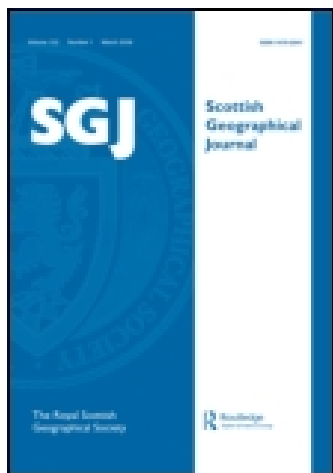


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The fauna and flora of the Antarctic

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members of the expedition are to number twenty-five, five of them constituting the scientific staff. It will steer southwards along the meridian of Kerguelen and will make observations in all branches of science—oceanography, meteorology, zoology, magnetism, pendulum observations, etc. A whole year, at least, is to be spent at a fixed station, where during the spring and summer excursions will be made along the coasts and towards the Pole. In June 1902 the expedition will start on its voyage home. The funds for the expedition have not yet been raised, but, as the original plan has been modified, one vessel only being now asked for and the time reduced to two years, it is hoped that little difficulty will be met with in obtaining the means of carrying it out.

It is much to be desired that a British expedition, thoroughly equipped for oceanographic research and for scientific investigation on land, should be sent out the same year. The importance of simultaneous magnetic observations and of meteorological records in the same years at different parts of the Antarctic is self-evident. Hitherto this country has contributed far more than any other to the exploration of the Antarctic, and it is to be hoped that it will not now leave all the work to others.

THE FAUNA AND FLORA OF THE ANTARCTIC.

By JAMES CHUMLEY, of the *Challenger* Expedition Office.

In the succeeding pages will be found lists of the Whales, Seals, and Birds recorded from the Southern seas, together with a few notes on the marine Metazoa and Protozoa, and on the land and marine vegetation.

a. CETACEA.

The species of whales known from the Southern regions are :—

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| <p><i>Balæna</i>. The species described as <i>biscayensis</i>, <i>australis</i>, <i>novæ-zealandiæ</i>, and <i>japonica</i> all belong to one and the same species, which inhabits the temperate seas of both northern and southern hemispheres.</p> <p><i>Neobalæna marginata</i>, a very rare species from Australian and New Zealand seas.</p> <p><i>Megaptera</i>. The Humpback whales have been divided into many species, but no satisfactory characters have yet been pointed out by which these can be distinguished from one another ; they have been</p> | <p>recorded from the North and South Atlantic, and North and South Pacific.</p> <p><i>Balænoptera</i>, the Rorquals recorded from the Southern Ocean are almost, if not quite, identical with those found in the British seas.</p> <p><i>Kogia breviceps</i>, various species described from distant localities in the Southern Ocean, and also off the coast of Madras, and in the North Pacific, are all referable to this species.</p> <p><i>Ziphius cavirostris</i> has been found in the seas around New Zealand and</p> |
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the Chatham Islands, Cape of Good Hope, Buenos Ayres, and also at the Shetland Islands.

Mesoplodon. The existing species of this genus are widely distributed in both the northern and southern hemispheres, but there is much dubiety regarding their distinctive characters.

Berardius arnauvi, a rare species found in the New Zealand seas.

Orca. The Grampus is met with in almost all seas from Greenland to Tasmania, but the number of species and their distinguishing characteristics are very uncertain.

Pseudorca crassidens, a rare species known hitherto from Tasmania and the coast of Denmark.

Globocephalus. Specimens of the Pilot

whale from the Australian coasts are quite indistinguishable, either by external or osteological character, from those from the North Atlantic.

Grampus richardsoni, a skull from the Cape of Good Hope described under this name differs very slightly from that of *G. griseus* of the North Atlantic and Mediterranean.

Delphinus forsteri described from the Australian seas is closely allied to, if not identical with, *D. delphis* the common dolphin of the Mediterranean and North Atlantic.

„ *peronii* from the South seas is remarkable for the absence of the dorsal fin.

The Greenland whale, *Balena mysticetus*, though eagerly sought for of late, has not been observed.

b. SEALS.

The seals known from Southern seas are :—

Ogmorhinus leptonyx (leopard seal).

„ *carcinophagus* (crab-eating or saw-toothed seal).

Leptonychotes weddelli (Weddell's seal).

Ommatophoca rossi (Ross's seal).

Macrorhinus leoninus (elephant seal); this species is supposed by some naturalists to be identical with *M. anguirostris* described from California.

Otaria jubata (sea-lion).

Eumetopias hookeri (Auckland Island hair-seal).

„ *cinereus* (grey sea-lion of New Zealand and Australia).

The other two species of this genus

belong to the northern hemisphere, viz., *E. stelleri* from the North Pacific, and *E. californianus* from California.

Arctocephalus australis (South American fur-seal).

