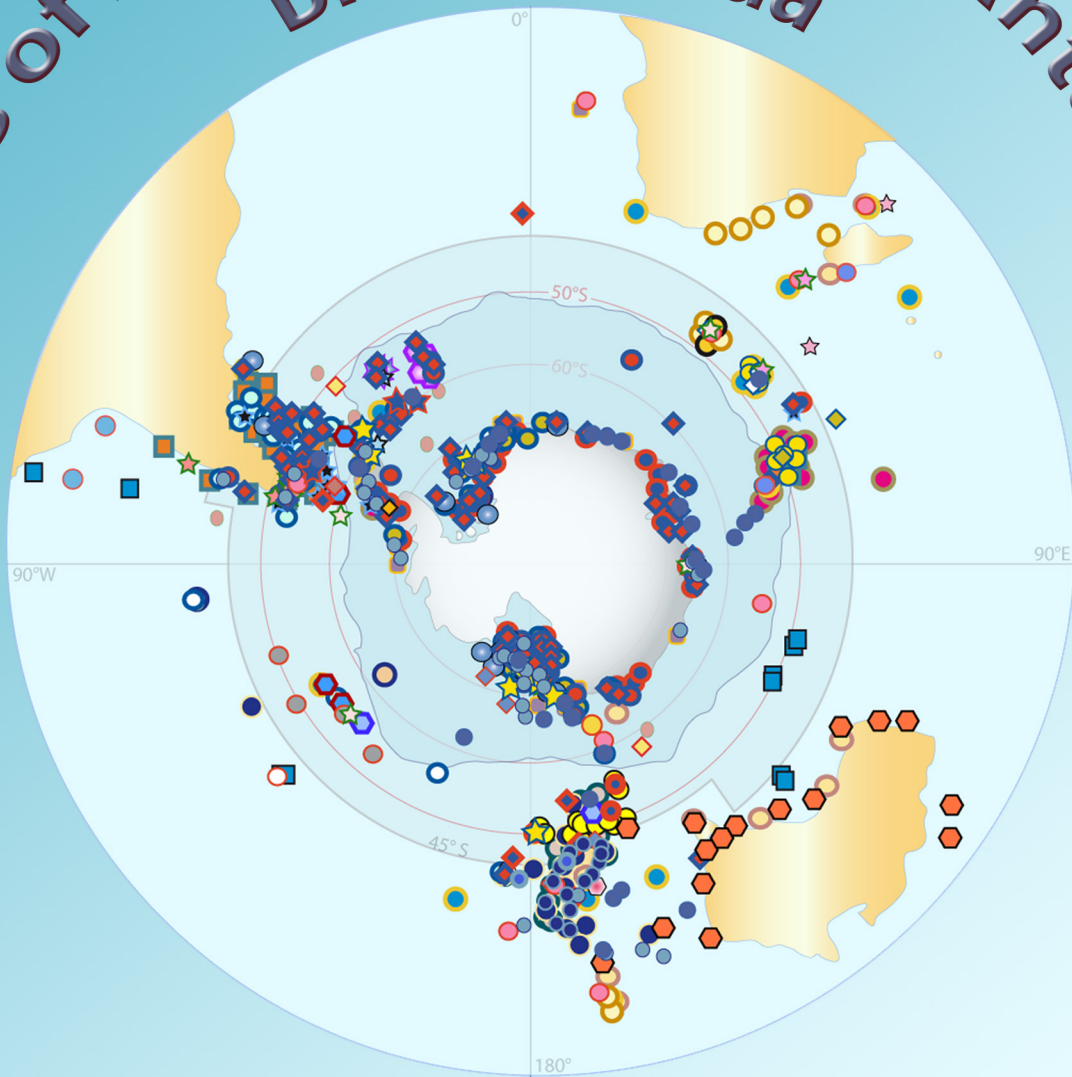


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# Atlas of Antarctic and sub-Antarctic Brachiopoda



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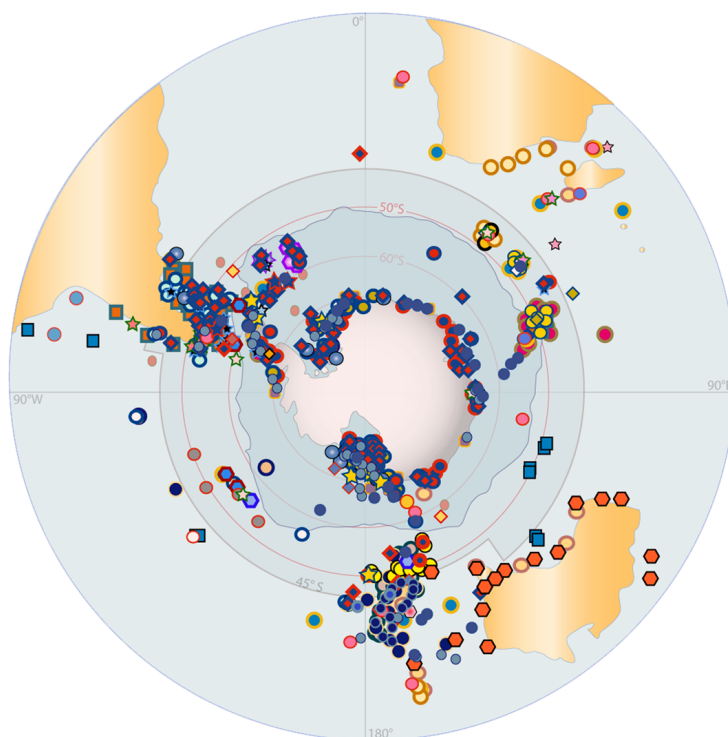
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# Atlas of Antarctic and sub-Antarctic Brachiopoda

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Cover : All Antarctic and sub-Antarctic records represented in this book.

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## Abstract

The specific diversity of Brachiopoda is proposed for the first time in an atlas of the Southern Ocean with maps for each genus in the Antarctic and sub-Antarctic zones. The three sub-phyla Linguliformea, Craniiformea and Rhynchonelliformea are represented: 51 species, belonging to 35 genera occur on a surface area covering about 20% of World Ocean. The low diversity in those zones is confirmed by the occurrence of only 12.6% of the total number of extant species of brachiopods (402) and of 29.4% of that of the genera (119). The absence of reliable diagnoses in most of the species makes difficult some comparisons and attributions. In the future several of these species and even genera could be considered as synonymous.

Keywords: brachiopod; diversity; Antarctic; sub-Antarctic; atlas.

## Résumé

### **Atlas des brachiopodes antarctiques et sub-antarctiques**

La diversité spécifique des Brachiopoda est proposée pour la première fois dans l'Océan austral (ou glacial antarctique) sous forme d'un atlas avec des cartes pour chaque genre dans les zones antarctiques et sub-antarctiques. Les trois sub-phylums Linguliformea, Craniiformea et Rhynchonelliformea sont représentés : 51 espèces, appartenant à 35 genres sur une superficie couvrant environ 20% de l'Océan Mondial. La faible diversité dans ces zones est confirmée par la présence de seulement 12,6% du nombre total d'espèces actuelles de brachiopodes (402) et de 29,4% de celui des genres (119). L'absence de diagnoses fiables dans pratiquement toutes les espèces rend difficile certaines comparaisons et attributions. Plusieurs de ces espèces et même genres pourraient se révéler être synonymes.

Mots-clés : brachiopod ; diversité ; antarctique ; sub-antarctique ; atlas.

## Introduction

Brachiopods, commonly known as lamp-shells, are lophophorate animals found only in marine waters. They are bilaterally symmetrical solitary coelomates, sessile benthic suspension-feeders, enclosed in a shell formed by a dorsal and a ventral valve, and fixed to or into the substrate by a pedicle. However, some taxa lacking a pedicle are cemented to the substratum by one of their valves, i.e., *Novocrania*. Brachiopods range in size from a few millimetres to over eight centimetres. The pedicle can adjust the position of the organism in relation to its surroundings (see Richardson, 1997; Emig, 1997). The lophophore, usually supported by a brachidium, varies in complexity among the taxa. Larvae are either planktotrophic or non-planktotrophic.

Brachiopods are one of the most ancient zoological groups with a long evolutionary history from before Precambrian to Holocene times. Extremely abundant during the Palaeozoic, especially during the Silurian and Devonian periods, they dominated the benthic fauna in number of species and in diversity of form. After the Permo-Triassic period the group has progressively decreased in diversity. However, in some biocenoses the brachiopods remain dominant. Fossil brachiopods are reported from the Antarctica since the lower Cambrian. Cenozoic brachiopods are rather well-known especially those from the Antarctic Peninsula. However, their degree of diversity remains questionable related to taxonomic uncertainties.

The classification established in the “Treatise on Invertebrate Paleontology” (Kaesler, 1997-2006) divides the Brachiopoda into three subphyla: the Linguliformea, the Craniiformea and the Rhynchonelliformea. Today, all three have representatives in Antarctic and sub-Antarctic waters (Table 1). Brachiopoda extend world-wide with at least 119 extant genera represented by 402 species. Representatives are found at all depths from littoral waters (generally subtidal) to the abyssal zone (Fig. 1). Most are epifaunal on hard substrates.

Taxa	genera	species	
Linguliformea	2	2	
Craniiformea	1	1	
Rhynchonelliformea	32	48	
O. Rhynchonellida	6	7	
O. Terebratulida	9	18	s/O.Terebratulidae
	17	23	s/O. Terebratellidae
Total	35	51	

Table 1: From the 70-75 extant species described in Antarctic and sub-Antarctic waters, there are only 51 valid recognized species, comprising 35 genera.

In Antarctic and sub-Antarctic waters, fifty-two extant species representing thirty-six genera have been recorded, of which seven genera occur also in Arctic waters (Table 2). All are epifaunal and are attached to hard substrate (stones, rocks, boulders, shells, worm tubes...). The diversity of the Antarctic fauna compares favourably with that of the faunas off other landmasses in the Southern Hemisphere: Australia, New Zealand, South Africa and South America, their identity being at either generic or specific levels. Several taxa in the vicinity of New Zealand differ markedly from those with a Magellanic distribution around South America and Antarctica; this diversification began about 82 Mya (Cohen *et al.*, 2011). Few Antarctic species are endemic. Many have a large distribution at least in the Southern Hemisphere. Among these, *Pelagodiscus atlanticus* and *Cryptopora gnomon*, are also present in Arctic waters (Table 2).

The extant brachiopod taxa are unusual in their relationship to science in that they are studied and described not only by zoologists but also and preponderantly by palaeontologists. Nevertheless most early studies from the Antarctic waters were by zoologists: Friedrich Blochmann (1858-1931), Louis

Joubin (1861-1935), Paul Eichler, William Dall (1845-1927), Johann Gerhard Helmcke (1908-1993), Paul Fischer (1835-1893) who had been sent material garnered during Antarctic cruises. However palaeontologists too: Thomas Davidson (1817-1885), Ehlert (1849-1920; see Emig, 2013), Allan Thomson (1881-1928), Wilfrid Jackson (1880-1978), Merrill Foster (publications in 1974 and 1989) have studied extant Antarctic brachiopods, providing excellent descriptions of the morphology and anatomy of soft body parts, including taxonomic characters.

Palaeontologists who since the 1950's have described some of the Antarctic brachiopods include only those characteristics found in fossils. Consequently, their accounts are restricted to characters used in describing fossils so the taxonomic characteristics they include are much less complete than the diagnoses prescribed by the International Code of Zoological Nomenclature (ICZN, 1999). This failing increased the number of species while omitting well-defined characters proposed previously. New species were established mainly on dimensional and morphological aspects of the shell, so several are invalid taxonomically.

However, morpho-anatomical characters were brought to prominence by various authors: musculature (Bulmann, 1939; Helmcke, 1939a, 1940; Foster, 1974; Emig, 1997; and others), lophophore and disposition of mantle canals (Emig, 1992; Williams *et al.*, 1997), pedicle (Richardson, 1979, 1981b), shell (Boullier *et al.*, 1986; Álvarez *et al.*, 2010), and the taxonomic value of spicules, nephridia, gonads and larvae was not yet appreciated. None of these diagnostic characters was used in the revision of systematics in part H (Brachiopoda) of the Treatise of Invertebrate Paleontology (Kaesler, 1997-2006; Selden, 2007), although they are detailed in the Anatomy chapter of Volume 1 (Williams *et al.*, 1997).

Moreover, ignorance regarding ecological data makes it impossible to place a population in its biocenosis (see Emig, 1987). And some of these data may also be considered as having a phylogenetic significance. It is well known that two species of the same genus may not occur in the same biotope. This fact must be taken into account in the Antarctic where specific diversity is low: about 12.6% of all extant brachiopod species, and 29.4% of the genera, have been recorded in the Southern Ocean which covers about 20% of the surface area of the Global Ocean (Tables 3 and 4; Fig. 1).

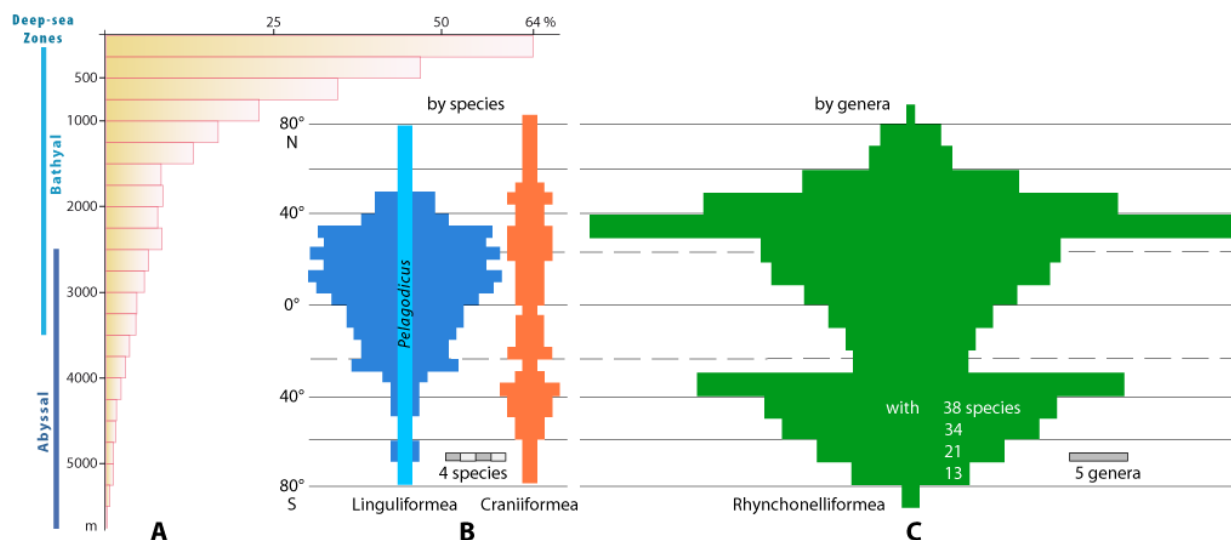


Figure 1: **A.** Bathymetrical distribution of the species of extant brachiopods (in percentage). **B & C.** Latitudinal distribution of the extant species of Linguliformea and Craniiformea (**B**) and the extant genera of Rhynchonelliformea (**C**). From Emig (2017).

Finally, there is a basic need to establish the intra- and inter-population variations for all valid taxonomic characters, as well as for those that are modified in accordance with the age of the individual. Three or more species of one genus have sometimes been established and described on the basis of differences in a given character, especially those of shell outline and shape. Yet such elements are known to have no taxonomic value. Consequently, a large number of described species, not only those from the Antarctic area, lack phylogenetic authenticity. For example, *Liothyrella moseleyi*, *L. delsolari* and *L. winteri* may probably be considered synonyms of *L. uva*, along with *Acrobrochus* and *Liothyrella*.

Consequently there is a pre-eminent need for the establishment of well-defined phylogenetic criteria for each species and genus that will result in a rigorous and reliable systematics, a requirement for any worthwhile analysis of biodiversity and molecular studies, but also in the food and pharmaceutical industries, taphonomy, palaeoecological interpretation, and in the broad field of formal and informal education at all levels. A cladistic approach based on extant brachiopod species cannot be confined solely to the shape and dimensions of the shell, because other phylogenetic characters occur in the soft-bodied parts of the brachiopods.

The diversity of brachiopods in the Arctic and Antarctic realms is best expressed by their numbers, respectively 10 and 51 species. Obviously the epifauna is more heterogeneous and predominates in the Antarctic communities. The list of brachiopod genera and species in the Arctic (Arndt & Grieg, 1933; Zezina, 1977a, 1997b, 1980, 1997; Zezina & Raysky, 2010) and that of the species of the same genera found in the Antarctica (Tables 1 and 4) is given on Table 2.

Both Arctic and Southern oceans have great differences which may explain their diversity: shortly, the Arctic Ocean is the smallest one in the World (14.2 millions de km<sup>2</sup>) and its southern limit is about the Arctic Circle (66°33'N), while the Southern Ocean has an area at last twice with a northern limit at nearly 40°S (Table 3).

Genera	Species	
	Arctic	Antarctic
<i>Pelagodiscus</i>	<i>atlanticus</i>	<i>atlanticus</i>
<i>Discradisca</i>	?	<i>cumingii</i>
<i>Cryptopora</i>	<i>gnomon</i>	<i>gnomon</i>
<i>Novocrania</i>	<i>anomala</i>	<i>lecointei</i>
<i>Terebratulina</i>	<i>retusa</i>	<i>kiiensis</i>
	<i>septentrionalis</i>	
<i>Macandrevia</i>	<i>cranium</i>	<i>americana</i>
		<i>diamantina</i>
<i>Dallina</i>	<i>septigera</i>	<i>elongata</i>
		<i>eltanini</i>

Table 2: List of the seven genera of Brachiopoda occurring in the Arctic and Antarctic zones.



## Limits of the Antarctic and sub-Antarctic zones

The scientific zones of the Southern Ocean used herein have been defined in De Broyer *et al.* (2011). Nevertheless as true biological demarcation of the Antarctic zone, we have retained the Antarctic Polar front (Table 3). The limit of the sub-Antarctic zone is defined on Table 3. This line is close to the sub-tropical front.

Both zones are covered by the Southern Ocean, which circles Antarctica. The northern limit of the Southern Ocean is not so clearly defined, but biological it is usually consider the Subtropical Front (Table 3) which is a transition zone between cool, fresh, nutrient-rich subantarctic waters and warm, salty, nutrient-poor subtropical waters. Although the position of the Subtropical Front varies with longitude, it lies roughly along 40°S for much of the Southern Ocean. Defined in this way, this latter occupies about 20% of the surface area of the Global Ocean.

The occurrences of the genera and species of Brachiopoda in each zone are listed on Table 4: only 12.6% of the species and 29.4% of the genera have been recorded when comparing to the diversity of the extant brachiopod in Global Ocean.

<i>Sub-Antarctic limit</i>	Longitude	Latitude
<i>South Atlantic and Indian Ocean</i>	60°W - 140°E	43°S
<i>Pacific Ocean</i>	140°E - 176°W	48°S
	176°W - 80°W	45°S
	80°W - 72°W	41°S

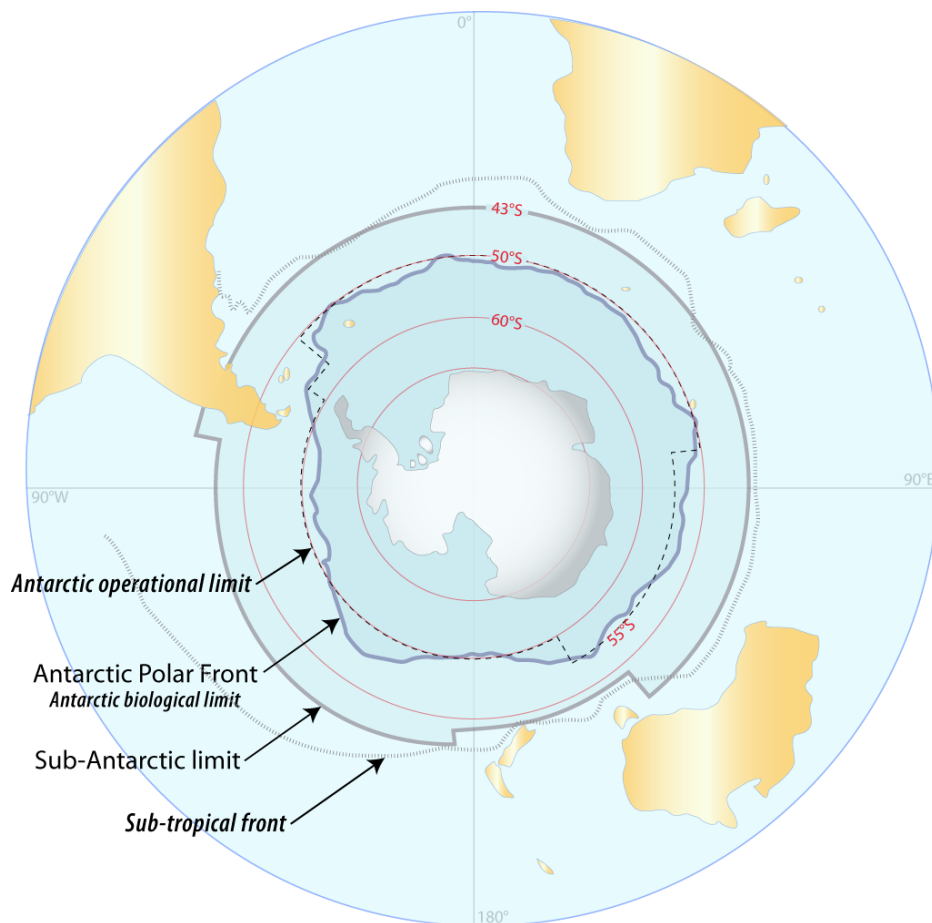


Table 3: Limits of the Antarctic and sub-Antarctic zones.

<i>Genera</i>	Antarctic Zone	Sub-Antarctic Zone
<i>Abyssorhynchia</i>		1
<i>Abyssothyris</i>	1	1
<i>Acrobrochus</i>	2	2
<i>Aerothyris</i>	2	2
<i>Amphithyris</i>	1	
<i>Aneboconcha</i>	2	1
<i>Cancellothyris</i>		1
<i>Compsothyris</i>	2	
<i>Cryptopora</i>	1	1
<i>Dallina</i>	1	2
<i>Discradisca</i>	1	
<i>Dyscolia</i>	1	1
<i>Dyscritosia</i>	1	
<i>Ecnomiosa</i>		1
<i>Eucalathis</i>	2	2
<i>Fallax</i>	1	
<i>Fosteria</i>	1	1
<i>Gyrothyris</i>		1
<i>Liothyrella</i>	1	4
<i>Macandrevia</i>	2	2
<i>Magasella</i>	1	1
<i>Magellania</i>	3	2
<i>Manithyris</i>	1	
<i>Melvicalathis</i>		1
<i>Neorhynchia</i>	1	1
<i>Neothyris</i>		1
<i>Novocrania</i>	1	1
<i>Pelagodiscus</i>	1	1
<i>Pemphixina</i>	1	1
<i>Phaneropora</i>	1	1
<i>Platidia</i>	1	1
<i>Syntomaria</i>	1	1
<i>Terebratella</i>		1
<i>Terebratulina</i>		1
<i>Xenobrochus</i>	1	2
<b>Genera: 35</b>	<b>28</b>	<b>30</b>
<b>Species: 51</b>	<b>35</b>	<b>39</b>

Table 4: Occurrences of genera and species in the Antarctic and sub-Antarctic zones.

## Classification

Phylum Brachiopoda Duméril, 1805

Subphylum LINGULIFORMEA Williams, Carlson, Brunton, Holmer & Popov, 1996

Class Lingulata Gorjansky & Popov, 1985

Order Lingulida Waagen, 1885

Superfamily Discinoidea Gray, 1840

Family Discinidae Gray, 1840

*Pelagodiscus* Dall, 1908

*Pelagodiscus atlanticus* (King, 1868)

*Discradisca* Stenzel, 1964

*Discradisca cumingii* (Broderip, 1833)

Subphylum CRANIIFORMEA Popov, Basset, Holmer & Laurie, 1993

Class Craniata Williams, Carlson, Brunton, Holmer & Popov, 1996

Order Craniida Waagen, 1885

Superfamily Cranioidea Menke, 1828

Family Craniidae Menke, 1828

*Novocrania* Lee & Brunton, 2001

*Novocrania lecointei* (Joubin, 1901)

Subphylum RHYNCHONELLIFORMEA Williams, Carlson, Brunton, Holmer & Popov, 1996

Class Rhynchonellata Williams, Carlson, Brunton, Holmer & Popov, 1996

Order Rhynchonellida Kuhn, 1949 Superfamily Dimerelloidea Buckman, 1918

Family Cryptoporidae Muir-Wood, 1955

*Cryptopora* Dall, 1908

*Cryptopora gnomon* Cooper, 1981

Superfamily Norelloidea Ager, 1959

Family Frieleiidae Cooper, 1959

Subfamily Freileiinae Cooper, 1959

*Comsothyris* Jackson, 1918

*Comsothyris racovitzae* (Joubin, 1901)

*Comsothyris ballenyi* Foster, 1974

Subfamily Hispanirhynchiinae Cooper, 1959

*Manithyris* Foster, 1974

*Manithyris rossi* Foster, 1974

*Abyssorhynchia* Zezina, 1980

*Abyssorhynchia craneana* (Dall, 1895)

Subfamily Neorhynchiinae Mancenido & Owen, 2002

*Neorhynchia* Thomson, 1915

*Neorhynchia strebeli* (Dall, 1908)

Superfamily Hemithiridoidea Rzhonsnitskaia, 1956

Family Hemithirididae Rzhonsnitskaia, 1956

*Pemphixina* Cooper, 1981

*Pemphixina pyxidata* (Davidson, 1880)

Order Terebratulida Waagen, 1883

Suborder Terebratulidina Waagen, 1883

- Superfamily Terebratuloidea Gray, 1840
    - Family Terebratulidae Gray, 1840
      - Subfamily Terebratulinae Gray, 1840
        - Acrobrochus* Cooper, 1983
          - Acrobrochus blochmanni* (Jackson, 1912)
          - Acrobrochus vema* (Cooper, 1973)
        - Liothyrella* Thomson 1916
          - Liothyrella uva* (Broderip, 1833)
          - Liothyrella delsolari* Cooper, 1982
          - Liothyrella moseleyi* (Davidson, 1878)
          - Liothyrella neozelanica* Thomson, 1918
          - Liothyrella winteri* (Blochmann, 1906)
  - Superfamily Dyscolioidea Fischer & Cehlert, 1891
    - Family Dyscoliidae Fischer & Cehlert, 1891
      - Subfamily Dyscoliinae Fischer & Cehlert, 1891
        - Dyscolia* Fischer & Cehlert, 1890
          - Dyscolia ? radiata* Cooper, 1981
          - Dyscolia* sp.
      - Subfamily Aenigmathyridinae Cooper, 1983
        - Abyssothyris* Thomson, 1927
          - Abyssothyris wyvillei* (Davidson, 1878)
        - Xenobrochus* Cooper, 1981
          - Xenobrochus africanus* (Cooper, 1973)
          - Xenobrochus anomalus* Cooper, 1981
          - Xenobrochus australis* Cooper, 1981
  - Superfamily Cancellothyroidea Thomson, 1926
    - Family Cancellothyrididae Thomson, 1926
      - Subfamily Cancellothyridinae Thomson, 1926
        - Cancellothyris* Thomson, 1926
          - Cancellothyris hedleyi* (Finlay, 1927)
        - Terebratulina* d'Orbigny, 1847
          - Terebratulina kiiensis* Dall & Pilsbry, 1891
    - Family Chlidonophoridae Muir-Wood, 1959
      - Subfamily Eucalathinae Muir-Wood, 1965
        - Eucalathis* Fischer & Cehlert, 1890
          - Eucalathis murrayi* (Davidson, 1878)
          - Eucalathis macrorhyncus* Foster, 1974
          - Eucalathis magna* Cooper, 1981
          - Eucalathis* sp.
        - Melvicalathis* Lee *et al.*, 2008
          - Melvicalathis macroctena* (Zezina, 1981)
- Suborder Terebratellidina Muir-Wood, 1955
  - Superfamily Zeillerioidea Allan , 1940
    - Family Zeilleriidae Allan , 1940
      - Subfamily Macandreviinae Cooper, 1973
        - Macandrevia* King, 1859
          - Macandrevia americana* Dall, 1895
          - Macandrevia diamantina* Dall, 1895

- Superfamily Kingenoidea Elliot, 1948
  - Family Kingenidae Elliot, 1948
    - Subfamily Ecnomiosinae Cooper, 1977
      - Ecnomiosia* Cooper, 1977
      - Ecnomiosa inexpectata* Cooper, 1981
  - Family Aulacothyropsidae Dagys, 1972
    - Subfamily Babukellinae MacKinnon, Smirnova & Lee, 2002
      - Fallax* Atkins, 1960
      - Fallax antarcticus* Foster, 1974
- Superfamily Platidioidea Thomson, 1927
  - Family Platidiidae Thomson, 1927
    - Subfamily Platidiinae Thomson, 1927
      - Platidia* Costa, 1852
      - Platidia anomioides* (Scacchi & Philippi, 1844)
      - Amphithyris* Thomson, 1918
      - Amphithyris hallenttensis* Foster, 1974
    - Subfamily Phaneroporinae Zezina, 1981
      - Phaneropora* Zezina, 1981
      - Phaneropora galathea* Zezina, 1981
- Superfamily Terebratelloidea King, 1850
  - Family Terebratellidae King, 1850
    - Subfamily Terebratellinae King, 1850
      - Terebratella* d'Orbigny, 1847
      - Terebratella dorsata* (Gmelin, 1790)
      - Magasella* Dall, 1870
      - Magasella sanguinea* (Leach, 1814)
      - Syntomaria* Cooper, 1982
      - Syntomaria curiosa* Cooper, 1982
      - Aerothyris* Allan, 1939
      - Aerothyris macquariensis* (Thomson, 1918)
      - Aerothyris kerguelensis* (Davidson, 1878)
      - Aneboconcha* Cooper, 1973
      - Aneboconcha obscura* (Cooper, 1973)
      - Aneboconcha smithii* (Pfeffer, 1886)
      - Dyscritosia* Cooper, 1982
      - Dyscritosia secreta* Cooper, 1982
      - Fosteria* Zezina, 1980
      - Fosteria spinosa* (Foster, 1974)
      - Gyrothyris* Thomson, 1918
      - Gyrothyris mawsoni* Thomson, 1918
      - Neothyris* Douvillé, 1879
      - Neothyris lenticularis* (Deshayes, 1839)
    - Subfamily Magellaniinae Beecher, 1893
      - Magellania* Bayle, 1880
      - Magellania fragilis* (Smith, 1907)
      - Magellania joubini* (Blochmann, 1906)
      - Magellania venosa* (Solander, 1789)
  - Family Dallinidae Beecher, 1893
    - Subfamily Dallinae Beecher, 1893
      - Dallina* Beecher, 1893

*Dallina elongata* Hatai, 1940

*Dallina eltanini* Foster, 1974

### Alphabetical list of genera and species

<i>Abyssorhynchia</i>	<i>craneana</i>		
<i>Abyssothyris</i>	<i>wyvillei</i>	<i>Liothyrella</i>	<i>uva</i> <i>delsolari</i> <i>moseleyi</i> <i>neozelanica</i> <i>winteri</i>
<i>Acrobrochus</i>	<i>blochmanni</i> <i>vema</i>	<i>Macandrevia</i>	<i>americana</i> <i>diamantina</i>
<i>Aerothyris</i>	<i>macquariensis</i> <i>kerquelensis</i>	<i>Magasella</i>	<i>sanguinea</i>
<i>Amphithyris</i>	<i>hallettensis</i>	<i>Magellania</i>	<i>fragilis</i> <i>joubini</i> <i>venosa</i>
<i>Aneboconcha</i>	<i>obscura</i> <i>smithii</i>	<i>Manithyris</i>	<i>rossi</i>
<i>Cancellothyris</i>	<i>hedleyi</i>	<i>Melvicalathis</i>	<i>macroctena</i>
<i>Compsothyris</i>	<i>ballenyi</i> <i>racovitzae</i>	<i>Neorhynchia</i>	<i>strebeli</i>
<i>Cryptopora</i>	<i>gnomon</i>	<i>Neothyris</i>	<i>lenticularis</i>
<i>Dallina</i>	<i>elongata</i> <i>eltanini</i>	<i>Novocrania</i>	<i>lecointei</i>
<i>Discradisca</i>	<i>cumingii</i>	<i>Pelagodiscus</i>	<i>atlanticus</i>
<i>Dyscolia</i>	<i>radiata</i> sp.	<i>Pemphixina</i>	<i>pyxidata</i>
<i>Dyscritosia</i>	<i>secreta</i>	<i>Phaneropora</i>	<i>galatheae</i>
<i>Ecnomiosa</i>	<i>inexpectata</i>	<i>Platidia</i>	<i>anomioides</i>
<i>Eucalathis</i>	<i>murrayi</i> <i>macrorhynchus</i> <i>magna</i> sp.	<i>Syntomaria</i>	<i>curiosa</i>
<i>Fallax</i>	<i>antarcticus</i>	<i>Terebratella</i>	<i>dorsata</i>
<i>Fosteria</i>	<i>spinosa</i>	<i>Terebratulina</i>	<i>kiiensis</i>
<i>Gyrothyris</i>	<i>mawsoni</i>	<i>Xenobrochus</i>	<i>africanus</i> <i>anomalus</i> <i>australis</i>

## Geographical distribution<sup>1</sup>

Genus *Abyssorhynchia* Zezina, 1980a

[Type species= *Hemithyris craneana* Dall, 1895 (p. 717)]

Diagnosis from volume 4 of the Treatise on Invertebrate Paleontology (Kaesler, 2002):

Medium, translucent, rounded-triangular; rectimarginate to broadly sulcate; ventribiconvex; shell smooth to faintly striate; beak short, suberect, foramen open, large, hypothyrud. Dorsal septum very short and low; crura anteriorly enlarged, forming small, flat, spadelike distal ends.

