

Systematics and biogeography of marine gastropod molluscs from South Georgia

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The gastropod fauna of South Georgia is reviewed and a complete list of the 121 species known from the archipelago is provided; 65 species were re-examined upon the study of 3047 specimens and reference specimens illustrated; other 56 species were included in the list from literature records. *Iothia coppingeri* (Smith, 1881), *Submargarita unifilosa* Thiele, 1912, *Eumetula dilecta* Thiele, 1912, *Omalogyra burdwoodiana* Strebel, 1908 and *Newnesia antarctica* Smith, 1902 are reported for the first time from South Georgia, and the presence of 16 species is confirmed by a second finding. Moreover, new bathymetric ranges for 30 species are given.

The analysis of faunistic affinities of the gastropod fauna from South Georgia revealed a high similarity with South Orkney Islands (35 %), the Antarctic Weddell Sector (35 %) and South Shetland Islands (32 %). These data suggest the placement of the South Georgia in the Antarctic Region. However, the high number of gastropod species only known from South Georgia (53 species, 43 % of the total) and the distinctiveness of the composition of their assemblages, suggest that South Georgia should be considered as an own section within the Antarctic Region.

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Introduction

In recent years, an increasing number of studies on the benthic invertebrate fauna from the Southern Ocean have been conducted; however, the gastropods from South Georgia (53°58'–54°55'S, 35°42'–38°20' W) remain scarcely studied. The first contribution to malacology in the archipelago was conducted by Martens (1885), who reported 34 species of gastropods, 10 of them new to science. Martens & Pfeffer (1886) reported 39 species of gastropods (21 new), most of them were not figured. Contributions by Lamy (1911), Dall (1914), David (1934) and Dell (1990) provided new localities for some species within the archipelago. The most significant contributions were based on collections made by the Schwedische Südpolar Expedition (Strebel 1908), and the Discovery, Discovery II and William Scoresby Expeditions (Powell 1951). From them, 62 new species were described. Subsequently, Carcelles (1953) provided additional locality data for 27 gas-

tropods from South Georgia and listed all nominal gastropod species reported from Antarctica (including South Georgia).

The relatively few malacological studies related to South Georgia contributed to the existing controversy about their biogeographic position (Clarke 1996). In a faunistic point of view, South Georgia were considered as being related to both Magellan (Linse 1997) or Antarctic Regions (Carcelles 1953, Zelaya 2000), as representing a transitional area between these regions (Linse et al. 2003, Schrödl 1999, 2003), or as a distinctive biogeographic unit (Linse 2002, Powell 1951); also, some workers argued on its faunistic affinities with Kerguelen Islands and Crozet Islands (Canteras & Arnaud 1985).

In the present paper, the diversity of the gastropods from South Georgia (except pteropods) is critically reviewed, and the faunistic affinities and the biogeographic position of the archipelago are re-examined.

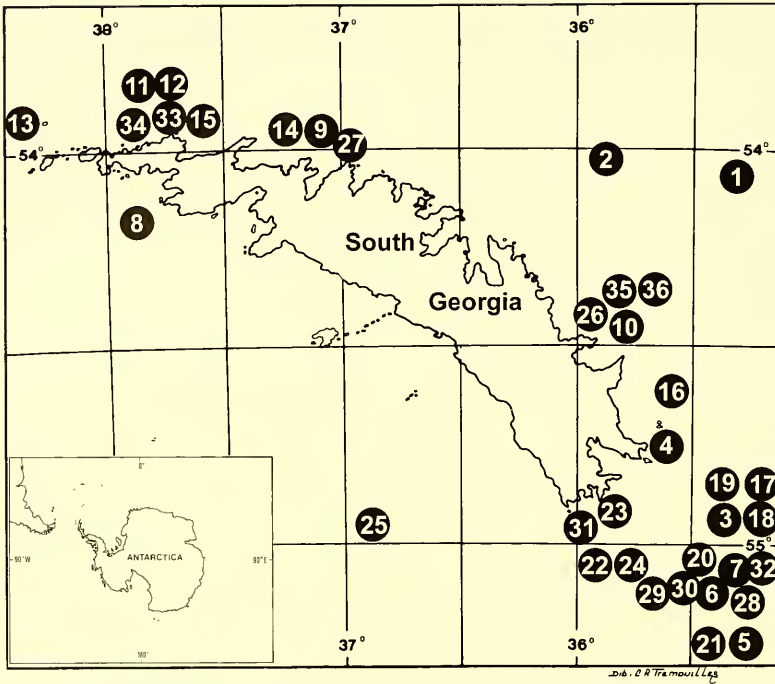


Fig. 1. Location map. R/V “Eduardo L. Holmberg” and “R/V Polarstern”. The numbers correspond to the sampling stations indicated in table 1.

Materials and Methods

The study is based on huge collections taken onboard of the R/V “Eduardo L. Holmberg” during the 1995, 1996, 1997 cruises to South Georgia, and the R/V “Polarstern” during the 2002 “Latin American Polarstern Study” (LAMPOS). Samples were collected with trawls and dredges, at 36 sampling stations, 72 to 256 m depth (Tab. 1 and Fig. 1). Specimens were sorted under a stereomicroscope. All studied species from South Georgia were figured and measured (measurements given correspond to the maximum linear dimension of the figured specimen). The examined material is housed at the invertebrate collections at Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN) and Museo de La Plata (MLP). Additional material from the MACN and from the Instituto Nacional de Investigación y Desarrollo Pesquero, Mar del Plata (INIDEP) was examined.

For each species, the following data are given:

Examined material: number of live-collected specimen/s (spm.) and empty shell/s (sh.) at each station.

Previous records at South Georgia: previous records from South Georgia are cited.

Bathymetric range: data given correspond to South Georgia and were restricted to the range where living specimens were collected.

Other records: on the basis of literature, the known distribution of each species is indicated as follows:

Antarctic Weddell Sector (WS: Antarctic mainland sector between 0 and 90° W), Antarctic Ross Sector (RS: Antarctic mainland sector between 90 and 180° W) [terminology for Antarctic sectors follows Powell 1951, but without any biogeographic implication], South Shetland Islands (SH), South Orkney Islands (SO), South Sandwich Islands (SA), Shag Rocks (SR), Patagonia (PT: for this study only the Argentine coast of the Magellan Region was considered), Malvinas (=Falkland) Islands (MI), Burdwood Bank (BB), Kerguelen Islands (KI), Crozet Islands (CI), Macquarie Islands (MA) and East Antarctica (EA: Antarctic mainland sector between 0 and 180° E). In order to avoid repetitive citations that would enlarge unnecessary the text, literature references corresponding to “Other localities” were not repeated for each species; the sources of this information were: Canteras & Arnaud (1985), Carcelles & Williamson (1951), Dell (1990), Hain (1990), Harasewych & Kantor (1999), Linse (1999), Melvill & Standen (1907, 1912), Numanami (1996), Ponder (1983), Powell (1951, 1960), Schrödl (1999, 2003), Strebel (1908) and Thiele (1912).

The number of species considered as occurring in each area resulted from a personal compilation (Tab. 2). Degrees of faunistic affinity between the studied areas were evaluated using the Simpson similarity coefficient (Cheetham & Hazel 1969), and similarities were indicated as SL × 100.

Results

1. Species present in South Georgia

Family Patellidae

Nacella (Patinigera) polaris
(Hombron & Jacquinot, 1841)

Fig. 2

Examined material: 240 spm., Grytviken (MACN 18941); 22 spm., Grytviken, (MACN 21665); 3 spm., Larsen Harbour (MACN 18940); 11 spm., Stromness Harbour (MACN 18945); 1 spm., Cumberland Bay (MACN 17061); 1 spm., Godthull Cove (MACN 18943); 15 spm., South Georgia (9 spm.: MACN 18588; 6 spm.: MACN 10011).
Previous records at South Georgia: South Georgia (Martens 1885; Martens & Pfeffer 1886); Cumberland

Bay, Cooking Pot Bay (15-25 m), 54°22'S 36°28' W (22 m), 54°22'S 36°27' W (95 m), Fjords (5 m), 54°24'S 36°22' W (195 m), 54°22'S 36°28' W (2-8 m), 54°22'S 36°28' W (1-2 m) (Strebel 1908); Cumberland Bay (Lamy 1911); Possession Bay, Bay of Isles (Dall 1914); Coal Bay, Cumberland Bay (David 1934); Jason Leith (shore), Moltke Harbour (in rock pool), Stromness Harbour (26-35 m), Undine Harbour (18-27 m), East Cumberland Bay (24-110 m) (Powell 1951).

Bathymetric range: 1-195 m.

Other records: WS, SO, SH, SA.

Remarks: *Nacella polaris* shows a great morphological variation: two subspecies and several morphotypes were described. One of these, *Nacella polaris polaris* is a member of the Antarctic fauna. Strebel (1908) reported both *N. p. polaris* and *N. polaris concinna* (Strebel 1908) from South Georgia. *Nacella*

Tab. 1. R/V “Eduardo L. Holmberg” and “R/V Polarstern”. Sampling stations.

| Station number | Latitude | Longitude | Depth (m) | Date | Vessel |
|----------------|----------|-----------|-----------|----------|----------------------|
| 1 | 54°05'S | 38°42' W | 213-249 | 02/11/95 | E. L. Holmberg, 1995 |
| 2 | 54°01'S | 35°55' W | 132 | 02/13/95 | E. L. Holmberg, 1995 |
| 3 | 54°59'S | 35°06' W | 107 | 02/17/95 | E. L. Holmberg, 1995 |
| 4 | 54°45'S | 35°38' W | 71 | 02/17/95 | E. L. Holmberg, 1995 |
| 5 | 55°14'S | 35°19' W | 135 | 02/18/95 | E. L. Holmberg, 1995 |
| 6 | 55°08'S | 35°25' W | 115 | 02/21/95 | E. L. Holmberg, 1995 |
| 7 | 55°03'S | 35°23' W | 108 | 02/22/95 | E. L. Holmberg, 1995 |
| 8 | 54°11'S | 37°57' W | 144 | 02/23/95 | E. L. Holmberg, 1995 |
| 9 | 53°57'S | 37°06' W | 109 | 02/23/95 | E. L. Holmberg, 1995 |
| 10 | 54°29'S | 35°41' W | 227 | 03/26/95 | E. L. Holmberg, 1995 |
| 11 | 53°48'S | 37°49' W | 140 | 03/24/96 | E. L. Holmberg, 1996 |
| 12 | 53°48'S | 37°44' W | 117 | 03/24/96 | E. L. Holmberg, 1996 |
| 13 | 53°53'S | 38°19' W | 118 | 03/24/96 | E. L. Holmberg, 1996 |
| 14 | 53°56'S | 37°06' W | 108 | 03/25/96 | E. L. Holmberg, 1996 |
| 15 | 53°51'S | 37°34' W | 108 | 03/25/96 | E. L. Holmberg, 1996 |
| 16 | 54°37'S | 35°37' W | 246 | 03/26/96 | E. L. Holmberg, 1996 |
| 17 | 54°56'S | 35°16' W | 114 | 03/27/96 | E. L. Holmberg, 1996 |
| 18 | 54°59'S | 35°05' W | 108 | 03/29/96 | E. L. Holmberg, 1996 |
| 19 | 54°57'S | 35°21' W | 124 | 03/29/96 | E. L. Holmberg, 1996 |
| 20 | 55°08'S | 35°25' W | 115 | 04/01/96 | E. L. Holmberg, 1996 |
| 21 | 55°14'S | 35°20' W | 132 | 04/01/96 | E. L. Holmberg, 1996 |
| 22 | 55°02'S | 35°59' W | 142 | 04/02/96 | E. L. Holmberg, 1996 |
| 23 | 54°51'S | 35°49' W | 72 | 04/02/96 | E. L. Holmberg, 1996 |
| 24 | 55°06'S | 35°40' W | 116 | 04/04/96 | E. L. Holmberg, 1996 |
| 25 | 54°58'S | 36°49' W | 210 | 04/05/96 | E. L. Holmberg, 1996 |
| 26 | 54°30'S | 35°50' W | 94 | 04/08/96 | E. L. Holmberg, 1996 |
| 27 | 53°58'S | 37°09' W | 138 | 04/10/96 | E. L. Holmberg, 1996 |
| 28 | 55°09'S | 35°23' W | 126 | 03/25/97 | E. L. Holmberg, 1997 |
| 29 | 55°07'S | 35°39' W | 118 | 03/25/97 | E. L. Holmberg, 1997 |
| 30 | 55°04'S | 35°32' W | 120 | 03/26/97 | E. L. Holmberg, 1997 |
| 31 | 54°55'S | 35°57' W | 129 | 03/26/97 | E. L. Holmberg, 1997 |
| 32 | 54°59'S | 35°02' W | 112 | 03/26/97 | E. L. Holmberg, 1997 |
| 33 | 53°59'S | 37°38' W | 82-85 | 04/01/97 | E. L. Holmberg, 1997 |
| 34 | 53°59'S | 37°38' W | 158-159 | 04/01/97 | E. L. Holmberg, 1997 |
| 35 | 54°27'S | 35°40' W | 236-239 | 04/11/02 | Polarstern, 2002 |
| 36 | 54°27'S | 35°41' W | 256 | 04/12/02 | Polarstern, 2002 |

p. concinna was subsequently reported from Amberses Islands (Antarctic Peninsula) and 38°09' S 56°30' W (Carcelles 1947). Powell (1951) reported *N. p. concinna* as endemic from deep waters around South Georgia, while *N. p. polaris* as a shallow water species, occurring in Antarctica and Scotia Arc Islands. Beaumont & Wei (1991), based on electrophoretic studies, described differences between the specimens from the Scotia Sea and those from the Antarctica. As diagnostic characters for each taxon were not clearly defined, nor the variability or their distributional ranges were well established, the specimens from South Georgia studied herein are reported as *Nacella polaris* (s.l.).

Family Lepetidae

Iothia coppingeri (Smith, 1881)

Fig. 3

Examined material: 1 spm., 54°30' S 35°50' W, 94 m, 4/8/1996 (MACN 36271).

Previous records at South Georgia: The present is the first record from South Georgia.

Bathymetric range: 94 m.

Other records: WS, RS, SH, SO, PT, MI. Reported from Kerguelen Islands and Crozet Islands by Canteras & Arnaud (1985) and Troncoso et al. (2001).

Remarks: Two species of Lepetidae, *Lepeta* (*Pilidium*) *antarctica* Smith, 1907 and *Pilidium fulviformes* Egorova, 1972 were described from the Antarctic Region. Powell (1951) and Hain (1990) considered *L. antarctica* a synonym of *Iothia coppingeri*, and Moskalev (1977) did not find differences between *I. coppingeri* and *P. fulviformes*.

Family Fissurellidae

Puncturella spirigera Thiele, 1912

Fig. 4

Examined material: 2 spm., 53°58' S 37°09' W, 138 m, 4/10/1996 (MLP 7300; MACN 36272).

