

inspirational
invertebrates

awesome ascidians

a guide to the sea squirts of New Zealand

Version 2, 2019



ports & harbours guide

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

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

key taxonomic references
Brewin B.L. (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

depth range
0
20
40
60
80
100
120
(width/dep)

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***

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.

image: Keith Hiscock

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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.



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.

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!



solitary sea squirt

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

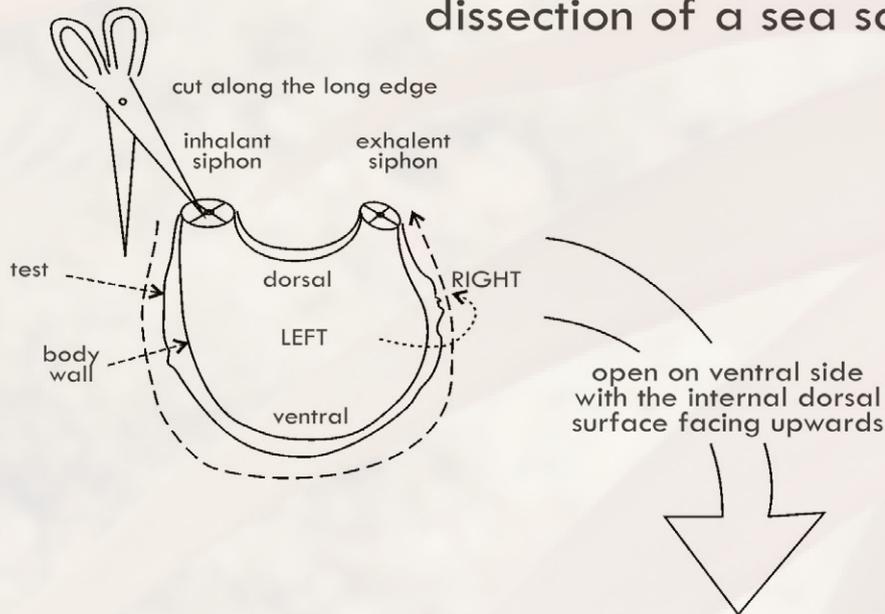


colonial sea squirt

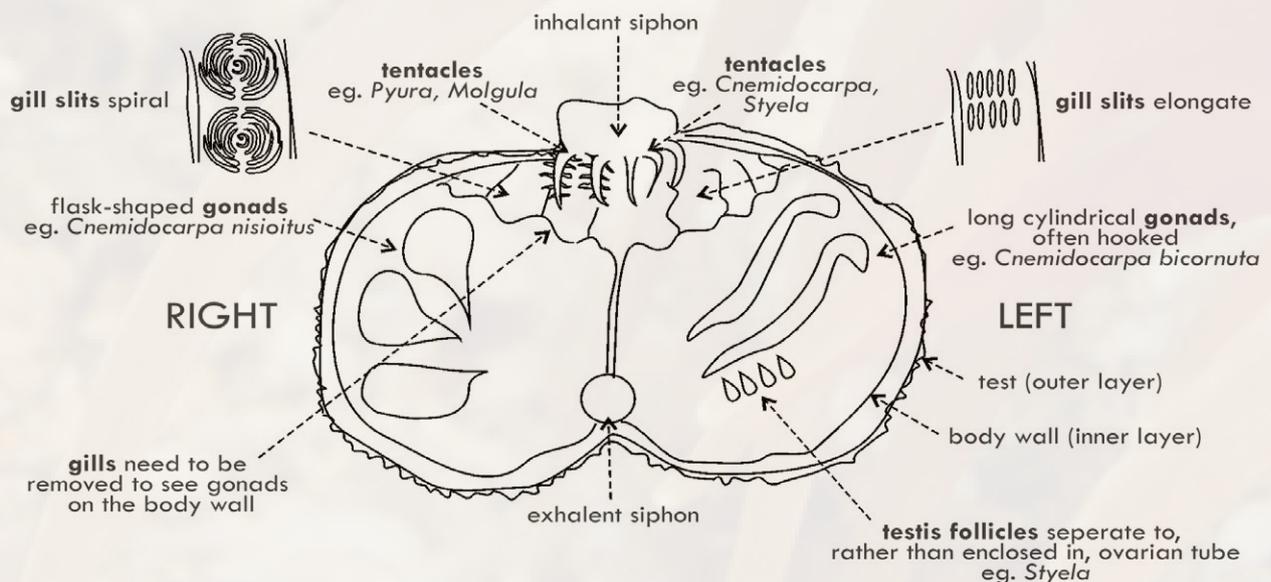
Groups of small animals (zooids) are embedded in a gelatinous test as a colony. Zooids can be arranged in circular or linear systems, sharing common exhalent canals and apertures. Other types can have zooids opening independently or on stalks connected to a common basal test.



