inspirational invertebrates

beloved barnacles

a guide to the barnacles of New Zealand

Version 1, 2022

John Buckeridge & Sadie Mills

with Michelle Kelly & Blayne Herr

NIWA

Taihoro Nukurangi

about this guide

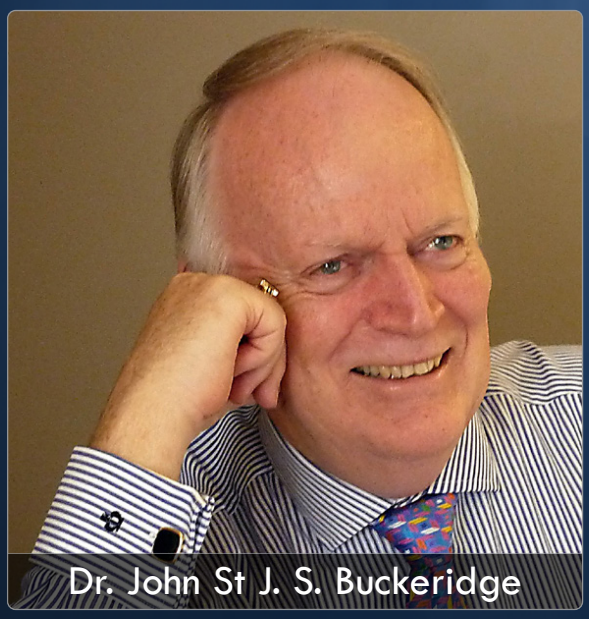
Barnacles (Cirripedia) are sessile crustaceans, found in most marine environments and even many brackish habitats, from rock crevices in the intertidal zone, on the bottom of boats, on fishing nets and down in to the deep sea. For the most part, they are an easily recognizable group and we hope you enjoy using this guide to explore them further and identify them in the field.

BELOVED BARNACLES is a fully illustrated working e-guide to the most commonly encountered species of Cirripedia, the gooseneck and acorn barnacles 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 e-guides on New Zealand Marine invertebrates and algae that NIWA's Coasts and Oceans group is presently developing.

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

Each barnacle species page illustrates and describes features that will 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 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.

The contributors to this guide are:


Dr. John St J. S. Buckeridge


Sadie Mills

For any ID advice on barnacles that you encounter, please email your questions and images to:
John john.buckeridge@rmit.edu.au or Sadie sadie.mills@niwa.co.nz

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Technical editor - Sadie Mills, NIWA

NIWA
Taihoro Nukurangi

a typical species page layout

taxonomic name of species

taxonomic authority
person(s) who first described this species

common name of species

species classification
see species index for arrangement

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 and other life characteristics

typical size bar
indicating typical size of the organism

quick id icons
highlighting morphology, surface, substrate and habitat

depth range
common depth range around New Zealand

scale of abundance
around New Zealand

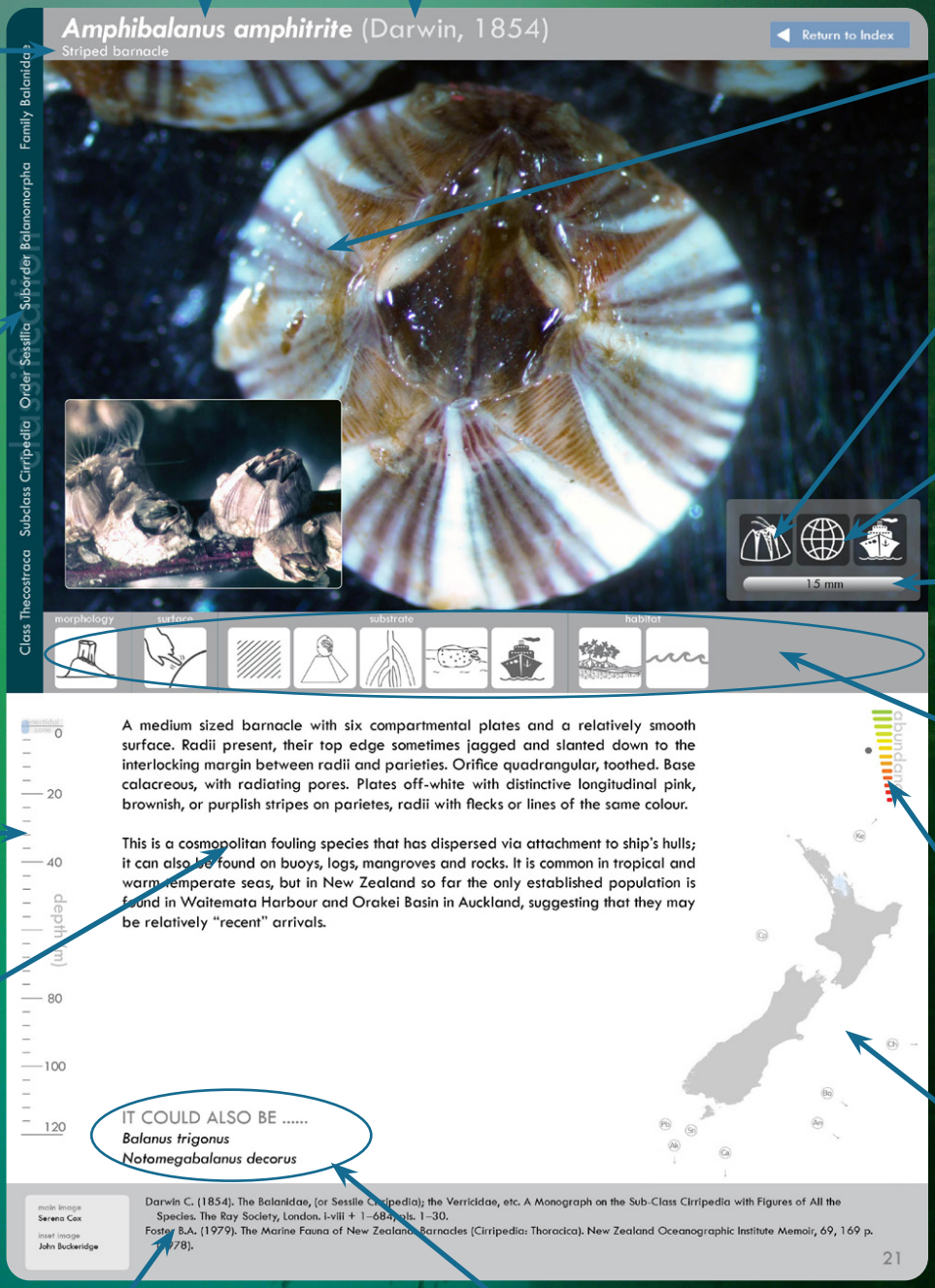
information
details on external and internal characters and habitat

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 more detailed information, so check the other species in the guide listed here to make sure that you have the correct species



BARNACLES

ACORN, GOOSENECK, AND PARASITIC BARNACLES

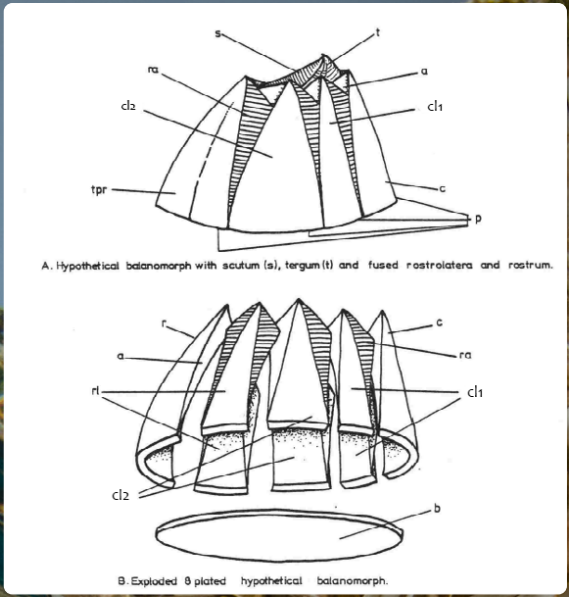
Barnacles are found from the splash zone to the abyssal depths of the ocean. They colonize any available hard surface – such as mollusc shells, rocks and wharf piles. In the open seas, they are found attached to floating objects such as logs, buoys, glass bottles and plastic. They are also found as parasites on fish, marine reptiles and whales. Globally, they are ubiquitous, occurring from tropical waters through to the poles. There are many beautiful species in New Zealand, especially in our temperate and sub-tropical waters.