„ *gazella* (Kerguelen fur-seal).

„ *pusillus* (fur-seal of the Cape and Crozets).

„ *forsteri* (fur-seal of New Zealand and Australia).

„ *philippii* (fur-seal of Juan Fernandez).

The only other species of this genus is *A. ursinus*, the well-known fur-seal of Alaska.

c. BIRDS.

The following birds have been recorded from Southern regions, those distinguished by an asterisk (*) having been observed in the far south near Antarctic ice :—

**Chionis alba* (kelp pigeon).

„ *minor* (sheath-bill).

| *Sterna antarctica* (tern).

* „ *hirundinacea* (black-headed tern).

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| <p><i>Sterna virgata.</i>
 „ <i>vittata.</i>
 *<i>Larus dominicanus</i> (gull of Kerguelen).
 „ <i>glaucodes.</i>
 * „ <i>scoresbyi.</i>
 *<i>Stercorarius antarcticus</i> (skua).
 „ <i>chilensis.</i>
 * „ <i>maccormicki.</i>
 <i>Diomedea exulans</i> (white albatross).
 * „ <i>fuliginosa</i> (sooty albatross).
 „ <i>melanophrys</i> (molly auk).
 *<i>Oceanites oceanicus</i> (Wilson's petrel).
 <i>Fregata melanogastra.</i>
 *<i>Majaqueus equinoctialis</i> (Cape-hen or
 black night-hawk).
 *<i>Thalassica antarctica.</i>
 * „ <i>glacialoides.</i>
 *<i>Ossifraga gigantea</i> (giant petrel).
 <i>Pelecanooides garnoti.</i>
 „ <i>urinatrix</i> (diving petrel).
 <i>Estrelata brevirostris.</i>
 „ <i>lessoni</i> (mutton-bird).
 *<i>Daption capensis</i> (Cape pigeon).</p> | <p><i>Prion banksi</i> (dove-petrel).
 * „ <i>desolatus</i> (whale-bird).
 * „ <i>turtur.</i>
 * „ <i>vittatus.</i>
 *<i>Pagodroma nivea</i> (snowy petrel).
 <i>Querquedula eatoni</i> (Kerguelen teal).
 <i>Phalacrocorax imperialis.</i>
 „ <i>verrucosus</i> (shag).
 *<i>Aptenodytes forsteri</i> (emperor penguin).
 „ <i>longirostris</i> (or <i>pennanti</i>)
 (king penguin).
 <i>Spheniscus demersus</i> (jackass penguin).
 „ <i>magellanicus.</i>
 *<i>Pygoscelis adeliae.</i>
 * „ <i>teniata</i> (Johnny penguin).
 *<i>Eudyptes antarctica</i> (ringed penguin).
 „ <i>chrysome</i> (rock-hopper pen-
 guin).
 „ <i>chrysolophus</i> (macaroni pen-
 guin).
 *<i>Bernicla antarctica</i> or <i>magellanica</i> (?).
 *A crow (?).</p> |
|---|--|

Though there is no evidence of specific identity between the birds of the Arctic and Antarctic regions, several of the genera (e.g. *Sterna*, *Larus*, *Stercorarius*, etc.) have representatives in the far north.

d. MARINE METAZOA AND PROTOZOA.

Our knowledge of the marine fauna of the South is to a large extent due to the investigations of the *Challenger* Expedition, during the cruise from the Cape of Good Hope to Australia. The results have been exhaustively and systematically treated by Sir John Murray in the paper quoted in the Bibliography on the Marine Fauna of the Kerguelen Region. We shall here attempt to show the extent of our knowledge by summarising the elaborate lists given in that paper (to which the reader is referred for details), dealing, first, with the Metazoa of the deep sea (over 1000 fathoms); second, with the Metazoa of moderate depths (150 to 1000 fathoms); third, with the Metazoa of shallow water (from the shore down to 150 fathoms); fourth, with the pelagic Metazoa; and lastly, with the Protozoa.

Life in the deep sea of the South seems to be present in extraordinary abundance and variety; thus at eight deep-water trawlings and dredgings, in depths between 1260 and 2600 fathoms, lying between lat. 42° 42' S. and lat. 65° 42' S., no fewer than 272 species and varieties of marine Metazoa were procured, representing 186 genera. In no other region of the ocean basins traversed by the *Challenger* did any similar series of deep hauls indicate such a profusion of animal life. The number of species taken in one of these hauls was 89, and the average number in the eight hauls was 34 species per haul; for the sake of comparison, it may be stated that the average number of species of Metazoa procured by the *Challenger* in all the remaining deep hauls over 1000 fathoms south of the southern tropic, outside this Kerguelen region, was about 10 species per haul.

