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The Brazilian research contribution to knowledge of the plant communities from Antarctic ice free areas

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ABSTRACT

This work aims to summarize the results of research carried out by Brazilian researchers on the plant communities of Antarctic ice free areas during the last twenty five years. Since 1988 field work has been carried out in Elephant Island, King George Island, Nelson Island and Deception Island. During this period six papers were published on the chemistry of lichens, seven papers on plant taxonomy, five papers on plant biology, two studies on UVB photoprotection, three studies about the relationships between plant communities and bird colonies and eleven papers on plant communities from ice free areas. At the present, Brazilian botanists are researching the plant communities of Antarctic ice free areas in order to understand their relationships to soil microbial communities, the biodiversity, the distribution of the plants populations and their relationship with birds colonies. In addition to these activities, a group of Brazilian researchers are undertaking studies related to Antarctic plant genetic diversity, plant chemistry and their biotechnological applications.

Key words: Scientific publication, Botany, South Shetlands Island, Antarctica.

INTRODUCTION

The importance of the study of plant species found in the ice-free areas of Antarctic were related with the environmental monitoring, as a source for to evaluate the global changes. Climate changes is expected to have a major impact on the terrestrial biota of the Antarctic. Studies suggested that increasing temperatures and greater water availability could extend the active season, increase development rates and reduce the life cycle leading to altered the species distribution (Turner and Marshall 2011).

One of the first expeditions to the South Pole was carried out by the French explorer Lozier Bouvet in 1739. His discovery was named as Bouvet Island, but he had no scientific interest on the region. The first systematic botanic studies were carried out by J. Torrey in 1823, when he describes the *Usnea fasciata*. J. Eights was the first scientist to collect lichens, mosses, sea algae and grasses, between 1829-1830 (Putzke and Pereira 2001).

The Brazilian introduction in the Antarctica began in 1882, when the astronomer Luiz Antonio Cruls, on request of the French Academy of Science, held several observation about the Venus

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passage across the sun. Hundred years after, in 1982, starts the effective Brazilian participation through the first Brazilian Antarctic expedition on board of the oceanographic support ship Barão de Teffé (Souza 2008).

The plant communities in the Antarctic ice free areas are comprised of populations of three flowering plants (of which two are natives): *Deschampsia antarctica* Desv. (*Poaceae*) and *Colobanthus quitensis* (Kunth) Bartl (*Caryophyllaceae*) and *Poa annua* L. (*Poaceae*), accidently introduced in the 1980s (Olech 1996). The latter is native to Europe and was found growing in the vicinity of the Polish Arctowski Station, Admiralty Bay, King George Island, South Shetlands. For bryophytes 110 mosses species and 22 liverworts species are cited. More than 360 species of lichens are recognized (Øvstedal and Lewis Smith 2004). There are two species of macroscopic algae growing in and at the surroundings of bird colonies (Pereira 2004).

The Antarctic flora has been studied continuously since its discovery, but only a few efforts have been made to really explore the species richness and relationship in different ice-free areas. The South Shetland Archipelago has 540 km of islands distributed over a SW to NE line, located in the northern part of the Antarctic Peninsula (ca. 160 km at north). King George Island is the largest one and the main area used for research bases in Antarctica. Argentina, Brazil, Chile, China, Poland, Russia, South Korea and Uruguay have permanently keep open bases on this island. Other countries have seasonal summer stations on different parts of this island, which demonstrates that human impact are strong on King George Island relative to other areas in the Maritime and Continental Antarctic.

This work aims to present the results of research carried out by Brazilian researchers on the plant communities of Antarctic ice free areas at the last twenty years in the South Shetland islands.

MATERIALS AND METHODS

Since 1988 field work has been carried out in different areas of the South Shetland Islands: Elephant Island (Stinker Point), King George Island (Admiralty Bay, Fildes Peninsula, Turret Point and Lions Rump), Nelson Island (Rip Point), Deception Island (Figures 1A-B, Figure 2). Phytosociological approaches were used to study the plant succession cover in the four islands.

Species identification were carried out with help of specialized literature, such Øvstedal and Lewis Smith (2001, 2004, 2009), Putzke and Pereira (2001) and Ochyra et al. (2008). The mosses names was up to date using the plant names database available in W3Tropicos web server (www.tropicos.org). For *Bryaceae* species was use the recent nomenclature following (Spence 2005, 2007). The lichen names was revised using the index fungorum database (www.indexfungorum.org) and most recent literature for antarctic lichens (Øvstedal and Lewis Smith 2001, 2004, 2009). The exsiccates of the specimens collected in Antarctica were deposited principally in the HCB Herbarium, ULBRA Herbarium, Botanical Garden of Rio de Janeiro Herbarium (RB) and HBEI (UNIPAMPA).