Barnacles are classified in phylum Arthropoda – they are relations of crabs, lobsters and sea slaters, but are most closely related to small planktonic crustaceans called copepods. The easiest way to understand how a barnacle is organised is to think of a crustacean sitting upside down on its head, covered with a hard, outer shell, out from which its legs protrude when feeding.

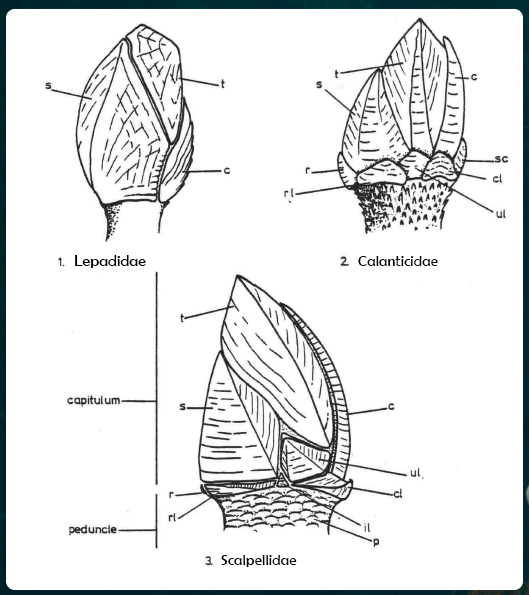
Chamaesipho brunnea, tiotio, werewere or brown surf barnacle, on the rocky shore at Flowerpot Harbour, Chatham Island. Scale = Coin is 23 mm diameter. Photo credit: John Buckeridge.

There are several major groups of barnacle: **acorn**, **stalked (gooseneck or pedunculate)**, and some **parasitic** ones that either live embedded in the skin of whales and fish, or latched on to the reproductive organs of other crustaceans.

Acorn barnacles are cemented or firmly attached directly to the rock surface with a tight arrangement of compartmental plates that form a very rigid outer case to protect the soft body parts from predation, and from crashing waves and rough sea in the splash zone.



Arrangement and naming of plates in a hypothetical 8-plated acorn barnacle (balanomorph): a=ala, b=basis, c=carina, cl1=first carinolatus, cl2=second carinolatus, p=paries (plural parietes), r=rostrum, ra=radius, rl=rostrolatus, tpr=tripartite rostrum (After Buckeridge, 1979, p.10).



Arrangement and naming of plates in some stalked barnacles, with examples in three families: c=carina, cl=carinolatus, il=inframedian latus, p=peduncular scales, r=rostrum, rl=rostrolatus, s=scutum, sc=subcarinal, t=tergum, ul=upper latus (After Buckeridge, 1979, p 5.)

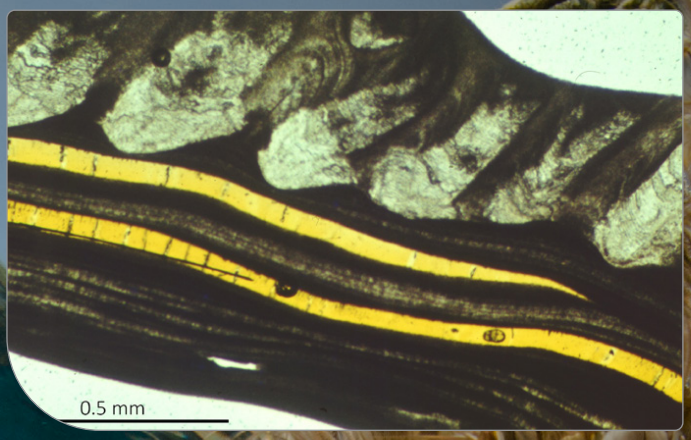
Gooseneck, or stalked barnacles have a stalk (peduncle). The peduncle, which in hermaphrodites and females contains the ovaries, lifts the capitulum above the substrate and permits some alignment of the barnacle for feeding. Calcareous plates are embedded in the thick skin of the capitulum, and in some species, calcareous scales protect the peduncle. Although most adult barnacles appear very much fixed in place, some have been shown to migrate slowly, e.g. those growing on the back of marine turtles.

Barnacles are identified by the arrangement of their hard, calcareous plates that make up their shell wall or capitulum. However, some barnacles, especially planktonic and parasitic species, may lack any plates at all. The two figures on this page show the specific names given to most of these plates.

Some species of barnacle have interlaminate chitin (yellow bands in fig below), which is a chitinous layer (lamellae or stringers) embedded within their calcareous compartmental plates. These are thought to help retain the strength and integrity of the shell following events that might attack the shell, for example with relatively quick pH changes in shallow water that can occur between tides.

Most of the time when you see barnacles at the beach you will only ever see the outer shell, but divers, rock-poolers, and beach goers encountering recently washed up gooseneck barnacles might see the cirri (their jointed "legs") extending out from their shell or capitulum.

Barnacles are well represented in the fossil record as their plates can persist for a very long time. Some areas of deep seafloor are carpeted in long-dead barnacle plates from fossil species.



Interlaminate chitin (the yellow bands) in acorn barnacle species *Epopella plicata*. This image shows a horizontal thin section through, and about half way up, a compartmental plate. Image credit: John Buckeridge.

Fossil barnacles. Thousands of barnacle plates on the deep seafloor of Zombie Seamount on the Chatham Rise, 896–1103 m. Photo credit: DTIS Camera, TAN1503 Graveyard Seamounts.

Geologists have aged plates like these at about 200 million years old. Barnacle paleontology and geochemical analyses of their plates can be very powerful tools to help us understand what ocean conditions might have been in the distant past (e.g., determining ocean temperatures and depths at the time when these species were alive).

Castlepoint in the Wairarapa is one of New Zealand's most impressive sites for finding barnacle fossils on land. The rocks of the reef at Castlepoint are about 2.4 million years old and primarily comprise a barnacle limestone that formed off the shelf. Curiously, both shallow and deep-water species are mixed in the limestone. This oddity was explained following the recognition of fossilized deep-sea canyons, which transported the shallow water species to deeper water via submarine flows. The Pliocene limestones of the East Coast of the North Island are the most extensive accumulations of fossil crustaceans known anywhere in the world.

Fossil acorn barnacles embedded in the barnacle limestone rocks near the Lighthouse at Castlepoint, Wairarapa. Scale = Coin is 23 mm diameter. Credit: John Buckeridge.

Barnacles are infamous for having one of the largest penis sizes in relation to the size of their body. They can reach across the rock with this to fertilize their neighbour's eggs. Most species are hermaphrodites with both male and female parts. Larger pedunculate barnacles are generally hermaphrodites, but may also have dwarf males attached, facilitating fertilization.

The eggs of the barnacles are fertilized inside the cavity of the shell and are released as nauplii (crustacean larvae), which grow and change across several planktonic stages until they eventually metamorphosise into the adults we see at the beach. The free-swimming larval stages enable the barnacle to find a safe place to settle that they are best adapted to and which suits their lifestyle. However, this also makes barnacles a problem for biosecurity as they can attach to ships, free-floating rubbish, seaweed and logs, or end up in ship ballast water, and get transported long distances to the shores of other countries.

Barnacle nauplii – a one-eyed larval stage of Antarctic species *Bathylasma coralliforme*, taken at 40 x zoom on a microscope. Credit: Mary Sewell, University of Auckland.

Barnacles are usually filter feeders extending their six pairs of jointed cirri into the current, and catching microscopic plankton and detritus including smaller crustacea, polychaetes, mites, algae and diatoms.

A gooseneck barnacle, *Lepas anatifera*, with cirri extended to catch planktonic food. Credit Crispin Middleton, NIWA

Two species of snails, the oyster borer *Haustrum scobina* and rock snail *Dicathais orbita* have been noted to feed on intertidal barnacles by dissolving and boring into the plates or forcing apart the plates to get to the juicy parts inside.

A species of gooseneck barnacle, *Pollicipes pollicipes*, commercially harvested on the East Atlantic Coast is a delicacy eaten by people in Spain and Portugal. It is not known if anyone eats barnacles in New Zealand today and they are not commercially harvested, but the acorn barnacle *Epopella plicata* was found in Maori middens around the Aotea Harbour in south Auckland and might have been eaten by people.

A distinctive circle bore hole in the wall plate of an *Epopella plicata* barnacle where a snail has dug in for a feast. Credit: John Buckeridge.

In this guide we also present various icons to describe the animal, but two in particular need some explanation.