Geological range: Present (Holocene).

***Abyssorhynchia craneana*** (Dall, 1895)

*Hemithyris craneana* Dall, 1895

*Hispanirhynchia craneana* Thomson, 1927

*Hispanirhynchia ? chiliensis* Foster, 1974

Type locality: "Station 3362, in 1175 fathoms, mud, off Cocos Island, Gulf of Panama" [2,149 m].

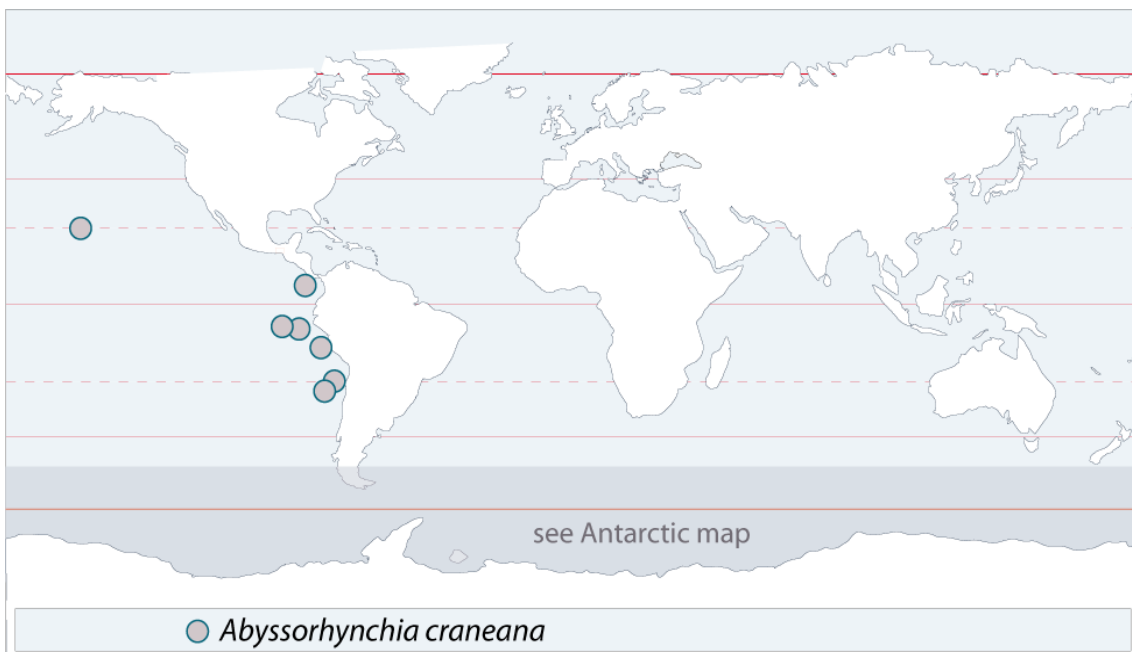
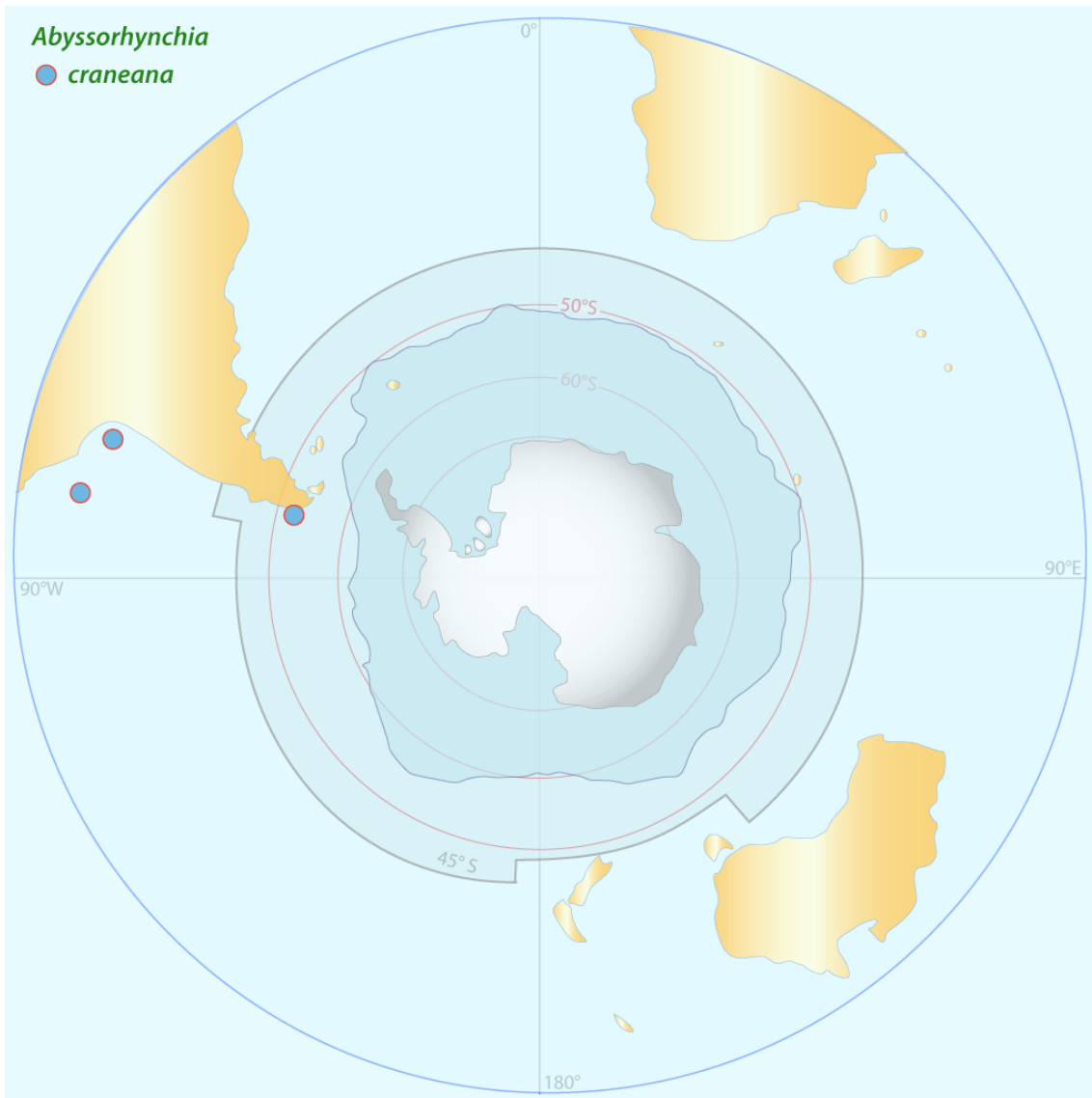
Depth range: 1409 – 4600 m.

References: Foster (1974), Zezina (1980a).

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<sup>1</sup> The references indicated for each species concern only the Antarctic and sub-Antarctic zones as limited on the maps.

The localities plotted outside of these zones are not exhaustive as well as on the maps of the world – no references are given for.





Genus *Abyssothyris* Thomson, 1927

[Type species= *Terebratula wyvilli* Davidson, 1878 (p. 436)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small to medium, oval to subpentagonal in outline, ventribiconvex, smooth, thin shelled; anterior commissure unisulcate; beak small, suberect; foramen large, permesothyrid; symphytium partly visible; pedicle collar short, teeth small; cardinal process small, semielliptical, outer hinge plates narrowly triangular, tapering anteriorly to bluntly pointed crural processes located at midloop; crural bases narrow; transverse band broad, gently folded medially, anterior part of loop variable, anterolateral extremities rounded to subangular. Lophophore plectolophous with small median coil.

Geological range: Miocene - Present (Holocene).

*Abyssothyris wyvillei* (Davidson, 1878)

*Liothyris wyvillii*: Davidson (1886)

*Terebratella (Liothyrina) wyvillei*: Möricke (1895)

*Liothyrina wyvillii*: Dall (1908)

*Gryphus wyvillii*: Dall (1921)

*Abyssothyris wyvillei*: Thomson (1927)

*Abyssothyris elongata* Cooper, 1972

*Abyssothyris* sp. Cooper, 1973a

*Abyssothyris* cf. *A. wyvillei*: Foster (1974)

*Liothyrella* sp. *A* Foster, 1974 (see Foster, 1989)

*Abyssothyris atlantica* Cooper, 1977 (see Laurin, 1997)

*Abyssothyris? parva* Cooper, 1977 (see Laurin, 1997)

*Abyssothyris* sp. 1 & 2 Cooper, 1977

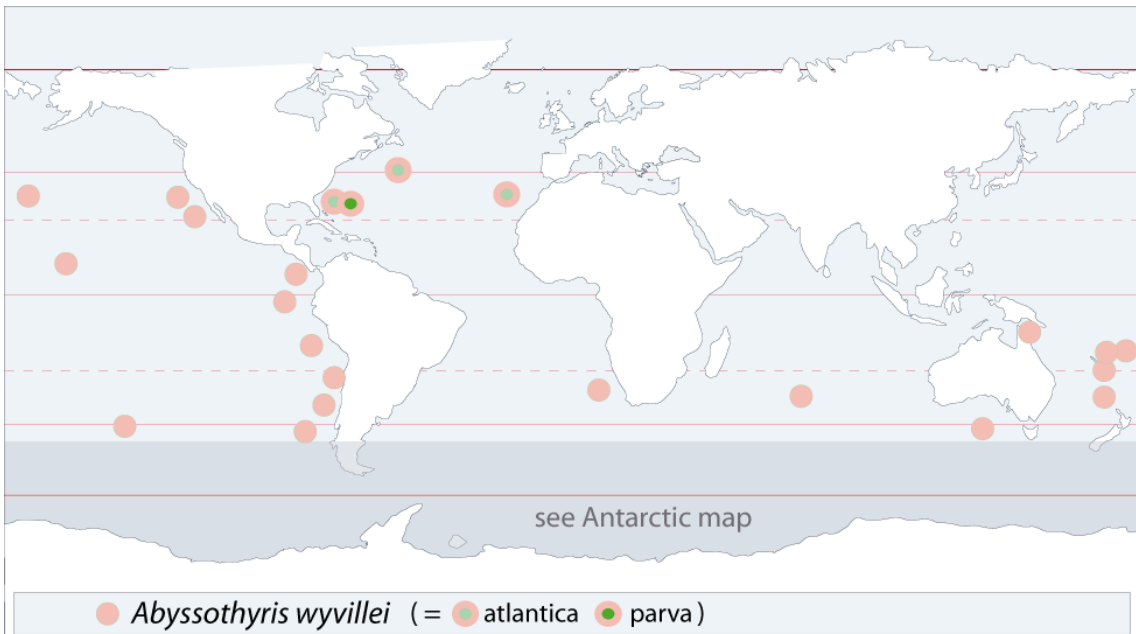
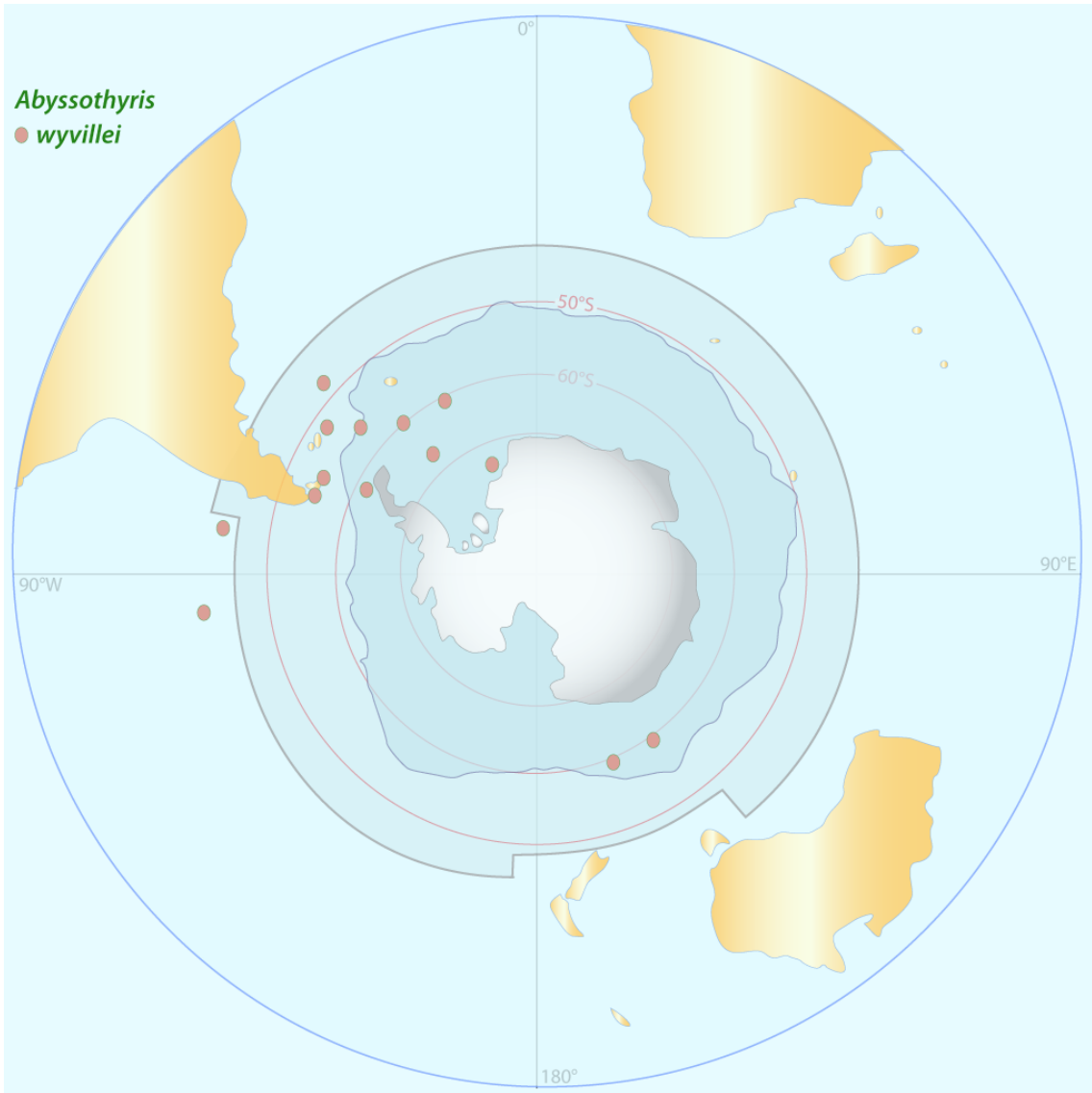
*Abyssothyris? sp.* Cooper, 1982

*Abyssothyris* cf. *elongata* Cooper, 1982

Type locality: "42°41'S, 134°10'E, depth 2,600 fathoms" [1,829 m].

Depth range: 284 - 6179 m.

References: Blochmann (1910), Cooper (1973a, 1982), Davidson (1878, 1886-1888), Dall (1921), Foster (1969, 1974, 1989), Zezina (1975, 1980a, 1993).



Genus ***Acrobrochus*** Cooper, 1983

[Type species= *Liothyrella? vema* Cooper, 1973a (p. 17)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Medium to large, oval to subpentagonal; anterior commissure rectimarginate to uniplicate, smooth; beak suberect, short, labiate; foramen moderately large, permesothyrid; symphytium partly visible; pedicle collar short, excavate; cardinal process is a transverse semiellipse; outer hinge plates taper onto posteroventral edges of crural processes; loop narrow with broad, transverse band.

Geological range: Eocene-Present (Holocene).

***Acrobrochus blochmanni*** (Jackson, 1912)

*Liothyris blochmanni* Jackson, 1912 (p. 378)

*Liothyrella blochmanni*: Thomson (1918)

?*Liothyrella multiporosa* Foster, 1974

?*Liothyrella scotti* Foster, 1974

*Liothyris blochmanni*: Zezina (1976)

Type locality: “Station 417; lat. 71°22'S., long. 16°34'W. (off Coats Land). Depth, 1410 fathoms. March 18, 1904” [depth 2579 m].

Depth range: 103 - ?3697 m.

References: Cooper (1973a), Dall (1921), Foster (1974, 1989), Jackson (1912), Zezina (1994).

***Acrobrochus vema*** (Cooper, 1973a)

*Liothyris vema*: Zezina (1976)

*Acrobrochus hendleri* Cooper, 1982

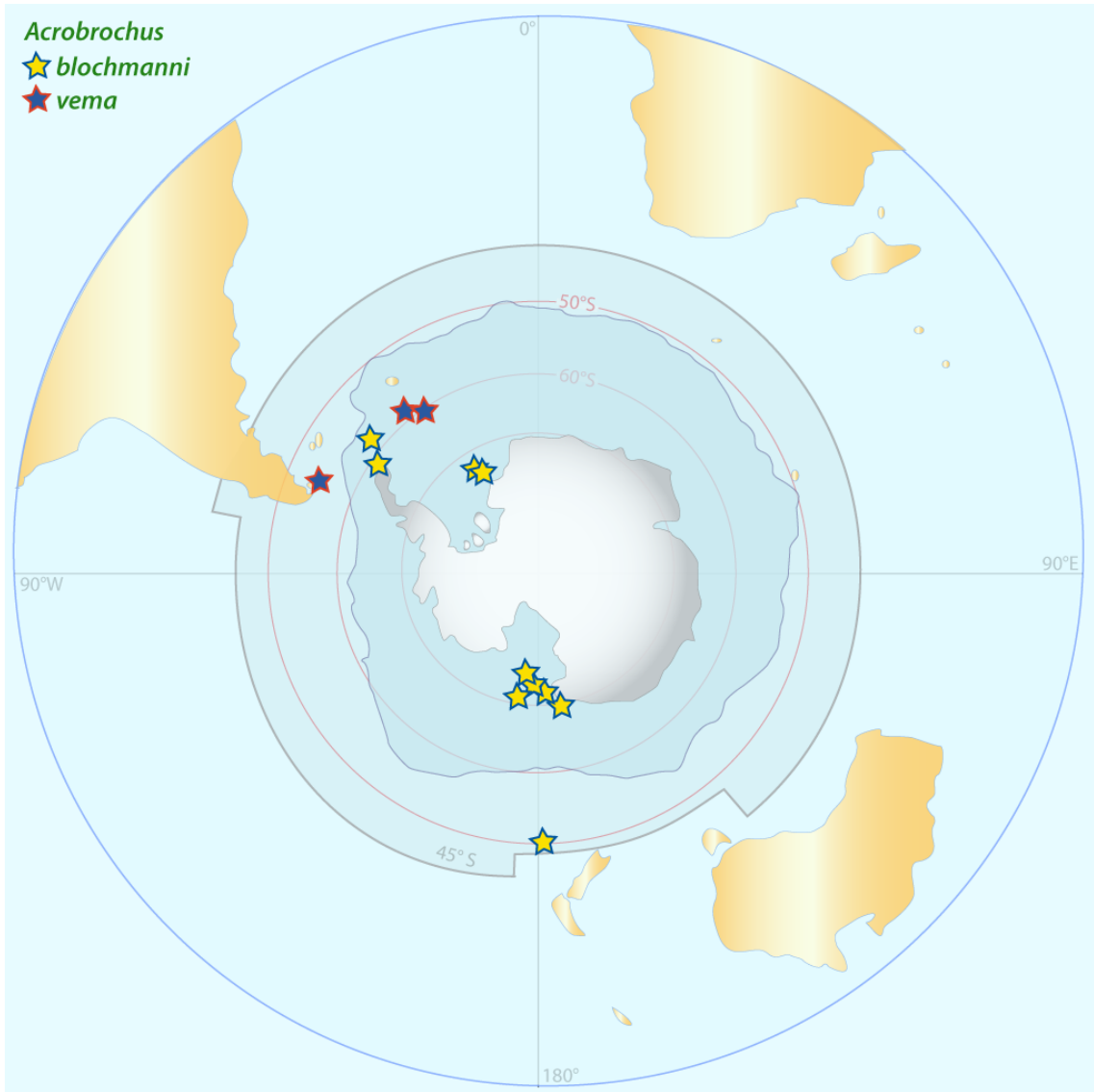
Type locality: “V-17-61. Latitude 54°44'S, longitude 55°39'W, at 1814-1919 meters, off east end of Burdwood Bank, east of south end of Argentina.”

off Burdwood Bank (54°44'S, 55°39'E, 1814-1919 m).

Depth range: 732 - 2578 m.

Diagnosis (Cooper, 1973a): Large, nearly equivalved *Liothyrella?*, with stout loop and broadly uniplicate anterior margin.

References: Cooper (1973a, 1982), Foster (1989).



Genus *Aerothyris* Allan, 1939

[Type species= *Magellania macquariensis* Thomson, 1918 (p. 30)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006)

Medium size, variably ovate, weakly to moderately unisulcate, smooth; beak suberect, attrite, foramen medium to large, mesothyrid, deltidial plates commonly disjunct, rarely conjunct in some adults. Cardinalia moderately thickened; outer hinge plates prominent and gently inclined; inner hinge plates more steeply inclined, uniting medianly to form septalium; cardinal process prominent, consisting of striated transverse myophore; crura with prominent crural processes; median septum bladeliike; adult loop teloform.

Geological range: Present (Holocene).

*Aerothyris macquariensis* (Thomson, 1918)

*Magellania macquariensis* Thomson, 1918

Type locality: "on beach above present high-water level, Wireless Cove, north-west end of Macquarie Island; over an extent of ¼ mile."

Depth range: 50 - 714 m.

References: Allan (1939, 1940a), Bowen (1968), Cooper (1981), Cotton (1937), Foster (1967, 1969, 1989), Richardson (1997), Thomson (1918).

*Aerothyris kerguelensis* (Davidson, 1878)\*

*Waldheimia kerguelensis* Davidson, 1878

*Waldheimia dilatata* Lamarck: Smith (1879)

*Terebratella dorsata* Davidson, 1880

*Magellania kerguelensis*: Eichler (1911) – See also *Aneboconcha eichleri*.

*Magellania kerguelenensis*: Jackson (1918)

*Aerothyris eichleri* Allan, 1939

*Magellania kerguelenensis*: Foster (1974)

*Macandrevia kerguelensis*: d'Hondt (1977)

*Magellania kerguelensis*: Zezina (1980)

*Aerothyris kerguelenensis*: Cooper (1981)

Type locality: "dredged by the 'Challenger' Expedition off Marion Island, west of Kerguelen Isle, in a depth of 100 fathoms, and also in lat. 50°4'S., long. 71°22'E., at a depth of 150 fathoms" (South Africa).

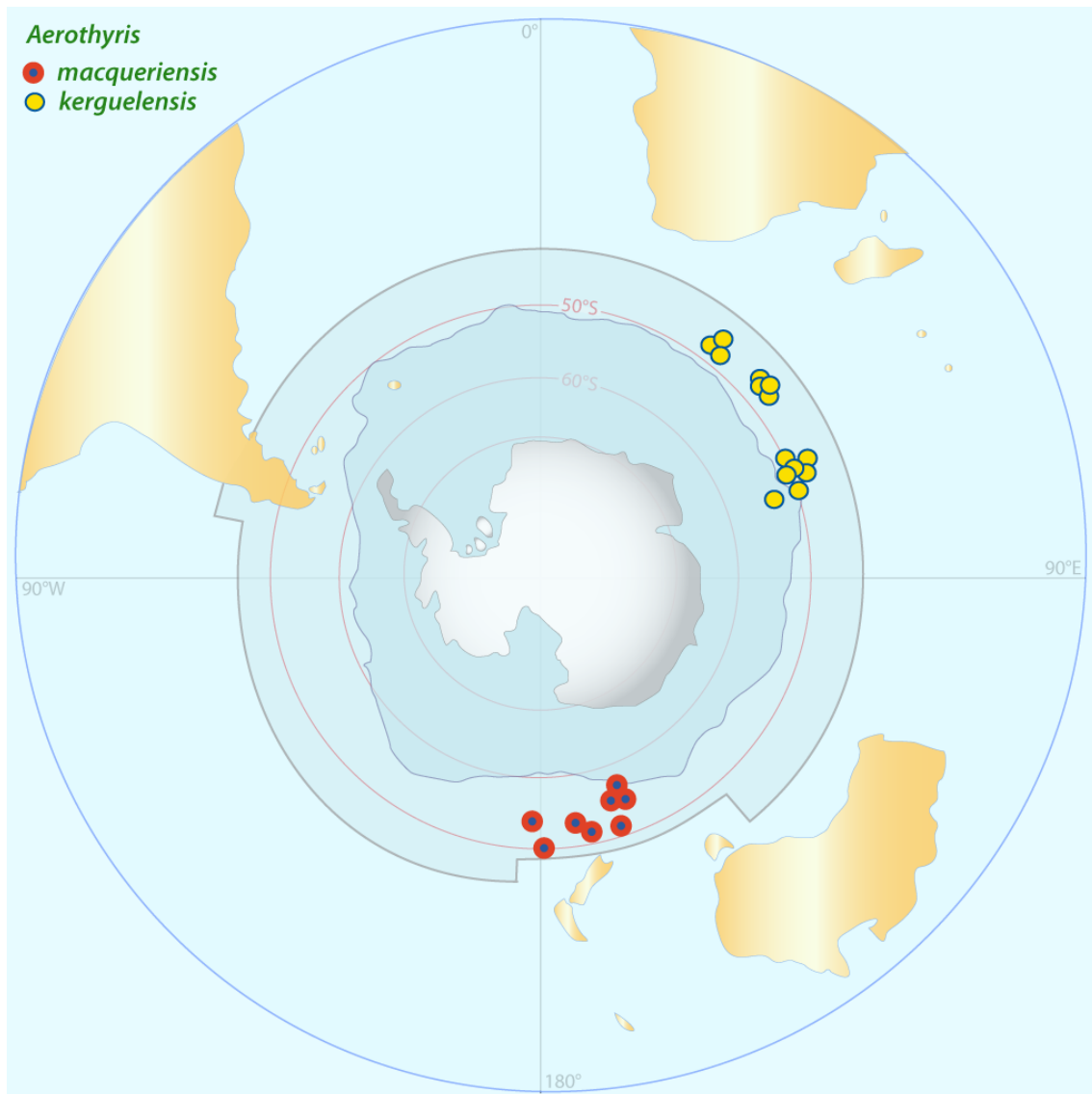
Depth range: from some meters – more than 500 m.

References: Allan (1939, 1940a), Cooper (1981), Dall (1921), Davidson (1880, 1886-1888), Eichler (1911), Foster (1969, 1974), Hiller (1994), d'Hondt (1977), Jackson (1918), Richardson (1997), Smith (1879), Zezina (1980a).

\* Note:

- The original species name by Davidson (1878, p. 431) is *kerguelensis* not *kerguelenensis* as written by several latter authors (see above); none of them got an explanation for this change of the original name. Hiller (1994, p. 72) used erroneously the name *kerguelenensis* for all synonyms. Consequently, the correct name remains *kerguelensis* according to article 32.1 of the International Code of Zoological Nomenclature (1999), which is applied herein.
- The genus name, *Magellania* Bayle, 1880 or *Aerothyris* Allan, 1939, remains under debate for this species. Cooper (1981) pointed out that *A. kerguelensis* retains a smooth-shell into the adult stages, which is an important characteristic according to Allan (1939). Hiller (1994) confirms this statement. Typical *Magellania* shows strong costae developed round the margins of mature shells. The use of such a taxonomical character to separate two genera remains questionable.
- Foster (1989) pointed out that "A better understanding of this species is particularly vital in

order to adequately evaluate a number of somewhat similar species that occur in the same area that may be variants of *Magellania venosa*. These similar species include: ***Waldheimia smithi*** Pfeffer, 1866 (= ***Anecoboncha smithi*** Zvezina, 1980a); ***Magellania wyvillei*** Davidson, 1878; ***Anecoconcha obscura*** Cooper, 1973a; ***Syntomaria curiosa*** Cooper, 1982; and ***Dysritostia secreta*** Cooper, 1982.”



Genus ***Amphithyris*** Thomson, 1918

[Type species= *Amphithyris buckmani* Thomson, 1918 (p. 20)]

Diagnosis from Nauendorf *et al.* (2014):

Small shell (up to 5mm), planoconvex to biconvex, punctate, round to oval; shell outline variable depending on substrate of attachment. Ventral valve convex; dorsal valve slightly convex to almost flat; short pedicle; beak apiculate; foramen amphithyrid; schizolophous lophophore. Hinge line nearly straight; triangular delthyrium; dental plates absent.

Geological range: Present (Holocene).

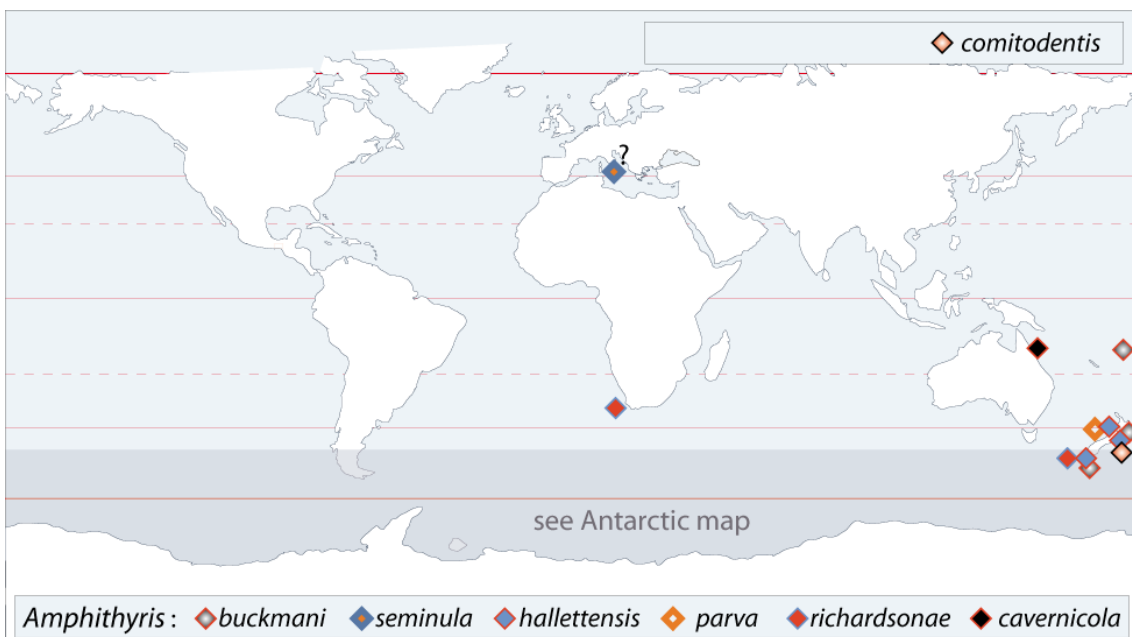
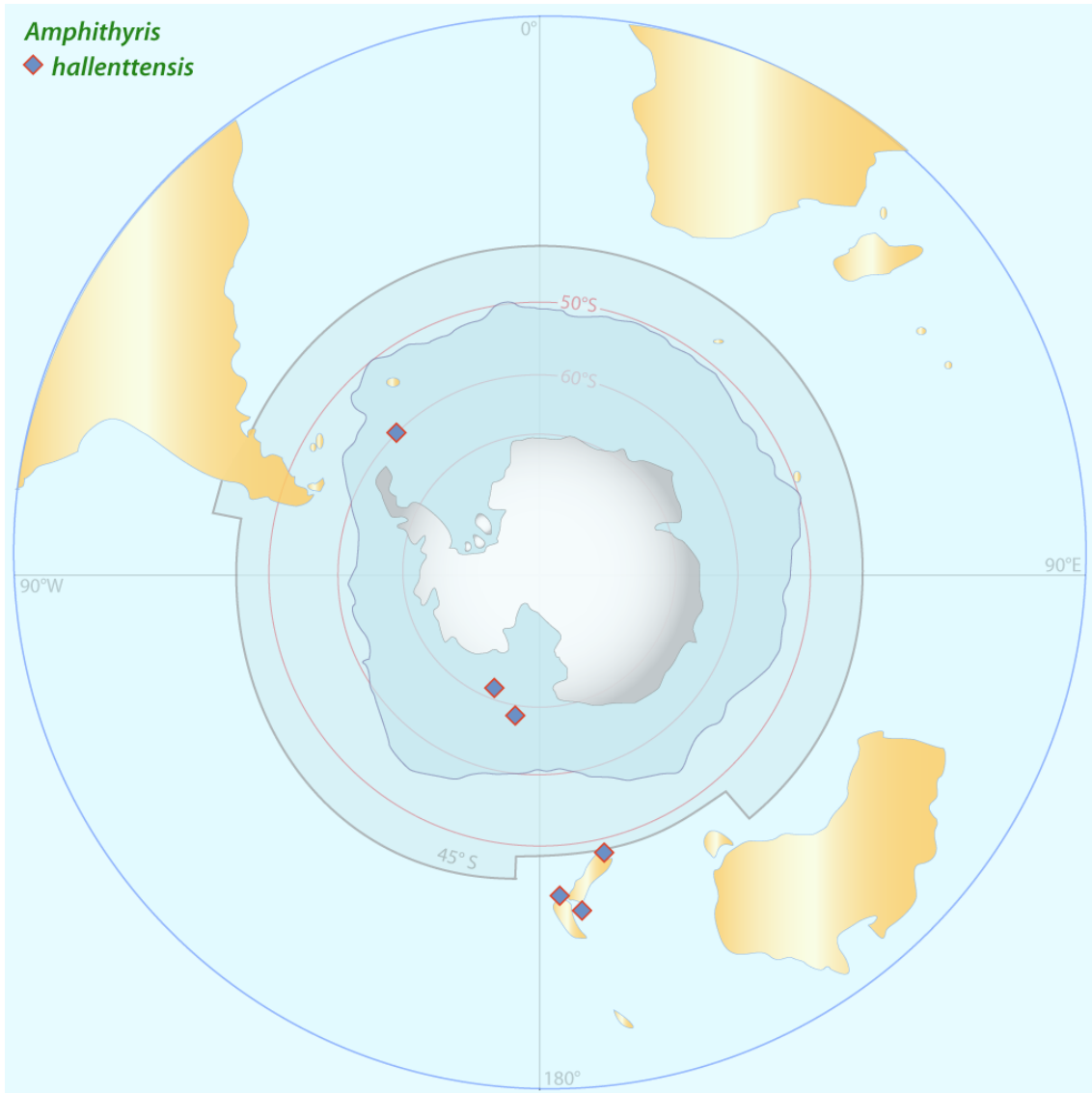
***Amphithyris hallettensis*** Foster, 1974

Type locality: "Deep Freeze III, USS *Atka* station 23, near Cape Hallet (72°05.8'S, 172°15.2'E), 392 m; January 8, 1958."