Previous records at South Georgia: West Cumberland Bay (110 m), East Cumberland Bay (110-60 m), off mouth of Cumberland Bay (120-204 m), Stromness Harbour (between 54°04' S 36°27' W and 53°58' S 36°26' W, 155-178 m), 53°51' S 36°21'30" W (200-236 m), 52°52'30" S 36°08' W (160 m) (Powell 1951); 53°51' S 37°38' W (97-101 m) (Dell 1990).

Bathymetric range: 60-236 m.

Other records: WS, RS, SH, EA.

Remarks: Five species of *Puncturella* were reported from Antarctic and Sub-Antarctic waters: *P. noachina* (Linnaeus, 1771), *P. conica* (d'Orbigny, 1841), *P. cognata* (Gould, 1852), *P. falklandica* (Adams, 1862) and *P. spirigera* Thiele, 1912. *P. noachina* inhabits the Northern Hemisphere and was erroneously reported from the Southern Ocean (Powell 1951, Dell 1990, Reid & Osorio 2000). *P. falklandica* and *P. cognata* were considered synonyms of *P. conica* by Powell (1951) and Reid & Osorio (2000), respectively. *P. spirigera* was also frequently considered synonymous of *P. conica* (Arnaud 1972a, Hain 1990, Reid & Osorio 2000). However, Dell (1990) commented that "... the antarctic *P. spirigera* probably forms part of a complex [of species]". Although a systematic revision of the Antarctic species of *Puncturella* is still pending, the specimens from South Georgia are here provisionally assigned to *P. spirigera*, following Dell (1990).

Family Scissurellidae

Anatoma euglypta (Pelseneer, 1903)

Fig. 5

Examined material: 7 spm., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7281; MACN 36273); 3 spm., 53°58' S 37°09' W, 138 m, 4/10/1996 (MLP 7301; MACN 36274).

Previous records at South Georgia: off mouth of Stromness Harbour (155-178 m) (Powell 1951).

Bathymetric range: 94-178 m.

Other records: WS, RS, SH, SO, PT, MI, BB. Reported from Kerguelen Islands and Crozet Island by Canteras & Arnaud (1985) and from East Antarctica by Numanami (1996).

Family Turbinidae

Homalopoma (*Leptocollonia*) *thielei*

(Powell, 1951)

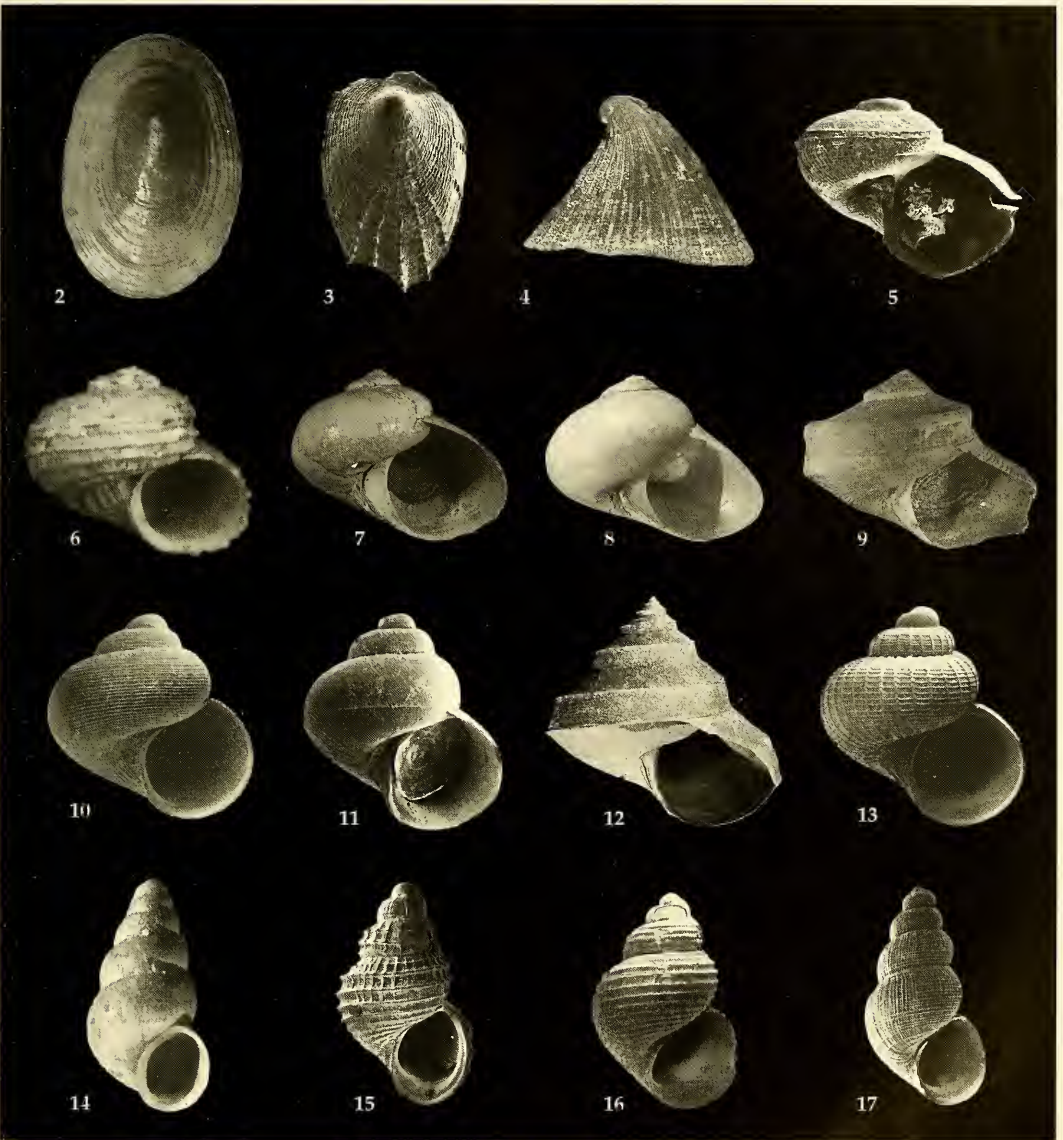
Fig. 6

Examined material: 1 spm., South Georgia (MACN 18933); 2 spm., Grytviken (MACN 21663).

Previous records at South Georgia: 54°08'30" S 36°27'30" W (106 m), Cape Saunder (200 m), off mouth of Cumberland Bay (120-204 m), Stromness Harbour (from 54°04' S 36°27' W to 53°58' S 36°26' W, 122-136 m), 53°51' S 36°21'30" W (200-236 m) (Powell 1951); Maud Cove (46 m), Cumberland Bay (Carcelles 1953).

Bathymetric range: 46-236 m.

Other records: WS.



Figs 2-17. Habitus. 2. *Nacella (Patinigera) polaris* (39 mm). 3. *Iothia coppingeri* (1.5 mm). 4. *Puncturella spirigera* (11 mm). 5. *Anatomia euglypta* (1.6 mm). 6. *Homalopoma (Leptocollonia) thielei* (9.3 mm). 7. *Margarella obsoleta* (9.3 mm). 8. *Margarella steineni* (10.4 mm). 9. *Margarella tropidophoroides* (17.5 mm). 10. *Submargarita notalis* (1.5 mm). 11. *Submargarita unifilosa* (1.8 mm). 12. *Venustatrochus georgianus* (34 mm). 13. *Brookula pfefferi* (1.1 mm). 14. *Eatoniella glacialis* (3 mm). 15. *Onoba delecta* (2.4 mm). 16. *Onoba gelida* (2.3 mm). 17. *Onoba schraderi* (2.4 mm).

Family Trochidae

Margarella achilles (Strebel, 1908)

Previous records at South Georgia: 54°22'S 36°28' W (1-2 m) (Strebel, 1908); Stromness Harbour (26-35 m), East Cumberland Bay (24-30 m), Undine Harbour (18-27 m) (Powell, 1951); Cumberland Bay (37 m), Gothull

Harbour (26 m), Nueva Fortuna Bay (12 m), Larsen Harbour (27 m), Annenkov Island (37 m), Dronning Maud Cove (42 m), Undine Harbour (53 m), Shlieper Bay (18 m), Stromness Harbour (44 m) (Carcelles 1953).

Bathymetric range: 1-53 m.

Other records: only known from South Georgia.

Margarella jason Powell, 1951

Previous records at South Georgia: Jason Leith (238-270 m) (Powell 1951).

Bathymetric range: 238-270 m.

Other records: only known from South Georgia.

Margarella obsoleta Powell, 1951

Fig. 7

Examined material: 64 spm., Cumberland Bay, 0-22 m (MACN 13526); 47 spm., Cumberland Bay (7 spm. MACN 18927; 40 spm., MACN 13527); 9 spm., Schliepper Bay (MACN 18936); 16 spm., Droning Maud Harbour (MACN 18933-1).

Previous records at South Georgia: East Cumberland Bay (24-30 m) (Powell 1951, Carcelles 1953, Lamy 1911).

Bathymetric range: 0-30 m.

Other records: only known from South Georgia.

Remarks: *Photinula lahillei* Lamy, 1906 (non Ihering, 1902) seems to be a synonym of *M. obsoleta*.

Margarella steineni (Strebel, 1905)

Fig. 8

Examined material: 14 spm., Cumberland Bay (5 spm., MACN 18937; 9 spm., MACN 13527).

Previous records at South Georgia: South Georgia (Strebel, 1905); Cumberland Bay, Cooking Pot Bay (Strebel 1908); Coal Bay (8-16 m), Penguin Bay (David 1934); East Cumberland Bay (17-27 m), Stromness Harbour (26-35 m), Undine Harbour (18-27 m) (Powell 1951).

Bathymetric range: 8-35 m.

Other records: only known from South Georgia

Remarks: *Margarella steineni* was reported as *M. expansa* (Sowerby, 1838) by Martens (1885) and Martens & Pfeffer (1886); most probably, the record of *Photinula expansa* (Sowerby) by Dall (1914) also corresponds to *M. steineni*.

28 species of *Margarella* (as *Margarella*, *Margarites*, *Margarita*, *Promargarita* and *Photinula* s.l.) were reported from the Antarctic and Sub-Antarctic waters. Zelaya (2004) studied the taxonomic status of the Southwestern Atlantic Ocean species, and concluded that all of them fall into *Margarella*. However, the species of this genus need systematic revision.

Margarella subantarctica (Strebel, 1908)

Previous records at South Georgia: Cumberland Bay (Strebel 1908).

Bathymetric range: ?

Other records: only known from South Georgia.

Margarella tropidophoroides (Strebel, 1908)

Fig. 9

Examined material: 1 spm., Cumberland Bay, 37 m (MACN 18928); 8 spm., Cumberland Bay (MACN 17056); 14 spm., Stromness Harbour (MACN 18939); 1 spm., Grytviken (MACN 21662).

Previous records at South Georgia: 54°22'S 36°27'W (20 m), 54°22'S 36°28'W (12-15 m) (Strebel 1908); Leith Harbour (55-22 m), East Cumberland Bay (18-38 m), Undine Harbour (18-27 m) (Powell 1951); Coal Bay, Maiviken (David, 1934); Cumberland Bay (37 m), Stromness Harbour (44 m) (Carcelles 1953).

Bathymetric range: 12-55 m.

Other records: only known from South Georgia.

Submargarita impervia Strebel, 1908

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908); Jason Leith (110 m) (Powell 1951).

Bathymetric range: 110-310 m.

Other records: only known from South Georgia.

Remarks: Castellanos & Landoni (1989) reported *Submargarita impervia* from Patagonia. However, the general shell shape and ornamentation of the specimen they figured does not fit with the holotype. The specimens on which the authors based their record were not found in the collections at MACN, MLP or INIDEP. Therefore, the presence of *S. impervia* in Patagonia is considered doubtful. Dell (1990) stated that the record of *S. impervia* from Gauss Sea by Thiele (1912) does not correspond to this species.

Submargarita notalis (Strebel, 1908)

Fig. 10

Examined material: 15 spm. and 3 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7302; MACN 36275).

Previous records at South Georgia: 54°22'S 36°27'W (24-52 m) (Strebel 1908); 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 24-101 m.

Other records: only known from South Georgia.

Submargarita unifilosa Thiele, 1912

Fig. 11

Examined material: 2 spm. and 2 sh., 54°30'S 35°50' W, 94 m, 4/8/1996 (MLP 7303; MACN 36276).

Previous records at South Georgia: The present is the first record from South Georgia.

Bathymetric range: 94 m.

Other records: WS, RS, EA.

Tropidomarga biangulata Powell, 1951

Previous records at South Georgia: 53°52'30" S 36°08' W (160 m) (Powell 1951).

Bathymetric range: 160 m.

Other records: SH.

Venustatrochus georgianus Powell, 1951

Fig. 12

Examined material: 1 spm., South Georgia (MACN s/n); 1 spm., 55°14'S 35°19' W, 135 m, 2/18/1995 (MLP 7251); 1 spm., 55°03' S 35°23' W, 108 m, 2/22/1995 (MACN 36277); 3 spm., 54°11' S 37°57' W, 144 m, 2/23/1995 (MACN 36278); 1 spm., 54°57' S 35°21' W, 124 m, 3/29/1996 (MLP 7234); 3 spm., 55°08' S 35°25' W, 115 m, 4/1/1996 (MLP 7235); 1 spm., 54°56' S 35°16' W, 114 m, 3/27/1996 (MLP 7236); 1 spm., 55°06' S 35°40' W, 116 m, 4/4/1996 (MACN 36279).

Previous records at South Georgia: off mouth of Cumberland Bay (120-204 m) (Powell 1951).

Bathymetric range: 108-204 m.

Other records: only known from South Georgia

Family Skeneidae

Brookula pfefferi Powell, 1951

Fig. 13

Examined material: 2 spm. and 1 sh., 54°30'S 35°50' W, 94 m, 4/8/1996 (MLP 6846; MACN 36280).

Previous records at South Georgia: 54°04' S 36°27' W to 53°58' S 36°26' W (155-178 m) (Powell 1951).

Bathymetric range: 94-178 m.

Other records: reported from several localities off Brazil by Absalão et al. (2001).

Remarks: Absalão et al. (2001) considered *Brookula strebeli* Powell, 1951 a synonym of *B. pfefferi*.

Family Eatoniellidae

Eatoniella cana Ponder, 1983

Previous records at South Georgia: South Georgia (1-2 m) (Ponder 1983).

Bathymetric range: 1-2 m.

Other records: SO, PT, MI.

Remarks: Ponder (1983) considered the specimens from station 43 from the Schwedische Südpolar Expedition, that were identified by Strebel (1908) as *Eatoniella kerguelensis contusa*, as *Eatoniella cana*.

Eatoniella contusa Strebel, 1908

Previous records at South Georgia: 54°14' S 36°31' W (10-15 m), Cumberland Bay (1-2 m), 54°24' S 36°26' W (125 m) (Strebel 1908).

Bathymetric range: 1-125 m.

Other records: only known from South Georgia.

Remarks: Ponder (1983) considered *Eatoniella kerguelensis* Martens & Pfeffer, 1886 (non Smith) a synonym of *Eatoniella contusa*.

Eatoniella glacialis (Smith, 1907)

Fig. 14

Examined material: 52 spm. and 1 sh., 54°30'S 35°50' W, 94 m, 4/8/1996 (MLP 7282; MACN 36282).