Body plan

These are very generalized, with the acorn barnacle (balanomorph plan), showing up to eight plates. However, the shallow water acorn barnacles you are likely to encounter have a shell wall that is totally fused (*Chamaesipho*), and initially comprised of six compartmental plates. Eight plated forms are known from New Zealand waters, but these are restricted to deeper water. The gooseneck or pedunculate barnacles are of two basic forms, the first is a scalpellomorph, typified by *Lepas*, with a capitulum made up of five plates and a stalk (or peduncle), often longer than the capitulum, and lacking calcareous peduncular scales. The second type, a calanticomorph, can have many more plates in the capitulum and may also have mineralized scales on the peduncle.

The orientation of the parts of acorn barnacles in particular, is unusual, as the “anterior”, (normally denoted by the position of the head), is at the bottom of the animal, often represented by a calcareous base. The “opening top” of the barnacle is called an operculum, and is made up of paired scuta and terga. (It is these four plates, with a carina, that comprise the capitulum of lepadomorph barnacles). Because of this, when we talk of the parts of a barnacle, the terms, basal and apical are often used (meaning the bottom or top respectively), and carinal or rostral, (for the front or back respectively).

Morphology

If an icon is included here, it gives a very general indication of the habit of the barnacle – its growth pattern, or appearance.

We have named the guide *Beloved Barnacles* in honour of Charles Darwin’s work on the group, published in the 1850s. Darwin described some of our local species of barnacle based on specimens he collected from the Bay of Islands during the voyage of HMS Beagle. The group was important in his unravelling the “origin of species” but it was not easy, the intricacies of barnacle taxonomy caused some frustration to him... in distress he once wrote: I hate a barnacle as no man ever did before (1846).

Nonetheless, we do hope you will love learning more about barnacles!

species index

Conchoderma virgatum Spengler, 1789

gooseneck barnacle

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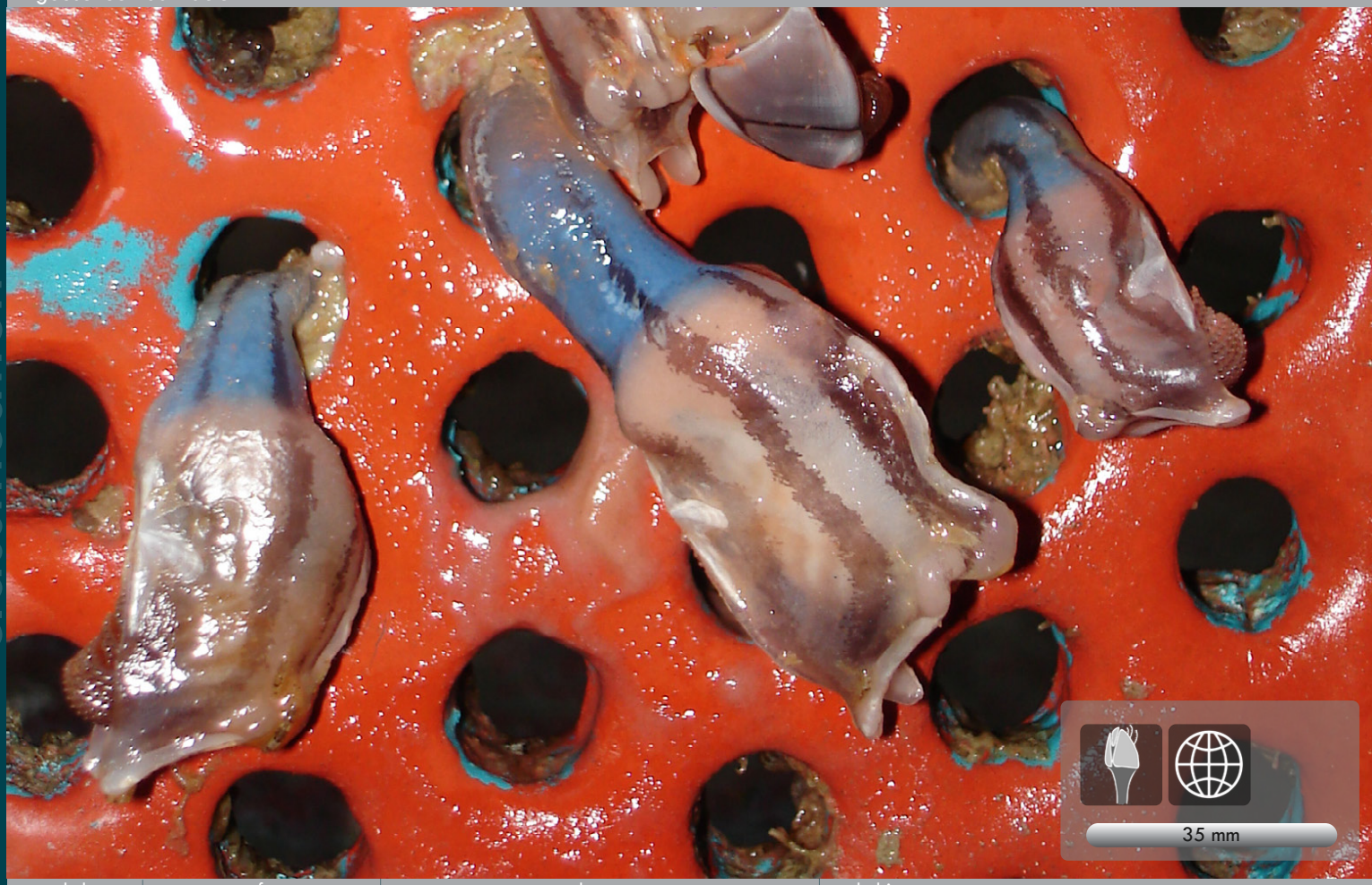
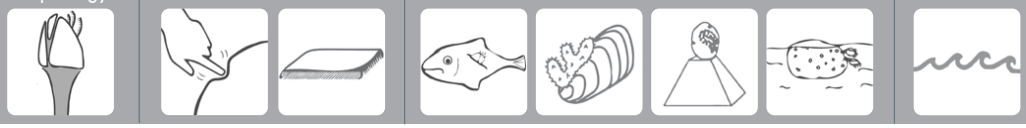
Class Thecostraca Subclass Cirripedia Order Scalpellomorpha Family Lepadidae

classification



morphology | surface | substrate | habitat



Large gooseneck (or pedunculate) barnacle, body quadrangular and not distinctly separate from stalk. Body with five reduced plates, widely separated, and embedded in thick skin. Scutum thin, with three lobes. Tergum lies along upper edge of body, variable in shape. Carina is bowed and variable in length. Umbo is just sub-central where the three lobes of the scutum meet. Peduncle flattened and smooth. Body and stalk are grey with long dark brown or purple longitudinal stripes. Stalk sometimes purple or light blue.

Hermaphrodite. Lives attached to floating objects such as buoys, ship hulls, and other animals such as sharks, turtles and fish. It is occasionally seen washed up on beaches or at marinas on flotsam. This species has been found right around New Zealand and is known globally in tropical and subtropical seas, but rare in far northern or far southern waters and not found in the Arctic or Antarctic.

main image
Chris Woods

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).

Darwin, C.R. (1851) *A monograph on the sub-class Cirripedia. The Lepadidae or pedunculated cirripedes.* Ray Society, London, 146–151.

Dosima fascicularis (Ellis & Solander, 1786)

buoy barnacle

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Class Thecostraca Subclass Cirripedia Order Scalpellomorpha Family Lepadidae

20–40 mm

morphology | surface | substrate | habitat




Small gooseneck (or pedunculate) barnacle, capitulum with five plates, paired scuta (largest) paired terga and a carina. A key feature of this barnacle is the outward flared skirt at the base of the scuta. This specialised barnacle builds its own float, which is a foamy looking structure attached to its short peduncle that lacks any calcareous scales. Body, shell and stalk are light blue, float white to cream.