Depth range: 348 - 891 m

Diagnosis (Nauendorf *et al.*, 2014): Shell ventribiconvex, small dorsal septum, imprints of capillae visible in ventral valve interior.

References: Foster (1974), Nauendorf *et al.*, (2014), Thomson (1918).





Genus *Aneboconcha* Cooper, 1973a

[Type species= *Aneboconcha obscura* Cooper, 1973a (p. 28)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small, smooth, elongate oval, gently unisulcate, beak suberect, foramen large, submesothyrid; deltidial plates disjunct. Cardinal process consisting of transversely oval myophore; socket ridges and outer hinge plates narrow, crural bases narrow, inner hinge plates well developed, uniting with bladelike median septum to form septalium; loop trabecular.

Geological range: Present (Holocene).

*Aneboconcha obscura* Cooper, 1973a

*Magellania* sp. Blochmann, 1912

Type locality: "V-17-51. Latitude 55°17.5'S, longitude 66°00'W, at 205-207 meters, off the southeast end of Tierra del Fuego, Argentina."

Depth range: 95 - 947 m.

References: Cohen *et al.* (2011), Cooper (1973a), Foster (1989, see below \*), Richardson (1997), Zezina (1980a).

*Aneboconcha smithii* \*\* (Pfeffer, 1886)

*Waldheimia smithii* Pfeffer in Martens & Pfeffer, 1886

*Aerothyris* (?) *smithi*: Allan, 1939

*Aneboconcha smithi*: Zezina (1980)

Type locality: "Süd-Georgien - Deutsche Station 1882-1883." [South Georgia Island].

Depth range: 275 - 970 m.

References: Allan (1939, 1940a), Cohen *et al.* (2011), Foster (1989, see below \*), Martens & Pfeffer (1886), Zezina (1980a), Zezina & Pakhnevich (1998, 2000).

\* Foster (1989) pointed out that "A better understanding of this species is particularly vital in order to adequately evaluate a number of somewhat similar species that occur in the same area that may be variants of *Magellania venosa*. These similar species include: *Waldheimia smithi* Pfeffer, 1866 (= *Anecoboncha smithi* Zezina, 1980); *Magellania wyvillei* Davidson, 1878; *Anecoconcha obscura* Cooper, 1973a; *Syntomaria curiosa* Cooper, 1982; and *Dysritosia secreta* Cooper, 1982."

\*\* Note: The original species name is *smithii* and, thus, must be used as it is according to the article 31.1.1. of the International code of Zoological Nomenclature (1999) because it has been formed from a personal name that is Latin.

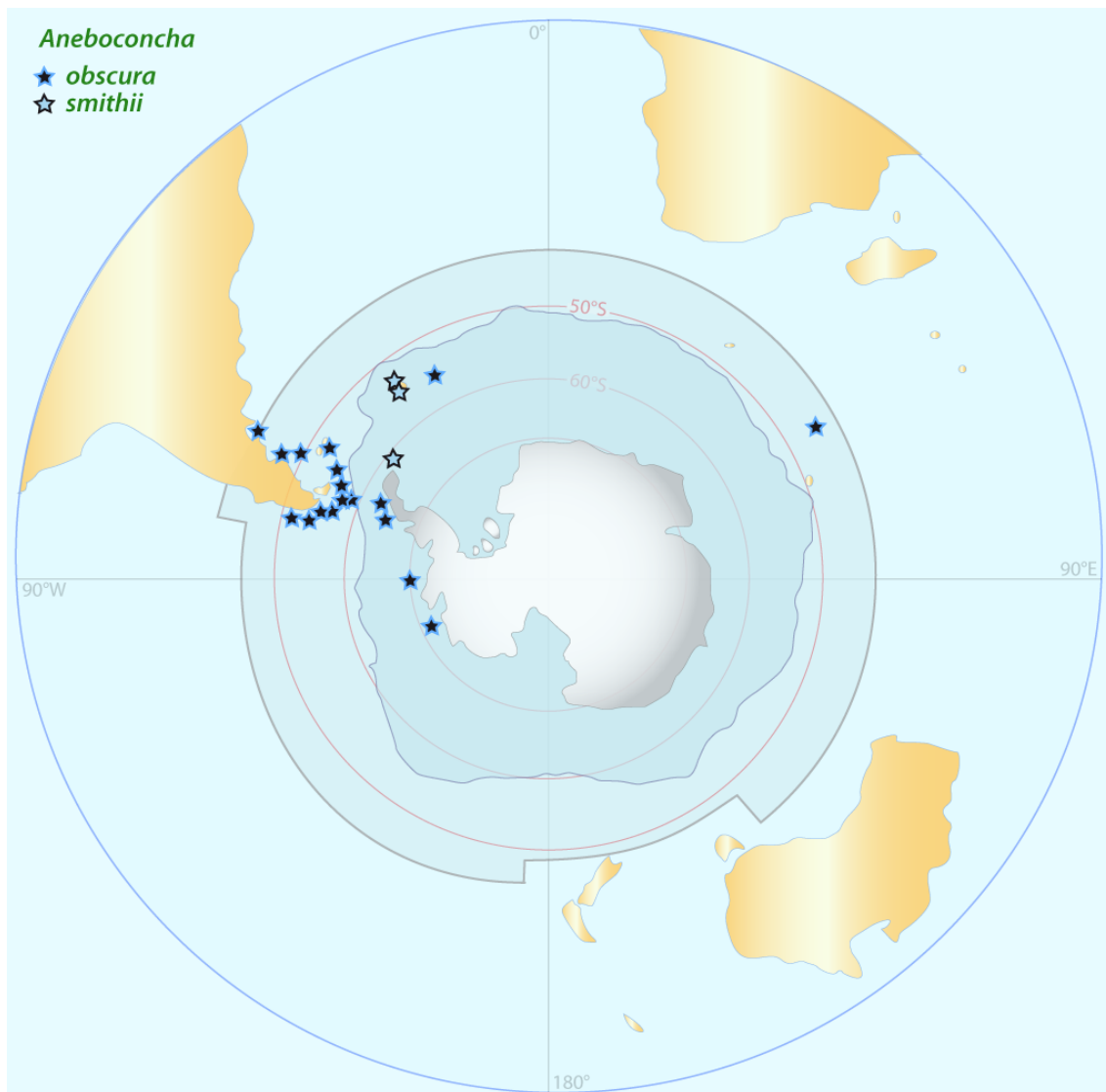
*Aneboconcha eichleri* (Allan, 1939)

Allan (1939, p. 246) attributed the specimens figured by Eichler (1911) to a new species of the genus *Aerothyris* Allan, 1939 under the name *A. eichleri* [(I) *AEROTHYRIS EICHLERI* nom. nov. = *Magellania Kerguelensis* Eichler 1911, ... (not of Davidson 1878). Type locality: Observatory Bay, Kerguelen Island, in 10 metres], without discussing this change and providing a diagnosis. Eichler's specimens were sampled at the station "Gauss" at less than 10 m depth, in Observatory Bay, by the "Deutsche Südpolar-expedition (1901-1903)". This bay was named in 1874 by the Challenger Expedition, today "baie de l'Observatoire", Kerguelen Islands (TAAF, France). Foster (1974) pointed out that these specimens are simply an elongated form of *Magellania kerguelensis*. Cooper (1981) considered *eichleri* as synonymous of *Aerothyris kerguelensis*.

Following Allan's statement, Zezina (1980a) attributed the specimens collected in Kerguelen Islands to *Aneboconcha eichleri* (Allan, 1939), considering that the specimens figured by Eichler (1911) are not *Waldheimia kerguelensis* Davidson, 1878, but no diagnosis, no figures are provided.

According to the brachidium type, Zezina (1980a) assigned her single specimen sampled in the Kerguelen islands to *Aneboconcha*. Foramen and deltidial plates of *A. eichleri* are similar to those of *A. smithii* but the former species differs by a smaller size and much more folding of the anterior commissure.

Until more investigations on this species, Eichler's (1911) specimens are considered as belonging to *Aerothyris kerguelensis* Davidson, 1878. Hiller (1994) indicated that *A. kerguelensis* is the most common of the brachiopods and is the species that extends over the greatest depth range, from less than 50 m deep to more than 500 m. It is particularly abundant in the shallow area of Marion and Prince Edward Islands (South Africa).



Genus *Cancellothyris* Thomson, 1926

[Type species = *Terebratula cancellata* Koch in Küster, 1843 (p. 35) = *Terebratulina hedleyi* Finlay, 1927]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small to medium sized, ovate to subpentagonal, valves biconvex; anterior commissure uniplicate to sulcinate; surface finely capillate; umbo short, massive, suberect; foramen large, epithyrid, labiate; deltidial plates conjunct. Pedicle collar developed; cardinal process low, bilobed; loop wide, transverse band broad, slightly arched ventrally. Lophophore plectolophous.

Geological range: Miocene - Present (Holocene).

*Cancellothyris hedleyi* (Finlay, 1927)

*Terebratula cancellata* Koch in Küster, 1843 (p. 36)

*Terebratulina cancellata* Koch: Davidson (1886)

*Terebratulina hedleyi* Finlay, 1927 (p. 533)

*Cancellothyris australis* Thomson, 1927

*Cancellothyris cancellata*: Foster (1969)

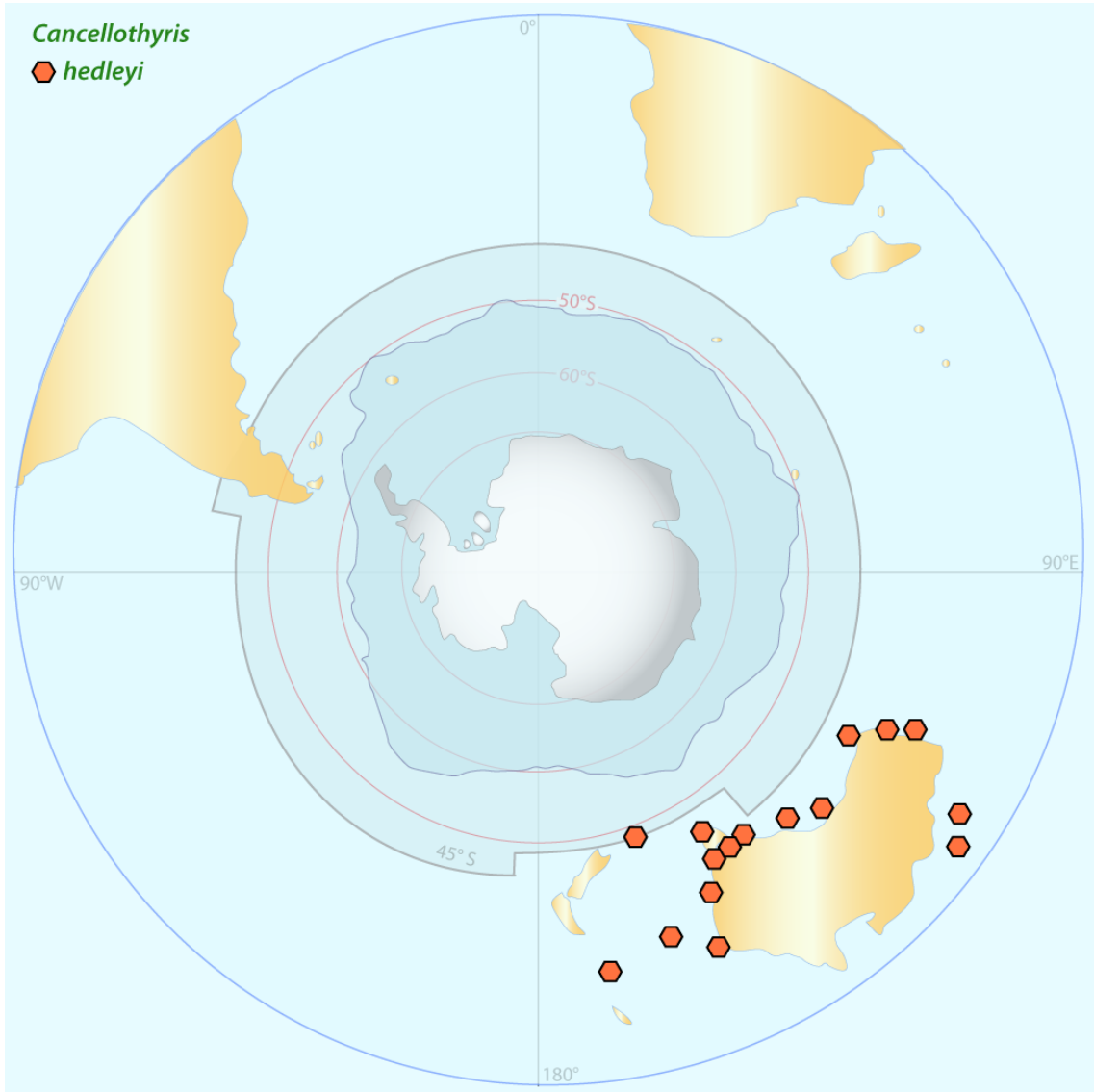
Type locality: “Westaustralien” [Western Australia].

Depth range: 6 - 366 m.

References: Dawson (1971a, 1971b, 1972, 1991), Foster (1969, 1989), Richardson (1979, 1981b), Zezina (2008).

Originally named *Terebratula cancellata* Koch in Küster (1845, p. 35), the need for renaming this species arose from the preoccupation of the specific name by *Terebratula cancellata* Eichwald, 1829. It was renamed *Terebratulina hedleyi* by Finlay (1927, p. 533), while Thomson in a book issued the same year proposed the name *Cancellothyris australis* (Thomson, 1927, p. 188).

The priority of *hedleyi* over *australis* is not doubtful: Finlay’s publication was read on 8<sup>th</sup> December 1925 before the Otago Institute and issued on 19<sup>th</sup> January 1927 (Finlay, 1927: p. 488), while Thomson’s book was published on December 1927 according to Dawson (1972). Curiously, this latter author indicated “H. J. Finlay in 1927” in text but forgot to quote the publication in “References”!



Genus *Compsothyris* Jackson, 1918

[Type species= *Rhynchonella racovitzae* Joubin, 1901 (p. 5)]

Diagnosis from volume 4 of the Treatise on Invertebrate Paleontology (Kaesler, 2002):

Uniplication trigonal, broad, gentle, dorsal fold poorly developed; shell surface with fine radial striae; foramen hypothyrud. Median dorsal septum ridgelike, supporting small septalium; crura somewhat spatulate, flat.

Geological range: Present (Holocene).

***Compsothyris racovitzae*** (Joubin, 1901)

*Rhynchonella racovitzae* Joubin, 1901

*Rhynchonella gerlachei* Joubin, 1901

*Hemithiris striata* Thomson, 1918

*Hispanirhynchia antarctica* Hatai, 1959

Type locality: “[St. Faubert VIII \[70°00'S, 80°48'W\], 500 m - 18 Octobre 1898.](#)”

Depth range: 329 - 3970m.

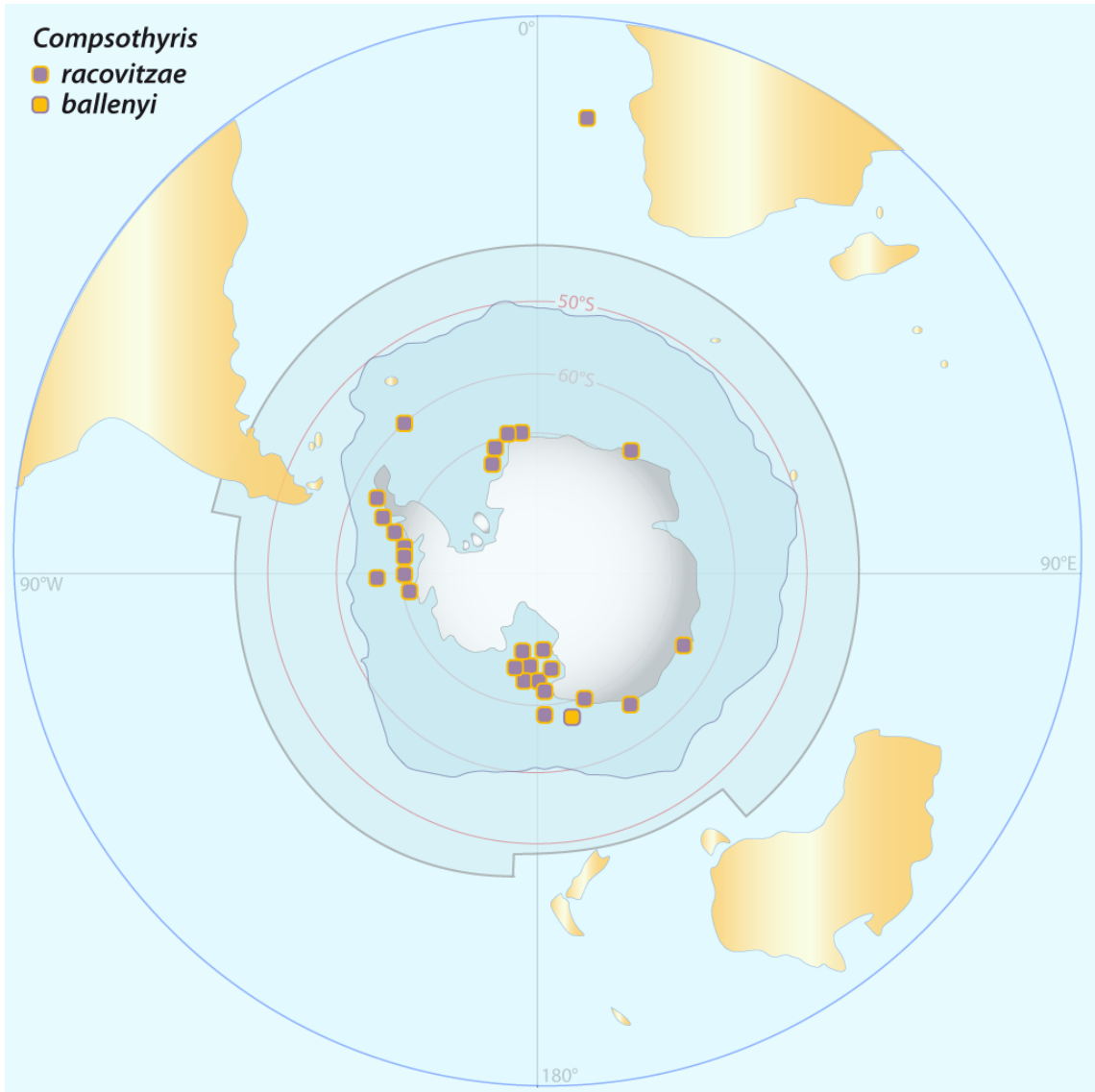
References: Álvarez *et al.* (2010), Chapman & Crespín (1923), Eichler (1911), Foster (1969, 1974). Hatai (1959), Jackson (1912, 1918), Joubin (1901), Thomson (1918), Zezina (1980a, 1993, 1998).

***Compsothyris ballenyi*** Foster, 1974

Type locality: “[off Balleny Island, 2507-2525 m](#)” [66°52'S, 164°32'E].

Depth range: 2507 - 2525 m.

References: Foster (1974), Zezina (1994).



Genus ***Cryptopora*** Jeffreys, 1869

[Type species= *Cryptopora gnomon* = *Atretia gnomon* Jeffreys, 1869 (p. 136)]

Diagnosis from volume 4 of the Treatise on Invertebrate Paleontology (Kaesler, 2002):

Small, translucent, subtrigonal to ovoid-lenticular, almost equibiconvex; rectimarginate to broadly sulcate, smooth; beak moderately long, pointed, nearly straight; foramen large, incomplete; deltidial plates auriculate, rudimentary, disjunct. Dental plates distinct, subvertical; cardinal process small and transverse; dorsal median septum high; crura digitate distally.

Geological range: lower Danian - Present (Holocene).

***Cryptopora gnomon*** Jeffreys, 1869

*Atretia gnomon*: Jeffreys, 1876

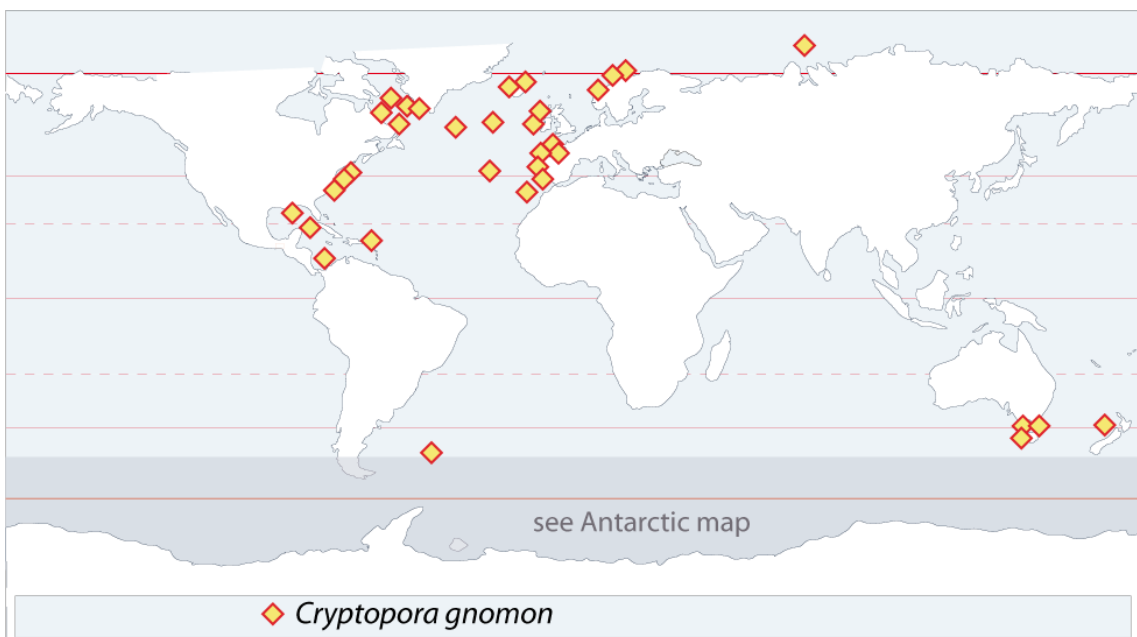
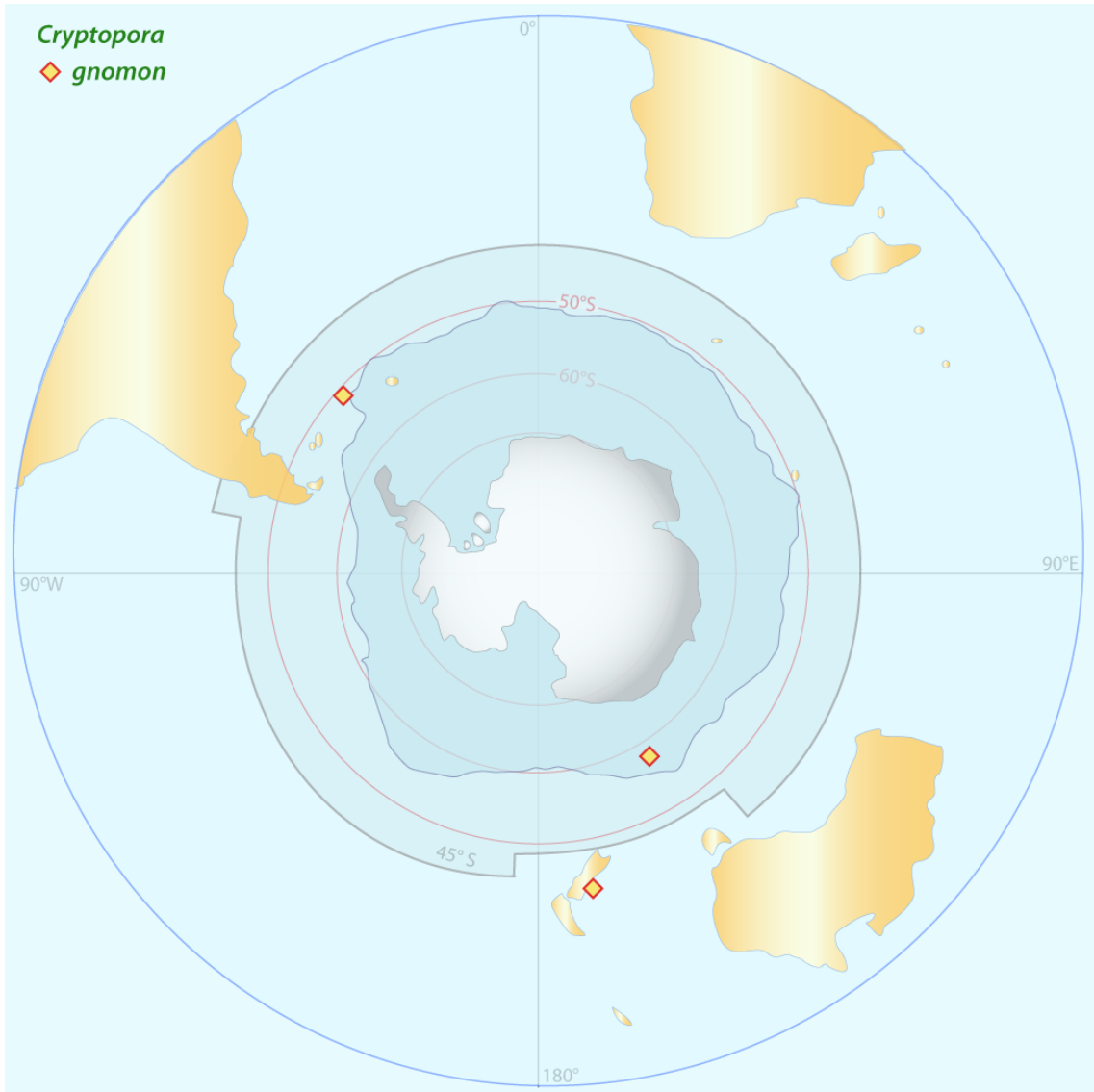
*Dimerella gnomon*: Dall, 1873

*Neatretia gnomon*: Fischer & Ehlert (1891)

Type locality: No information on location in Jeffreys (1869) and Carpenter *et al.* (1869), but in Jeffreys (1876), this species has been sampled “during the 'Porcupine' expedition of 1869, in stations 20 [55°11'N, 11°31'W, 2639 m] and 30 [56°24'N, 11°49'W, 2524 m], at depths of 1443 and 1380 fathoms, off the west coast of Ireland.”

Depth range: 300 - 5950 m.

References: Cooper (1973a), Zezina (1981a).





Genus *Dallina* Beecher, 1893

[Type species= *Terebratula septigera* Lovén, 1846 (p. 29)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small to large, triangular to subquadrangular in outline; rectimarginate to paraplicate; beak erect, without beak ridges; foramen small to large, mesothyrid, attrite, symphytium concave. Hinge teeth small, weak; pedicle collar very short. Cardinalia lamellar with excavate inner and outer hinge plates separated by narrow crural bases; inner hinge plates converging on median septum to form V-shaped septalium; cardinal process not differentiated; median septum low anteriorly, extending beyond midvalve; adult loop teloform.

Geological range: Miocene - Present (Holocene).

*Dallina elongata* Hatai, 1940

Type locality: "Sôyô-maru St. 575, 37°48'N, 137°18'E., 123 m, sand."

Depth range: 123 - 567 m.

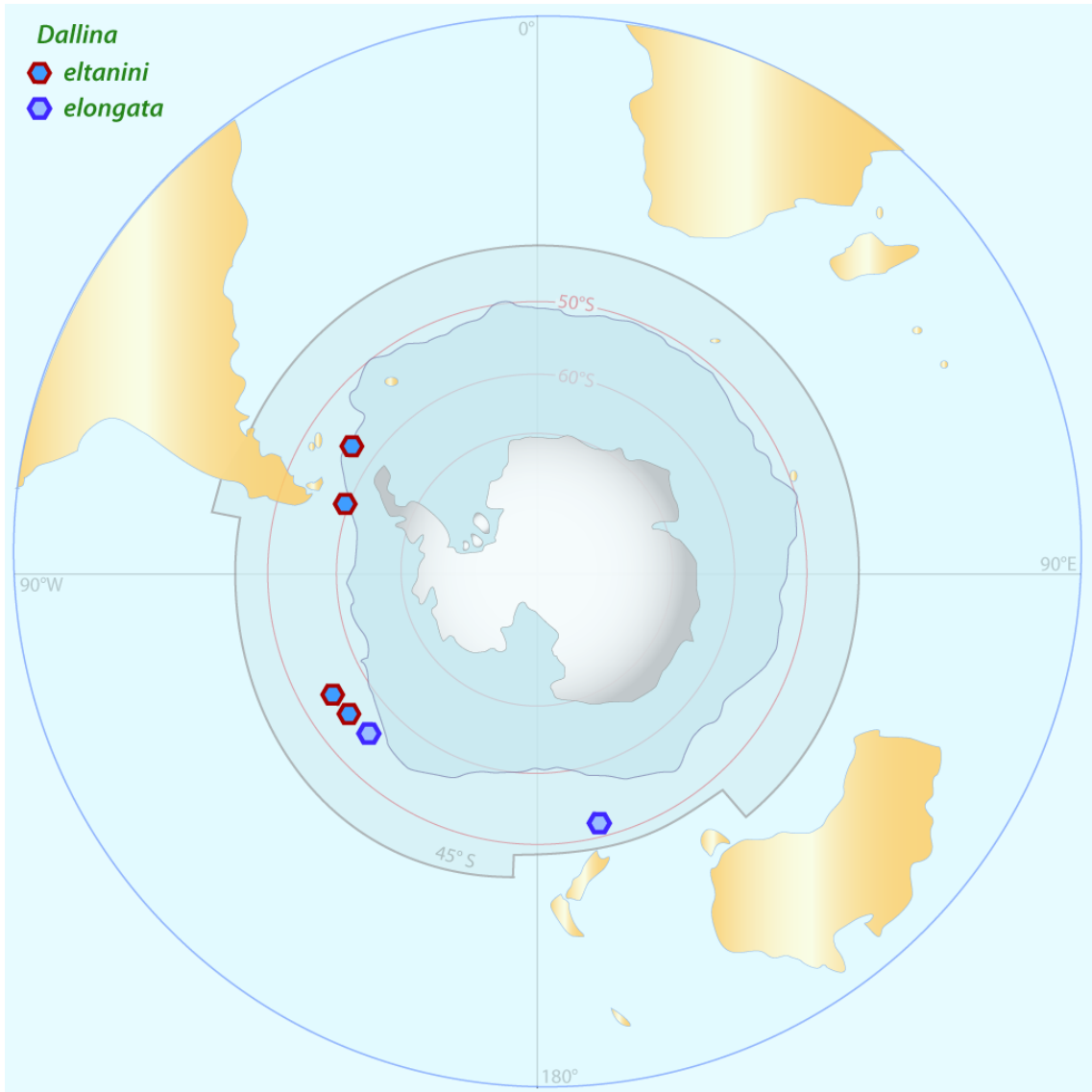
References: Foster (1974, 1989).

*Dallina eltanini* Foster, 1974

Type locality: "Stations USC 1345 (54°50'S, 129°48'W): 915-1153 m."

Depth range: 339 - 1208 m.

References: Foster (1974, 1989).



Genus ***Discradisca*** Stenzel, 1964

[Type species= *Orbicula antillarum* d'Orbigny, 1846 (p. 368)]

Diagnosis from volume 2 of the *Treatise on Invertebrate Paleontology*

Similar to *Discinisca* but with wide, transversely suboval pedicle track, closed apically by semicircular, gently concave listrium; ornamentation of fine costellae and growth lamellae.

Geological range: Lower Tertiary (Danian) - Present (Holocene).