dissection of a sea squirt



composite schematic of a solitary sea squirt

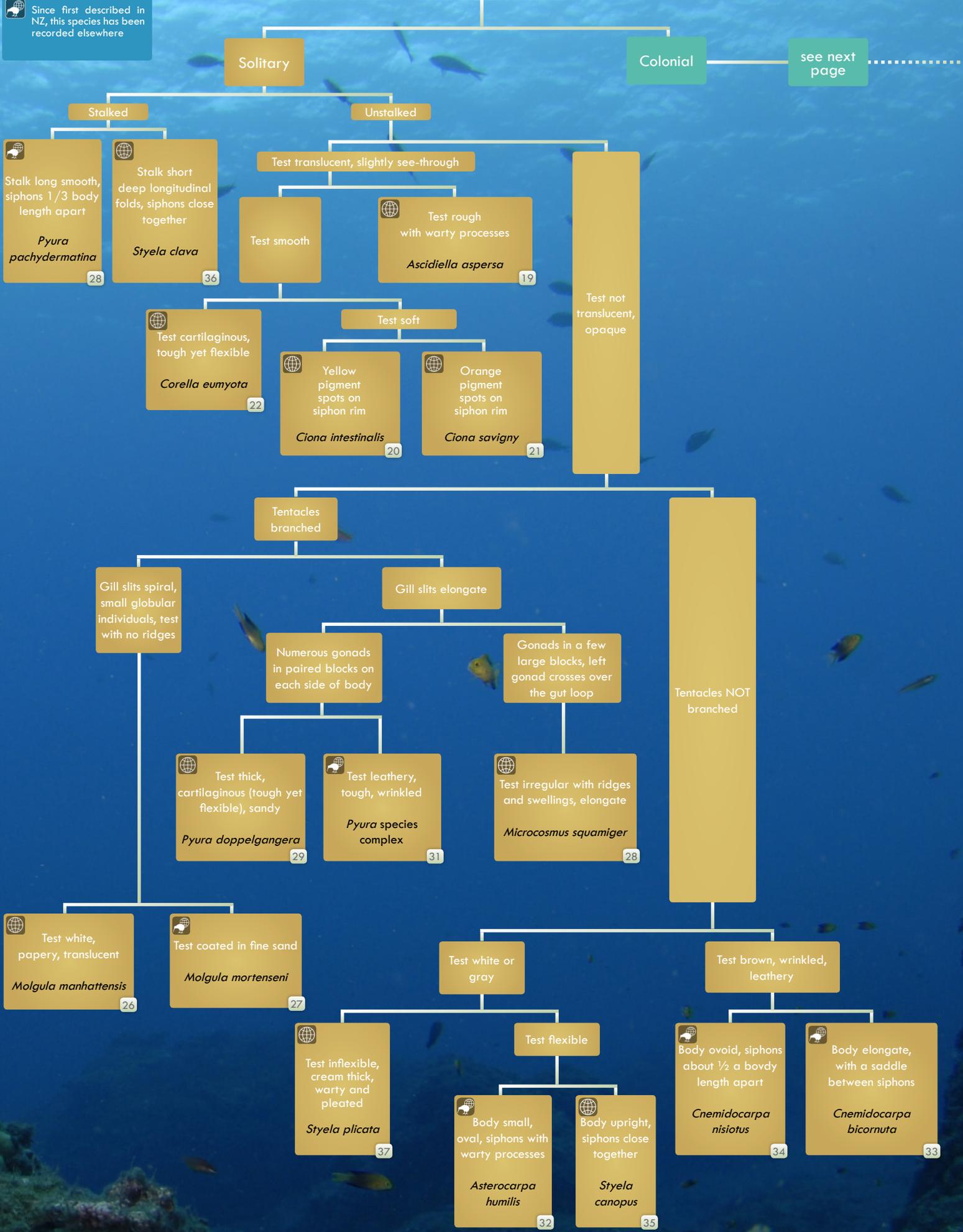


 Introduced species

 Native species

 Since first described in NZ, this species has been recorded elsewhere

identify your sea squirt



identify your sea squirt

-  Introduced species
-  Native species
-  Since first described in NZ, this species has been recorded elsewhere

see previous page

Solitary

Colonial

Colony gelatinous, transparent

Colony opaque, grainy appearance

Large zooids > 3mm

Small zooids < 3mm

Colony 3-dimensional, thick

 Zooids long bulbous stalks from common basal mat

Clavelina lepadiformis 11

Zooids not on stalks, ampullae visible on colony edge

 Colony thick, firm gelatinous sheet

Aplidium phortax 18

Colony globular

 Colony fleshy drooping tendrils, dull yellow

Didemnum vexillum 13

 Colony crisp, firm, spicules throughout

Didemnum species complex 12

Colony thin, encrusting

Zooids in star to circular shaped systems, encrusting

 Zooids in branching double row systems

Botryllodes leachii 23

 Gelatinous, >2 mm thick

Botryllus schlosseri 24

 Very thin, <2 mm thick

Botryllus tuberatus 25

 Colony upright on short stalks

Hypsistozoa fasmeriana 16

 Colony drooping cream fingers

Eudistoma elongatum 17

 Very slimy, gelatinous, flecked with grey

Diplosoma listerianum 14

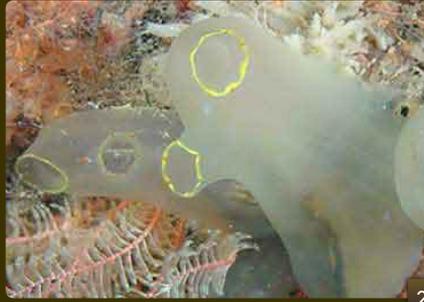
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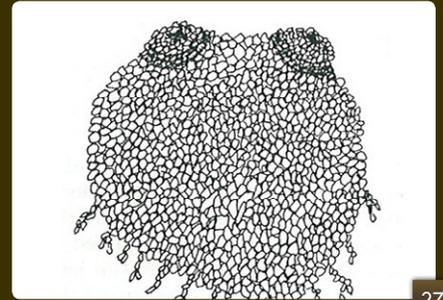
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Clavelina lepadiformis

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Pyura species complex

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Pyura doppelgangera

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Botrylloides leachii

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species index

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Chordata

SUBPHYLUM
Tunicata

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Ascidiacea

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lightbulb sea squirt



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



Millar, R.H. (1966) Tunicata. *Ascidiacea Marine invertebrates of Scandinavia*. 1.

Hayward P.J., Ryland, J.S. (1947) Introduction to protozoans and arthropods. *The marine fauna of the British Isles and Northwest Europe*. Clarendon Press, Oxford: 627.



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



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 exhalent 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.

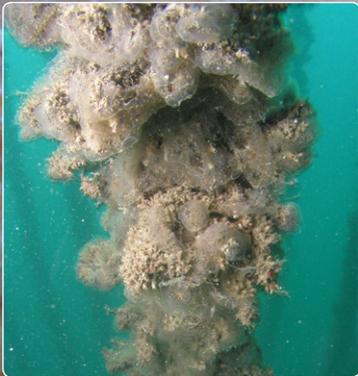
Kott, P. (2002) A complex didemnid ascidian from Whangamata, New Zealand. *Journal of the marine Biological Association of the United Kingdom*, 82: 625-628.

Diplosoma listerianum (Milne-Edwards, 1841)

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main image: Floor Anthoni

Class Ascidiacea Order Aplousobranchia Family Didemnidae



3 cm

morphology



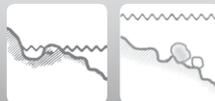
surface



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 exhalant 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.....
Botrylloides leachii

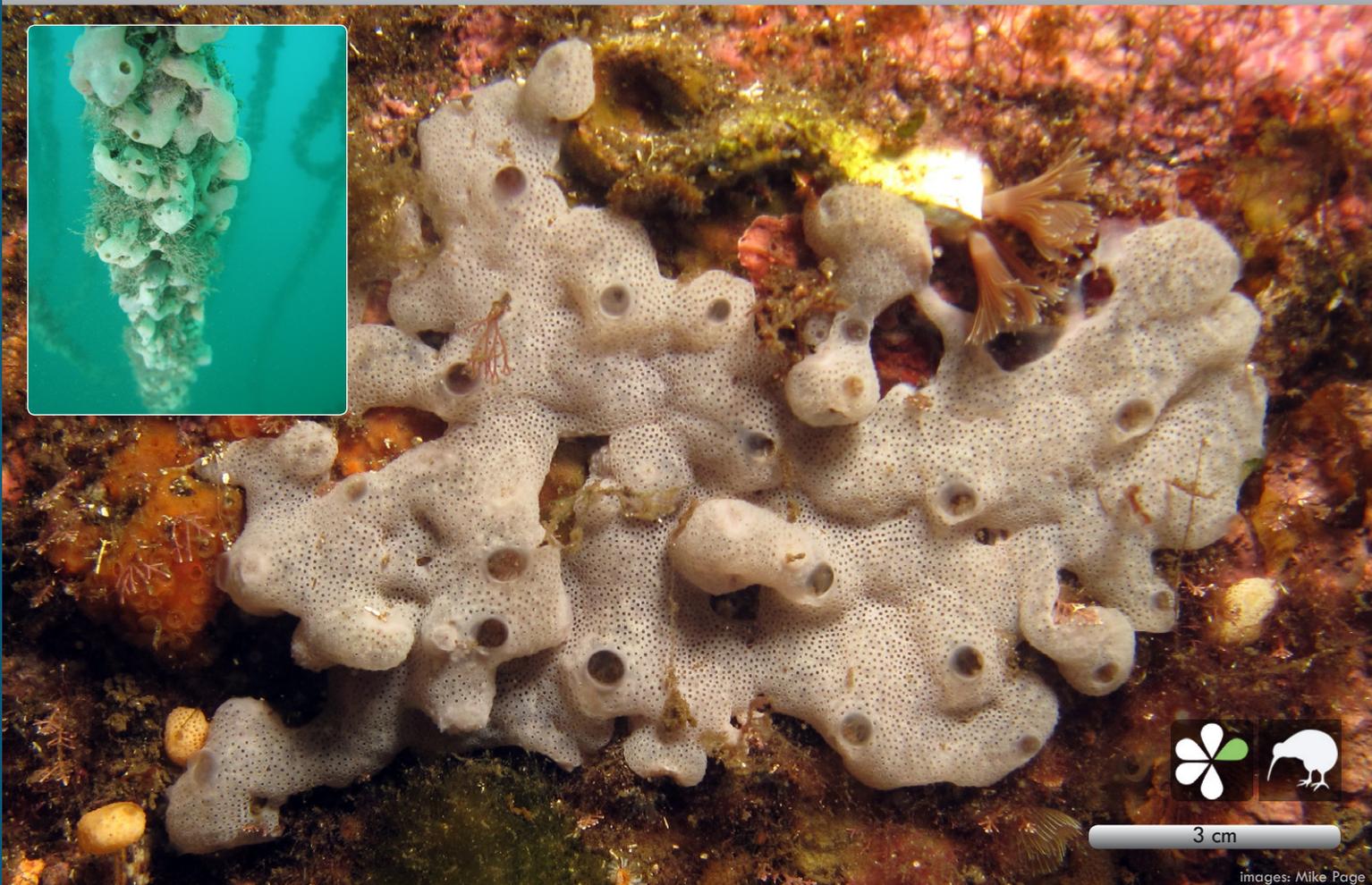


Cosmopolitan



Kott, P. (2001) The Australian ascidiacea Part 4: Aplousobranchia (3), Didemnidae. *Memoirs of the Queensland Museum*, 47 (1): 1-410.

