



Phylum
PORIFERA
Sponges

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Phylum

PORIFERA

Sponges

There is a general perception that sponges are primitive animals because of their 'simple' body plan; they are multicellular, with specialised cells doing the job of tissues and organs in 'higher' animals. With the discovery of an immune system in sponges (the ability to recognise and differentiate 'self' from 'non-self') in the early 1900s, and the discovery of biologically active chemicals in sponges in the 1950s, a greater understanding of the cellular processes in higher organisms has emerged, and confirmation that sponges are 'smart' not simple! Sponges also frequently dominate shallow and deep sea environments (down to abyssal and hadal depths of several kilometres!), from the tropics to the poles, and they were dominant reef organisms in the past; their fossil record dates back to about 600 million years ago.

As the name Porifera implies, sponges are 'pore-bearers.' With the exception of glass sponges, most sponges are composed of three major cellular layers. The pinacoderm lines all external surfaces of the sponge body. The choanoderm, or feeding layer, is dominated by choanocytes (collared cells) that draw water, and hence nutrition, into the sponge via the aquiferous canal system. The pores (ostia) on the external surface of the sponge lead to the feeding chambers in the middle of the sponge, which then lead to one or two large exit pores (oscles) usually on the apex or sides of the sponge. The feeding cells have tail-like flagellae that whip in unison to draw a water current in through the aquiferous system. Any food particles that come in on the current are trapped by the feeding cells and then passed back to the mesohyl that lies between the pinacoderm and choanoderm and performs the various other functions of sponge life, including reproduction, nutrition, respiration, storage, and provision of skeletal support. Sponges reproduce by the sequential or synchronous production of eggs and sperm. The sperm arise from the feeding cells (which already have 'tails' for motility) and the eggs come from archaeocyte cells in the sponge mesohyl. Sponges can also bud and fragment to produce genetically identical 'clones'.

There are three major types of sponges: the demosponges (**Class Demospongiae**), the glass sponges (**Class Hexactinellida**), and the calcareous sponges (**Class Calcarea**). These groups are differentiated firstly on the mineral composition of the inorganic skeletal components and cellular organisation of the sponge body. Despite recent advances in the use of biochemical and molecular data, sponge classification is still very much in a state of flux, and the taxonomic relationships of sponges remain somewhat controversial, especially at the higher levels of Class and Order.

Class Demospongiae

Sponges in the largest class, the Demospongiae, have a skeletal network of opaline (siliceous) spicules, frequently supplemented or entirely replaced by spongin protein fibres. These sponges are extremely diverse, ranging from tiny delicate hydroid-like feathers to large round solid ball-shaped masses, with textures that range from stony (lithistid sponges) to woody (hadromerid and astrophorid sponges) to fleshy (poecilosclerid and dictyoceratid sponges) to fibrous and airy (haplosclerid sponges). The dominant colours are variations of carotenoid pigments (brown, orange, yellow, mustard, red, and black), but may also be green, blue and purple.