Lives in the open ocean at the sea surface. The float (seen clearly in the inset image) attaches to other floating items such as plastic or tar pellets or sometimes other animals. This species washes up on west coast beaches in New Zealand often in association with other surface dwelling species. One of the other blue floating species commonly washed up with them is the by-the-wind sailor (*Velella vellella*), and this is pictured in the main image attached to the barnacle float. This species is found globally in tropical and temperate waters.

main image
Karen Pratt

inset image
Sofia Anderson &
Kara Gross

Junoy, J., Junoy, J. (2014) First record of the buoy barnacle *Dosima fascicularis* (Ellis & Solander, 1786) (Crustacea, Cirripedia) from the Galician beaches (NW Spain) after the Prestige oil spill. *Check List 10* (3): 669–671. http://doi.org/10.15560/10.3.669

Lepas anatifera Linnaeus, 1758

pelagic or smooth gooseneck barnacle

Return to Index

Class Thecostraca Subclass Cirripedia Order Scalpellomorpha Family Lepadidae

morphology

surface

substrate

habitat

Large gooseneck (or pedunculate) barnacle with five smooth plates (paired scuta and terga, plus a carina), the largest plate (the scutum) has fine, concentric growth lines radiating from the bottom corner, or umbo. The right scutum has one internal tooth at its base, although this is not present in all individuals and not easy to see on animals at the beach. Plates white, approximate, bordered with yellow-orange integument, peduncle black to straw coloured. Cirri (visible in inset image) brown.

An open-ocean, pelagic species that colonizes almost any floating object such as logs, buoys, plastic rubbish, macroalgae, boats and turtles. There can be thousands of individuals attached to an object. It is most commonly found in tropical and subtropical waters, and is commonly washed up on West coast North Island beaches after storms.

It could also be .....

Lepas testudinata

main image
Crispin Middleton

inset image
Karen Pratt

Hinojosa, I.A., Boltana, S., Lancellotti, D., Macaya, E., Ugalde, P., Valdivia, N., Vásquez, N., Newman, W.A., Thiel, M. (2006) Geographic distribution and description of four pelagic barnacles along the south east Pacific coast of Chile - A zoogeographical approximation. *Revista chilena de historia natural*. http://doi.org/10.4067/S0716-078X2006000100002

Lepas pectinata Spengler, 1793

small gooseneck barnacle | werewere

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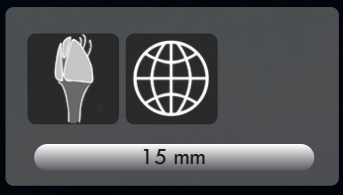
Class Thecostraca Subclass Cirripedia Order Scalpellomorpha Family Lepadidae

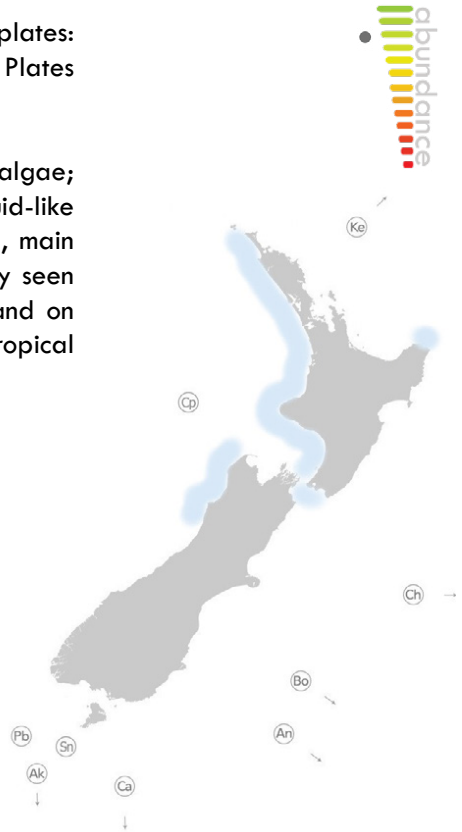
classification



morphology | surface | substrate | habitat

Small gooseneck (or pedunculate) barnacle, with the capitulum made up of five plates: paired scuta and terga, plus a carina. Peduncle short, lacking calcareous scales. Plates with coarse ridges, often with tiny spines so may feel rough to the touch.

An open ocean, pelagic species that grows attached to floating objects such as algae; often attached to internal shells of *Spirula spirula* (*Spirula* is a common squid-like cephalopod; its internal shell floats to the surface after death of the animal, main image). *Lepas pectinata* also colonizes driftwood and plastic. It is occasionally seen washed up in New Zealand mainly on west coast beaches of the North Island on flotsam, but is rare in temperate seas and more common in tropical and subtropical waters.



It could also be .....

Lepas denticulata, but *L. pectinata* has less well-defined ridges

main image
Crispin Middleton

inset image
Karen Pratt

Hinojosa, I.A., Boltana, S., Lancellotti, D., Macaya, E., Ugalde, P., Valdivia, N., Vásquez, N., Newman, W.A., Thiel, M. (2006) Geographic distribution and description of four pelagic barnacles along the south east Pacific coast of Chile - A zoogeographical approximation. *Revista chilena de historia natural*. http://doi.org/10.4067/S0716-078X2006000100002

Lepas testudinata Aurivillius, 1892

large gooseneck barnacle | werewere

Return to Index

Class Thecostraca Subclass Cirripedia Order Scalpellomorpha Family Lepadidae

morphology | surface | substrate | habitat

Large gooseneck (or pedunculate) barnacle with five smooth plates (paired scuta and terga, plus a carina), separated by conspicuous areas of skin (in *Lepas anatifera* the plates are closer set). Scuta without internal umbonal teeth, not easy to see on animals at the beach but this also distinguishes it from *Lepas anatifera*. Peduncle surface smooth or with small chitinous spines. Shell plates white, bordered with dark brown integument, peduncle dark brown.

An open ocean, pelagic species generally attached to floating objects such as boats, buoys and macroalgae. Found in the southern hemisphere in temperate seas. In New Zealand it is generally found in the North Island.

It could also be .....

Lepas anatifera

images
Chris Woods

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).
Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Calantica spinilatera Foster, 1979

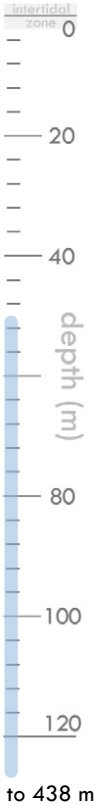
Return to Index

Class Thecostraca Subclass Cirripedia Order Calanticomorpha Family Calanticidae

morphology | surface | substrate | habitat

Large gooseneck (or penduculate) barnacle with six large primary plates (paired scuta and terga, plus a rostrum and carina). Plates relatively smooth, embedded in very minutely hairy tough skin. Smaller individuals have fewer plates than larger individuals, but once the capitulum reaches about 5 mm they will have a full set of the 6 primary plates and 10 secondary. The lower (secondary) plates are small, triangular and widely spaced in older specimens, protruding spine-like or even curved downwards (as seen in the image). The plates are white, but they and the peduncle, being covered with tough skin (integument) appear yellow-brown.

Sometimes hooked by fishers in clumps, this barnacle occurs in deeper water on the continental shelf. It is found around New Zealand from Foveaux Strait to the Far North. It is known as fossil from the late Pliocene (2 million years ago) of the North Island, and possibly from the Miocene of Victoria, although it is not known in present-day Australian waters.



It could also be .....

Calantica spinosa (intertidal, thick black spiny peduncle)

main image
Peter Marriott

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).
Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Calantica spinosa (Quoy & Gaimard, 1834)

spiny stalked barnacle, werewere tūkaha

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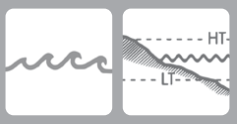
Class Thecostraca Subclass Cirripedia Order Calanticomorpha Family Calanticidae

50 mm

morphology | surface | substrate | habitat



Large, but short gooseneck (or pedunculate) barnacle with six large primary plates (paired scuta and terga, plus a rostrum and carina), a subcarina, an upper latus, a subrostrum and up to 50 small, short, spiny or triangular plates (latera) embedded in smooth tough skin on its capitulum. Minute spines embedded in the tough skinned short stalk (peduncle). Plates dirty white and eroded in older individuals, peduncle black. Cirri reddish brown (see inset image). Like most barnacles, this species is a hermaphrodite, but it may also possess tiny males attached to the capitulum. It lives wedged tightly in rock crevices in the lower end of the intertidal zone, usually in a cluster with other individuals on exposed rocky shores. This barnacle has a long history in New Zealand since it was the first endemic barnacle species to be described from here following the scientific expedition of the French exploration ship *Astrolabe* to New Zealand shores in 1827. Found throughout New Zealand from the Three Kings Islands to the Snares, although it is not known in the Chatham Islands or the Subantarctic Islands.