Previous records at South Georgia: 54°22' S 36°28' W (12-15 m) and 54°22' S 36°28' W (22 m) (Ponder 1983; previously reported as *Eatoniella kerguelensis* by Strebel 1908).

Bathymetric range: 12-94 m.

Other records: WS, RS, SH, EA.

Eatoniella strebeli Ponder & Worsfold, 1994

Previous records at South Georgia: 54°22' S 36°27' W (20-58 and 24-52 m) (Strebel 1908).

Bathymetric range: 20-58 m.

Other records: SO.

Remarks: Ponder (1983) considered the specimens from stations 25 and 27 from the Schwedische Südpolar Expedition, that were identified by Strebel (1908) as *Eatoniella kerguelensis contusa*, as *Eatoniella* aff. *caliginosa*. Later, on the basis of this material, Ponder & Worsfold (1994) described *Eatoniella strebeli*.

Eatoniella subgonostoma Strebel, 1908

Previous records at South Georgia: 54°22'S 36°28'W (22 m), 54°22'S 36°28'W (20 m) (Strebel 1908); Coal Bay, Penguin Bay (David 1934).

Bathymetric range: 20-22 m.

Other records: only known from South Georgia.

Eatoniella (?) *georgiana*
(Pfeffer in Martens & Pfeffer, 1886)

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: only known from South Georgia.

Family Rissoidae

Onoba anderssoni (Strebel, 1908)

Previous records at South Georgia: 54°22'S 36°28'W (12-15 m) (Strebel 1908).

Bathymetric range: 12-15 m.

Other records: only known from South Georgia.

Onoba delecta Ponder, 1983
Fig. 15

Examined material: 12 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7304; MACN 36283); 2 spm., 53°58'S 37°09'W, 138 m, 4/10/1996 (MACN 36284); 1 sp., 54°27'S 35°41'W, 256 m, 4/12/2002 (MLP 7257); 54°27'S 35°40'W, 236-239 m, 4/11/2002 (MLP 7258).

Previous records at South Georgia: 53°51'S 37°38'W (97-101 m) (Ponder, 1983); Stromness Harbour (155-178 m) (Powell 1951).

Bathymetric range: 94-256 m.

Other records: ML.

Remarks: According to Ponder (1983), the record of *Onoba paucilirata* from South Georgia by Powell (1951) corresponds to *Onoba delecta*.

Onoba gelida (Smith, 1907)
Fig. 16

Examined material: 100 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7305; MACN 36285); 5 spm., 53°58'S 37°09'W, 138 m, 4/10/1996 (MACN 36286); 2 sh., 54°27'S 35°40'W, 236-239 m, 4/11/2002 (MLP 7259); 2 sh., 54°27'S 35°41'W, 256 m, 4/12/2002 (MLP 7260).

Previous records at South Georgia: 53°51'S 37°38'W (97-101 m) (Ponder 1983).

Bathymetric range: 94-138 m.

Other records: WS, RS, SH, EA.

Onoba georgiana
(Pfeffer in Martens & Pfeffer, 1886)

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886); Cumberland Bay, 54°22'S 36°27'W (24-52 m), 54°22'S 36°28'W, 54°22'S 36°27'W (20-52 m) (Strebel 1908); West Cumberland Bay (168 m), Undine Harbour (18-27 m) (Powell 1951); Undine Harbour (Ponder 1983).

Bathymetric range: 18-168 m.

Other records: SO, PT, ML.

Remarks: According to Ponder (1983), *Rissoia insignificans* Strebel, 1908 is a synonym of *Onoba georgiana*.

Onoba grisea (Martens, 1885)

Previous records at South Georgia: South Georgia (Martens 1885); 54°22'S 36°18'W, 54°22'S 36°28'W (12-15 m) (Strebel 1908).

Bathymetric range: 12-15 m.

Other records: WS, SO.

Remarks: According to Ponder (1983), *Rissoia sulculata* Strebel, 1908 (non *Rissoia sulculata* Brown, 1844; non *Rissoia nana* var. *sulcata* Pezant, 1908) and *Rissoia fraudulenta* Melvill & Standen, 1907 (in part) (non Smith, 1907) are synonyms of *Onoba grisea*.

Onoba schraderi (Strebel, 1908)
Fig. 17

Examined material: 196 spm. and 10 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7306; MACN 36287).

Previous records at South Georgia: 54°22'S 36°28'W (12-15 m) (Strebel 1908).

Bathymetric range: 12-94 m.

Other records: only known from South Georgia.

Remarks: *Onoba schraderi* was also reported from Kerguelen Islands (Canteras & Arnaud 1985); in Ponder's (1983) opinion, the record from Kerguelen Islands does not correspond to the species.

Onoba steineni (Strebel, 1908)
Fig. 18

Examined material: 26 spm. and 3 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7307; MACN 36288).

Previous records at South Georgia: 54°22'S 36°28'W (20 and 22 m) (Strebel 1908).



Figs 18-36. Habitus. 18. *Onoba steineni* (3.5 mm). 19. *Colpospirella algida* (2.4 mm). 20. *Laevilacunaria antarctica* (1.3 mm). 21. *Laevilitorina caliginosa* (1.7 mm). 22. *Pellilitorina pellita* (16.1 mm). 23. *Perissodonta georgiana* (39 mm). 24. *Calyptreaa (Trochita) georgiana* (7.5 mm). 25. *Torellia mirabilis* (37 mm). 26. *Amauropsis anderssoni* (19 mm). 27. *Amauropsis aureolutea* (32 mm). 28. *Sinuber sculpta scotiana* (9.5 mm). 29. *Cerithiella seymouriana* (2.2 mm). 30. *Cerithiopsisilla bisculpta* (2.8 mm). 31. *Eumetula dilecta* (2.6 mm). 32. *Melanella subantarctica* (2.7 mm). 33. *Trophon brevispira* (26.3 mm). 34. *Trophon cribellum* (20.3 mm). 35. *Trophon scotianus* (54 mm). 36. *Trophon shackletoni paucilamellatus* (37.6 mm).

Bathymetric range: 20-94 m.

Other records: KI, MI.

Remarks: According to Ponder (1983), *Rissoa stude-riana* Thiele, 1912 and *Rissoa valdiviae* Thiele, 1925 are synonyms of *Onoba steineni*.

Family Cingulopsidae

Skenella (Skenella) georgiana
Pfeffer in Martens & Pfeffer, 1886

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886); Cumberland Bay (Strebel 1908, Ponder 1983); 54°22'S 36°28'W (22 m) (Strebel 1908).

Bathymetric range: 22 m.

Other records: MI.

Remarks: According to Ponder (1983), the record of *Skenea cf. subcanaliculata* by Martens (1885) corresponds to *Skenella georgiana*.

Skenella wareni Ponder & Worsfold, 1994

Previous records at South Georgia: 54°22'S 36°28'W (12-15 m and 24-52 m) (Ponder & Worsfold 1994).

Bathymetric range: 12-52 m.

Other records: only known from South Georgia.

Family Turritellidae

Colpospirella algida (Melvill & Standen, 1912)

Fig. 19

Examined material: 1,239 spm. and 176 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7283; MACN 36289); 9 spm., 54°27'S 35°40'W, 236-239 m, 4/11/2002 (MLP 7261); 10 spm., 54°27'S 35°41'W, 256 m, 4/12/2002 (MLP 7262).

Previous records at South Georgia: West Cumberland Bay (110 m), Stromness Harbour (from 54°04'S 36°27'W to 53°58'S 36°26'W, 155-178 m) (Powell 1951).

Bathymetric range: 94-256 m.

Other records: PT, MI, BB.

Family Littorinidae

Laevilacunaria antarctica (Martens, 1885)

Fig. 20

Examined material: 8 spm., Cumberland Bay (MACN 13533).

Previous records at South Georgia: South Georgia (Martens 1885); 54°14'S 36°31'W (10-15 m), 54°23'S 36°26'W (64-74 m) (Strebel 1908); Coal Bay, Else Bay, Cumberland Bay (David 1934); Cumberland Bay (0-22 m) (Carcelles 1953).

Bathymetric range: 0-74 m.

Other records: WS, SO, SH, PT; reported from Kerguelen Islands by Lamy (1915).

Remarks: Martens & Pfeffer (1886) considered *Litorina pumilio* Smith (= *Laevilacunaria pumilio* or *Hydrobia pumilio*) as a synonym of *Laevilacunaria antarctica*. Melvill & Standen (1907) reported *Lacuna divaricata* Fabricius (a species from the Northeastern Atlantic Ocean) from Puerto Williams, Malvinas Islands; this record most likely corresponds to *L. antarctica*.

Laevilitorina caliginosa (Gould, 1848)

Fig. 21

Examined material: 4 spm., Cumberland Bay (MACN 19000).

Previous records at South Georgia: South Georgia (Martens 1885, Martens & Pfeffer 1886); Cumberland Bay, Cooking Pot Bay (Strebel, 1908); Cumberland Bay (Lamy 1911); Coal Bay, Else Bay, Penguin Bay (David 1934); Maiviken, West Cumberland Bay (0-1 m), Moltke Harbour (shore) (Powell 1951).

Bathymetric range: 0-1 m.

Other records: WS, SO, SH, PT, MI, KI, CI.

Laevilitorina granum Pfeffer in Martens & Pfeffer, 1886

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886); Cumberland Bay (Carcelles 1953).

Bathymetric range: ?

Other records: only known from South Georgia.

Laevilitorina pygmaea Pfeffer in Martens & Pfeffer, 1886

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886); 54°11'S 36°18'W, Cumberland Bay (252-310 m) (Strebel 1908).

Bathymetric range: 252-310 m.

Other records: only known from South Georgia.

Laevilitorina umbilicata Pfeffer in Martens & Pfeffer, 1886

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: reported from WS by Lamy (1905) and Arnaud & Bandell (1978).

Laevilitorina venusta Pfeffer in Martens & Pfeffer, 1886

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: only known from South Georgia.

Pellilitorina pellita (Martens, 1885)

Fig. 22

Examined material: 3 spm., Stromness Harbour (2 spm., MACN 18995; 1 spm., MACN 19009); 3 spm., Undine Harbour (MACN 18993); 1 spm., Antarctic Bay (MACN 18994); 7 spm., Grytviken (MACN 21664); 1 spm., Schlieper Bay (MACN 18992); 7 spm., Cumberland Bay (1 spm., MACN 18583; 3 spm., MACN 13531; 3 spm., 13531-1).

Previous records at South Georgia: South Georgia (Martens 1885); Cumberland Bay, Fjords (5 m), 54°22' S 36°28' W (2-8 m) (Strebel 1908); Coal Bay (David 1934); Jason Leith (238-270 m) (Powell 1951); Cumberland Bay, Schlieper Bay, Antarctica Bay, Stromness Bay (Carcelles 1953); 54°02' S 38°03' W (shore) (Dell 1990).

Bathymetric range: 0-8 m.

Other records: WS, SO, SH, BB; reported from Kerguelen Islands by Lamy (1915) and Gaillard (1954).

Pellilitorina setosa (Smith, 1875)

Previous records at South Georgia: South Georgia (Martens 1885; Martens & Pfeffer 1886); Cumberland Bay, 54°17' S 36°28' W (75 m), Fjords (5 m), 54°22' S 36°27' W (20-30 m), 54°22' S 36°28' W (2-15 m) (Strebel 1908); Coal Bay, Cumberland Bay (David 1934); Stromness Harbour (26-35 m), Leith Harbour (55-22 m), East Cumberland Bay (18-26 m and 110-60 m), Undine Harbour (18-27 m) (Powell 1951); Stromness Harbour (Carcelles 1953).

Bathymetric range: 2-110 m.

Other records: WS, RS, SO, SH, KI, CI.

Remarks: Carcelles (1953) misidentified specimens of *Pellilitorina pellita* from Undine Harbour (MACN 18993) as *Pellilitorina setosa*.

Family Struthiolariidae

Perissodonta georgiana (Strebel, 1908)

Fig. 23

Examined material: 2 spm., Undine Harbour (MACN 18957); 2 spm., Antarctic Bay (MACN 18959); 4 spm., South Georgia (MACN 18586); 2 spm., Annenkov Island (MACN 18955); 3 spm., Cumberland Bay (MACN 18653); 10 spm., Wilson Harbour (MACN 18956); 7 spm., Blauhwall Harbour (MACN 18958); 1 sh., 54°45' S 35°39' W, 71 m, 2/17/1995 (MLP 7273); 1 sh., 54°11' S 37°57' W, 144 m, 2/23/1995 (MACN 36290); 2 sh., 55°04' S 35°32' W, 120 m, 3/26/1997 (MACN 36291); 1 sh., 53°59' S 37°38' W, 82-85 m, 4/1/1997 (MLP 7237).

Previous records at South Georgia: 54°11' S 36°18' W (252-310 m) (Strebel 1908); Leith Harbour (38 m), 54°59' S 35°24' W (130 m), Wilson Harbour (26-83 m) (Powell 1951); Annenkov Island (37 m), Undine Harbour (37 m), Blauhwall Cove (24 m), Antarctic Bay (37 m), Cumberland Bay (Carcelles 1953).

Bathymetric range: 24-310 m.

Other records: only known from South Georgia.

Family Calyptraeidae

Calyptraea (Trochita) georgiana Powell, 1951

Fig. 24

Examined material: 1 spm., Schlieper Bay (MACN 18972); 2 spm., Cumberland Bay (1 spm., MACN 18969; 1 spm., MACN 13537); 2 spm., Antarctic Bay (MACN 18973); 1 spm., Stromness Harbour (MACN 18974); 4 spm., Larsen Harbour (MACN 18970); 1 spm., 55°08' S 35°25' W, 115 m, 2/21/1995 (MACN 36292); 1 spm., 53°58' S 37°09' W, 138 m, 4/10/1996 (MACN 36293); 4 spm. and 1 sh., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7284; MACN 36294); 2 spm., 53°59' S 37°38' W, 82-85 m, 4/1/1997 (MLP 7238).

Previous records at South Georgia: 53°43'40" S 40°47' W (177 m), West Cumberland Bay (110 m), Stromness Harbour to Larsen Point (122-136 m), 53°51' S 36°18'30" W (245 m), 53°51' S 36°21'30" W (200-238 m), 53°52'30" S 36°08' W (160 m), 54°59' S 35°24' W (130 m) (Powell 1951); Cumberland Bay (37 m), Larsen Harbour (27 m), Annenkov Island (37 m), Schlieper Bay (37 m), Antarctic Bay (37 m), Stromness Harbour (44 m) (Carcelles 1953).

Bathymetric range: 27-245 m.

Other records: only known from South Georgia.

Family Capulidae

Torellia mirabilis (Smith, 1907)

Fig. 25

Examined material: 2 spm., South Georgia (MACN s/n); 1 spm., 54°01' S 35°55' W, 132 m, 2/13/1995 (MACN 36295); 1 spm., 55°14' S 35°20' W, 132 m, 4/1/1996 (MLP 7274); 1 spm., 55°09' S 35°23' W, 126 m, 3/25/1997 (MACN 36296).