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



3 cm

images: Mike Page

morphology



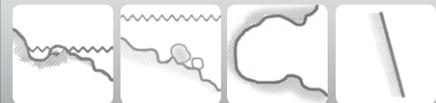
surface



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 exhalent 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.

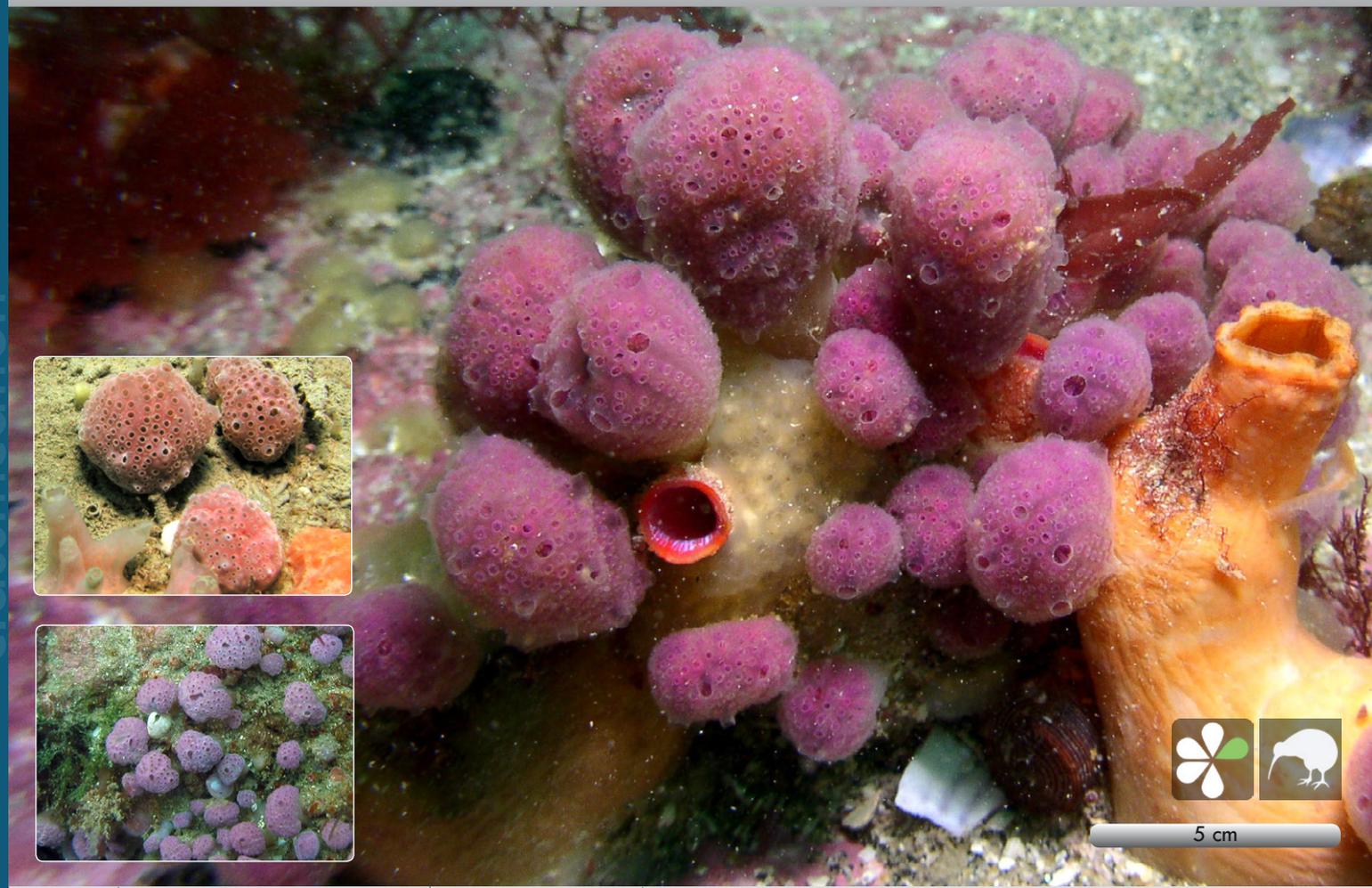
This species is distinguished from *Lissoclinum* sp. (violet) by having only one testis follicle, more complex burred spicules and no spicule-free halos around the common cloacal apertures.

It could also be.....
Didemnum spp.

Western South Pacific



Class Ascidiacea Order Aplousobranchia Family Holozoidae



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 exhalent 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) 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.



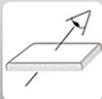
6 cm

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.

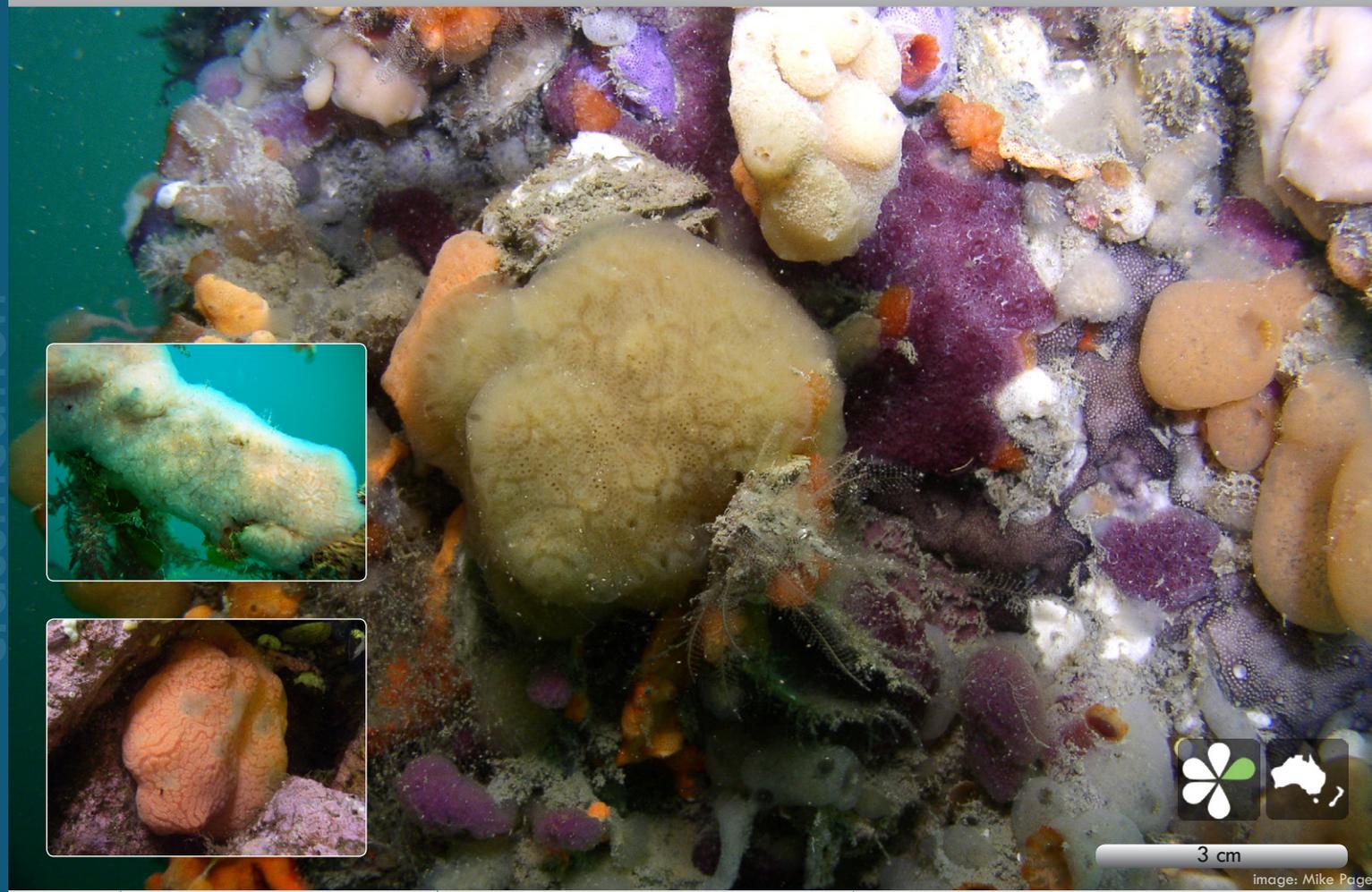
This species occurs locally in high abundance in sheltered bays, growing on oyster racks, mangrove roots, rocky shoreline and on shells embedded in mud. Found in the far north of New Zealand at Parengarenga, Hohoura and Ranganu harbours and the Bay of Islands. Reported from Wellington. First described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



