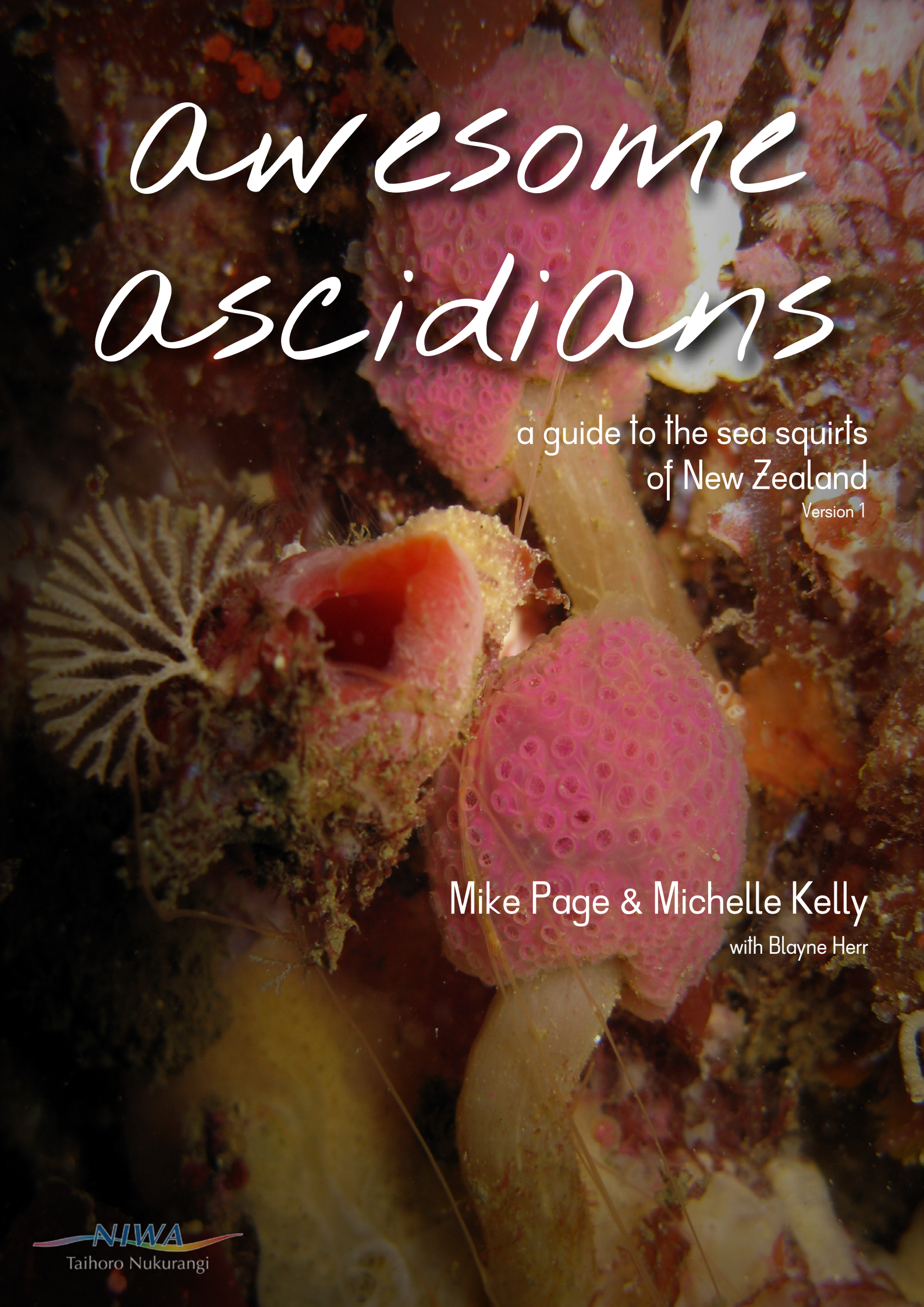


awesome ascidians

a guide to the sea squirts of New Zealand

Version 1

Mike Page & Michelle Kelly

with Blayne Herr

NIWA
Taihoro Nukurangi

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 invertEguide 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 invertEguide 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 invertEguide 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. Information is provided in descriptive text or quick reference icons that convey information without words. Icons are fully explained at the end of this document and a glossary explains unfamiliar terms.

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 Mike your photo's ... (mike.page@niwa.co.nz)

Remember to check out

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

for any updated versions!

a typical species page layout

taxonomic name of species

taxonomic authority
person(s) who first described this species

species classification
see species index for arrangement

species images
inset images show variations

life history icons
highlighting whether native or introduced, solitary or colonial, and size (scale bar)

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

depth range
common depth range around New Zealand

abundance

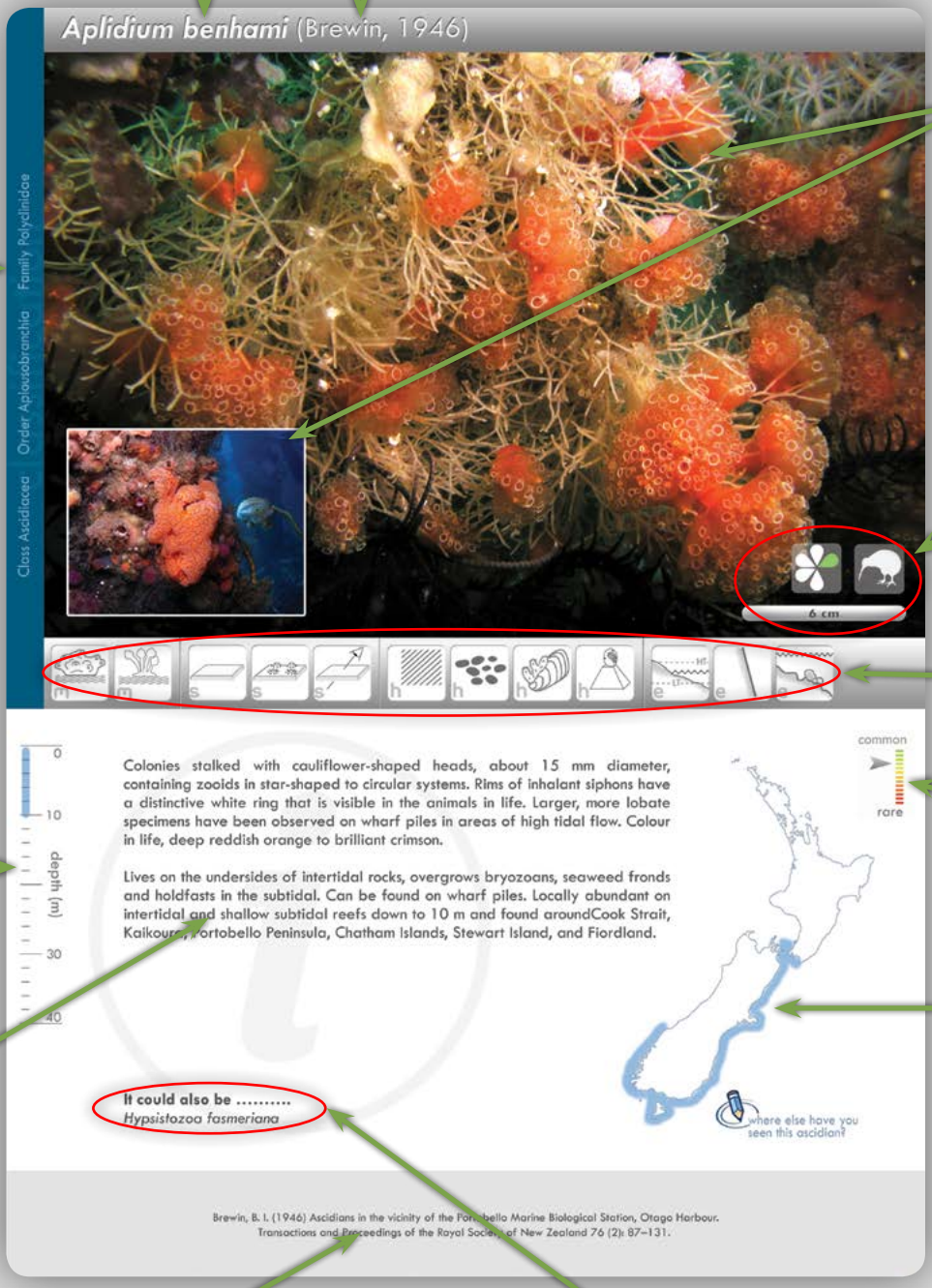
information
details on external and internal characters and habitat

distribution
section of coastline where species is most commonly found

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

key taxonomic references

it could also be ...
some species are difficult to tell apart without careful identification, so check the species listed here to make sure that you have the correct species



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 **exhalent 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.

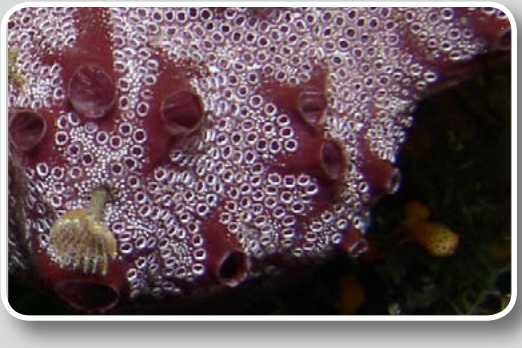
Fish, flatworms, sea urchins and sea stars are the sea squirts' primary predators, although, in Chile, Japan, Korea , Europe and parts of Aboriginal Australia, some sea squirts are eaten by humans!

solitary sea squirt

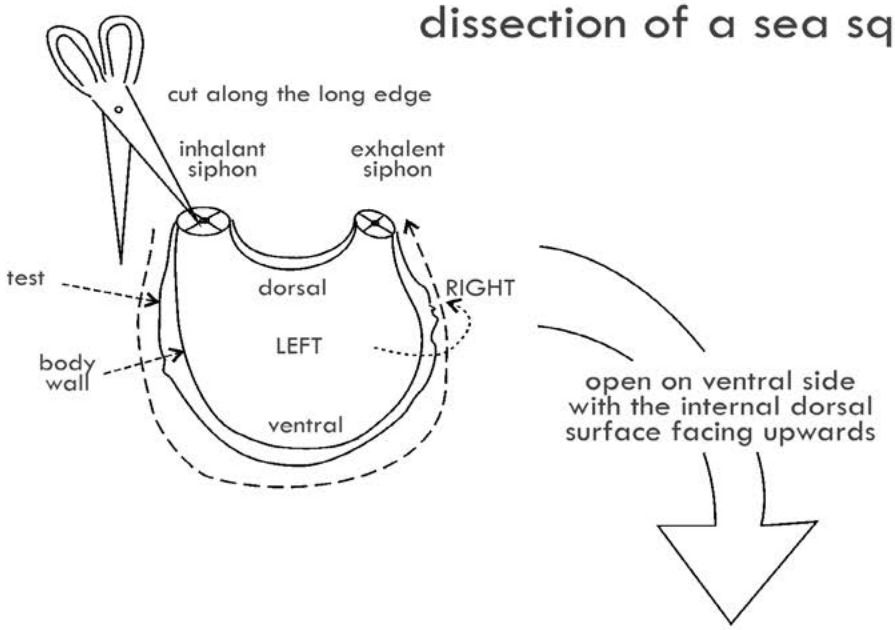
Individual animals with an inhalant siphon and an exhalent siphon, often with a thick leathery test that encloses the body of the animal.

colonial sea squirt

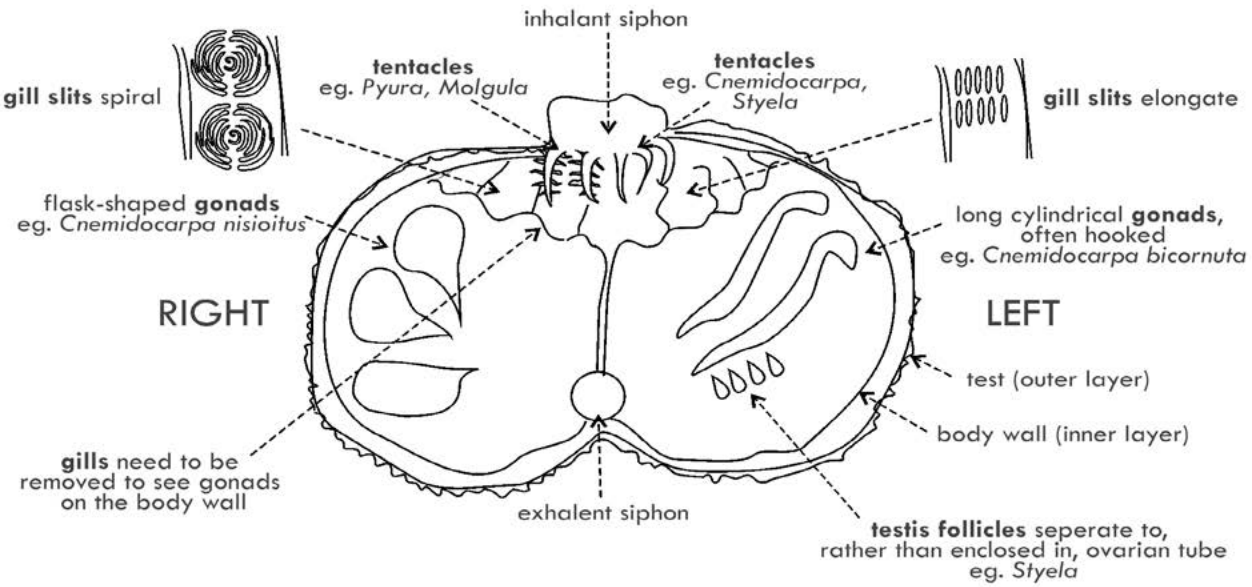
Groups of small animals (zooids) are embedded in a gelatinous test as a colony. Zooids can be arranged in circular or linear systems, sharing common exhalent canals and apertures. Other types can have zooids opening independently or on stalks connected to a common basal test.



dissection of a sea squirt



composite schematic of a solitary sea squirt



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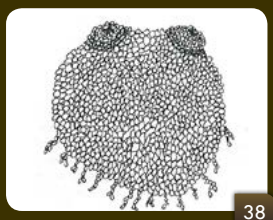
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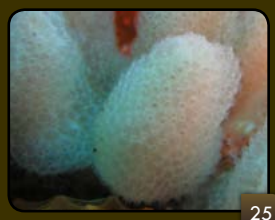
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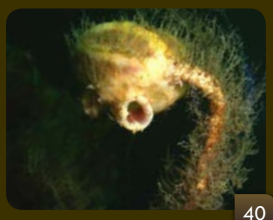
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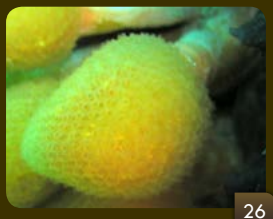
Pycnoclavella kottae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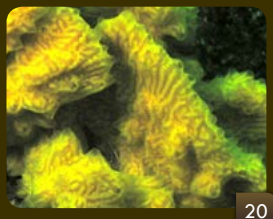
Pseudodistoma novaezelandiae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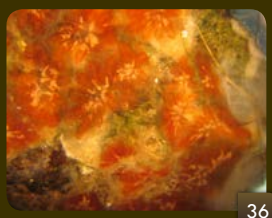
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Didemnum jucundum

species index

Phylum Chordata

Subphylum Tunicata

Class Ascidiacea

Order Aplousobranchia

Order Phlebobranchia

Order Stolidobranchia

Clavelina lepadiformis (Müller, 1776)

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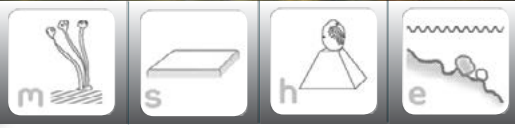

Colonies have a distinctive medusoid shape in which multiple elongate zooids are joined by a thin common basal test and protrude as individual heads opening separately to the outside. Inhalant gill sac and stomach are clearly visible through the transparent test. The endostyle and tentacles are pigmented 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.