RESULTS AND DISCUSSION

The Brazilian contribution to the study of plant communities in Antarctic ice free areas, began as the foundation of the Brazilian Antarctic Program that performed the first Scientific Antarctic Expedition in Austral-Summer 1982/1983. In the first and second expeditions only oceanology studies were carried out, including cartographic and marine biology survey. Research on the land ecosystems was made possible after the inauguration of the Brazilian Antarctic Station in 1984, named Comandante Ferraz. Research on terrestrial plants began in the Austral Summer 1985 and 1986, with the study of lichens chemistry published by Xavier-Filho (1986, 1988, 1989,

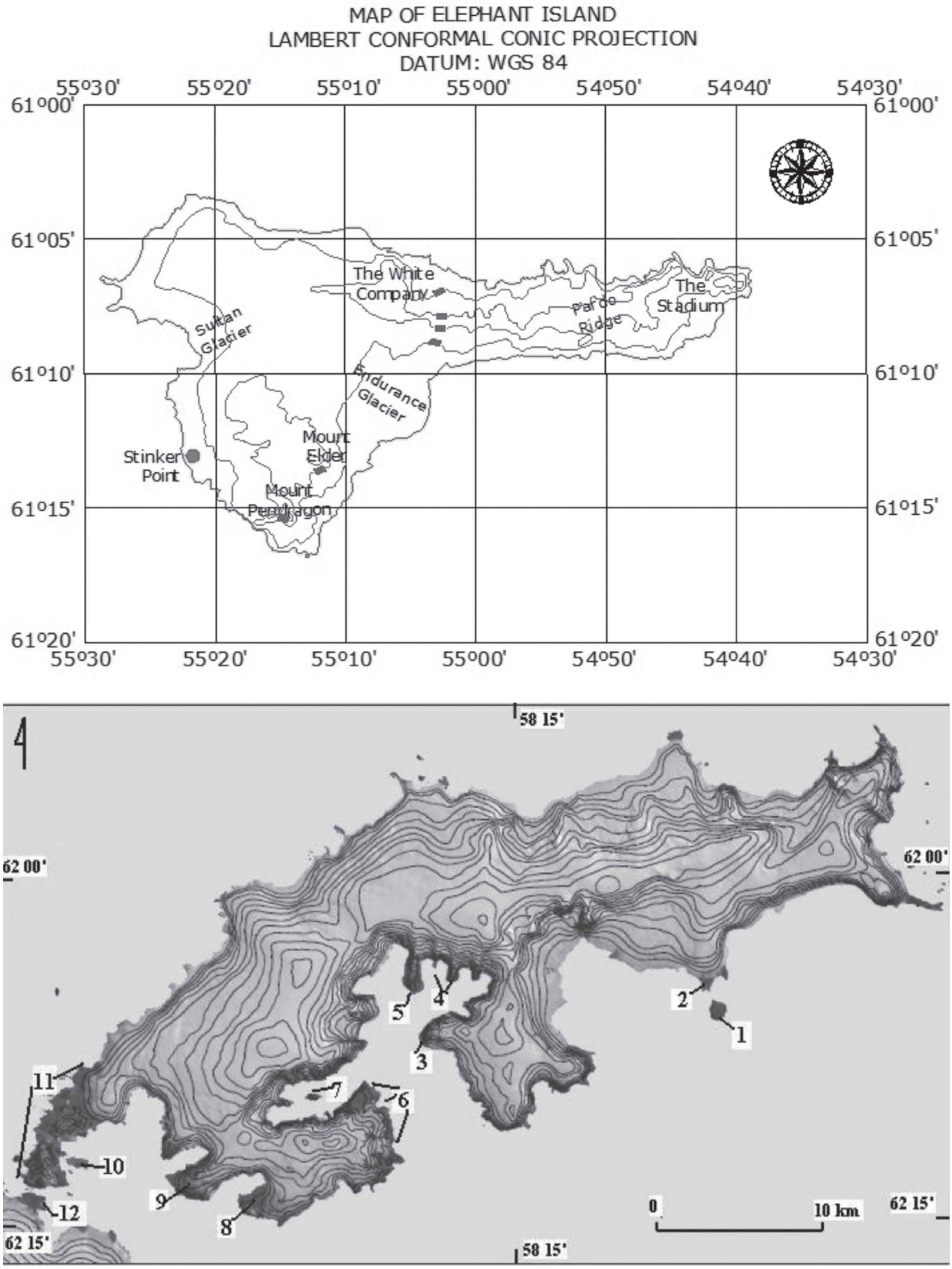

Figure 1 – Maps of Islands visited by the group: Elephant island (upper part), King George and Nelson Islands (middle) and Deception Island (down). 1 – Penguin Island. 2 – 11 King George Island: 2- Turret Point; 3- Hennequin point; 4-Ullman Point and Stenhouse Bluff; 5- Keller Peninsula; 6- Region from Thomas Point to Telefone Point; 7- Dufaiel Island; 8- Potter Peninsula; 9- Barton Peninsula; 10- Ardley Island; 11- Fildes Peninsula; 12 – Nelson Island (Rip Point).

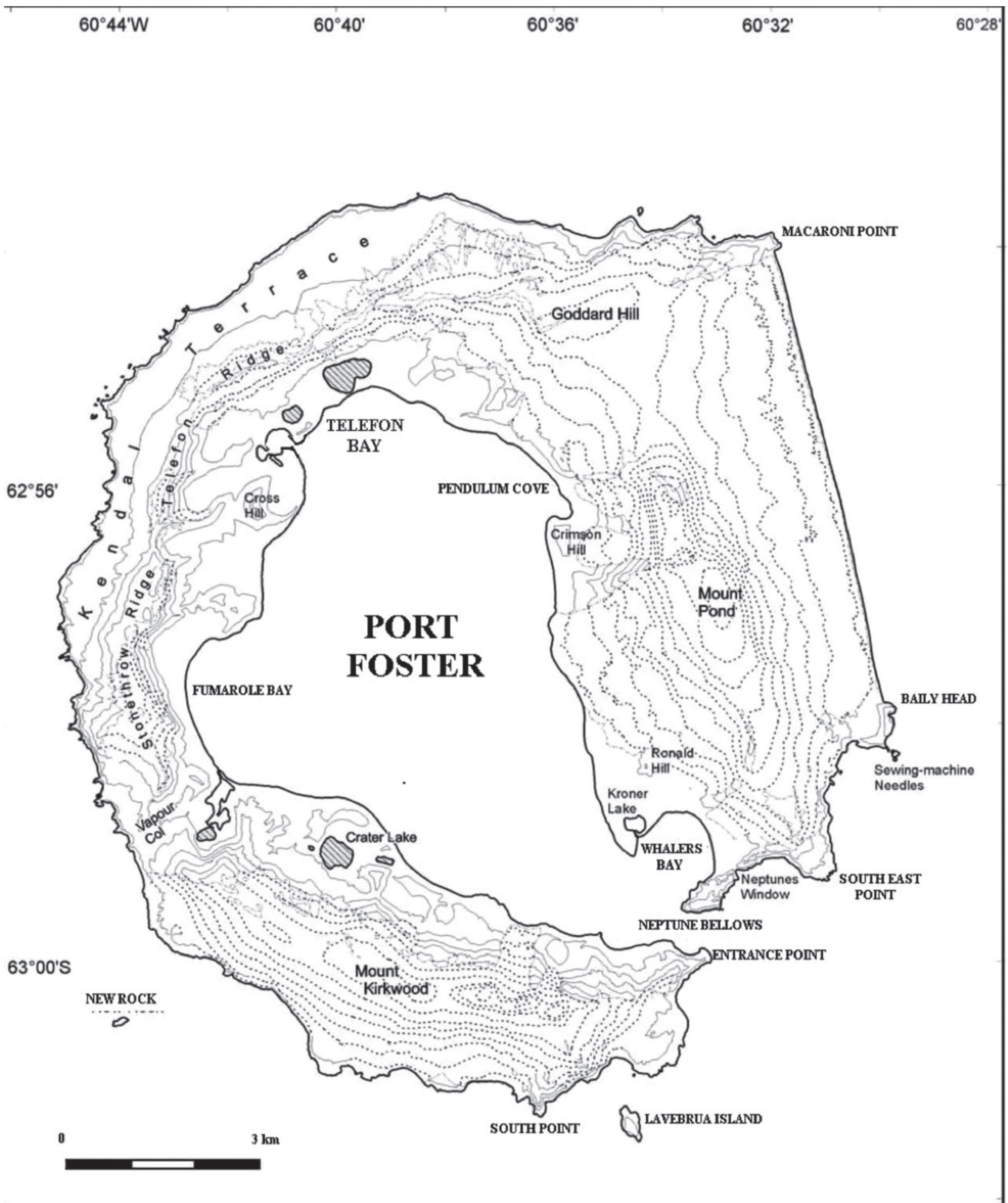

Figure 2 – Deception Island map, where all ice free areas were visited.