Previous records at South Georgia: East Cumberland Bay (200-234 m), Stromness Harbour (122-136 and 155-178 m), off Cape Saunders (132-148 m), off mouth of Cumberland Bay (230-250 m) (Powell 1951); 53°51' S 37°38' W (97-101 m) (Dell 1990).

Bathymetric range: 97-250 m.

Other records: WS, RS, SH, KI, CI.

Family Lamellariidae

Marseniopsis pacifica Bergh, 1886

Previous records at South Georgia: off mouth of Cumberland Bay (120-204 m) (Powell 1951).

Bathymetric range: 120-204 m.

Other records: WS, SO, PT, KI, CI.

Family Naticidae

Amauropsis anderssoni (Strebel, 1906)

Fig. 26

Examined material: 1 spm. and 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36297); 1 sh., 53°58'S 37°09'W, 138 m, 4/10/1996 (MLP 7239).

Previous records at South Georgia: Cumberland Bay (250 m), 54°17'S 36°28'W (75 m), 54°22'S 36°28'W (12-15 m), 54°24'S 36°26'W (125 m), 54°24'S 36°22'W (210 m), 54°11'S 36°18'W (252-310 m), 54°22'S 36°28'W (20 m) (Strebel 1908); West Cumberland Bay (110 and 251 m), East Cumberland Bay (179-235 and 220-247 m), off mouth of Cumberland Bay (120-204 and 230-250 m), Leith Harbour (55-22 m), mouth of Drygalski Fjord (91-225 m), Wilson Harbour (26-83 m) (Powell 1951); Stromness Harbour, Bay of Isles (24 m) (Carcelles 1953).

Bathymetric range: 12-310 m.

Other records: MI, SR.

Amauropsis aureolutea (Strebel, 1908)

Fig. 27

Examined material: 2 spm., 54°11'S 37°57'W, 144 m, 2/23/1995 (MACN 36298); 11 sp. and 11 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7240; MACN 36348); 1 sp. and 1 sh., 54°27'S 35°41'W, 256 m, 4/12/2002 (MLP 7285).

Previous records at South Georgia: 54°22'S 36°27'W (24-52 m) (Strebel 1908); Stromness Harbour to Larsen Point (122-136 m), 53°52'30"S 36°08'W (160 m), 54°58'S 35°00'W (97 m) (Powell 1951); 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 24-256 m.

Other records: WS, SA, SO, SH.

Amauropsis georgiana (Strebel, 1908)

Previous records at South Georgia: 54°23'S 36°26'W (64-74 m), 54°22'S 36°27'W (95 m), 54°22'S 36°27'W (24-52 m) (Strebel 1908); Jason Leith (238-270 m) (Powell 1951); Larsen Harbour (27 m), Bay of Isles (24 m) (Carcelles 1953).

Bathymetric range: 24-270 m.

Other records: only known from South Georgia.

Remarks: the status of *Amauropsis georgiana* is uncertain. Powell (1951) suggested that *Amauropsis georgiana* could be synonym of *A. anderssoni*. Numanami (1996) reported *Amauropsis georgiana* from East Antarctica, however, his figures of shell morphology and radula seem to correspond to *Amauropsis aureolutea*.

Amauropsis powelli Dell, 1990

Previous records at South Georgia: 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 97-101 m.

Other records: only known from South Georgia.

Kerguelenatica bioperkulata Dell, 1990

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908); Cumberland Bay (David 1934); Wilson Cove (26 m), Larsen Harbour (27 m) (Carcelles 1953).

Bathymetric range: 26-310 m.

Other records: WS, RS, SA, SH, KI, CI, EA.

Remarks: Cernohorsky (1977) pointed on the homonymy of *Natica grisea* Martens, 1878 and *N. grisea* Requier, 1848, assuming from literature that *Amauropsis delicatula* (Smith, 1902) is a synonym of the former. Thus, he proposed the use of *Amauropsis delicatula* as a replacement name for *Natica grisea* Martens, 1878. Dell (1990) realized that *Natica grisea* Martens, 1878 is not a synonym of *Amauropsis delicatula* but a species of *Kerguelenatica*, proposing *K. bioperkulata* as nomen novum pro *Natica grisea* Martens, 1878. The species was also referred to as *Polinices (Lunatia) grisea* by David (1934) and as *Amauropsis (Kerguelenatica) grisea* by Powell (1951) and Carcelles (1953).

Simber sculpta scotiana Powell, 1951

Fig. 28

Examined material: 1 spm., Larsen Bay, 8-27 m (MACN 18961); 2 spm. and 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7286; MACN 36299).

Previous records at South Georgia: 54°17'S 36°28'W (75 m), 54°24'S 36°26'W (125 m) (Strebel 1908); Jason Leith (238-270 m), mouth of Drygalski Fjord (225 m) (Powell 1951).

Bathymetric range: 8-270 m.

Other records: SO.

Remarks: *Sinuber sculpta* (Martens, 1878) was described from Kerguelen Islands and reported from South Georgia by Strebel (1908). Powell (1951) proposed a subspecies, *Sinuber sculpta scotiana*, to include the specimens from South Orkney and South Georgia, considering those from Ross Sea and Malvinas Islands as *Sinuber sculpta*. Carcelles (1953) listed both *S. sculpta* and *S. s. scotiana* as present in South Georgia. Dell (1990) reported *Sinuber s. sculpta* from Burdwood Bank and Crozet Islands, and *Sinuber sculptum scotianum* from Drake Passage and Weddell Sea. Despite a revisory study of the two subspecies is still pending, I assign the specimens from South Georgia to the subspecies proposed by Powell (1951).

Tectonatica impervia (Philippi, 1845)

Previous records at South Georgia: 53°52'30" S 36°08' W (160 m) (Powell 1951).

Bathymetric range: 160 m.

Other records: PT, MI.

Family Cerithopsidae

Cerithiella seymouriana (Strebel, 1908)

Fig. 29

Examined material: 1 spm., 54°05' S 38°42' W, 213-249 m, 2/11/1995 (MACN 36300); 40 spm. and 6 sh. 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7287; MACN 36301); 1 spm., 53°58' S 37°09' W, 138 m, 4/10/1996 (MACN 36302).

Previous records at South Georgia: 54°59' S 35°24' W (130 m) (Powell 1951).

Bathymetric range: 94-249.

Other records: WS.

Cerithiopsilla biscalpta (Strebel, 1908)

Fig. 30

Examined material: 6 spm. and 3 sh., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7288; MACN 36303).

Previous records at South Georgia: 54°11' S 36°18' W (252-310 m) (Strebel 1908).

Bathymetric range: 94-310 m.

Other records: only known from South Georgia.

Remarks: Castellanos & Landoni (1984) and Castellanos et al. (1987) reported specimens collected at 47°29' S 61°29' W and 46°15' S 60°9' W as *Cerithiopsilla* aff. *biscalpta*. However, their figures show shell shapes and ornamentation that differ from the

original description of the species; as these specimens were not found in the collections at MACN, MLP and INIDEP to be re-examined, the presence of the species in Patagonian waters is considered doubtful.

Eumetula dilecta Thiele, 1912

Fig. 31

Examined material: 2 spm., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7351; MACN 36304).

Previous records at South Georgia: The present is the first record from South Georgia.

Bathymetric range: 94 m.

Other records: EA.

Remarks: Castellanos et al. (1987) reported *Eumetula dilecta* for Patagonia but these specimens were not found in the collections at MACN, MLP and INIDEP to confirm their identity.

Family Epitonidae

Cirsotrema fenestrata (Strebel, 1908)

Previous records at South Georgia: Cumberland Bay (253-310 m) (Strebel 1908); Stromness Harbour to Larsen Point (122-136 m) (Powell 1951).

Bathymetric range: 122-310 m.

Other records: only known from South Georgia.

Family Eulimidae

Melanella subantarctica (Strebel, 1908)

Fig. 32

Examined material: 11 spm. and 1 sh., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7289; MACN 36305); 2 spm., 53°58' S 37°09' W, 138 m, 4/10/1996 (MLP 7308; MACN 36306).

Previous records at South Georgia: 54°22' S 36°28' W (22 m) (Strebel 1908).

Bathymetric range: 22-138 m.

Other records: reported from Kerguelen Islands and Crozet Islands by Canteras & Arnaud (1985), and from Patagonia by Linse (1997).

Family Muricidae

Trophon albolabratus Smith, 1875

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: KI.

Remarks: Strebel (1908) and Cernohorsky (1977) considered *Trophon cinguliferus* Martens & Pfeffer, 1886 as a synonym of *Trophon albolabratius*.

Trophon brevispira Martens, 1885

Fig. 33

Examined material: 1 spm., Grytviken (MACN 30346); 1 spm., Cumberland Bay (MACN 19989); 1 spm., Undine Harbour (MACN 18989).

Previous records at South Georgia: South Georgia (Martens 1885); Cumberland Bay, 54°22'S 36°28'W (2-8 m) (Strebel 1908); Cumberland Bay (Lamy 1911); Undine Harbour (18-27 m), Jason Leith (238-270 m) (Powell 1951); Coal Bay, Penguin Bay (David 1934); Cumberland Bay (37 m), Undine Harbour (27 m), Antarctic Bay (33 m), Schlieper Bay (18 m) (Carcelles 1953).

Bathymetric range: 2-270 m.

Other records: only known from South Georgia.

Remarks: Arnaud (1972b) reported *Trophon brevispira* from Petermann Islands, stressing that the reports of *Trophon geversianus* and *Cominella modesta* by Lamy (1906a and b, respectively) also correspond to *T. brevispira*. However, Arnaud's (1972b) description does not seem to correspond to *Trophon brevispira* but to *T. nucelliformis* Oliver & Picken, 1984.

Trophon cribellum Strebel, 1908

Fig. 34

Examined material: 5 spm., Cumberland Bay (MACN 18988); 1 spm., Cumberland Bay, 22 m (MACN 13536); 5 spm., Stromness Harbour, 44 m (MACN 18987).

Previous records at South Georgia: 54°17'S 36°28'W (75 m), 54°22'S 36°27'W (20 m) (Strebel, 1908); Coal Bay (David 1934).

Bathymetric range: 20-75 m.

Other records: only known from South Georgia.

Remarks: The specimens from Stromness Harbour examined herein were previously referred to *Trophon cinguliferus* by Carcelles (1953).

Trophon cuspidarioides Powell, 1951

Previous records at South Georgia: Off mouth of Cumberland Bay (120-204 m), Stromness Harbour (from 54°04'S 36°27'W to 53°58'S 36°26'W, 155-178 m) (Powell 1951).

Bathymetric range: 120-204 m.

Other records: only known from South Georgia.

Trophon distantelamellatus Strebel, 1908

Previous records at South Georgia: 54°23'S 36°26'W (64-74 m) (Strebel 1908); East Cumberland Bay (38, 26-18 and 110-60 m) (Powell 1951).

Bathymetric range: 18-110 m.

Other records: only known from South Georgia.

Trophon minutus Melvill & Standen, 1907

Previous records at South Georgia: 54°22'S 36°27'W (24-52 m) (Strebel 1908).

Bathymetric range: 24-52 m.

Other records: WS, RS, SO, SH, SA.

Remarks: Melvill & Standen (1907) described *Trophon minutus* from South Orkney using a name given by Strebel in a manuscript sent to Melvill & Standen. Strebel (1908) described specimens of the same species from South Georgia as new, under the same name *Trophon minutus*. Certainly, Melvill & Standen's authority has priority.

Trophon scotianus Powell, 1951

Fig. 35

Examined material: 1 spm., Schlieper Bay, 18 m (MACN 18991); 1 spm., Cumberland Bay (MACN 18990); 1 spm., 54°01'S 35°55'W, 132 m, 2/13/1995 (MLP 7241); 1 spm., 54°11'S 37°57'W, 144 m, 2/23/1995 (MACN 36307); 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7242).

Previous records at South Georgia: 53°55'S 38°01'W (107 m) (Powell 1951); Cumberland Bay (Carcelles 1953); 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 18-144 m.

Other records: WS, RS, EA.

Trophon shackletoni paucilamellatus Powell,

1951

Fig. 36

Examined material: 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7243); 1 sh., 53°58'S 37°09'W, 138 m, 4/10/1996 (MLP 7244); 2 sh., 53°59'S 37°38'W, 82-85 m, 4/1/1997 (MACN 36308).

Previous records at South Georgia: 54°03'S 36°39'W to 54°05'S 36°36'30"W (132-148 m), West Cumberland Bay (100 m), Stromness Harbour (122-136 and 155-178 m), 53°52'30"S 36°08'W (160 m), 54°59'S 35°24'W (130 m) (Powell 1951); 54°17'S 36°28'W (75 m) (Strebel 1908); Schlieper Bay (18 m) (Carcelles 1953); 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 18-178 m.

Other records: SR, SA.

Remarks: According to Powell (1951), the specimens reported as *Trophon laciniatus* from South Georgia by Strebel (1908) correspond to *T. shackletoni paucilamellatus*.

Family Buccinulidae

Cavineptunea monstrosa Powell, 1951

Fig. 37

Examined material: 2 sh., 55°14'S 35°20'W, 132 m, 4/1/1996 (MLP 7245); 1 sh., 53°48'S 37°49'W, 140 m, 3/24/1996 (MACN 36309); 1 sh., 55°02'S 35°59'W, 142 m, 4/2/1996 (MACN 36310); 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36311).

Previous records at South Georgia: 53°52'30"S 36°08'W (160 m), 53°43'40"S 40°57'W (177 m) (Powell 1951).

Bathymetric range: 160-177 m.

Other records: SH.

Chlanidota (Chlanidota) densesculpta (Martens, 1885)

Fig. 38

Examined material: 205 spm., Cumberland Bay (116 spm., MACN 13528; 72 spm., MACN 18952; 17 spm., MACN 17057); 53 spm., Larsen Harbour (MACN 18946); 1 sh., 54°37'S 35°37'W, 246 m, 3/26/1996 (MACN 36312); 1 sh., 53°59'S 37°38'W, 158-159 m, 4/1/1997 (MLP 7246); 2 sp. and 1 sh., 54°27'S 35°41'W, 256 m, 4/8/1996 (MLP 7290).

Previous records at South Georgia: South Georgia (Martens 1885); Kochttopfbucht, 54°22'S 36°28'W (12-15 m) (Strebel 1908); Bay of Isles (7 m) (Dall 1914); Coal Bay (13-14 m), Cumberland Bay (David 1934); Jason Leith (238-270 m), East Cumberland Bay (17-27, 24-30 and 26-18 m), Stromness Harbour (26-35 m), Leith Harbour (55-22 m), Wilson Harbour (26-83 m) (Powell 1951); Cumberland Bay (37 m), Larsen Harbour (27 m), Undine Harbour (27 m), King Maud Cove (46 m), Nueva Fortuna Cove (12 m), Gold Cove (12 m), Stromness Harbour (44 m) (Carcelles 1953); 54°00'S 33°27'W (shore) (Dell 1990); 54°00'S 37°27'W (3-6 m), 54°02'30"S 37°39'36"W (60-71 m), 54°01'42"S 37°40'W (46-70 m), 54°00'06"S 37°40'36"W (68-80 m), 53°57'30"S 37°20'42"W (27-40 m), 54°11'48"S 37°41'06"W (68-80 m), 54°43'S 35°13'W (300-306 m), Bay of Isles (8 m), Wilson Harbour (Harasewych & Kantor 1999).