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 amd Northwest Europe. Clarendon Press, Oxford: 627.

Didemnum jucundum Kott, 2001

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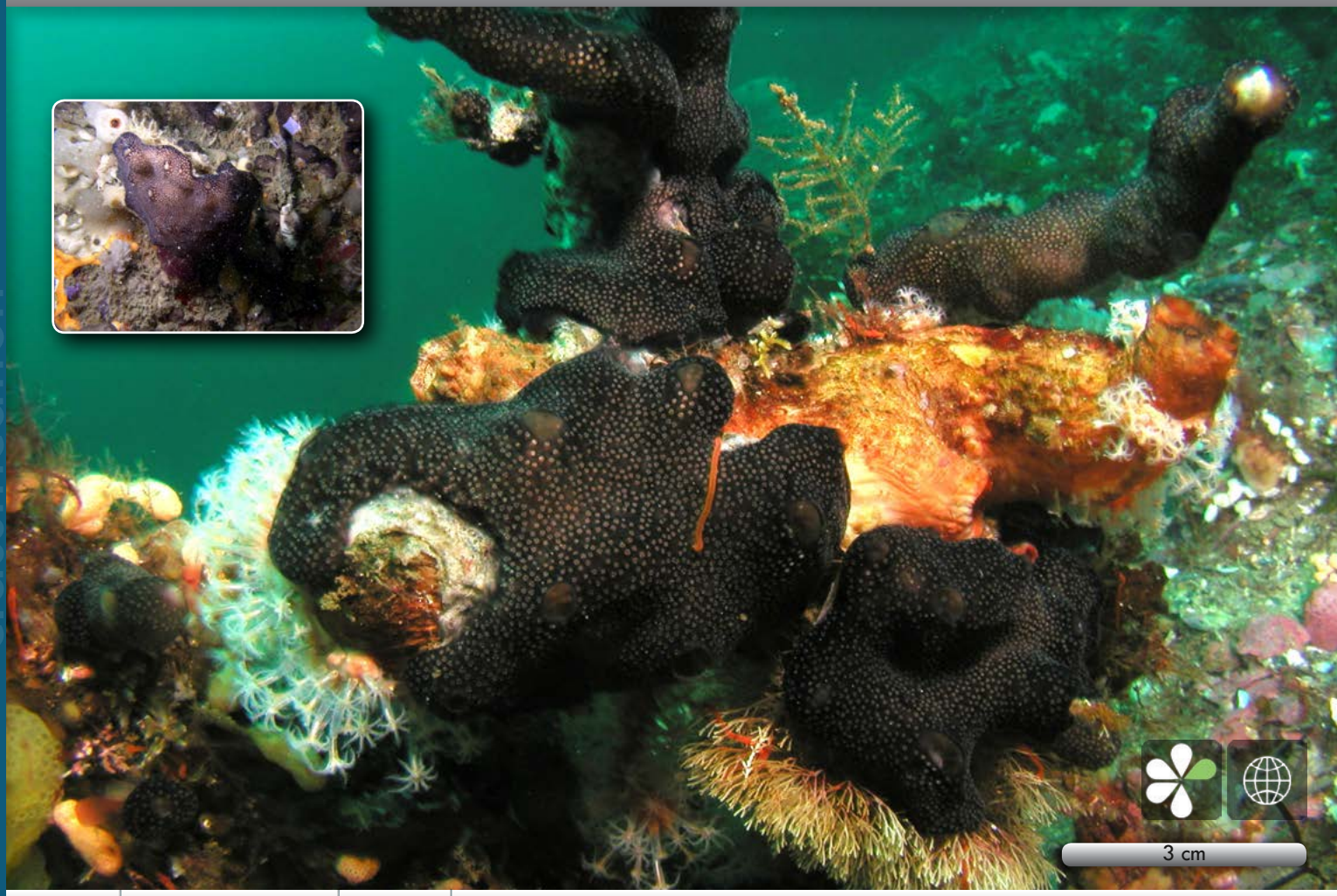
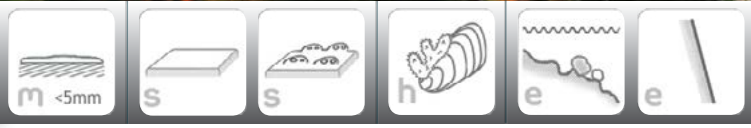
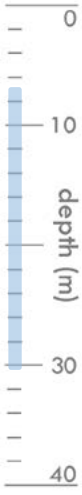
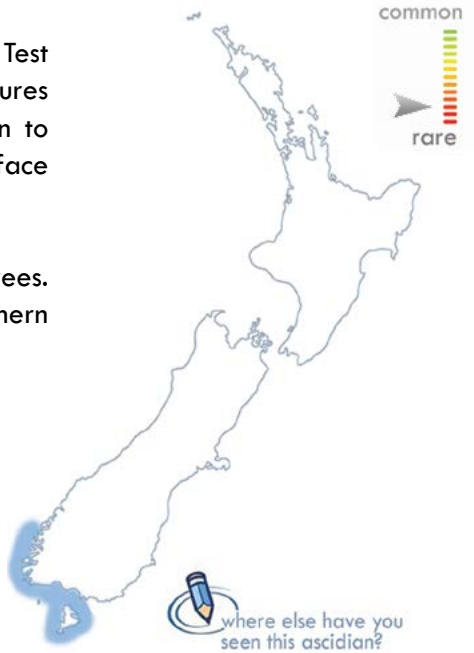






Colonies are thin and appear highly inflated in life. Texture soft, filmy. Test covered in closely spaced inhalant apertures, occasional exhalent apertures are visible. Surface layer of the test is coloured dark chocolate brown to black; the cream-coloured interior can be seen below the translucent surface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

Typically encrusts bivalves, solitary ascidians and dead black coral trees. Native to western and southern Australia. Restricted at present to southern Fiordland region and Stewart Island.



It could also be .....
Lissoclinum notti

Australia

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

Didemnum vexillum Kott, 2001

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m <20mm | s | h | h | h | h | e

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. Outgrowths of the colony encrust 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.

It could also be .....
Didemnum species complex
Encrusting sponges

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.

Didemnum species complex

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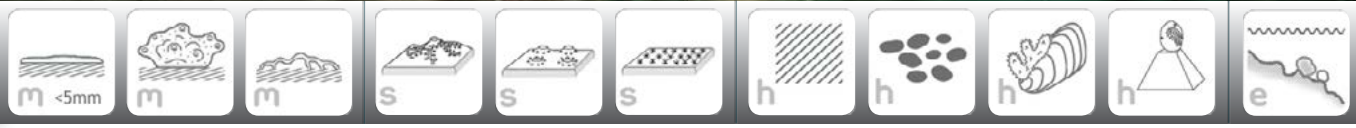
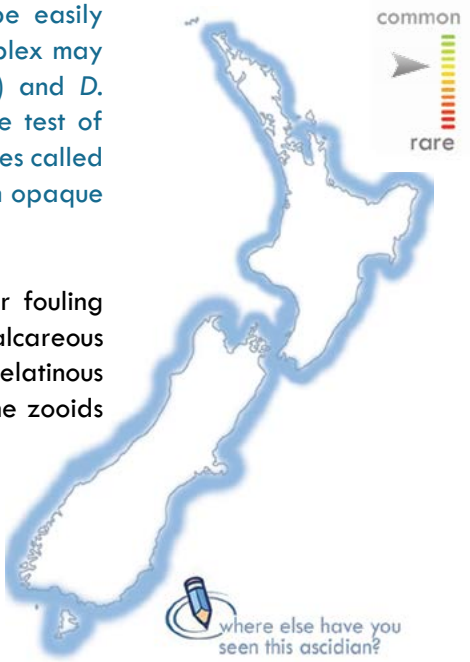


A 'species complex' is a group of closely related species that cannot be easily distinguished in the field due to their physical similarity. Species in the complex may include *Didemnum incanum* (Herdman, 1899), *D. maculatum* (Nott, 1892) and *D. lambitum* (Sluiter, 1900). They often vary by only the 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

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

Diplosoma listerianum (Milne-Edwards, 1841)

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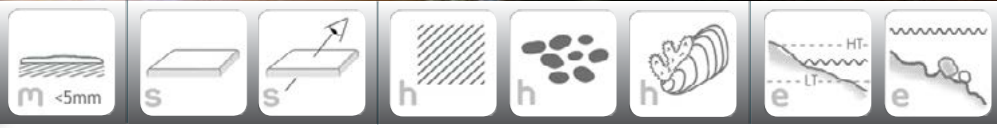
main image: Floor Anthoni

3 cm



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, and this species is easily removed from the substratum as a slimy film.

Encrusts a variety of submerged surfaces including shellfish, algae and barnacles.

It could also be .....
Botrylliodes leachii

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.

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.

Lissoclinum notti Brewin, 1958

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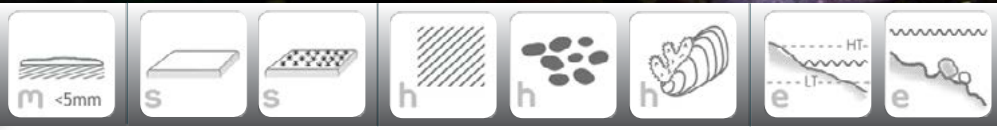

Colonies characteristically very thin, encrusting, <2 mm thick, easily torn and fragile. Zooids are not in marked systems, but there are relatively large, common exhalent apertures evenly distributed throughout the colony or on the apex of lobes formed on encrusted organisms. Spicules are found in 2 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, brown or violet.

Common on shallow subtidal reefs, wharf piles and aquaculture structures.

It could also be .....
Didemnum species complex
Didemnum vexillum

Western South Pacific

Brewin B.I. (1958) Ascidians of New Zealand. Part 12. Ascidians of the Hauraki Gulf. Part 3. *Transactions and Proceedings of the Royal Society of New Zealand*, 85 (3): 455–458.

Hypsistozoa fasmeriana (Michaelsen, 1924)

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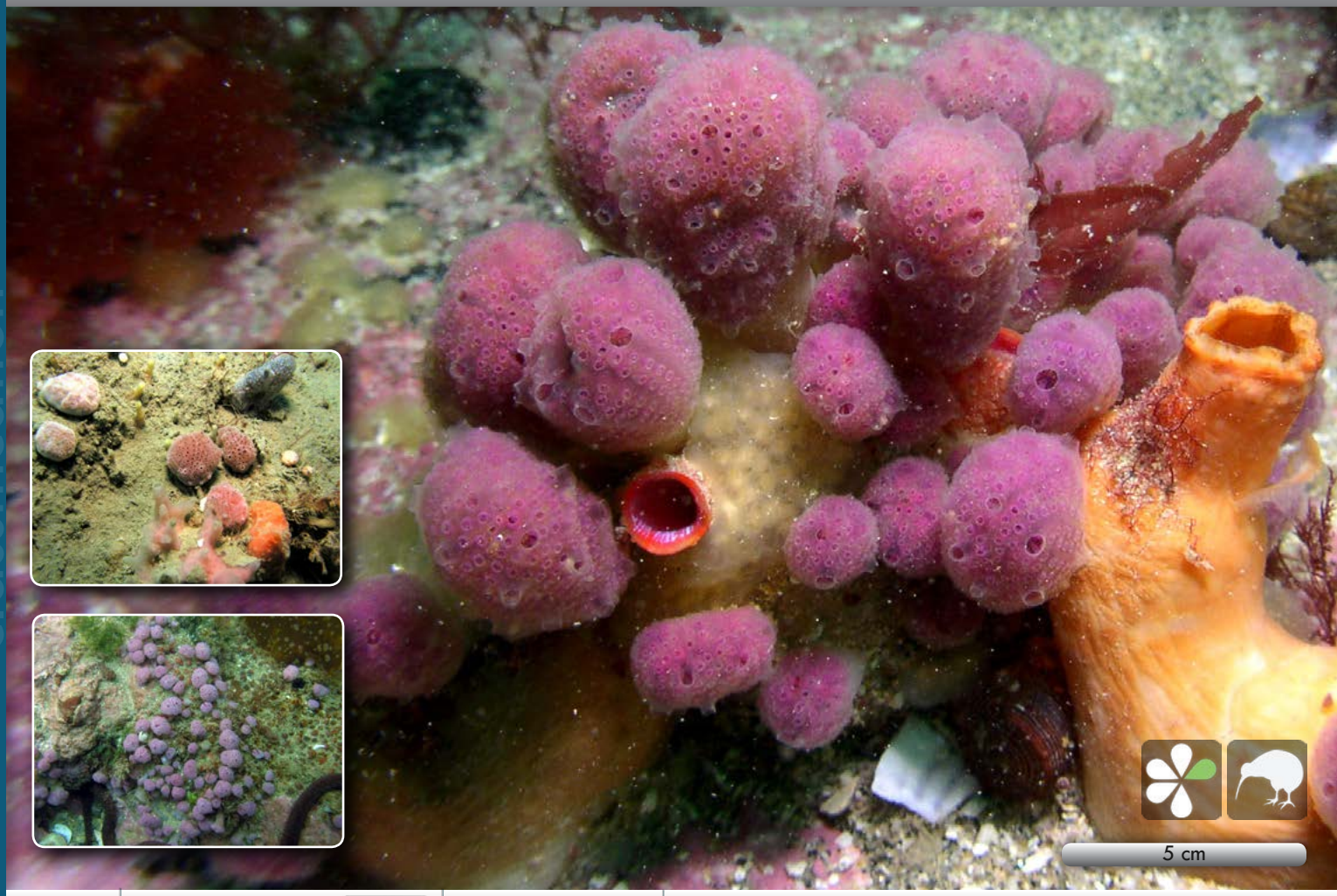
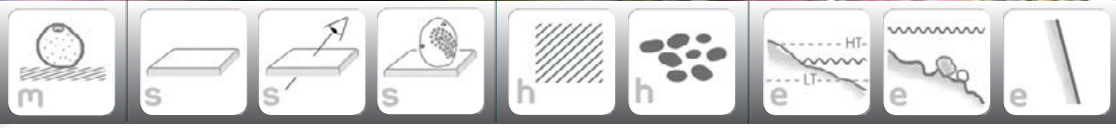
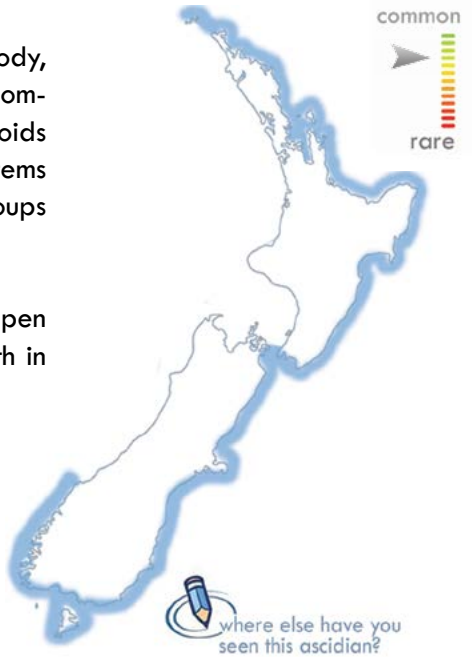




Colony consists of a short fleshy stalk topped with a much larger ovoid body, attached individually to the substrate. Body is often button or mushroom-shaped. Stalks are often not visible. Soft and gelatinous to the touch. Zooids are in parallel systems around numerous large exhalent apertures, systems 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.



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.