Class Hexactinellida

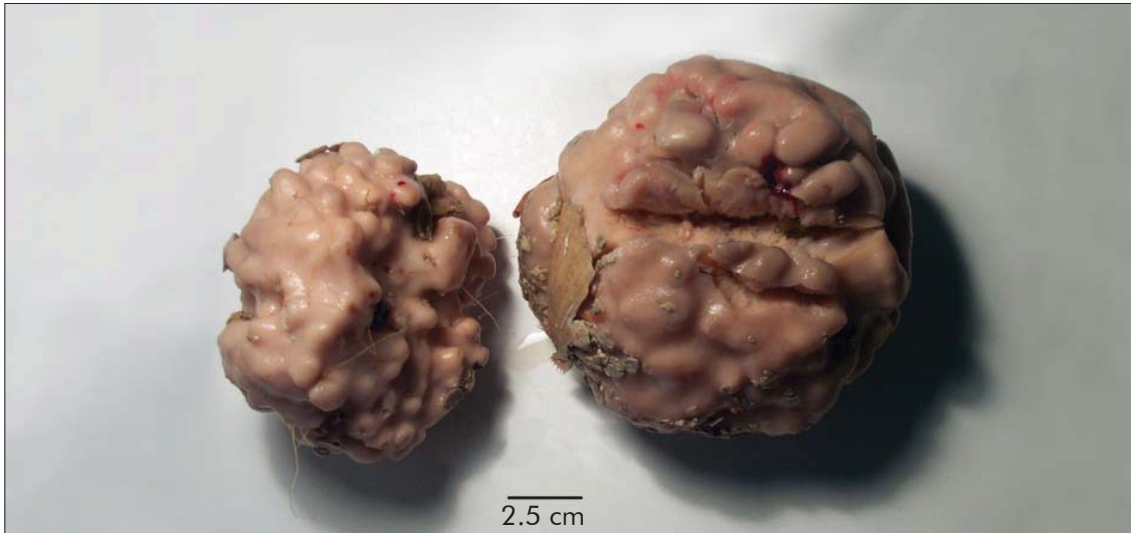
The Hexactinellida (glass sponges) are uniquely constructed of six-rayed opaline (siliceous) spicules and a non-cellular (syncytial) organisation, with extensive regions of multinucleate cytoplasm. These unusual sponges are characterised by their siliceous rather than fleshy nature; they often look and feel like baskets of woven strands of glass, mushy sacking, or gorgonian corals, and are rarely coloured, being typically whitish grey with occasionally a faint pink or beige tinge. They are most common in the deep sea attached by their hard stony base to hard substrate on seamounts, or rooted in fine mud with a basal mass of very hair-like spicules.

Class Calcarea

Calcareous sponges have calcitic (calcareous) spicules and are usually quite small and fragile. They are most obvious in relatively shallow tropical waters, and shallow protected temperate environments. Several distinctive species occur on coastal rocky reefs and harbours in New Zealand waters. They will not be considered further within this guide.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Astrophorida (sandpaper sponges)
Family Ancorinidae

***Ancorina novaezelandiae* (Knobbly sandpaper sponge) (ANZ)**



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Distinguishing features: Roughly spherical sponge with a restricted base and slightly flattened top, covered in large irregular flat-topped nodules; the texture is solid, heavy, firm and barely compressible; the surface feels like sandpaper to the touch.

Colour: Beige to peachy tan.

Size: Typical diameter 10 cm.

Distribution: Chatham Rise.

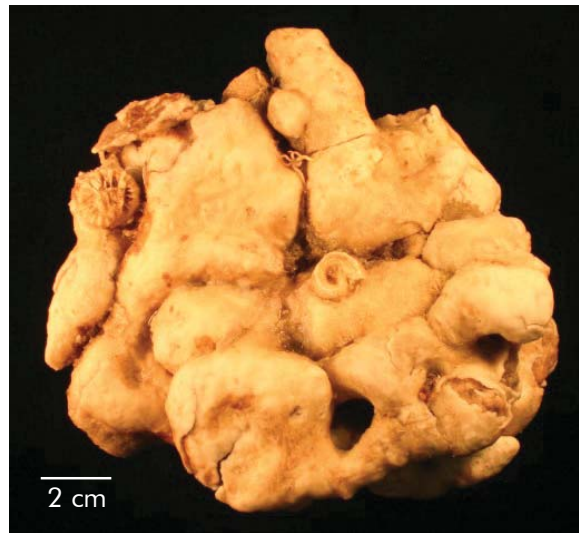
Depth: 316 to 376 m.

Similar species: None.

References: Dendy, A. (1924). Porifera. Part I. Non-antarctic sponges. Natural History Report. British Antarctic ("Terra Nova") Expedition, 1910, *Zoology* 6 (3): 269-392, pls 1-15.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Astrophorida (sandpaper sponges)
Family Geodiidae

***Geodinella vestigifera* (Ostrich egg sponge) (GVE)**



Distinguishing features: Convoluted mass with hard outer shell and softer inside; groups of exhalant pores on surface; sometimes like a tuber.

Colour: Tan with mottled patches of pink or brown.

Size: Typical diameter 50 cm.