Among these 272 species all the classes of marine invertebrates and fishes

were well represented. Thus, of Sponges there were 19 species (Monaxonida 7, Tetractinellida 1, Hexactinellida 11); of Cœlenterata 23 species (Alcyonaria 1, Pennatulida 2, Antipatharia 1, Actiniaria 9, Corals 2, Hydroida 3, Medusæ 4, Siphonophoræ 1); of Echinodermata 87 species (Crinoidea 8, Asteroidea 19, Ophiuroidea 16, Echinoidea 13, Holothurioidea 31); of Vermes 26 species (Entozoa 2, Nemertea 1, Gephyrea 1, Annelida Polychæta 19, Myzostomida 3); of Crustacea 59 species (Ostracoda 9, Cirripedia 6, Amphipoda 5, Isopoda 14, Phyllocarida 1, Schizopoda 7, Macrura 6, Anomura 3, Pycnogonida 8); of Mollusca 23 species (Lamellibranchiata 9, Scaphopoda and Gasteropoda 11, Cephalopoda 3); of Polyzoa 9 species, of Brachiopoda 1, of Tunicata 11, and of Fishes 14 species.

In moderate depths (*i.e.* between 150 and 1000 fathoms) the *Challenger* took three dredgings in the Kerguelen region, near Marion Island and the Crozet Islands, in depths varying from 210 to 550 fathoms. The number of species of Metazoa obtained in these three dredgings was 68, and with five exceptions each individual species was the representative of a distinct genus. Among these 68 species there were of Sponges 13 species (Monaxonida 8, Hexactinellida 5); of Cœlenterata 13 species (Alcyonaria 9, Antipatharia 2, Corals 2); of Echinodermata 12 species (Asteroidea 3, Ophiuroidea 5, Echinoidea 1, Holothurioidea 3); of Annelida Polychæta 2 species; of Crustacea 8 species (Amphipoda 1, Isopoda 2, Macrura 1, Anomura 4); of Mollusca 4 species (Lamellibranchiata 1, Gasteropoda 2, Chitons 1); of Polyzoa 13 species, of Brachiopoda 1, and of Fishes 2 species.

In shallow water (from the shore down to 150 fathoms) the *Challenger* took many dredgings and trawlings in the Kerguelen region, off Marion and Prince Edward Islands, off Kerguelen, and off Heard Island. The total number of species and varieties of Metazoa procured in these shallow hauls was 533, belonging to about 325 genera. Among these 533 species, there were of Sponges 34 species (Monaxonida 23, Tetractinellida 5, Hexactinellida 1, Calcarea 5); of Cœlenterata 28 species (Alcyonaria 5, Actiniaria 4, Hydroida 19); of Echinodermata 62 species (Crinoidea 5, Asteroidea 25, Ophiuroidea 16, Echinoidea 5, Holothurioidea 11); of Vermes 50 species (Entozoa 2, Nemertea 6, Gephyrea 1, Annelida Polychæta 41); of Crustacea 145 species (Ostracoda 43, Cirripedia 2, Amphipoda 48, Isopoda 39, Cumacea 5, Schizopoda 2, Macrura 2, Anomura 1, Brachyura 1, Pycnogonida 5); of Mollusca 105 species (Lamellibranchiata 27, Scaphopoda and Gasteropoda 71, Chitons 2, Nudibranchiata 2, Marseniadæ 2, Cephalopoda 1); of Polyzoa 57 species, of Brachiopoda 6, of Tunicata 35, and of Fishes 11 species.

Besides Protozoa, Algæ, etc. (to be briefly referred to later on), the *Challenger* naturalists observed in the surface waters of the Southern Ocean representatives of Medusæ, Siphonophoræ (*Diphyes*), Hydroids (on floating seaweed), Ctenophoræ, Holothurians (on floating *Macrocystis*), Worms (*Pelagonemertes*, Planarians, *Sagitta*, *Alciopa*, *Tomopteris*), Ostracoda (*Halocypris*), Copepods and Amphipods in great variety and abundance, *Lepas* (on floating pumice), Isopods, Schizopods abundant, Macrura, Lamellibranchs and Gasteropods (on floating seaweeds), Heteropods and Pteropods (*Atlanta*, *Clio*, *Limacina*, *Spongiobranchæa*), Cephalopods (*Cranchia* and *Taonius*), Polyzoa (on floating seaweeds), Tunicates (*Appendicularia*, *Salpa*, *Pterosoma*), and Fishes (young *Prymnothonus*, *Sternoptyx*). In lat. 47° S. the water was quite red-coloured, due to innumerable red Copepods, which were captured in so thick a mass that it was impossible to see the other organisms present.