Sycozoa sigillinoides Lesson, 1830

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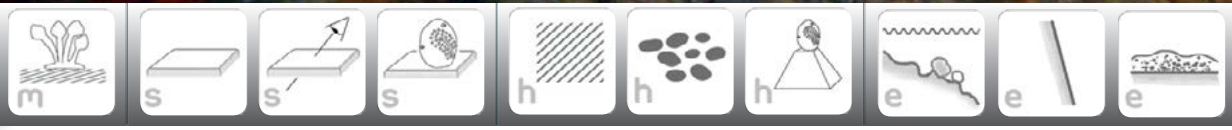
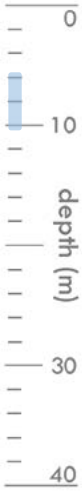
main and inset images: Crispin Middleton





Elongate ovoid heads on flexible stalks. Texture soft, gelatinous. Zooids can be seen through the test as linear double rows of inhalant apertures visible as white dots, connecting to a single common exhalent 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, including the Chatham Islands, and occurs as far south as Antarctica.

Circum polar

Kott, P. (1990) The Australian Ascidiacea, Part 2, Aplousobranhia (1). *Memoirs of the Queensland Museum*, 29 (1): 1–226.

Eudistoma elongatum (Herdman, 1886)

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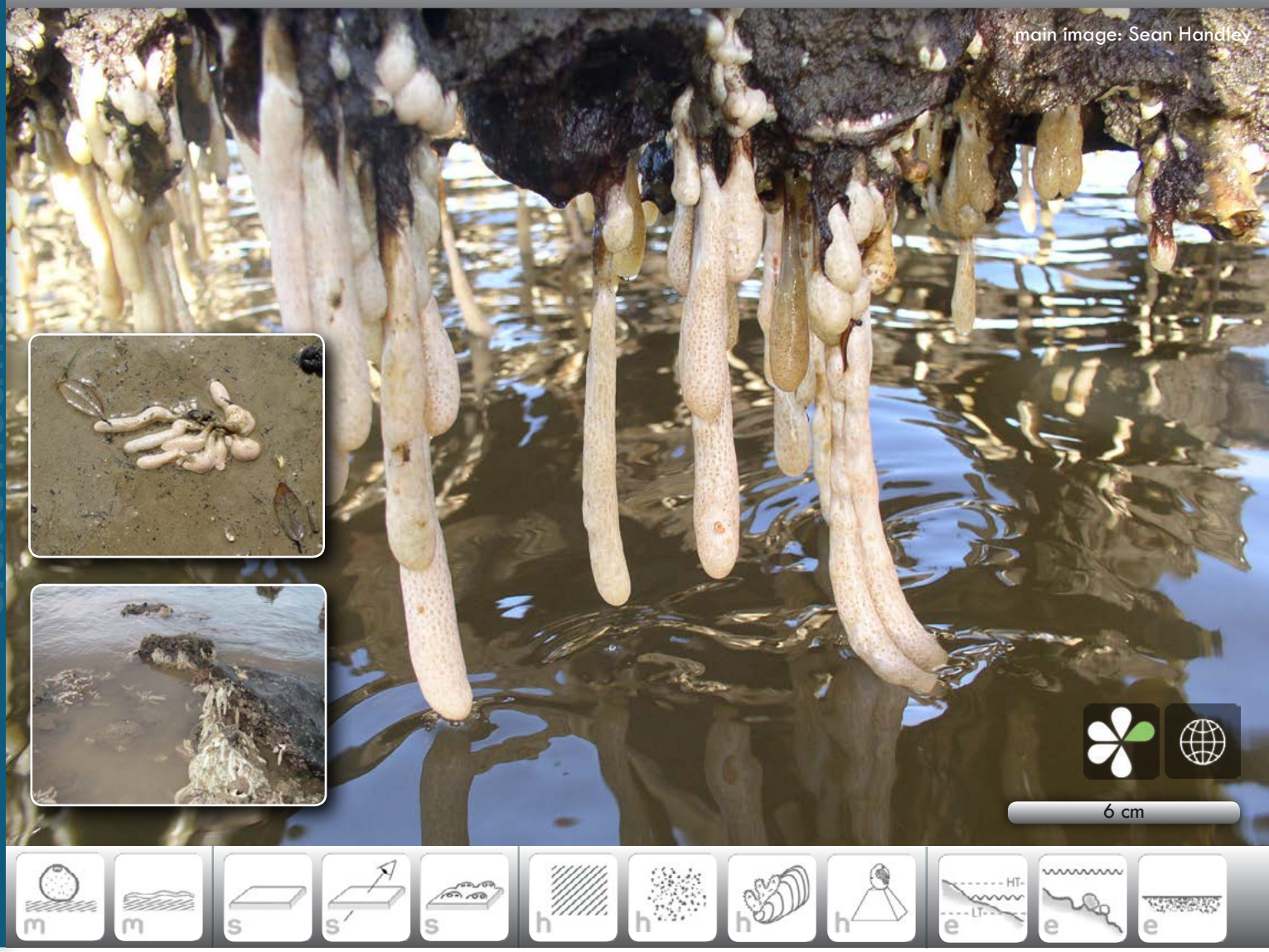
main image: Sean Handley



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.

Species occur locally in high abundance in sheltered bays, growing on oyster racks, mangrove roots, rocky shoreline and on shells embedded in mud. Restricted at present to the far north of the North Island.

Australia

Kott, P. (1990) The Australian Ascidiacea, Part 2, Aplousobranhia (1). *Memoirs of the Queensland Museum*, 29 (1): 1–226.

Aplidium benhami (Brewin, 1946)

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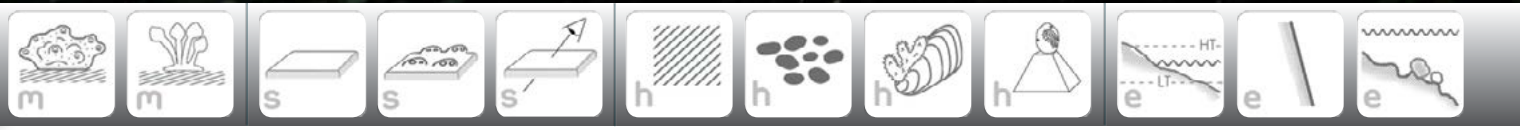

Colonies stalked with cauliflower-shaped heads containing zooids in star-shaped to circular systems. Rims of inhalant siphons have a distinctive white ring that is visible in the animals in life. Larger, more lobate specimens have been observed on wharf piles in areas of high tidal flow. Colour in life, 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 and found around Cook Strait, Kaikoura, Portobello Peninsula, Chatham Islands, Stewart Island, and Fiordland.

It could also be .....
Hypsistozoa fasmeriana

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.

Aplidium phortax (Michaelson, 1924)

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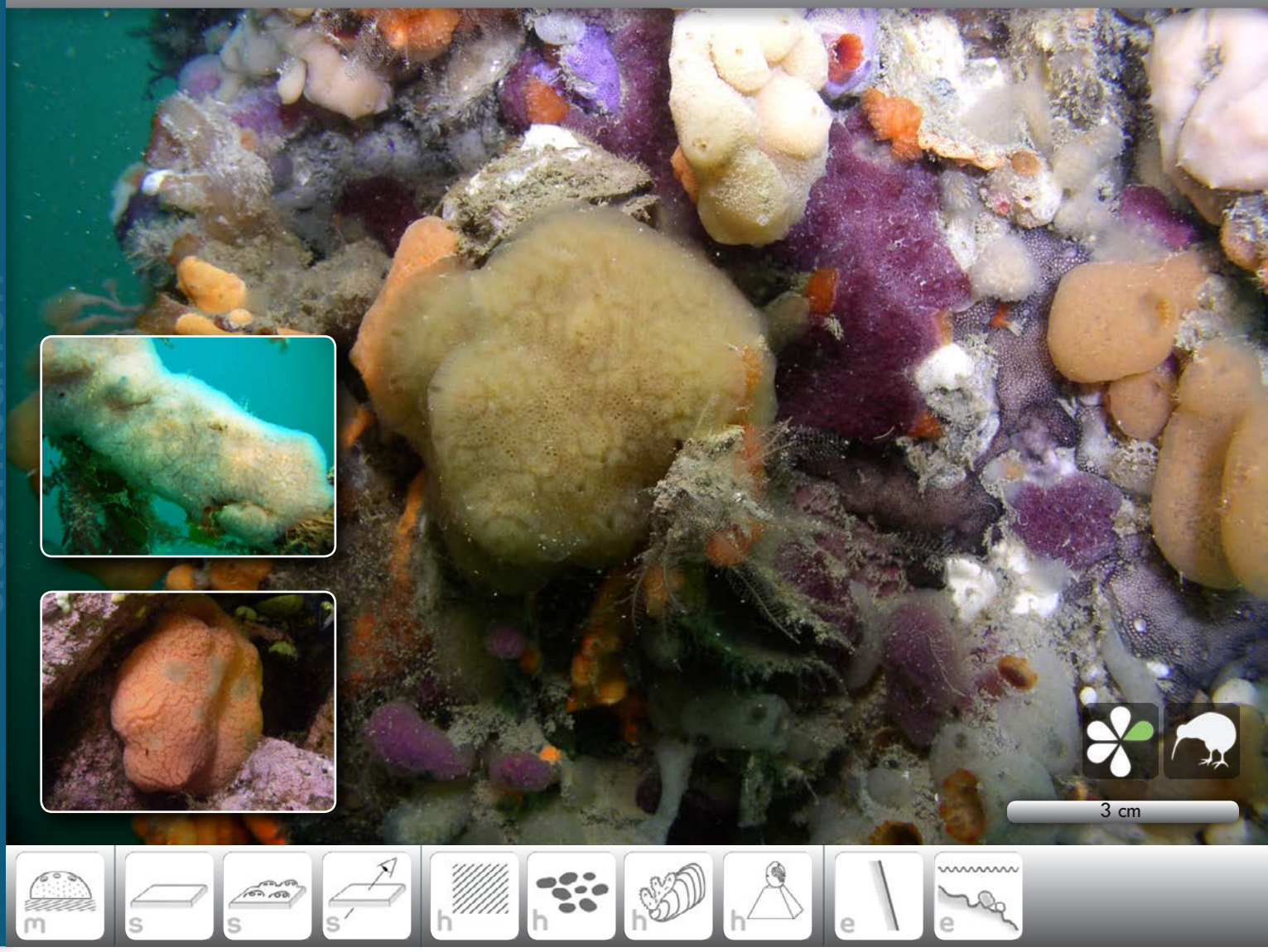

Large spherical, fleshy, firm, gelatinous colonies. Zooids form meandering double-rowed, at times branching systems, along obvious subsurface canals. Common exhalent apertures are indistinct, but are often situated on the apex of lobes on the colony. Colour in life varies from translucent cream, to light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

Very common species fouling wharf piles and aquaculture structures in ports, bays, and harbours.

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.

Aplidium powelli (Brewin, 1958)

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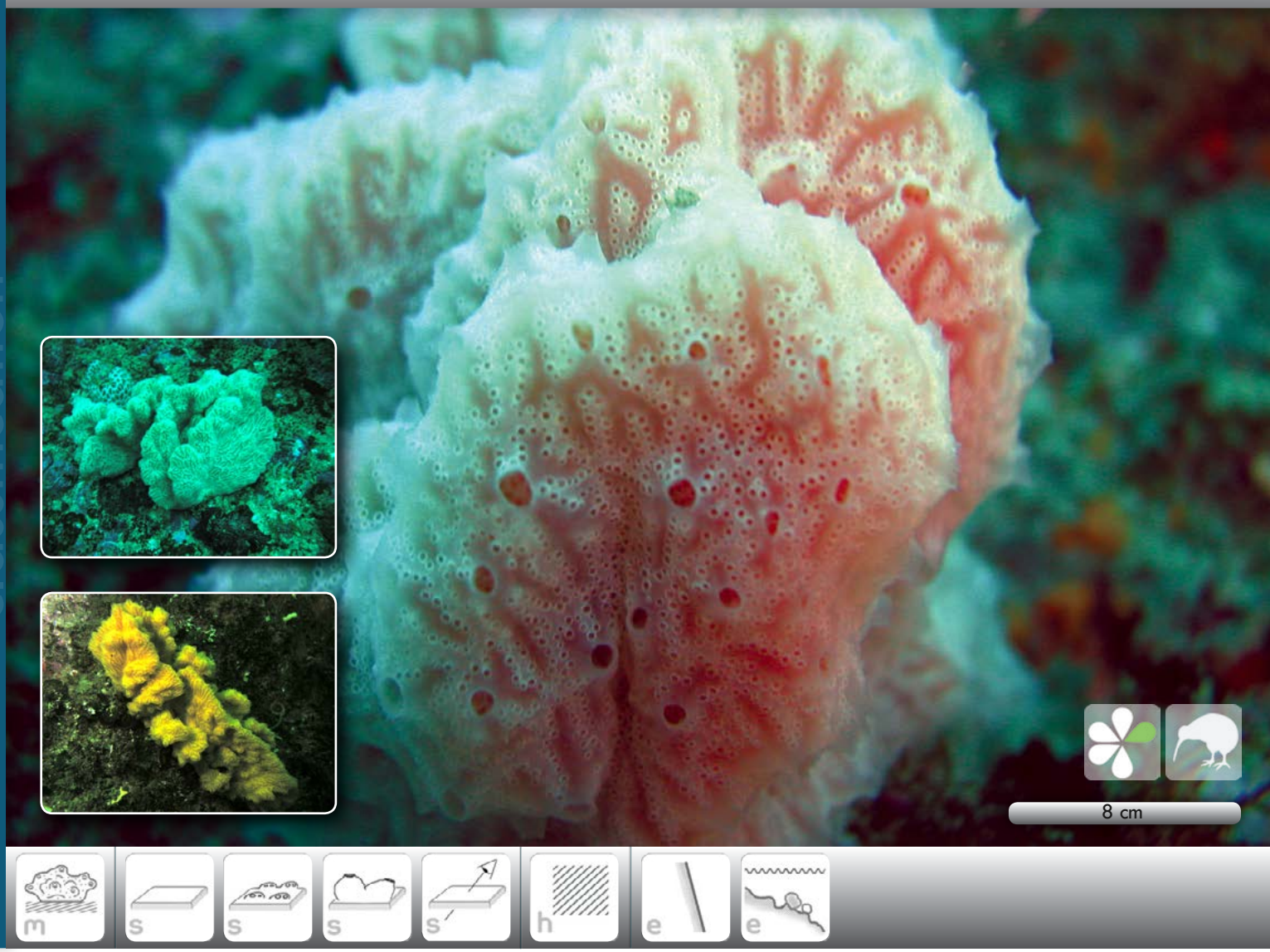

Grows in large, fleshy, multi-lobed colonies up to 10 cm high. Gelatinous yet firm to the touch. Easily distinguished by the many common exhalent apertures and the distinctive branched pattern of zooid inhalant apertures visible through the outer test. Colour in life usually light pink, but can also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

Most common on sheltered deep reefs down to 30 m depth on the north eastern coastline of the North Island.

It could also be .....
Aplidium phortax

Brewin B.I. (1958) Ascidians of New Zealand. Part 12. Ascidians of the Hauraki Gulf. Part 3. *Transactions and Proceedings of the Royal Society of New Zealand*, 85 (3): 45–458.