Australia



Class Ascidiacea Order Aplousobranchia Family Polycliniidae



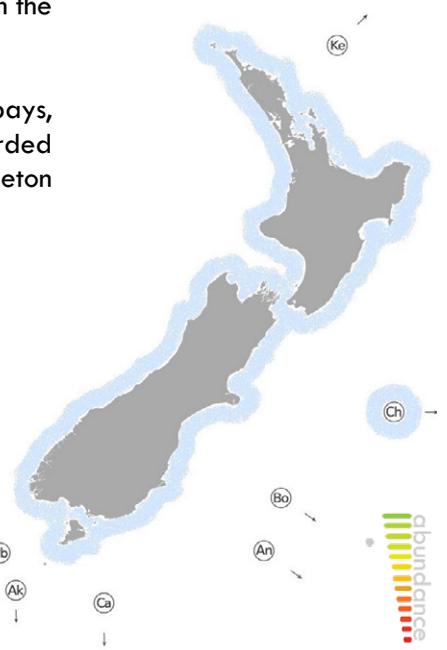
3 cm
image: Mike Page

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) 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.

Class Ascidiacea Order Phlebobranchia Family Ascidiidae

European sea squirt



2 cm

main image: Dennis Gordon inset image: Arjan Gittenberger

morphology	surface	substrate	habitat

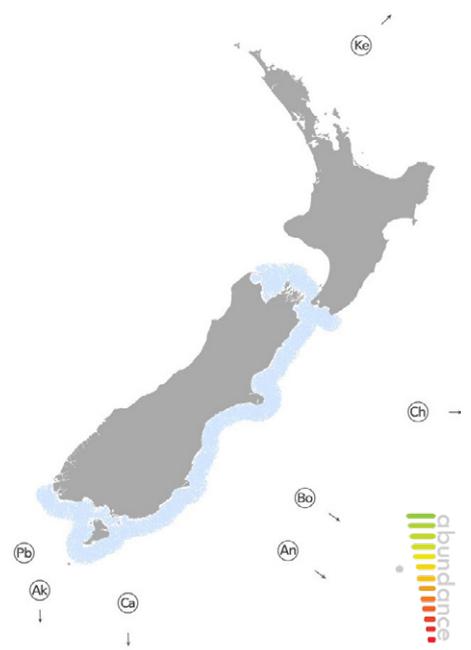


Sack-like ovoid body with an inhalant siphon at the top of the animal, and an exhalant siphon one third to halfway down one side. Test is thin, translucent, and covered in small bumps. The gill slits are elongate, and not folded, the tentacles are smooth.

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

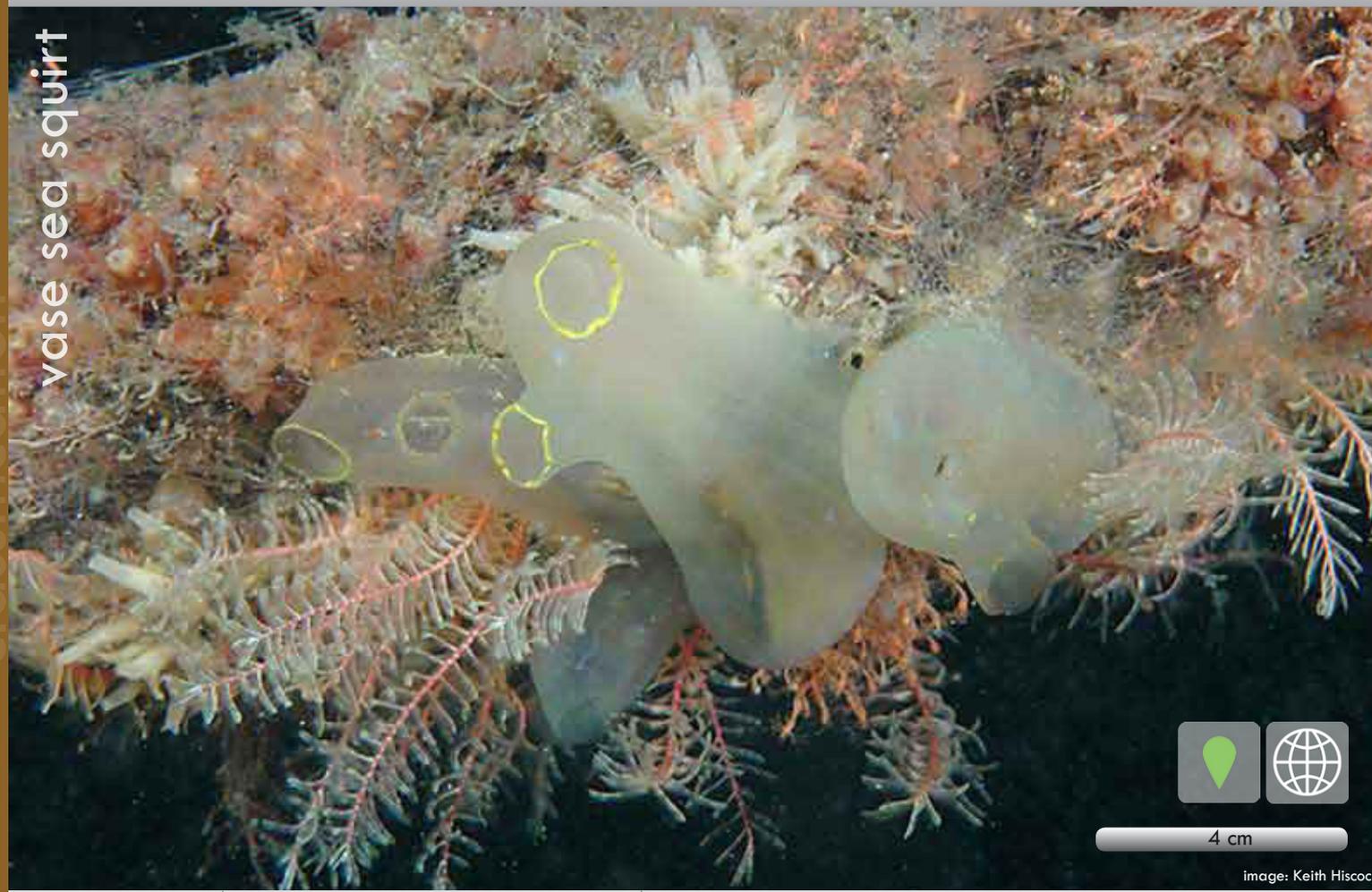


Brewin, B.I. (1946) Ascidiaceans in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

