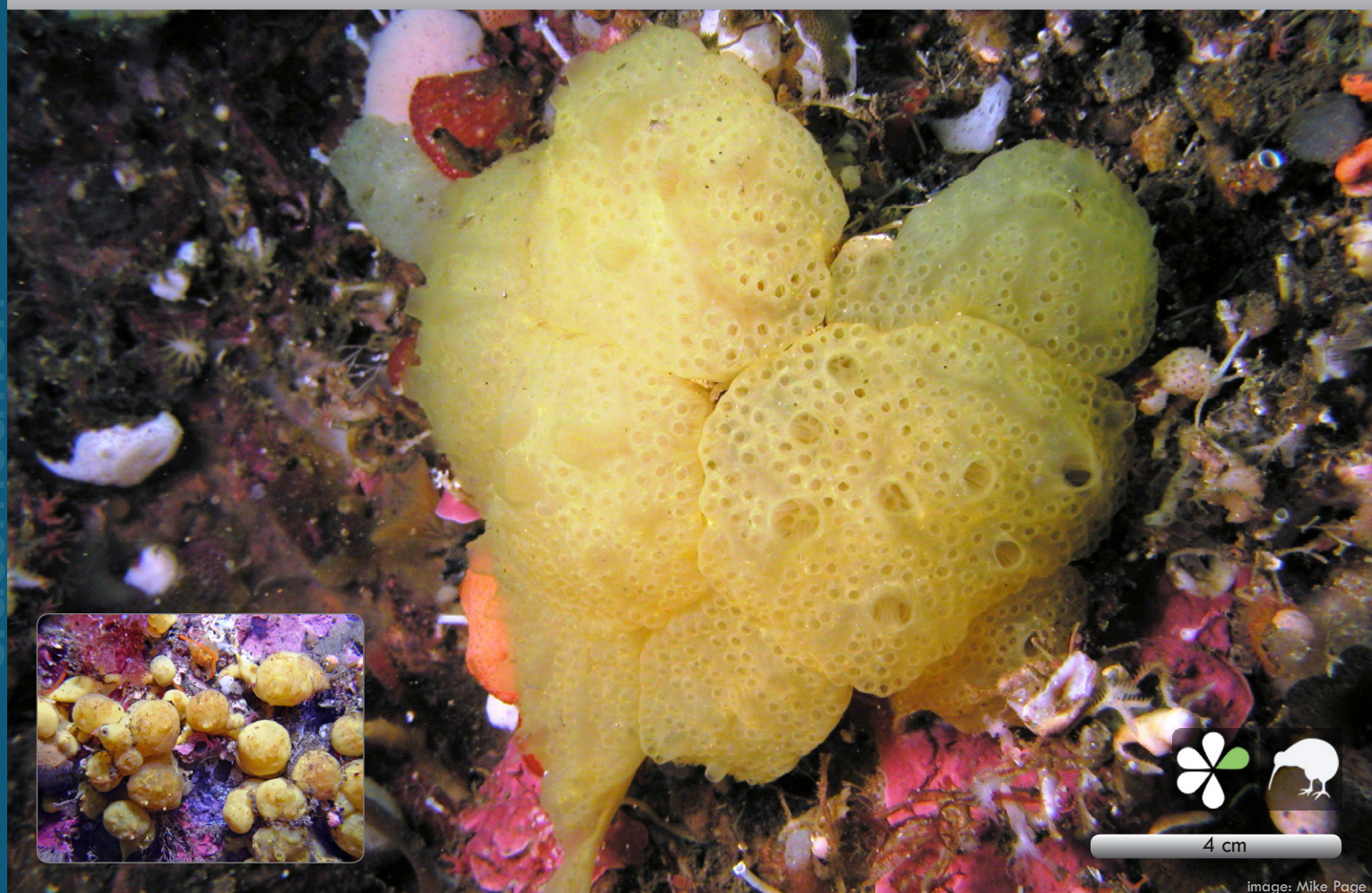
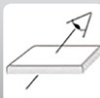


image: Mike Page

morphology



surface



substrate



habitat



Smooth flat cushion or several cushions fused at the base. Gelatinous, no sediment incorporated in the test. Zooids in circular systems at times visible under the opaque test. Common exhalant apertures at times not visible in senescent colonies.. Colour in life patchy yellow orange, translucent.

Infrequently found over-growing coralline paint on rock walls or shallow subtidal habitats. Also known from benthic trawls on the shelf-break to 300 m. This species was first found in benthic trawls on the west coast of the South Island. It is now known to occur off Kaikoura and is common in Fiordland.

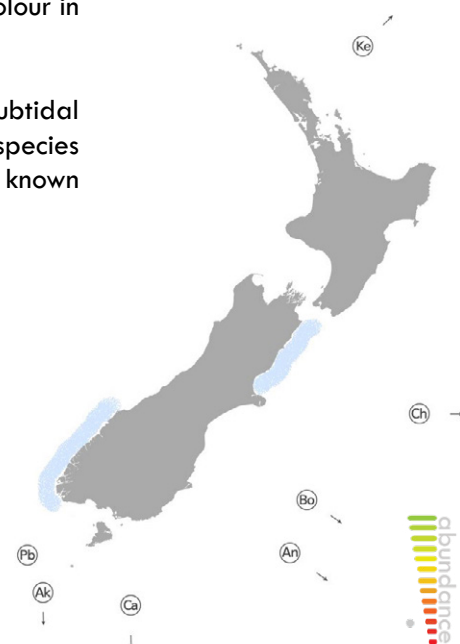
depth (m)

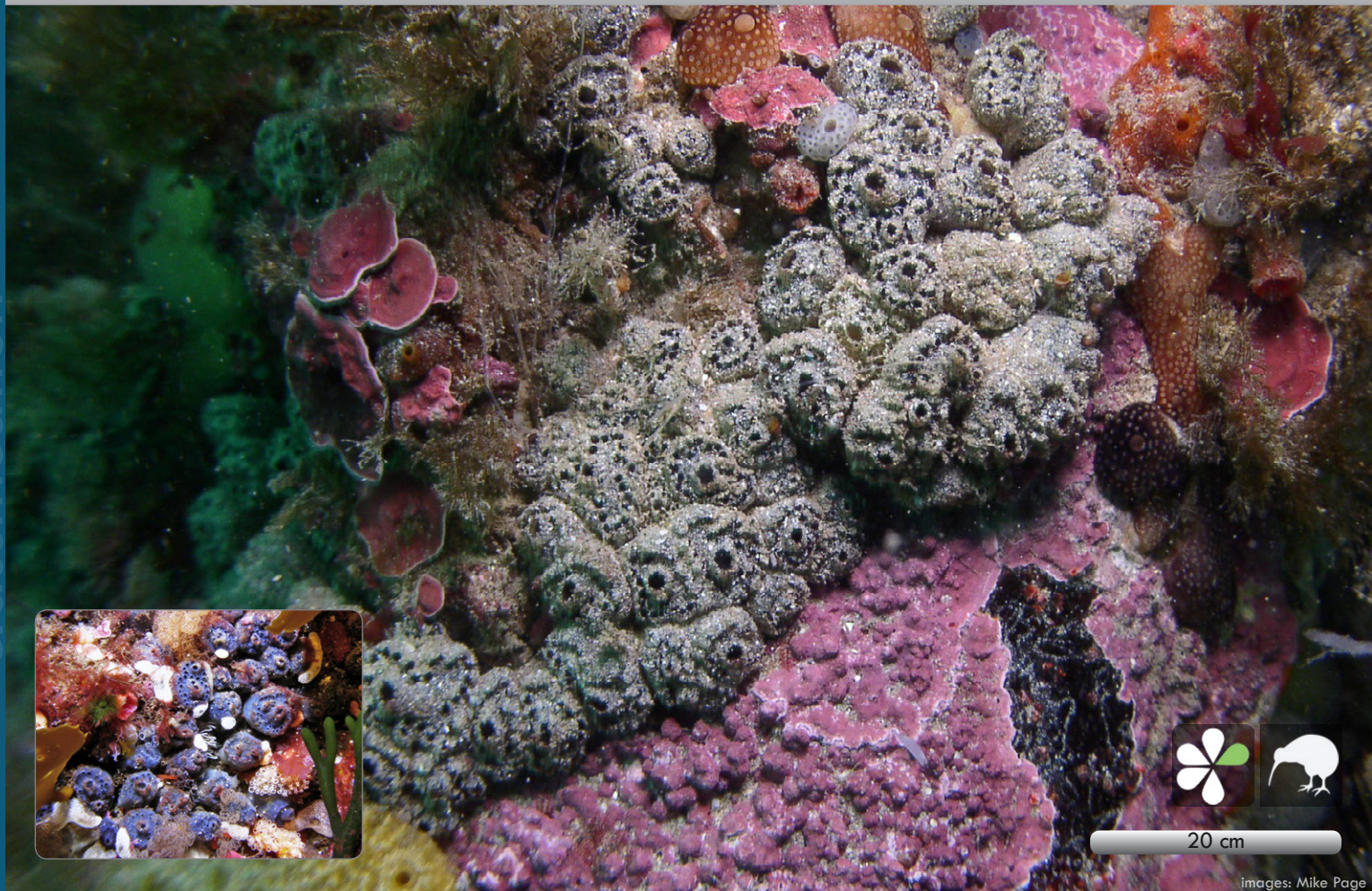
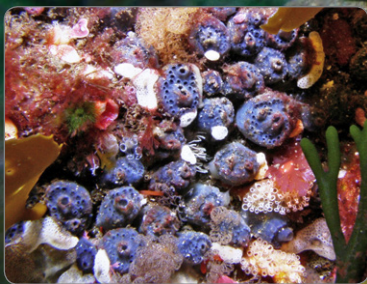
80