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

Aplidium scabellum (Michaelsen, 1924)

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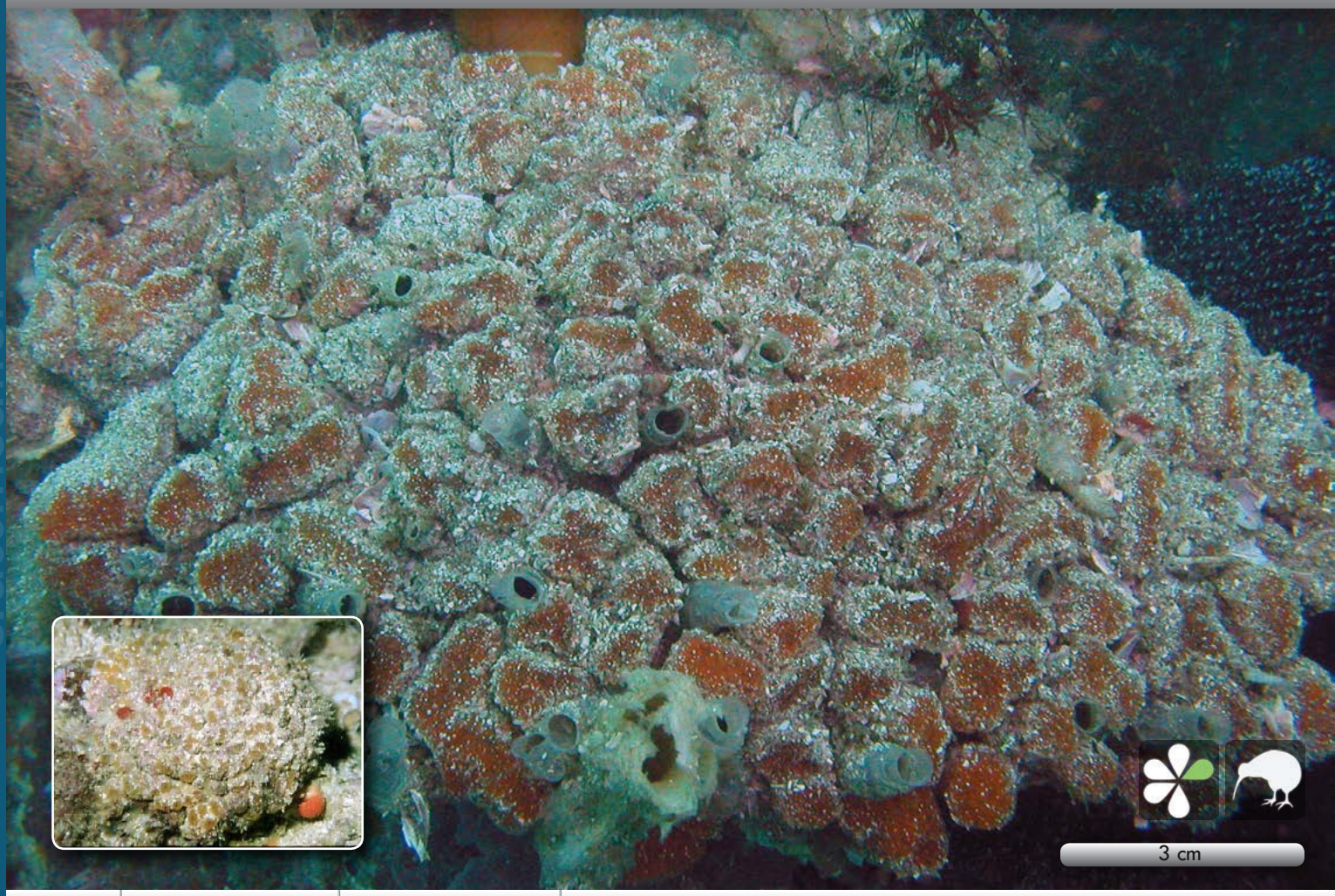

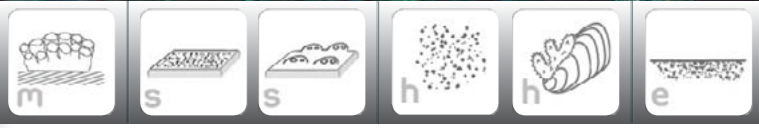

Colonies are composed of closely packed flat-topped heads in a large mound approximately 60 mm high. The test is heavily invested with sand; the tops of the heads less so, revealing dull orange zooids beneath the surface. No systems or common exhalent apertures are visible in the colony in life. Colonies 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. It has been recorded from north eastern North Island and Chatham Islands.

It could also be .....
Botryllus stewartensis

Michaelsen W. (1924) Ascidiae Krikobranchiae 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.

Polyclinum novaezelandiae Brewin, 1958

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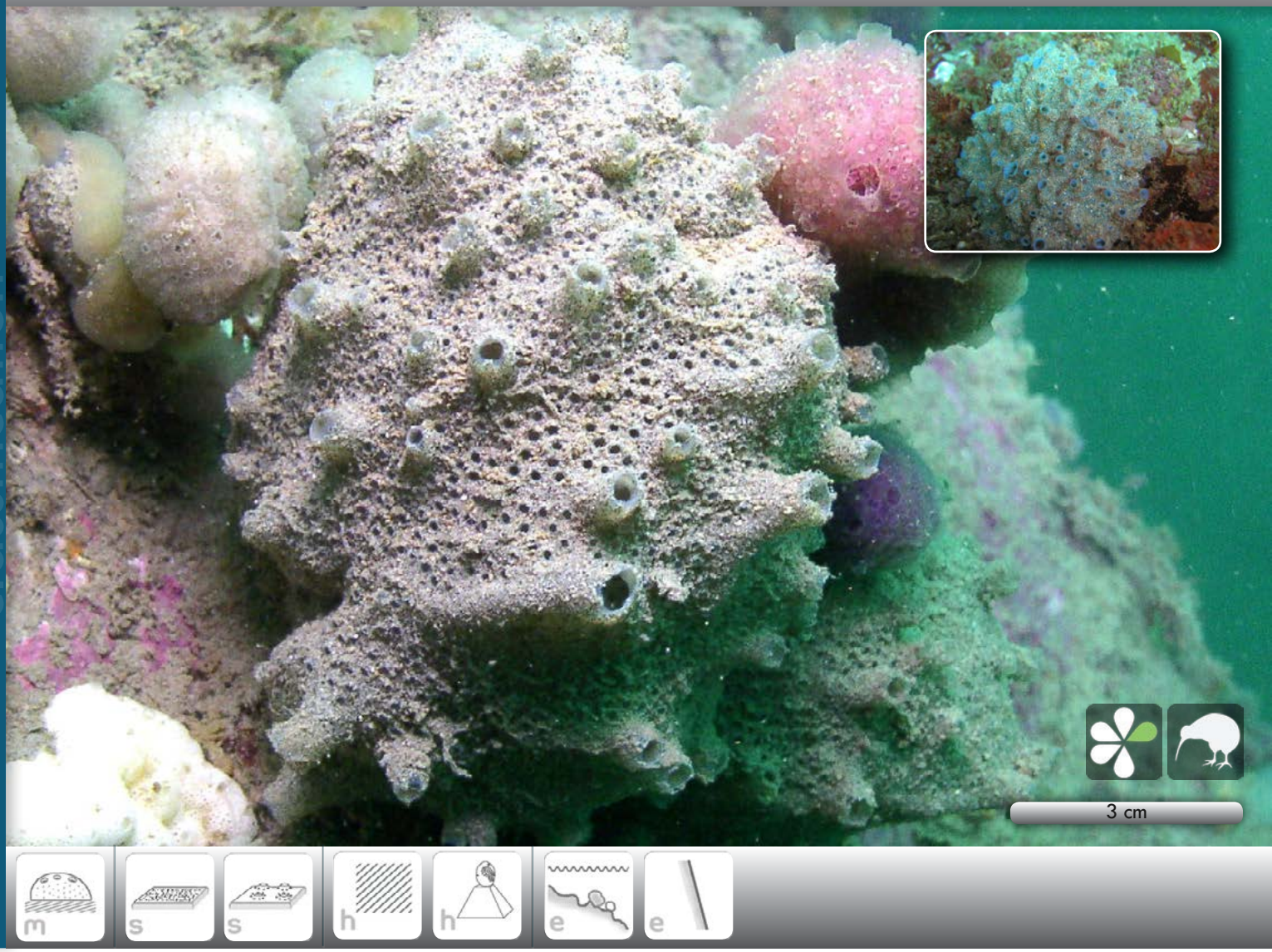

Distinctive large cushion-shaped colonies with numerous raised turret-shaped common exhalent siphons interspersed with small but obvious inhalant apertures. The surface is lightly coated with sand and the inside soft and gelatinous. Colour in life is gray lilac-gray; the inside of the common siphons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

Found in sheltered, sandy subtidal environments growing on natural and artificial substrata.

It could also be .....
Aplidium scabellum

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

Synoicum kuranui Brewin, 1950

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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 exhalent 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.

It could also be .....
Hypsistozoa fasmeriana

Brewin, B.I. (1950) Ascidians of New Zealand. Part 5. Ascidians from the East Coast of Great Barrier Island. *Transactions of the Royal Society of New Zealand*, 78 (2–3): 354–362.

Synoicum occidentalis Millar, 1982

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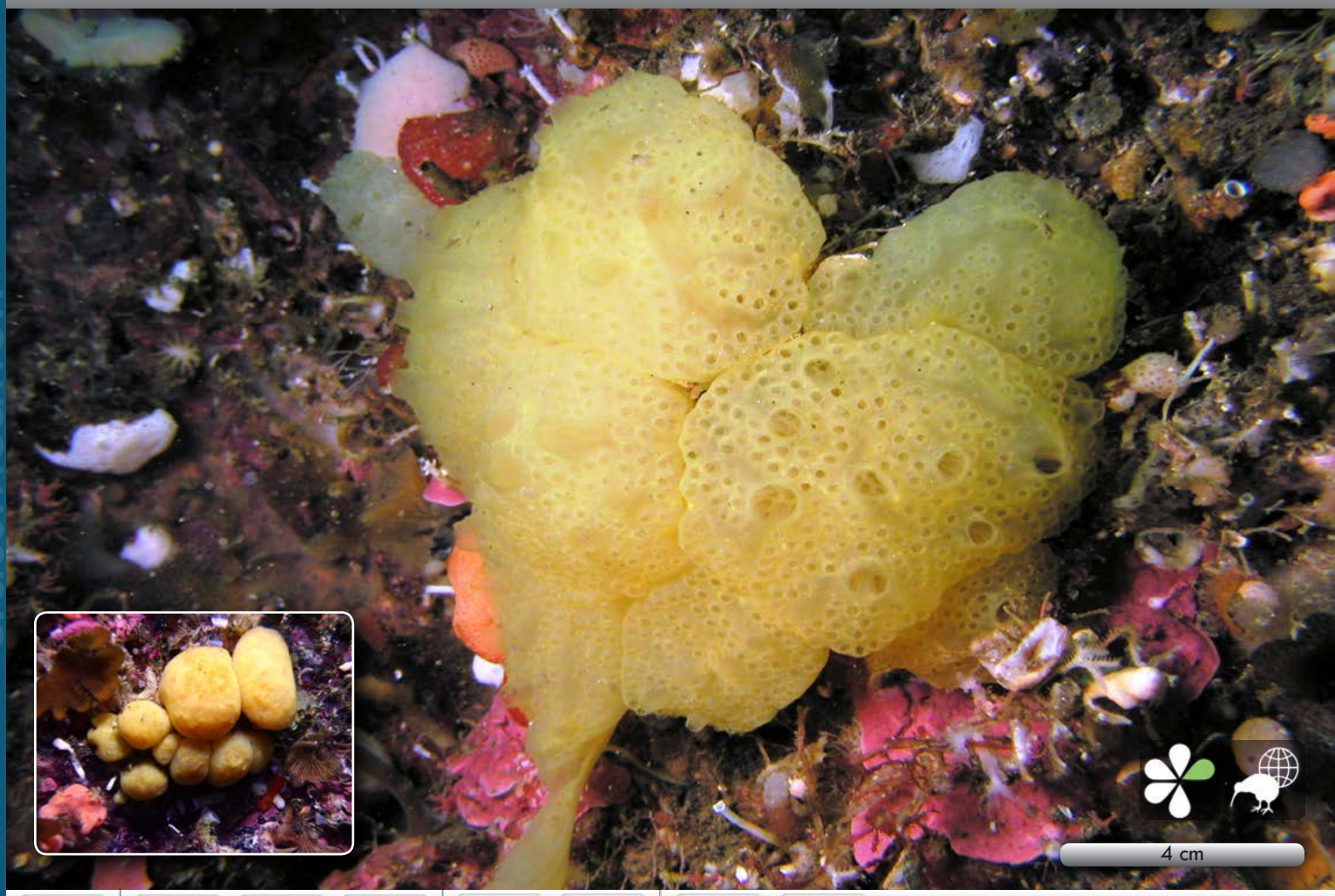
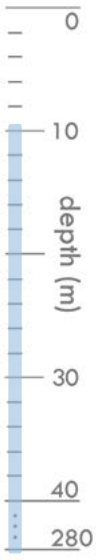


m s s s h h e e



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 exhalent apertures not visible. Colour in life patchy yellow orange, translucent.

Infrequently found over-growing coralline paint on rock walls or shallow subtidal habitats. Also known from trawls on the shelf-break to 300 m.

South West Pacific Ocean

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

Pseudodistoma cereum Michaelson, 1924

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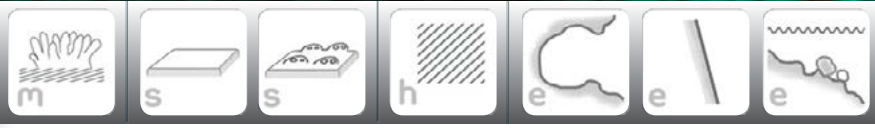
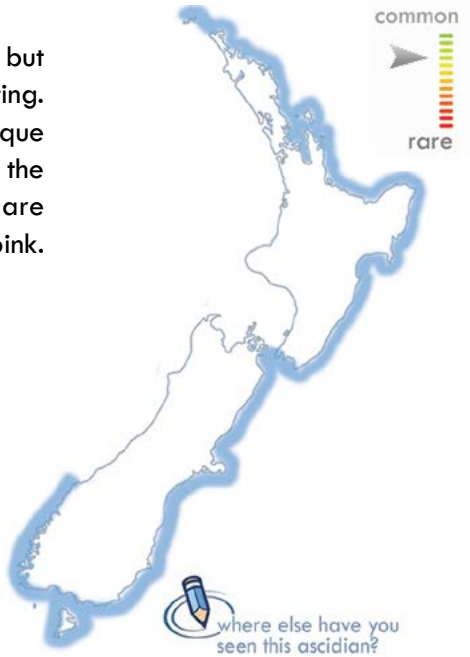


Colonies usually form fat rounded fingers on stalks up to 50 mm high, but in high energy environments they may flatten and become more encrusting. Small test cells may be numerous in some colonies giving them an opaque appearance. Fingers are stiff and cartilaginous, but soft to the touch on the exterior. 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.

Most common in coastal deep reefs down to 30 m.