***Discradisca cumingii*** (Broderip, 1833)

*Orbicula cumingii* Broderip, 1833 (pp. 124-125)

*Discina cumingi*: Suess (1859)

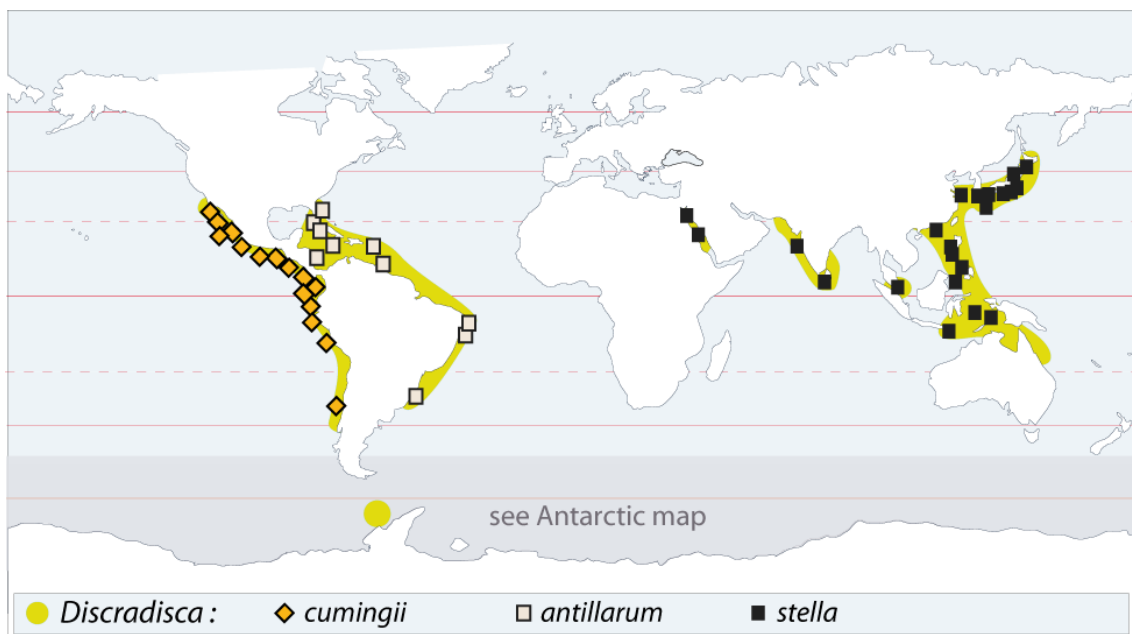
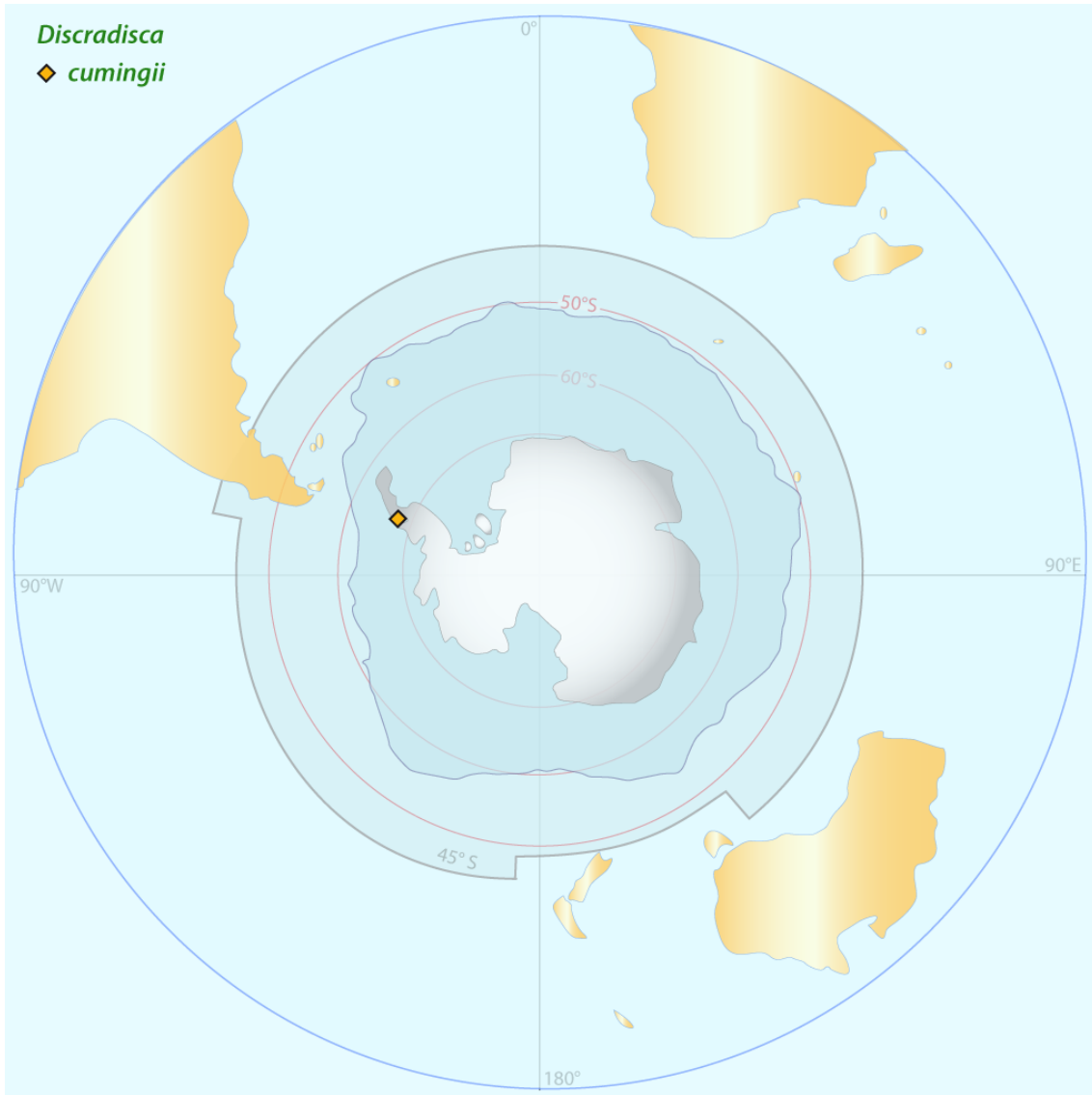
*Discinisca cumingii*: Davidson (1888)

*Discradisca cumingii*: Gaspard (2001)

Type locality: “[ad Paytam Peruviae, ad Sanctam Elenam, et ad Panamani... and in some instances at a depth of six fathoms](#)” [20 m].

Depth range: 11 - 53 m.

Reference: Zezina & Pakhnevich (1998).



Genus *Dyscolia* Fischer & Ehlert, 1890

[Type species = *Terebratulina wyvillei* Davidson, 1878 (p. 436)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Medium to very large, subtrigonal to elongate oval; ventribiconvex; surface smooth or with fine, zigzag capillae; beak short, suberect, often truncated or labiate; foramen large, epithyrid to submesothyrid; symphytium almost concealed; pedicle collar long, anteriorly excavated; cardinal process not developed, diductor muscles attached to apical pit; outer hinge plates very weakly developed; crural processes weak, blunt; loop small (less than 0.3 dorsal valve length), thin, with rounded, anterolateral extremities; lophophore small, modified schizolophe; spicules very abundant; four main mantle canals in each valve, branching pattern pinnate.

Geological range: Pliocene – Present (Holocene).

*Dyscolia? radiata* Cooper, 1981

Type locality: “MD.08: st. 6, DC 47: 33°11.4'S, 44°00.4'E, Walters Bank, at 620-635 m.”

Depth: 263 – 635 m.

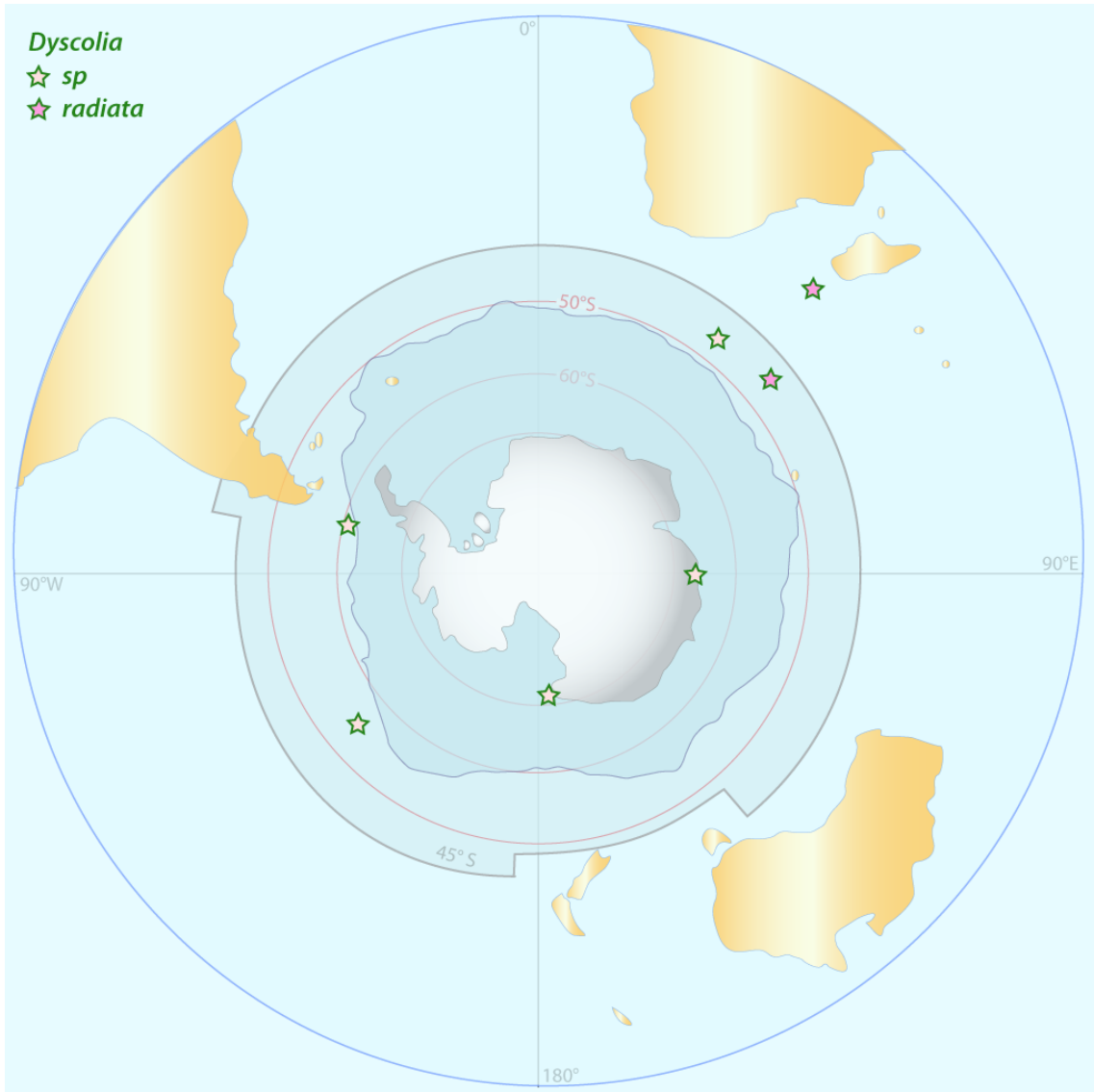
Diagnosis (Cooper, 1981): Subtriangular, loop narrow, crural processes obtuse, surface covered by fine irregular capillae.

Cooper (1981, p. 24) states: “*Dyscolia? radiata* most resembles *Dyscolia ewingi* Cooper from off South America in south Atlantic waters. There is also resemblance to *Liothyrella? neozelanica*.”

Reference: Cooper (1981), Hiller (1986).

*Dyscolia* sp.

References and Depth: Foster (1974): 915-1153 m, 1887-1894 m; Foster (1989): 4118 m; Hiller (1994): 680-715; Zezina (1980a): 580 m.



Genus *Dyscritosia* Cooper, 1982

[Type species= *Dyscritosia secreta* Cooper, 1982 (p. 22)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small to medium, smooth, subcircular, biconvex, rectimarginate; beak low, attrite, erect; foramen medium, submesothryd; deltidial plates narrow, disjunct. Cardinalia similar to *Aneboconcha*. Adult loop trabecular.

Original diagnosis: Shells just under medium size, roundly oval, biconvex, externally like *Waltonia inconspicua* (Sowerby) but like that species in having rectimarginate anterior commissure and only rudimentary deltidial plates (Cooper, 1982).

Geological range: Present (Holocene).

*Dyscritosia secreta* Cooper, 1982

Type locality: "*Islas Orcadas* cruise 575, sta 89, 54°43.1'S, 036°48.3'W, off the South Sandwich Islands, at 225-265 m."

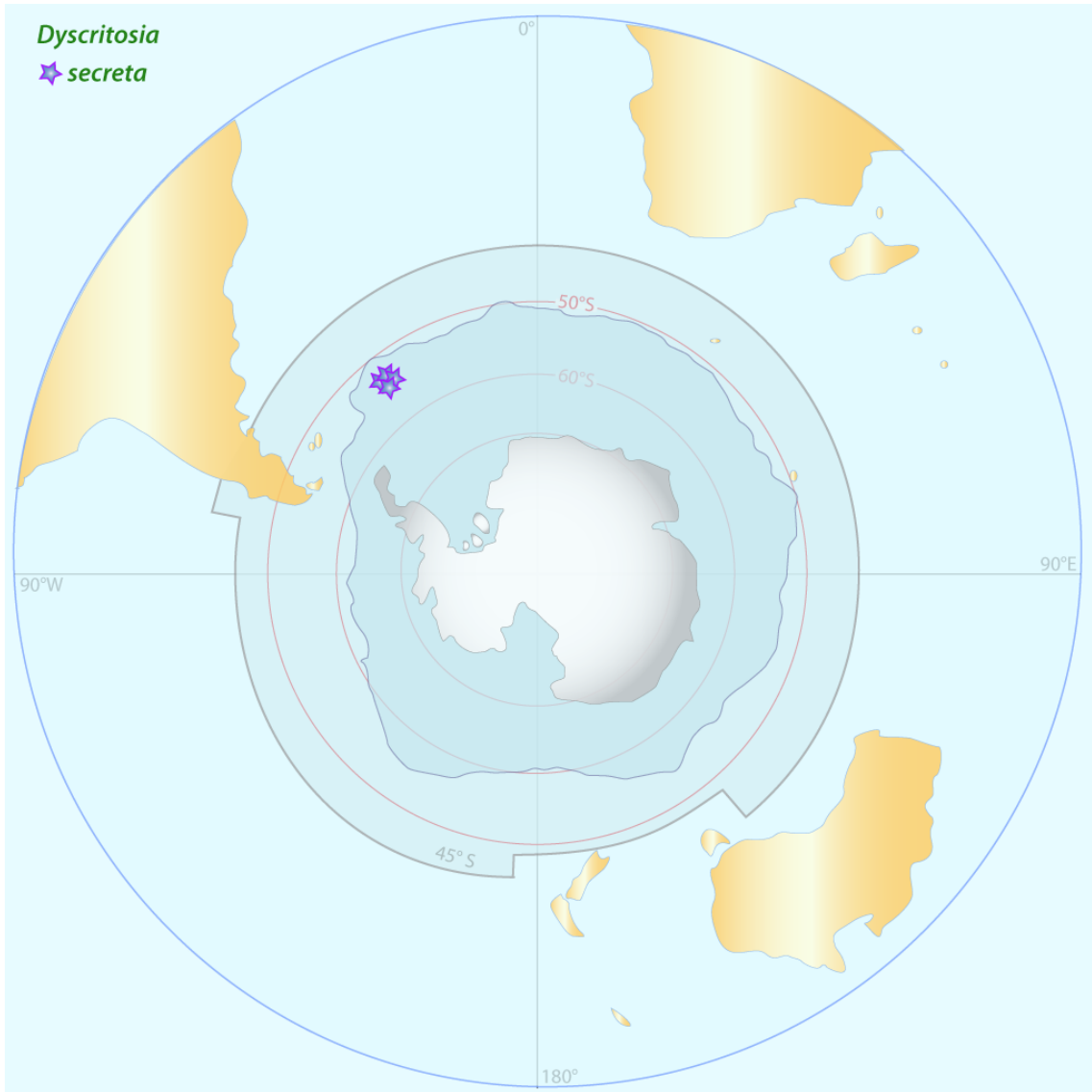
Depth range: 66 - 872 m.

Diagnosis (Cooper, 1982): *As for the genus* [sic] \*.

References: Cooper (1982), Foster (1989), Richardson (1997).

Foster (1989) suggests that "this species may be an extreme variant of *Magellania venosa*. (See remarks for *M. venosa*.)" In this part, this author wrote: "A better understanding of this species is particularly vital in order to adequately evaluate a number of somewhat similar species that occur in the same area that may be variants of *Magellania venosa*. These similar species include: *Waldheimia smithi* Pfeffer, 1866 (= *Anecoboncha smithi* Zezina, 1980); *Magellania wyvillei* Davidson, 1878; *Anecoconcha obscura* Cooper, 1973a; *Syntomaria curiosa* Cooper, 1982; and *Dyscritosia secreta* Cooper, 1982."

\* **Note:** A genus diagnosis allows to distinguish, and so to identify the genus from other genera in the same family (or subfamily), while the diagnosis of a species should only contain the taxonomic characters, and their variations, distinguishing a species from another in the same genus - see ICZN (1999). So even in a monospecific genus, the characters should allow to describe a new species within a given genus. In this case a cladistic analysis should be provided to confirm the validity of the phylogenetic characters.





Genus *Ecnomiosa* Cooper, 1977

[Type species= *Ecnomiosa gerda* Cooper, 1977 (p. 131)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small, subcircular, smooth, gently biconvex, anterior commissure rectimarginate; beak ridges slightly tuberculate; foramen large, hypothyrid, deltidial plates very narrow, disjunct, pedicle collar short; hinge teeth with small recessive dental plates. No cardinal process; high inner socket ridges with long crura that are anteromedially convergent; septal pillar platelike at its base with high, narrow distal extremity (axial loop phase), descending branches absent. Lophophore zygalophous and heavily spiculate.

Geological range: Present (Holocene).

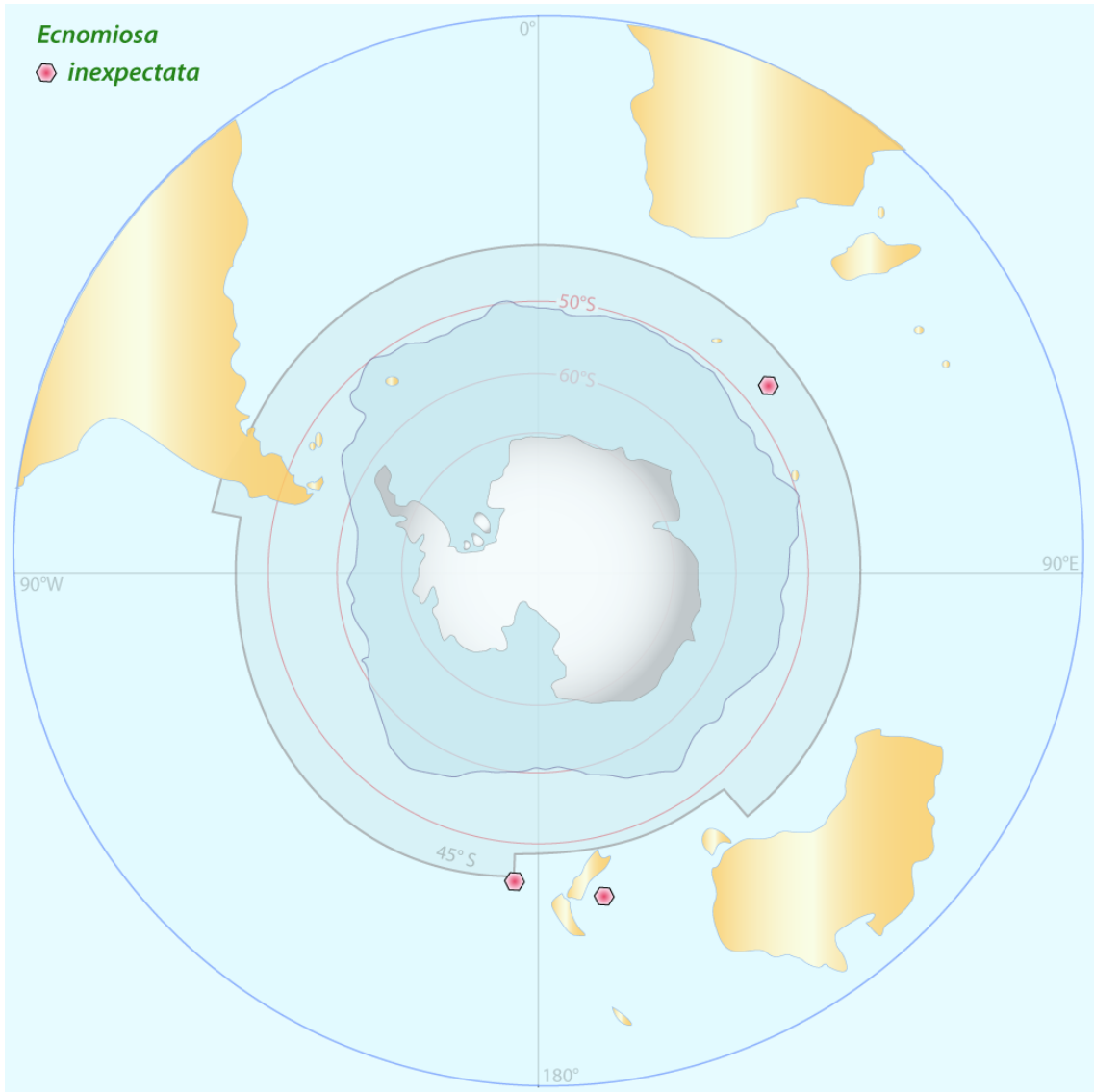
*Ecnomiosa inexpectata* Cooper, 1981

Type locality: "MD.08: st. 44, CP 199, 46°18.0'S, 51° 14.0'E to 46°16.0'S, 51°13.0'E, east-west radial Crozet, between Possession and Cochons Islands at 1500 m."

Depth range: 884 - 1500 m.

Diagnosis (Cooper, 1981): Medium size, faintly sulcate *Ecnomiosa*.

References: Cooper (1981), Lüter (2008).



Genus ***Eucalathis*** Fischer & Cehlert, 1890

[Type species= *Terebratulina (?) murrayi* Davidson, 1878 (p. 437)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small, subtrigonal, auriculate, ventribiconvex, anterior commissure rectimarginate or incipiently uniplicate, hinge straight; surface capillate with rare intercalations or granular; umbo short, obliquely truncate; deltidial plates short, triangular, disjunct. Pedicle collar present, loop chlidonophorid but transverse band dorsally directed, socket ridges as narrow plates uniting with cardinal process, and anteriorly with crural bases; lophophore with 2 single whorl spirals set at angle to plane of symmetry, filaments long.

Geological range: Eocene - Present (Holocene).

***Eucalathis murrayi*** (Davidson, 1878)

*Eucalathis costellata* Cooper, 1981

*Eucalathis rotundata* Cooper, 1981

Type locality: “dredged, lat. 28°33'S., long. 177°50'W., near Kermadoc Isle, south of Fejee Isles, in a depth of 600 fathoms” [1097 m] – correct spelling is Kermadec.

Depth range: 185 - 3374 m.

References: Foster (1969, 1974), Pakhnevitch *et al.* (2013), Zezina (1980a, 2010).

***Eucalathis macrorhynchus*** Foster, 1974

Type locality: “USC st. 1345(54°50'S, 129° 48'W): depth 915-1153 m.”

Depth range: 326 - 1153 m.

References: Foster (1974, 1989), Zezina (1980a).

***Eucalathis magna*** Cooper, 1981

Type locality: “MD.03: st. 11, CP7, lat. 53°20.3'S, long. 72°29.2'E; west of Heard Island at 790 m.”

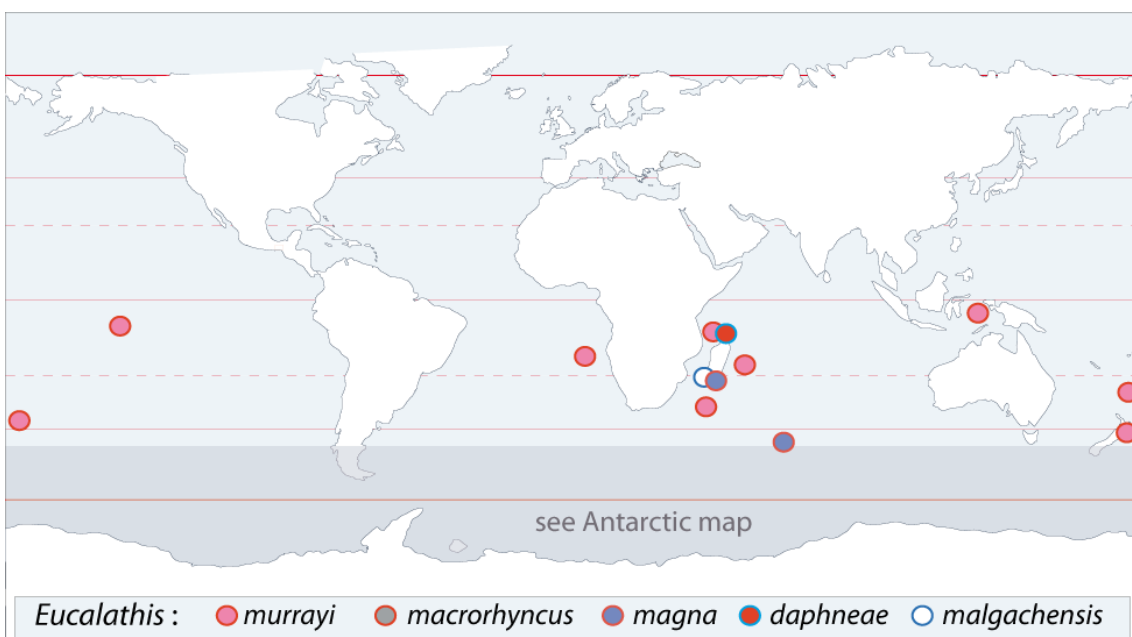
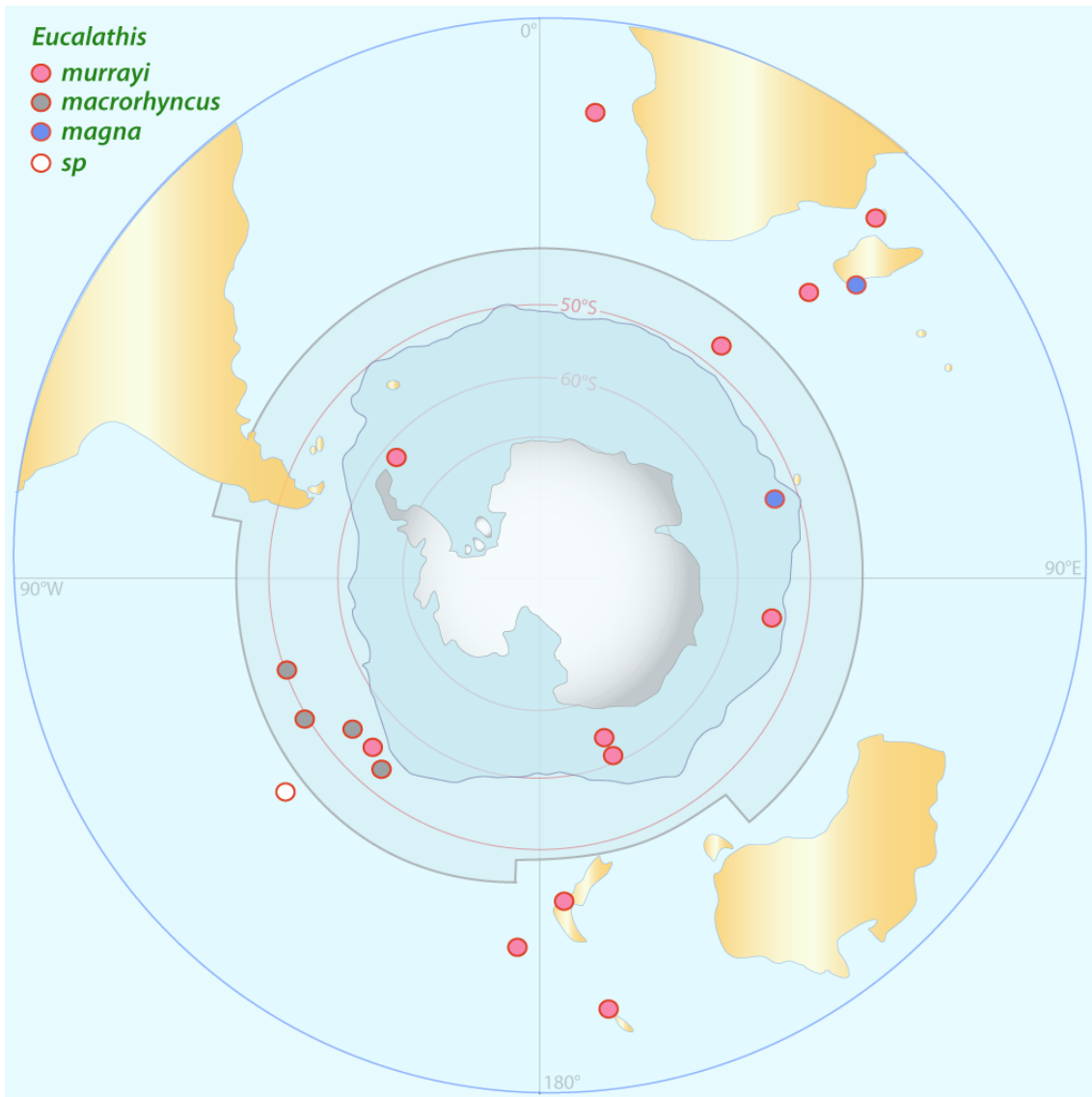
Depth range: 207 - 402 and 790 m.

Diagnosis (Cooper, 1981): Large, elongate *Eucalathis*.

Reference: Cooper (1981).

***Eucalathis* sp.**

Foster (1989) identified a single specimen of an *Eucalathis*-like species dredged between 390 and 3493 m as a possible *E. macroctena* ? Zezina, 1891 or an immature *Terebretulina*.



Genus *Fallax* Atkins, 1960

[Type species= *Fallax dalliniformis* Atkins, 1960 (p. 72)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Medium, biconvex, smooth, elongate ovate to subpentagonal, anterior commissure rectimarginate to parasulcate; beak low, erect; beak ridges rounded; deltidial plates conjunct in adults; foramen small, round, permesothyrid. Dental plates lamellar, straight; pedicle collar broad, sessile, impunctate. Cardinalia lamellar with short, well-developed septalium; inner and outer hinge plates well developed, crural bases not differentiated; cardinal process not differentiated; median septum extending anteriorly about three-quarters valve length; crura short, subparallel, crural processes short; loop diploform; lophophore and mantle finely spiculate.

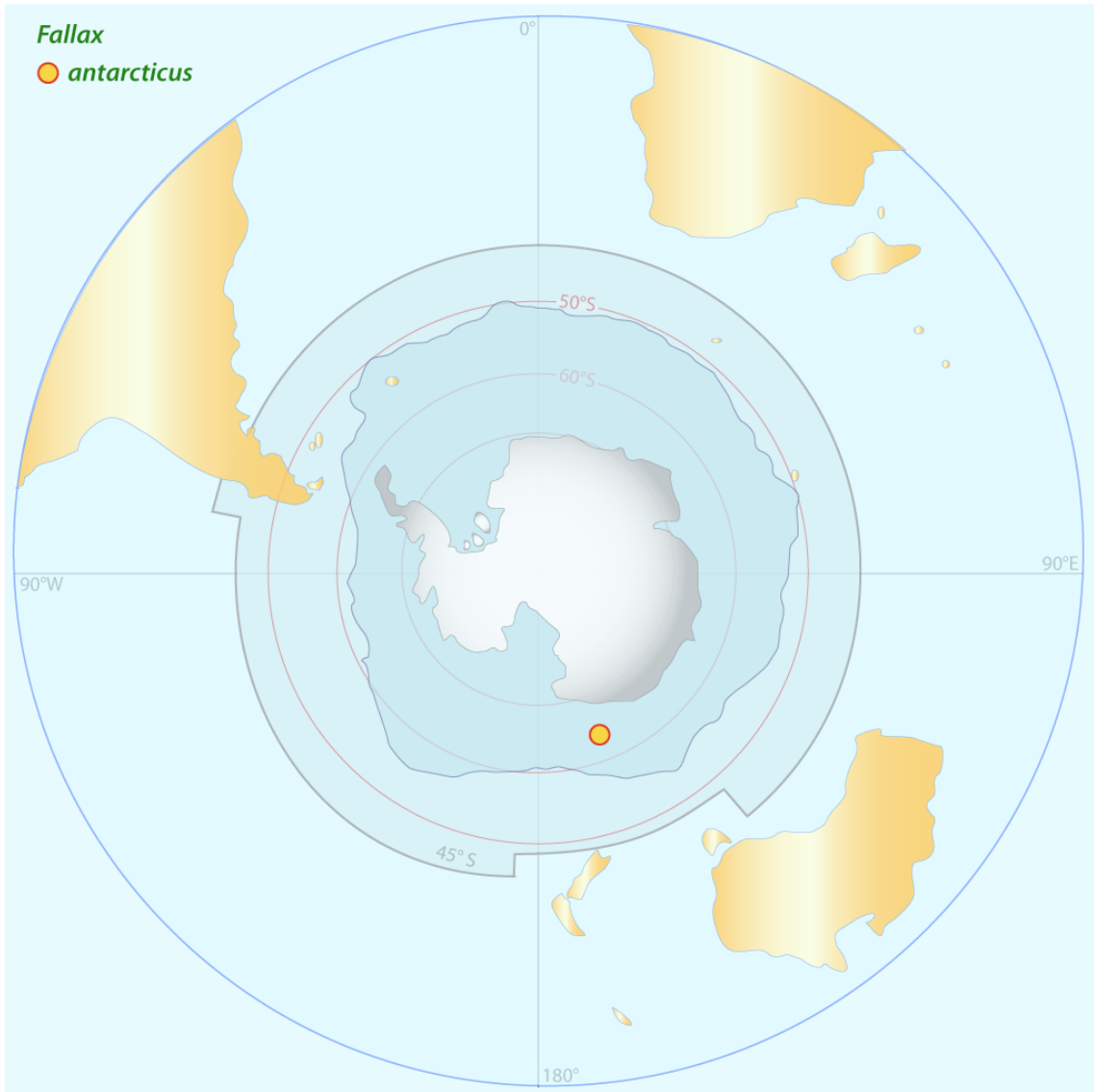
Geological range: Present (Holocene).