Distribution: Northeastern New Zealand seamounts and coastal waters; Chatham Rise.

Depth: 10 to 1090 m.

Similar species: None.

References: Dendy, A. (1924). Porifera. Part I. Non-antarctic sponges. Natural History Report. British Antarctic ("Terra Nova") Expedition, 1910, *Zoology* 6(3): 269–392, pls 1–15.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Astrophorida (sandpaper sponges)
Family Pachastrellidae

***Poecillastra laminaris* (Fibreglass cup sponge) (PLN)**

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Distinguishing features: Shallow cup-like sponge with rippled edges, siliceous, non-elastic but relatively flexible, very hairy.

Colour: Cream to white, tinged with brown.

Size: Typical diameter 10 cm.

Distribution: Christable Seamount, Cavalli Seamounts, Chatham Rise seamounts.

Depth: 770 to 1050 m.

Similar species: None.

References: Lévi, C.; Lévi, P. (1983). Eponges Tetractinellides et Lithistides bathyales de Nouvelle Calédonie. *Bulletin Muséum National d'Histoire Naturelle, Paris* (4)5 (A,1): 101–168.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Astrophorida (sandpaper sponges)
Family Pachastrellidae

***Thenea novaezelandiae* (Yoyo sponge) (THN)**



Distinguishing features: Semispherical sponge with a distinctive thick biscuit shape, with a rounded summit and base separated by a transverse recess running around the mid section of the sponge body (the recess is a specialised aquiferous system); small root-like structures project from the ventral surface of the sponge; body compact, spongy, and siliceous.

Colour: Grey to off-white.

Size: Typical diameter 10 cm.

Distribution: Northwest Chatham Rise, Stewart Island region.

Depth: 815 to 896 m.

Similar species: None.

References: Bergquist, P. R. (1961). Demospongiae (Porifera) of the Chatham Islands and Chatham Rise, collected by the Chatham Islands 1954 Expedition. *New Zealand Department of Scientific and Industrial Research Bulletin 139, Biological Results of the Chatham Islands 1954 Expedition, 1961, Part 5: 169-206.*

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Dictyoceratida (rubber sponges)
Family Irciniidae

***Psammocinia* sp. (Rubber sponge) (PHW)**



Distinguishing features: Club-shaped with expanded lobes, slightly flat on top; top (illuminated) surfaces tinged with maroon; compressible; fine conules on surface.

Colour: Dark tan with maroon tinges on upper surfaces.

Size: Typical diameter 30 cm.

Distribution: Southeastern Subantarctic region.

Depth: 300 to 600 m.

Similar species: *Psammocinia hawere* Cook & Bergquist, 1998; *Psammocinia charadroides* Cook & Bergquist, 1998; *Ircinia akaroa* Cook & Bergquist, 1999.

References: Cook, S. de C.; Bergquist, P.R. (1998). Revision of the genus *Psammocinia* (Porifera: Demospongiae: Dictyoceratida), with six new species from New Zealand. *New Zealand Journal of Marine and Freshwater Research* 32: 399–426.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Hadromerida (woody sponges)
Family Suberitidae

***Suberites affinis* (Fleshy club sponge) (SUA)**



Distinguishing features: Very smooth club-shaped sponge with a large circular opening on the apex; soft, fleshy, slippery to the touch; often attached to the Golden Volutes *Provocator mirabilis* and *Alcithoe larochei*, or the base is anchored in sediment.

Colour: Cream to pale yellow, mottled with brown.

Size: Length up to 20 cm.

Distribution: Southern Plateau (Campbell Plateau, Pukaki Rise) and Chatham Rise; west coast of South Island.

Depth: 317 to 676 m.

Similar species: *Suberites australiensis* Bergquist, 1968.

References: Brøndsted, H. V. (1924). Papers from Dr Th. Mortensen's Pacific Expedition 1914-16. XV. Sponges from the Auckland and Campbell Islands. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening I Kjobenhaven* 75: 117-167.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Haplosclerida (air sponges)
Family Callyspongiidae

Callyspongia sp. (Airy finger sponge) (CRM)



Distinguishing features: Flattened fingers of thick, golden fibres; looks dead (not fleshy); elastic and flexible when wet; airy, compressible.