1990) and Czeczuga and Xavier-Filho (1987, 1988), describing beta-carotenoid, natural products and the antimicrobial activity of several lichen species.

Since 1988 the Brazilian Antarctic Program botanists initiated the study of plant communities in melting areas. Early works are published on the plant taxonomy, including first moss species list for King George Island (Putzke and Pereira 1990), as summarize in Table I, as well as the new records for *Usnea trachycarpa* (Pereira 1990), and other taxonomical studies (Putzke and Pereira 1996, 1998a) (see plant checklist in the present paper). More recently the first book on Antarctic Mosses (Putzke and Pereira 2001), was published a contribution on diatoms of Deception Island (Sramkova et al. 2007) and the first record of a myxomycete species in Antarctica (Putzke et al. 2004). Were also carried out studies on plant biology as Elster et al. 2008, Gonçalves et al. 2008, Kovácik et al. 2004, Martins et al. 2004 and Kovácik and Pereira 2001 detail information on the *Mastodia tesselata* (Hook. f. & Harv.) Hook. f. & Harv. lichenization processes. In addition, studies regarding the relationships between plant communities and bird colonies were published by Pereira et al. (1990a, b) and Sander et al. (2004). The photoprotective effect of extracts of *Deschampsia*. *antarctica*, *Colobanthus quitensis*, and *Polytrichum juniperinum* Hedw., against UVB. They attributed their photoprotective properties to several molecules, such as flavonoids and carotenoids, that absorb UV, act as antioxidants, and stimulate DNA-repair processes (Kappel Pereira et al. 2004, 2009). Several plant community studies were carried out, such as Pereira (2004) (the first phytosociological survey for Antarctica), Pereira and Putzke (1994), Pereira et al. (2007, 2008, 2009), Putzke and Pereira (1998b), Victoria et al. (2004, 2006, 2009a, b) and Victoria and Pereira (2007). These studies will be useful for environmental impact evaluations in the ice-free areas by the Brazilian Antarctic Program in the future.

TABLE I
Moss species collected in the four South Shetland Islands by Brazilian botanist.

MOSSES	**Elephant**	**King George**	**Nelson**	**Deception**
AMBLYSTEGIACEAE				
Cratoneuropsis relaxa ssp. *minor* (Hook. f. & Wilson) Ochyra [=*Orthotheciella varia* (Hedw.) Ochyra]	X	X		
Sanionia uncinata (Hedw.) Loeske	X	X	X	X
Sanionia georgicouncinata (Müll Hal.) Ochyra & Hedenas	X	X	X	X
Warnstorfia fontinaliopsis (Müll. Hal.) Ochyra	X	X	X	X
Warnstorfia sarmentosa (Wahlenb.) Hedenas	X	X	X	
ANDREAEACEAE				
Andreaea depressinervis Cardot	X	X	X	X
Andreaea gainii Cardot	X	X	X	X
Andreaea regularis Müll. Hal.	X	X	X	X
BARTRAMIACEAE				
Bartramia patens Brid.	X	X	X	X
Conostomum magellanicum Sull.		X	X	
Philonotis polymorpha (Müll. Hal.) Kindb. (=*Bartramia polymorpha* Müll. Hal.)				X
BRACHYTHECIACEAE				
Brachythecium austrosalebrosum (Müll. Hal.) Paris	X	X		
Brachythecium austroglareosum (Müll. Hal.) Paris		X	X	
Brachythecium subpilosum (Hook. f. & Wilson) A. Jaeger		X		

TABLE I (continuation)