Bathymetric range: 0-256 m.

Other records: only known from South Georgia.

Remarks: Harasewych & Kantor (1999) considered that the bathyal specimens referred by Dell (1990) as *Chlanidota densesculpta* correspond to *Chlanidota (Pfefferia) invenusta*, and those of *Chlanidota densesculpta* from Kerguelen Islands, Crozet Islands and Graham Land (Antarctica) are doubtful. Specimens of *Chlanidota densesculpta* from South Georgia were reported by Dall (1914) as *Neobuccinum densicilicatum*.

Chlanidota (Chlanidota) paucispiralis Powell, 1951

Fig. 39

Examined material: 1 sh., 54°11'S 37°57'W, 144 m, 2/23/1995 (MACN 36313); 1 spm., 53°51'S 37°34'W, 108 m, 3/25/1996 (MACN 36314); 4 sh., 53°59'S 37°38'W, 82-85 m, 4/1/1997 (MLP 7247); 1 sp., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7290).

Previous records at South Georgia: 53°52'30"S 36°08'W (160 m), 53°51'S 36°11'15"W (970 m), 53°48'30"S 35°57'W (401-411 m) (Powell 1951); Antarctic Bay (37 m) (Carcelles 1953); 54°49'S 38°01'W (732-814 m), 53°51'S 37°38'W (97-101 m) (Dell 1990); 53°35'48"S 37°35'12"W (254-366 m), 53°47'48"S 37°26'42"W (165-234 m), 53°38'12"S 37°54'42"W (130-137 m), 53°44'12"S 37°59'30"W (128-137 m), 53°41'48"S 37°57'12"W (144-150 m), 53°37'42"S 38°04'W (128-137 m), 53°38'12"S 38°01'06"W (130-134 m), 53°36'S 38°03'W (120-124 m), 53°50'36"S 36°18'36"W (185-205 m), 53°44'S 39°22'W (304-342 m), 53°58'S 38°42'W (189-200 m), 54°05'S 38°25'W (197-207 m), 54°30'S 38°56'W (220-232 m), 54°18'S 35°37'W (238-247 m), 53°47'S 36°34'W (263-277 m), 53°40'S 36°48'W (161-192 m), 53°43'S 38°36'W (260-306 m), 53°57'S 38°10'W (90-100 m), 54°41'S 38°38'W (220-320 m), 54°49'S 38°01'W (732-814 m), 53°51'S 37°38'W (97-101 m) (Harasewych & Kantor 1999).

Bathymetric range: 94-814 m.

Other records: only known from South Georgia.

Remarks: Harasewych & Kantor (1999) assigned to *Chlanidota paucispiralis* specimens from South Georgia previously referred by Dell (1990) as *Chlanidota signeyana*.

Chlanidota (Chlanidotella) modesta (Martens, 1885)

Fig. 40

Examined material: 1 spm., Dröning Maud Harbour (MACN 18997); 1 spm., Schlieper Bay, 18 m (MACN 18983); 3 spm., Undine Harbour, 37 m (MACN 18984).

Previous records at South Georgia: South Georgia (Martens 1885); 54°22'S 36°28'W (2-8 m) (Strebel 1908); Coal Bay (David 1934); East Cumberland Bay (26-18 m), Larsen Harbour (Drygalski Fjords, 2 m) (Powell 1951).

Bathymetric range: 2-37 m.

Other records: reported from Patagonia by Castellanos et al. (1987) and from Crozet Islands by Canteras & Arnaud (1985).

Remarks: The specimens from South Georgia previously referred by Carcelles (1953) as *Conorbela antarctica* (Strebel 1908) (MACN 18982, 18983 and 18984) are herein identified as *Chlanidota (Chlanidotella) modesta*.

Lamy (1906b) reported *Chlanidota modesta* (as *Cominella*) as present in South Orkney; the same specimens were reported as *Trophon brevispira* by Lamy (1911).

Chlanidota (Pfefferia) chordata Strebel, 1908

Fig. 41

Examined material: 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36315); 2 sh., 53°58'S 37°09'W, 138 m, 4/10/1996 (MLP 7248).

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908); 53°43'30"S 37°30'06" W (271-313 m), 54°02'30"S 37°39'36" W (60-71 m), 54°01'42"S 37°40' W (46-70 m), 54°00'06"S 37°40'36" W (68-80 m), 54°02'48"S 37°23'42" W (66-75 m), 53°51'02"S 36°49'03" W (199-247 m), 53°43'06"S 36°49'18" W (183-192 m), 54°31'45"S 36°48'42" W (150-154 m), 54°44'12"S 37°11'12" W (225-265 m), 54°50'48"S 37°23'48" W (223-227 m), 54°14'10"S 37°54'20" W (164-183 m), 53°58'S 38°42' W (189-200 m), 54°18'S 37°54' W (158-194 m), 54°39'S 35°49' W (98-127 m), 54°28'S 35°39' W (231-249 m), 54°15'S 35°51' W (232-254 m), 54°10'S 35°15' W (242-262 m), 54°09'S 35°55' W (218-227 m), 53°47'S 36°34' W (263-277 m), 53°40'S 36°48' W (161-192 m), 53°44'S 36°51' W (178-201 m) (Harasewych & Kantor 1999).

Bathymetric range: 46-313 m.

Other records: only known from South Georgia.

Chlanidota (Pfefferia) invenusta
Harasewych & Kantor, 1999

Previous records at South Georgia: 53°31'12"S 37°50'54" W (1267-1599 m), 53°34.9'S 36°47.8' W (448-872 m), 53°35'S 36°28' W (796-824 m), 53°23'S 37°11' W (1299-1400 m) (Harasewych & Kantor 1999).

Bathymetric range: 448-1599 m.

Other records: only known from South Georgia.

Chlanidota (Pfefferia) palliata (Strebel, 1908)

Previous records at South Georgia: 54°17'S 36°28'W (75 m), 54°11'S 36°18' W (252-310 m) (Strebel 1908); Cumberland Bay (251 m), 53°48'S 35°37'30" W (728 m), 53°48'30"S 35°57' W (401-411 m) (Powell 1951); 54°05.36'S 36°30.48' W (130-143 m), 54°21.36'S 35°58.42' W (141-164 m), 54°30.7'S 35°35.9' W (261-267 m) (Harasewych & Kantor 1999).

Bathymetric range: 75-728 m.

Other records: only known from South Georgia.

Remarks: Harasewych & Kantor (1999) considered *Pfefferia elata* Strebel, 1908 and *Pfefferia cingulata* Strebel, 1908 as synonyms of *Chlanidota (Pfefferia) palliata*.

Mangelia (?) nigropunctata Martens, 1885

Previous records at South Georgia: South Georgia (Martens 1885); 54°22'S 36°28' W (12-15 m) (Strebel 1908); Coal Bay (David 1934); Stromness Harbour to Larsen Point (122-136 m), mouth of Cumberland Bay (230-250 and 200-234 m), Undine Harbour (18-27 m) (Powell 1951).

Bathymetric range: 12-250 m.

Other records: only known from South Georgia.

Remarks: *Mangelia nigropunctata* was described by Martens (1885). Pfeffer (in Martens & Pfeffer 1886) found that the black dots on which the name "*nigropunctata*" was based, are not a specific character; he therefore renamed the species as *Mangelia antarctica*, with *M. nigropunctata* as a synonym. Strebel (1908) referred to this species as *Lachnesis antarctica*, and Carcelles (1953) reported it under *Chauvetia*. Powell (1951) considered *Mangelia antarctica* a synonym of *Falsimohnia albozonata* (Watson, 1882), a species previously reported (as *Pareuthria*) from South Georgia by David (1934). Powell's (1951) opinion is not shared in the present contribution.

In fact, *Mangelia antarctica* is an objective synonym of *Mangelia nigropunctata*, and the latter should be used. The generic placement of the species requires to be reanalyzed.

Probuccinum angulatum Powell, 1951

Previous records at South Georgia: 53°51'S 36°21'30" W (200-236 m), 53°52'30"S 36°08' W (160 m) (Powell 1951).

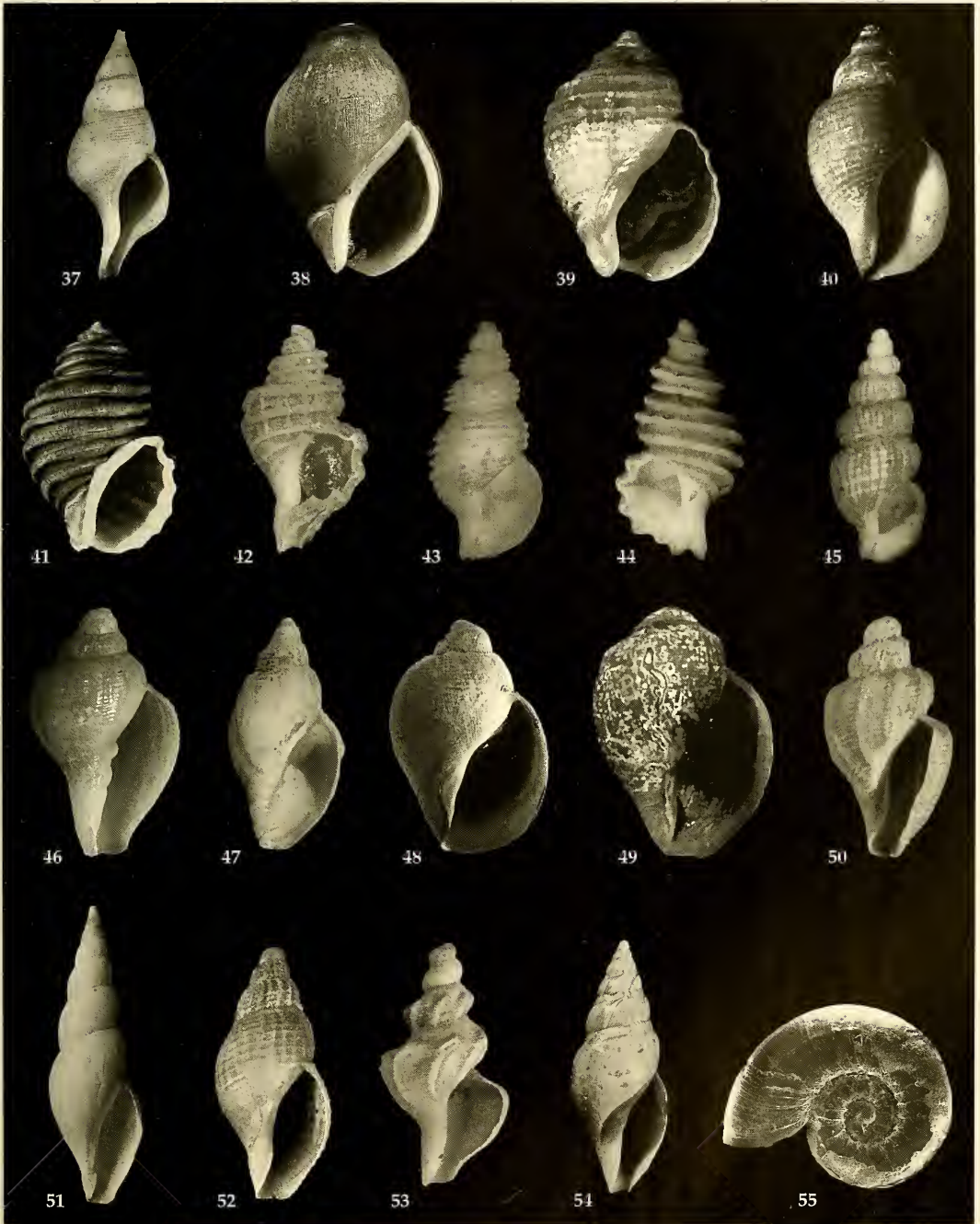
Bathymetric range: 160-236 m.

Other records: only known from South Georgia.

Remarks: Numanami (1996) reported *Probuccinum angulatum* from East Antarctica, but the radula and shell morphology he figured does not fit with that in the original description.

Probuccinum delicatulum Powell, 1951

Previous records at South Georgia: 54°02'S 36°38' W to 54°11'30"S 36°29' W (122-136 m), 53°52'30"S 36°08' W (160 m), 53°43'40"S 40°57' W (177 m) (Powell 1951).



Figs 37-55. Habitus. 37. *Cavineptunea monstrosa* (52.5 mm). 38. *Chlanidota* (*Chlanidota*) *densesculpta* (29.3 mm). 39. *Chlanidota* (*Chlanidota*) *paucispiralis* (30 mm). 40. *Chlanidota* (*Chlanidotella*) *modesta* (13 mm). 41. *Chlanidota* (*Pfefferia*) *chordata* (33.3 mm). 42. *Proneptunea fenestrata* (4.5 mm). 43. *Prosipho chordatus* (7 mm). 44. *Prosipho contrarius* (4 mm). 45. *Prosipho pellitus* (6.5 mm). 46. *Volutomitra* (*Paradmete*) *curta* (9.3 mm). 47. *Volutomitra* (*Paradmete*) *typica* (8.7 mm). 48. *Nothoadmete antarctica* (3.1 mm). 49. *Nothoadmete consobrina* (12 mm). 50. *Bela fulvicans* (2.5 mm). 51. *Belaturricula turrata turrata* (73 mm). 52. *Lorabela pelseneeri* (3.6 mm). 53. *Pleurotomella bathybia* (4.6 mm). 54. *Typhlodaphne purissima* (28 mm). 55. *Omalogyra burdwoodiana* (1.3 mm).

Bathymetric range: 122-177 m.

Other records: only known from South Georgia.

Proneptunea fenestrata (Powell, 1951)

Fig. 42

Examined material: 4 spm., Grytviken (MACN 21660); 4 spm. and 1 sh., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7291; MACN 36316).

Previous records at South Georgia: East Cumberland Bay (17-27 m), Stromness Harbour (26-35 and 122-136 m), Undine Harbour (18-27 m), East Cumberland Bay (26-18 m) (Powell 1951); Grytviken, Cumberland Bay (Carcelles 1953).

Bathymetric range: 17-136 m.

Other records: only known from South Georgia.

Remarks: Castellanos (1983) and Castellanos et al. (1987) referred specimens from 48°21' S 62°27' W and 46°15' S 60°9' W to *Proneptunea* aff. *fenestrata*. However, their figure does not fit the original description of the species regarding general shell shape or ornamentation. As these specimens were not found in the collections at MACN, MLP or INIDEP, the occurrence of *Proneptunea fenestrata* from Patagonia is considered doubtful.

Prosipho astrolabiensis (Strebel, 1908)

Previous records at South Georgia: Jason Leith (238-270 m), Stromness Harbour (122-136 and 155-178 m), 53°55' S 38°01' W (107 m) (Powell 1951).