As regards Protozoa, many Foraminifera of small size and compound and other Radiolaria were invariably observed in the tow-net gatherings in the South, and their dead shells and skeletons formed part of the deposits at the bottom. The number of species and varieties of Foraminifera observed in the deposit samples brought home by the *Challenger* from the Antarctic regions south of lat. 40° S.,

from shallow water down to 2600 fathoms, amounts to 220, of which 10 were of pelagic origin. The species of Radiolaria were determined in the surface gatherings and in the bottom samples brought home from the *Challenger* station in lat. 54° S., depth 1950 fathoms. Out of a total number of 93 species of Radiolaria observed at this Station, 69 species were procured only in the deposit, 12 species were obtained only in the surface gatherings, while the remaining 12 species were noted both at the surface and bottom. Thus of the 24 species detected in the surface gatherings, 12 were observed also in the deposit at the bottom, but the other 12 species belong to the classes Acantharia and Phæodaria, the skeletons of which are composed of substances comparatively readily soluble in sea-water, and are therefore seldom met with in bottom deposits.

e. THE FLORA.

When in lat. 65° S., the *Challenger* naturalists observed the water to be of a greenish colour, which on examination was found to be due to myriads of minute spherical transparent Algæ (*Tetraspora poucheti*), identical with Algæ observed in the Arctic Ocean. The surface waters of the far South teemed with Diatoms, and the *Challenger's* tow-nets were often filled with a yellowish slime (almost entirely composed of Diatoms), which dried into a whitish, felt-like mass. The most abundant form was the peculiar, very elongated, flexuous *Thalassiothrix longissima*, var. *antarctica*, a species which has been recorded as forming large floating masses in the Arctic Ocean. In the Antarctic its frustules were found arranged in little bundles of from ten to twelve, fastened together loosely at one end, but separate at the other, the whole being loosely twisted into a spindle; it is, along with *Chatoceros remotum*, the most characteristic species found on the surface of the Antarctic seas. The number of species and varieties of Diatoms observed in the deposits collected by the *Challenger* at three shallow-water localities and one deep-water station in the Kerguelen region was 187, and the number observed in the surface gatherings brought home from a station in lat. 54° S. was 51. Thus, out of a total number of 213 species, 26 were noticed both at the surface and at the bottom, and 25 on the surface only, the remainder being recorded only from the deposit. Fifteen of the species of Diatoms from these Antarctic localities are known also from Arctic regions.

The seaweeds of the Antarctic are closely related to those of the Arctic; in fact, 54 species have been recorded as common to the northern and southern oceans but not occurring within the tropics. Three species may be especially mentioned—*Macrocystis pyrifera*, *Lessonia fuscescens*, and *Durvillea utilis*. The first occurs in all parts of the ocean from lat. 40° to 64° S., and attains an enormous length, specimens having been seen by Hooker of fully 700 feet. *Durvillea utilis* also attains a high latitude, 65° S., on the meridian of New Zealand. Its enormous fronds, sometimes ten feet long, are used by the natives of Chili to make soup, and hence its name. Equally singular is the *Lessonia fuscescens*, with its stems five to ten feet long and as thick as a man's thigh; when dried the stem contracts into a substance harder than horn, which is used by the Gauchos for knife handles. This seaweed is found only on the outskirts of the Antarctic Ocean and does not occur in high latitudes.

On the floating masses of *Macrocystis* at Kerguelen the *Challenger* naturalists found Hydroids, Holothurians, small bivalve shells, *Patella*, and Polyzoa; towards the northern limits of the Antarctic, on the way to Australia, floating pieces of *Durvillea* were met with, sometimes covered with barnacles.

Land vegetation is scarce even in the islands surrounding the Southern Ocean.

No tree grows on South Georgia or on the eastern islands—the Crozets, Kerguelen, Heard, etc.—the nearest approach to this form of vegetation being the *Phyllica nitida* of Amsterdam Island. The flora of these eastern islands contains numerous representatives of the American vegetable kingdom, and also shows a connection with the New Zealand plant life. Peculiar to them is the *Pringlea antiscorbutica*, or Kerguelen cabbage. Of the Antarctic islands proper South Georgia, being in a lower latitude, contains higher forms than any other, thirteen phanerogams having been collected there. Only one of these has a brightly coloured blossom—the *Ranunculus biternatus*. Tussock grass (*Poa flabellata*) and the *Aira antarctica* have also been reported from the South Shetlands, where no other vegetation appears to grow, in spite of the subterranean heat (a minimum thermometer placed by Captain Foster on Deception Island, and brought away by Captain Smiley marked only -5° F.). The highest latitude at which land vegetation has been found, except the lichen gathered by Mr. Borchgrevink from Cape Adare, is at Cockburn Island. Sir Joseph Hooker collected 29 species of mosses, algae, and lichens. Of the mosses two out of five were new, and one or two of the lichens. The lichen *Lecanora miniata* gives a yellow colour to the cliffs, while the *Ulva crispa* is the only plant easily discernible on landing.

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