Changes in taxonomy arise following a greater appreciation of the morphology (including DNA) of a species and its relationships with similar species. A proposal, based on the number of lateral plates, that this species be renamed *Smilium spinosa* was made in 2011 and has been adopted by some. However, if it were to be changed in this manner, the rules of nomenclature require it to be *Smilium spinosum*. We retain it in *Calantica* on the basis of the triangular shape of the scutum (a key plate) and the low elevation of the upper latus. This also minimizes confusion, as *Calantica spinilatera* was previously called *Smilium spinosum*.

It could also be .....

Calantica spinilatera (larger individuals, golden brown-yellow colour, from deeper water 50 m +)

main image
Chris Woods

inset image
Crispin Middleton

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).
Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Smilium zancleanum (Seguenza, 1876)

Return to Index

Class Thecostraca Subclass Cirripedia Order Calanticomorpha Family Calanticidae

morphology | surface | substrate | habitat

Very large gooseneck (or pedunculate) barnacles with 13 large smooth plates on the capitulum: paired terga, scuta, upper latera, plus a carina, rostrum, subcarina and two other pairs of lower latera. All plates with bottom edges embedded in a smooth brown-yellow integument. Peduncle armoured with small, spindle-shaped scales, which are difficult to see in larger specimens. Where integument is worn, plates are white; peduncle yellow-brown.

Large specimens are hermaphrodites. Juveniles and small males grow on the peduncle. This species is often collected in large clumps. Sometimes trawled up by deep sea fishers. It lives in deep water on the continental slope, on the Chatham Rise and Subantarctic Plateau, in the Tasman Sea on Reinga Ridge, Southern Norfolk Ridge, off Tasmania and Macquarie Ridge.

It could also be .....

Calantica spinilatera (NZ continental shelf species to ~400 m)

images
John Buckeridge

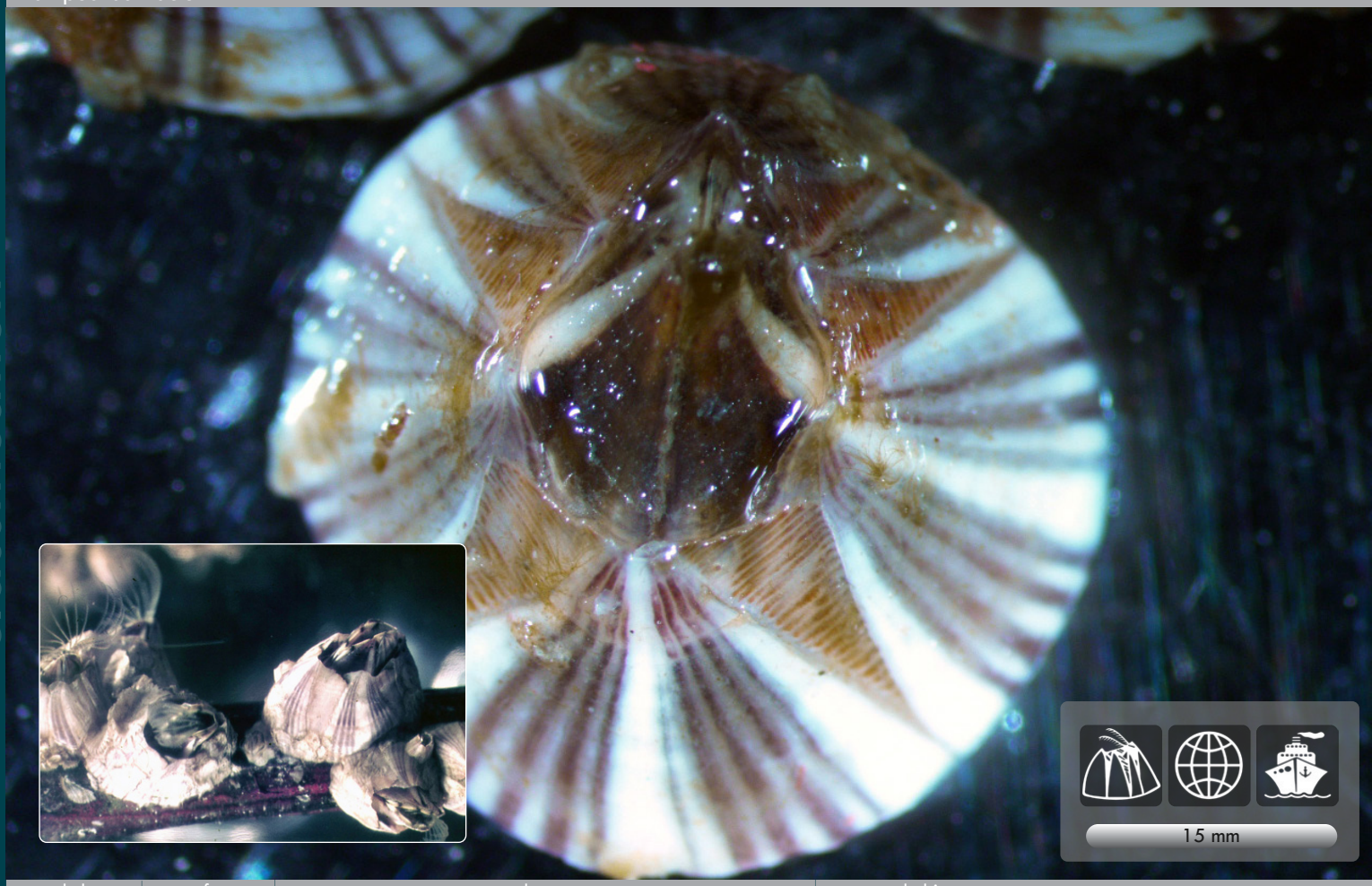
Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).
Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Amphibalanus amphitrite (Darwin, 1854)

striped barnacle

Return to Index

Class Thecostraca Subclass Cirripedia Order Sessilia Suborder Balanomorpha Family Balanidae



morphology | surface | substrate | habitat

A medium sized acorn barnacle with six compartmental plates and a relatively smooth surface. Radii present, their top edge sometimes jagged and slanted down to the interlocking margin between radii and parieties. Orifice quadrangular, toothed. Base calacreous, with radiating pores. Plates off-white with distinctive longitudinal pink, brownish, or purplish stripes on parietes, radii with flecks or lines of the same colour.

This is a cosmopolitan fouling species that has dispersed via attachment to ship's hulls; it can also be found on buoys, logs, mangroves and rocks. It is common in tropical and warm temperate seas, but in New Zealand so far the only established population is found in Waitemata Harbour and Orakei Basin in Auckland, suggesting that they may be relatively "recent" arrivals.

It could also be .....

Balanus trigonus

Notomegabalanus decorus

main image
Serena Cox

inset image
John Buckeridge

Darwin, C. (1854) *The Balanidae, (or Sessile Cirripedia); the Verricidae, etc. A Monograph on the Sub-Class Cirripedia with Figures of All the Species*. The Ray Society, London. i-viii + 1–684, pls. 1–30. https://ia600409.us.archive.org/30/items/monographonsubcl02darw/monographonsubcl02darw.pdf

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).

Balanus trigonus Darwin, 1854

triangle barnacle

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morphology | surface | substrate | habitat

Relatively small acorn barnacle, with six compartmental plates (parietes) with prominent and regularly spaced ribs. Radii solid, their top edge slightly sloping down to the interlocking margin between radii and parieties. Orifice roughly triangular, acutely pointed at the carinal end. Base calcareous, with radiating fine pores.
Plates pink to purplish-red with vertical white stripes. In living specimens the tissues lining gap between the opercular valves are pink edged with white.

This is a cosmopolitan fouling species. It grows on shells and rocks in the zone below low tide, at times it can be nearly covered by encrusting ascidians and sponges with only the trigonal orificice visible. It is common in tropical and warm temperate seas, and in New Zealand it is usually found in the north-east of the North Island, in Waitemata Harbour and off Auckland's east coast.

It could also be .....

Amphibalanus amphitrite
Notomegabalanus decorus

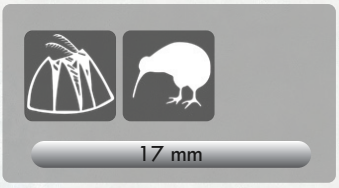
main image
John Buckeridge

Darwin, C. (1854) *The Balanidae, (or Sessile Cirripedia); the Verricidae, etc. A Monograph on the Sub-Class Cirripedia with Figures of All the Species*. The Ray Society, London. i-viii + 1–684, pls. 1–30. https://ia600409.us.archive.org/30/items/monographonsubcl02darw/monographonsubcl02darw.pdf
Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).