100

120

to 280m





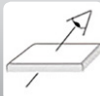
20 cm

Images: Mike Page

morphology



surface



substrate



habitat

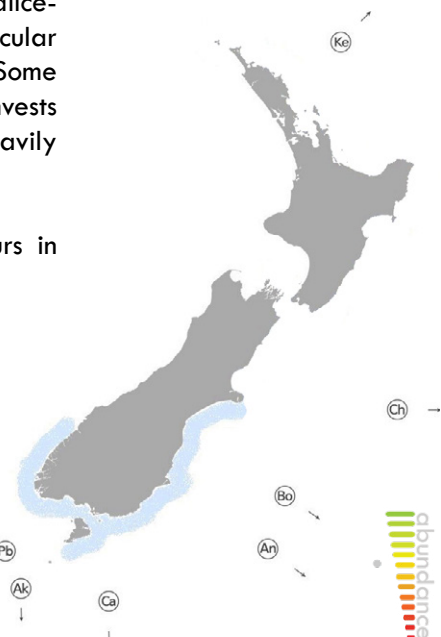


A small colonial ascidian, often found with heads of the colonies embedded among bryozoans and turfing red algae. Colonies are up to 100 mm across and 20 mm thick. The colonies are composed of numerous flat-topped, bright blue chalice-shaped heads that taper to a common basal mat. Each head generally has a circular system of 15–20 zooids around a central raised common cloacal aperture. Some colony heads may have two systems. Sand invests the basal test and sparsely invests the posterior half of the colony. The test is firm but gelatinous and the zooids heavily pigmented red when fixed in formalin.

Found on rocky reef, walls in moderately exposed coast and fiords. Occurs in Fiordland, Stewart Island and on the Chatham Rise.

It could also be.....

Botryllus stewartense



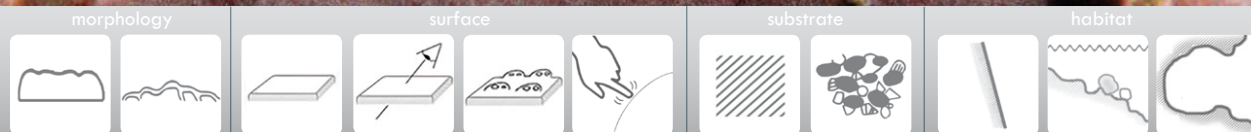
Millar, R.H. (1982) The marine fauna of New Zealand: Ascidiacea. New Zealand Oceanographic Memoir, 85, 114 p.

Page, M., Willis, T., Handley, S. (2014) The colonial ascidian fauna of Fiordland, New Zealand with a description of two new species. *Journal of Natural History*, 48 (27-28): 1653-1688.



1.5 cm

Image: Mike Page



This species grows as a thick convoluted plate with varying degrees of folding. The test is semi-transparent with a brown, yellow or purple colouration but in certain light the colony has a surface sheen. This is because of numerous distinctive white test cells scattered over the surface. Openings are difficult to observe. There are no common cloaca and atrial siphons open directly to the surface. There is no systematic arrangement of zooids. The texture is very firm and gelatinous.

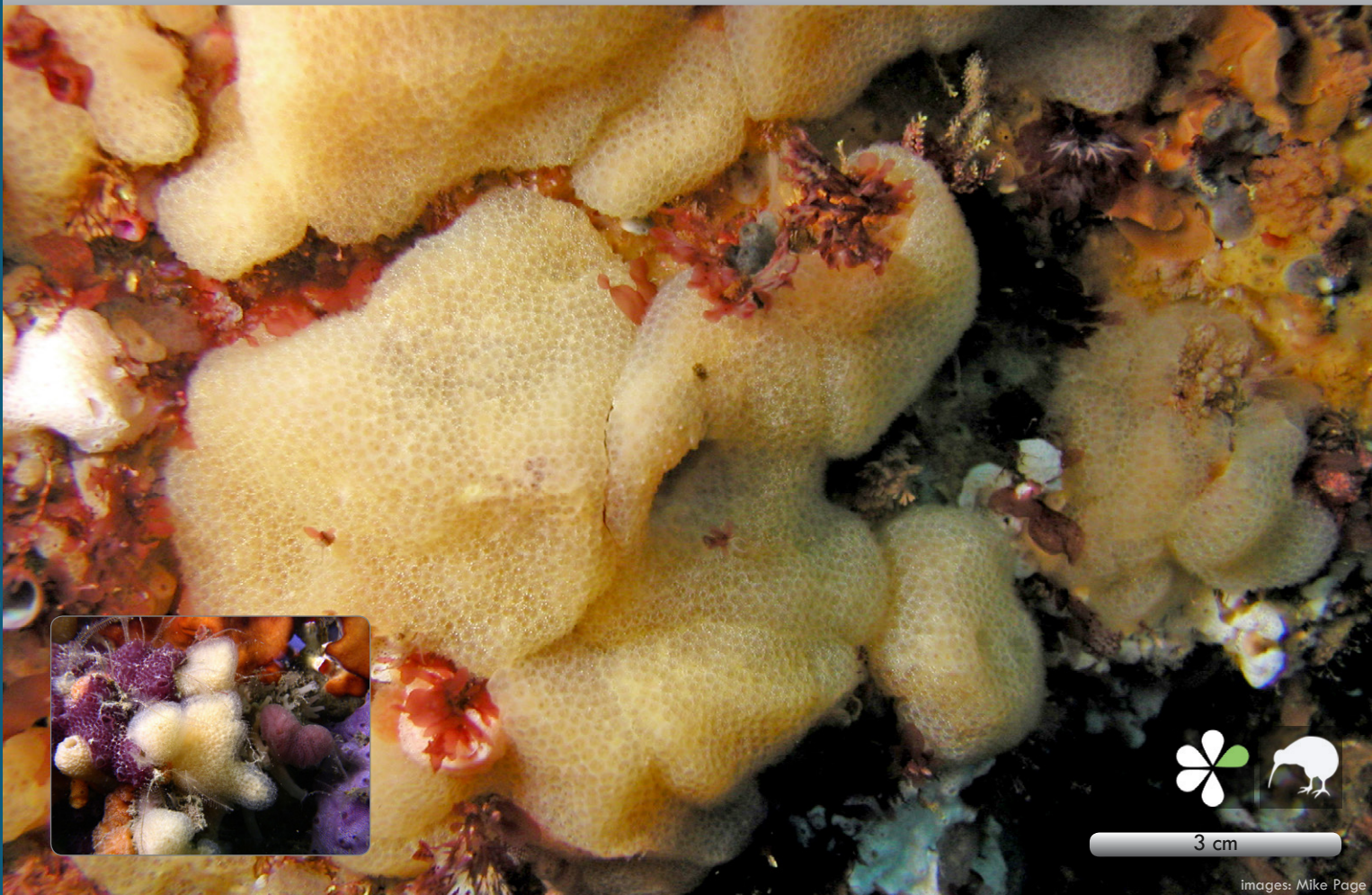
It is commonly found on open rock flats and urchin-grazed habitats in the shallow subtidal zone on the east coast of Northern New Zealand and Kaikoura.



Brewin, B.I. (1957) Ascidians of New Zealand. Part X. Ascidians from North Auckland. *Transactions and Proceedings of the Royal Society of New Zealand*, 84 (3): 577–580.

Millar, R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Memoir*, 85, 114 p.

Stocker, L.J. (1985) *An identification guide to some common New Zealand ascidians*, 74 p



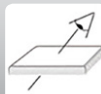
3 cm

Images: Mike Page

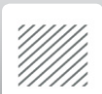
morphology



surface



substrate



habitat

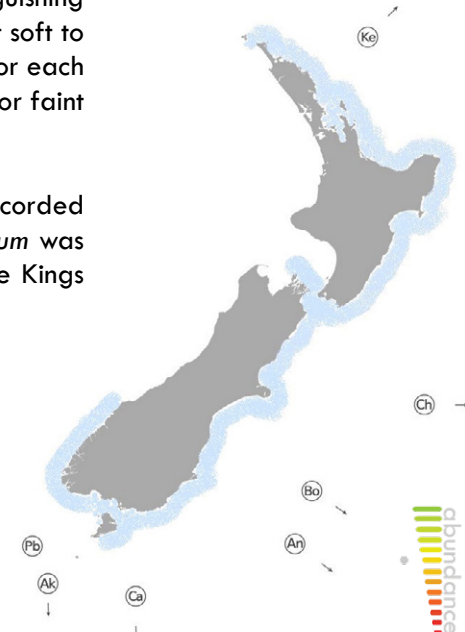


Colonies usually form fat rounded fingers up to 50 mm high, but in high energy environments they may flatten and become more encrusting cushions. Small test cells may be numerous in some colonies giving them an opaque appearance, distinguishing this from other similar looking species. Fingers are stiff and cartilaginous, but soft to the touch on the exterior. Zooids open separately to the exterior; openings for each zooid are apparent on the apex of small lumps. Colour in life cream, yellow or faint pink.

This species is most commonly found from 10 to 20 m in Fiordland and is recorded from the Hare's Ears, Dusky Sound and Caswell Sound. *Pseudodistoma cereum* was first described from Stewart Island. It is now known to occur from the Three Kings Islands down the east coast to North Cape, Bluff and Fiordland.

It could also be.....

Aplidium phortax



Brewin, B.I. (1958) Ascidiaceae of New Zealand. Part 11. Ascidiaceae of the Stewart Island region. Transactions of the Royal Society of New Zealand, 85 (3): 439–453.