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

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

Pseudodistoma novaezelandiae (Brewin, 1950)

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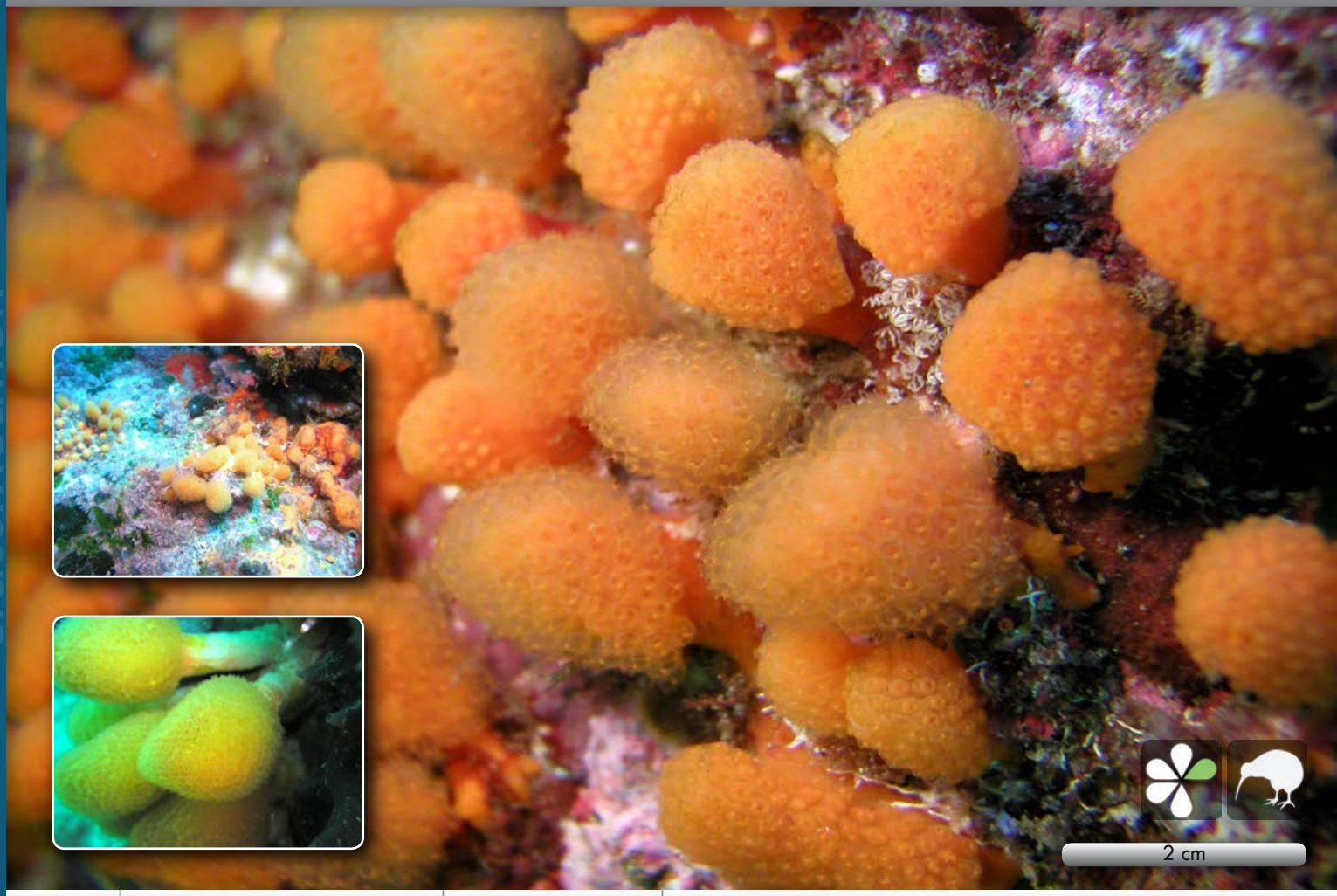

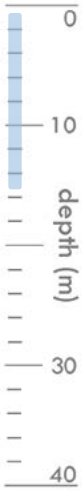

Stalked colonial ascidian with an ovoid to spherical head, test clear, no sand. Inhalant and exhalent siphons of individual zooids open directly on surface. Colour in life bright peach orange.

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 on the north eastern coast of the North Island. This species is also common around the Kermadec Islands.

It could also be .....
Aplidium benhami

Brewin, B.I. (1950) Ascidians of New Zealand. Part 5. Ascidians from the East Coast of Great Barrier Island. *Transactions of the Royal Society of New Zealand*, 78 (2–3): 354–362.

Pseudodistoma opacum (Brewin, 1950)

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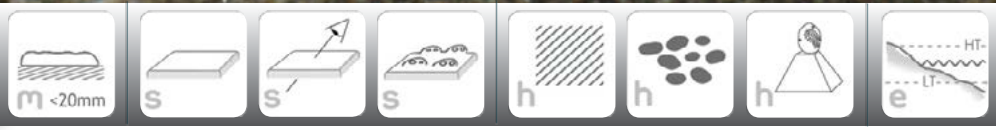
main and inset images: Brent Copp

10 cm



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 to dull peach.

Typically encrusts the undersides of intertidal boulders. Colonies can have epiphytic red algae growing on the surface.

It could also be .....
Pseudodistoma cereum

Brewin, B.I. (1950) Ascidians of New Zealand. Part 5. Ascidians from the East Coast of Great Barrier Island. *Transactions of the Royal Society of New Zealand*, 78 (2–3): 354–362.

Pycnoclavella kottae Millar, 1980

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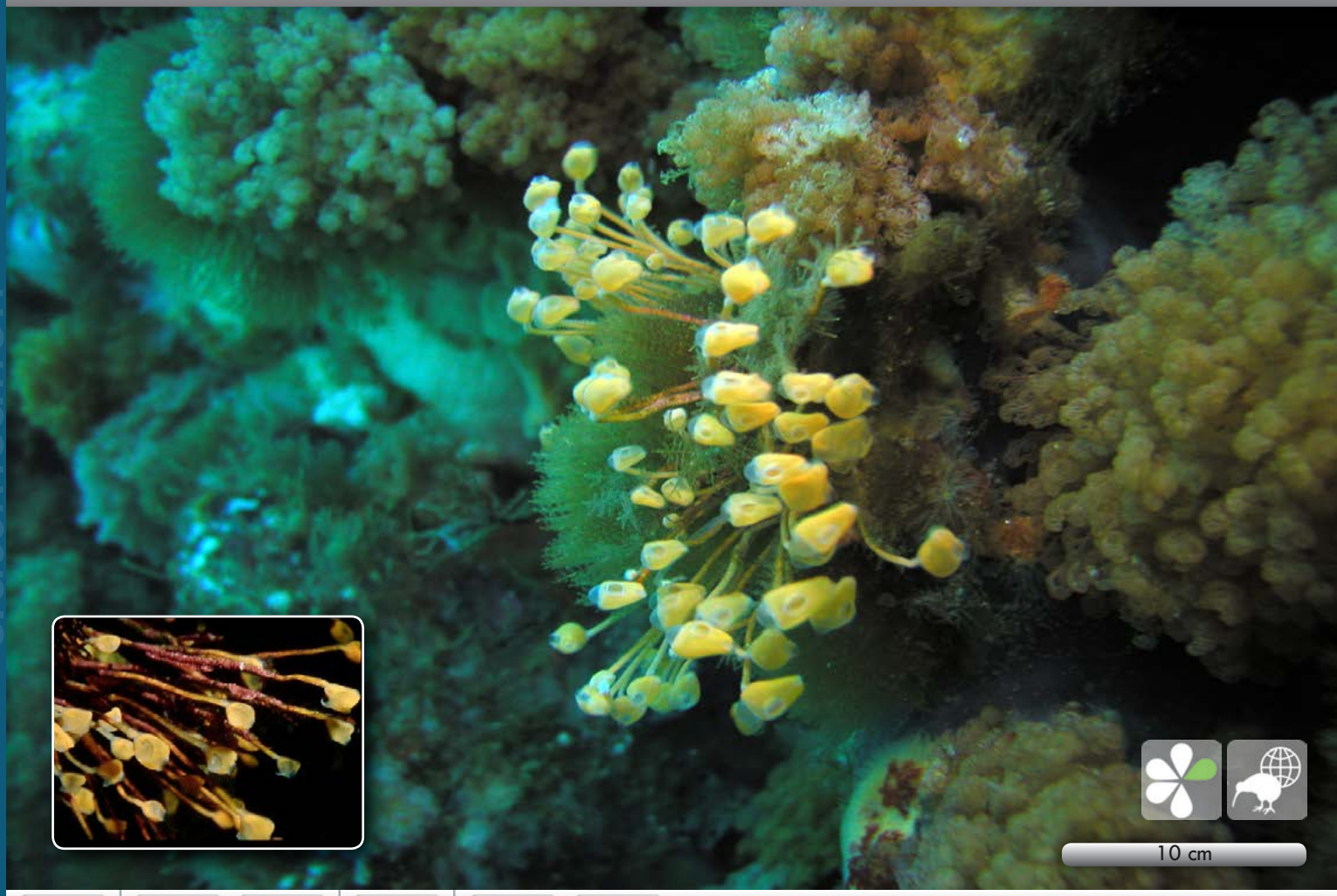

A distinctive colonial ascidian that has numerous pod-like heads arising from a narrow basal mat. Stalks are long and slender; heads have an oral (inhalant) opening halfway down and an atrial (exhalent) opening at the top of the colony head. Colour in life is gold and slightly translucent on the siphons.

Found occasionally on walls and the edge of overhangs in areas of high exposure, where it can be locally abundant. Restricted to North Cape and Three Kings Islands.

It could also be .....
Clavelina lepadiformis

South West Pacific Ocean

Millar, R.H. (1960) Ascidiacea. *Discovery Reports*, 30: 1–160.

Ascidiella aspersa (Müller, 1776)

Class Ascidiacea Order Phlebobranchia Family Ascidiidae

main image: Dennis Gordon
inset image: Arjan Gittenberger

2 cm

Sack-like ovoid body with an inhalant siphon at the top of the animal, and an exhalent 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.

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.

Kott, P. (1985) The Australian Ascidiacea 1. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23: 440.

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

Ciona intestinalis (Linnaeus, 1767)

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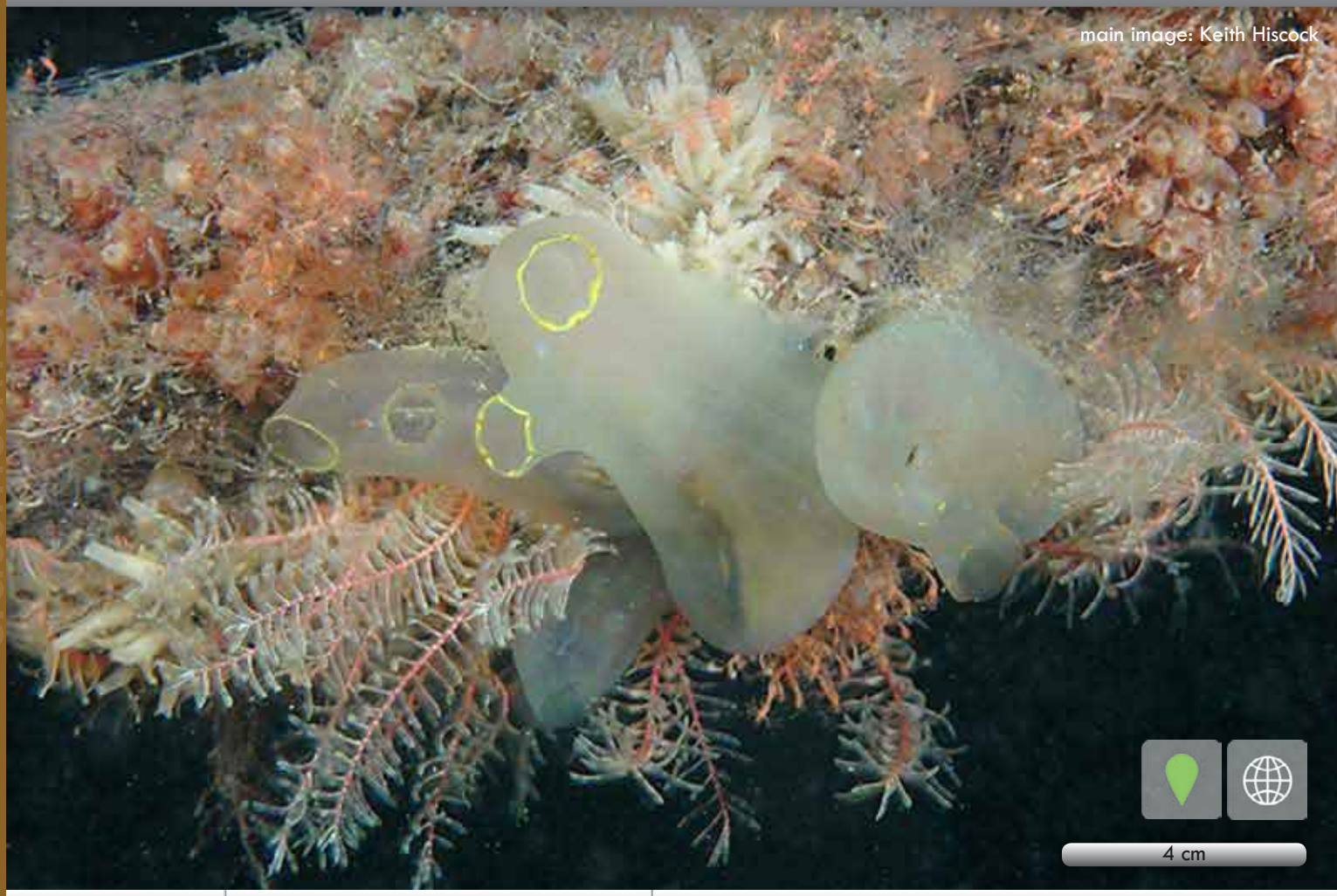

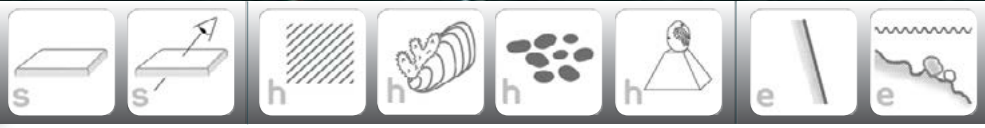

Two species of *Ciona* are known to co-occur in New Zealand ports and harbours. *Ciona intestinalis* has lemon yellow pigment spots on the siphon rim while *Ciona savigny* has orange pigment spots on the siphon rim.

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 around New Zealand.

It could also be .....
Ciona savigny

Cosmopolitan

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.

Ciona savigny Herdman, 1882

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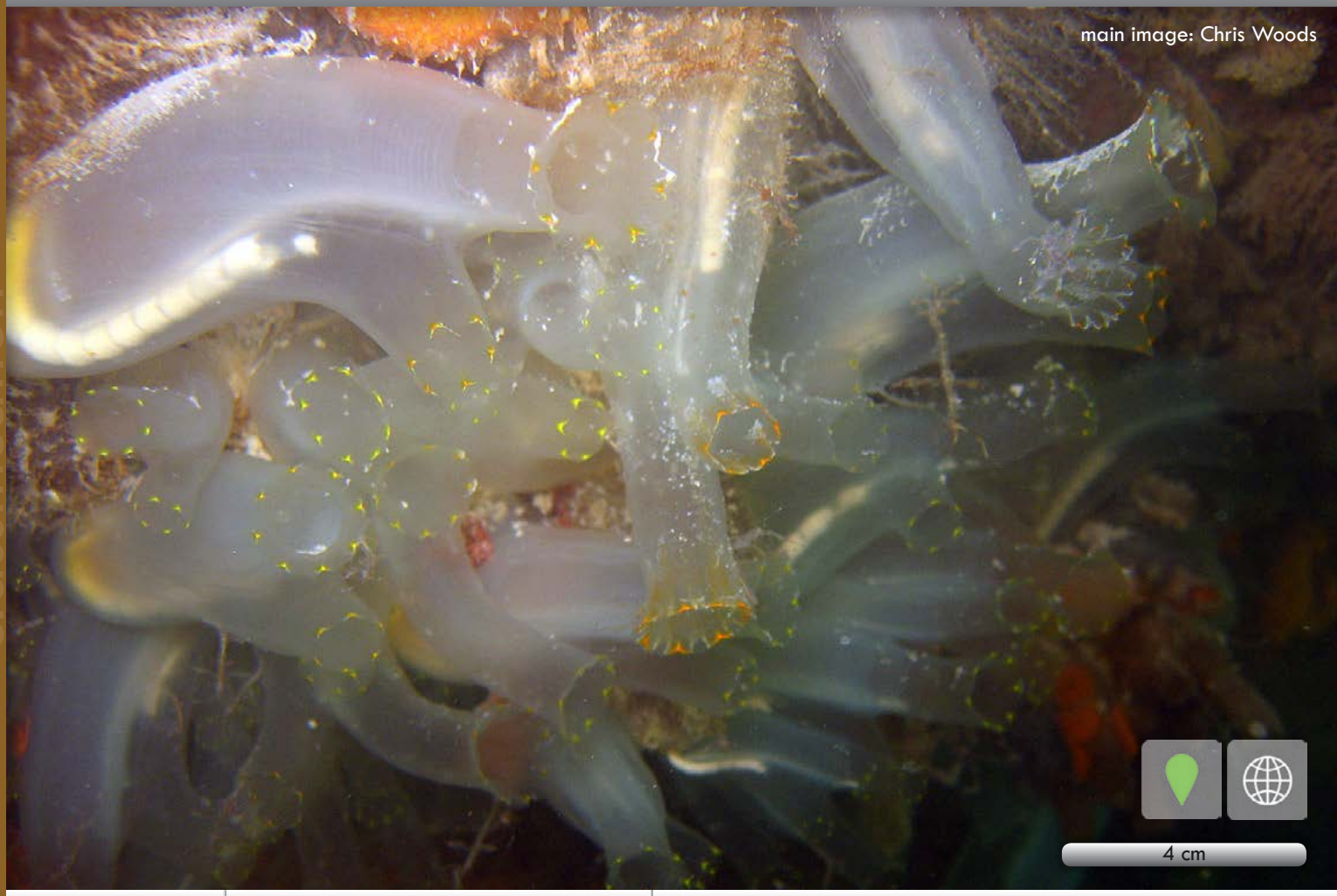

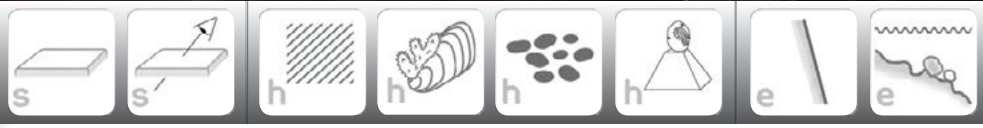

Two species of *Ciona* are known to co-occur in New Zealand ports and harbours. *Ciona intestinalis* has lemon yellow pigment spots on the siphon rim while *Ciona savigny* has orange pigment spots on the siphon rim.