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

Class Ascidiacea Order Phlebobranchia Family Cionidae

vase sea squirt



4 cm

image: Keith Hiscock

morphology		substrate			habitat	



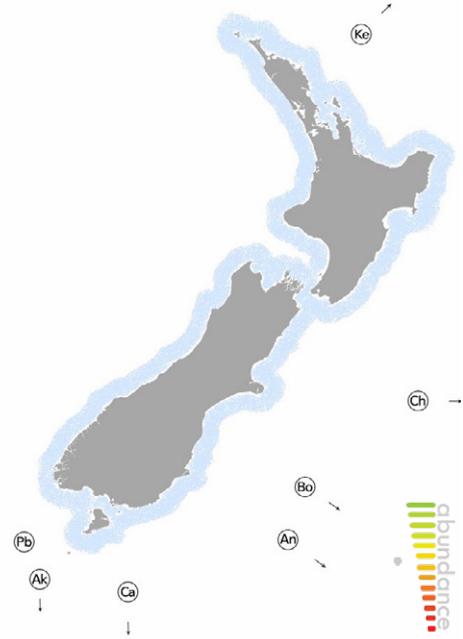
Two species of *Ciona* are known to co-occur in New Zealand ports and harbours. *Ciona intestinalis* has lemon yellow pigment spots on the siphon rim while *Ciona savigny* has orange pigment spots on the siphon rim.

Body elongate, tapering towards two closely spaced siphons. Test is soft, flexible, gelatinous, transparent, with light green pigment at the anterior end, and 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 savigny

Cosmopolitan



Brewin B.I. (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.

Class Ascidiacea Class Phlebobranchia Family Cionidae

pacific vase sea squirt



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) 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.

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

Class Ascidiacea Order Phlebobranchia Family Corellidae

jelly sea squirt



3 cm

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 exhalent siphon 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.

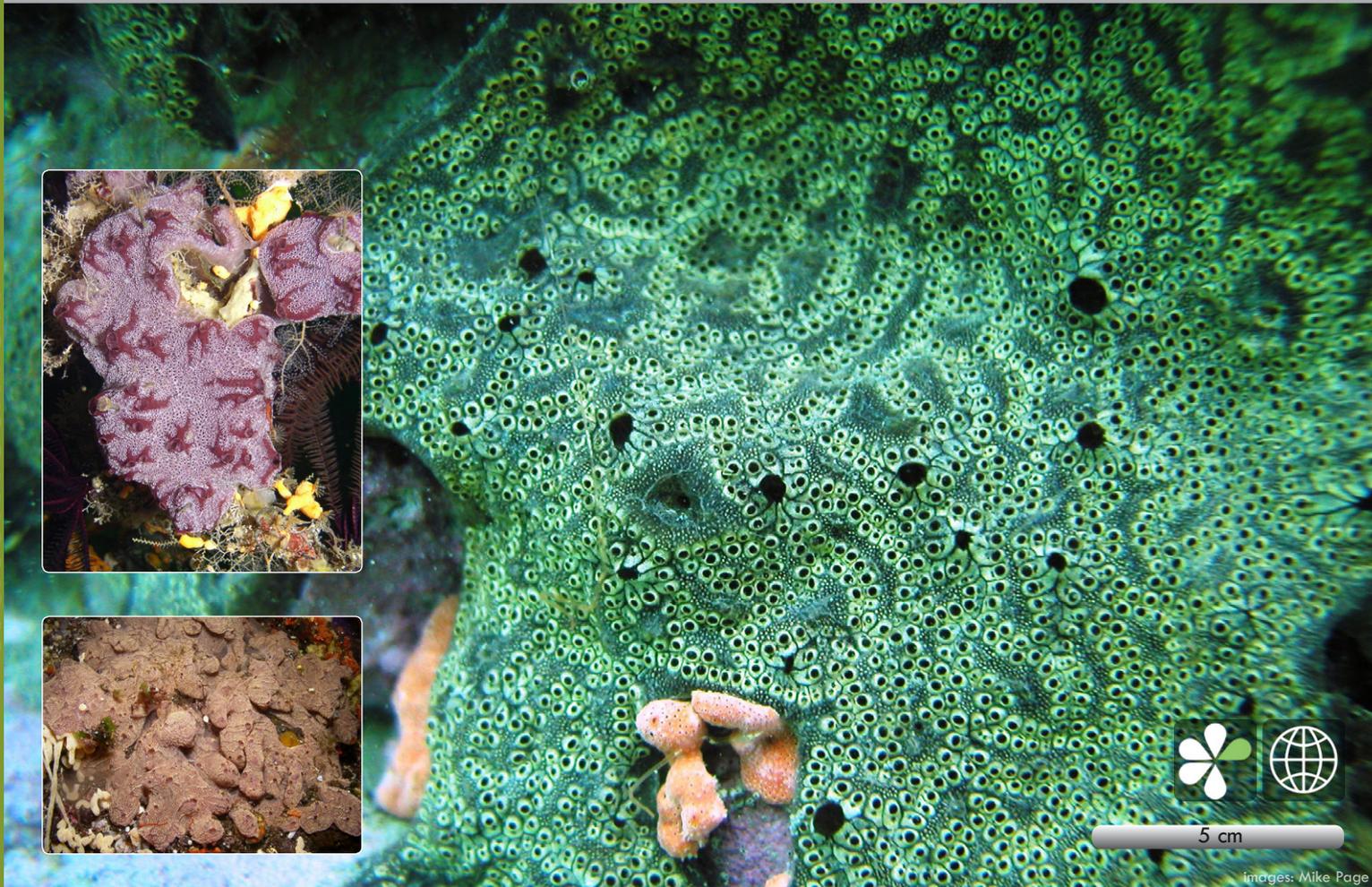
Prefers calm protected waters, found in shallow subtidal environments attached to wharf piles, ropes and other submerged structures around New Zealand. This species is widespread throughout New Zealand. It is a temperate Southern Hemisphere species common to Subantarctic and Antarctic regions that has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

It could also be.....
Ascidiella aspersa
Molgula spp.

Cosmopolitan



Millar, R.H. (1962) Further descriptions of South African ascidians. *Annals of the South African Museum*, 46 (7): 113–221.