Michaelson W. (1924) Ascidiaceae Krikobranthiae von Nueseeland den Chatham- und den Auckland- Inseln. Videnskabelige Meddelelser fra Dansk naturhistorisk Forening i Kobenhavn, 77: 263–434.



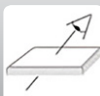
2 cm

image: Mike Page

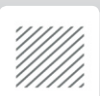
morphology



surface



substrate



habitat



Stalked colonial ascidian with an ovoid to spherical head, test clear, no sand. Inhalant and exhalent siphons of individual zooids open directly on surface. Colour in life bright peach orange.

Colonies occur in patchy groups (20–30 cm diameter) on coralline paint. Very common in exposed shallow coastal reefs, generally down to 10 m depth. This species was first recorded from Great Barrier Island. It occurs at the Kermadec Islands, North Cape, Poor Knights Islands, Whangarei Heads, Leigh and the Hauraki Gulf.

It could also be.....

Aplidium benhami



Pseudodistoma opacum (Brewin, 1950)

[Return to Index](#)

Class Ascidiacea Order Aplousobranchia Family Pseudodistomidae



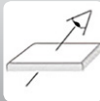
10 cm

main image: Richard Taylor inset image: Brent Copp

morphology



surface



substrate



habitat

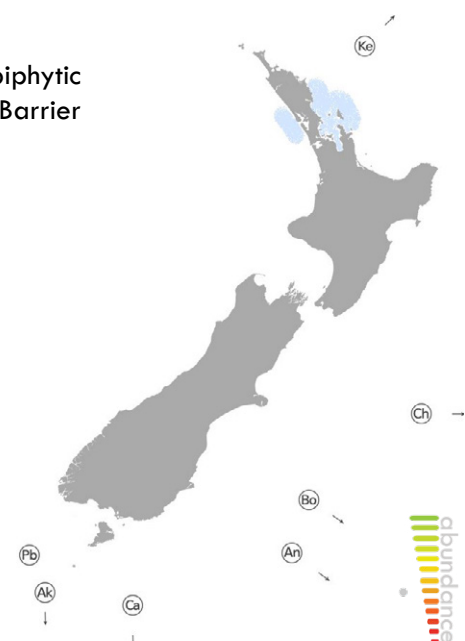


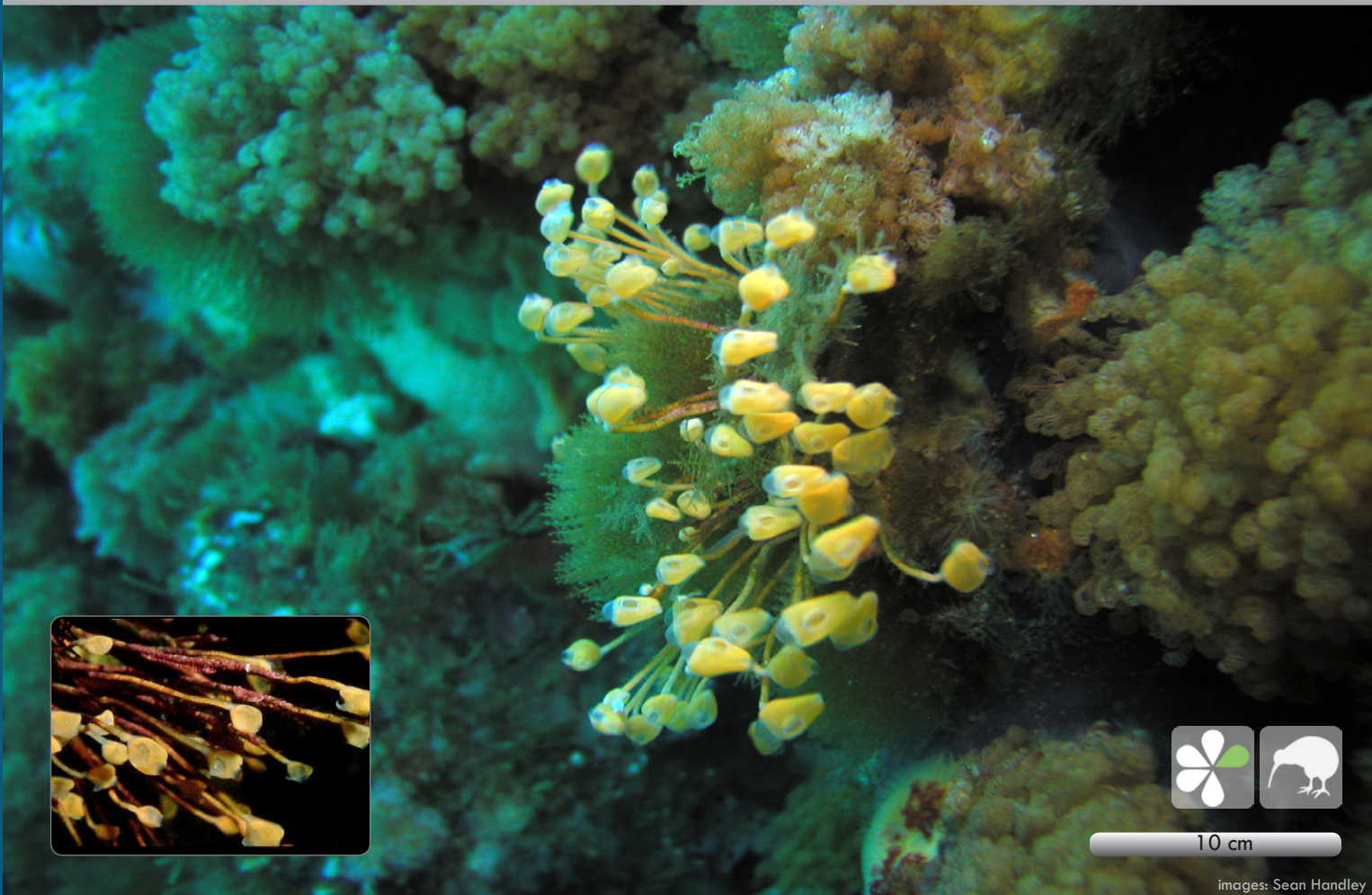
Thick fleshy irregular mats made up of a spreading basal membrane that gives rise to small flat-topped lobes. Test semi-transparent with yellow zooids, apertures opening onto the surface. Colour in life tan.

Typically encrusts the undersides of intertidal boulders. Colonies can have epiphytic red algae growing on the surface. This species was first recorded from Great Barrier Island. It is known to occur on the north and west coasts of Auckland.

It could also be.....

Pseudodistoma cereum





10 cm

images: Sean Handley

morphology



surface



substrate



habitat



A distinctive colonial ascidian that has numerous pod-like heads arising from a narrow basal mat. Stalks are long and slender; heads have an oral (inhalant) opening halfway down and an atrial (exhalant) opening at the top of the colony head. Colour in life is gold and slightly translucent on the siphons.

Found occasionally on walls and the edge of overhangs in areas of high exposure, where it can be locally abundant. This species is found around Three Kings Islands and North Cape.

It could also be.....
Clavelina lepadiformis





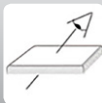
2 cm

main image: Dennis Gordon inset image: Arjan Gittenberger

morphology



surface



substrate



habitat



Sack-like ovoid body with an inhalant siphon at the top of the animal, and an exhalant siphon one third to halfway down one side. Test is thin, translucent, and covered in small bumps. The gill slits are elongate, and not folded, the tentacles are smooth.

This species is found on shallow subtidal rock, wharf piles and submerged structures, in both marine and estuarine environments of the South Island. This species occurs in New Zealand around the northern and southern coasts of the South Island. It is native to the northeastern Atlantic, from the Mediterranean Sea to Norway. It is now widespread in the Northern Hemisphere and Australasia.