Colour: Golden yellow-brown.

Size: Typical diameter 30 cm.

Distribution: Southern New Zealand region.

Depth: 300 to 600 m.

Similar species: *Callyspongia ramosa* (Gray, 1843) *sensu* Bergquist & Warne (1980).

References: Bergquist, P.R.; Warne, K.P. (1980). The marine fauna of New Zealand: Porifera, Demospongiae, Part 3 (Haplosclerida and Nepheliospongia). *New Zealand Oceanographic Institute Memoir* 87. 77 p.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order 'Lithistid' Demospongiae (rock sponges)
Family Corallistidae

***Corallistes fulvodesmus* (Smooth white cup sponge) (CFU)**



Distinguishing features: Shallow smooth cup with a narrow short stalk for attachment, stony texture, inflexible, surface like sandpaper.

Colour: Creamy white to tan occasionally.

Size: Typical diameter 30 cm.

Distribution: New Caledonia, Norfolk Ridge Seamounts, northeastern New Zealand seamounts.

Depth: 400 to 1700 m.

Similar species: *Aciculites pulchra* Dendy, 1924 is similar but is ear-shaped when young and a convoluted cup as an adult. The surface of *A. pulchra* has tiny pimples and is usually maroon red.

References: Lévi, C.; Lévi, P. (1983). Eponges Tetractinellides et Lithistides bathyales de Nouvelle Calédonie. *Bulletin Muséum National d'Histoire Naturelle, Paris* (4)5 (A,1): 101–168.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order 'Lithistid' Demospongiae (rock sponges)
Family Scleritodermiidae

***Aciculites pulchra* (Pimpled ear sponge) (APU)**

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Distinguishing features: Ear-shaped plate with a curved edge as a juvenile, forming a large convoluted bowl-like structure as an adult; concave surface covered in regularly spaced "pimples"; texture stony and rigid.

Colour: Cream to tan throughout, but may be deep maroon on the upper or illuminated surfaces.

Size: Typical diameter 40 cm.

Distribution: New Caledonia, Norfolk Ridge seamounts, northeastern New Zealand seamounts.

Depth: 100 to 1100 m.

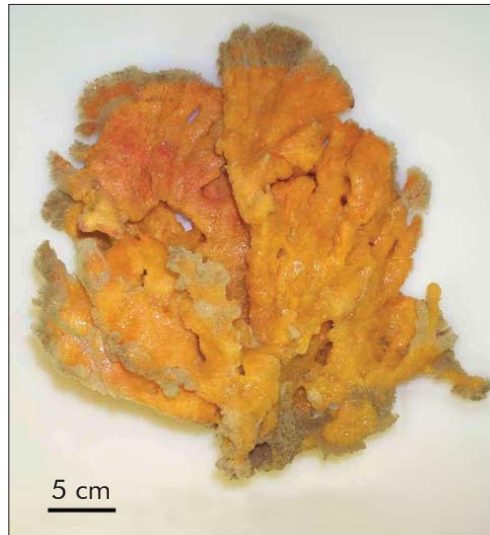
Similar species: *Neoschrammeniella fulvodesmus* (Lévi and Lévi, 1983), *Pleroma turbinatum* Sollas, 1888.

References: Dendy, A. (1924). Porifera. Part I. Non-Antarctic sponges. Natural History Report. British Antarctic ("Terra Nova") Expedition, 1910, *Zoology* 6(3): 269–392, pls 1–15.

Kelly, M. In Press: The Marine Fauna of New Zealand: Porifera: 'Lithistid' Demospongiae (Rock sponges). *NIWA Biodiversity Memoir* 121.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Poecilosclerida (bright sponges)
Family Crellidae

***Crella incrustans* (Orange frond sponge) (CIC)**



Distinguishing features: Mass of flattened fronds or finger-like branches; rubbery, fibrous, flexible; slightly translucent.

Colour: Bright orange.

Size: Typical diameter 30 cm.

Distribution: New Zealand region.

Depth: 300 to 600 m.