*Fallax antarcticus* Foster, 1974

Type locality: "HU st. 27-35 (62°47'S, 158°12'W): 2288-2342 m."

Depth range: 2285 - 2342 m.

Reference: Foster (1974).



Genus *Fosteria* Zezina, 1980a

[Type species= *Magellania (?) spinosa* Foster, 1974 (p. 142)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small, smooth, rectimarginate to unisulcate, foramen large, submesothyrid; beak suberect, attrite; deltidial plates very narrow, disjunct. Cardinalia lamellar, lacking clearly defined cardinal process; inner hinge plates broad, steeply inclined, uniting with low posterior trail of median septum to form septalium; septal pillar high, spinose anteriorly; loop annular, descending branches with several curved spines.

Geological range: Oligocene - Present (Holocene).

*Fosteria spinosa* (Foster, 1974)

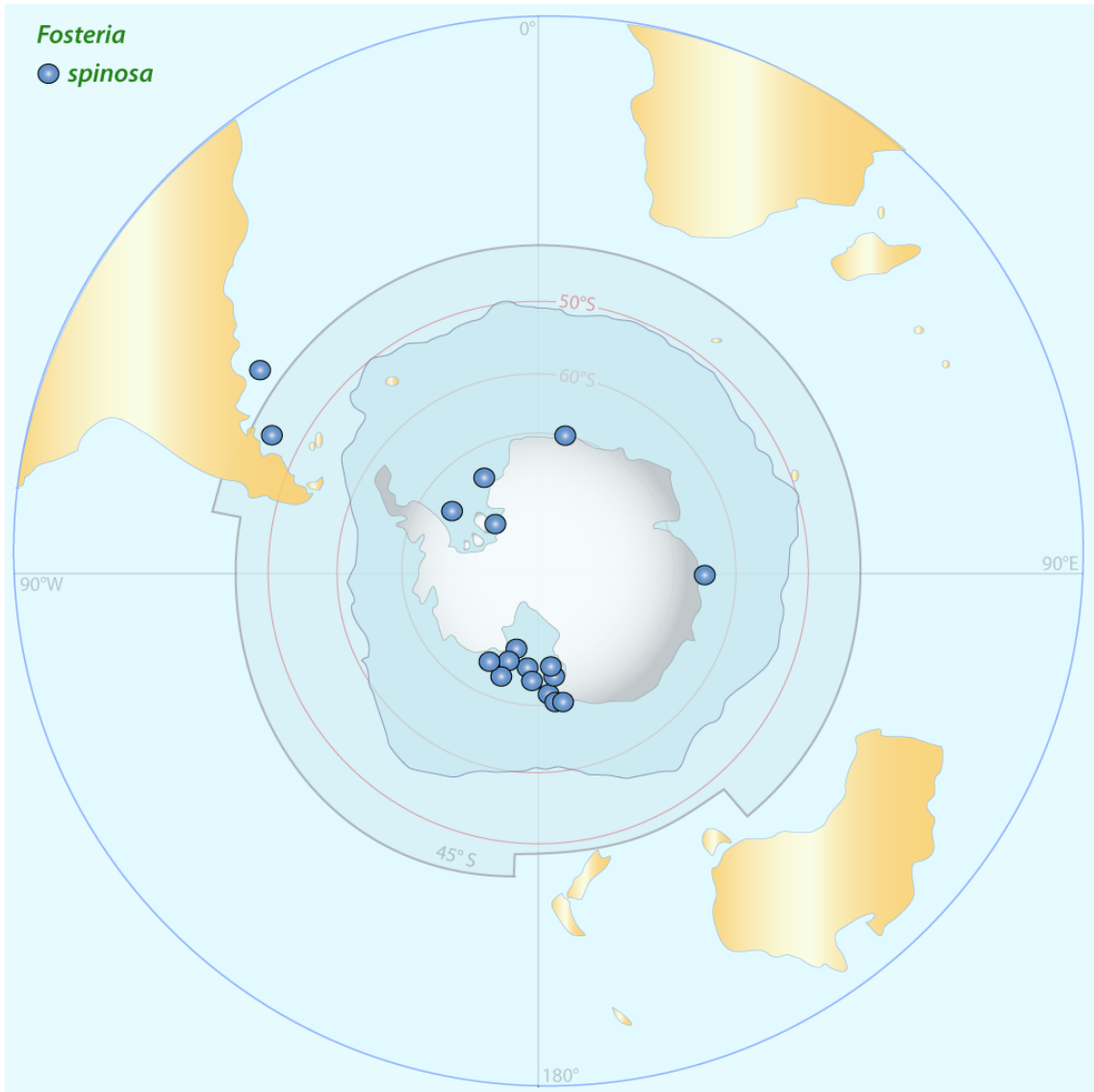
*Magellania (?) spinosa* Foster, 1974

*Fosteria spinosa*: Zezina (1980a)

Type locality: "HU st. 32-33 (76°22.4'S, 163°26.2'W): 501 m."

Depth range: 256 - 1226 m.

References: Foster (1974), Richardson (1994, 1997), Zezina (1980a).





Genus ***Gyrothyris*** Thomson, 1918

[Type species= *Gyrothyris mawsoni* Thomson, 1918 (p. 28)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006)

Medium, transversely ovate to elongate oval; finely multicostate, anterior commissure weakly unisulcate; beak suberect to erect, foramen small, mesothyrid, attrite; deltidial plates usually conjunct, concave, almost hidden. Cardinalia thickened; cardinal process transversely oval myophore, median septum uniting posteriorly with narrow septalium; adult loop typically trabecular but occasionally teliform.

Geological range: Present (Holocene).

***Gyrothyris mawsoni*** Thomson, 1918

*Gyrothyris mawsoni antipodesensis* Foster, 1974

*Gyrothyris mawsoni aucklandensis* Foster, 1974

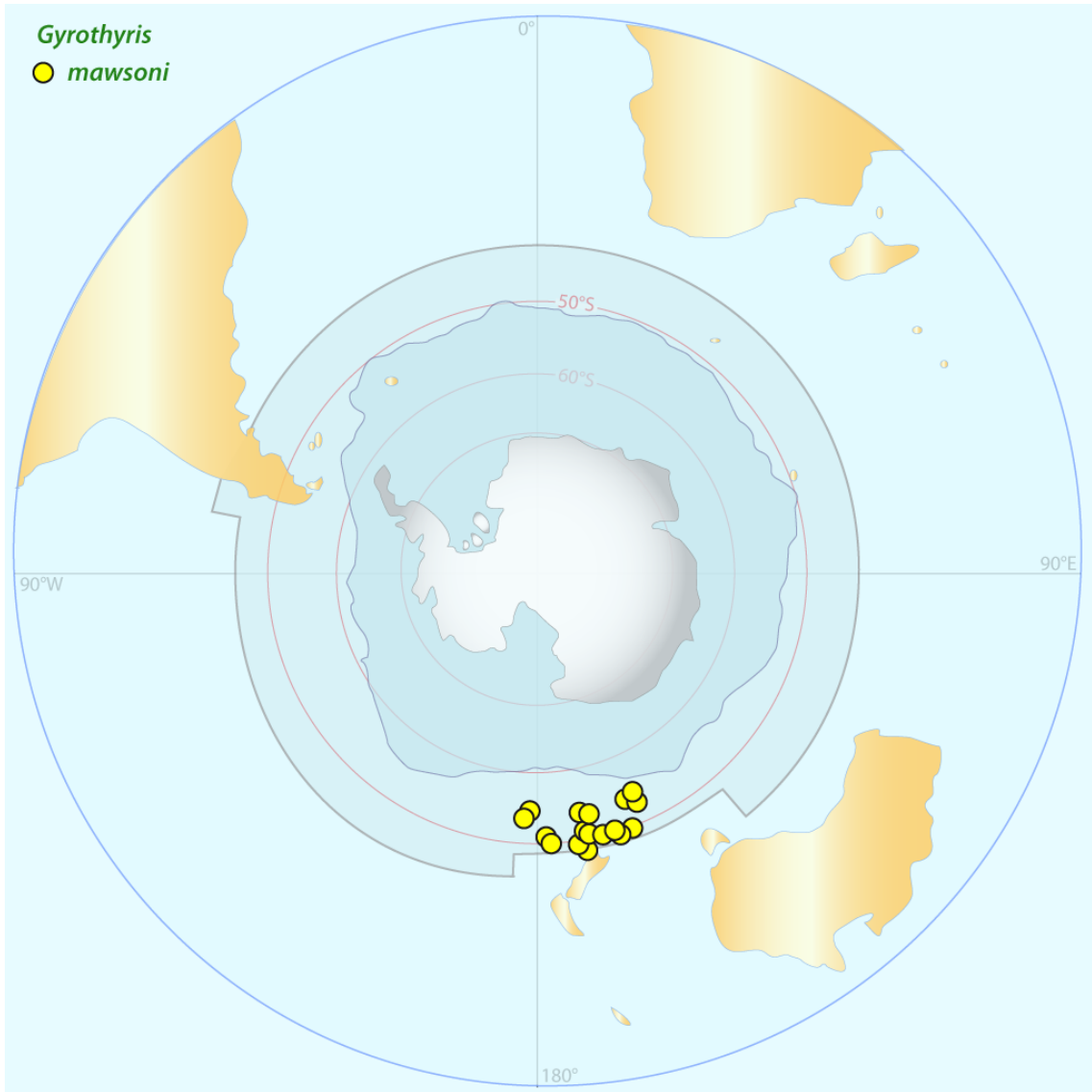
Type locality: “one mile off south end of Macquarie Island.”

Depth range: 79 - 563 m.

References: Bowen (1968), Brand *et al.* (2003), Cooper (1973a), Foster (1967, 1969, 1974), Harper *et al.* (2011), Richardson (1997), Thomson (1918), Zezina (1980a).

Note: Tomson (1918) wrote: “*Gyrothyris* resembles *Pachymagas* more than *Terebratella*, but, differs from the former, in the absence of beak ridges, the shallowness of the hinge trough, and the transverse nature of the cardinal process. Further, *Gyrothyris mawsoni* possesses a radial ornament which has never been observed on any species of *Pachymagas*.”

According to Bowen (1968), “the Macquarie Island specimens of *G. mawsoni* resemble *Magasella sanguinea* but lack its characteristic reddish colour. On the inside, the shell structures are more thickened than in *M. sanguinea*.”



Genus *Liothyrella* Thomson, 1916

[Type species = *Terebratula uva* Broderip, 1833 (p. 124)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Large to very large, elongate oval to subcircular; ventribiconvex, anterior commissure usually rectimarginate, occasionally broadly uniplicate; smooth or with faint, radial or zigzag capillae; beak usually short, suberect; foramen usually large, submesothyrid, labiate; symphytium wholly or partly visible; pedicle collar short, teeth triangular, narrow; low myophragm may be present; cardinal process transverse semiellipse; outer hinge plates variable in width and length; attached near dorsal edge of crural bases; loop variable; usually widely triangular, crural processes located near socket openings, transverse band relatively narrow, variable; spicules abundant.

Geological range: Eocene – Present (Holocene).

*Liothyrella uva* (Broderip, 1833)

*Liothyris uva*: Davidson (1886)

?*Terebratula uva*: Gray (1853)

*Terebratula moseleyi* Fischer & Ehlert, 1892

*Liothyrella antarctica* Blochmann, 1906

*Liothyrina uva*: Blochmann (1906)

*Liothyrina moseleyi*: Dall (1908)

*Liothyrina uva* var. *notorcadensis* Jackson, 1912

*Liothyrina antarctica*: Joubin (1914)

?*Liothyrella ovata* Thomson, 1918

*Liothyrella notorcadensis* Thomson, 1918

*Gryphus antarcticus*: Dall (1921)

*Gryphus uva*: Dall (1921)

*Liothyrella oblonga* Cooper, 1973a

*Liothyrella uva georgina* Foster, 1974

*Liothyrella antarctica georgina* Zezina 1980

*Liothyrella "uva"*: Cooper (1983)

*Liothyrella uva notorcadensis*: Foster (1974)

*Liothyrella uva cancerderma* Foster, 1974

*Liothyris uva*: Zezina (1976)

*Liothyrella georgina*: Cooper (1982)

*Liothyrella fosteri* Cooper, 1982

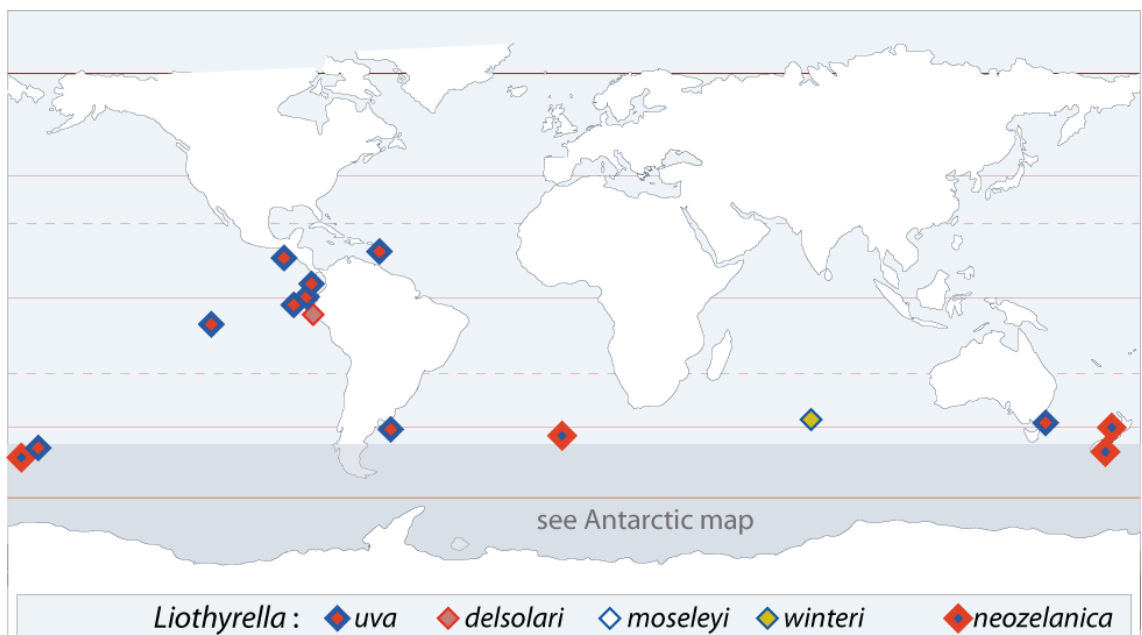
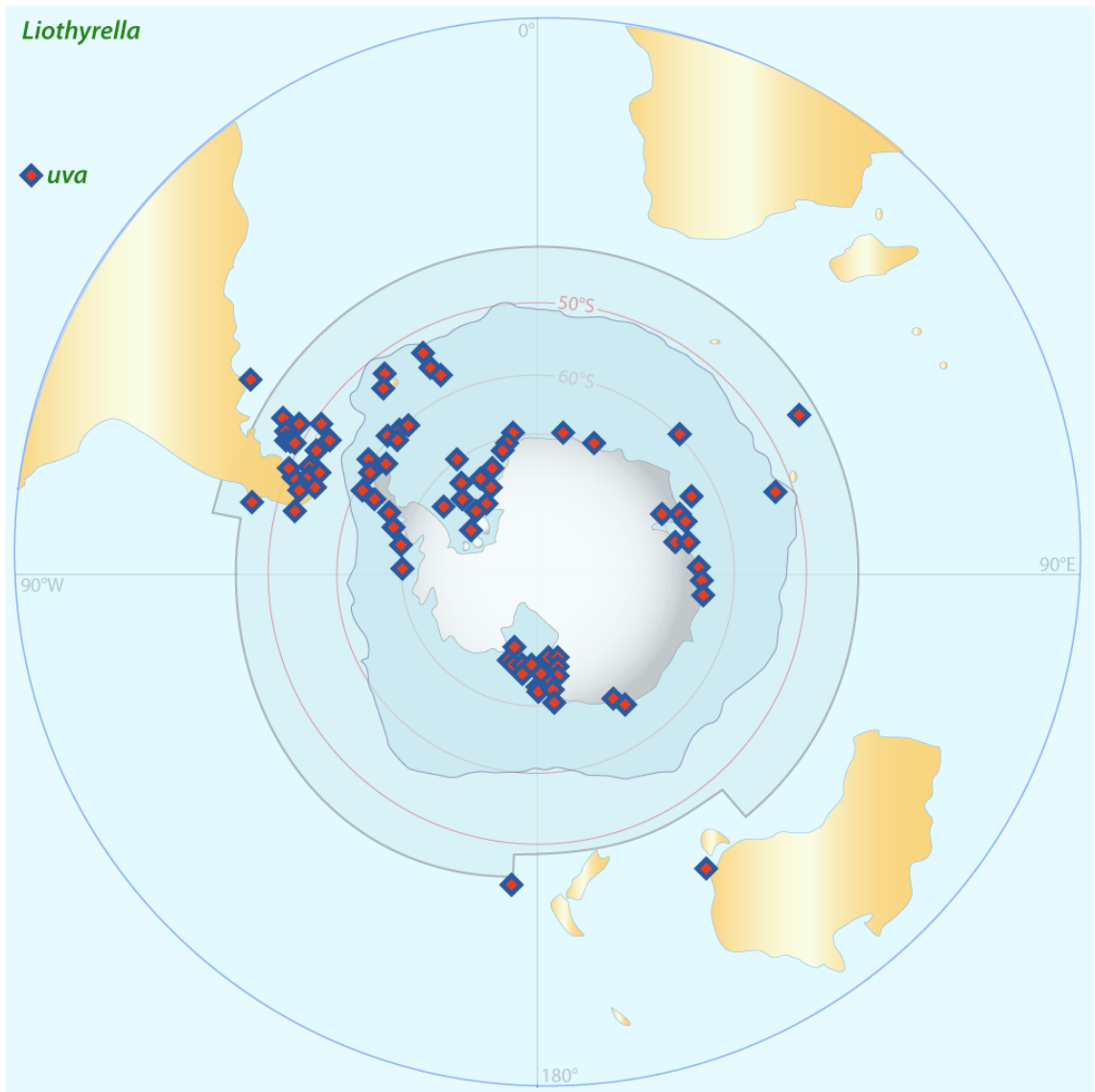
*Liothyrella expansa* Cooper, 1982

*Liothyrella notocadensis*: Cooper (1982)

Type locality: “in sinu Tehuantepec”, “found by Captain Dare, attached to a sea-vorn bivalve, at a depth of 10-12 fathoms” [18-22 m].

Depth range: 0 - 2273 m.

References: Alexander (1990), Barnes & Clarke (1995), Blochmann (1906, 1908), Bowden *et al.* (2006), Broderip (1833), Came *et al.* (2014), Cohen *et al.* (1998), Cohen *et al.* (2011), Cooper (1973a, 1982), Dall (1908, 1921), Davidson (1880, 1886-1888), Eichler (1911), Fischer & Ehlert (1892), Foster (1969, 1974, 1989), Harper & Peck (2003), Jackson (1912, 1918), Joubin (1914), Lee *et al.* (2001), Lüter *et al.* (2016), Mahon *et al.* (2003), Marshall *et al.* (1997), McClintock *et al.* (1993), Meidlinger *et al.* (1998), Ehlert (1906, 1908), Owen (1835), Parkinson *et al.* (2005), Peck *et al.* (2005), Peck & Brey (1996), Peck & Robinson (1994), Peck & Holmes (1989), Peck *et al.* (2001), Roux & Bremec (1996), Thomson (1918), Zezina (1980a, 1994, 1998), Zezina & Pakhnevich (1998).



***Liothyrella delsolari* Cooper, 1982**

Type locality: “[4°00'S, 80°30'W, between Mancora and Chicama, Peru, at 760-1000 m.](#)”

Depth range: 760 - 1208 m.

References: Cooper (1982), Foster (1989).

***Liothyrella moseleyi* (Davidson, 1878)**

*Terebratula moseleyi* Davidson, 1878

*Liothyris moseleyi*: Davidson (1886)

*Terebratula (Liothyrina) moseleyi*: Davidson (1892)

*Liothyrina moseleyi*: Blochmann (1906)

*Liothyrella moseleyi*: Hertlein & Grant (1944)

Type locality: “[west of Kergelen Island, 210 fathoms \[lat. 46°47'S., long. 51° 37'E. ; depth 210 fathoms\]](#) [384 m].

Depth range: some meters - 700 m.

References: Blochmann (1908), Cooper (1981), Dall (1908, 1921), Davidson (1878, 1880, 1886-1888), Fischer & Ehlert (1892), Foster (1974), Hiller (1994).

***Liothyrella neozelanica* Thomson, 1918**

*Liothyrina* sp. Jackson, 1918

*Liothyris neozelanica* Zezina, 1976

Type locality: “[on a flat stone entangled on a fishing line of 200 fathoms length, Cook Strait, off Wellington, New Zealand](#)” [370 m].

Depth range: 6 - 1939 m.

References: Bowen (1968), Dawson (1971a, 1991), Foster (1974, 1989), Lee (1991), Lüter (2008), Richardson (1981a), Thomson (1918), Ullmann *et al.* (2017).

***Liothyrella winteri* (Blochmann, 1906)**

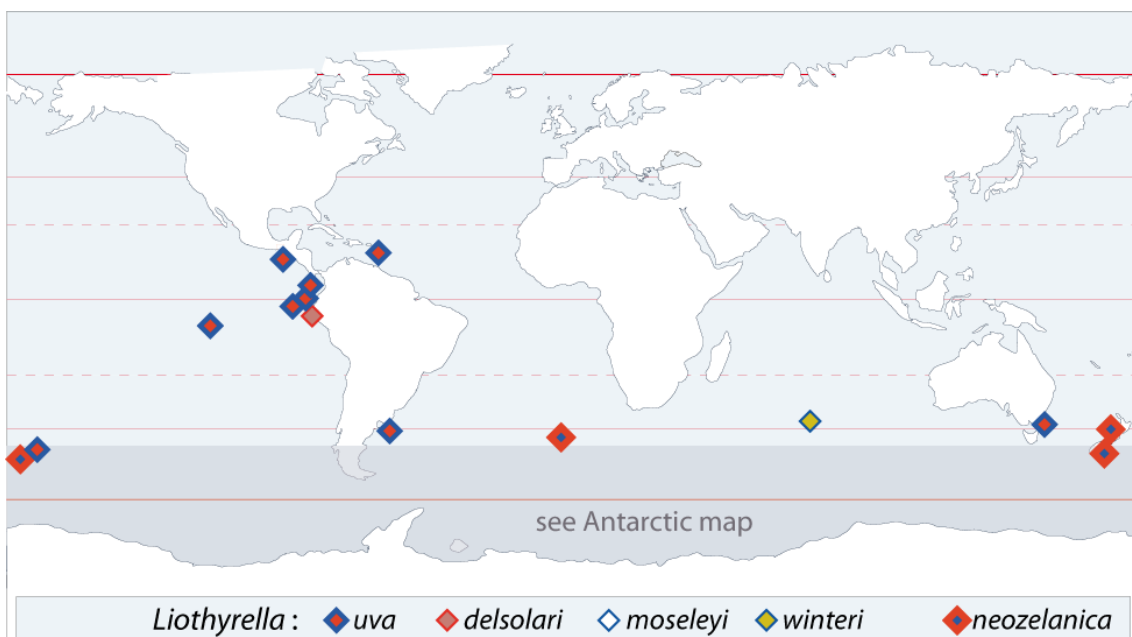
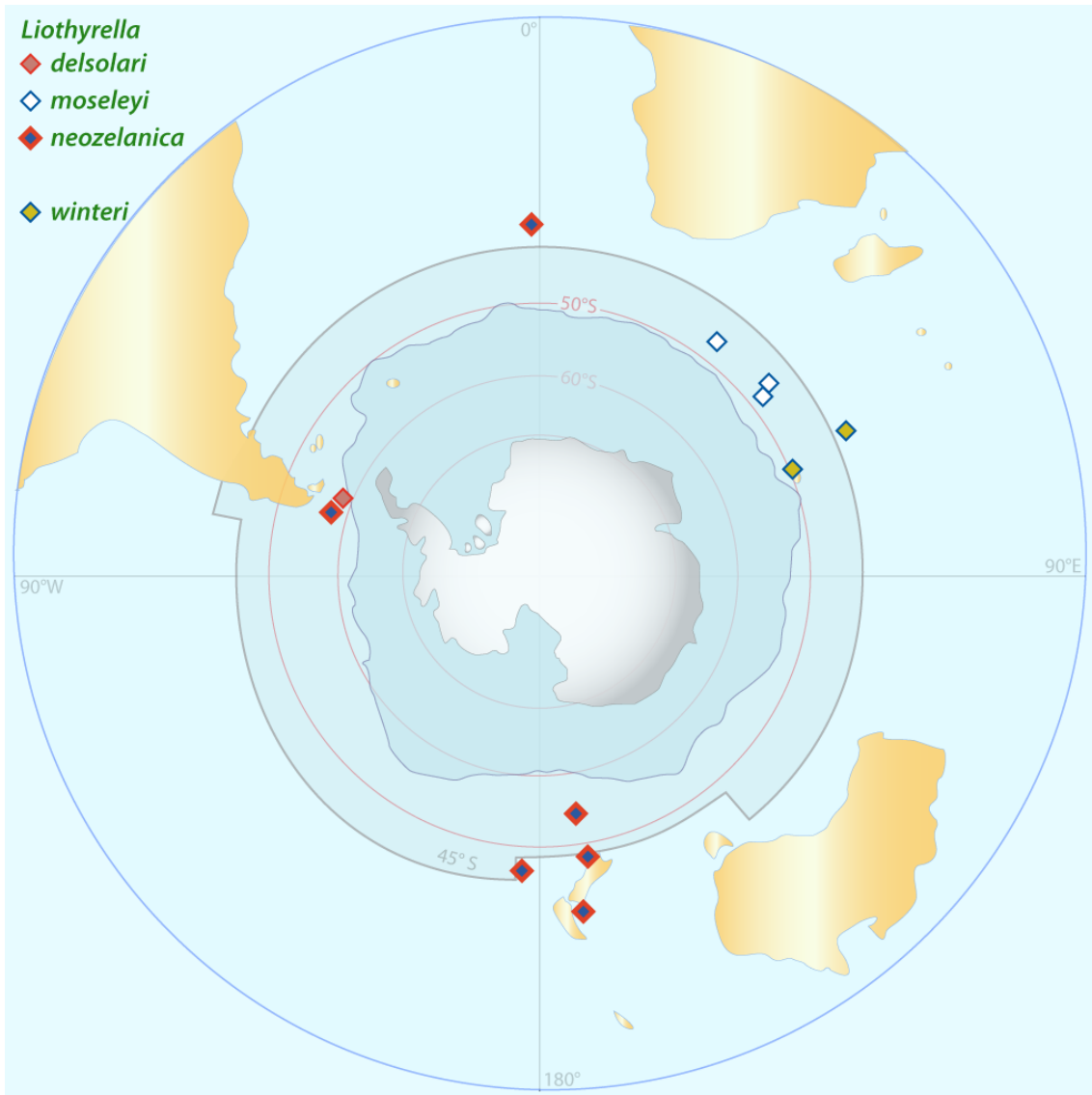
*Liothyrina winteri* Blochmann, 1906

*Liothyrella winteri* Thomson, 1927

Type locality: “[Valdivia, Station 165, St. Paul Tiefe 680 m](#)” [38°40,0'S, 77°38,6'E, depth 672 m, NE of Saint-Paul Island, Valdivia-Expedition, 1898-1899].

Depth range: 672 - 680 m.

References: Blochmann (1906, 1908), d'Hondt (1977).



Genus ***Macandrevia*** King, 1859

[= *Macandrewia* Bronn, 1862; *Frenula* Dall, 1871; = *Waldheimiathyris* Helmcke, 1939; = *Notorygmia* Cooper, 1972]

[Type species= *Terebratula cranium* Müller, 1776 (p. 261)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Subpentagonal in outline, smooth or with fine radial sculpture, umbo suberect to erect, deltidial plates rudimentary, pedicle foramen possibly permesothyrid, attrite; teeth moderate to large, dental plates short, straight, ventrally divergent, united by callus deposit closely applied to floor of valve; crural bases fused with inner socket ridges, crural plates steeply inclined to floor of valve, extended anteriorly, forming long, V-shaped trough extending about 0.5 valve length, low median ridge present early in ontogeny, but median septum absent in adult, loop extending about 0.75 valve length, smooth except for anterior fringe of short spines, ascending branches and transverse band moderately broad with short, posterior projections at union; diductor muscle scars attached to small, transverse impression over dorsal umbo; endopunctae minute, rather widely separated.

Geological range: Eocene - Present (Holocene).

***Macandrevia americana*** Dall, 1895

*Eudesia fontaineana* Dall, 1890 (not *Terebratula fontainei* d'Orbigny, 1846)

*Macandrevia craniella* Dall, 1895

*Macandrevia vanhoeffeni* Blochmann, 1906

*Magellana fragilis* Joubin, 1914 (not *M. fragilis* Smith, 1907)

*Macandrevia lata* Thomson, 1918

*Waldheimiathyris americana*: Elliot (1951)

*Waldheimiathyris vanhoeffeni*: Elliot (1951)

*Waldheimiathyris lata* Elliot, 1951

*Macandrevia diegenensis* Cooper, 1975

Type locality: “[station 2783, in 122 fathoms, off the west coast of Patagonia, in latitude 51°2' south; and station 3360, in 1672 fathoms, in the Gulf of Panama](#)” [223 and 3058 m].

Depth range: 71 – 4062 m.

References: Blochmann (1906), Cooper (1973a, 1982), Dall (1921), Davidson (1886-1888), Eichler (1911), Foster (1969, 1974), Thomson (1918), Zezina (1980a).

***Macandrevia diamantina*** Dall, 1895

*Macandrevia coasti* Helmcke, 1939

*Notorygmia diamantina*: Cooper (1972)

*Notorygmia abyssa* Cooper, 1972

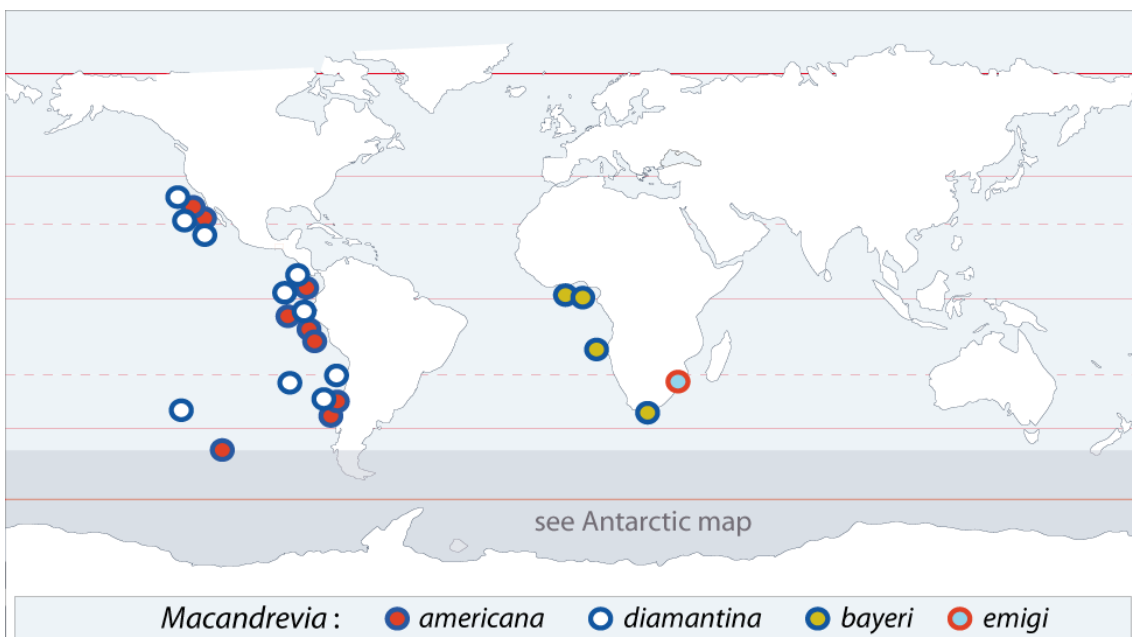
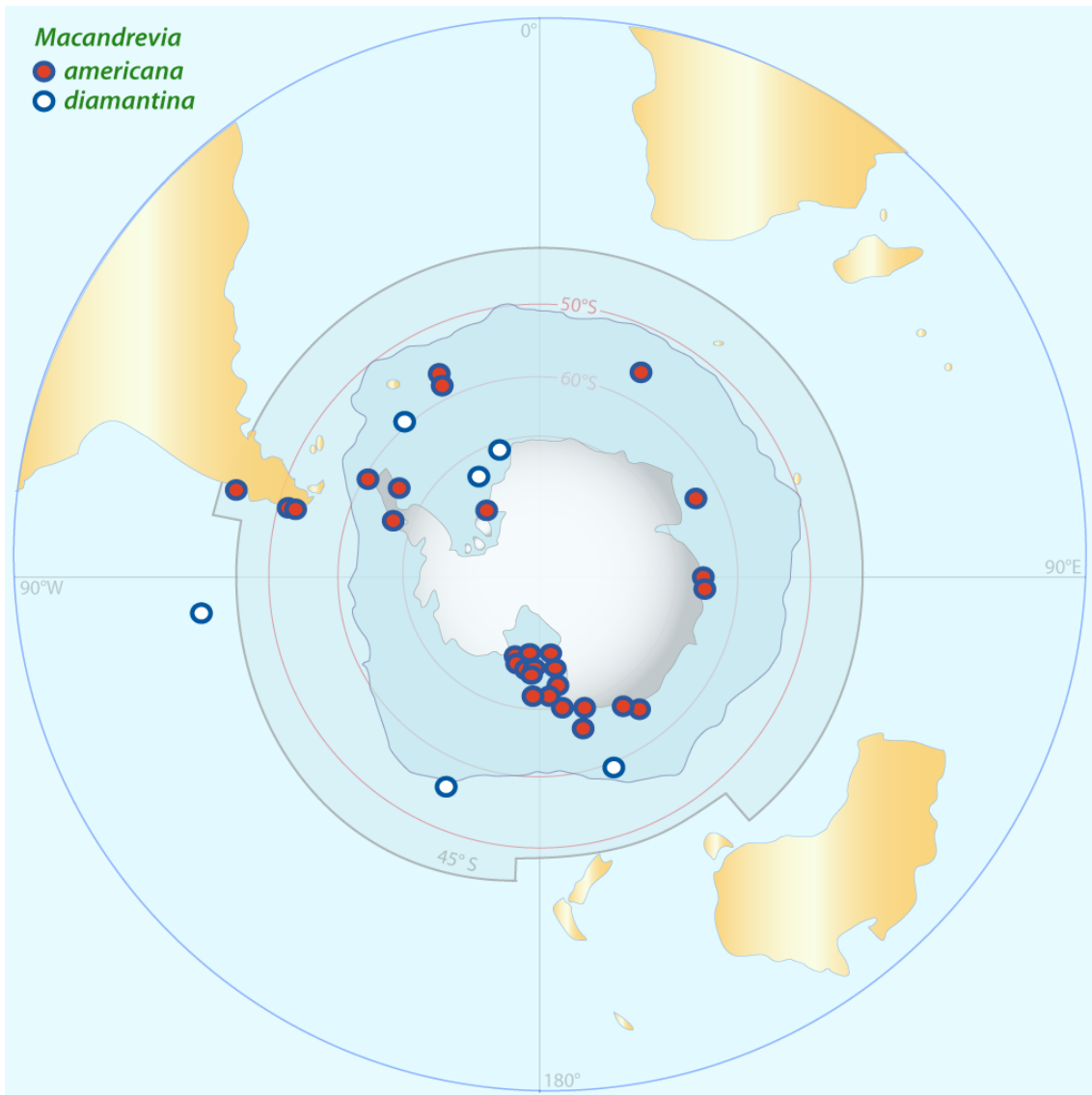
*Macandrevia* aff. *diamantina*: Cooper, 1973a

*Macandrevia* (*Notorygmia*) *diamantina*: Zezina, 1980

Type locality: “[off Cocos Island \(approximately 550 km off the W shore of Costa Rica\)](#).”