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.

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.

Corella eumyota Traustedt, 1882

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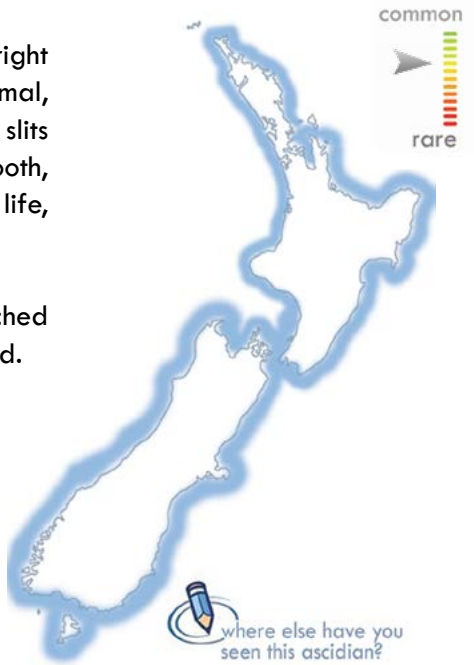
main image: Judith Oakley
inset image: Natural History Museum, UK

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 ⅓ 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.



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.

Botrylloides leachii (Savigny, 1816)

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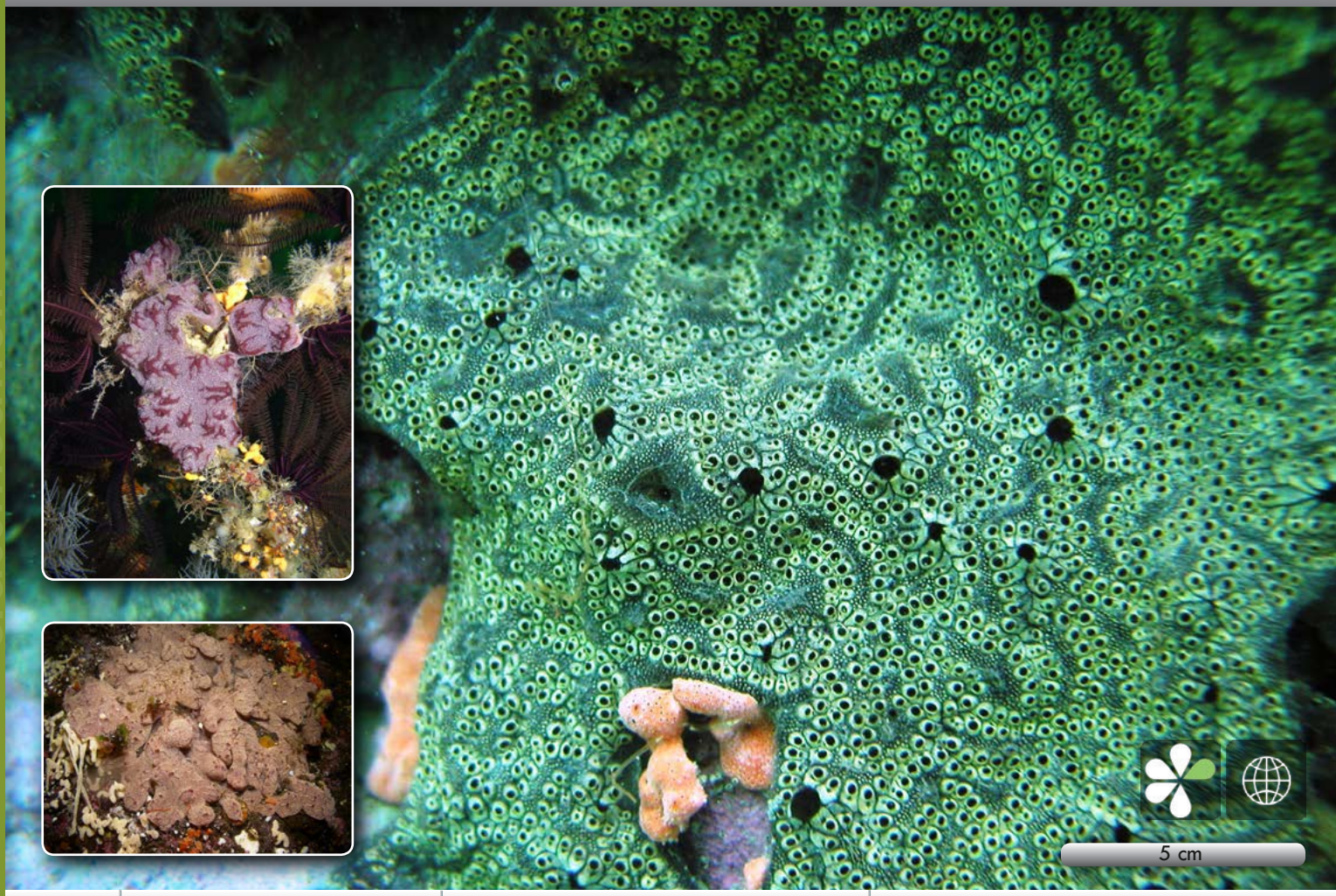
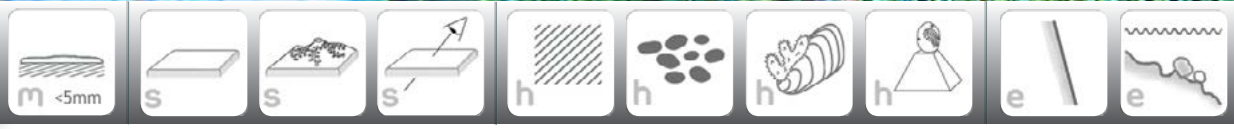
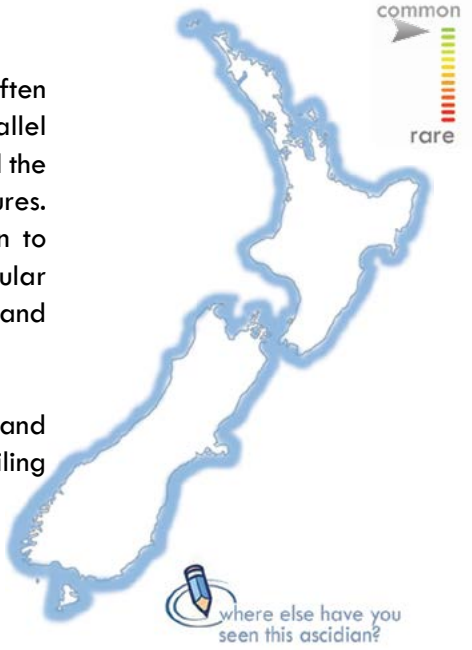




Colonies are encrusting, about 3-5 mm thick and up to 20 cm diameter, often overgrowing other species, giving colonies a lobate appearance. Parallel systems of zooids are usually obvious because of light pigmentation around the inhalant apertures. Systems connect to numerous common exhalent apertures. 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.



It could also be .....
Botryllus schlosseri

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.

Kott P. (1985) The Australian Ascidiacea 1. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23: 440.

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

Botryllus schlosseri (Pallas, 1766)

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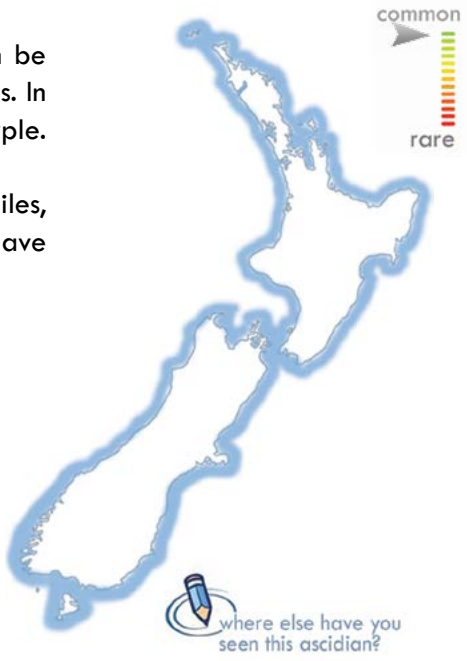
inset image: Chris Woods

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.



It could also be .....
Botrylloides leachii

Cosmopolitan

Kott P. (1985) The Australian Ascidiacea 1. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23: 440.

Botryllus stewartensis Brewin, 1958

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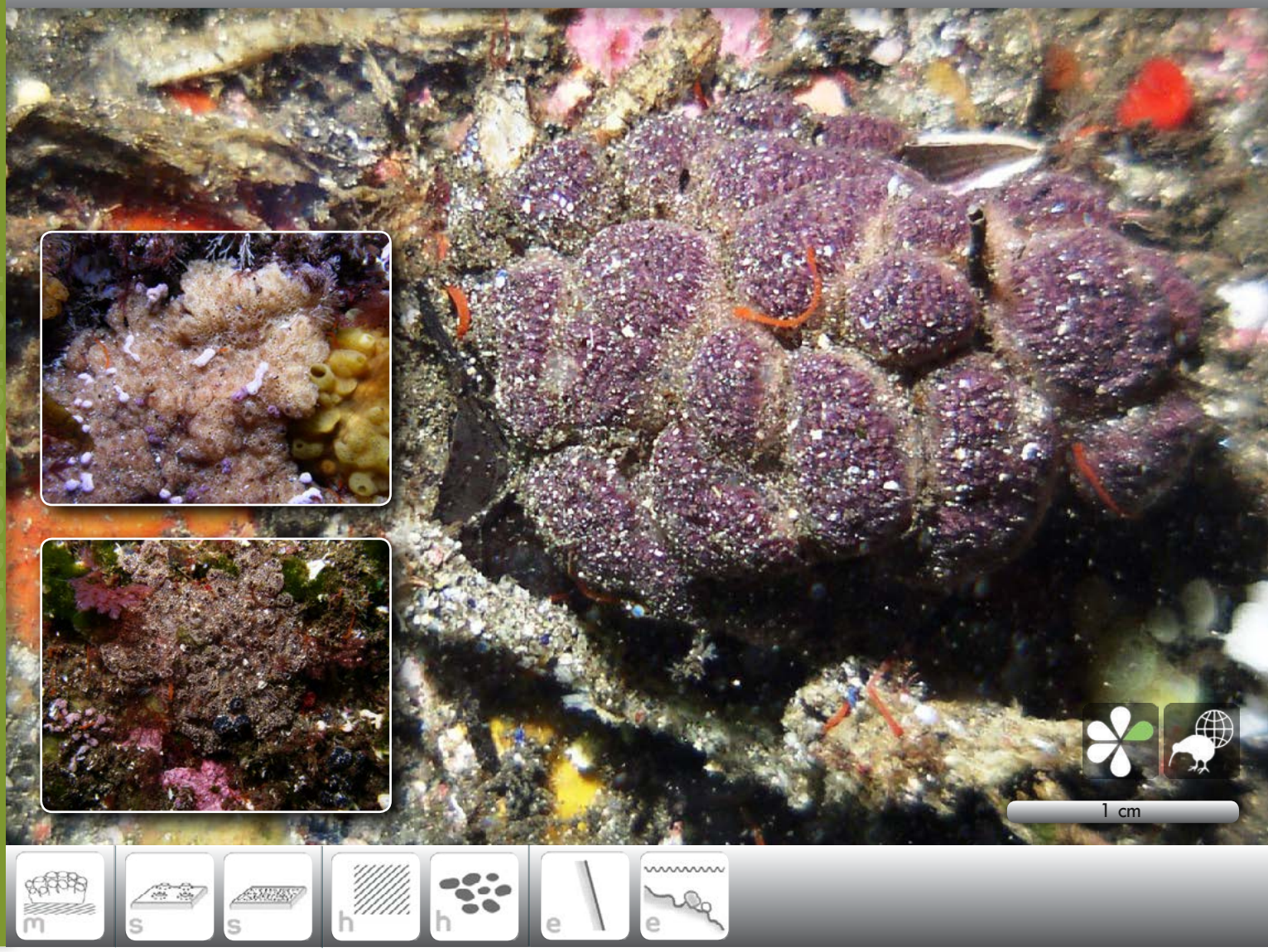

Colonies are low sandy lobes approximately 10 mm high, tightly packed on a basal mat. Each lobe has a central common exhalent aperture with a circle of zooids. Morphology and colour in life vary with sediment levels and exposure. Colour in life is sandy violet, or cream. The test is delicate and soft,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

Australia

It could also be .....
Botrylloides leachii

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

Kott P. (1985) The Australian Ascidiacea 1. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23: 440.