MOSSES	Elephant	King George	Nelson	Deception
BRACHYTHECIACEAE				
Sciuro-hypnum glaciale (Schimp.) Ignatov & Huttunen (=*Brachythecium glaciale* Schimp)		X		
BRYACEAE				
Bryum archangelicum Bruch & Schimp (=*Bryum amblyodon* Müll. Hal.)	X	X	X	X
Bryum argenteum Hedw.	X	X	X	X
Gemmabryum dichotomum (Hedw.) J. R. Spence & H. P. Ramsay (=*Bryum dichotomum* Hedw.)	X	X		X
Bryum orbiculatifolium Cardot & Broth.	X	X	X	
Bryum pallescens Schleich. ex Schwaegr.		X		X
Ptychostomum pseudotriquetrum (Hedw.) J. R. Spence & H. P. Ramsay [=Bryum pseudotriquetrum (Hedw.) P. Gaertn., B. Mey. & Scherb.]	X	X	X	X
Pohlia cruda (Hedw.) Lindb.	X	X	X	
Pohlia drummondii (Müll. Hal.) A. L. Andrews	X	X	X	
Pohlia nutans (Hedw.) Lindb.	X	X		
Pohlia wahlenbergii (F. Weber & D. Mohr) A.L. Andrews	X	X		
DICRANACEAE				
Dicranella campylophylla (Taylor) A. Jaeger [=*Anisothecium cardotii* (R. Br. bis.) Ochyra]		X		
Chorisodontium aciphyllum (Hook. f. & Wills.) Broth.	X	X	X	X
Kiaeria pumila (Mitt.) Ochyra		X		
DITRICHACEAE				
Ceratodon purpureus (Hedw.) Brid.	X	X	X	X
Distichium capillaceum (Hedw.) Bruch & Schimp	X	X	X	X
Ditrichum hyalinum (Mitt.) Kuntze		X		
Ditrichum hyalinocuspidatum Cardot (=Ditrichum lewis-smithii Ochyra)		X		
ENCALYPTACEAE				
Encalypta rhaptocarpa Schwaegr.	X	X	X	X
GRIMMIACEAE				
Orthogrimmia sessitana (De Not.) Ochyra & Zarnowiec		X		X
Bucklandiella sudetica (Funck) Bednarek-Ochyra & Ochyra		X		
Schistidium amblyophyllum (Müll. Hal.) Ochyra & Hertel		X		
Schistidium antarctici (Cardot) L. I. Savicz & Smirnova		X		
Schistidium cupulare (Müll. Hal.) Ochyra		X		
Schistidium falcatum (Hook. f. & Wils.) B. Bremer		X		
Schistidium halinae Ochyra		X	X	X
Schistidium andinum (Mitt.) Herzog [=*Schistidium occultum* (Müll. Hal.) Ochyra & Matteri]			X	
Schistidium rivulare (Brid.) Pobp.		X		
Schistidium steerei Ochyra		X		
Schistidium urnulaceum (Müll. Hal.) B. G. Bell.		X		

TABLE I (continuation)

MOSSES	Elephant	King George	Nelson	Deception
HYPNACEAE				
Hypnum revolutum (Mitt.) Lindb.		X	X	
Platydictya jungermannioides (Brid.) H. A.Crum		X		
MEESIACEAE				
Meesia uliginosa Hedw.		X		
ORTHOTRICHACEAE				
Muelleriella crassifolia (Hook. f. & Wils.) Dusén	X	X		
POLYTRICHACEAE				
Notoligotrichum trichodon (Hook. & Wilson) G. L. Sm.		X		
Polytrichastrum alpinum (Hedw.) G. L. Smith	X	X	X	X
Polytrichum strictum Menzies ex Brid.	X	X	X	
Polytrichum juniperinum Hedw.	X	X	X	X
Polytrichum piliferum Hedw.	X	X	X	X
POTTIACEAE				
Didymodon brachyphyllus (Sull.) R. H. Zander	X	X		
Hennediella antarctica (Angström) Ochyra & Matteri	X	X	X	X
Hennediella heimii (Hedw.) R. H. Zander.	X	X	X	X
Stegonia latifolia (Schwaegr.) Vent ex Broth.		X		X
Syntrichia filaris (Müll. Hal.) R. H. Zander	X	X		X
Syntrichia magellanica (Mont.) R.H. Zander [=*Syntrichia princeps* (De Not.) Mitt.]	X	X	X	X
Syntrichia saxicola (Cardot) R. H. Zander	X	X	X	X
SELIGERACEAE				
Hymenoloma crispulum (Hedw.) Ochyra		X		X
Hymenoloma grimmiaceum (Müll. Hal.) Ochyra	X	X	X	
Hymenoloma antarcticum (Müll. Hal.) Ochyra	X	X	X	X
Holodontium strictum (Hook f. & Wilson) Ochyra		X		
Syntrichia saxicola (Cardot) R. H. Zander	X	X	X	X
SELIGERACEAE				
Hymenoloma crispulum (Hedw.) Ochyra		X		X
Hymenoloma grimmiaceum (Müll. Hal.) Ochyra	X	X	X	
Hymenoloma antarcticum (Müll. Hal.) Ochyra	X	X	X	X
Holodontium strictum (Hook f. & Wilson) Ochyra		X		

Comparing the data on the vegetal communities of different areas, we can see that Stinker Point has the greater *Bryum argenteum* and *Chorisodontium acyphyllum* formations, which are reduced in the other areas (Pereira and Putzke 1994). At Rip Point the mosses are dispersed over all the area, in small patches or cushions, rarely carpets, and the lakes rich in submerged communities (Putzke and Pereira 1998a, b). The biggest lake in Elephant Island also has a submerged community that is, not observed on the Keller Peninsula (Pereira et al. 2007). The vegetation of Deception Island (Figure 2) is still recovering the last volcanic eruption, but some fast growing patches of *D. antarctica* are found. For description of the main plants communities see Pereira et al. 2008 and Victoria et al. 2009b.