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

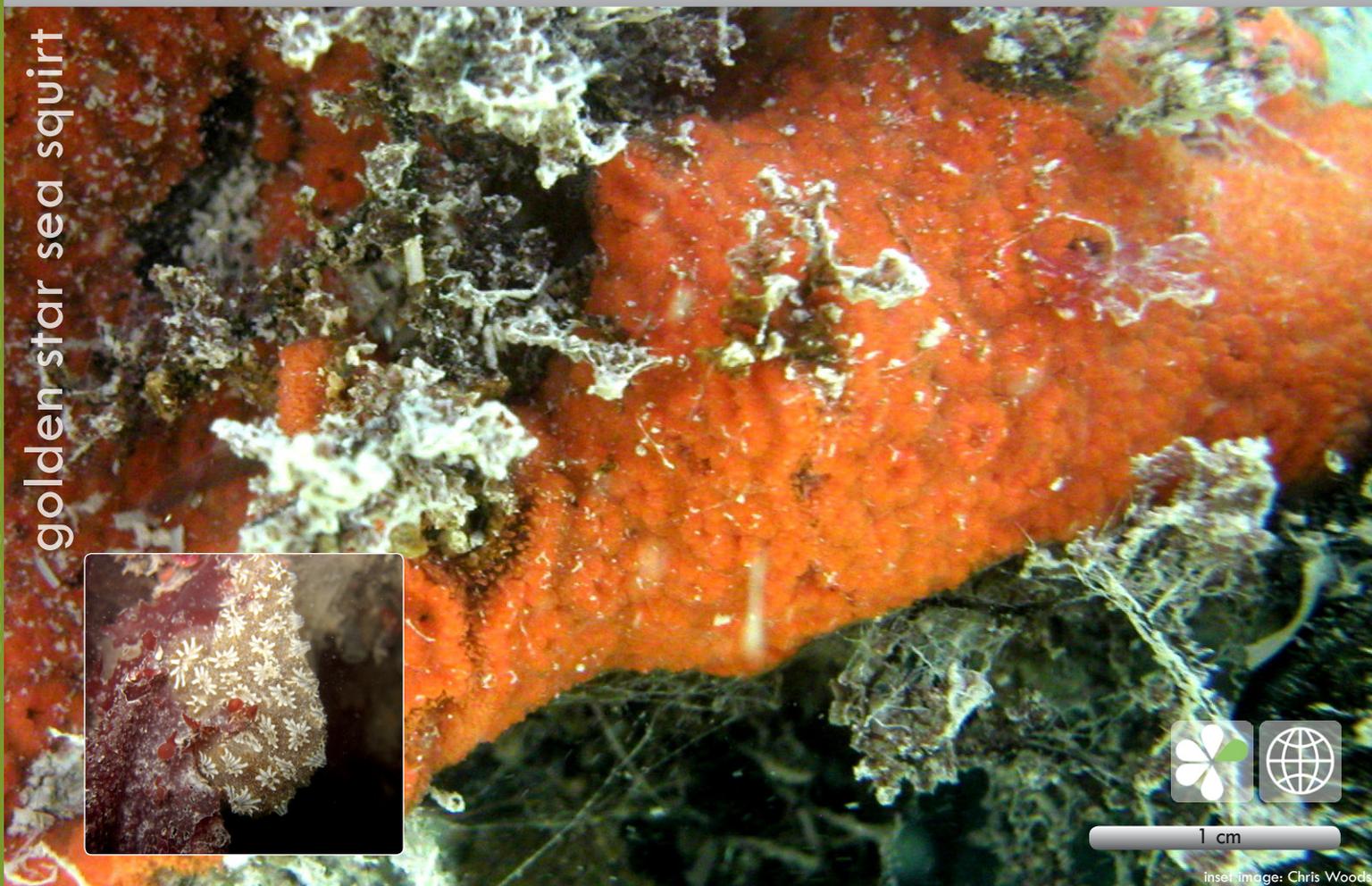


Brewin B.I. (1946) Ascidians in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Transactions and Proceedings of the Royal Society of New Zealand*, 76 (2): 87–131.

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

Class Ascidiacea Order Stolidobranchia Family Molgulidae

golden star sea squirt



1 cm

inset image: Chris Woods

morphology



surface



substrate



habitat



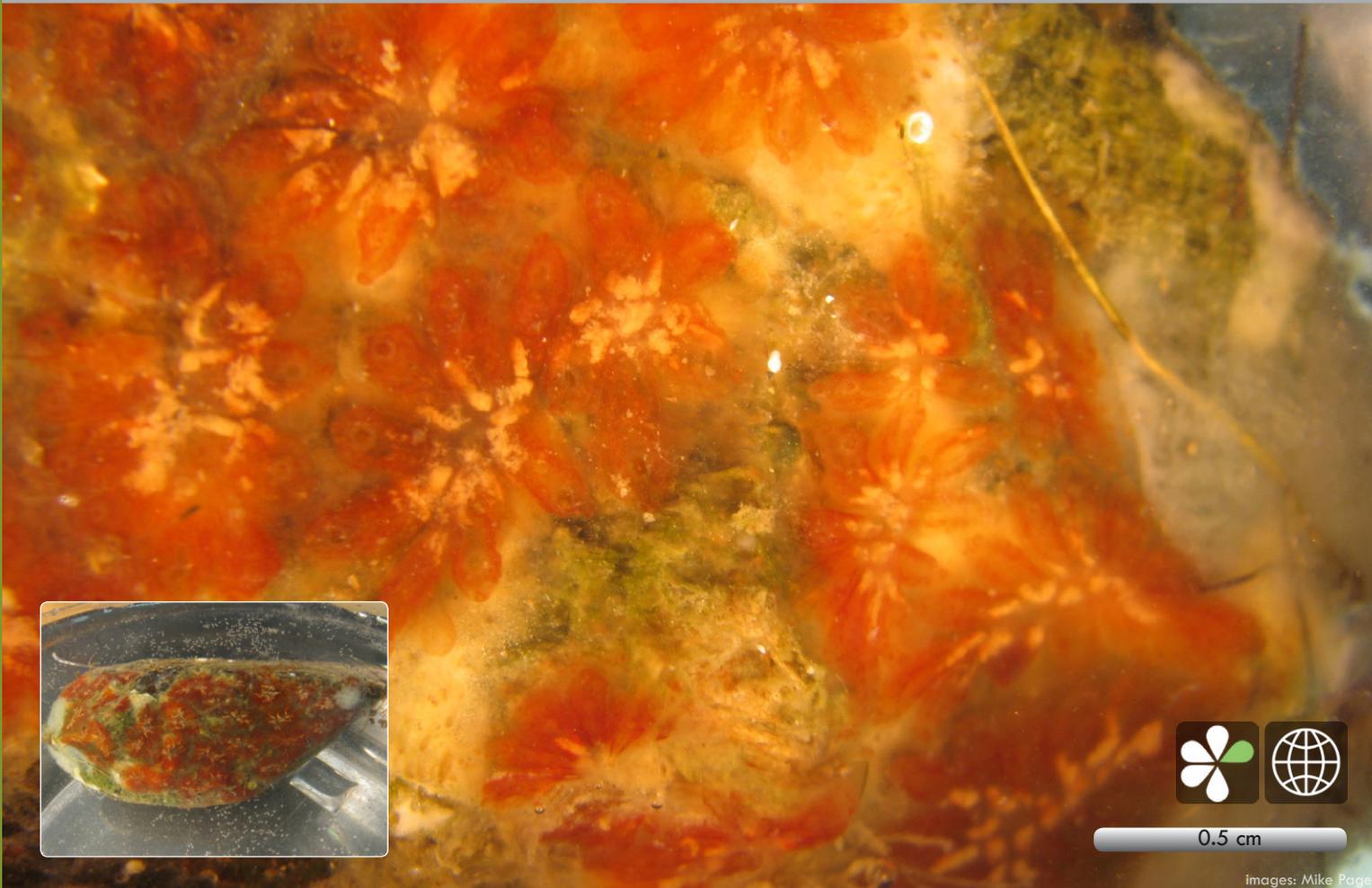
Colonies 3 mm thick, often co-occurring with *Botrylloides leachii*, but can be distinguished by circular zooid systems around common exhalent apertures. In life, colonies can vary widely in colour, but are usually orange, green or purple.