Bathymetric range: 107-270 m.

Other records: WS.

Remarks: Castellanos et al. (1987) reported *Prosipho* aff. *astrolabiensis* from 46°15' S 60°9' W, but the figure given does not fit with that in the original description regarding general shell shape or ornamentation. As these specimens were not found in the collections at MACN, MLP or INIDEP, the record from Patagonia is considered doubtful.

Prosipho chordatus (Strebel, 1908)

Fig. 43

Examined material: 9 spm. and 2 sh., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7309; MACN 36317); 1 spm., 54°27' S 35°41' W, 256 m, 4/12/2002 (MLP 7264).

Previous records at South Georgia: Cumberland Bay (252-310 m), 54°24' S 36°22' W (195 m) (Strebel 1908); Stromness Harbour to Larsen Point (122-136 m), 53°51' 30" S 36°18'30" W (245 m), Cumberland Bay (230-250 m), 53°51' S 36°21'30" W (200-236 m) (Powell 1951).

Bathymetric range: 94-310 m.

Other records: only known from South Georgia.

Remarks: Castellanos (1982), Castellanos & Landoni (1984) and Castellanos et al. (1987) reported *Prosipho chordatus* from Patagonia, but the shell figured appears as to be more flat, with a major number of spiral cords at the base and a more elongated siphonal aperture than that in the original description. As these specimens were not found in the collections at MACN, MLP or INIDEP, the record from Patagonia is considered doubtful.

Prosipho contrarius Thiele, 1912

Fig. 44

Examined material: 3 spm. and 1 sh., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7310; MACN 36318); 1 spm., 53°58' S 37°09' W, 138 m, 4/10/1996 (MACN 36319).

Previous records at South Georgia: off mouth Stromness Harbour (155-178 m) (Powell 1951); 53°51' S 37° 38' W (97-101 m) (Dell 1990).

Bathymetric range: 94-178 m.

Other records: WS, RS, SH, EA.

Remarks: *Prosipho perversus* Powell, 1951 described from South Georgia seems to be a synonym of *Prosipho contrarius*.

Prosipho hunteri Hedley, 1916

Previous records at South Georgia: Stromness Harbour to Larsen Point (122-136 m), 53°51'30" S 36°18'30" W (245 m) (Powell 1951).

Bathymetric range: 122-245 m.

Other records: WS, RS, SH, SA, EA.

Prosipho pellitus Thiele, 1912

Fig. 45

Examined material: 5 spm., 54°30' S 35°50' W, 94 m, 4/8/1996 (MLP 7311; MACN 36320).

Previous records at South Georgia: 53°51' S 37°38' W (97-101 m) (Dell 1990).

Bathymetric range: 94-101 m.

Other records: KI.

Prosipho (?) *georgianus*
(Pfeffer in Martens & Pfeffer, 1886)

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: only known from South Georgia.

Remarks: The species was originally described as *Cerithium georgianum*, tentatively located into *Cerithiopsiella* (sic) by Thiele (1912) and reported as *Cerithiopsiella georgiana* by Powell (1951) and Carcelles (1953). The shell morphology, namely the fusiform shell shape, the high spire with rounded whorls and deep sutures, the short and wide siphonal canal, and the shell surface sculptured with strong spiral cords, suggest a better placement for the species into *Prosipho*.

Studying specimens from Patagonia (up to 42° S) Castellanos (1983) believed to recognize *Cerithium georgianum* Pfeffer, and reported it as *Mathilda*. Later, these specimens were shown to belong to a true, unknown *Mathilda* species, which was described as *M. argentina* Castellanos, 1990.

Oliver & Picken (1984) described *Prosipho turrita* including in the synonymy of the species *Cerithium georgianum* Melville & Standen, 1907 (non Pfeffer) from South Orkney.

Family Volutomitridae

Volutomitra (Paradmete) curta (Strebel, 1908)

Fig. 46

Examined material: 1 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36321).

Previous records at South Georgia: 54°22'S 36°27'W (95 m), 54°17'S 36°28'W (75 m) (Strebel 1908); 54°22'S 36°27'W (95 m) (Powell 1951); 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 75-101 m.

Other records: WS, RS, SR, EA.

Remarks: Cernohorsky (1970) considered *Paradmete longicauda* Strebel, 1908 to be a synonym of *Volutomitra curta*.

Volutomitra (Paradmete) typica Strebel, 1908

Fig. 47

Examined material: 3 spm., Antarctic Bay, 37 m (MACN 18985); 2 sh., 53°58'S 37°09'W, 138 m, 4/10/1996 (MLP 7312; MACN 36322); 4 spm. and 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7292; MACN 36323).

Previous records at South Georgia: 54°17'S 36°28'W (75 m), 54°22'S 36°27'W (24-52 m), 54°22'S 36°27'W (30 m), 54°11'S 36°18'W (252-310 m) (Strebel 1908); West Cumberland Bay (110 m), 54°02'S 36°38'W a 54°11'30"S 36°29'W (122-136 m), 53°51'S 36°21'30"W (200-236 m), 53°52'30"S 36°08'W (160 m) (Powell 1951); 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 24-310 m.

Other records: WS, RS, SH, BB.

Remarks: Smith (1915) regarded *Volutomitra (Paradmete) typica* as a synonym of *Volutomitra fragillima* Watson, 1883; this was accepted by Cernohorsky (1970) and Numanami (1996). However, *V. typica* is more fusiform and has a higher spire than *V. fragillima*; these characters suggest Strebel's species to be different.

Family Cancellariidae

Nothoadmete antarctica (Strebel, 1908)

Fig. 48

Examined material: 7 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7293; MACN 36324).

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908); 54°29'S 39°22'W (659-686 m) (Dell 1990).

Bathymetric range: 94-686 m.

Other records: WS, RS, SH, SO.

Remarks: Castellanos et al. (1987) reported *Admete* aff. *antarctica* from 46°15'S 60°9'W (Patagonia). The identity of these specimens could not be confirmed since they were not found in the collections at MACN, MLP or INIDEP; the record from Patagonia is considered doubtful.

Nothoadmete consobrina (Powell, 1951)

Fig. 49

Examined material: 1 spm., 53°53'S 38°19'W, 118 m, 3/24/1996 (MACN 36325).

Previous records at South Georgia: 53°52'30"S 36°08'W (160 m) (Powell 1951).

Bathymetric range: 118-160 m.

Other records: RS, SO.

Family Turridae

Bela anderssoni Strebel, 1908

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908).

Bathymetric range: 252-310 m.

Other records: WS, BB.

Bela fulvicans Strebel, 1908

Fig. 50

Examined material: 7 spm. and 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7294; MACN 36326).

Previous records at South Georgia: 54°22'S 36°27'W (24-52 m), 54°11'S 36°18'W (252-310 m) (Strebel 1908).

Bathymetric range: 24-310 m.

Other records: WS, BB.

Belaturricula turrita turrita (Strebel, 1908)

Fig. 51

Examined material: 1 sh., 54°51'S 35°49'W, 72 m, 4/2/1996 (MACN 36327); 1 sp., 54°27'S 35°41'W, 256 m, 4/11/2002 (MLP 7266).

Previous records at South Georgia: 53°52'30"S 36°08'W (160 m) (Powell 1951); Stromness Harbour (44 m) (Carcelles 1953); 53°51'S 37°38'W (97-101 m) (Dell 1990).

Bathymetric range: 44-256 m.

Other records: SR.

Remarks: *Belaturricula turrita multispinata* Dell, 1990 from South Shetland, differs from *B. t. turrita* in having a greater number of spiral cords. Kantor & Harasewych (1999) recognized both allopatric subspecies as being valid.

Lorabela notophila (Strebel, 1908)

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908); off mouth of Cumberland Bay (230-250 m), East Cumberland Bay (200-234 m), 53°55'S 38°01'W (Powell 1951).

Bathymetric range: 200-310 m.

Other records: only known from South Georgia.

Lorabela pelseneeri (Strebel, 1908)

Fig. 52

Examined material: 3 spm. and 2 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7313; MACN 36328); 1 spm., 54°27'S 35°41'W, 256 m, 4/12/2002 (MLP 7267).

Previous records at South Georgia: Cumberland Bay (252-310 m), 54°11'S 36°18'W (252-310 m) (Strebel 1908); Jason Leith (238-270 m), Stromness Harbour (from 54°04'S 36°27'W to 53°58'S 36°26'W, 155-178 m) (Powell 1951).

Bathymetric range: 94-310 m.

Other records: WS.

Pleurotomella bathybia Strebel, 1908

Fig. 53

Examined material: 2 spm. and 1 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7295; MACN 36329); 1 spm., 54°27'S 35°40'W, 236-239 m, 4/11/2002 (MLP 7268).

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908).

Bathymetric range: 94-310 m.

Other records: only known from South Georgia.

Typhlodaphne purissima (Strebel, 1908)

Fig. 54

Examined material: 1 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36330); 1 sh., 53°59'S 37°38'W, 82-85 m, 4/1/1997 (MLP 7249).

Previous records at South Georgia: 53°52'30"S 36°08'W (160 m) (Powell 1951).

Bathymetric range: 94-160 m.

Other records: SR.

Remarks: Specimens from 37°35'3"S 54°55'3"W, 54°26'S 65°53'W, 54°41'S 64°01'W, 54°50'S 64°01'W, 55°41'S 66°34'W and San Juan Bay (Isla de los Estados) identified by Carcelles (1944) as *Typhlodaphne purissima* actually correspond to *T. strebeli* Powell, 1951. Carcelles & Williamson (1951), Carcelles (1953), Castellanos (1970 and 1977) and Castellanos & Landoni (1993) repeated this erroneous report.

Family Omalogyridae

Omalogyra burdwoodiana Strebel, 1908

Fig. 55

Examined material: 7 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7296; MACN 36331); 3 spm., 53°58'S 37°09'W, 138 m, 4/10/1996 (MACN 36332).

Previous records at South Georgia: The present is the first record from South Georgia.

Bathymetric range: 94-138 m.

Other records: PT, BB.

Family Pyramidellidae

Liostomia georgiana Pfeffer
in Martens & Pfeffer, 1886

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: only known from South Georgia.

Volutaxiella (?) translucens Strebel, 1908

Fig. 56

Examined material: 1 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36333).

Previous records at South Georgia: 54°22'S 36°28'W (22 m) (Strebel 1908).

Bathymetric range: 22-94 m.

Other records: only known from South Georgia.

Remarks: Castellanos & Landoni (1984) and Castellanos (1989) reported *Volutaxiella translucens* (under *Odotomia*) from 54°20'S 65°28'W (by mistake 64°28'W in Castellanos 1989), but the figure they gave does not fit with that in the original description. As these specimens were not found in the collections at MACN, MLP or INIDEP, the record from Patagonia is considered doubtful.

Streptocionella singularis Pfeffer
in Martens & Pfeffer, 1886

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: only known from South Georgia.

Family Orbitestellidae

Microdiscula subcanaliculata (Smith, 1875)

Previous records at South Georgia: 54°22'S 36°28'W (22 m) (Ponder 1990).

Bathymetric range: 22 m.

Other records: SO, KI, MA.

Family Acteonidae

Neactaeonina cingulata (Strebel, 1908)

Fig. 57

Examined material: 1 spm., 54°27'S 35°40'W, 236-239 m, 4/11/2002 (MLP 7314).

Previous records at South Georgia: 54°22'S 36°27'W (24-52 m) (Strebel 1908); 53°52'30"S 36°08'W (160 m), Stromness Harbour (155-178 m) (Powell 1951).

Bathymetric range: 24-239 m.

Other records: WS, RS, SH.

Remarks: Powell (1951) reported both *Neactaeonina cingulata* and *Neactaeonina edentula* (Watson) from South Georgia. However, Powell (1960) emended his previous report of *N. edentula* from South Georgia, suggesting it could correspond "to *N. cingulata*

or a new species". Carcelles (1953) and Dell (1990) included *Neactaeonina edentula* (type locality: Keguelen Islands) in the list of molluscs from South Georgia, probably repeating the record reported by Powell (1951).

Family Cylichnidae

Cylichna cumberlandiana (Strebel, 1908)

Fig. 58

Examined material: 8 spm. and 2 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7297; MACN 36334).

Previous records at South Georgia: 54°15'S 36°25'W (250 m) (Strebel 1908).

Bathymetric range: 94-250 m.

Other records: only known from South Georgia.

Remarks: Odhner (1926) suggested that *Cylichna cumberlandiana* could be synonym of *C. georgiana* (Strebel 1908). Castellanos (1983) reported specimens from 52°29'S 64°35'W (183 m) as *C. cumberlandiana* but later, Castellanos et al. (1987) followed Odhner arguing in favor of the synonymy of *C. cumberlandiana* and *C. georgiana*. Changing their previous opinion, Castellanos et al. (1993) reported specimens from 46°S 60°W (Patagonia) as *Cylichna cumberlandiana*. Within the material from South Georgia studied herein, both species are well recognizable. The specimens from Patagonia reported by Castellanos et al. (1987) were not found in the collections at MACN, MLP or INIDEP, but from the figure given by Castellanos et al. (1987 and 1993) it seems they belong to *Cylichna georgiana*.

Cylichna georgiana (Strebel, 1908)

Fig. 59

Examined material: 40 spm. and 11 sh., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7298; MACN 36335); 1 sh., 54°27'S 35°40'W, 236-239 m, 4/11/2002 (MLP 7269); 1 sh., 54°27'S 35°41'W, 256 m, 4/12/2002 (MLP 7270).

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908); Stromness Harbour (between 54°04'S 36°27'W and 53°58'S 36°26'W, 155-178 m) (Powell 1951).

Bathymetric range: 94-310 m.

Other records: PT.

Remarks: *Cylichna georgiana* was described under the genus *Cylichnina* Monterosato, 1884. Dell (1990) placed the species under *Cylichna*, without giving the reasons for the generic change. The presence of a well-developed radula in the specimens studied here (lacking in *Cylichnina* according to Thiele, 1931) confirms the placement into *Cylichna*.

Family Scaphandridae

Kaitoa scaphandroides Powell, 1951

Fig. 60

Examined material: 1 spm., Larsen Harbour (MACN 18977).

Previous records at South Georgia: West Cumberland Bay (251 m), Wilson Harbour (26-83 m) (Powell 1951); Larsen Harbour (27 m) (Carcelles 1953).

Bathymetric range: 26-251 m.

Other records: only known from South Georgia.

Family Philinidae

Philine gibba Strebel, 1908

Fig. 61

Examined material: 7 spm., Cumberland Bay, 22 m (MACN 13529).

Previous records at South Georgia: 54°22'S 36°28'W (20 m) (Strebel 1908); mouth of Drygalski Fjord (329-278 m) (Powell 1951); Cumberland Bay (37 m), Nueva Fortuna Cove (12 m), Antarctic Bay (37 m) (Carcelles 1953).

Bathymetric range: 12-329 m.

Other records: only known from South Georgia.

Family Diaphanidae

Diaphana anderssoni (Strebel, 1908)

Previous records at South Georgia: 54°22'S 36°28'W (22 m) (Strebel 1908).

Bathymetric range: 22 m.