It could also be.....
Corella eumyota

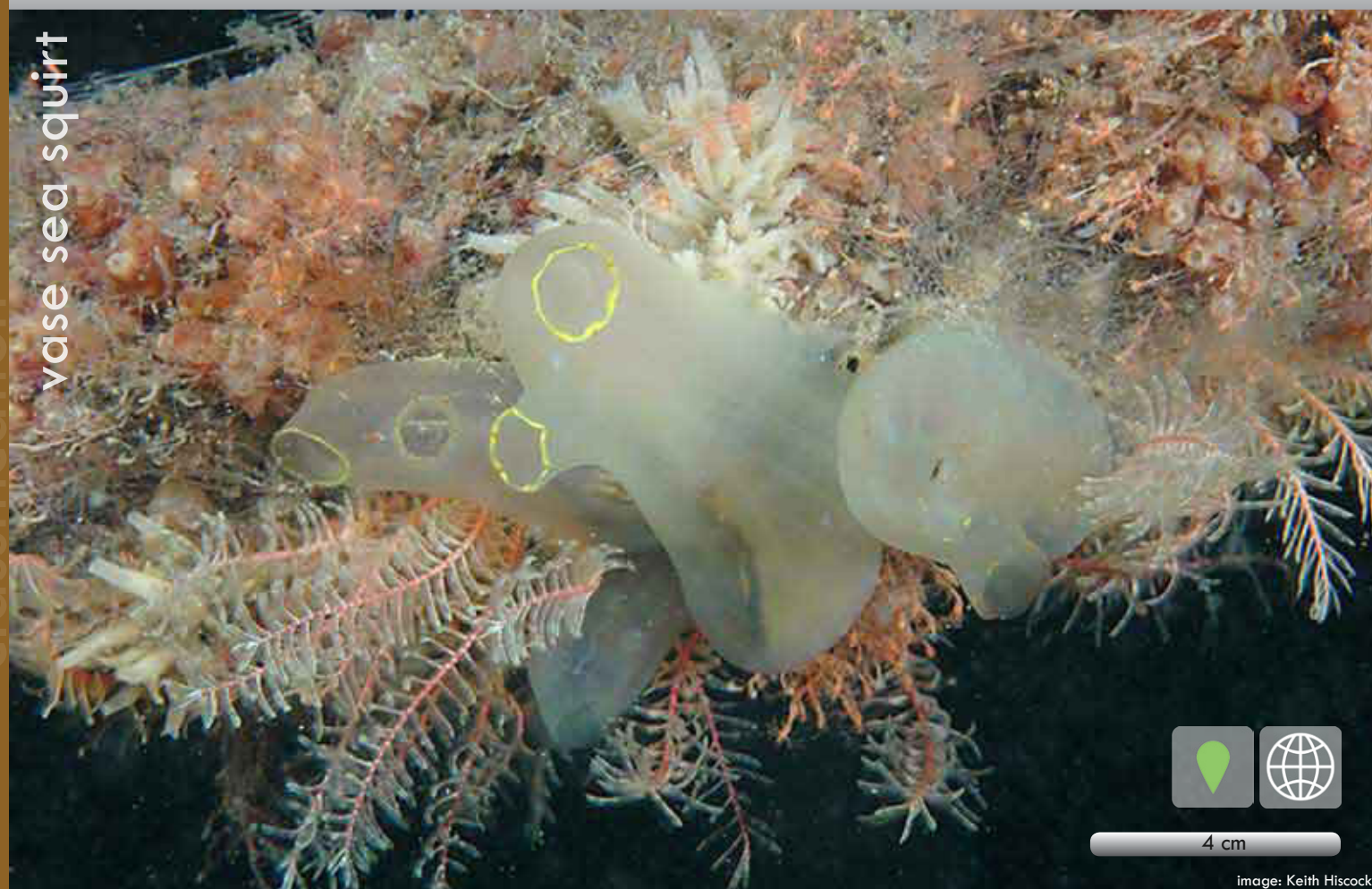


Cosmopolitan



Brewin, B.I. (1946) Ascidians in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

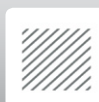
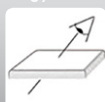
Millar R.H. (1982) The marine fauna of New Zealand: Ascidacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.



4 cm

image: Keith Hiscock

morphology



habitat



Two species of *Ciona* are known to co-occur in New Zealand ports and harbours. *Ciona intestinalis* has lemon yellow pigment spots on the siphon rim while *Ciona savignyi* has orange pigment spots on the siphon rim.

Body elongate, tapering towards two closely spaced siphons. Test is soft, flexible, gelatinous, transparent, with light green pigment at the anterior end, and lemon yellow pigment spots on siphon rim. Gill slits are elongate, not folded, and tentacles are smooth. Six broad longitudinal muscle bands are found on each side of the body wall.

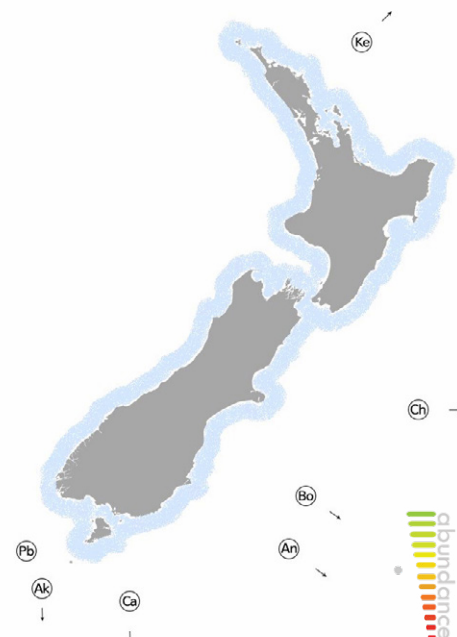
Often found in high abundance on aquaculture structures, wharf piles and pontoons. This species is widespread throughout New Zealand ports, harbours and sheltered bays. It has a global distribution and the natural range of this species is uncertain.

It could also be.....

Ciona savignyi



Cosmopolitan

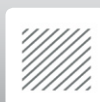
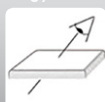




4 cm

image: Chris Woods

morphology



substrate

habitat



Two species of *Ciona* are known to co-occur in New Zealand ports and harbours. *Ciona intestinalis* has lemon yellow pigment spots on the siphon rim while *Ciona savigny* has orange pigment spots on the siphon rim.

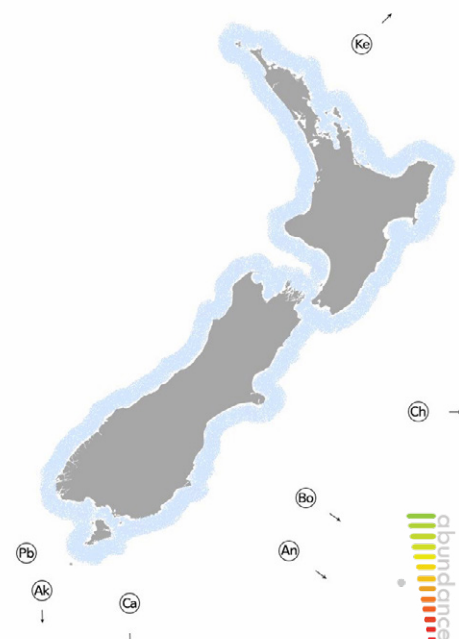
Body elongate, tapering towards two closely spaced siphons. Test is soft, flexible, gelatinous, transparent, with light green pigment at the anterior end, and orange pigment spots on siphon rim, and yellow or white pigment flecks on the body wall. Gill slits are elongate, not folded, and tentacles are smooth. Six broad longitudinal muscle bands are found on each side of the body wall.

Often found in high abundance on aquaculture structures, wharf piles and pontoons around New Zealand. *Ciona savigny* is a sister species to *C. intestinalis* and also appears to have a global distribution.

It could also be.....
Ciona intestinalis



North Pacific



Brewin B.I. (1950) Ascidians of New Zealand. Part IV. Ascidians in the vicinity of Christchurch. *Transactions and Proceedings of the Royal Society of New Zealand*, 78 (2-3): 344-353.

Herdman, W.A. (1882) Report on the Tunicata collected during the voyage of H.M.S. Challenger during the years 1873-1876, Part 1, Ascidiae simplices. *Zoology of the Challenger Expedition*, 6 (17): 1-296.



main image: Judith Oakley inset image: Natural History Museum, UK

morphology



surface



substrate



habitat



Body oval to elongate, laterally compressed, attached to the substrate on right side, individuals are often found in groups. Inhalant siphon at top of animal, smaller exhalant siphon $\frac{1}{3}$ of the way down the side of the body. Gill slits spiral, gills not folded, and oral tentacles smooth. Test transparent, smooth, cartilaginous. Gut and gonads often visible through the test. Colourless in life, but some have bright peach inhalant siphons.

Prefers calm protected waters, found in shallow subtidal environments attached to wharf piles, ropes and other submerged structures around New Zealand. This species is widespread throughout New Zealand. It is a temperate Southern Hemisphere species common to Subantarctic and Antarctic regions that has spread throughout the North Atlantic.

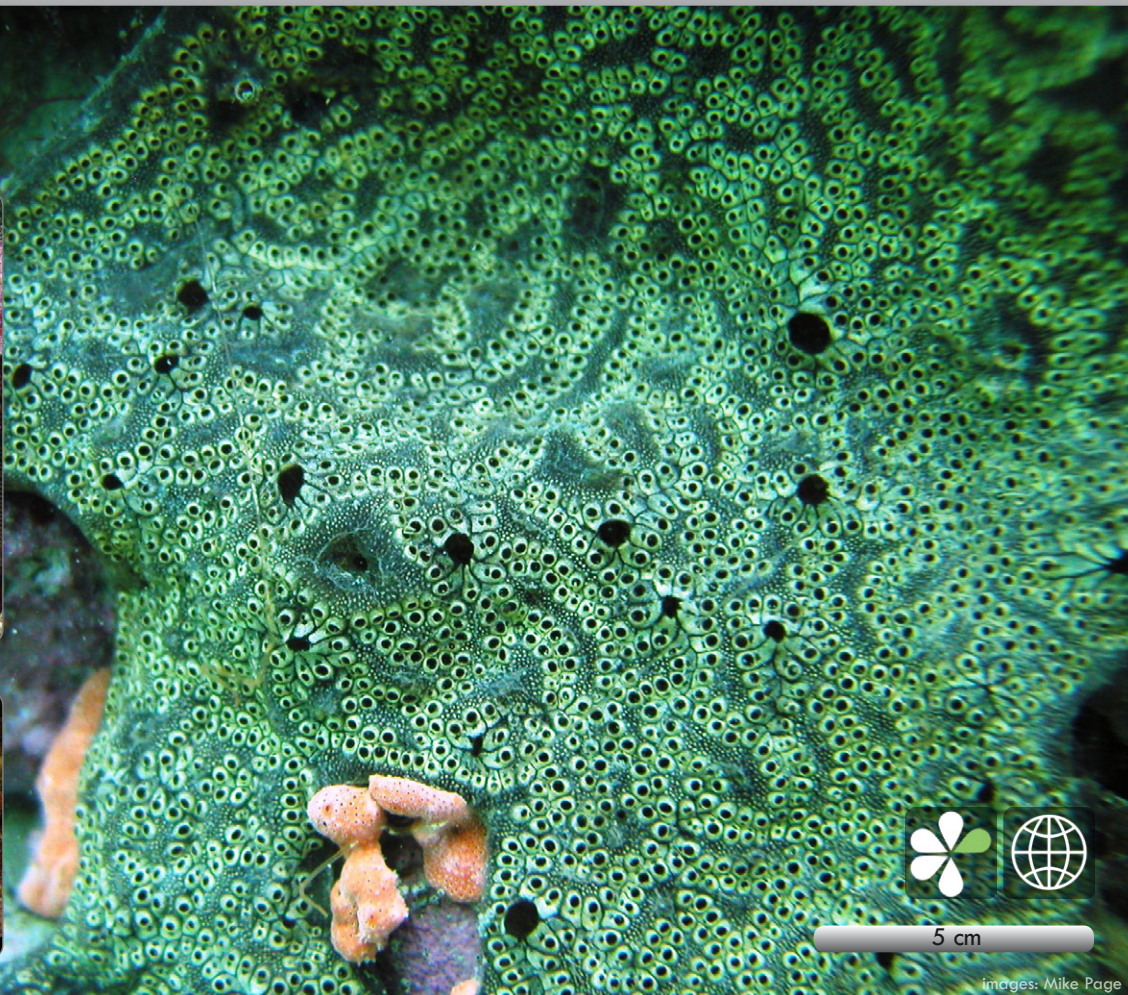
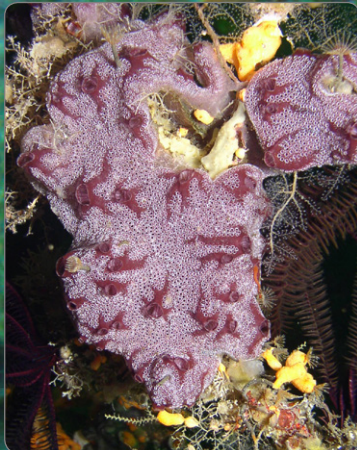
It could also be.....