Botryllus tuberatus Ritter & Forsyth, 1917

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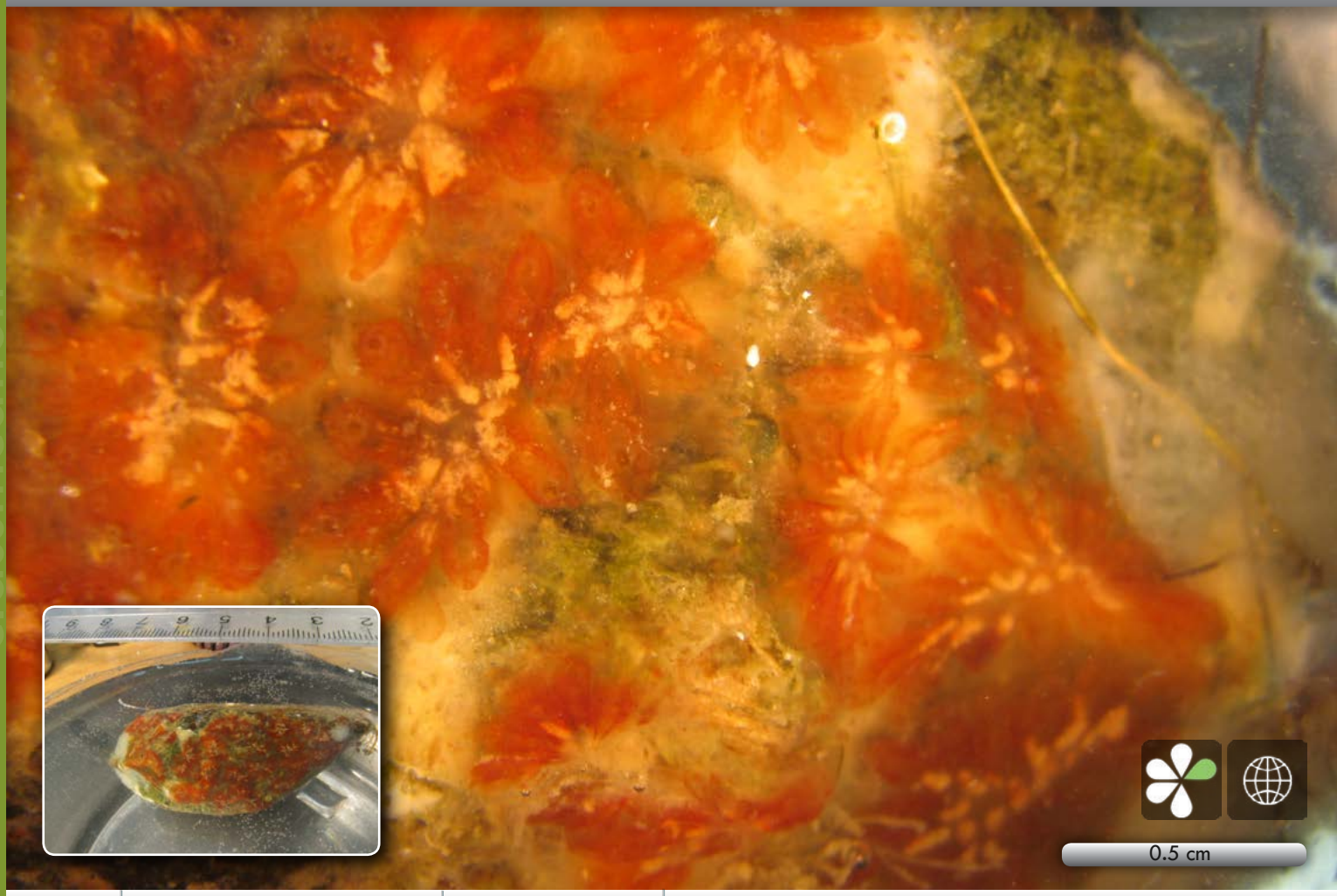

Colonies are small, delicate, very thin and transparent. Bright orange zooids are arranged in widely spaced circular systems, giving the colony a flower-shaped appearance. Colour in life brilliant orange and cream in a transparent test.

This species typically encrusts other organisms such as mussels and oysters in intertidal and shallow subtidal environments around Wellington south coast and Nelson harbour.

It could also be .....
Botryllus schlosseri

Circum equitorial

Kott P. (1985) The Australian Ascidiacea 1. Phlebobranchia and Stolidobranchia. *Memoirs of the Queensland Museum*, 23: 440.

Molgula manhattensis (De Kay, 1843)

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main image: Keith Hiscock
inset image: Misjel Declee

4 cm

m s s h h h h h e

0
10
depth (m)
30
40

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.

It could also be .....
Molgula mortenseni

Cosmopolitan

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

Molgula mortenseni (Michaelsen, 1922)

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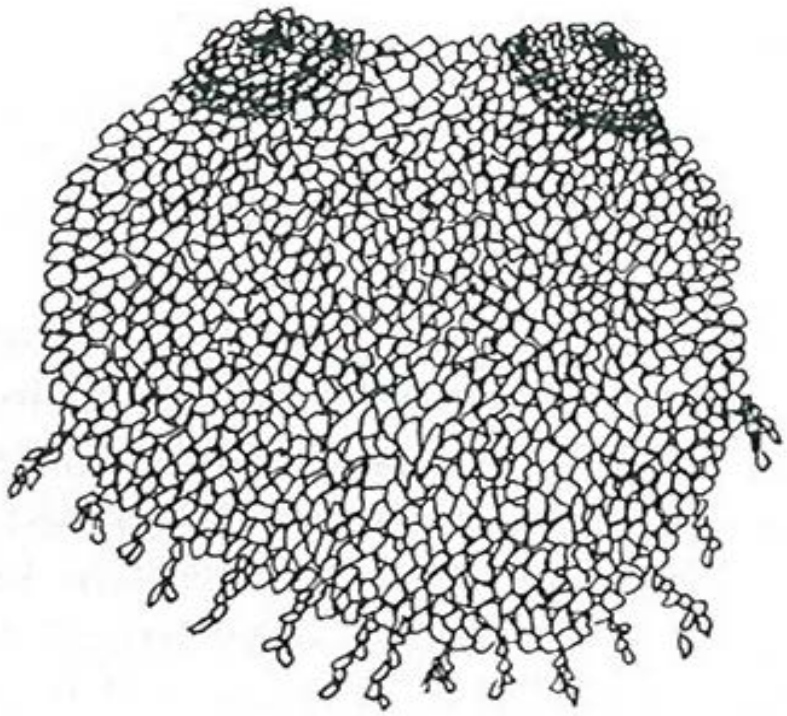
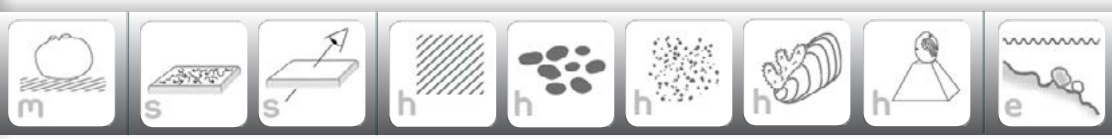
illustration sources from: Brewin (1951)



0.5 cm



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.

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.

Microcosmus squamiger Michaelsen, 1927

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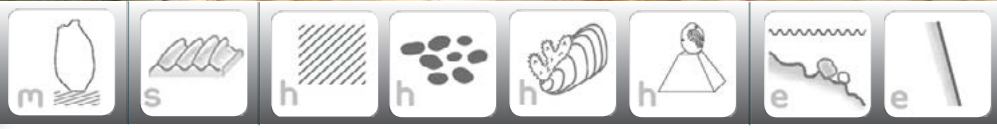
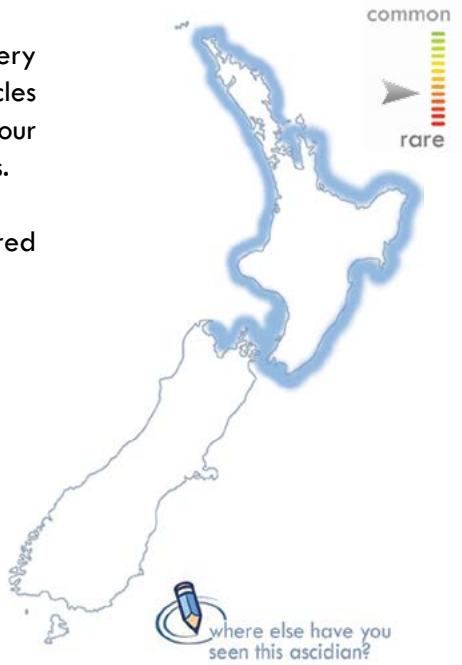
main image: Charles Griffiths



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.



It could also be .....
Pyura species complex
juvenile *Cnemidocarpa nisiotus*

Cosmopolitan

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

Pyura pachydermatina (Herdman, 1881)

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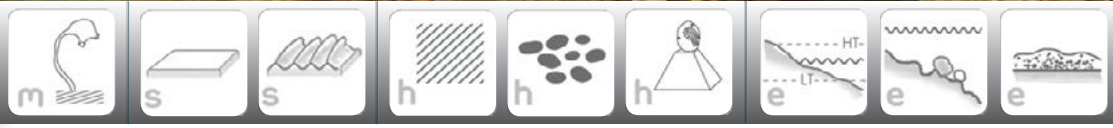
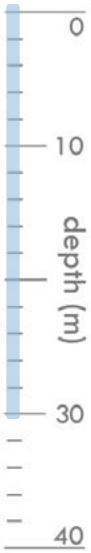
main image: Floor Anthoni





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 exhalent 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.

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.

Pyura doppelgangera Rius & Teske, 2013

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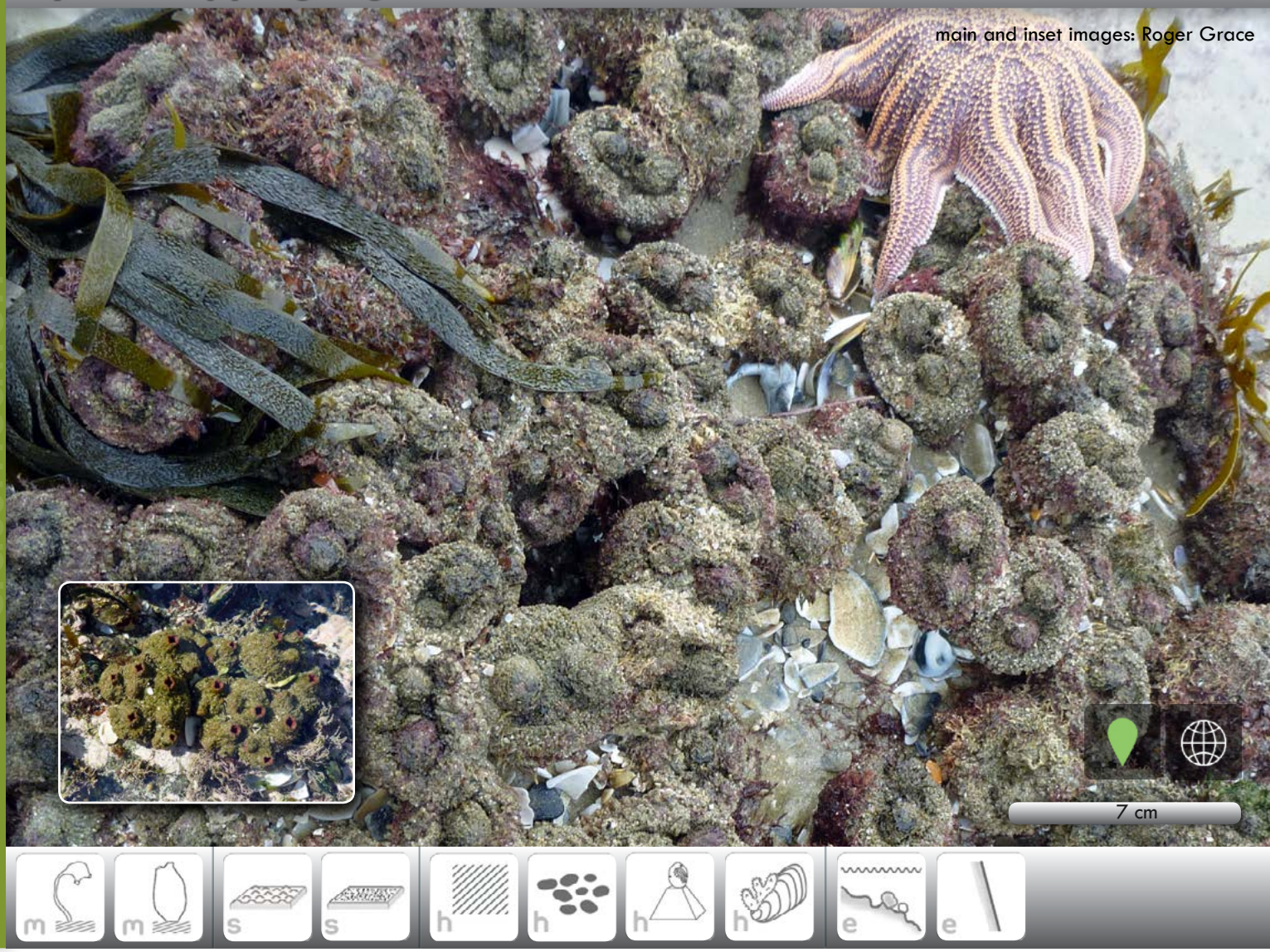
main and inset images: Roger Grace



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.

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.

Pyura species complex

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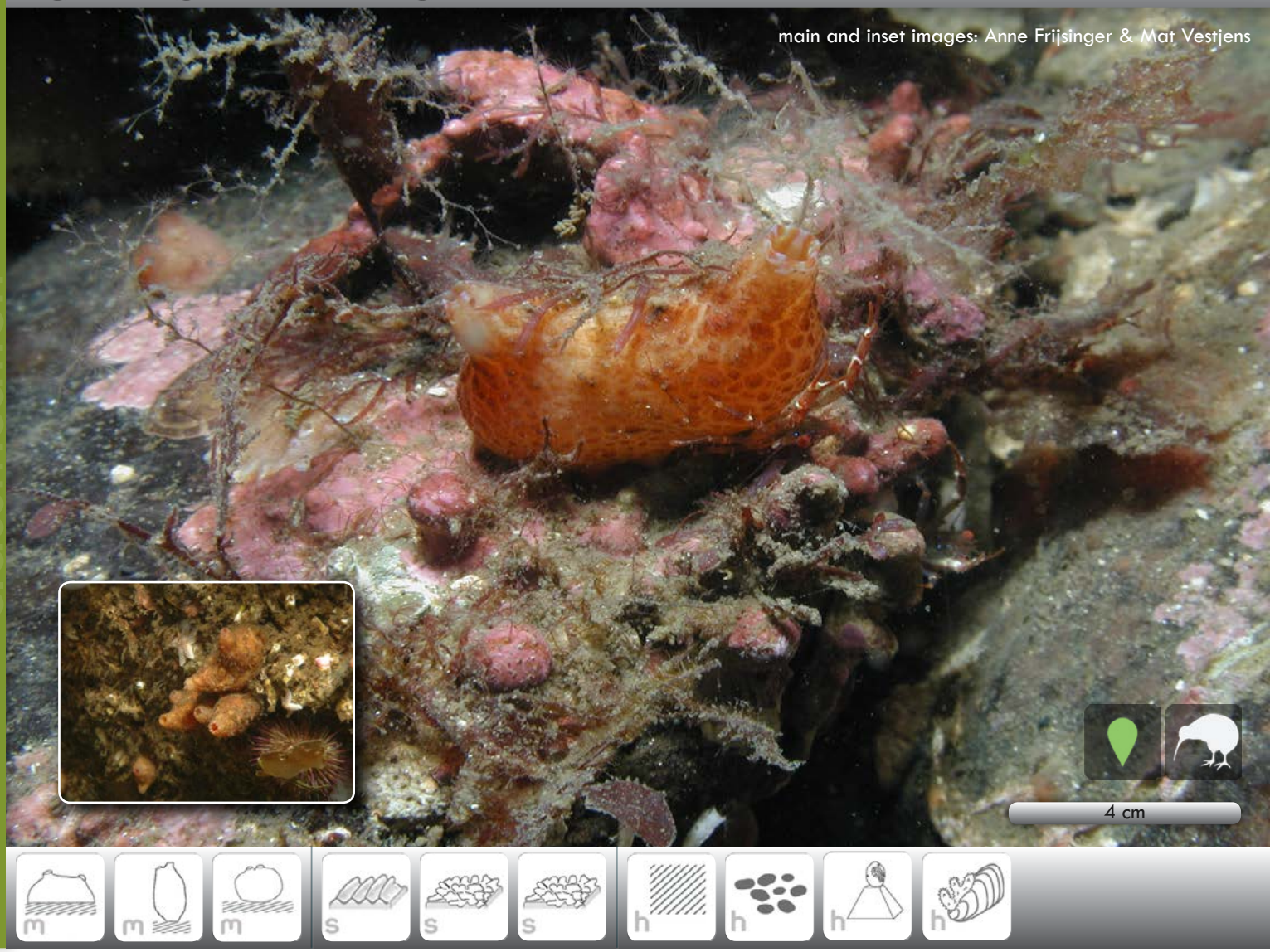

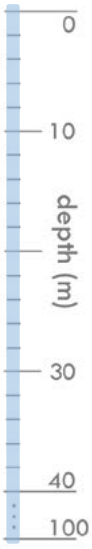

A 'species complex' is a group of closely related species that cannot be easily distinguished in the field due to their physical similarity. They often vary by only the smallest details. Species in the complex include *P. rugata* Brewin, 1948, *P. subuculata* (Sluiter, 1900) and *P. cancellata* Brewin,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

Asterocarpa humilis (Heller, 1878)

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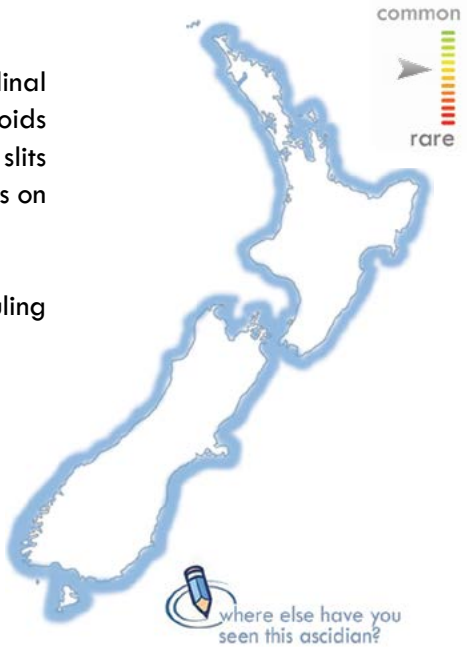
main image: Dirk Schories

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 occurs in the subtidal under boulders, on wharf piles and fouling bivalves around New Zealand.