Other records: only known from South Georgia.

Diaphana inflata (Strebel, 1908)

Previous records at South Georgia: 54°11'S 36°18'W (252-310 m) (Strebel 1908); Grytviken (Schjøtte 1998).

Bathymetric range: 252-310 m.

Other records: WS.

Diaphana paessleri (Strebel, 1908)

Fig. 62

Examined material: 25 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MLP 7315; MACN 36336).

Previous records at South Georgia: 54°22'S 36°28'W (12-15 m) (Strebel 1908); 54°22'S 36°28'W (Schjøtte 1998).

Bathymetric range: 12-94 m.

Other records: WS, RS, SO, PT, MI.

Remarks: Schjøtte (1998) considered *Diaphana paessleri* var. A (Strebel 1908), *Retusa antarctica* Melville & Standen, 1912 (= *Diaphana antarctica*) and *Retusa frigida* Hedley, 1916 as synonyms of *Diaphana paessleri*.

Diaphana pfefferi (Strebel, 1908)

Fig. 63

Examined material: 1 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36337).

Previous records at South Georgia: 54°22'S 36°28'W (12-15 m) (Strebel 1908).

Bathymetric range: 12-94 m.

Other records: only known from South Georgia.

Newnesia antarctica Smith, 1902

Fig. 64

Examined material: 1 spm., 54°59'S 35°06'W, 107 m, 2/17/1995 (MLP 7250); 1 spm., 53°57'S 37°06'W, 109 m, 23/2/1995 (MACN 36338); 1 spm., 54°58'S 36°49'W, 210 m, 4/5/1996 (MACN 36339); 1 spm., 54°30'S 35°50'W, 94 m, 4/8/1996 (MACN 36349).

Previous records at South Georgia: The present is the first record from South Georgia.

Bathymetric range: 107-210 m.

Other records: WS, RS, SH.

Remarks: *Anderssonia sphinx* Strebel, 1908 is here considered a synonym of *Newnesia antarctica*.

Toledonia punctata Thiele, 1912

Previous records at South Georgia: Stromness Harbour (between 54°04'S 36°27'W and 53°58'S 36°26'W, 155-178 m) (Powell 1951).

Bathymetric range: 94-178 m.

Other records: RS, PT, KI.

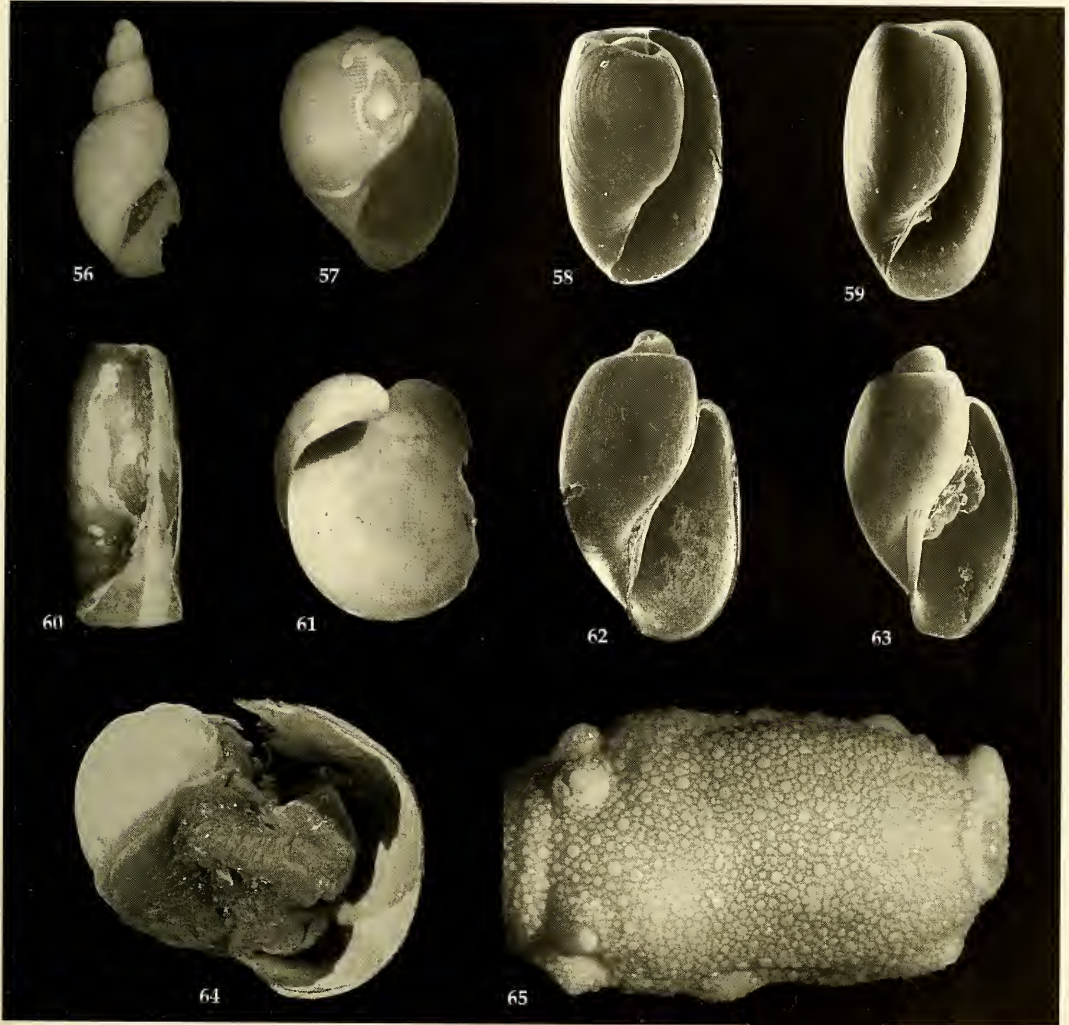
Family Pleurobranchidae

Bathyberthella antarctica Willan & Bertsch, 1987

Previous records at South Georgia: 53°36.6'S 37°7.1'W (262 m), 53°38.6'S 37°04.4'W (160 m), 53°45.3'S 36°30.1'W (262 m) (Wägele & Willan 1994); 54°40'S 37°55'W (145 m) (Troncoso et al. 1997).

Bathymetric range: 145-262 m.

Other records: RS, SO, SH, SR; also present in New Zealand.



Figs 56-65. Habitus. 56. *Volutaxiella translucens* (2.6 mm). 57. *Neactaeonina cingulata* (5.1 mm). 58. *Cylichna cumberlandiana* (1.2 mm). 59. *Cylichna georgiana* (2 mm). 60. *Kaitoa scaphandroides* (21.7 mm). 61. *Philine gibba* (5.5 mm). 62. *Diaphana paessleri* (2.4 mm). 63. *Diaphana pfefferi* (2.2 mm). 64. *Newnesia antarctica* (30 mm). 65. *Austroductoris kerguelenensis* (98 mm).

Family Bathydorididae

Bathydoris clavigera Thiele, 1912

Previous records at South Georgia: 54°11.1' S 38° 32.9' W (256 m), 53°36.1' S 37°23.4' W (270 m), 53°36.6' S 37° 7.1' W (252 m), 53°38.6' S 37° 4.4' W (160 m), 53°40.3' S 37° 27.3' W (200 m), 53°57' S 35° 41.4' W (319 m) (Wägele 1987); 53°58' S 39°06' W (244 m), 53°57' S 35°41' W (342 m) (Troncoso et al. 1997).

Bathymetric range: 160-342 m.
Other records: WS, SO, MI, EA.

Family Dorididae

Austroductoris kerguelenensis (Bergh, 1884)

Fig. 65

Examined material: 7 spm., 54° 29' S 35°41' W, 227 m, 3/26/1995 (MLP 7271); 1 spm., 53°48' S 37°44' W, 117 m, 3/24/1996 (MLP 7253); 4 spm., 53°48' S 37°49' W, 140 m, 3/24/1996 (MACN 36340); 1 spm., 53°56' S 37°06' W, 108 m, 3/25/1996 (MACN 36341); 1 spm., 54°57' S 35° 21' W, 124 m, 3/29/1996 (MACN 36342); 2 spm., 54°59' S 35°05' W, 108 m, 3/29/1996 (MACN 36343); 1 spm., 54°37' S 35°37' W, 246 m, 3/26/1996 (MACN 36344);

1 spm., 55°08'S 35°25'W, 115 m, 4/1/1996 (MACN 36345); 1 spm., 55°07'S 35°39'W, 118 m, 3/25/1997 (MACN 36346); 6 spm., 54°55'S 35°57'W, 129 m, 3/26/1997 (MLP 7272); 1 spm., 54°59'S 35°02'W, 112 m, 3/26/1997 (MACN 36347).

Previous records at South Georgia: 54°24'S 36°22'W, 54°24'S 36°26'W (125 m) (Odhner 1926); 54°33.3'S 37°3.9'W (123 m), 54°14.5'S 37°45.4'W (133 m), 54°11.1'S 38°32.9'W (256 m), 53°38.6'S 37°4.4'W (160 m), 53°52'S 37°1.4'W (148 m), 53°40.3'S 36°27.3'W (200 m), 54°15.1'S 36°36.3'W (209 m), 54°13.4'S 36°16'W (138 m), 54°19.8'S 35°54.1'W (221 m), 55°5.1'S 35°56.4'W (148 m) (Wägele 1987); 54°43'S 38°13.30'W (184-215 m), 53°40'S 37°19.70'W (163-180 m), 53°47.10'S 36°35.50'W (257-258 m), 54°41.20'S 35°38.20'W (93-104 m), 54°56.60'S 35°16.90'W (108-115 m), 55°08.40'S 36°01.10'W (164-178 m), 55°00'S 34°31.20'W (91-105 m), 55°04.10'S 34°41.50'W (100-102 m), 55°10.20'S 34°58.30'W (279-330 m) (García et al. 1993).

Bathymetric range: 91-330 m.

Other records: WS, RS, SH, SO, SR, PT, MI, KI.

Remarks: Wägele (1987, 1990) considered *Austrodoris rubescens* Odhner as a synonym of *A. kerguelensis*; the same is valid for *A. georgiensis* García, Troncoso, García Gomez & Cervera, 1993 (Schrödl 1999).

Family Chromodorididae

Cadlina georgiensis Schrödl, 2000

Previous records at South Georgia: 54°23'S 36°25'W (16 m) (Schrödl 2000).

Bathymetric range: 16 m.

Other records: only known from South Georgia.

Family Tritoniidae

Tritonia challengeriana Berg, 1884

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886); 53°55'S 37°34'W (100 m) (Troncoso et al. 1997).

Bathymetric range: 100 m.

Other records: RS, SH, SO, SR, PT, MI, EA, KI.

Remarks: Schrödl (1999) considered *Tritonia antarctica* Pfeffer in Martens & Pfeffer, 1886 as a synonym of *T. challengeriana*.

Tritoniella belli Eliot, 1907

Previous records at South Georgia: 53°36.8'S 38°8.2'W (366 m), 53°38.6'S 37°4.4'W (160 m), 55°1.7'S 35°36.9'W (225 m) (Wägele 1989).

Bathymetric range: 160-366 m.

Other records: WS, RS, SR, EA, KI.

Remarks: according to Schrödl (2003), the records of *T. belli* from Patagonian coasts are erroneous.

Tritonia vorax (Odhner, 1926)

Previous records at South Georgia: 54°13.4'S 36°16'W (138 m), 54°S 37°W, 53°22.6'S 42°43.6'W (342 m), 53°51.8'S 35°58'W (130 m) (Wägele 1995).

Bathymetric range: 130-342 m.

Other records: PT, BB.

Family Flabellinidae

Flabellina falklandica (Eliot, 1907)

Previous records at South Georgia: 54°22'S 36°27'W, Cumberland Bay (Odhner 1926).

Bathymetric range: ?

Other records: SR, MI, PT, CI.

Family Tergipedidae

Cuthona antarctica (Pfeffer in Martens & Pfeffer, 1886)

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: only known from South Georgia.

Remarks: all Antarctic and sub-Antarctic Tergipedidae need to be revised (Schrödl com. pers.).

Cuthona georgiana (Pfeffer in Martens & Pfeffer, 1886)

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: RS, PT, KI.

Cuthona schraderi (Pfeffer in Martens & Pfeffer, 1886)

Previous records at South Georgia: South Georgia (Martens & Pfeffer 1886).

Bathymetric range: ?

Other records: only known from South Georgia.

Family Siphonariidae

Siphonaria (Pugillaria) lateralis Gould, 1846

Previous records at South Georgia: Cumberland Bay, Fjords (5 m) (Strebel 1908); Cumberland Bay (Lamy 1911); Maiviken (shore) (Powell 1951).

Bathymetric range: 0-5 m.

Other records: PT, MI.

2. Species doubtfully present in the area

12 species, listed below, have been previously reported as occurring in South Georgia. They were, however, not included in the present contribution because the records are not well documented by references to literature or to samples in collections.

Nacella deaurata (Gmelin, 1791) reported by Lamy (1911).

Patinigera fuegiensis Reeve, 1855 listed by Carcelles (1953).

Nacella kerguelensis (Smith, 1877) listed by Canteras & Arnaud (1985).

Nacella mytilina (Helbling, 1779) listed by Carcelles & Williamson (1951) and Carcelles (1953).

Lacunella reflexa Dall, 1884, described from Alaska, was listed by Carcelles (1953) under the genus *Haloconcha*.

Natica nigromaculata Lamy, 1906 listed by Carcelles (1953).

Natica joubini Lamy, 1906 listed by Carcelles (1953). *Amauropsis xantha* (Watson, 1881) reported by Lamy (1911); Dell (1990) considered this record as unconfirmed.

Polinices patagonicus (Philippi, 1845) described from Magellan Strait (Patagonia), was reported from South Georgia (53°48'30"S 35°47'W, 401-411 m) on the basis of two eroded shells (Powell 1951), and listed by Carcelles (1953).

Melanella antarctica (Strebel, 1908) listed by Carcelles (1953).

Trochon poirieria Powell, 1951 listed by Carcelles (1953).

Argobuccinum (Fusitriton) magellanicum (Chemnitz, 1788) reported by Carcelles (1954).

3. Composition, bathymetric distribution and biogeographic relationships of the gastropod fauna of South Georgia

Most of the gastropod families present in South Georgia are represented by only one or two species (57 % and 16.7 %, respectively), and only a few

families (7.1 %) show a higher diversity with more than 8 species each. The families Buccinulidae and Trochidae are the most diverse ones in number of species (18 and 12 respectively); Muricidae, Littorinidae, Turridae, Rissoiidae, Naticidae, Eatoniellidae and Diaphanidae are represented by 6 to 8 species each.

The analysis of the bathymetric ranges reveals that 55 species live between 0 and 50 m depth, 71 species between 50 and 100 m depth, 66 between 100-150 m depth and 60 between 150-200 m depth; species diversity decreases rapidly below 200 m, where only 48 species appear (Fig. 66). Fig. 67 shows the bar chart of the distribution of number of sampling events that included gastropod records (from new data provided herein and literature) according to depth; the decrease in number of species below 200 m is coincident with the decrease in sampling effort below this depth.