Ascidiella aspersa
Molgula spp.



Cosmopolitan





5 cm

images: Mike Page

morphology



surface



substrate



habitat



Colonies are encrusting, about 3–5 mm thick and up to 20 cm diameter, often overgrowing other species, giving colonies a lobate appearance. Parallel systems of zooids are usually obvious because of light pigmentation around the inhalant apertures. Systems connect to numerous common exhalant apertures. Colour in life is highly variable, ranging from typically purple to green to orange and cream. The test is transparent, soft and gelatinous. Small granular bodies are visible near the surface of the test between the zooid systems and the border of the colony.

Encrusts moorings, jetties and wharf piles, and is very common in ports and harbours throughout New Zealand. May have been introduced by early sailing ships. This species is common and widespread throughout New Zealand. The native range appears to be from the northeastern Atlantic Ocean to the Mediterranean, and from the Red Sea to the tropical Indo-West Pacific down to the temperate waters of South Australia and New Zealand.



North Atlantic Ocean and Seas



Brewin B.I. (1946) Ascidiaceans in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

Millar R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.



1.5 cm

Images: Mike Page

morphology



surface



substrate



habitat



Cushion-shaped colonies vary in colour from lavender with white branchial apertures to cream with purple pigment around the branchial apertures. The test in lavender-coloured colonies is transparent and the zooid branchial sacs clearly visible through the cream colonies are opaque. Double rows of zooids are tightly packed in a soft fleshy test. There are numerous common cloacal apertures, approximately 5 mm in diameter randomly distributed throughout the colonies.

This species is most commonly found from 5 to 25 m on walls in Fiordland and the white colour variant is found on wharf piles in Bluff. *Botrylloides* sp. is easily recognisable because of the white 'branchial rings' over the surface. The species was first recorded from Fiordland.

depth (m)

0
20
40
80
100
120



golden star sea squirt



1 cm

inset image: Chris Woods

morphology



surface



substrate



habitat



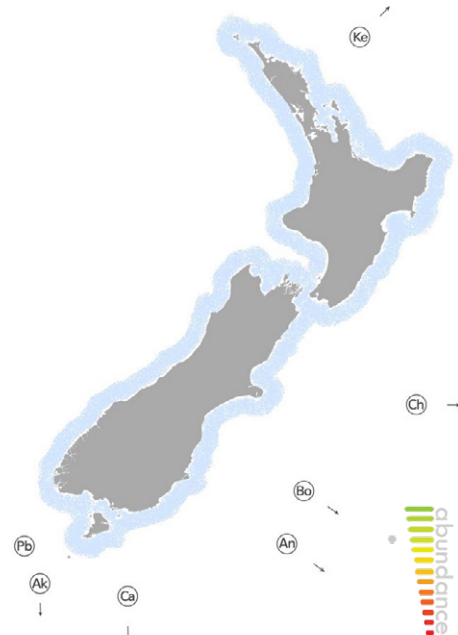
Colonies 3 mm thick, often co-occurring with *Botrylloides leachii*, but can be distinguished by circular zooid systems around common exhalant apertures. In life, colonies can vary widely in colour, but are usually orange, green or purple.

Encrusts moorings, jetties, undersides of mooring pontoons, and wharf piles, and is very common in ports and harbours throughout New Zealand. May have been introduced by early sailing ships. This species is widespread around New Zealand. It is common around the coast of Great Britain, Ireland and Europe, Faroe Islands and Norway to the north and as far south as the Mediterranean. It is also known from the Western Atlantic along parts of the coast of North America. It is also known from Mexico, South China Sea and South Africa. This species is recorded from eastern, western and southern coasts of Australia where it is thought to have been introduced by early sailing ships.

It could also be.....
Botrylloides leachii



Cosmopolitan



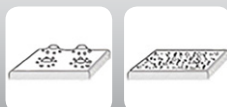


Images: Mike Page

morphology



surface



substrate



habitat



Colonies are low sandy lobes approximately 10 mm high, tightly packed on a basal mat. Each lobe has a central common exhalant aperture with a circle of zooids. Morphology and colour in life vary with sediment levels and exposure. Colour in life is sandy violet, or cream. The test is delicate and soft, when present, sediment is confined to the outer test.

Found occasionally on reefs in sheltered coves and on walls in fiords in southern New Zealand. This species has been recorded from Lyttleton Harbour, Stewart Island, and Foveaux Strait and Fiordland. It is also known from southern, eastern and Western Australia.

It could also be.....

Botrylloides leachii





0.5 cm

Images: Mike Page

morphology



surface



substrate



habitat



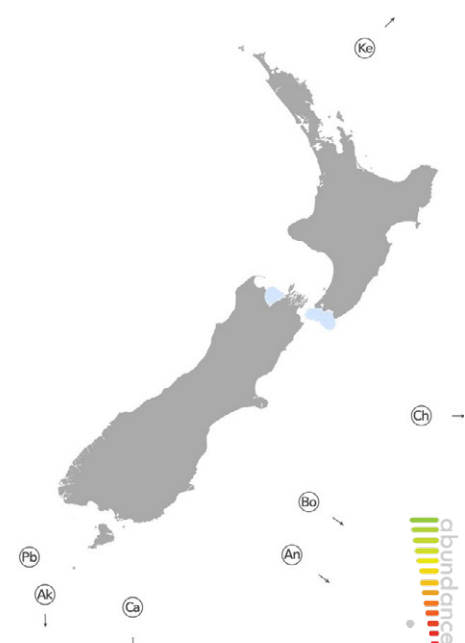
Colonies are small, delicate, very thin and transparent. Bright orange zooids are arranged in widely spaced circular systems, giving the colony a flower-shaped appearance. Colour in life brilliant orange and cream in a transparent test.

This species typically encrusts other organisms such as mussels and oysters in intertidal and shallow subtidal environments around Wellington south coast and Nelson harbour. This species was first described from Southern California and is now globally widespread.

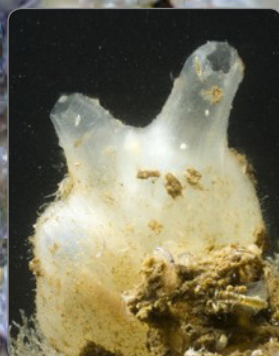
It could also be.....
Botryllus schlosseri



Circum equatorial



sea grape sea squirt



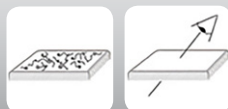
4 cm

main image: Keith Hiscock Inset image: Misjel Declerck

morphology



surface



substrate



habitat



Body small, spherical to oval, inhalant and exhalant siphons relatively long and close together on the upper surface. Test semi-translucent and relatively tough, looks like cellophane. Gill slits spiral, gills folded, and oral tentacles branched. Sediment adheres to short hairs on the surface of the test; hairs are usually longer at the base, forming root-like processes. Colour in life translucent to cream.