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.

Kott P. (1992) The Australian ascidiacea 3. Aplousobranchia (2). *Memoirs of the Queensland Museum*, 32 (2): 375–620.

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

Cnemidocarpa bicornuta (Sluiter, 1900)

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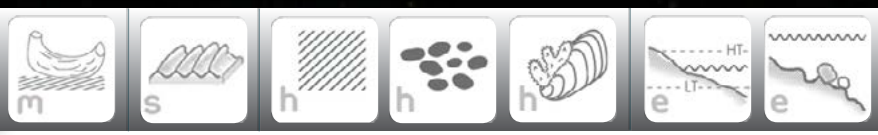
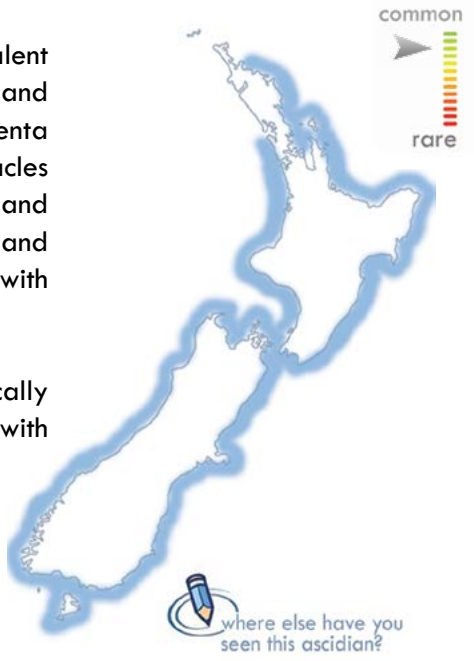


Banana-shaped with the inhalant siphon usually at the top, and the exhalent siphon nearer to the base. Siphons are separated by a distinctive saddle, and are covered in warty processes. Characterised by four bands of magenta pigment on the orange siphon lining. Gill slits are elongate, folded, tentacles 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 nisiotus*.



It could also be .....
Cnemidocarpa nisiotus

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.

Cnemidocarpa nisiotus (Sluiter, 1900)

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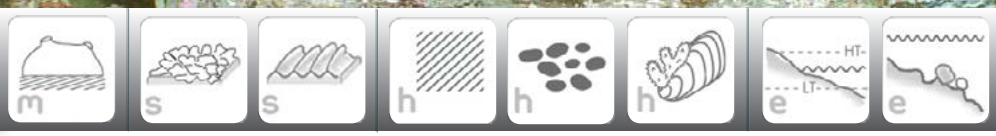
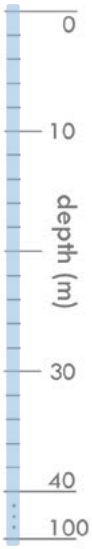
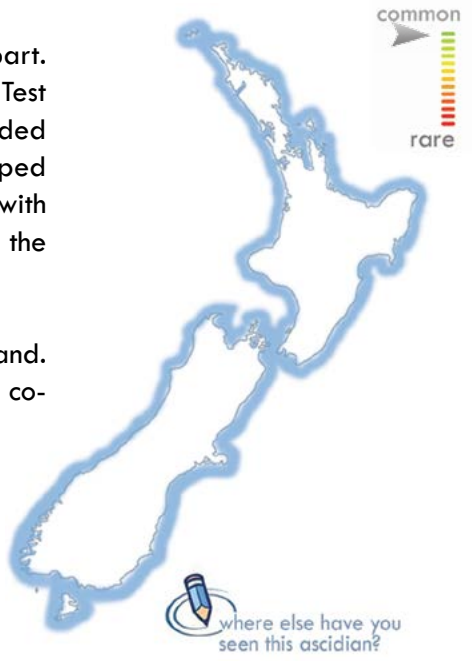
main image: Floor Anthoni





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*.



It could also be .....
Cnemidocarpa bicornuta

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.

Styela canopus (Savigny, 1816)

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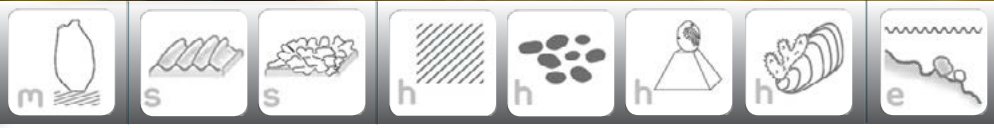
main and inset images: Rosana Rocha



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.

It could also be .....
Pyura species complex

Cosmopolitan

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

Styela clava Herdman, 1881

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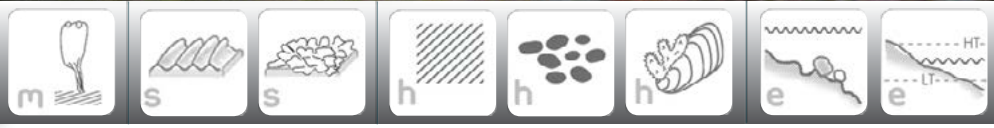

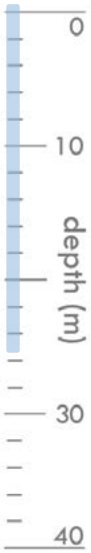

Individuals usually with a short stalk, generally no longer than the cylindrical body, anchored to substratum by root-like processes. Short siphons are close together at the top of the body. Test leathery and conical, with warty swellings at the top around the siphons. Posterior half of test creased 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 and marine farms, and the seabed. Can be locally abundant.

It could also be .....
Pyura pachydermatina

Cosmopolitan

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

Styela plicata (Lesueur, 1823)

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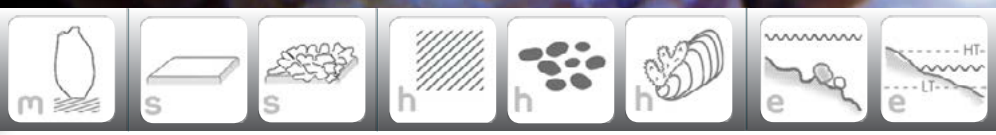
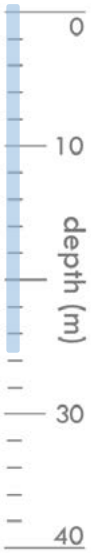
inset images: John Borom

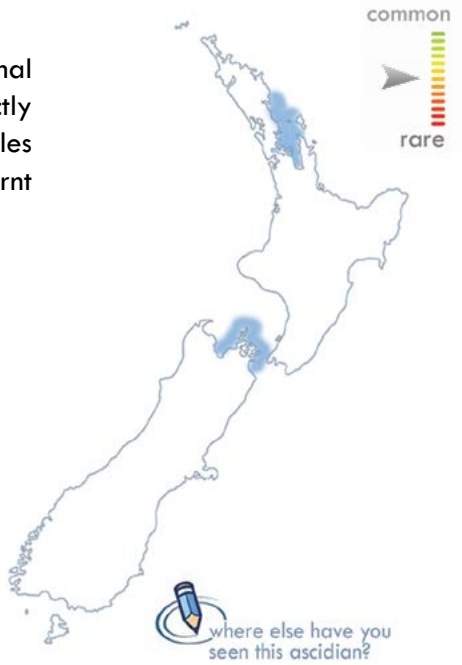
2 cm





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.



Cosmopolitan

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

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

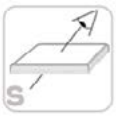
icons morphology

	ball	spherical, globular
	loaf	rounded elongate, hemispherical
	amorphous	without definable shape, often with lobed surface, potato or tuber-shaped, massive
	thick encrusting	spreading over substratum, more than 20 mm thick
	thin encrusting	spreading over substratum, less than 5 mm thick
	fingers	finger-like, often arising from an encrusting or restricted base, digitate
	meandering	wandering along and above substratum attached at intervals, repent
	stalked grouped	stalked with club-shaped bodies attached to a common basal mat
	stalked simple	single stalked bodies
	grapes	bunched vase-shaped individuals joined basally

	brain	hemispherical with brain-like corrugations
	sausage	long tubular sausage-shaped colonies
	lobed cluster	closely packed flat topped lobes joined by basal mat
	medusa	many single bodies on long stalks arising from a narrow basal mat
	solitary saddle	widely-spaced siphons with low saddle in between
	solitary stalked vase	elongated body with a short narrow stem, siphons closely spaced at anterior end
	solitary stalked	oval bulbous body with 2 siphons on a long narrow stem
	solitary mound	low, laterally elongate, oval shaped, with 2 siphons, separated by about ½ a body length
	solitary rounded	rounded body, siphons often close together at the anterior end
	solitary oblong	vertically elongated body with 2 siphons at the anterior end

icons surface

	smooth	even, hairless, silky, can be slightly undulating
	radial systems	zooid apertures line subdermal canals radiating and branching away from common cloacal apertures
	circular systems	zooid apertures form rings around common cloacal apertures
	spiny	prickly bundles of very long spicules projecting from the test of solitary ascidians
	rough	irregularly pitted and ridged surface, often tough, rugose
	sand in test	sandy sediment incorporated into test of colonial ascidians, feels granular
	deeply wrinkled	bearing irregularly parallel ribs and grooves along the body wall
	honeycomb	test surface with ridges in a honeycomb pattern

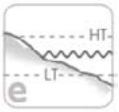
	warty	bearing small flattened bumps or tubercles, verrucose
	hairy	hairs projecting from the body of solitary ascidians, often holding sand grains, hirsute
	raised lobes	common cloacal apertures raised at the terminal end of lobes
	transparent	gelatinous and see-through, translucent
	wrinkled siphons	siphons raised above the body wall, wrinkled and often warty
	spicules	star-shaped carbonate granules visible in and on the test
	parallel systems	zooid oral apertures in parallel lines along subdermal canals
	no systems	zooids open separately forming paired openings on low humps in the test

icons habitat

	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	living or growing on the external surface of an animal
	artificial substratum	anything man-made such as mooring blocks, mussel lines, wharf piles

icons environment

	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
	wall	underwater cliffs and slopes, 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
	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
	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

icons life history

	solitary	one animal bound by a single test
	colonial	multiple animals bound by a single test

	native	species first described from and only found New Zealand waters, endemic
	introduced	species first described from outside of New Zealand waters and is found in New Zealand and other locations, invasive
	range extention	since first described in NZ, this species has been recorded elsewhere

glossary

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	front
apertures	openings of the body to the exterior for exchange of water, inhalant 'mouth' (branchial) aperture, exhalent (atrial) aperture
artificial substratum	anything man-made such as mooring blocks, mussel lines, wharf piles
ball	spherical, globular
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
brain	hemispherical with brain-like corrugations
cartilaginous	having the texture of cartilage, firm and tough yet flexible
circular systems	zooid apertures form rings around common cloacal apertures
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
deeply wrinkled	bearing irregularly parallel ribs and grooves along the body wall
environment	physical, chemical, ecological, behavioural, and other conditions experienced by an organism
epizoic	living or growing on the external surface of an animal
fingers	finger-like, often arising from an encrusting or restricted base, digitate
firm	requires some pressure to compress, firm
fleshy	feels like skin or edam cheese, dense, slightly stretchy, cellular material more abundant than fibrous material
gelatinous	jelly-like, slippery
gill sac	organ used for both the exchange of gasses (breathing) and collection of food
gonad	reproductive structure
granular	sand papery texture due to presence of calcareous spicules in the test
grapes	bunched vase-shaped individuals joined basally
habitat	environment and local situation an organism lives in
hairy	hairs projecting from the body of solitary ascidians, often holding sand grains, hirsute
honeycomb	test surface with ridges in a honeycomb pattern
indents	indentations in the substrate such as underwater caves, shelves and overhangs, organisms may experience wave surge, subdued illumination, or near darkness
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
loaf	rounded elongate, hemispherical
lobed cluster	closely packed flat-topped lobes joined by basal mat
meandering	wandering along and above substratum attached at intervals, repent
medusa	many single bodies on long stalks arising from a narrow basal mat
morphology	shape
mud	very fine muddy and silty sediments derived from terrigenous rocks, soils and clays
no systems	zooids open separately forming paired openings on low humps in the test
opaque	impenetrable by light
parallel systems	zooid oral apertures in parallel lines along subdermal canals
posterior	back
radial systems	zooid apertures line subdermal canals radiating and branching away from common cloacal apertures
raised lobes	common cloacal apertures raised at the terminal end of lobes
rock	hard substrate such as mudstone, sandstone, basalt, compressed carbonates
rough	irregularly pitted and ridged surface, often tough, rugose
rubble	shell, stone, and pebble rubble
sand in test	sandy sediment incorporated into test of colonial ascidians, feels granular
sand	small coarse grains of worn silica, rock, and shell
sausage	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
smooth	even, hairless, silky, can be slightly undulating
solitary mound	low, laterally elongate, oval shaped, with 2 siphons, separated by about ½ a body length
solitary oblong	vertically elongated body with 2 siphons at the anterior end
solitary rounded	rounded body, siphons often close together at the anterior end
solitary saddle	widely-spaced siphons with low saddle in between
solitary stalked vase	elongated body with a short narrow stem, siphons closely spaced at anterior end
solitary stalked	oval bulbous body with 2 siphons on a long narrow stem
spicules	star-shaped carbonate granules visible in and on the test

spiny prickly bundles of very long spicules projecting from the test of solitary ascidians

stalked grouped stalked with club-shaped heads attached to a common basal mat

stalked simple single stalked bodies

subdermal canal a canal that connects zooids together around a common cloacal aperture (exhalent)

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 a protein coating surrounding the body, it can be 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 the test, but not enough to perceive distinct details through it.

transparent test of both colonial and solitary ascidians can be gelatinous, apearing see-through, translucent

wall underwater cliffs and slopes, organisms exposed to wave surge and currents, and subdued illumination

warty bearing small flattened bumps or tubercles, verrucose

wrinkled siphons siphons raised above the body wall, wrinkled and often warty

zooids small individual seasquirts of the same species living communally in a common test, often forming systems to pump water, or opening individually to the exterior

acknowledgements

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 NIWA's Marine Biotechnology Programme collection voyages; many thanks to Vicky Webb for having the foresight to support our research in this area. This research was funded by NIWA under Coasts and Oceans Research Programme 2 Marine Biological Resources: Discovery and definition of the marine biota of New Zealand (2012/2013 SCI).

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