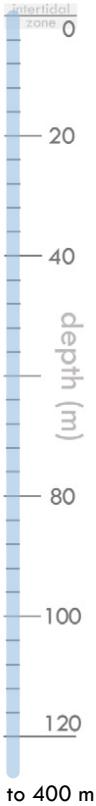
Notobalanus vestitus (Darwin, 1854)

Return to Index

Class Thecostraca Subclass Cirripedia Order Sessilia Suborder Balanomorpha Family Balanidae



morphology | surface | substrate | habitat



A steep, cone-shaped acorn barnacle with six compartmental plates (parietes). Orifice small, toothed, opercular plates set well below the edge of the orifice. Radii very narrow to absent. Plates smooth or faintly ribbed. Base calcareous, thin, lacking any internal pores. Plates covered by a yellow chitinous integument that extends about 2/3 of the way up the shell from the base, when this is worn off, the shell is pink to white.

This is an endemic species, and is termed a "living fossil" because of its fossil record dating back to the Oligocene (33.9–23 million years before the present). It can be found from the shore to 400 m deep commonly encrusting on mollusc shells, worm tubes, crab carapaces, and stones. It lives thoughout New Zealand from North Cape to Campbell Island and the Chatham Islands.

main image
John Buckeridge

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).
Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Notomegabalanus decorus (Darwin, 1854)

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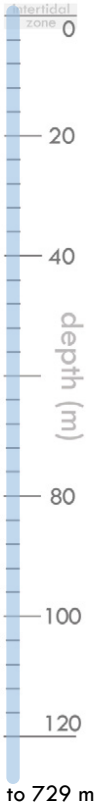
morphology | surface | substrate | habitat



A large, tube shaped acorn barnacle, with six compartmental plates (parietes): Shell without any obvious ribbing or ridging, quite smooth in young specimens. Radii smooth. Orifice wide, roughly diamond shaped and toothed. Base calcified and porous. In living specimens, the colours of the tissue lining the opercular valves is pink. Plates pale rose colour, radii a darker pink.

This is a common species, that lives from the uppermost subtidal in sheltered bays to deeper water on the New Zealand shelf. It is found thoughout New Zealand from the Kermadecs Islands to the subantarctic islands including Macquarie Island. Related species are abundant as fossils at Wanganui and Castlepoint.

It could also be .....
Amphibalanus amphitrite

main image
Crispin Middleton

inset image
John Buckeridge

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).
Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Chamaesipho brunnea Moore, 1944

brown surf barnacle | tiotio

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morphology | surface | substrate | habitat

Small acorn barnacle. Six non-tubiferous compartmental plates in juveniles, which as adults fuse together and thicken to form a ring. Shell pale brown (due to interlaminate chitin); low conic, wider than tall. Older specimens in exposed sites can be heavily eroded. Close neighbours don't completely fuse together (unlike C. *columna*) but can be very tightly packed. A distinctive square joint develops between the opercular plates, which sit lower than the compartmental plates. Body inside shells is brown.

This species lives in the high tide zone on exposed rocky shores, and can tolerate living in the splash zone above the high tide level on beaches with a lot of wave action. It is endemic species, found mostly in Northern New Zealand, but there are a few records on the East Coast of the South Island as far south as Dunedin and on the Chatham Islands. This species is not known on shores of the Subantarctic or Kermadec Islands.

It could also be .....

Chamaesipho columna

main image
John Buckeridge

inset image
Chris Woods

Carson, S., Morris, R. (2017) *Collins Field Guide to the New Zealand Seashore*. Harper Collins, Auckland, New Zealand, 415 pp.

Chamaesipho columna (Spengler, 1790)

columnar barnacle | tiotio tai pari

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morphology | surface | substrate | habitat

Small acorn barnacle. Juveniles with six non-tubiferous wall plates (compartments), which with growth fuse together into a solid ring, obliterating plate boundaries. When space is limited, they can grow taller than wide, with shape varying from low-conical to columnar shape. Shell becomes pitted on corrosion. When close packed this barnacle fuses its wall plates with its neighbours, forming a honey-comb like network. White shells. Body inside shells is navy-blue.

This species lives in the upper zone of semi-exposed and exposed rocky shores. It is endemic, found right around New Zealand, including the Kermadec Islands, but is not present in Chatham Island or the Subantarctic Islands. *Chamaesipho columna* was originally described from material supposedly collected from "Otaheiti" (Tahiti) in 1790, but later revision of the samples and species showed that the samples from Spengler's original description came from New Zealand and that this species is restricted to our shores. A closely related species, *Chamaesipho tasmanica*, is found in southern Australia.

It could also be .....

Chamaesipho brunnea

main image
Sadie Mills

inset image
John Buckeridge

Foster, B.A. (1967) A guide to the littoral balanomorph barnacles of New Zealand. *Tuatara* 15 (2): 75–86. http://nzetc.victoria.ac.nz/tm/scholarly/tei-Bio15Tuat02-t1-body-d3.html

Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Coronula diadema (Linnaeus, 1767)

whale barnacle

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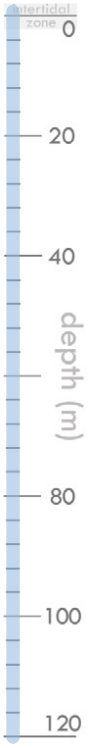
morphology | surface | substrate | habitat



Large acorn barnacle with a crown shaped shell. Wall plates (parietes) thickly ribbed, crossed with narrow ridges. Radii thin and as wide in upper part as parietes in lower part. Orifice wide, hexagonal. Terga not visible, scuta very small and embedded in thick opercular cuticle. Only a small part of the shell is embedded in its host's skin so they are very obvious (see inset). Compartments covered with a yellow-brown integument, but when this is worn, they are white. Cirri, if exposed at orifice, reddish-brown.

This species lives on the skin of whales (an ectoparasite). It is usually associated with humpback whales (*Megaptera novaeangliae*) but has occasionally been reported on other species of whale. *Lepas* barnacles commonly attach onto the shells of *Coronula* (see inset image). Found as widespread as their hosts, which transit past New Zealand on their migration routes northwards, congregating near the Kermadec Islands then moving southwards to Antarctica. *Coronula* is well represented in New Zealand's fossil fauna from the Pliocene.

It could also be .....

Coronula reginae, which is shaped like a flat cone, but is rare.

main image
John Buckeridge

inset image

Darren Stone

Foster B.A. (1979). The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). New Zealand Oceanographic Institute Memoir, 69, 169 p. (1978).
Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Austrominius modestus (Darwin, 1854)

beaked barnacle, tio piripiri

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Class Thecostraca Subclass Cirripedia Order Sessilia Suborder Balanomorpha Family Elminiidae

morphology | surface | substrate | habitat

A small acorn barnacle, with the shell comprising four compartmental plates with wide folds spreading out to a wide base. The four opercular plates are arranged in a kite or diamond shaped orifice and protrude above the outer plates a little. Base membranous. Yellowish (due to a thin chitinous integument); otherwise a bright white colour with pale grey stripes on the opercula.

This species is found in sheltered rocky shores and estuaries. It can attach to any hard surface so is found on rocks, mangrove roots, wharf piles and boat hulls, and mollusc shells such as cockles, mussels and oysters. It is endemic to Australasia, and found throughout New Zealand's main islands, but not in the Subantarctic, Kermadec or Chatham Islands. It was accidentally introduced to Europe on boats during the Second World War, so is now found around the UK and the European continental coastlines from the Mediterranean to the Baltic. A closely related species, *Austrominius covertus*, lives in southest Australia.

It could also be .....

Tetraclitella depressa

images
John Buckeridge

Buckeridge, J.S., Newman, W.A. (2010) A review of the subfamily Elminiinae (Cirripedia: Thoracica: Austrobalanidae), including a new genus, *Protelminius* nov. from the Oligocene of New Zealand. *Zootaxa* 2349: 39–54. https://doi.org/10.11646/zootaxa.2349.1.3

Darwin, C. (1854) *The Balanidae, (or Sessile Cirripedia); the Verricidae, etc. A Monograph on the Sub-Class Cirripedia with Figures of All the Species.* The Ray Society, London. i-viii + 1–684, pls. 1–30. https://ia600409.us.archive.org/30/items/monographonsubcl02darw/monographonsubcl02darw.pdf

Epopella plicata (Gray, 1843)

ribbed barnacle | tiotio

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morphology | surface | substrate | habitat

Large acorn barnacle. This species is much larger than other intertidal acorn barnacle species; it has four non-tubiferous compartmental plates which may grow into a low ribbed cone. However, if crowded, they may grow as moderately tall tubes. The shell is yellow to pale brown in colour, due to interlaminate yellow chitin. When worn, the shells can appear white (see inset).