Depth range: 2140 – 4600 m.

References: Cooper (1973a), Dall (1895, 1921), Davidson (1886-1888), Foster (1969, 1974), Jackson (1912), Thomson (1918), Zezina (1980a, 1993).





Genus *Magasella* Dall, 1870

[Type species= *Terebratula sanguinea* Leach, 1814 (p. 76)]

Diagnosis from Robinson *et al.* (2016):

Medium to large, subpentagonal to oval, unisulcate, valve exterior strongly to weakly costate to smooth, fine concentric growth rings, beak erect to suberect, attrite, foramen medium to large, submesothyrid to mesothyrid, deltidial plates commonly conjunct. Cardinalia weakly to moderately thickened, cardinal process canoe-shaped with fine ridges, hinge plates excavate, moderately to steeply inclined, meeting on low, thin median septum to form septalium, adult loop trabecular, lophophore plectolophous.

Geological range: Present (Holocene).

*Magasella sanguinea* (Leach, 1814)

*Anomia cruenta* Dillwyn, 1817

*Terebratella zelandica* Deshayes, 1839

*Terebratella rubicunda* Sowerby, 1846

*Terebratella rubra* Sowerby, 1847 (non Pallas, 1766)

*Terebratella evansii* Davidson, 1852

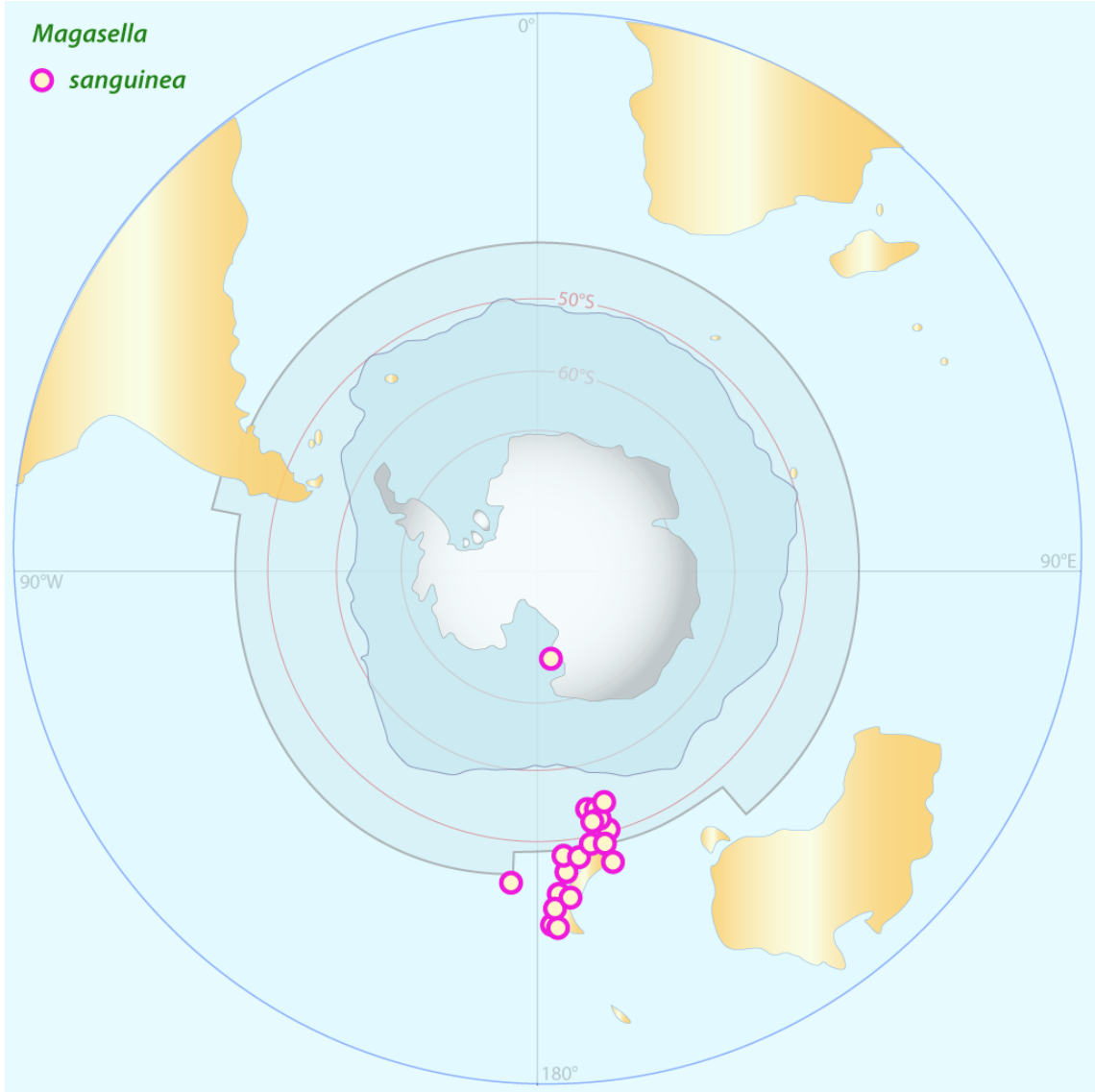
*Terebratella cruenta* Davidson, 1887

*Magasella sanguinea*: Allan (1960)

Type locality: "[Habitat in Nova Zelandia.](#)"

Depth range: 9 - 1030 m

References: Álvarez (2017), Blochmann (1913), Davidson (1886), Foster (1969, 1974, 1989), Jackson (1918), Robinson *et al.* (2016), Zezina (1980a).



Genus *Magellania* Bayle, 1880

[Type species= *Terebratula flavescens* Lamarck, 1819 (p. 246)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Medium to large, ovate, smooth as juvenile, becoming costate, unisulcate; beak suberect to erect; foramen large, mesothyrid, attrite; symphytium moderately high. Cardinalia lamellar with wide inner hinge plates and narrow outer hinge plates divided by narrow crural bases, hinge plates excavate, meeting on medium septum to form septalium; cardinal process a transverse myophore; crura short, crural processes prominent; loop teloform. Lophophore plectolophous.

Geological range: Miocene - Present (Holocene).

*Magellania fragilis* Smith, 1907

*Stetothyris antarctica* Thomson, 1918

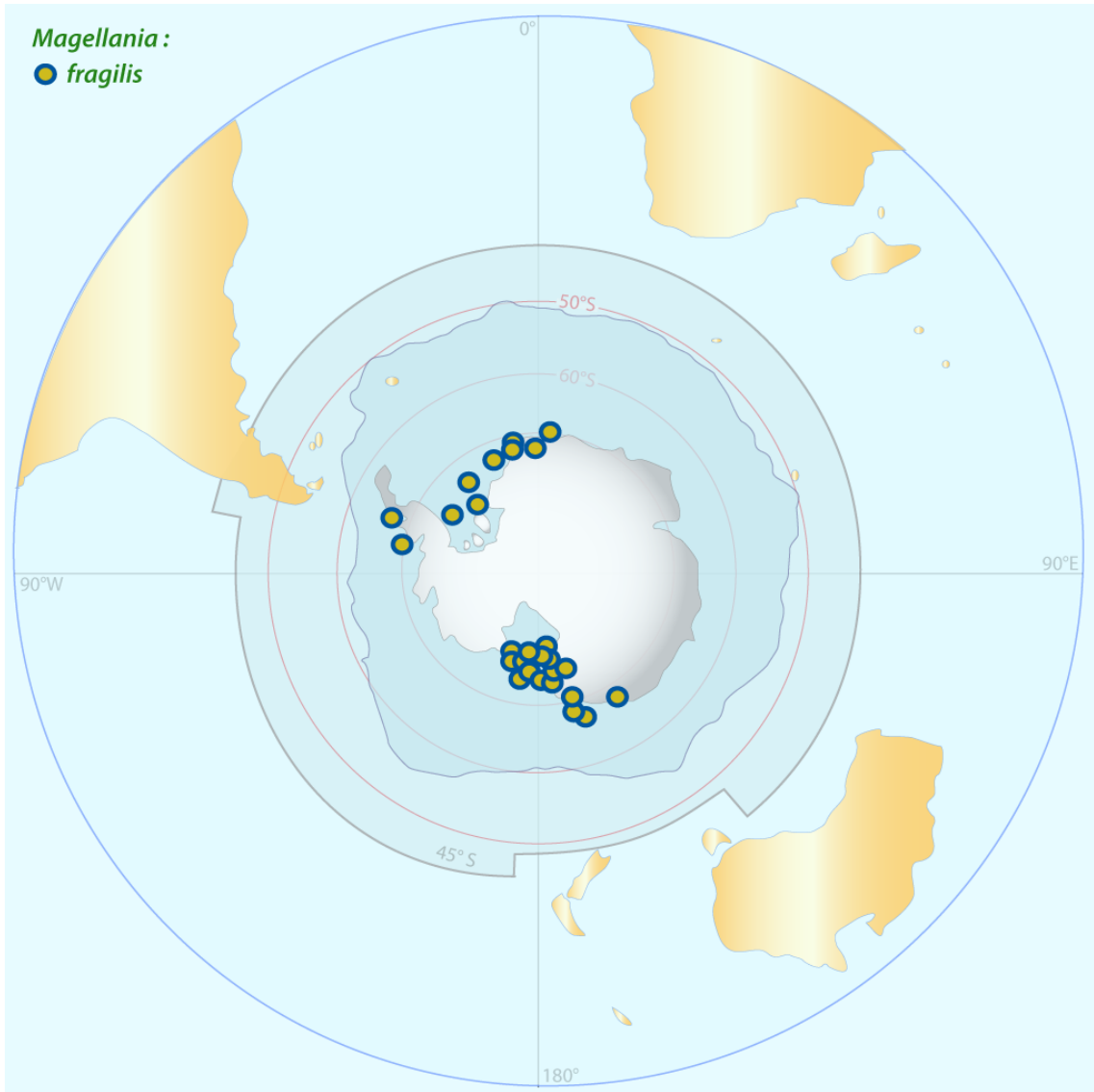
*Aerothyris fragilis*: Allan (1939)

*Victorithyris? antarctica* Allan, 1940

Type locality: "Agassiz island, 300 fathoms, off ice barrier" [549 m].

Depth range: 75 - 1254 m

References: Allan (1939, 1940a, 1940b), Brey *et al.* (1995), Eichler (1911), Foster (1974, 1989), Jackson (1918), Joubin (1914), Richardson (1997), Smith (1907), Thomson (1818), Zaky *et al.* (2016), Zezina (1980a, 1998).



***Magellania joubini* Blochmann, 1906**

*Magellania sulcata* Smith, 1907  
*Campages joubini* Hedley, 1911  
*Aerothyris joubini*: Allan (1939)

Type locality: “[Winter-station der Gaußexpedition in 385 m Tiefe](#)” [66°20’S, 89°38’E].

Depth range: 80 – 1894 m.

References: Allan (1939, 1940a), Blochmann (1906), Cotton (1937), Dall (1921), Eichler (1911), Foster (1969, 1974, 1989), Jackson (1918), Richardson (1997), Thomson (1918), Smith (1907), Zezina (1980a, 1998).

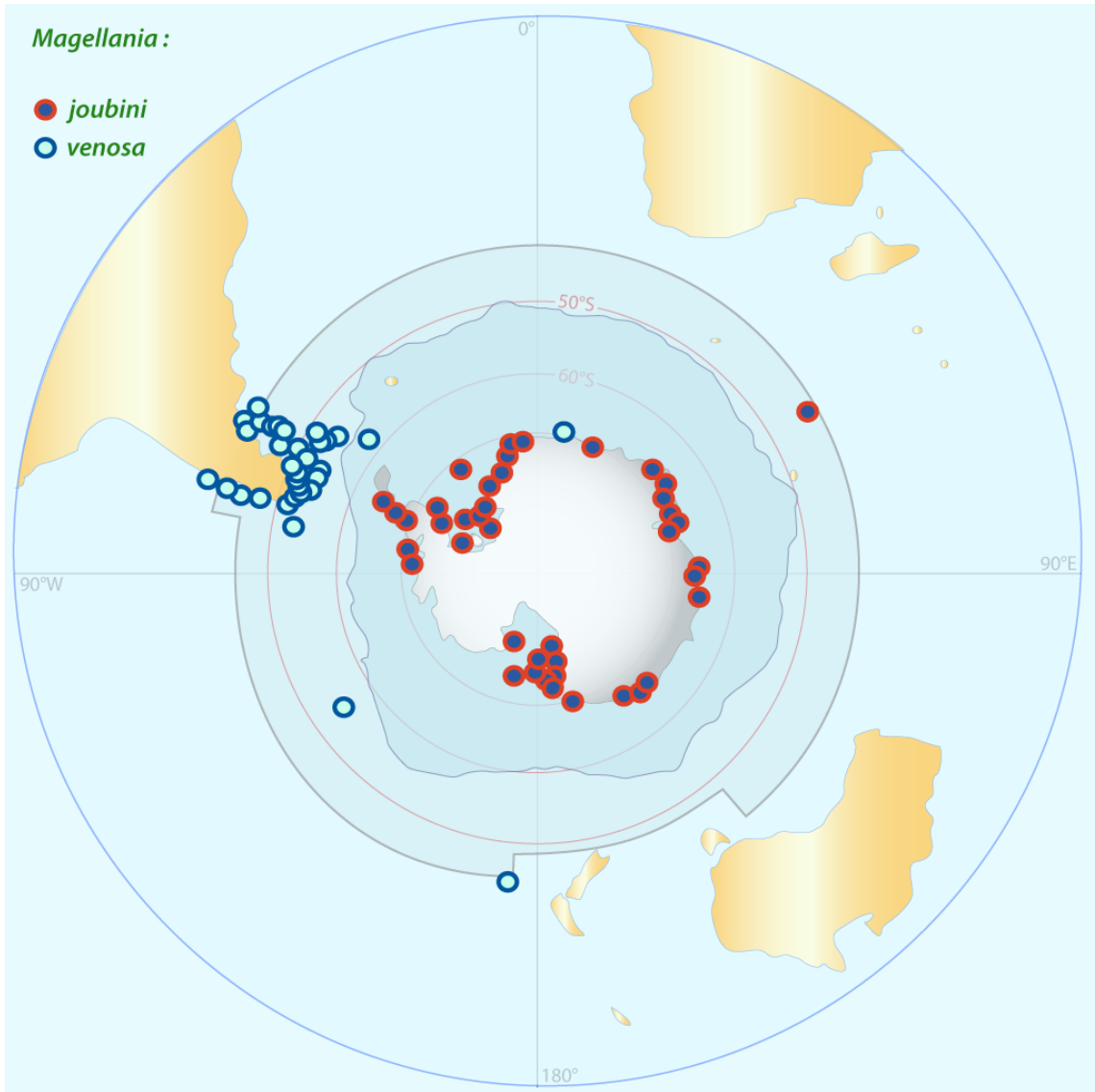
***Magellania venosa* (Solander, 1786)**

*Anomia venosa* Solander, 1786  
*Terebratula dilata* Lamarck, 1819  
*Terebratula malvinae* d’Orbigny, 1847  
*Terebratula fontanea* d’Orbigny, 1847  
*Terebratula pulvinata* Gould, 1850  
*Waldheimia venosa*: Davidson (1861)  
*Magasella laevis* Dall, 1870  
*Magellania venosa*: Fischer & Ehlert (1892)  
*Magellania (Neothyris) venosa*: Dall (1921)  
*Waldheimiathyris americana* Elliot, 1951  
*Aerothyris? venosa*: Levy (1961)  
*Magellania? venosa*: Cooper (1981)

Type locality: “[the country unkown](#)” (Solander, 1786); “[Falkland’s Islands](#)” (Dixon, 1789)

Depth range: 2 – 3510 m.

References: Álvarez (2017), Cohen *et al.* (2011), Dall (1921), Davidson (1886), Dixon (1789), Fischer & Ehlert (1892), Försterra *et al.* (2008), Foster (1969, 1974, 1989), Jackson (1912), Jackson *et al.* (2015), Richardson (1997), Roux & Bremec (1996), Solander (1786), Zezina (1980a).



Genus *Manithyris* Foster, 1974

[Type species= *Manithyris rossi* Foster, 1974 (p. 55)]

Diagnosis from volume 4 of the Treatise on Invertebrate Paleontology (Kaesler, 2002):

Small, subequibiconvex, broadest anterior to midlength; finely capillate shell surface and irregularly ligate anterior commissure. Widely spaced crura spatulate, with outer surfaces strongly convex and inner surfaces concave, transitional between spinuliform and arcuiform; low dorsal median ridge; outer hinge plate narrow, no inner hinge plate.

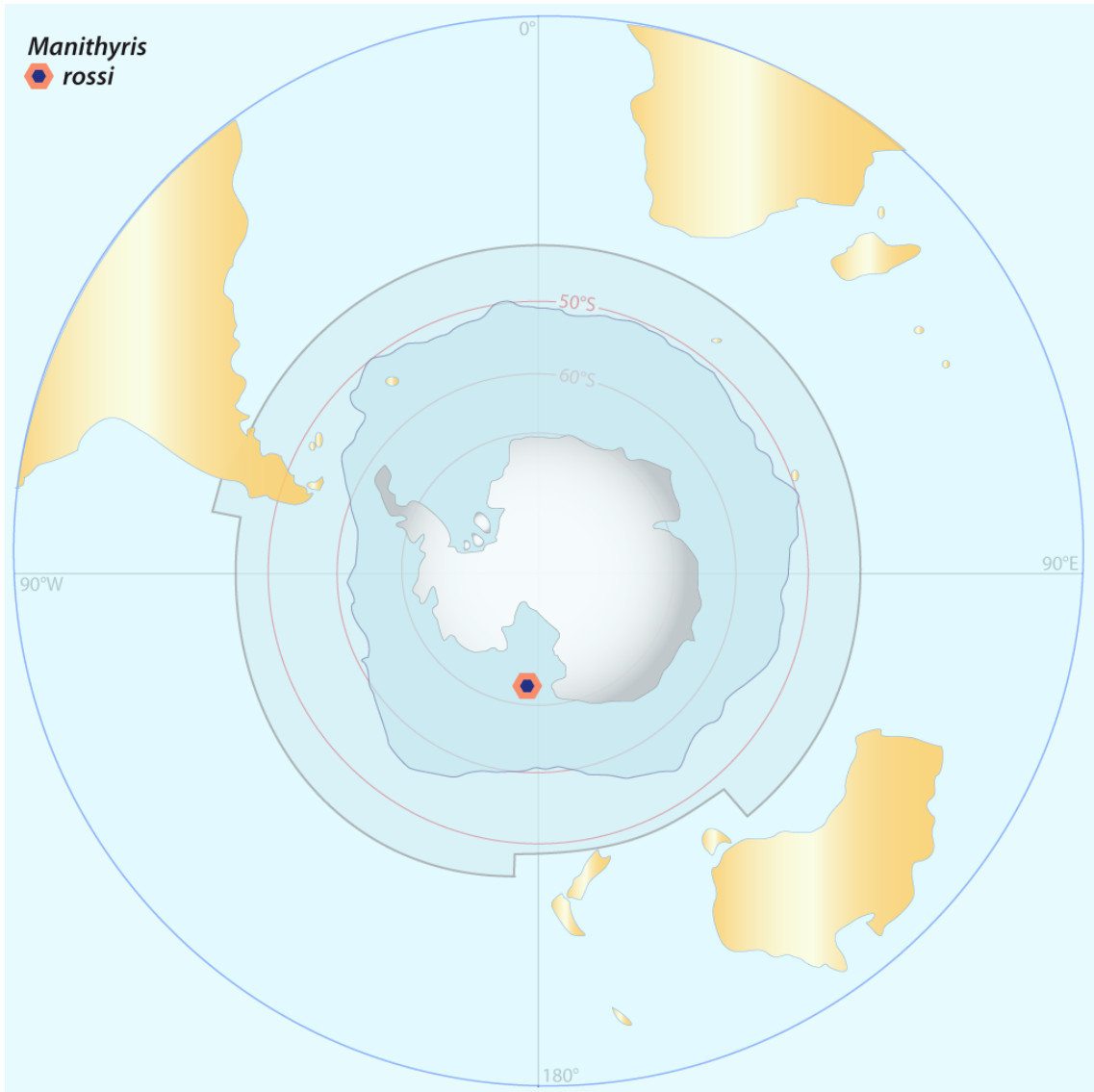
Geological range: Present (Holocene).

*Manithyris rossi* Foster, 1974

Type locality: "HU st. 32-52 (73°19'S, 174°53.1'W): 2897-2904 m."

Depth range: 2897 - 2904 m.

Reference: Foster (1974).





Genus ***Melvicalathis*** Lee, Lüter & Zezina, 2008 in Lee *et al.* (2008)

[Type species= *Eucalathis macroctena* Zezina, 1981 (p. 159)]

Diagnosis from Lee *et al.* (2008):

Costae broad, triangular in cross-section; foramen hypothyrid, beak very attrite; transverse band of loop medially directed towards dorsal valve; loop may be incomplete.

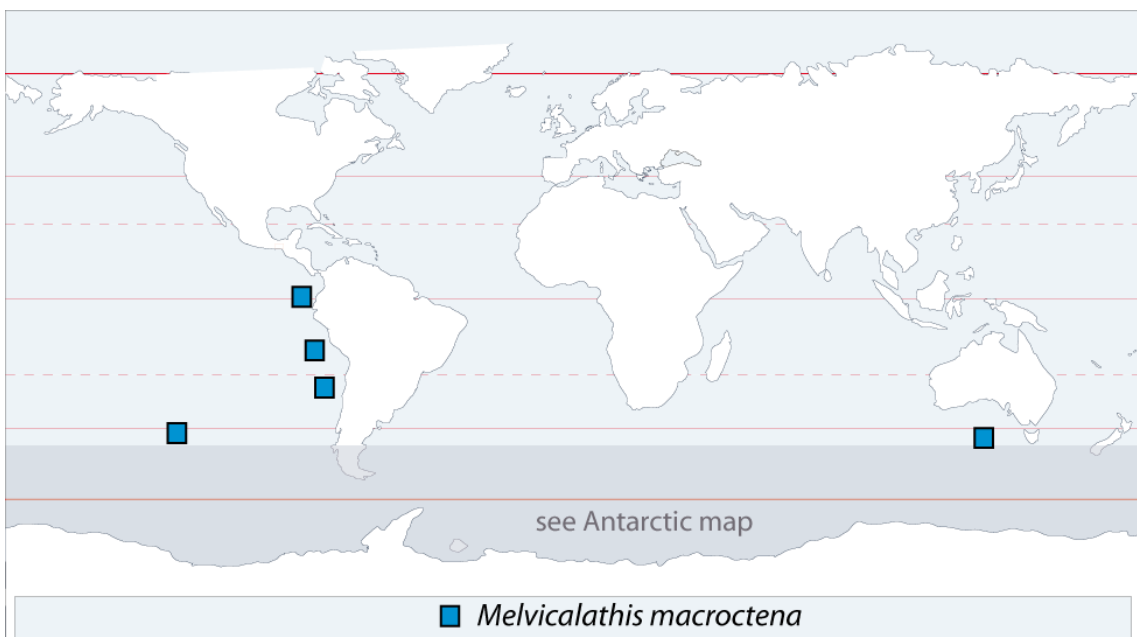
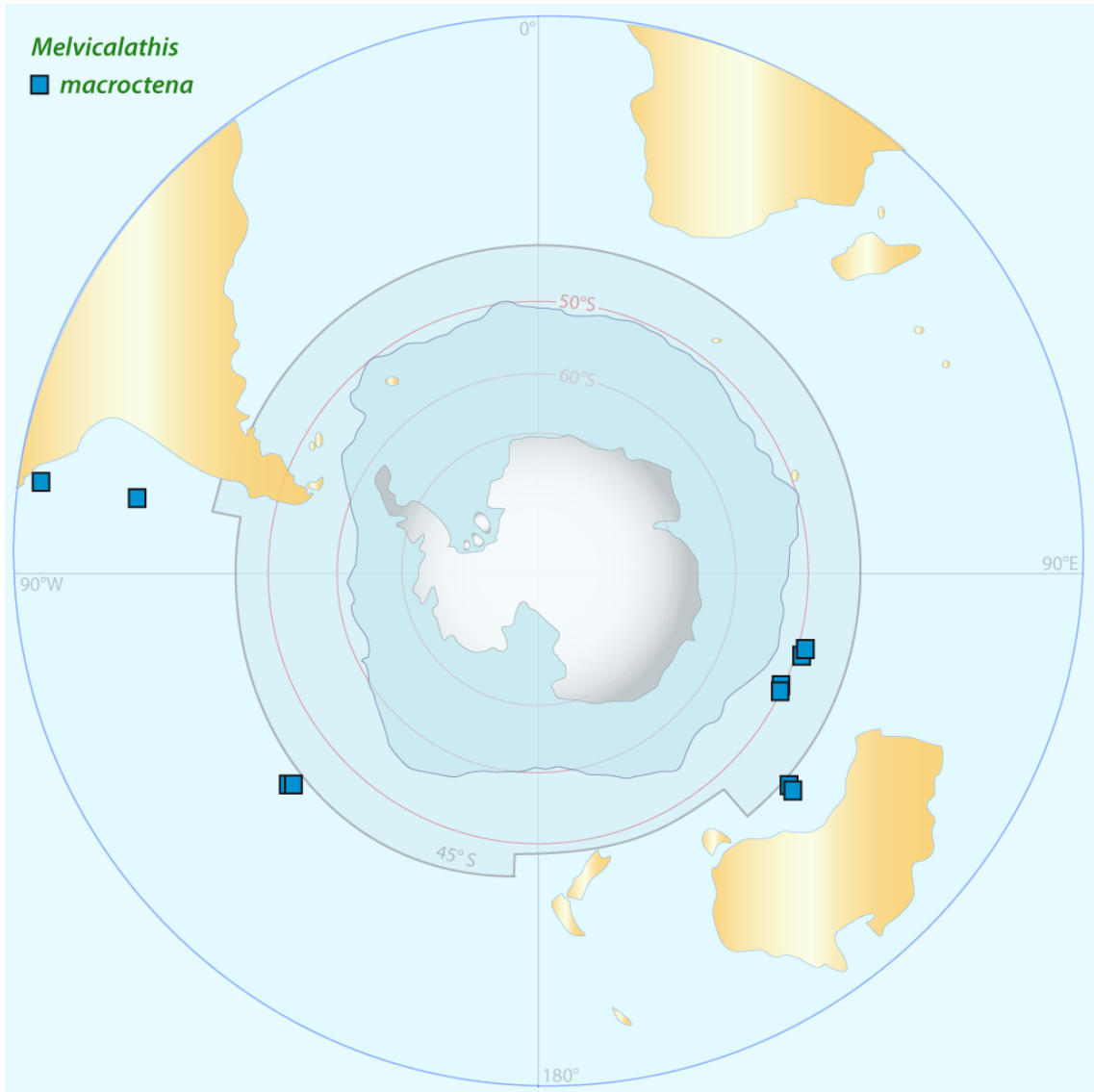
Geological range: Present (Holocene).

***Melvicalathis macroctena*** (Zezina, 1981)

Type locality: “Akademik Kurchatov st. 261, 7.x.1969, 30°24'S, 78°59'W, 3870 m.”

Depth range: 2009 - 4900 m.

References: Lee *et al.* (2008).



Genus *Neorhynchia* Thomson, 1915

[Type species= *Hemithyris strebeli* Dall, 1908 (p. 441)]

Diagnosis from volume 4 of the Treatise on Invertebrate Paleontology (Kaesler, 2002):

Suboval to pentagonal, gently ventribiconvex, typically sulcate, smooth; broad but deep, arcuate anterior commissure; beak short, hypothyrid; foramen moderate, deltidial plates disjunct. Crura short, gently arcuiform.

Geological range: Present (Holocene).

*Neorhynchia strebeli* (Dall, 1908)

*Neorhynchia strebeli*: Thomson (1915)

*Neorhynchia* sp. Foster, 1969

*Neorhynchia profunda* Cooper, 1972

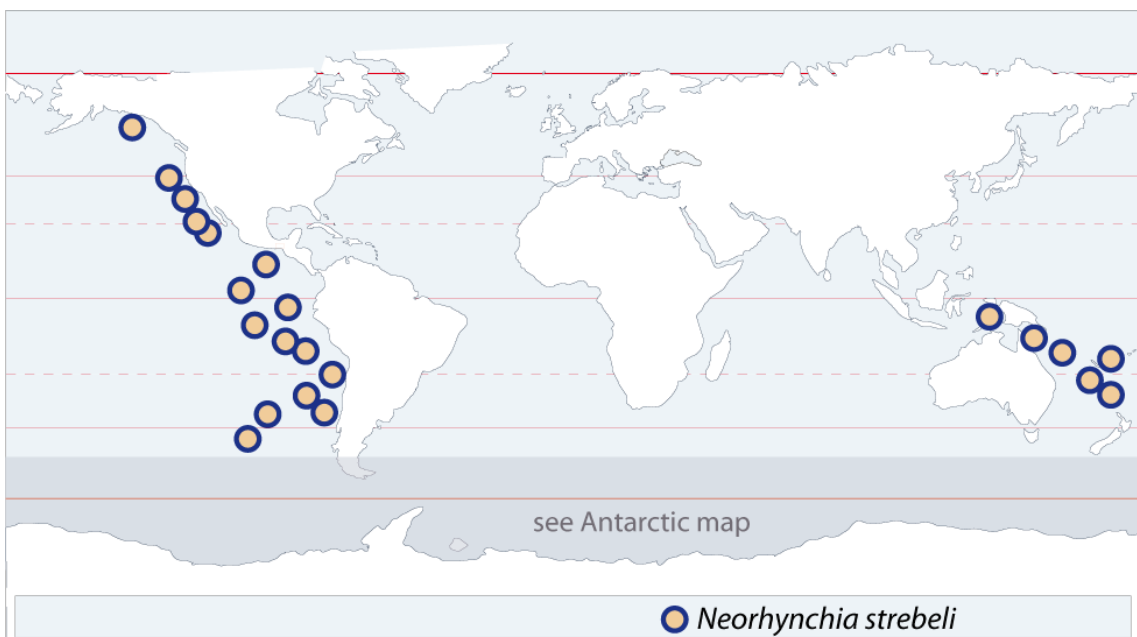
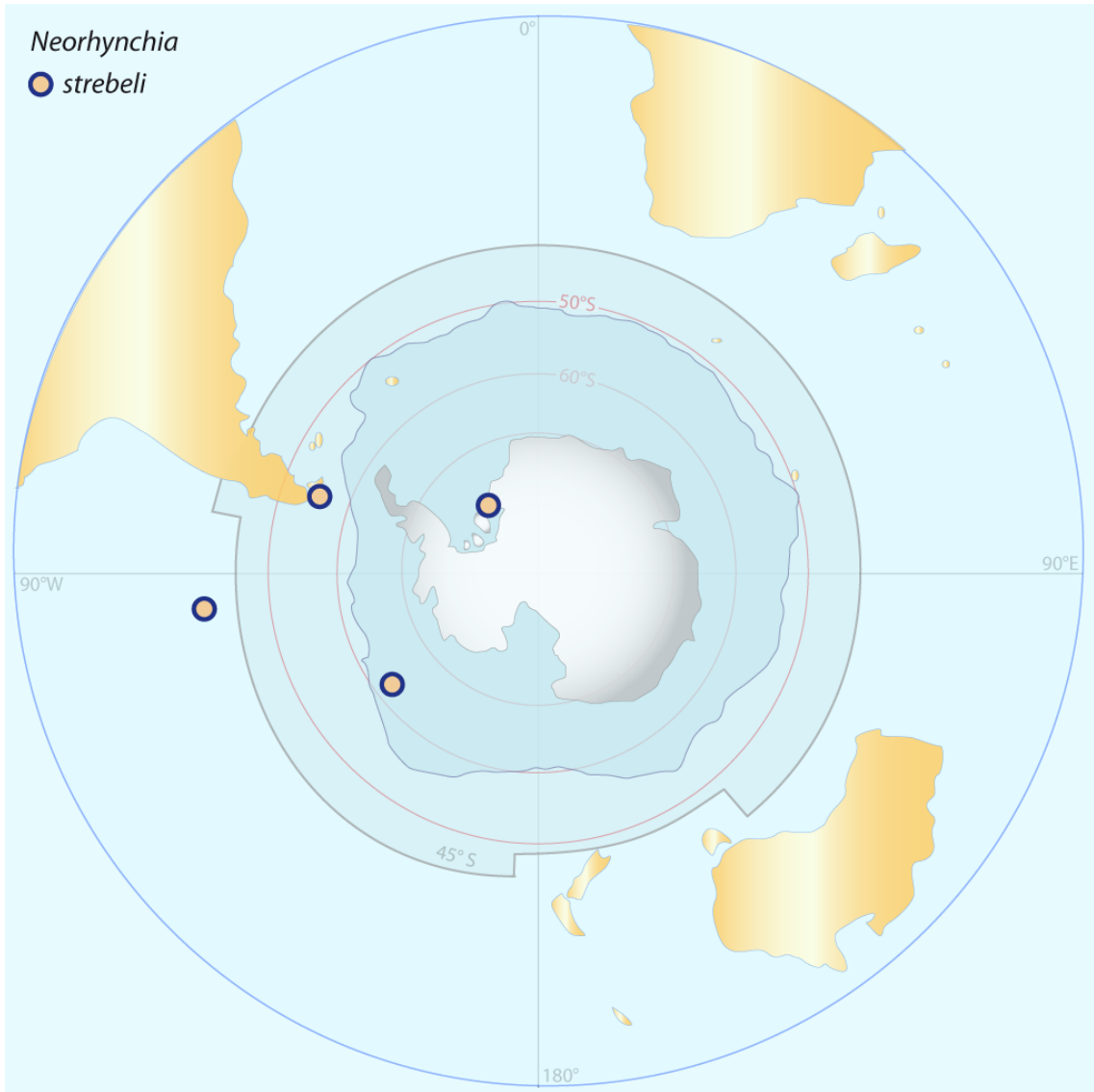
*Neorhynchia abyssa* Cooper, 1972

*Neorhynchia strebeli rectimarginata* Foster, 1974

Type locality: “U.S.S. Albatross, station 4721, in Mid Pacific, in 2084 fathoms” [16°48.3'N, 62°20.3'E, 3860 m].