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





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 Delee

morphology



surface



substrate



habitat



Body small, spherical to oval, inhalant and exhalent 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.

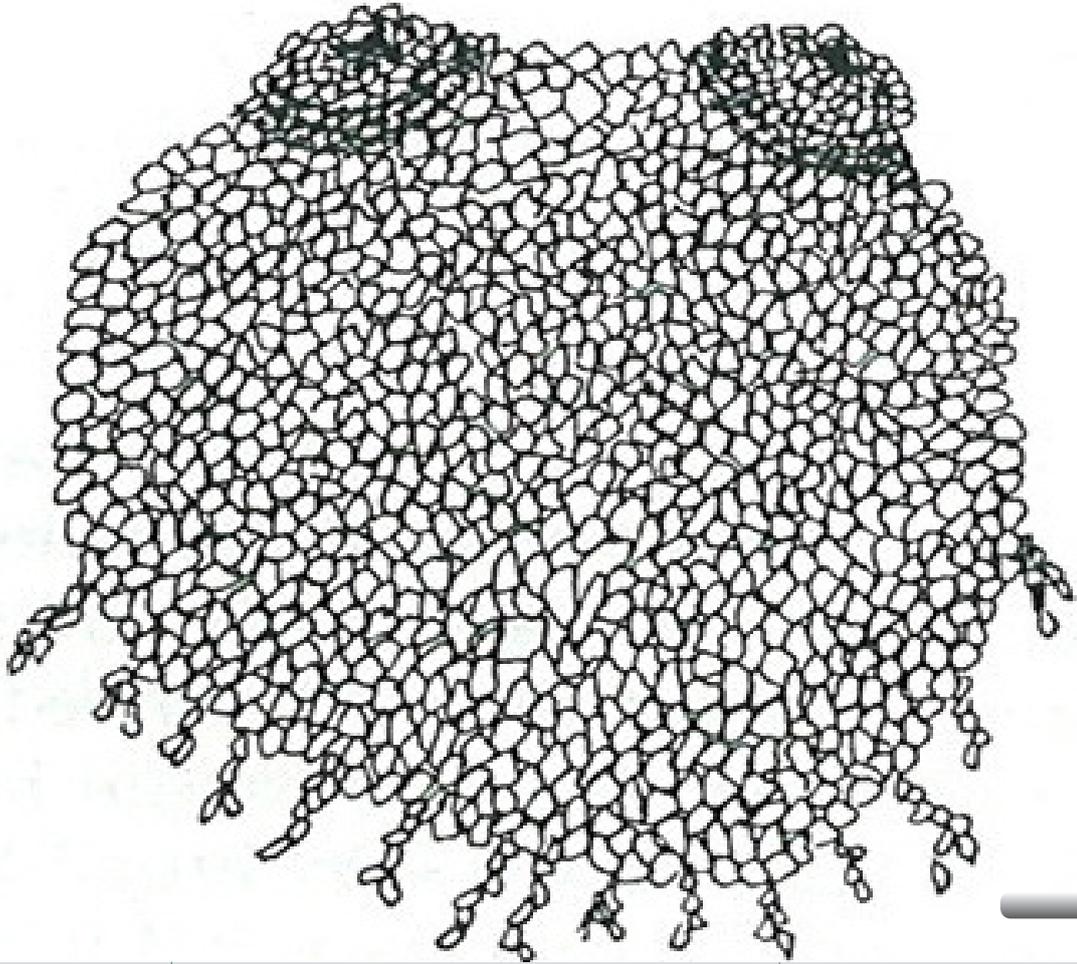
Tolerant of high sediment and low salinity. May occur in large aggregations on the seafloor. Presently restricted to the Manukau Harbour. This species was first described from New York Harbour with a continuous northwestern Atlantic distribution from Cape Cod to southern Louisiana. It is now globally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



Brewin, B.I. (1951) Ascidians of New Zealand. Part 6. Ascidians of the Hauraki Gulf. Part 2. *Transactions and Proceedings of the Royal Society of New Zealand*, 79 (1): 104–113.

Kott, P. (1985) The Australian Ascidiacea I. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23, 440 p.



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 nisiotus*



Cosmopolitan



Class Ascidiacea Order Stolidobranchia Family Pyuridae

cunjevoi



morphology

surface

substrate

habitat



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



Rius, M., Teske, P.R. (2013) Cryptic diversity in coastal Australasia: a morphological and mitonuclear genetic analysis of habitat-forming sibling species. *Zoological Journal of the Linnean Society*, 168: 597–611.

Class Ascidiacea Order Stolidobranchia Family Pyuridae

sea tulip



6 cm

main image: Floor Anthoni

morphology 	surface 	substrate 	habitat
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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.

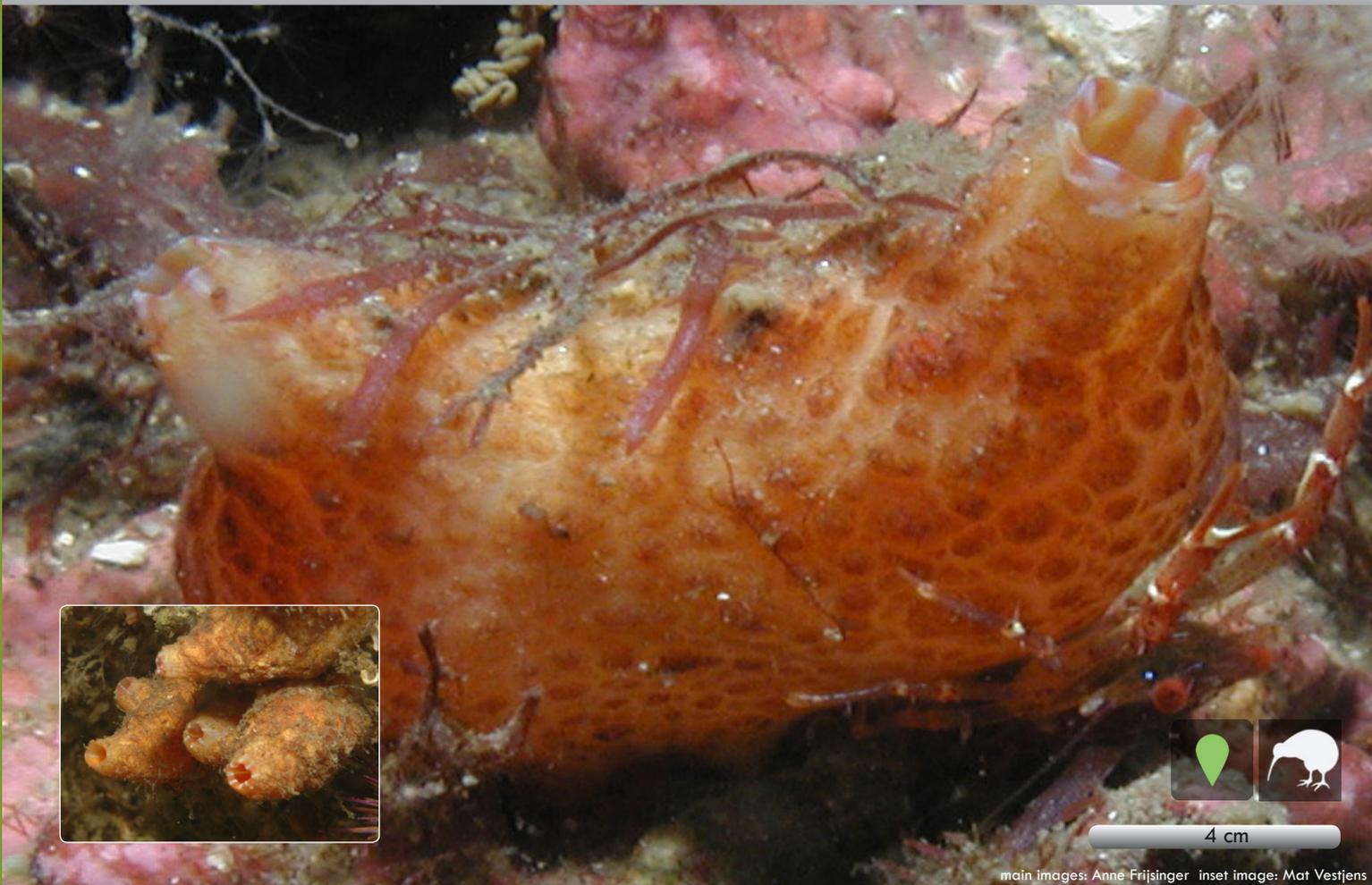
Sea tulips grow in high energy environments in southern New Zealand on the open coast, and in harbours with high tidal flow. In optimal conditions they can form dense forests on the sea floor from the intertidal down to greater than 30 m. A cold water species common to the South Island



It could also be.....
Styela clava

Brewin, B.I. (1946) 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.