This species lives on boulders in the mid-low tidal zones of exposed shores. It is found throughout the New Zealand North and South islands, Chatham Island, Auckland Island and Snares. It is absent from the Campbell Islands. A related species, *Epopella kermadeca* is known from the Kermadec Islands.

main image
Chris Woods

inset image
John Buckeridge

r, B.A. (1967) A guide to the littoral balanomorph barnacles of New Zealand. *Tuatara* 15 (2): 75–86. http://nzetc.victoria.ac.nz/tm/scholarly/tei-Bio15Tuat02-t1-body-d3.html

Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

Tetraclitella depressa Foster & Anderson, 1986

flat barnacle

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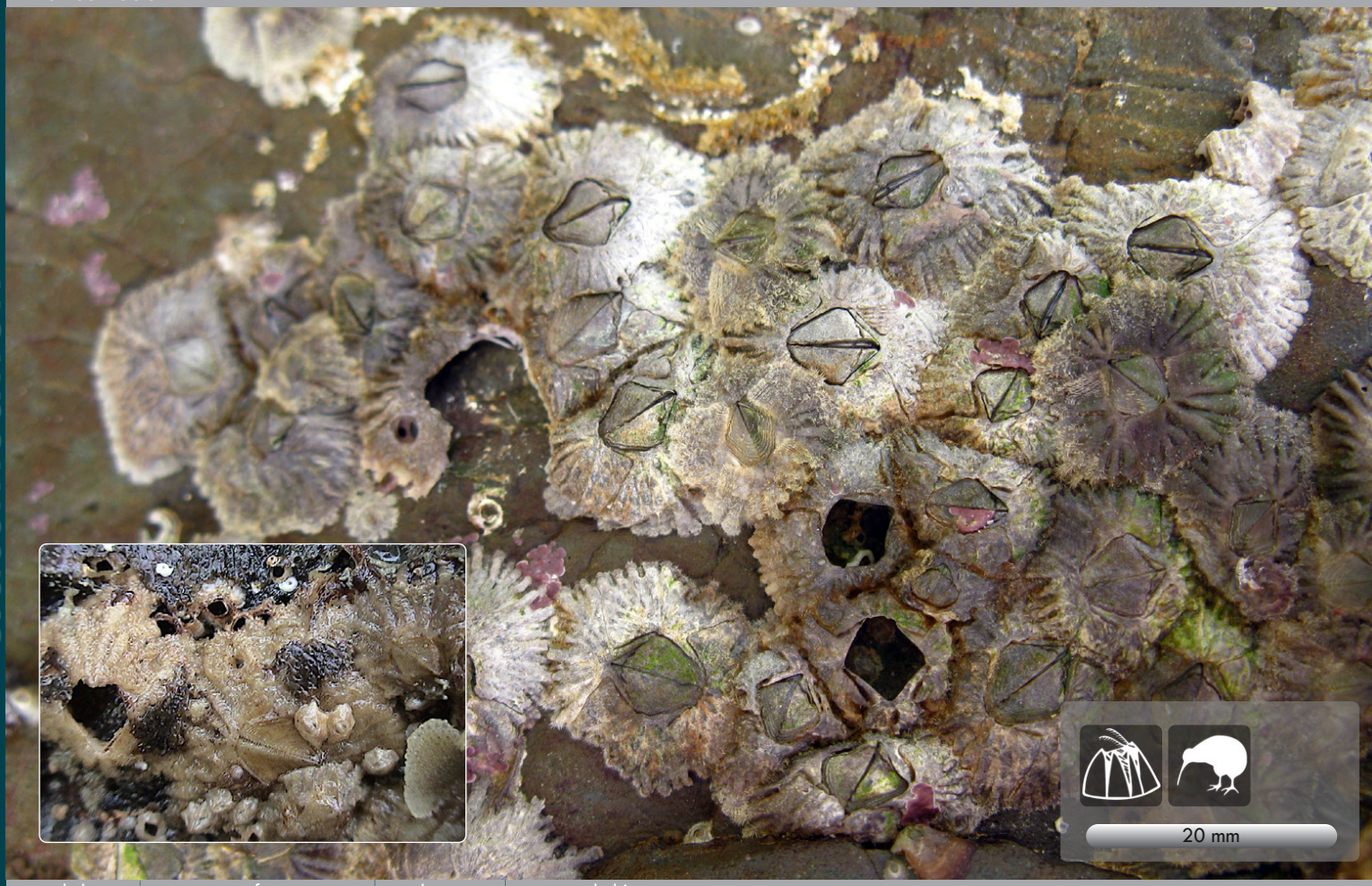


morphology | surface | substrate | habitat

Medium acorn barnacle. Comprised of four compartmental plates: carina, rostrum and paired carinolatera; shell very flattened, to sit in very low profile against the rocks they are attached to. Top of opercular plates level with the shell wall. Surface of unweathered shells with fine radiating ribs. Juveniles with fine chitinous hairs. Shell is brownish, with white opercular plates; often overgrown with pink coralline algae (as pictured in the main image).

This species was first known as *Tetraclitella purpurascens* (a species endemic to southern Australia, and which has a purplish shell, but it was identified as a distinct species in 1986). *Tetraclitella depressa* is an endemic species; it lives in the mid-tide zone on rocky shores in shady positions under stones and in crevices around the North, South and Stewart Islands, Kermadec Is., Chatham Island and Snares Is. Closely related species are fossil in the New Zealand Miocene.

It could also be .....

Austrominius modestus

main image
Chris Woods

inset image
John Buckeridge

Carson, S., Morris, R. (2017) *Collins Field Guide to the New Zealand Seashore*. Harper Collins, Auckland, New Zealand, 415 pp.
Foster B.A. & Anderson D.T. (1986) New names for two well-known shore barnacles (Cirripedia, Thoracica) from Australia and New Zealand. Journal of the Royal Society of New Zealand, 16(1), 57–69.

icon glossary

BODY PLAN

	acorn barnacle
	gooseneck barnacle

LIFE HISTORY

	Southern Hemisphere	region south of the Equator
	widespread	species recorded globally
	antipodean	naturally occuring around New Zealand and Australia only

	endemic	biota native and restricted to New Zealand
	introduced	species naturally ocurring outside of New Zealand waters and has been introduced into New Zealand, invasive

MORPHOLOGY

	close-packed	lives closely packed with its neighbors, outer shells are not fused (e.g. *Chamaesipho brunnea*)
	high-profile encrusting	tall, columnar shells that stand erect from rock to which they are attached
	low-profile encrusting	flattened, low-profile shells that lie close to the rock to which they are attached

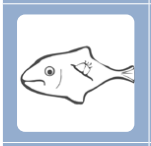
	outer plates fused	outer plates fused into a ring (e.g. *Chamaesipho* spp.), lives alone and/or in groups
	smooth, simple	peduncle smooth, simple plates (e.g. Lepadidae spp.)
	spines or scales	peduncle is covered with spines or scales, with a ring of lower plates on the capitulum (e.g. *Calantica* spp.)