Depth range: 1806 - 4682 m.

References: Barnes & Peck (1997), Foster (1969, 1974, 1989), Zezina (1975).



Genus *Neothyris* Douvillé, 1879

[Type species= *Terebratula lenticularis* Deshayes, 1839 (p. 274)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Large, smooth, weakly unisulcate, beak erect to incurved, foramen small, mesothyrid, attrite; deltidial plates conjunct. Strong posterior shell thickening in adults. Cardinalia thickened, crural bases fused with socket ridges; median septum short, high, bifurcating posteriorly to form wide hinge trough, almost filled by large, swollen boss of cardinal process; crura rather short, crural processes prominent; adult loop teloform. Lophophore plectolophous.

Geological range: Miocene - Present (Holocene).

*Neothyris lenticularis* (Deshayes, 1839)

*Terebratula gaudichaudii* Gray, 1833 (not Blainville, 1828)

*Waldheimia lenticularis*: Gray (1853)

*Neothyris lenticularis*: Douvillé (1879)

*Magellania lenticularis*: Suter (1911)

*Magellania (Neothyris) lenticularis*: Dall (1921)

*Neothyris obtusa* Thomson, 1920

*Neothyris lenticularis compressa* Neall, 1972

*Neothyris dawsoni* Neall, 1972

*Neothyris parva* Cooper, 1982

*Neothyris compressa*: Foster (1989)

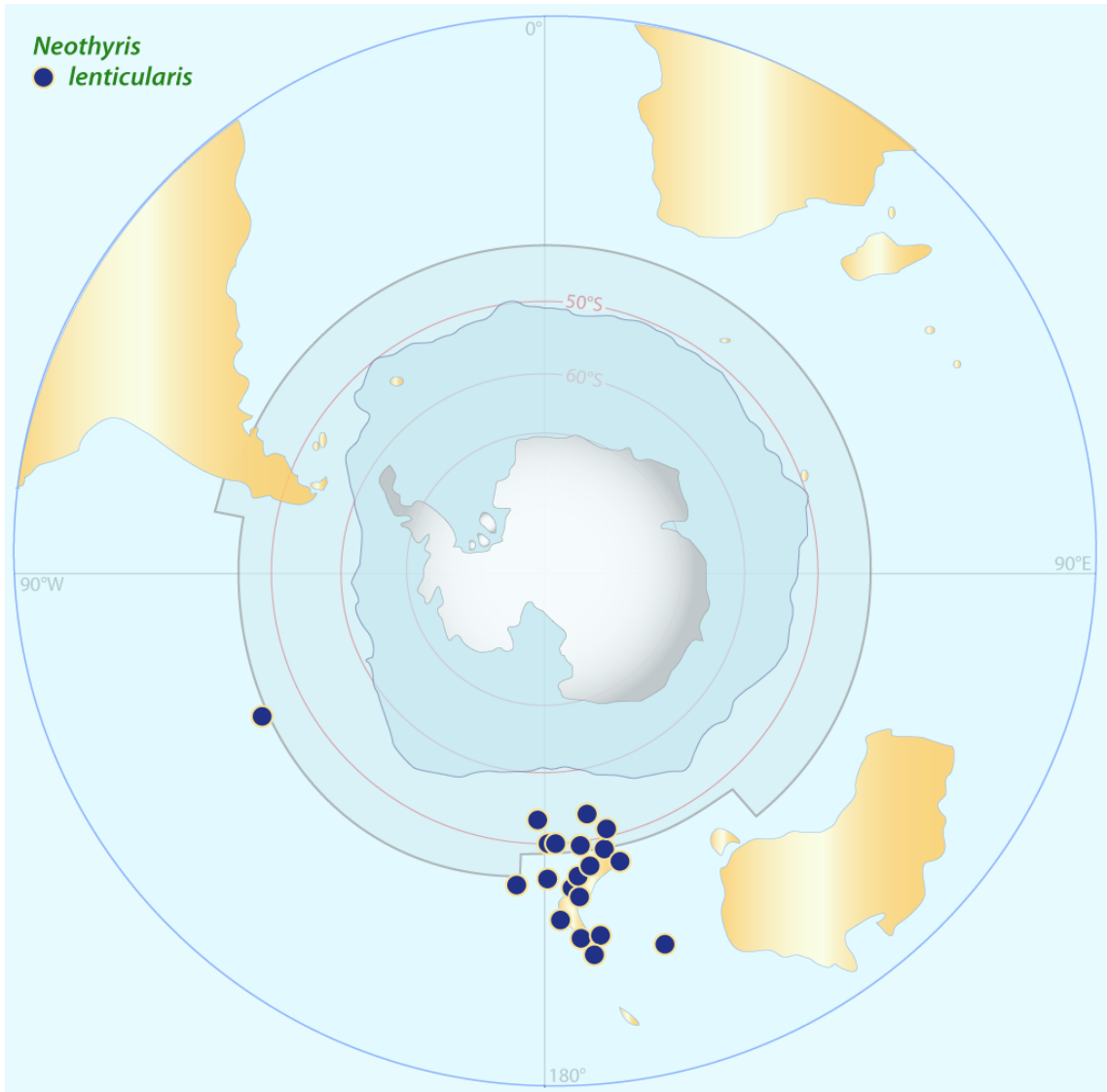
Type locality: Foveaux Strait (Southern New Zealand).

Depth range: 0 - 1210 m.

References: Bowen (1968), Brand *et al.* (2003), Came *et al.* (2014), Foster (1967, 1969, 1974, 1989), Harper *et al.* (2011), Neall (1970, 1972), Parkinson *et al.* (2005), Richardson (1997), Zezina (1980a).

***Terebratula lenticularis*. — Testa orbiculari, inæquivalvi, lentiformi, rubra, lævigata, inferne subsinuosa, umbonæ valvæ inferioris recurvo, foramine minimo perforato, lateraliter planulato. — Détroit de Fauveau, à la Nouvelle-Zélande.**

Fac-simile of the original description by Deshayes (1839).



Genus *Novocrania* Lee et Brunton, 2001

[Type species= *Patella anomala* Müller, 1776; ICZN plenary powers, 1988, opinion 1468]

Diagnosis from volume 2 of the Treatise on Invertebrate Paleontology (Kaesler, 2000):

Dorsal valve convex to conical; beak subcentral to posterocentral, smooth, finely pustulose or rarely finely costellate; posterior margin commonly straight; recent species with dendroid shell punctation; dorsal posterior adductor scars large, rounded, thickened, widely separated; anterior scars commonly crescentic, raised above valve floor; weak myophragm bisects muscle field; encrusting; ventral valve uncalcified in recent species, otherwise sometimes thin; ventral posterior adductor scars large, anterior scars united medially; marginal mantle setae observed in recent forms; valve margins variably thickened, with limbus or faint submarginal rim.

Geological range: Paleogene (Eocene) - Present (Holocene).

*Novocrania lecointei* (Joubin, 1901)

? *Crania pourtalesii* Dall, 1890 (not *Crania anomala* var. *pourtalesii* Dall, 1871, p. 35)

*Crania patagonica* Dall, 1902

*Crania joubini* Thomson, 1918

*Discina?* *joubini* Thomson, 1918

*Crania antarcticaensis* Hatai, 1965

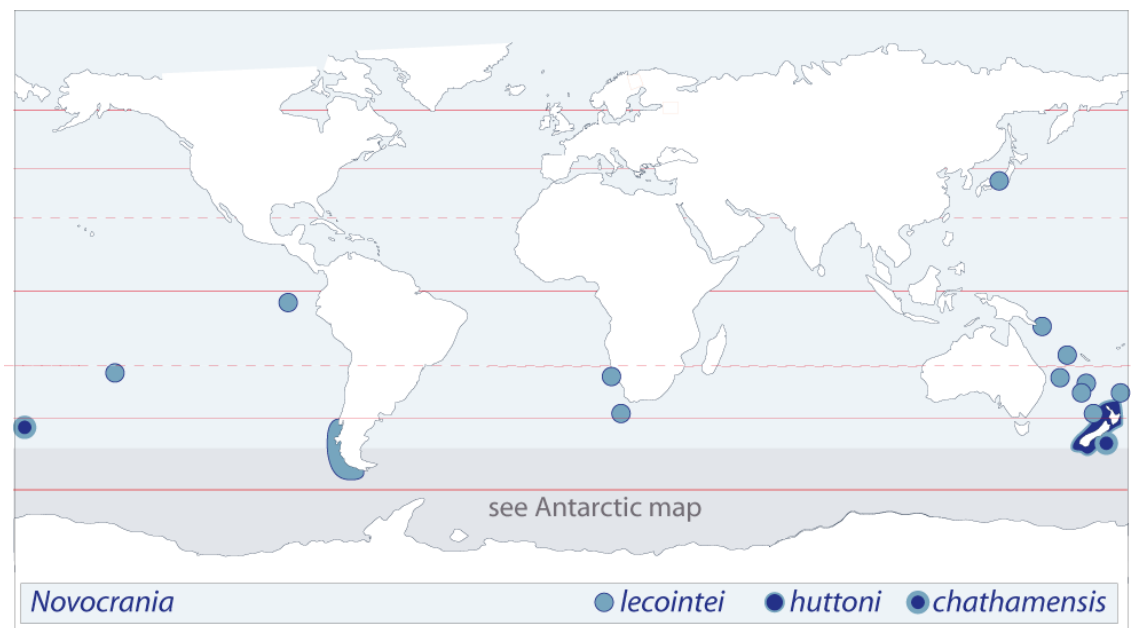
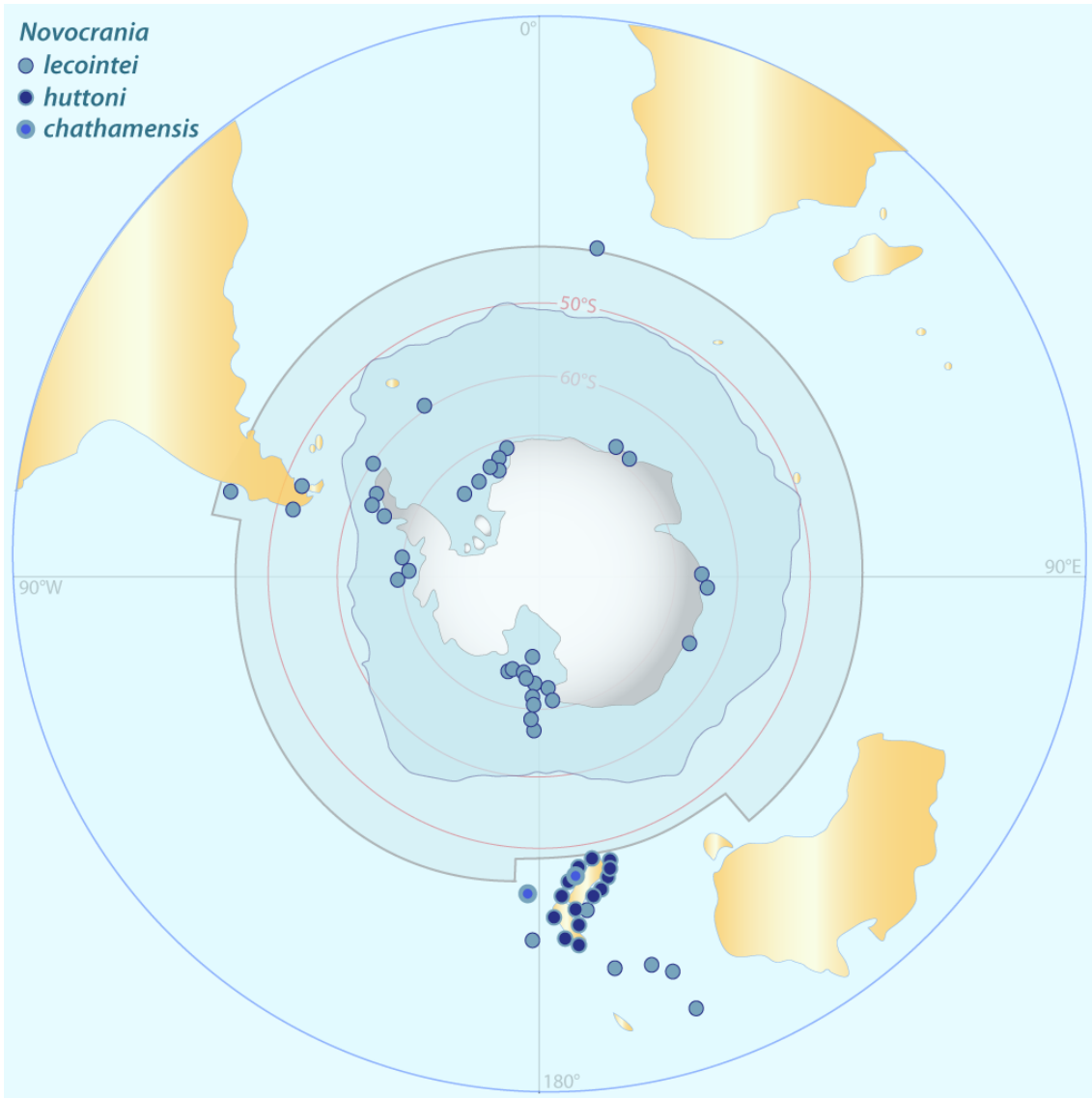
*Neocrania lecointei*: Lee & Brunton (1986)

*Novocrania lecointei*: Lee & Brunton (2001)

Type locality: "N° 578b. - Faubert VII - Lat.70°23' S., Long. 82°47'O - 8 Octobre 1898 - Profondeur : 500 m environ."

Depth range: 40 - 3310 m.

References: Brand *et al.* (2003), Cohen *et al.* (2014), Cooper (1973a, 1981), Dall (1921), Eichler (1911), Foster (1969, 1974), Hatai (1965), Robinson (2014), Sáiz *et al.* (2008), Thomson (1918), Zezina (1980a, 1981, 1994, 1998), Zezina & Pakhnevich (1998).





Genus *Pelagodiscus* Dall, 1908

[Type species= *Discina atlantica* King, 1868 (p. 171)]

Diagnosis from volume 2 of the Treatise on Invertebrate Paleontology (Kaesler, 2000):

Similar to *Discinisca* but smaller, very thin-shelled; lophophore schizolophous.

Geological range: ?Miocene - Present (Holocene).

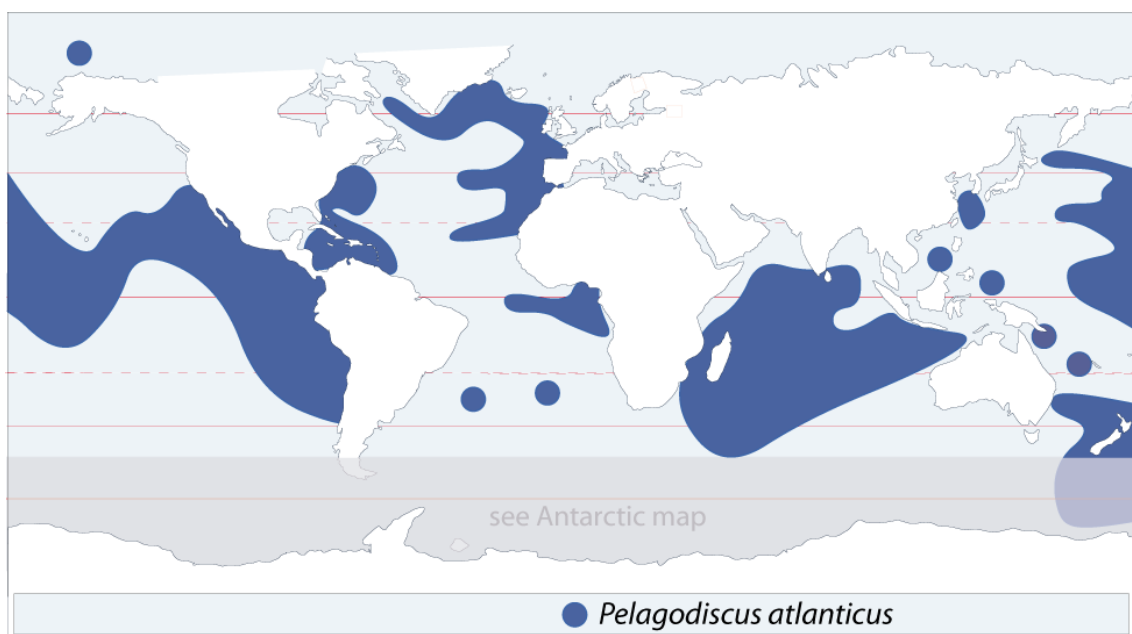
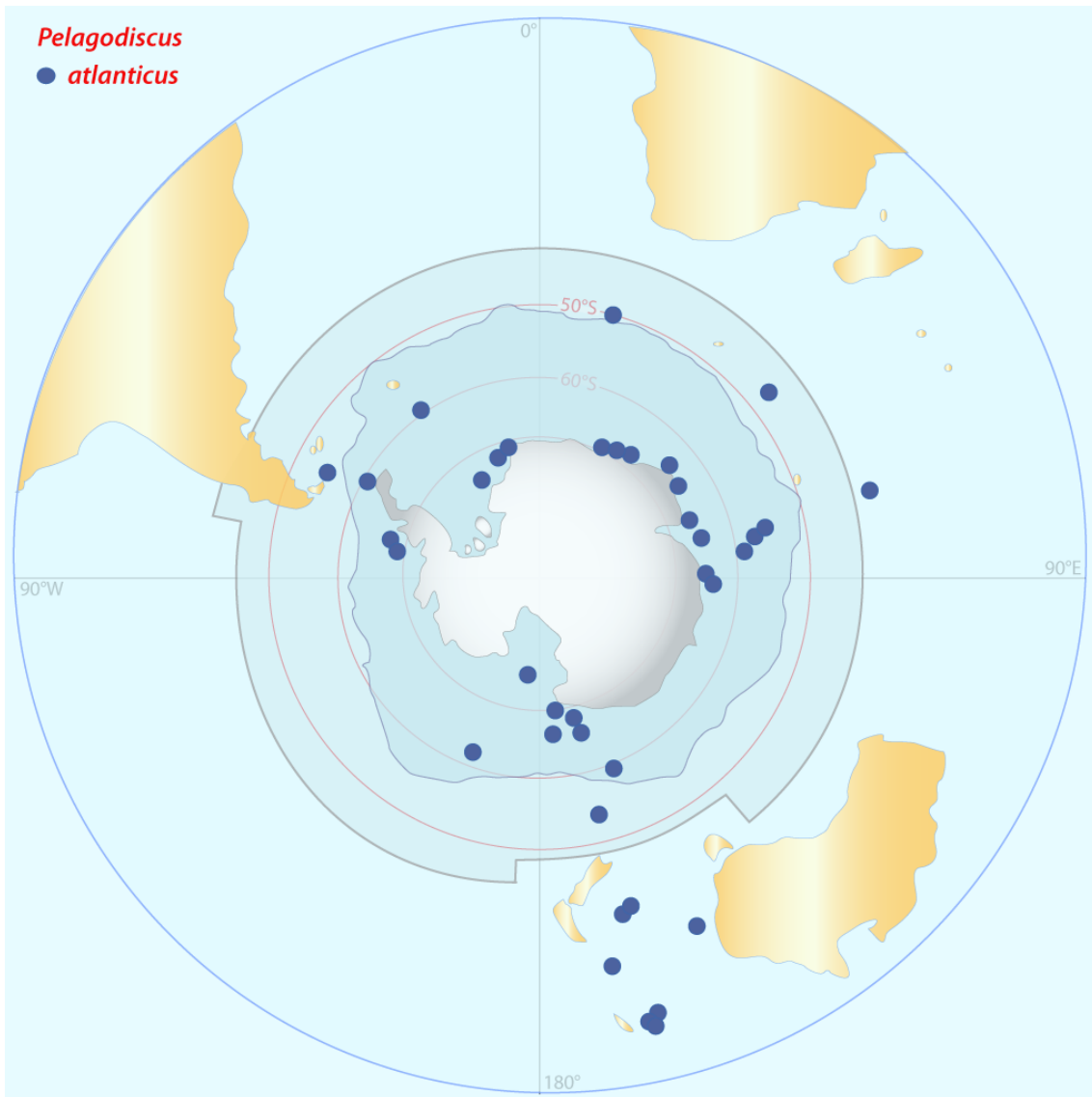
*Pelagodiscus atlanticus* (King, 1868)

*Pelagodiscus atlantica* Hatai, 1936

Type locality: “depth of 1240 fathoms, in N. lat. 52°8', W. long. 15°30', or nearly due west of Dingle Bay” [2268 m].

Depth range: 336 - 5530 m (empty shells until 7600 m).

References: Cooper (1981, 1982), Dall (1921), Eichler (1911), Foster (1967, 1969, 1974), Helmcke (1940), Jackson (1912), Zezina (1975, 1980a, 1981a, 1981b, 1993), Zezina *et al.* (1993).



Genus ***Pemphixina*** Cooper, 1981

[Type species= *Rhynchonella nigricans* var. *pyxidata* Davidson, 1880 (p. 59)]

Diagnosis from volume 4 of the Treatise on Invertebrate Paleontology (Kaesler, 2002):

Small to medium, moderately dorsibiconvex, rounded to globular, strongly uniplicate, but dorsal fold scarcely raised; beak short, erect, foramen hypothyrid, elongate-oval, small; deltidial plates disjunct; shell surface multicostellate, costellae rounded, interrupted by numerous concentric growth lines. Hinge teeth thick, buttressed by short dental plates; crura short, crescentic in cross section, incipiently canaliform; dorsal median septum short but rising to crest just anterior to crura. Geological range: Present (Holocene).

***Pemphixina pyxidata*** (Davidson, 1880)

*Rhynchonella nigricans* var. *pyxidata* Davidson, 1888

*Rhynchonella nigricans* var. *pyxidata*: Chapman & Crespin (1923)

*Tegulorhynchia pyxidata*: Champan & Crespin (1923)

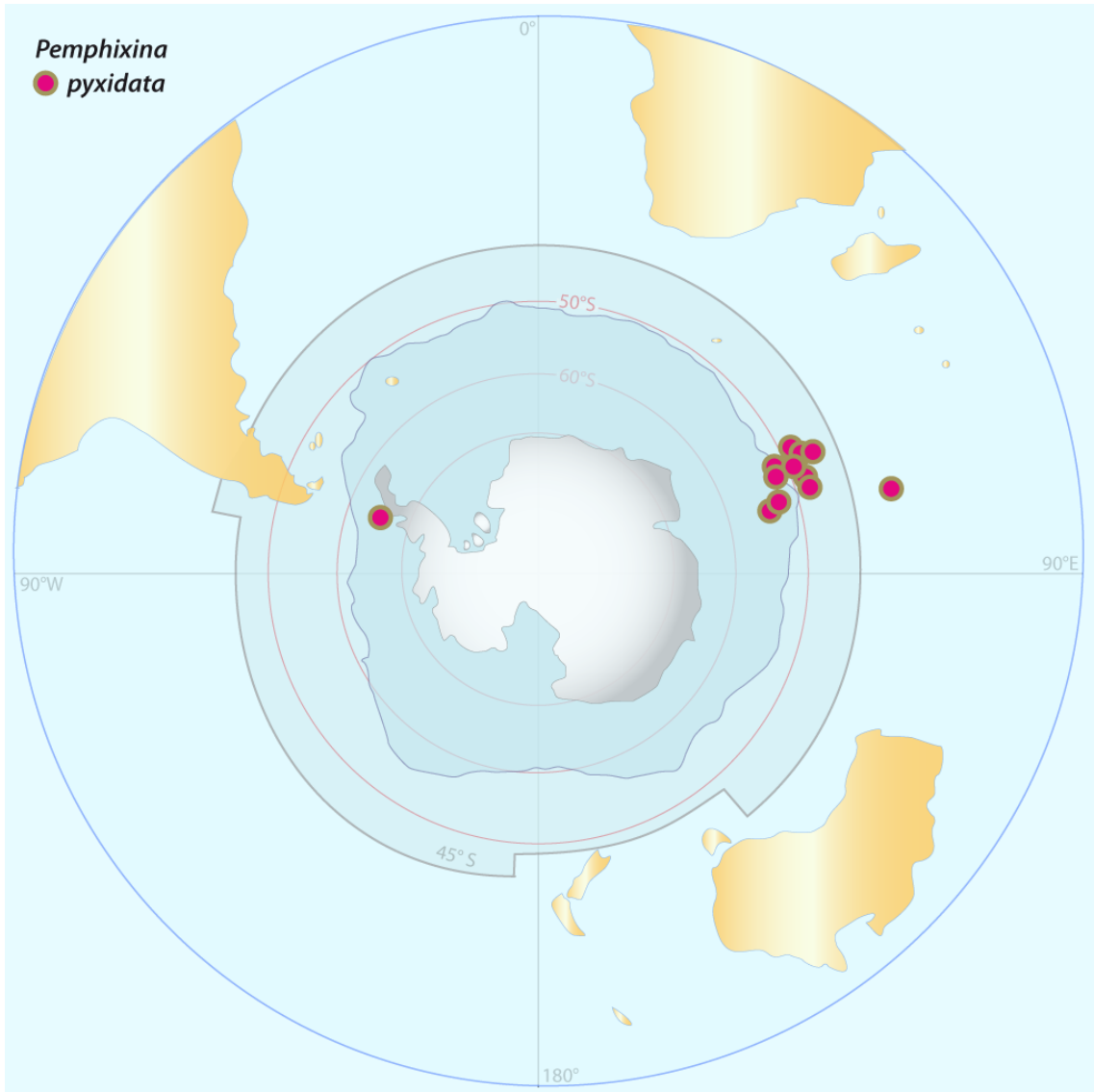
*Notosaria nigricans pyxidata*: Cooper (1959)

*Notosaria pyxidata*: d'Hondt (1977)

Type locality: “South of Kerguelen Island at Station 150, lat. 50°4'S., long. 71°22'E. Depth, 150 fathoms” [274 m].

Depth range: 185 - 900 m.

References: Chapman & Crespin (1923), Cooper (1959, 1981), Davidson (1880), Foster (1974), d'Hondt (1977).



Genus *Phaneropora* Zezina, 1981

[Type species= *Phaneropora galathea* Zezina, 1981 (p. 18)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small, subcircular, smooth, gently biconvex, anterior commissure rectimarginate; beak ridges slightly tuberculate; foramen large, hypothyrid, deltidial plates very narrow, disjunct, pedicle collar short; hinge teeth with small recessive dental plates. No cardinal process; high inner socket ridges with long crura that are anteromedially convergent; septal pillar platelike at its base with high, narrow distal extremity (axial loop phase), descending branches absent. Lophophore zygalphous and heavily spiculate.

Geological range: Present (Holocene).

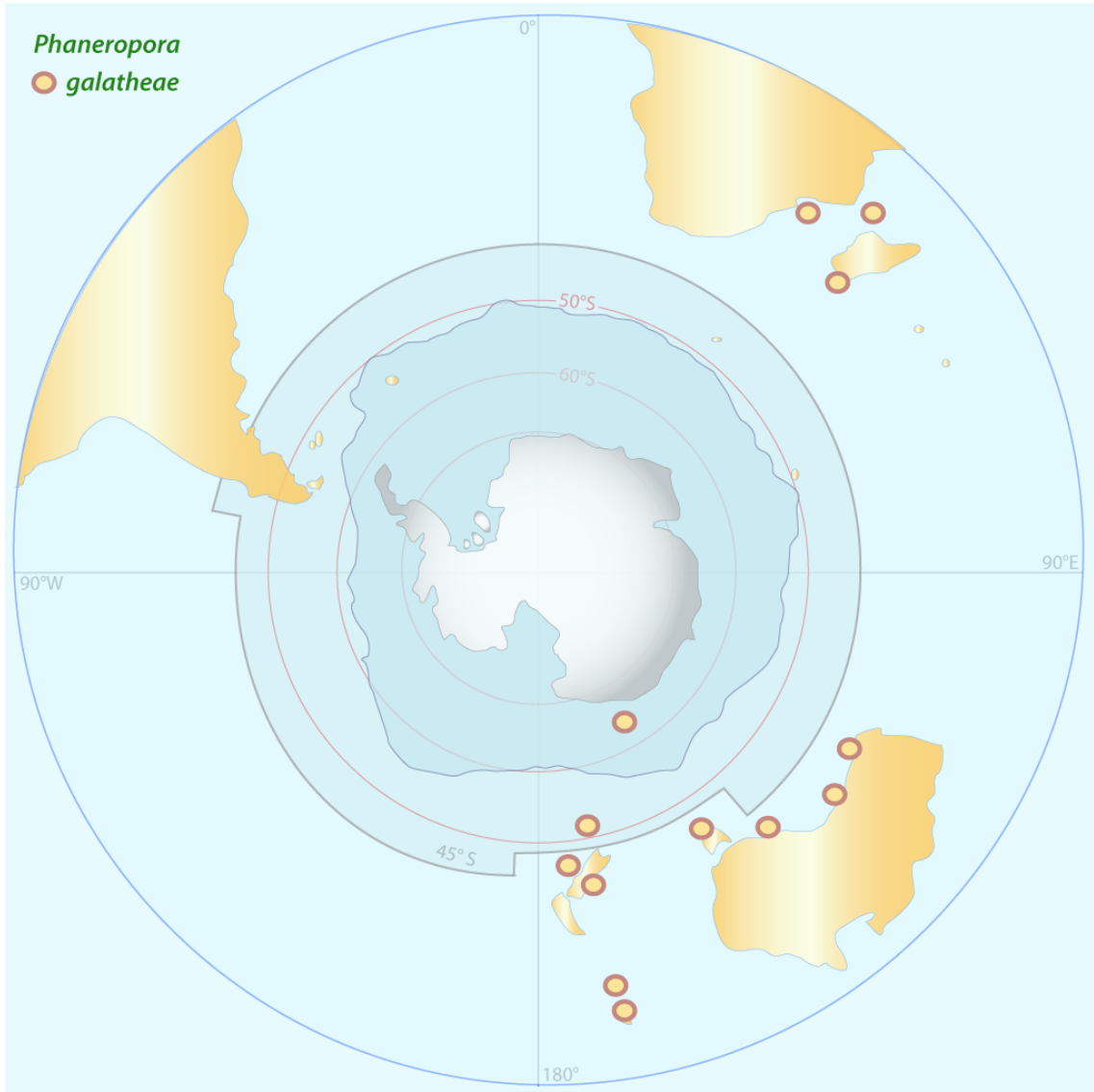
*Phaneropora galathea* Zezina, 1981

*Leptothyrella* cf. *ignota*: Hiller, 1986

Type locality: "Galathea" St. 554. 5 Dec. 1951. 37°28'S, 138°55'E, Great Australian Bight, 1320-1340 m."