On Elephant and Nelson Islands human impact are minimal since the only buildings present are small refuges that are only sporadically occupied (Pereira and Putzke 1994, Puztke and Pereira 1998b). On the first island, the Brazilian refugee Wiltgen was completely removed, contributing to the moss regeneration at Stinker Point.

On Deception Island the touristic activity has been affecting the flora, but new rules are being followed and the impact is being reduced.

Keller Peninsula studies over the years have shown that human activity impacts the moss formations in a negative manner, but in some areas the plant communities increase faster (Pereira et al. 2007, 2008).

The use of land plants for nest building was studied in *Catharacta* spp, in *L. dominicanus* and in *Phalacrocorax atriceps*. In the three cases studied land plant were the principal material in the nest, but lots of garbage are being used (Pereira et al. 1990a, b, Sander et al. 2004).

Plant checklist from the areas studied, collected and indentified by Brazilian researchers and preserve in herbarium

ANGIOSPERMAE

POACEAE

Deschampsia antarctica Desv.

CARYOPHYLLACEAE

Colobanthus quitensis (Kunth) Bartl.

LIVERWOTS

Cephaloziella varians (Gottsche) Stephani

Lophozia excisa (Dicks.) Dumort.

Marchantia berteroana Lehm. & Lindenb.

MOSSES

AMBLYSTEGIACEAE

Cratoneuropsis relaxa ssp. *minor*

Sanionia uncinata (Hedw.) Loeske

Sanionia georgico-uncinata (Müll Hal.) Ochyra & Hedenas

Warnstorfia laculosa (Müll. Hal.) Ochyra & Matteri

Warnstorfia sarmentosa (Wahlenb.) Hedenas

ANDREAEACEAE

Andreaea depressinervis Cardot

Andreaea gainii Cardot

Andreaea regularis Müll. Hal.

BARTRAMIACEAE

Bartramia patens Brid.

Conostomum magellanicum Sull.

BRACHYTHECIACEAE

Brachythecium austrosalebrosum (Müll. Hal.) Kindb.

Sciuro-hypnum glaciale (Schimp.) Ignatov & Huttunen

BRYACEAE

Bryum archangelicum Bruch & Schimp

Bryum argenteum Hedw.

Bryum orbiculatifolium Cardot & Broth.

Bryum pallescens Schleich. ex Schwaegr.

Ptychostomum pseudotriquetrum (Hedw.) J. R. Spence & H. P.

Pohlia cruda (Hedw.) Lindb.

Pohlia drummondii (Müll. Hal.) A. L. Andrews in Grout

Pohlia nutans (Hedw.) Lindb.

Pohlia wahlenbergii (F. Weber & D. Mohr) A.L. Andrews

DICRANACEAE

Chorisodontium aciphyllum (Hook. f. & Wills.) Broth.

Dicranella campylophylla (Taylor) A. Jaeger

Dicranella varia (Hedw.) Schimp

Kiaeria pumila (Mitt. & Hook. f.) Ochyra - very rare.

DITRICHACEAE

Ceratodon purpureus (Hedw.) Brid.

Distichium capillaceum (Hedw.) Bruch & Schimp
Ditrichum hyalinum (Mitt.) Kuntze
Ditrichum hyalinocuspidatum Cardot

ENCALYPTACEAE
Encalypta rhaptocarpa Schwaegr.

GRIMMIACEAE
Grimmia reflexidens Müll. Hal.
Bucklandiella sudetica (Funck) Bednarek-Ochyra & Ochyra
Schistidium amblyophyllum (Müll. Hal.) Ochyra & Hertel
Schistidium antactici (Cardot) L. I. Savicz & Smirnova
Schistidium cupulare (Müll. Hal.) Ochyra
Schistidium falcatum (Hook. f. & Wils.) B. Bremer
Schistidium halinae Ochyra
Schistidium andinum (Mitt.) Herzog *Schistidium rivulare* (Brid.) Pobp.
Schistidium steerei Ochyra
Schistidium urnulaceum (Müll. Hal.) B. G. Bell.

HYPNACEAE
Hypnum revolutum (Mitt.) Lindb.
Platydictya jungermannioides (Brid.) Crum

MEESIACEAE
Meesia uliginosa Hedw.