Among the 53 species only known from South Georgia, the bathymetric range is known for 45 species: 20 occur in shallow waters (to 200 m depth), 19 from shallow water to 400 m depth, 2 species were only found between 200 and 400 m depth, and 3 were widely distributed from shallow waters to more than 400 m depth. The remaining species, *Chlanidota invenusta*, is known from deep waters, between 448 and 1599 m.

Tab. 2 shows the number of gastropod species from South Georgia (SG) shared with the remaining areas considered in this study. The highest faunistic similarities were those with the Antarctic Weddell Sector (29 % of the 121 species of gastropods present in South Georgia). The faunistic similarities with South Sandwich Islands were remarkably lower, with only 6 species (5 %) in common (Table 2). Analyzing faunistic similarities with the Simpson similarity coefficient (which moderates the weight of differential sampling efforts), the highest values of similarity are those with South Orkney Islands (35 %), the Antarctic Weddell Sector (35 %) and South Shetland Islands (32 %); lower values are obtained comparing South Georgia fauna with Patagonia (17 %), Malvinas Islands (20 %) and eastern Sub-Antarctic Islands (17 %) (Tab. 2). However, it should be noted that similarity indexes are non-sensitive for endemic species; the character of uniqueness given by the 53 gastropod species (of a total number of 121) only present in South Georgia (Tab. 3), is not evidenced by this type of analysis.

Two different patterns of geographic distribution could be recognized among the gastropods of the South Georgia: a group of species that show a short range of distribution, restricted to the Magellan Region, Antarctic Weddell Sector and Scotia Arc Islands; and a second group of wider-spread species

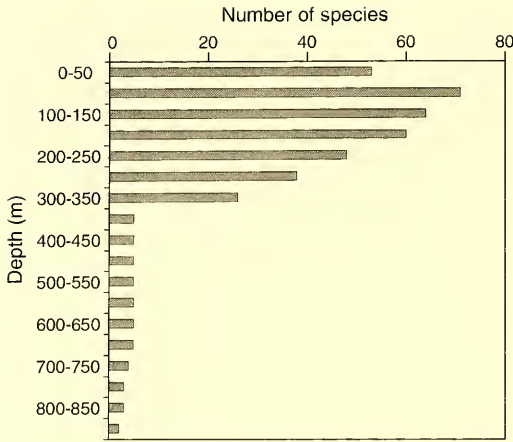


Fig. 66. Gastropod diversity at South Georgia according to depth.

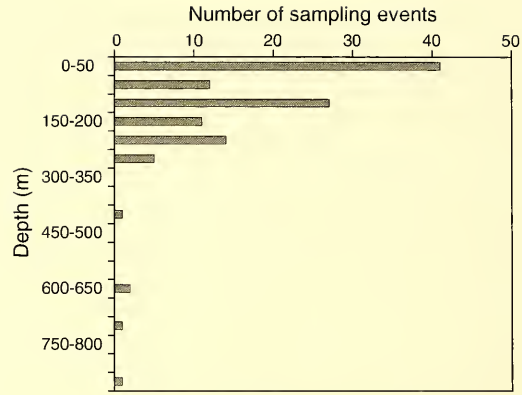


Fig. 67. Bathymetric distribution of the total sampling events in South Georgia for which gastropods were reported.

surpass the waters adjacent to South Georgia and reaching East Antarctica and the eastern Sub-Antarctic Islands (Kerguelen, Crozet and Macquarie Islands). Among the former group, 53 species are only known from South Georgia, 8 species are only shared with the Magellan Region (Patagonia or Malvinas Islands), 7 with the Antarctic Weddell Sector, 7 with Shag Rocks, South Orkney Islands, South Sandwich Islands or South Shetland Islands, 8 with the Antarctic Weddell Sector and other Scotia Arc Islands, and 3 with the Magellan Region and other Scotia Arc Islands. Within the second group, 8 species reach East Antarctica and eastern Sub-Antarctic islands, 13 species are circum-Antarctic and 15 species are present in all considered areas.

Discussion

South Georgia is characterized by a diverse marine gastropod fauna. The present study shows that 36 of 152 nominal species previously reported for the area correspond to species with dubious records. In addition, 5 species (*Iothia coppingeri*, *Submargarita unifilosa*, *Eumetula dilecta*, *Omalogyra burdwoodiana* and *Newnesia antarctica*) are here reported for the first time. Therefore, 121 gastropod species representing 42 families are now recognized as present in South Georgia. The number of gastropod species in South Georgia is similar to those reported from the Antarctic Weddell (93 species: Hain 1990; 107 species: pers. compilation) and Ross Sectors (144 species: Dell 1990), higher than numbers from other Scotia Arc Islands (South Shetland: 85 species; South Orkney: 69 species; South Sandwich: 30 species, pers. compilation), but represents only half the number of gastropod species reported from the Magellan Region (250 species: Linse 1999).

Tab. 2. Zoogeographic affinities of South Georgia gastropods: total number of species present in the considered areas; number of species shared with South Georgia; ratio of similarity and Simpson similarity coefficient. ¹ from personal compilation; ² after Dell (1990); ³ after Canteras & Arnaud (1985).

| | Total number of species | Species shared with South Georgia Is. | Ratio of similarity | Simpson similarity coefficient |
|----------------------------|-------------------------|---------------------------------------|---------------------|--------------------------------|
| Antarctic Weddell Sector | 107 ¹ | 38 | 0.29 | 0.35 |
| Antarctic Ross Sector | 144 ² | 26 | 0.21 | 0.21 |
| South Shetland Islands | 85 ¹ | 27 | 0.22 | 0.32 |
| South Sandwich Islands | 30 ¹ | 6 | 0.05 | 0.20 |
| South Orkney Islands | 69 ¹ | 24 | 0.20 | 0.35 |
| Patagonia | 229 ¹ | 21 | 0.17 | 0.17 |
| Malvinas Islands | 177 ¹ | 24 | 0.20 | 0.20 |
| East Sub-Antarctic Islands | 130 ³ | 21 | 0.17 | 0.17 |

The pattern of bathymetric distribution reported herein for the South Georgia gastropods is compared with that known from Antarctica: in both areas there is a relatively low number of species living in intertidal waters. This phenomenon was correlated with the instability of this environment by Davenport & MacAlister (1996). The bathymetric range with highest number of species found in South Georgia is between 50 and 100 m depth. In contrast, Arnaud and Hain (1992) reported the highest diversity values in the Weddell Sea as occurring between 400-800 m depth, and Dell (1990) mentioned 350-400 m depth for the Ross Sea.

South Georgia shows representative species from both the Magellan and Antarctic regions, being the northern limit for 33 Antarctic species and the southern limit for 11 Magellan species. A similar pattern was reported for several invertebrate groups (Mühlenhardt-Siegel 1999, Saiz-Salinas & Pagola-Carte 1999, Schrödl 1999, 2003). From a faunistic point of view, the archipelago thus was usually considered a transitional area. This could be explained by two water masses that converge at the archipelago, one coming from the Magellan Region and the other one from Antarctica (Whitehouse et al. 1993). The dispersive effect of the Circumantarctic Current (= West Wind Drift) has been widely accepted as an explanation for the presence of Magellanic species in South Georgia. On the other hand, Ichii & Naganobu (1996) and Hoffmann et al. (1998) also reported the effect of water currents from Antarctic Peninsula and South Shetland to South Georgia as being responsible for dispersal of krill larvae. However, dispersal of planktonic gastropod larvae or even of adults (by rafting or buoyancy) from Antarctica still has to be proved. The present analysis of the gastropod faunal similarities (particularly when evaluated through the Simpson similarity coefficient) resulted that affinities with the Magellan Region are lower than previously proposed. Brandt et al. (1999) reported a value of similarity of 30.7 % between "Magellanic Gastropoda and the fauna of South Georgia"; this value is considerably higher than the one found in the present study (16 %). This discrepancy appears to be due to the different number of species from the Magellan Region included in these analyses (52 vs. 122 species, respectively) rather than to the number of shared species computed (16 vs. 19). The study of Brandt et al. (1999) seems to be limited to faunal comparisons between the Beagle Channel and South Georgia only, while the present study considers the entire Argentinian Patagonian coast.

The results of the present study clearly show that the gastropod fauna of South Georgia is more similar to that of the Antarctic Weddell Sector and other Scotia Arc islands than to that of the Magellan

Region. This fact pleads for the allocation of this archipelago to the Antarctic faunal Region. Additional evidences supporting the placement of the South Georgia into the Antarctic Region come from the analysis of the genera composition of the molluscan assemblages: the genera *Fissurella* (Fissurellidae), *Calliostoma*, *Photinula* and *Photinastoma* (Trochidae), *Crepidula* (Calyptraeidae), *Fusitriton* (Cymatiidae), *Xymenopsis*, *Fuegotrophon*, *Stramoniotrophon* and *Achantina* (Muricidae) (Powell, 1951), *Pupatonina* (Eatonellidae) and *Pusillina* (Rissoidae) (Ponder & Worsfold 1994) and *Savatieria* and *Pareuthria* (Buccinulidae) (pers. obs.), all them common in the Magellan Region were not found in South Georgia or Antarctica. On the other hand, the genera *Venustatrochus* (Trochidae) and *Belaturricula* (Turridae) that are present in South Georgia and Antarctica (Dell 1990), were not recorded from the Magellan Region. Other available data from invertebrate faunas also support the placement of South Georgia within the Antarctic Region (e.g. Hastings 1943, Arnaud 1964, Hedgpeth 1969, De Broyer & Jazdewski 1993). Temperature differences due to the Antarctic Convergence and deep water gaps between South Georgia and the Patagonian shelf could be responsible for differences found with respect to the Magellan fauna.

The relatively low similarity between the gastropod fauna of South Georgia and South Sandwich could reflect differences in the origin and age of these islands and with regard to the oceanic floor physiography, which affected the process of molluscan colonization. South Georgia, as well as the South Orkney and South Shetland Islands originated from the fragmentation of the Gondwana supercontinent, and they are surrounded by a continental shelf (Dalziel & Elliot 1971, Udintsev et al. 2000, Whitehouse et al. 1993). In contrast, the South Sandwich Islands form a much younger archipelago (1-10 million of years old) of volcanic origin, and lack a surrounding continental shelf (Udintsev et al. 2000). The low number of gastropod species presently known from the South Sandwich archipelago could also be a consequence of a lower sampling effort that results in the underestimation of the species richness and, consequently, in the low levels of similarity found when compared with adjacent Scotia Arc Islands.

Despite the overall similarity of the gastropod fauna of South Georgia with that of the Antarctic Weddell Sector, there is a remarkable level of local endemism: 54 species (43 % of the total) are only known from South Georgia. This fact strongly suggests that the South Georgia could be well regarded as a distinct section within the Antarctic Region. Previous information on molluscs (Powell 1951, Dell 1972, Linse 2002) as well as data coming from foraminifers (Earland 1934, Boltovskoy 1964), echino-

Tab. 3. Marine gastropod species endemic at South Georgia. (*): only known from the original description.

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- Venustatrochus georgianus* Powell, 1951
Margarella steineni (Strebel, 1905)
(*) *Margarella jasoni* Powell, 1951
(*) *Margarella subantarctica* (Strebel, 1908)
Margarella achilles (Strebel, 1908)
Margarella tropidophoroides (Strebel, 1908)
Margarella obsoleta Powell, 1951
Submargarita notalis (Strebel, 1908)
Submargarita impervia Strebel, 1908
Brookula pfefferi Powell, 1951
Eatoniella subgonostoma Strebel, 1908
Eatoniella contusa Strebel, 1908
(*) *Eatoniella* (?) *georgiana* (Pfeffer in Martens & Pfeffer, 1886)
(*) *Onoba anderssoni* (Strebel, 1908)
Onoba schraderi (Strebel, 1908)
(*) *Skenella wareni* Ponder & Worsfold, 1994
Laevilitorina granum Pfeffer in Martens & Pfeffer, 1886
Laevilitorina pygmaea Pfeffer in Martens & Pfeffer, 1886
(*) *Laevilitorina venusta* Pfeffer in Martens & Pfeffer, 1886
Perissodonta georgiana (Strebel, 1908)
Calyptraea (Trochita) georgiana Powell, 1951
Amauropsis georgiana (Strebel, 1908)
(*) *Amauropsis powelli* Dell, 1990
Cerithiopsisilla bisculpta (Strebel, 1908)
Cirsotrema fenestrata (Strebel, 1908)
Trophon brevispira Martens, 1885
Trophon cuspidarioides Powell, 1951
Trophon distantelamellatus Strebel, 1908
Trophon cribellum Strebel, 1908
Chlanidota (Chlanidota) densesculpta (Martens, 1885)
Chlanidota (Chlanidota) paucispinalis Powell, 1951
Chlanidota (Pfefferia) chordata Strebel, 1908
Chlanidota (Pfefferia) invenusta Harasewych & Kantor, 1999
Chlanidota (Pfefferia) palliata (Strebel, 1908)
Pronoptunea fenestrata (Powell, 1951)
(*) *Probuccinum delicatulum* Powell, 1951
(*) *Probuccinum angulatum* Powell, 1951
Mangelia (?) *nigropunctata* Martens, 1885
Prosipho choradatus (Strebel, 1908)
(*) *Prosipho* (?) *georgianus* (Pfeffer in Martens & Pfeffer, 1886)
Lorabela notophila (Strebel, 1908)
Pleurotomella bathybia Strebel, 1908
Odosomia translucens (Strebel, 1908)
(*) *Liostomia georgiana* (Pfeffer in Martens & Pfeffer, 1886)
(*) *Streptocionella singularis* Pfeffer in Martens & Pfeffer, 1886
Cylichna cumberlandiana (Strebel, 1908)
Kaitoa scaphandroides Powell, 1951
Philine gibba Strebel, 1908
Diaphana pfefferi (Strebel, 1908)
(*) *Diaphana anderssonii* (Strebel, 1908)
(*) *Cadlina georgiensis* Schrödl, 2000
(*) *Cuthona antarctica* (Pfeffer in Martens & Pfeffer, 1886)
(*) *Cuthona schraderi* (Pfeffer in Martens & Pfeffer, 1886)
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derms (Arnaud 1964) and crustaceans (isopods and tanaidaceans: Kussakin 1967; decapods: Gorny 1999) support this view. Other large-scale biogeographic studies (Pfeffer 1888, Ekman 1953 and Hedgpeth 1969) also plead for faunal distinctiveness of South Georgia. The recent geographic isolation and the relatively long time elapsed since their separation from Gondwana (about 50 million years ago) seem to have favored intense speciation processes. However, the possibility that the number of species exclusively known from South Georgia could be at least partially biased by a still scarce knowledge of the fauna from the adjacent Scotia Arc islands should not be dismissed. In fact, 16 of the 54 gastropod species from South Georgia, were not reported after their original description. On the other hand, new studies in the area will most likely result in the description of new species for the archipelago, as it was the case for some bivalve genera (Zelaya & Ituarte 2002, 2003). In this regard, additional surveys would essentially contribute to the assessment of the actual levels of endemism at South Georgia.

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