Depth range: 184 - 4205 m.

References: Foster (1989), Zezina (1980a, 1981).



Genus *Platidia* Costa, 1852

[Type species= *Orthis anomioides* Scacchi & Philippi, 1844 in Philippi, 1844 (p. 69)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small, subcircular to subquadrate in outline, planoconvex, thin shelled, semitransparent; smooth, or with radiating lines or spinules on ventral valve; hinge line wide, foramen large, amphithyrid; deltidial plates very narrow, disjunct. Pedicle collar short, sessile; hinge teeth with narrow dental plates and grooved, swollen bases; short ventral myophragm. Cardinal process absent; inner socket ridges strong; outer socket ridges narrow; no hinge plates; septal pillar located directly anterior to large amphithyrid pedicle embayment, bladelike and leaning anteriorly proximally but posteriorly deflected distally and terminating in a pair of posteriorly directed, Ushaped septal flanges; crura long and slender with short processes, descending branches strongly arcuate, uniting medianly with lateral flanks of Ushaped septal flanges. Lophophore zygocephalous.

Geological range: Danian - Present (Holocene).

***Platidia anomioides*** (Scacchi & Philippi, 1844 in Philippi, 1844)

*Terebratula appressa* Forbes, 1844

*Platydia anomioides*: Costa (1852)

*Morrisia anomioides*: Davidson (1853)

*Platidia davidsoni* (Deslongchamps, 1855)

*Platidia marionensis* Cooper, 1981

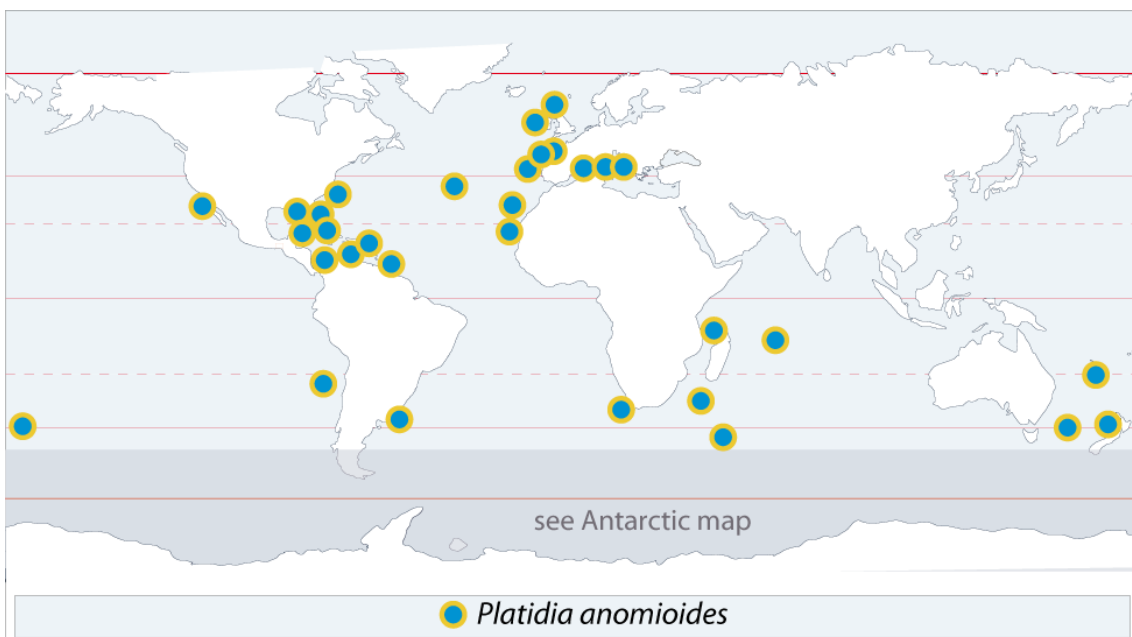
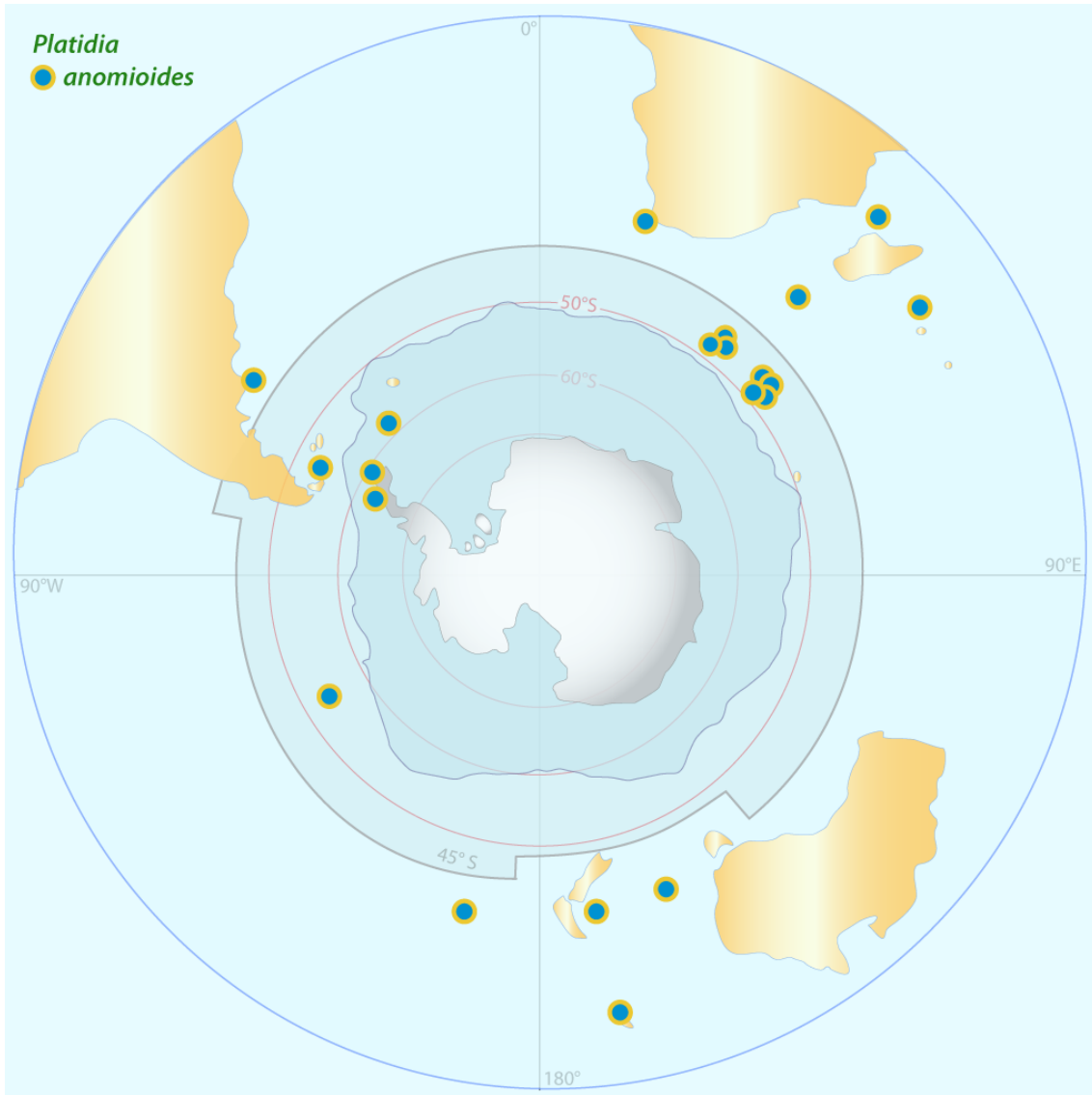
*Amphithyris* sp. Simões & Kowalewski, 2000

? *Platidia concentrica* Zezina, 1980

Type locality: Sicily.

Depth range: 8 - 2289 m.

References: Cooper (1981, 1982), Davidson (1880, 1886-1888), Foster (1974, 1989), Hiller (1994), Zezina (1980a), Zezina & Pakhnevich, (1998, 2000).





Genus *Syntomaria* Cooper, 1982

[Type species= *Syntomaria curiosa* Cooper, 1982 (p. 20)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small, smooth but with prominent growth lines, elongate oval, narrowly biconvex, rectimarginate; beak suberect, attrite, foramen wide, deltidial plates narrow, disjunct. Cardinal process a well-developed transverse myophore; inner hinge plates excavate, uniting on valve floor; septal pillar high, anteriorly inclined, and narrow. Loop annular to incipiently haptoid; descending branches occasionally incomplete.

Geological range: Present (Holocene).

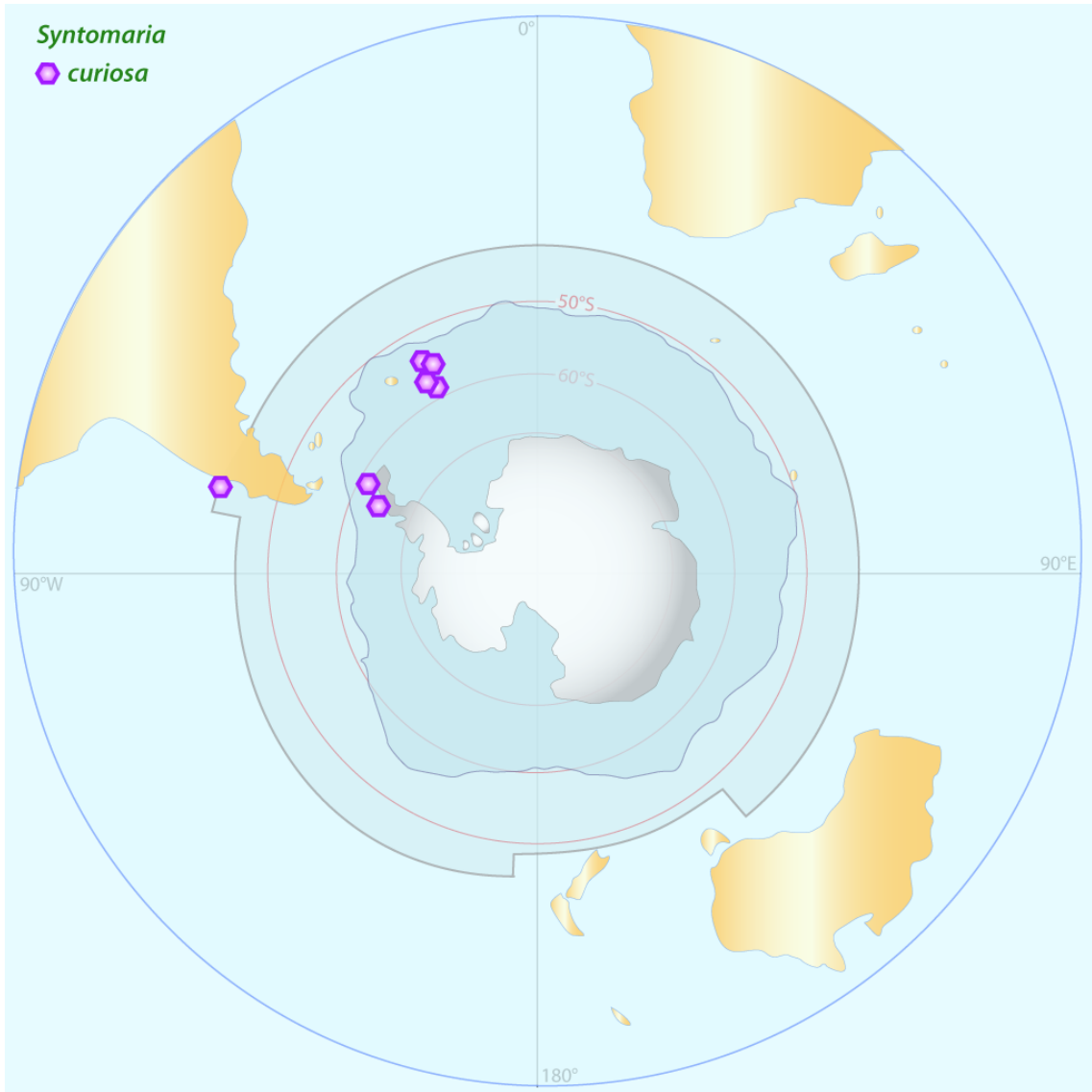
*Syntomaria curiosa* Cooper, 1982

Type locality: "*Islas Orcadas* cruise 575, sta 74, 56°12'S, 027°23.9'W, off the South Sandwich Islands, Antarctica, at 179-238 m."

Diagnosis (Cooper, 1982): Small, dark brown, biconvex, elongate oval shells with rudimentary deltidial plates and wide foramen.

Depth range: 161 - 486 m.

Reference: Cooper (1982), Richardson (1997).



Genus *Terebratella* d'Orbigny, 1847, p. 269

[Type species= *Terebratula chilensis* Broderip, 1833, p. 141 - (= *Anomia dorsata* Gmelin, 1790 (p. 3, 348); = *Terebratula flexuosa* King, 1835, p. 337; = *Terebratula patagonica* Gould, 1850, p. 347]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Medium to large, transversely ovate, unisulcate, costate to strongly multicostate; beak erect to suberect, attrite, foramen medium to large, submesothyrid to mesothyrid, deltidial plates commonly conjunct. Cardinalia weakly to moderately thickened, hinge plates excavate, moderately to steeply inclined, meeting on low median septum to form septalium; adult loop trabecular. Lophophore plectolophous.

Geological range: Oligocene - Present (Holocene).

*Terebratella dorsata* (Gmelin, 1790)

*Terebratella flexuosa* King, 1831

*Terebratula sowerbii* King, 1831

*Terebratula chilensis* Broderip, 1833

*Terebratula lupinus* Philippi, 1845

*Terebratula rhombea* Philippi, 1845

*Terebratula patagonica* Gould, 1851

*Terebratella dorsata* var. *submutica* Fischer & Ehlert, 1892

? *Terebratella rubiginosa* Dall, 1871

*Terebratella enzenspergeri* Blochmann, 1906

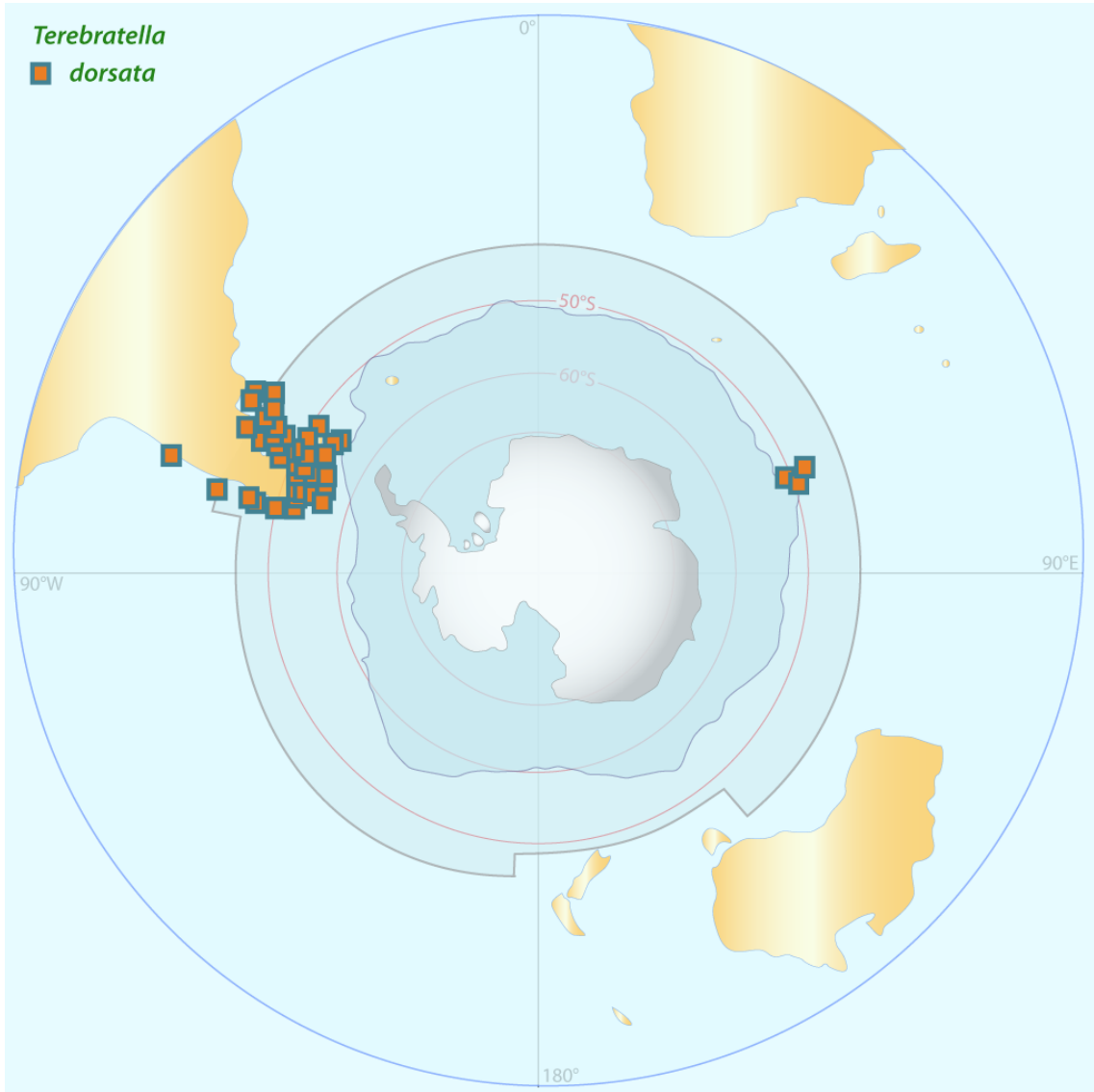
*Terebratella submutica* Hertlein & Grant, 1944

Type locality: "[Habitat in freto magellanico.](#)"

Depth range: 9 - 500 m (? 2653 m).

References: Álvarez (2017), Cohen *et al.* (2011), Cooper (1973a, 1982), Cotton (1937), Dall (1873, 1921), Davidson (1886), Eichler (1911), Fischer & Ehlert (1892), Foster (1969, 1974, 1989), Gmelin (1790), Gould (1950), d'Hondt (1976, 1977), Jackson (1912), Richardson (1997), Roux & Bremec (1996), Zezina (1980a).

Note: see references for more extensive synonymies.



Genus *Terebratulina* d'Orbigny, 1847

[Type species= *Anomia retusa* Linné, 1758 (p. 587)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small to large, ovate to subpentagonal, slightly auriculate, valves biconvex; anterior commissure rectimarginate to uniplicate; surface costellate, costellae may be enlarged or granular, with prominent nodules in young; umbo suberect, foramen incomplete, mesothyrid to permesothyrid, deltidial plates disjunct. Pedicle collar present, median septum and hinge plates absent; cardinal process small; socket ridges and crural bases fused, forming prominent ridge, hinge teeth without swollen bases, but with sulcus on inner face; crura converging, crural processes united to form ringlike loop, transverse band ventrally arched.

Geological range: Upper Jurassic - Present (Holocene).

*Terebratulina kiiensis* Dall & Pilsbry, 1891

*Terebratulina crossei*: Fischer & Ehlert (1892) (not Davidson, 1882)

*Terebratulina* sp. Dall, 1908.

*Terebratulina magalhaenica* Helmcke, 1939

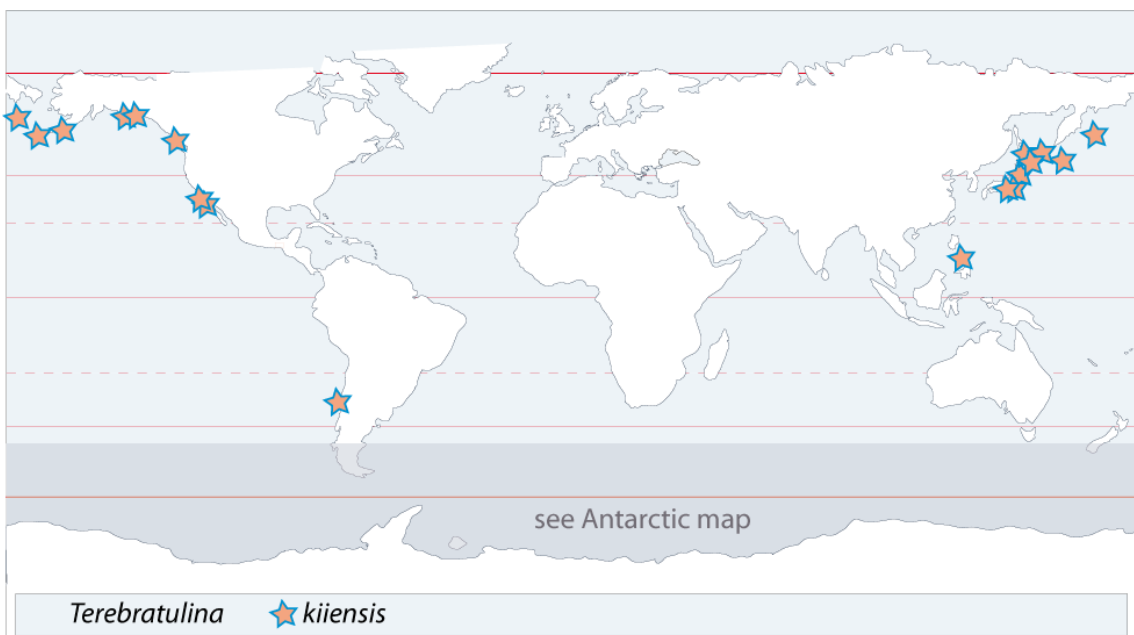
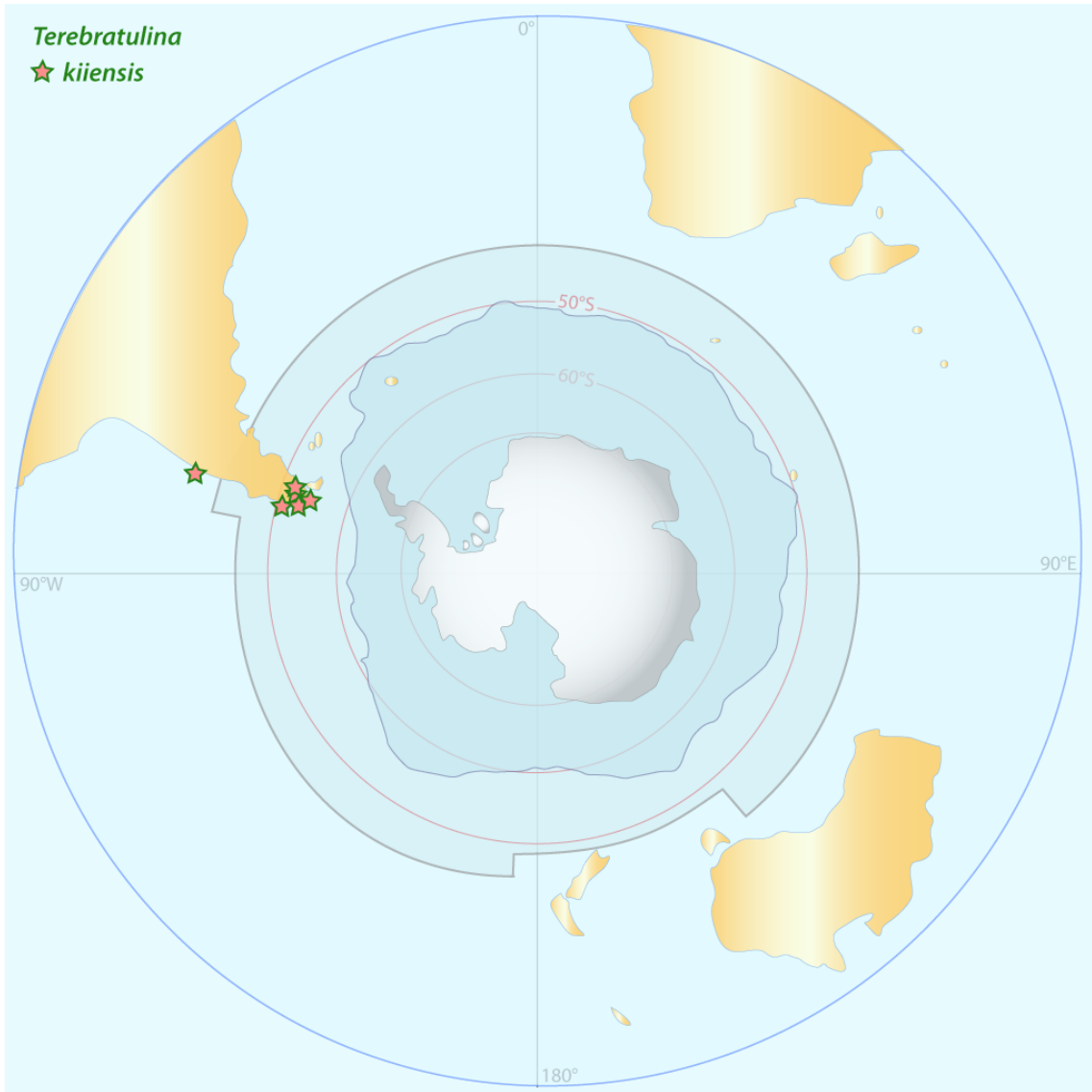
*Terebratulina crossei*?: Foster (1969)

Type locality: “Coasts of Province Kii, Japan, Streamns;”

Depth range: 18 – 1370 m (?4640 m).

References: Cooper (1982), Dall (1921), Fischer & Ehlert (1892), Foster (1969, 1989), Helmcke (1939a), Lüter & Sieben (2005).

Note: Helmcke (1939b, p. 240) mentioned that the diagnoses of the new species would follow later in a revision of the genus. Foster (1989, p. 284) stated that “the differences among the species of *Terebratulina* are in great need of further study on a worldwide level.” As Lüter & Sieben (2005) emphasized, this revision was never done until today.



Genus *Xenobrochus* Cooper, 1981

[Type species= *Gryphus africanus* Cooper, 1973b (p. 8)]

Diagnosis from volume 5 of the Treatise on Invertebrate Paleontology (Kaesler, 2006):

Small to medium, oval, ventribiconvex, smooth; anterior commissure rectimarginate; beak long, erect, labiate, foramen large, permesothyrid, symphytium visible; pedicle collar short, teeth large; cardinal process broad, semielliptical; hinge plates narrow, poorly defined; loop narrow, rounded, transverse band convex anteriorly.

Geological range: Present (Holocene).

***Xenobrochus africanus*** (Cooper, 1973b)

*Gryphus africanus* Cooper, 1973b

*Xenobrochus anomalus* Cooper, 1981

Type locality: "[Anton Bruun Cruise 7, Station 358A, 366 m, 29°19'S, 32°00'E, Durban Bay, South Africa.](#)"

Depth range: 70 - 850 m.

Reference: Hiller (1994).

***Xenobrochus anomalus*** Cooper, 1981

Type locality: "[MD.08: station 15, BB 88 - Latitude 46°57.7'S, longitude 37°59.9'E, southeast of Marion Island at 204 m.](#)"

Depth range: 204 - 460 m.

Diagnosis (Cooper, 1981): [Very small, elongate oval \*Xenobrochus\* with tubular pedicle collar and extended, erect, socket ridges.](#)

References: Cooper (1981), Hiller (1994).

***Xenobrochus australis*** Cooper, 1981

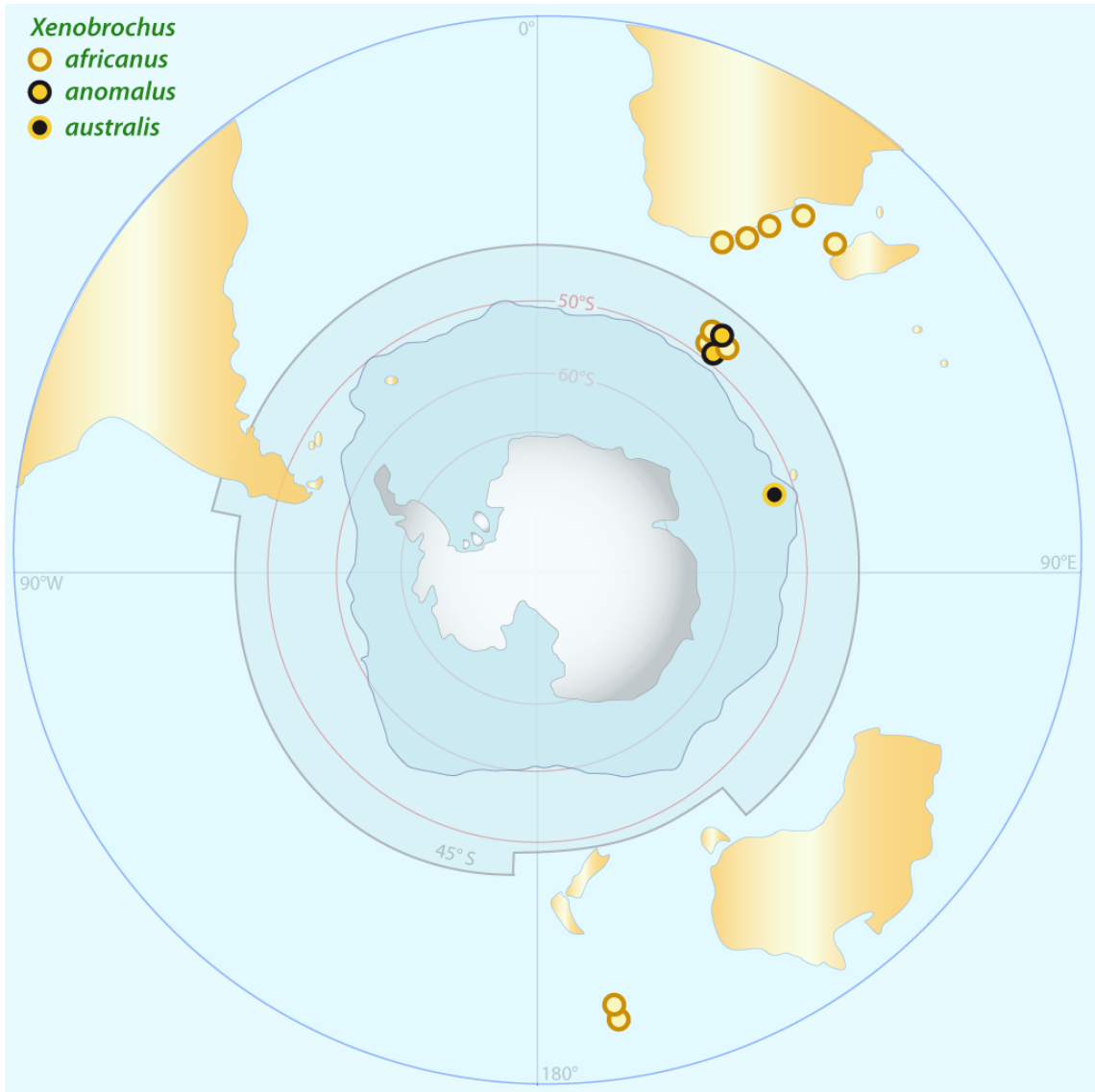
Not *Xenobrochus australis* Cooper: Bitner (2009) (now *X. norfolkensis* Bitner, 2011)

Type locality: "[MD.08: station 11, CP 7 - Latitude 53°20.3'S, longitude 72°29.2'E, west of Heard Island at 790 m.](#)"

Depth range: 200 - 967 m.

Diagnosis (Cooper, 1981): [Large \*Xenobrochus\* with width 60% of length.](#)

Reference: Cooper (1981).





## Acknowledgements

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My best thanks to my friends Aleksandra Bitner, Instytut Paleobiologii, PAN, Warszawa (Poland) and Fernando Álvarez, Universidad de Oviedo (Spain), for their comments and improvement.

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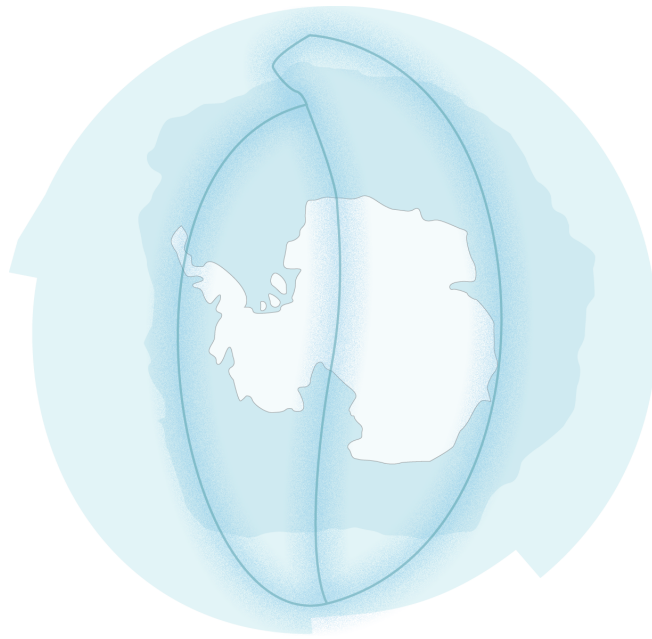
**Note:** Except Helmcke (1939b), all publications were available on my desk and desktop at home.

In 1892, Fischer & Ehlert wrote in their paper entitled “*Brachiopodes de la mission scientifique du Cap Horn, 1882-1883*”:

« *Il sera donc nécessaire désormais de pratiquer une révision nouvelle des Brachiopodes et de supprimer peut-être un certain nombre d'espèces. Il en résulte que plus on étudie ces animaux, plus aussi diminue le chiffre des formes spécifiques légitimes.* »

[“*At present it will be necessary to do a new revision of the Brachiopods and to perhaps remove a certain number of species. The consequence is that more these animals are studied, more also decreases the number of the valid taxa.*”]





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