ORTHOTRICHACEAE
Muelleriella crassifolia (Hook. f. & Wils.) Dusén

POLYTRICHACEAE
Polytrichastrum alpinum (Hedw.) G. L. Smith
Polytrichum strictum Brid.
Polytrichum juniperinum Hedw.
Polytrichum piliferum Hedw.

POTTIACEAE
Didymodon brachyphyllus (Sull.) R. H. Zander
Hennediella antarctica (Angstr.) Ochyra & Matteri
Hennediella heimii (Hedw.) Zand.
Stegonia latifolia (Schwaegr.) Vent ex Broth.
Syntrichia filaris (Müll. Hal.) Zand.
Syntrichia magellanica (Mont.) R.H. Zander
Syntrichia saxicola (Cardot) Zand.

SELIGERACEAE
Hymenoloma antarcticum (Müll. Hal.) Ochyra
Hymenoloma crispulum (Hedw.) Ochyra
Hymenoloma grimmiaceum (Müll. Hal.) Ochyra

ALGAE

MACROSCOPIC CONTINENTAL ALGAE
Prasiola crispa (Lightfoot) Menegh

MACROSCOPIC FUNGI

Lamprospora miniatopsis Spooner
Omphalina antarctica Sing.
Galerina moelleri Bas.
Galerina perara Sing.

LICHENIZED AND LICHENICOLOUS FUNGI

Acarospora macrocyclos Vain.
Amandinea coniops (Wahlenb.) *M. Choisy* ex Scheid. & H. Mayrhofer. (=*Buellia coniops*)
Amandinea petermanii (Hue) Matzer, H. Mayrhofer & Scheid. [=*Rinodina petermanii* (Hue) Darb.]
Arthopyrenia maritima Øvstedal
Arthrorhaphis citrinella (Ach.) Poelt
Austrolecia antarctica Hertel
Bacidia stipata Lamb
Biatorella antarctica B. J. Murray
Bryonora castanea (Hepp) Poelt
Bryoria chalybeiformis (L.) Brodo et D. Hawksw.
Buellia anisomera Vain.
Buellia augusta Vain.
Buellia cladocarpiza Lamb
Buellia granulosa (Darb.) Dodge
Buellia latemarginata Darb.
Buellia nelsonii Darb.
Buellia papillata (Sommerf.) Tuck.
Buellia perlata (Hue) Darb.
Buellia pycnogonoides Darb.
Buellia russa (Hue) Darb.
Buellia subpedicillata (Hue) Darb.
Caloplaca amniospila (Ach.) H. Olivier
Caloplaca athallina Darb.