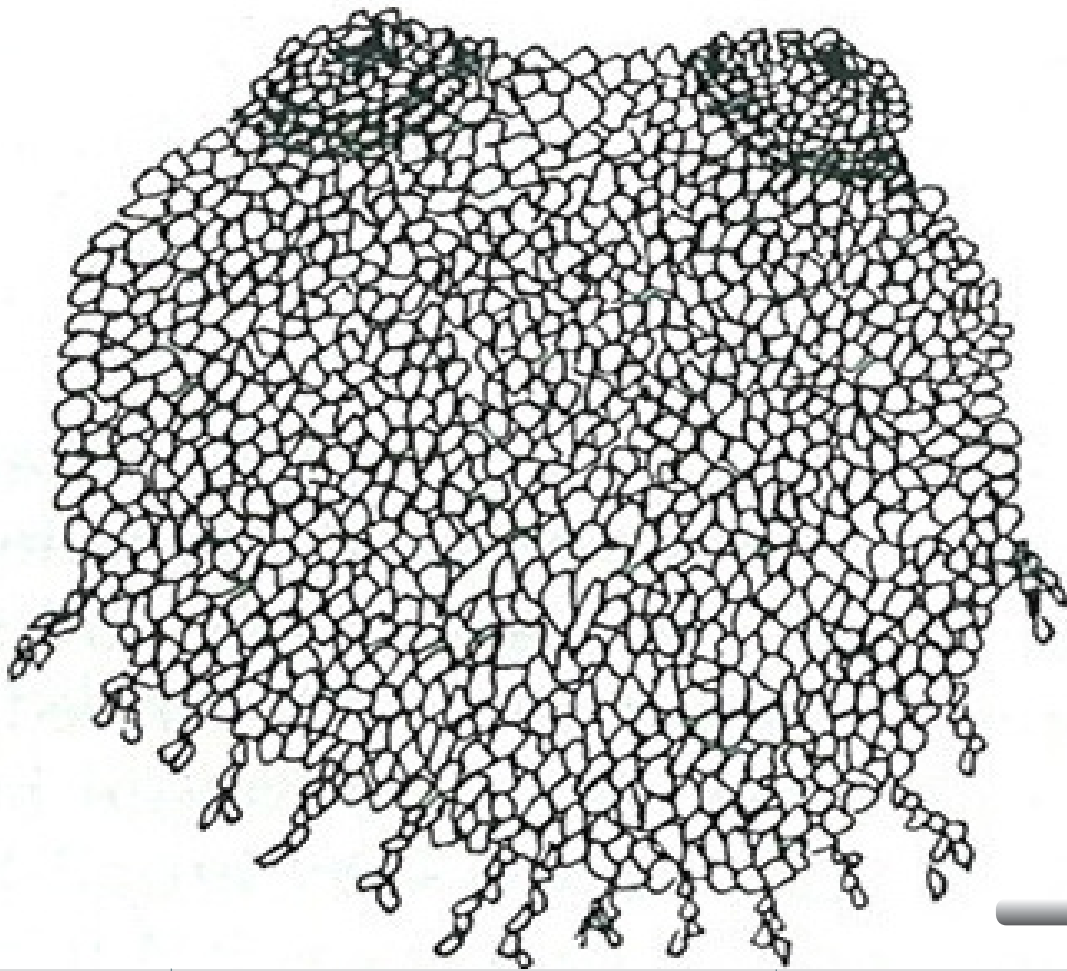
Tolerant of high sediment and low salinity. May occur in large aggregations on the seafloor. Presently restricted to the Manukau Harbour. This species was first described from New York Harbour with a continuous northwestern Atlantic distribution from Cape Cod to southern Louisiana. It is now globally widespread.

It could also be.....
Molgula mortenseni



Cosmopolitan





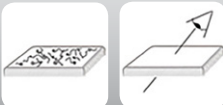
0.5 cm

illustration from Brewin (1951)

morphology



surface



substrate



habitat



Body ovoid to globular, 1–2 cm diameter, apertures close together on upper surface, test thin, flexible, coated with fine sand grains. Gill slits spiral, gills folded, and tentacles branched. A kidney can often be seen clearly through the body wall. Colour in life that of adherent sand, otherwise translucent white to cream.

Can be found in aggregations of individuals in high sediment environments such as harbour seabeds around New Zealand. Often epizoic, living among shells and other large solitary ascidians. This species was first described from the Hauraki Gulf but is now known to occur throughout New Zealand and south Australia.

It could also be.....
Molgula manhattensis



South West Pacific Ocean





1 cm

main image: Charles Griffiths

morphology



surface



substrate



habitat



Body elongate to oval, apertures on short wart-like siphons. Test leathery and tough, at times hard and occasionally brittle. Gill slits simple, tentacles branched, left gonad crosses over the descending limb of the gut loop. Colour in life orange with maroon on wrinkles, orange and maroon-striped siphons.

Usually occurs in large aggregates on rock, concrete and cave walls in sheltered and exposed locations, predominantly around northern New Zealand. This species has been recorded in New Zealand from the Hauraki Gulf, Hawke Bay, Taranaki, and Marlborough Sounds. It is an Australian species that has colonised other parts of the world, including South Africa, the Mediterranean, France, the North Atlantic, California, and Mexico.

It could also be.....

Pyura species complex
juvenile *Cnemidocarpa nisetos*



Cosmopolitan

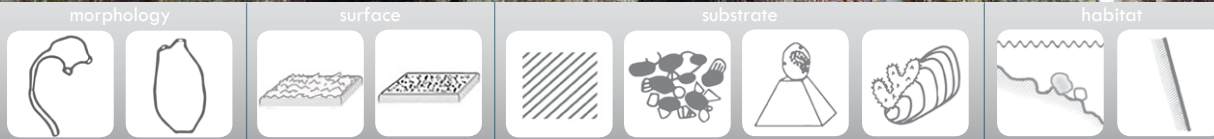


cunjevoi

Family Pyuridae
Order Stolidobranchia
Class Ascidiacea



Images: Roger Grace



Large, solitary, stumpy, chalice-shaped ascidian with two large mounds representing siphons set in the depressed upper surface of the body. Test tough, thick, cartilaginous, coated with sand and algal filaments. When inflated, cruciform or cross-shaped siphons are visible by the bright reddish orange body wall visible from exterior. Gill slits elongate, gills folded, tentacles branched. Colour in life is that of the sandy, encrusted test, may be quite green, siphons are bright reddish orange.

Individuals can be very large and often form dense aggregates on intertidal platforms, sometimes occupying 100% cover. May be found subtidally down to 12 m. Restricted at present to the Far North including Tauroa Bay, Parengarenga Harbour, Ninety Mile Beach, and Wareana Bay in the Far North. The native range is South Australia and Tasmania.

It could also be.....

Pyura praeputialis

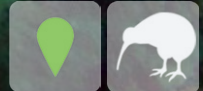


Australasia



sea tulip

Class Ascidiacea Order Stolidobranchia Family Pyuridae



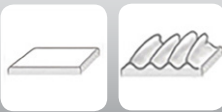
6 cm

main image: Floor Anthoni

morphology



surface



substrate



habitat



The 'sea tulip' is easily distinguished by its long leathery stalk and bulbous head. Stalks generally smooth or horizontally wrinkled, never longitudinally wrinkled. Large inhalant and exhalant siphons are obvious at the top of head. Surface of the head smooth, thrown into thick undulating longitudinal ridges that are more pronounced in smaller individuals. Gill slits elongate, gills folded, tentacles branched, gonads in paired blocks on each side of the body. Colour in life cream, tinged with maroon along longitudinal ridges and in siphons.

Sea tulips grow in high energy environments in southern New Zealand on the open coast, and in harbours with high tidal flow. In optimal conditions they can form dense forests on the sea floor from the intertidal down to greater than 30 m. A cold water species common to the South Island

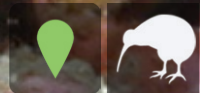
It could also be.....

Styela clava



Brewin, B.I. (1946) Ascidiaceans in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

Millar, R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.



4 cm

main images: Anne Frijsinger inset image: Mat Vestjens

morphology



surface



substrate



A 'species complex' is a group of closely related species that cannot be easily distinguished in the field due to their physical similarity. They often vary by only the smallest details. Species in the complex include *P. rugata* Brewin, 1948, *P. subuculata* (Sluiter, 1900) and *P. cancellata* Brewin, 1946.

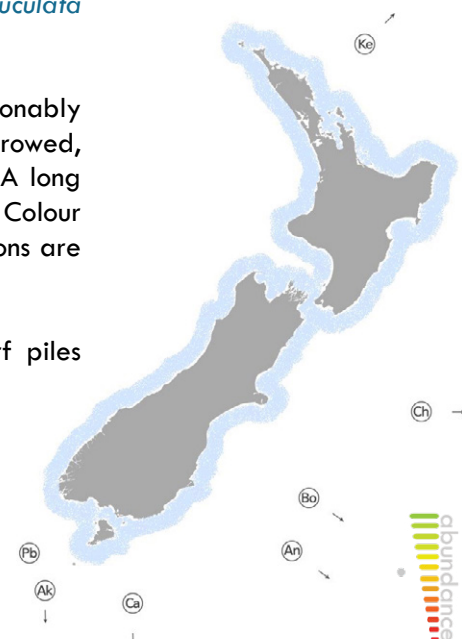
Body elongate, oval to banana-shaped with long muscular siphons set reasonably close together or at either end of the body. Test tough, leathery, deeply furrowed, warty, finely wrinkled. Gill slits elongate, gills folded, tentacles branched. A long gonad on each side of the body wall may be arranged in paired blocks. Colour in life pale peach with darker burnt orange on raised sections of test. Siphons are often pigmented with deep purple, and siphon rim striped white or peach.

Found growing on the seabed attached to shell debris and fouling wharf piles around New Zealand.

It could also be.....

Cnemidocarpa nisiotis

Microcosmus squamiger



Brewin, B.I. (1946) Ascidiaceans in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

Millar, R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.

compass sea squirt



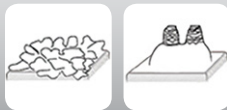
0.5 cm

main image: Mike Page

morphology



surface



substrate



habitat



Body globular with maroon siphons which have eight white internal longitudinal bands. The test is smooth and flexible, at times encrusted with sponges, hydroids and algae, and is translucent and usually grey to buff-coloured. The gill slits are elongate, tentacles smooth, and gonads appear in star-shaped clusters on either side of the body wall.