SURFACE

	smooth	plates smooth without any ribbing
	spiky	surface covered in raised peaks
	ridges	hard plates with ribs, folds or ridges running along them

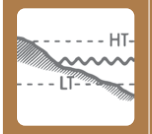
	hard	hard to the touch, not compressible, rigid
	soft	soft to the touch, easily compressible, elastic

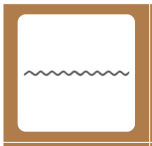
SUBSTRATE

	living organism	living or growing on the external surface of an animal (epizoic) or seaweed (epiphytic)
	rubble	shell, stone, and pebble rubble
	mangrove roots	wood
	parasitic	parasite on other organisms such as fish or invertebrates
	boats and ships	living on hulls of boats and ships

	rock	hard substrate such as mudstone, sandstone, basalt, compressed carbonates
	artificial substratum	anything man-made such as mooring blocks, mussel lines, wharf piles
	flotsam	lives on floating substrates in the open ocean i.e., pumice, wood, or man-made objects like plastics (e.g., barnacles)
	whales	ectoparasite on whales

HABITAT

	exposed water	exposed habitats with wind and wave action
	littoral	the part of the sea that is closest to shore extending from high water mark
	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
	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
	mangrove forest	salt tolerant terrestrial plants growing intertidally on muddy to sandy shores

	sheltered water	sheltered water habitats, little wind or wave action
	estuarine	estuarine, brackish or mangrove environments
	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

glossary

base	the underside of an acorn barnacle. It may be membranous or calcareous. If the latter, porous or solid
calcified (calcareous)	comprised of calcite (calcium carbonate)
capitulum	main body of stalked barnacles that sits above the peduncle
carina	plate on the body of a stalked barnacle between the two terga and at the front of an acorn barnacle
carinolatus	paired compartmental plates in the shell wall of acorn barnacles and in the capitulum of many stalked barnacles. There are two pairs in six-plated acorn barnacles first carinolatus (cl1) and second carinolatus (cl2)
chitin	a fibrous protein that is used in the exoskeletons of arthropods such as crustaceans and insects, also found in fish scales, fungi cell walls, mollusc radula and squid beaks
compartment	the term used to describe the plates (generally four or six), that make up the shell wall of acorn barnacles.
ectoparasite	a parasite that lives on the outside of its host
integument	a tough outer protective layer, as seen coating the bottom of plates in *Smilium zancleanum*
interlaminate chitin	chitinous layers (lamellae or stringers) within the calcareous compartmental barnacle plate of acorn barnacles. Helps retain shell integrity following pH changes in shallow water
latus (pl. latera)	compartmental plate(s) on each side of some species of barnacle
non-tubiferous	solid compartmental plates lacking longitudinal pores. Some barnacle plates have what appear (on a broken surface) to be hollow tubes running through them
opercular plates	four calcareous plates (paired scuta and terga) that together open, allowing feeding appendages (cirri) to function when the tide is in, and serve as close at low tide, preventing the barnacle from drying out. In addition, closure can provide some protection from predation
orifice	opening at the top of the shell, in which the opercular plates lie, and where the cirri extend out
peduncle	the stalk in pedunculate barnacles (below the capitulum)
paries (pl. parietes)	the part of a compartmental plate of acorn barnacles that excludes the radii
plates	the hard calcareous parts that make up the outer shell of a barnacle
porous	minute tubes in the paries, radii and bases
radius (pl. radii)	the extension beyond the paries where compartmental plates overlap adjacent plates on acorn barnacles
rostrum	plate at the opposite end of the shell wall to the carina. The rostrum overlaps adjacent plates, the carina is overlapped by carinolatera
scutum (pl. scuta)	paired plates on the body of a stalked barnacle adjacent to the terga In acorn barnacles, with terga comprise the operculum
subcarina	plate positioned below the carina
subrostrum	plate positioned below the rostrum
tergum (pl. terga)	paired plates adjacent to the scuta on the body of a stalked barnacle. In acorn barnacles, with scuta comprise the operculum
umbo	oldest part of the shell

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image credits

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further reading

Batham, E. (1944) *Pollicipes spinosus* Quoy and Gaimard. I. Notes on biology and anatomy of adult barnacle. *Transactions of the Royal Society of New Zealand* 74 (4): 359–374. https://paperspast.natlib.govt.nz/periodicals/TPRSNZ1944-74.2.6.26

Bruce, N., MacDiarmid, A. (2006) Crabs, crayfish and other crustaceans - barnacles and copepods. *Te Ara - the Encyclopedia of New Zealand*. http://www.TeAra.govt.nz/en/crabs-crayfish-and-other-crustaceans/page-6

Buckeridge, J.S. (1979) *The fossil barnacles (Cirripedia: Thoracica) of New Zealand and Australia*. PhD thesis, Geology, University of Auckland, New Zealand, 431 pp. + plates. https://researchspace.auckland.ac.nz/handle/2292/1585

Buckeridge, J.S. (1983) Fossil barnacles (Cirripedia: Thoracica) of New Zealand and Australia. Wellington: NZ Geological Survey. *New Zealand Geological Survey Paleontological Bulletin* 50, 152 pp.

Buckeridge, J.S. (2010) Barnacles, biologists, bigots and natural selection. Confound and exterminate the whole tribe! *Biology International 47*: 5–10.

Buckeridge, J.S. (2011) Of trees, geese and cirripedes: man's quest for understanding. *Integrative Zoology* 6: 3–12.

Buckeridge, J.S., Beu, A., Gordon, D. (2018) Depositional environment of the early Pleistocene Castlepoint Formation, New Zealand: a canyon fill in situ. *New Zealand Journal of Geology and Geophysics* 61 (4): 524–542. https//doi.org/10.1080/00288306.2018.1516227

Carson, S., Morris, R. (2017) *Collins Field Guide to the New Zealand Seashore*. Harper Collins, Auckland, New Zealand, 415 pp.

Chan, B.K.K., Dreyer, N., Gale, A.S., Glenner, H., Ewers-Saucedo, C., Pérez-Losada, M., Kolbasov, G.A., Crandall, K.A., Høeg, J.T. (2021) The evolutionary diversity of barnacles, with an updated classification of fossil and living forms. *Zoological Journal of the Linnean Society*. https://doi.org/10.1093/zoolinnean/zlaa160

Darwin, C. (1852) *The Lepadidae or pedunculated cirripedes. A monograph on the sub-class Cirripedia, with figures of all the species. 1*. Ray Society, London. http://darwin-online.org.uk/content/frameset?itemID=F339.1&viewtype=side&pageseq=1

Darwin, C. (1854) *The Balanidae, (or Sessile Cirripedia); the Verricidae, etc. A Monograph on the Sub-Class Cirripedia with Figures of All the Species*. The Ray Society, London. i-viii + 1–684, pls. 1–30. https://ia600409.us.archive.org/30/items/monographonsubcl02darw/monographonsubcl02darw.pdf

Foster, B.A. (1967) A guide to the littoral balanomorph barnacles of New Zealand. *Tuatara* 15 (2): 75–86. http://nzetc.victoria.ac.nz/tm/scholarly/tei-Bio15Tuat02-t1-body-d3.html

Foster, B.A. (1979) The Marine Fauna of New Zealand: Barnacles (Cirripedia: Thoracica). *New Zealand Oceanographic Institute Memoir*, 69, 160 pp.http://docs.niwa.co.nz/library/public/Memoir%20069_Marine%20Fauna%20of%20NZ_Barnacles%20-%201978.pdf

Foster, B.A., Anderson, D.T. (1986) New names for two well-known shore barnacles (Cirripedia, Thoracica) from Australia and New Zealand, *Journal of the Royal Society of New Zealand* 16 (1): 57–69. https://doi.org/10.1080/03036758.1986.10426956

Hinojosa, I.A., Boltana, S., Lancellotti, D., Macaya, E., Ugalde, P., Valdivia, N., Vásquez, N., Newman, W.A., Thiel, M. (2006) Geographic distribution and description of four pelagic barnacles along the south east Pacific coast of Chile - A zoogeographical approximation. Revista chilena de historia natural. http://doi.org/10.4067/S0716-078X2006000100002

Junoy, J., Junoy, J. (2014) First record of the buoy barnacle *Dosima fascicularis* (Ellis & Solander, 1786) (Crustacea, Cirripedia) from the Galician beaches (NW Spain) after the Prestige oil spill. *Check List* 10 (3): 669–671. http://doi.org/10.15560/10.3.669

Luckens, P.A. (1975) Predation and intertidal zonation of barnacles at Leigh, New Zealand, *New Zealand Journal of Marine and Freshwater Research*, 9 (3): 355–378. https://doi.org/10.1080/00288330.1975.9515573

Webber, W.R., Fenwick, G.D., Bradford-Grieve, J.M., Eagar, S.G., Buckeridge, J.S., Poore, G.C.B., Dawson, E.W., Watling, L., Jones, J.B., Wells, J.B.J., Bruce, N.L., Ahyong, S.T., Larsen, K., Chapman, M.A., Olesen, J., Ho, J., Green, J.D., Shiel, R.J., Rocha, C.E.F., Lörz, A., Bird, G.J., Charleston, W.A (2010) Phylum Arthropoda Subphylum Crustacea: shrimps, crabs, lobsters, barnacles, slaters, and kin. Pp. 98–232 in: Gordon D.P. (Ed.) (2010). *New Zealand Inventory of Biodiversity: 2. Kingdom Animalia: Chaetognatha, Ecdysozoa, Ichnofossils*, 544 pp.

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