Similar species: None.

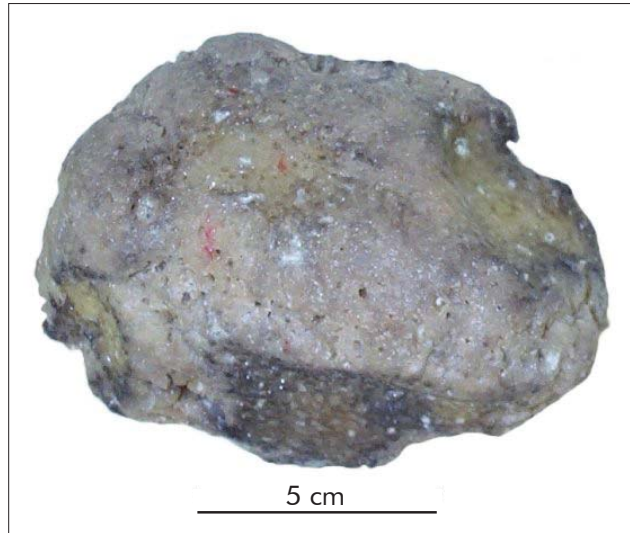
References: Bergquist, P.R.; Fromont, P.J. (1988). The marine fauna of New Zealand: Porifera, Demospongiae, Part 4 (Poecilosclerida). *New Zealand Oceanographic Institute Memoir* 96. 197 p.

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Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Poecilosclerida (bright sponges)
Family Hymedesmiidae

Phorbasp. (Grey fibrous massive sponge) (PHB)

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Distinguishing features: Bulky fibrous mass with flattened lateral planes; surface relatively smooth and featureless, but with characteristic opaque whitish sections into which sand has been incorporated; texture soft, cotton-like.

Colour: Grey to off-white with opaque whitish fibres.

Size: Typical diameter 15 cm.

Distribution: Chatham Rise, Pukaki Rise.

Depth: 400 to 490 m.

Similar species: None.

References: Bergquist, P.R.; Fromont, P.J. (1988). The Marine Fauna of New Zealand: Porifera, Demospongiae, Part 4 (Poecilosclerida). *New Zealand Oceanographic Institute Memoir* 96: 1-197.

Phylum Porifera
Class Demospongiae (siliceous sponges)
Order Spirophorida (spiral sponges)
Family Tetillidae

***Tetilla leptoderma* (Furry oval sponge) (TLD)**



Distinguishing features: Elongated egg shaped sponge with no visible point of attachment, surface furrowed and furry, somewhat shaggy, soft to the touch; several openings are located at the top of the sponge between bristles and furry protrusions; texture firm but compressible.

Colour: Cream to pale tan.

Size: Length from 5 to 10 cm.

Distribution: Chatham Rise, Stewart Island region

Depth: 576 to 919 m.

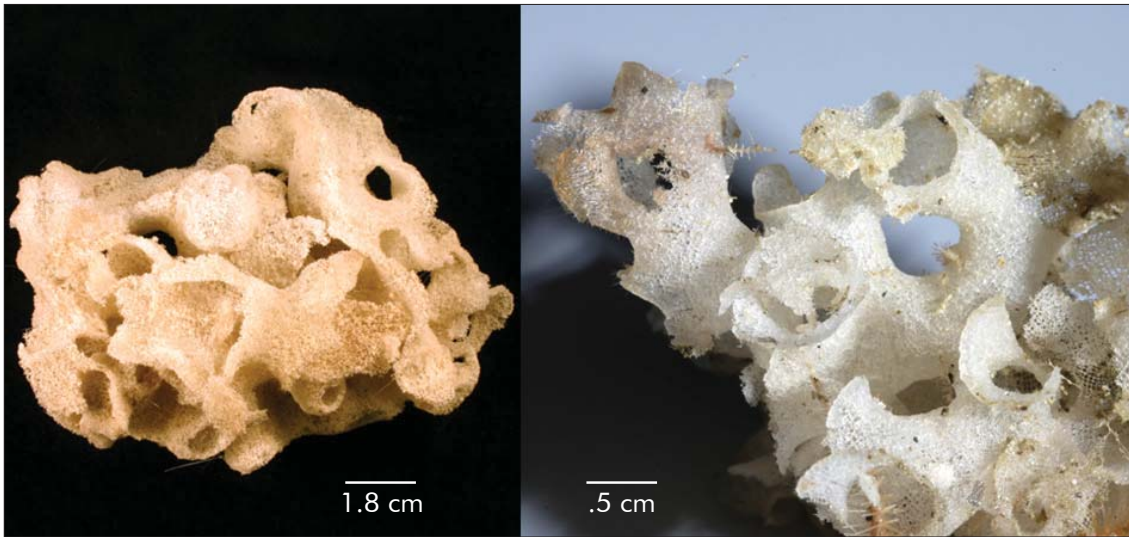
Similar species: *Tetilla australe* Bergquist, 1968 which is spherical with a bristly, not shaggy surface.