The species has a subtidal distribution, occurring under boulders, on wharf piles and fouling bivalves around New Zealand. It was first recorded from Tasmania and early records are from South Australia, South Africa, and New Zealand. This Southern Hemisphere species has spread to the Celtic Sea, the English Channel, France and the North Atlantic.

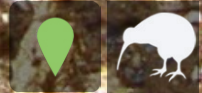


Tasmania / Indo-Pacific



Brewin B.I. (1946) Ascidians in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

Millar R.H. (1982) The marine fauna of New Zealand: Ascidiacea. *New Zealand Oceanographic Institute Memoir*, 85: 1–117.



2 cm

Images: Mike Page

morphology



surface



substrate



habitat



Saddle-shaped with the inhalant siphon usually at the top and the exhalant siphon nearer to the base. Siphons are separated by a distinctive saddle, and are covered in warty processes. Characterised by four bands of magenta pigment on the orange siphon lining. Gill slits are elongate, folded, tentacles are smooth. Gonads attached to the body wall under the gill sac are long and tubular, sometimes bent backwards at their terminal end. Test leathery and longitudinally wrinkled. Colour in life light orange to cream. Often fouled with hydrozoans, bryozoans and filamentous algae.

Very common in ports, harbours, and coastal environments. May be locally abundant on shallow reefs and wharf piles. Generally co-occurs with *Cnemidocarpa nisiotis*. This species is widespread throughout New Zealand.

It could also be.....

Cnemidocarpa nisiotis





1.5 cm

main image: Floor Anthoni

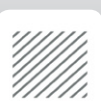
morphology



surface



substrate



habitat



Oval shaped body with two siphons approximately half a body length apart. Body wrinkled, large irregular warty processes occur around the siphons. Test leathery, usually fouled with hydroids, bryozoans and algae. Gills are folded with elongate slits, tentacles are smooth, and there are three flask-shaped gonads on each side of the body wall. Colour in life dark brown to silty, with maroon siphon linings and four pale yellow to white longitudinal bands in the siphons.

Very common in ports, harbours and coastal environments around New Zealand. Can be locally abundant on shallow reefs and wharf piles. Generally co-occurs with *Cnemidocarpa bicornuta*. This species is widespread around the coasts of the North Island, South Island and Chatham Islands.

It could also be.....

Cnemidocarpa bicornuta





1 cm

images: Rosana Rocha

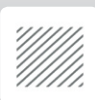
morphology



surface



substrate



habitat



Body small, erect, oblong, with no stalk and two short closely spaced siphons on the top of the body, one slightly larger than the other. Test tough with warty tubercles occurring around the siphons and longitudinal wrinkles, becoming less distinct on the back of the body. Fine stripes run down the external surface of the siphons and upper body; these may be obscured by wrinkles in the tough leathery test. Gill slits elongate, gills folded, tentacles smooth, testis follicles outside ovary. Colour in life cream to tan, stripes white, or burnt orange brown with purplish tinges.

Occurs subtidally on wharf piles in low abundance, present known distribution, Nelson Harbour. This species has a global distribution in temperate and tropical latitudes including the South Pacific Islands.

It could also be.....

Pyura species complex



Cosmopolitan



club sea squirt



4 cm

main image: Mike Page

morphology



surface



substrate



habitat



Individuals usually with a short stalk, generally no longer than the cylindrical body, anchored to substratum by root-like processes. Short siphons are close together at the top of the body. Test leathery and conical, with warty swellings at the top around the siphons. Posterior half of test creased longitudinally and down the stalk. Gills folded, gill slits elongate, and tentacles smooth. Testis follicles outside ovary. Colour in life cream to tan, often covered with epiphytes and sediment.

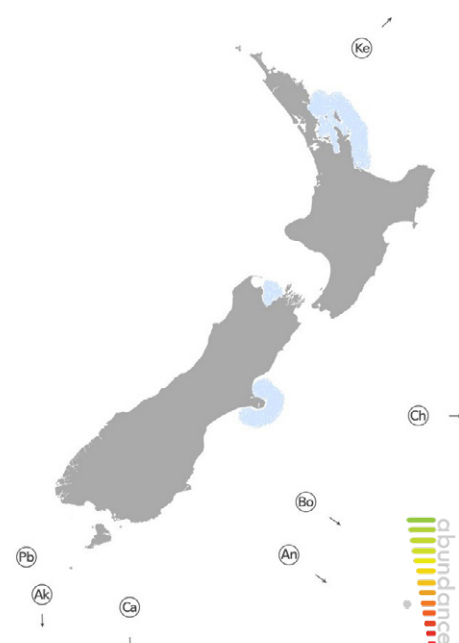
Settles on artificial structures such as marina pontoons, marine farms, and the seabed. Can be locally abundant. This species has been recorded from the Bay of Islands, Whangarei, Hauraki Gulf, Coromandel Peninsula, Tauranga, South Taranaki to Wellington and around the South Island from Farewell Spit to Bluff. The native range of this species is the northwestern Pacific where it occurs from Japan to Siberia. It has spread worldwide throughout the Pacific and Atlantic Oceans, Mediterranean, Baltic, and Black Seas.

It could also be.....

Pyura pachydermatina



Cosmopolitan





2 cm

inset images: John Borom

morphology



surface



substrate



habitat

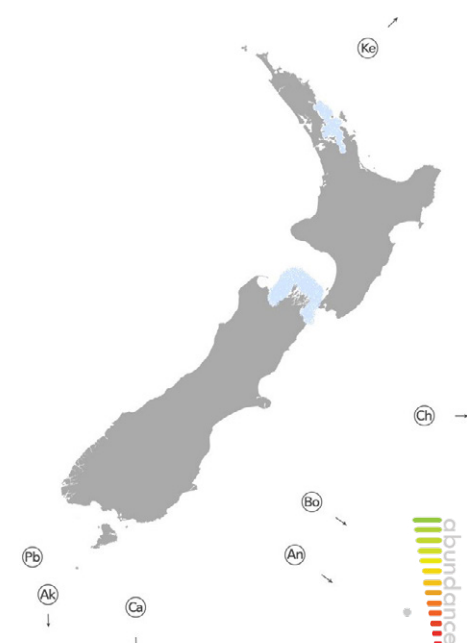


Body ovoid with a firm, thick cartilaginous test. Test divided into longitudinal ridges which are further subdivided by horizontal creases, giving it a distinctly knobbed, pleated appearance. Gill slits elongate, gills folded, tentacles smooth, and testis follicles outside ovary. Colour in life dull white with burnt orange tinges.









Often occurs in dense clusters and is rarely fouled with other organisms. This species has been recorded in most North Island harbours and around the South Island from Farewell Spit to Banks Peninsula.















Cosmopolitan


















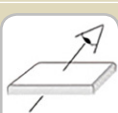








icons

life history		native	naturally occurring around New Zealand, endemic		southwest pacific	naturally occurring around New Zealand, Australia and other pacific locations
		range extension	since first described in New Zealand, this species has been recorded elsewhere		introduced	species first described from outside of New Zealand waters and is found in New Zealand and other locations, invasive
		antipodean	naturally occurring around New Zealand and Australia only		widespread	species recorded globally
		solitary	solitary animal bound by a single test		colonial	multiple animals bound by a single test
















morphology		ball	spherical, globular		brain	hemispherical with brain-like corrugations
		loaf	rounded elongate, hemispherical		sausage	long tubular sausage-shaped colonies
		amorphous	without definable shape, often with lobed surface, potato or tuber-shaped, massive		lobed cluster	closely packed flat topped lobes joined by basal mat
		thick encrusting	spreading over substratum, more than 20 mm thick		medusa	many single bodies on long stalks arising from a narrow basal mat
		thin encrusting	spreading over substratum, less than 5 mm thick		solitary saddle	widely-spaced siphons with low saddle in between
		fingers	finger-like, often arising from an encrusting or restricted base, digitate		solitary stalked vase	elongated body with a short narrow stem, siphons closely spaced at anterior end

icons

morphology		meandering	wandering along and above substratum attached at intervals, repent		solitary stalked	oval bulbous body with 2 siphons on a long narrow stem
		stalked grouped	stalked with club-shaped bodies attached to a common basal mat		solitary mound	low, laterally elongate, oval shaped, with 2 siphons, separated by about 1/2 a body length
		stalked simple	single stalked bodies		solitary rounded	rounded body, siphons often close together at the anterior end
		grapes	bunched vase-shaped individuals joined basally		solitary ob-long	vertically elongated body with 2 siphons at the anterior end

surface		smooth	even, hairless, silky, can be slightly undulating		warty	bearing small flattened bumps or tubercles
		radial systems	zooid apertures line subdermal canals radiating and branching away from common cloacal apertures		hairy	hairs projecting from the body of solitary ascidians, often holding sand grains, hirsute
		circular systems	zooid apertures form rings around common cloacal apertures		raised lobes	common cloacal apertures raised at the terminal end of lobes
		spiny	prickly bundles of very long spicules projecting from the test of solitary ascidians		transparent	body wall can be gelatinous, appearing see-through, internal details visible
		rough	irregularly pitted and ridged surface, often tough, rugose		wrinkled siphons	siphons raised above the body wall, wrinkled and often warty
		sand in test	sandy sediment incorporated into test of colonial ascidians, feels granular		spicules	star-shaped carbonate granules visible in and on the test
		deeply wrinkled	bearing irregularly parallel ribs and grooves along the body wall		parallel systems	zooid oral apertures in parallel lines along subdermal canals
		honeycomb	test surface with ridges in a honeycomb pattern		no systems	zooids open separately forming paired openings on low humps in the test