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) 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.

Class Ascidiacea Order Stolidobranchia Family Styelidae

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) 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.

saddle sea squirt



2 cm

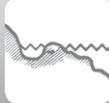
Images: Mike Page

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.

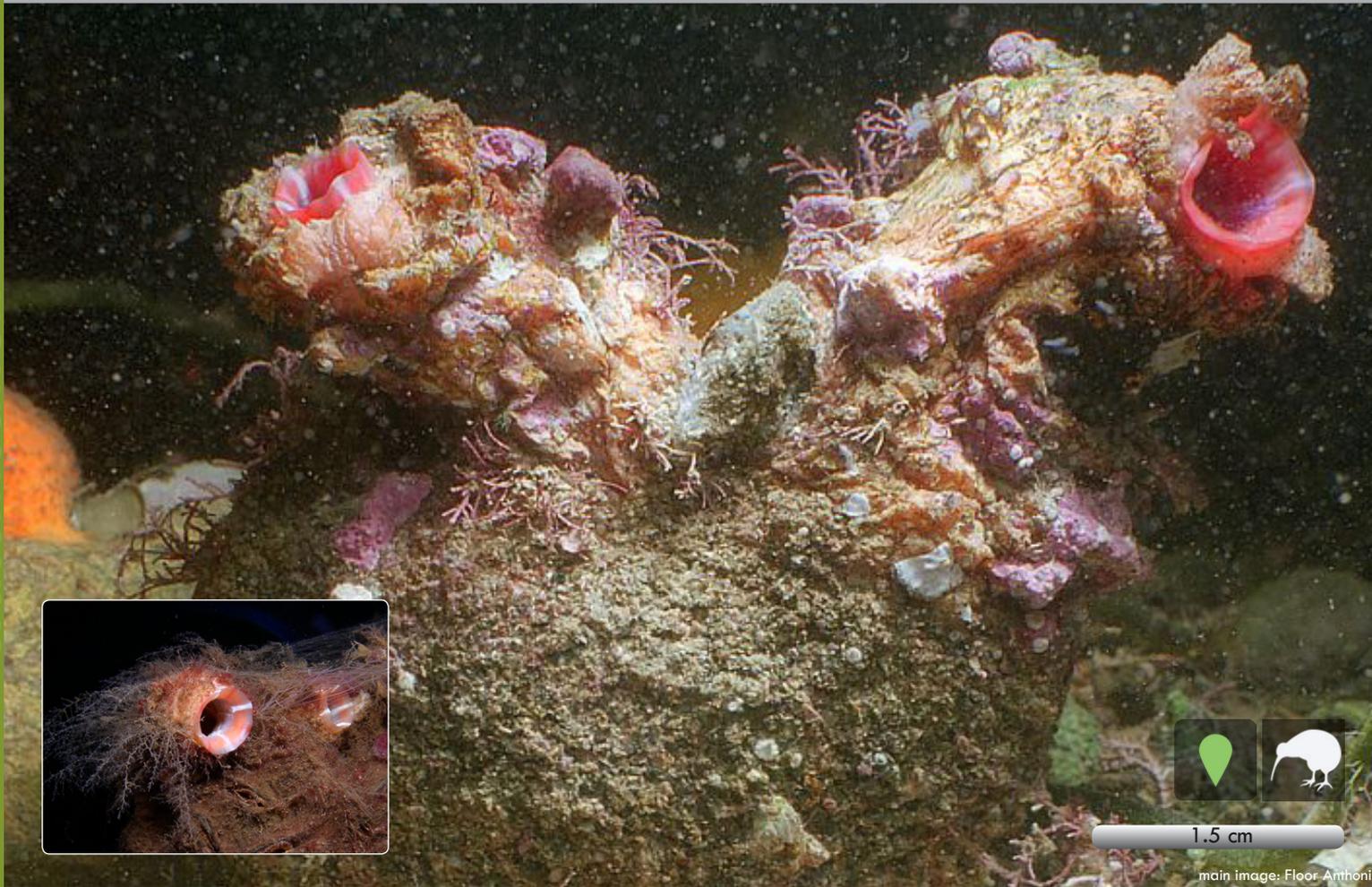
Very common in ports, harbours, and coastal environments. May be locally abundant on shallow reefs and wharf piles. Generally co-occurs with *Cnemidocarpa nisiotis*. This species is widespread throughout New Zealand.

It could also be.....
Cnemidocarpa nisiotis



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

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



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.

Class Ascidiacea Order Stolidobranchia Family Styelidae

rough sea squirt



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



Class Ascidiacea Order Stolidobranchia Family Styelidae

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



Kott, P. (1985) The Australian Ascidiacea I. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23, 440 p.

Class Ascidiacea Order Stolidobranchia Family Styelidae

pleated sea squirt



2 cm

inset images: John Borom

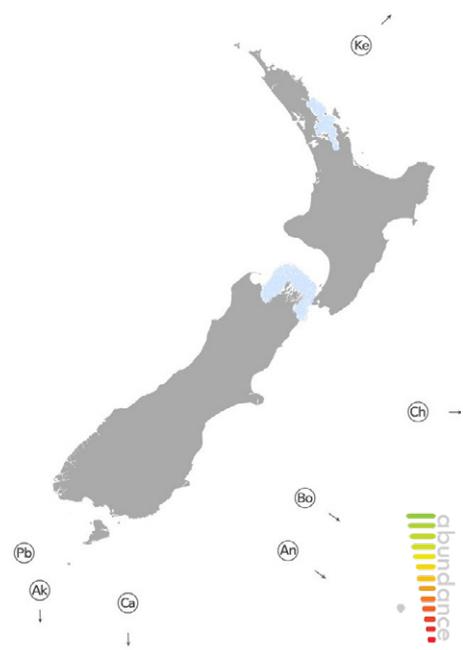
morphology	surface	substrate	habitat



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



Kott, P. (1985) The Australian Ascidiacea I. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23, 440 p.

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

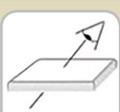
icons

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, repeat		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		mud	very fine muddy and silty sediments derived from terrigenous rocks, soils and clays
		rubble	shell, stone and pebble rubble		epizoic/epiphytic	living or growing on the external surface of an animal (epizoic) or seaweed, (epiphytic)
		sand	small coarse grains of worn silica, rock, and shell		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		algal beds	coralline algae, seagrass or algal beds
		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		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
		indents	underwater caves, shelves and overhangs, organisms may experience wave surge, subdued illumination, or near darkness		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
		rockpool	indentation in rock filled with water, intertidal		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
		wall	underwater cliffs and slopes, organisms exposed to 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
indentations	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 1/2 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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