References: Sollas, W. J. (1886). Preliminary account of the tetraxinellid sponges dredged by H. M. S. 'Challenger', 1872-1876. Part I. The Choristida. *Scientific Proceedings of the Royal Dublin Society (new series)* 5: 177-199.

Phylum Porifera
Class Hexactinellida (glass sponges)
Order Hexactinosida (lacey honeycomb sponges)
Family Farreidae

Farrea sp. (Lacey honeycomb sponge) (FAR)

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Distinguishing features: Very brittle lace-like honeycomb of white tubes with elevated openings along the side of the tube; can be very delicate.

Colour: White to cream; dark brown if dead for a while.

Size: Typical diameter 5 cm.

Distribution: Northeastern New Zealand seamounts, Kermadec Ridge, Chatham Rise, Bollons Seamount.

Depth: 770 to 1070 m.

Similar species: None.

References: Reiswig, H. M. (2002); Family Farreidae Gray, 1872. *In:* Hooper, J. N. A.; Soest, R. W. M. van ed. *Systema Porifera: a guide to the classification of sponges*. New York. Kluwer Academic/Plenum Publishers, Pp. 1332-1340.

Phylum Porifera
Class Hexactinellida (glass sponges)
Order Lyssacinosida (glass horn sponges)
Family Euplectellidae

***Euplectella regalis* (Basket-weave horn sponge) (ERE)**



Distinguishing features: Horn-like tubular body, circular in cross-section, broadest at the upper end, gradually narrowing towards a slightly bulbous basal tuft of fine hair-like spicules; wall resembles a basket-weave of hair-like spicules and is beset with frilled irregular ridges that run obliquely around the tubular body. The apex of the sponge is a lattice-like sieve-plate surrounded by an undulating cuff.

Colour: Creamy white.

Size: Length up to 50 cm.

Distribution: Northwest and northeast Chatham Rise.

Depth: 885 to 1116 m.

Similar species: *Euplectella imperialis* Ijima, 1894

References: Schulze, F. E. (1900). Hexactinelliden des Indischen Oceans. III Theil. Abhandlungen der Preussischen Akademie de Wissenschaften . Berlin 1900: 46 pp., + Pls I-VII.

Tabachnick, K. R. (2002). Family Euplectellidae Gray, 1867. In: Hooper, J. N. A.; Soest, R. W. M. van ed. Systema Porifera: a guide to the classification of sponges. New York. Kluwer Academic/ Plenum Publishers, Pp. 1388-1434.

Phylum Porifera
Class Hexactinellida (glass sponges)
Order Lyssacinosida (tubular sponges)
Family Rossellidae

***Hyalascus* sp. (Floppy tubular sponge) (HYA)**



Distinguishing features: Soft, floppy, collapsible sponge. Tubular to trumpet-shaped with a thin wrinkled irregular wall. Texture in life like that of thick soggy paper, close-up looks like fibreglass matt; tears easily.

Colour: Tan to cream.

Size: Length up to 1500 cm. Diameter up to 30 cm at broadest.

Distribution: Northeastern New Zealand seamounts, Chatham Rise, Campbell Plateau (North of Campbell Island).