icons

substrate		rock	hard substrate such as mudstone, sandstone, basalt, compressed carbonates
		rubble	shell, stone and pebble rubble
		sand	small coarse grains of worn silica, rock, and shell
		mud	very fine muddy and silty sediments derived from terrigenous rocks, soils and clays
		epizoic/epiphytic	living or growing on the external surface of an animal (epizoic) or seaweed, (epiphytic)
		artificial substratum	anything man-made such as mooring blocks, mussel lines, wharf piles
habitat		intertidal	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
		subtidal	zone below the low tide, including rock flats, slopes, walls, crevices, overhangs, boulder fields, organisms exposed to wave surge and currents, and subdued illumination
		indents	underwater caves, shelves and overhangs, organisms may experience wave surge, subdued illumination, or near darkness
		rockpool	indentation in rock filled with water, intertidal
		wall	underwater cliffs and slopes, organisms exposed to wave surge and currents, and subdued illumination
		algal beds	coralline algae, seagrass or algal beds
		bank	seabed raised into a bank of compacted rubbles and other carbonate materials including shell, kina and sealace hash, organisms exposed to wave surge and currents, and subdued illumination
		covered rock	sand and rubble spread over underlying hard substrate, organisms attached to basement rock susceptible to inundation and scouring from wave surge and currents, and subdued illumination
		seabed	composed of a variety of sedimentary substrates including coarse gravels, shell hash and sands to finer sand, mud, and silts, organisms susceptible to inundation and scouring from wave surge and currents, and subdued illumination

glossary

algal beds	areas of seafloor with coralline algae, sea-grass or multiple seaweed species
amorphous	without definable shape, often with lobed surface, potato or tuber-shaped, massive
ampullae	blind terminal expansion of the epidermal vessels, often flask-shaped in the Botryllidae
anterior	towards the front
antipodian	naturally occurring in New Zealand and Australia, and may include seamounts and ridges to the north
apertures	openings of the body to the exterior for exchange of water, inhalant 'mouth' (branchial) aperture, exhalant (atrial) aperture
artificial substratum	anything man-made such as mooring blocks, mussel lines, wharf piles
ball	spherical, globular or semi-spherical
bank	seabed raised into a bank of compacted rubble and other carbonate materials including shell, kina and sea lace hash, organisms exposed to wave surge and currents, and subdued illumination
blunt	not sharp, rounded ends
brain-shaped	hemispherical with brain-like corrugations
brittle	fragile but rigid, breaks apart easily
cartilaginous	having the texture of cartilage, firm and tough yet flexible
circular systems	zooid apertures form rings around common cloacal apertures
colonial	multiple animals bound by a single test
concentric	circles arranged with one inside the other
covered rock	sand and rubble spread over underlying hard substrate, organisms attached to basement rock susceptible to inundation and scouring from wave surge and currents, and subdued illumination
cryptic	difficult to see (habitat) or difficult to detect differentiate from other species
deeply wrinkled	bearing irregularly parallel ribs and grooves along the body wall
diameter	the distance across the widest point of a circle
digitate	finger-like
dorsal	upper surface of the animal
endemic	naturally occurring in New Zealand, but not elsewhere
environment	physical, chemical, ecological, behavioural, and other conditions experienced by an organism
epiphytic	living or growing on the external surface of a plant
epizoic	living or growing on the external surface of an animal
eurybathic	can live or be found at many depths
fingers	finger-like, often arising from an encrusting or restricted base, digitate
firm	requires some pressure to compress
fleshy	feels like skin or edam cheese, dense
gelatinous	jelly-like, slippery
gill sac	organ used for both the exchange of gasses (breathing) and collection of food
gonad	reproductive structure
granular	surface covered in small to medium sized rounded or square granules, giving a sand-papery texture due to calcareous or siliceous minerals in or on (echinoderms) the surface of the organism
grapes	bunched vase-shaped individuals joined basally
habitat	the environment and local situation in which an organism lives
hairy	hairs projecting from the body of solitary ascidians, often holding sand grains, hirsute
hard	solid to the touch, not compressible, rigid
honeycomb	test surface with ridges in a honeycomb pattern
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 from outside of New Zealand waters and is found in New Zealand and other locations, invasive, adventive
lateral	side of an animal
leathery	thick, tough, flexible, slightly elastic

loaf	rounded elongate, hemispherical
lobed cluster	closely packed flat-topped lobes joined by basal mat
margins	edge of a surface
meandering	wandering along and above substratum attached at intervals, repent
medusa	many single bodies on long stalks arising from a narrow basal mat
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, endemic
no systems	zooids open separately forming paired openings on low humps in the test
opaque	impenetrable by light
oral	related to the mouth of an animal
parallel systems	zooid oral apertures in parallel lines along subdermal canals
posterior	towards the rear of the organism
radial systems	zooid apertures line subdermal canals radiating and branching away from common cloacal apertures
radius	distance between the edge and centre of a circle
raised lobes	common cloacal apertures raised at the terminal end of lobes
range extension	since first described in New Zealand, this species has been recorded elsewhere
refuge	safe place to hide from predators
rock	hard substrate such as mudstone, sandstone, basalt, compressed carbonates
rockpool	indentation in rock, filled with water, intertidal zone
rough	irregularly pitted and ridged surface, often tough
rubble	shell, stone, and pebble rubble
sand	small coarse grains of worn silica, rock, and shell
sand in test	sandy sediment incorporated into test of colonial ascidians, feels granular
sausage-shaped	long tubular sausage-shaped colonies
seabed	composed of a variety of sedimentary substrates including coarse gravels, shell hash and sands to finer sand, mud, and silts, organisms susceptible to inundation and scouring from wave surge and currents, and subdued illumination
sinuous	wavy pattern
smooth	even, hairless, silky, can be slightly undulating
soft	easily compressible, elastic
solitary	one animal bound by a single test
solitary mound	low, laterally elongate, oval shaped, solitary ascidian with 2 siphons, separated by about ½ body length
solitary oblong	vertically elongated solitary ascidian body with 2 siphons at the anterior end
solitary rounded	rounded solitary ascidian body, siphons often close together at the anterior end
solitary saddle	solitary ascidian with widely-spaced siphons separated by a low saddle
solitary stalked	solitary ascidian with oval bulbous body and 2 siphons on a long narrow stem
solitary stalked vase	elongated solitary ascidian body with a short narrow stem, siphons closely spaced at anterior end
spicules	star-shaped carbonate granules visible in and on the test
spined	surface covered with spines (echinoderms), or prickly bundles of very long spicules projecting from surface of the organism (sponges, ascidians)
stalked grouped	stalked with club-shaped heads attached to a common basal mat
stalked simple	single stalked bodies
subdermal canal	canal that connects zooids together around a common aperture (exhalent)
substrate	an underlying substance or layer, rock, sand, etc
subtidal	zone below the low tide, including rock flats, slopes, walls, crevices, overhangs, boulder fields, organisms exposed to wave surge and currents, and subdued illumination
surface	patterning or ornamentation on the surface of the body of an animal
tentacle	tentacles surround the inhalant (branchial) aperture; they can be simple or branched and are important characters at the genus level
test	protein coating surrounding the body, tough and leathery in some solitary species, or a gelatinous matrix surrounding zooids in colonial species

testis follicle	sacs that contain sperm; these are usually cream-coloured and the ovary is orange, containing eggs
thick encrusting	spreading over substratum, more than about 20 mm thick
thin encrusting	spreading over substratum, less than about 5 mm thick
translucent	lets light through body wall or surface of organism, but not enough to perceive distinct details through it.
transparent	body wall can be gelatinous, appearing see-through, internal details visible
transverse	across the short axis of the body wall
ventral	lower surface or underside of the animal that sits on the seabed
wall	underwater cliffs and slopes, organisms exposed to wave surge and currents, and subdued illumination
warty	bearing small flattened bumps or tubercles
widespread	species recorded globally
wrinkled siphons	siphons raised above the body wall, wrinkled and often warty
zooids	small individual sea squirts of the same species living communally in a common test, often forming systems to pump water, or opening individually to the exteriorlateral side of an animal

acknowledgements

The majority of specimens examined to produce this guide came from the NIWA Invertebrate Collection (NIC) and were collected under the following research programs:

- The National Institute of Water and Atmospheric Research (NIWA) Marine Biotechnology Programme collection voyages, New Zealand Foundation for Research Science and Technology (contract COIX0207);
- The Department of Conservation (DoC) Biodiversity China Shops and Deep Reefs Expedition (contract FMA08/2), Fiordland (Te Moana o Atawhenua) Marine Area Monitoring (project DOC 12405) and Fiordland (Te Moana o Atawhenua) Sunday Cove Biodiversity Atlas (project DOC14401);
- The Ministry Fisheries project ZBS2005/35, MAF Biosecurity New Zealand project 10623 and Ministry of Primary Industries (MPI) Project 12099.

This guide is dedicated to the late Patricia Mather (nee Kott) in acknowledgement of her lifetime contribution to the taxonomy of Southern Hemisphere ascidians. Our knowledge of the New Zealand ascidian fauna is richer for the early works of Sluiter, Michaelsen and more recently, those of Brewin and Millar. Many of the images in this guide were taken during the Marine Biotechnology Program collection expeditions, many thanks to Vicky Webb for having the foresight to support our research in this area.

The preparation of this guide was funded by NIWA under Coasts and Oceans Research Programme 2 Marine Biological Resources: Discovery and definition of the marine biota of New Zealand (2015/2016 SCI).

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further reading

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