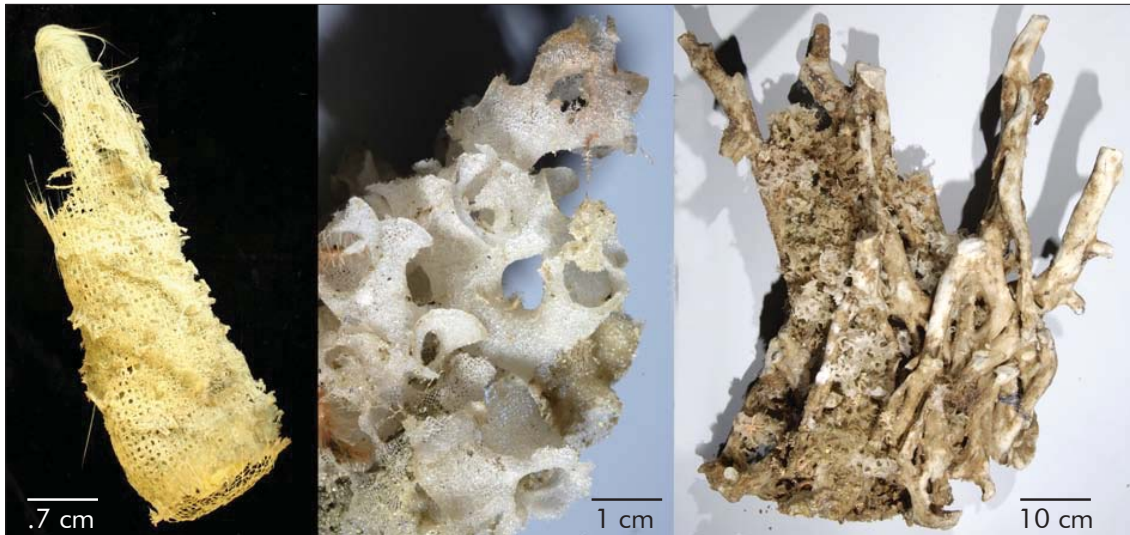
Depth: 300 to 600 m.

Similar species: None.

References: Tabachnick, K. R. (2002). Family Rossellidae Schulze, 1885. *In*: Hooper, J.N.A.; Soest, R.W.M. van (eds). *Systema Porifera: a guide to the classification of sponges*. New York. Kluwer Academic/Plenum Publishers, Pp. 1441–1505.

Phylum Porifera
Class Hexactinellida (glass sponges)
Order
Family

(Glass sponges) (GLS)



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Distinguishing features: Glass sponges are extremely diverse but all have a non-fleshy fibreglass or sacking texture; shapes range from rigid lacey honeycombs, to long solid rigid stems topped with a mushy sack-like body, to hollow fragile stems with 'windows', to stringy horns made of woven glass fibres, to rigid coral-like plates, to the soft mushy sack-like trumpets, to long twisted rope-like glass strands, to solid polystyrene-like balls with tufts of fine glass 'hair'.

Colour: White to grey, beige to pinkish.

Size: Standard length up to 50 cm.

Distribution: Widely distributed in the New Zealand deepsea region on hard and soft seafloor.

Depth: 60 to 200 m.

Similar species: Hexactinellid sponges are extremely difficult to identify unless the entire specimen is preserved; they are usually extremely fragile. The most common specimens are dredged up as delicate lacy honeycombs, broken solid or hollow stems, mushy 'sacking', matts of glass hair and sediment. Spicule analysis is essential for species determination.

References: Reiswig, H. M. (2002). Class Hexactinellida Schmidt, 1870. *In:* Hooper, J. N. A.; Soest, R. W. M. van ed. *Systema Porifera: a guide to the classification of sponges*. New York. Kluwer Academic/Plenum Publishers, Pp. 1201-1202.

Schulze, F. E. (1887). Report on the Hexactinellida collected by the H. M. S. 'Challenger' during the years 1873-1876. Report on the Scientific results of the Voyage of the H. M. S. 'Challenger', 1873-1876. *Zoology* 21: 1-514, pls I-CIV, 1 map.