Caloplaca buelliae Olech & Søchting
Caloplaca cirrochrooides (Vain.) Zahlbr.
Caloplaca citrina (Hoffm.) Th. Fr.
Caloplaca iomma Olech & Søchting
Caloplaca millegrana (Müll. Arg.) Zahlbr.
Caloplaca psoromatis Olech & Søchting
Caloplaca regalis (Vain.) Zahlbr.
Caloplaca siphonospora Olech & Søchting
Caloplaca sublobulata (Vain.) Zahlbr.
Caloplaca tetraspora (Nyl.) H. Oliv.
Caloplaca tiroliensis Zahlbr.
Candelaria murrayi (Dodge) Poelt
Candelariella hallettensis (Murray) Øvstedal
Candelariella vitellina (Hoffm.) Müll. Arg.
Carbonea assetiens (Nyl.) Hertel
Carbonea vorticosa (Flörke) Hertel
Catapyrenium daedaleum (Kremp.) Stein
Catapyrenium lachneum (Ach.) R. Sant.
Catillaria corymbosa (Hue) Lamb
Cetraria aculeata (Schreb.) Fr. [=*Coelocaulon aculeatum* (Schreber) Link]
Cladonia cariosa (Ach.) Spreng.
Cladonia chlorophaea (Flörke ex Sommerf.) Spreng.
Cladonia furcata (Huds.) Schrader
Cladonia gracilis (L.) Willd.
Cladonia metacorallifera Asah.
Cladonia phyllophora Ehrh. ex Hoffm.
Cladonia pyxidata (L.) Hoffm.
Cladonia rangiferina (L.) Weber
Coleopogon epiphorellus (Nyl.) Brusse & Kärnefelt [=*Coelocaulon epiphorellum* (Nyl) Kärnef.]
Cystocoleus ebeneus (Dillwyn) Thwaites
Dermatocarpon intestiniforme (Körb.) Hasse
Haematomma erythroma (Nyl.) Zahlbr.
Himantormia lugubris (Hue) Lamb
Huea cerussata (Hue) C.W. Dodge & G.E. Baker
Huea coralligera (Hue) C.W. Dodge & G.E. Baker
Hypogymnia lugubris (Pers.) Krog
Hypogymnia lububris var. compactior (Zahlbr.) D. C. Linds.
Japewia tornoensis (Nyl.) Tønsberg
Lecania brialmontii (Vain.) Zahlbr.
Lecania gerlachei (Vain.) Zahlbr.
Lecanora dispersa (Pers.) Sommerf.
Lecanora expectans Darb.
Lecanora mons-nivis Darb.
Lecanora physciella (Darb.) Hertel
Lecanora polytropa (Hoffm.) Rabenh.
Lecidea atrobrunnea (Ramond ex Lam. et DC.) Schaer.
Lecidea lapicida (Ach.) Ach.
Lecidea sarcogynoides Körb.
Lecidea sciatrapha Hue
Lecidella stigmatea (Ach.) Hertel and Leuckert
Lecidella wulfenii (Hepp) Körb.
Leptogium menziesii Mont.
Leptogium puberulum Hue
Massalongia carnosa (Dicks.) Körb.
Mastodia tesselata (Hook.f. & Harv.) Hook.f. & Harvey
Megaspora verrucosa (Ach.) Hafellner
Micarea assimilata (Nyl.) Coppins (=*Lecidea assimilata* Nyl.)
Microglaena antarctica Lamb
Ochrolechia frigida (Sw.) Lynge
Ochrolechia parella (L.) A. Massal.
Pannaria hookeri (Borrer ex Sm.) Nyl.
Parmelia saxatilis (L.) Ach.
Physcia caesia (Hoffm.) Fürnr.
Physcia dubia (Hoffm.) Lettau
Physconia muscigena (Ach.) Poelt
Placopsis contortuplicata Lamb
Poeltidea perusta (Nyl.) Hertel et Hafellner
Polyblastia gothica Th. Fr.
Porpidia albocaerulescens (Wulfen) Hertel et Knoph
Porpidia crustulata (Ach.) Hertel et knoph
Pseudephebe minuscula (Nyl. ex Arnold) Brodo et D. Hawksw. (=*Alectoria minuscula* Lindsay)
Pseudephebe pubescens (L.) Choisy
Psoroma hypnorum (Vahl) Gray
Ramalina terebrata Hook et Tayl.
Rhizocarpon geminatum Körb.

Rhizocarpon geographicum (L.) DC.
Rhizocarpon polycarpon (Hepp) Th. Fr.
Rhizoplaca aspidophora (Vain.) Redón
Rhizoplaca melanophthalma (DC. in Lam. et DC.) Leuck. et Poelt
Rinodina deceptionis Lamb
Rinodina mniaraea (Ach.) Körb.
Rinodina turfacea (Wahlenb.) Körb.
Sphaeorophorus fragilis (L.) Pers.
Sphaeorophorus globosus (Hudson) Vain.
Sphaeorophorus melanocarpus (Sw.) DC.
Staurothele gelida (Hook & Tayl.) Lamb
Stereocaulon alpinum Laurer ex Funck
Stereocaulon glabrum (Müll. Arg.) Vain.
Tephromela atra (Hudson) Hafellner
Thelocarpon cyaneum Olech et Alstrup
Tremolecia atrata (Ach.) Hertel
Umbilicaria aprina Nyl.
Umbilicaria decussata (Vill.) Zahlbr.
Umbilicaria propagulifera (Vain.) Llano
Umbilicaria rufidula (Hue) Filson
Usnea acromelana Stirton
Usnea antarctica Du Rietz
Usnea aurantiacoatra (Jacq.) Bory
Usnea trachycarpa (Stirt.) Mull. Arg.
Verrucaria ceuthocarpa Wahlenb.
Verrucaria cylindrophora Vain.
Verrucaria dispartita Vain.
Verrucaria elaeoplaca Vain.
Verrucaria halizoa Leight.
Verrucaria psycrophila Lamb
Verrucaria racovitzae Vain.
Verrucaria tesselatula Nyl.
Xanthoria candelaria (L.) Th. Fr.
Xanthoria elegans (Link.) Th. Fr.

Actually, the main concern of the Brazilian botanists in Antarctica is to describe and map the plant and microbial community in order to better understand the processes that drive in the Antarctic ice-free areas, and to relate these to human impacts or natural phenomena. Global changes are leading to the loss of ice cover in Antarctica, and with it, potentially dramatic changes in plant and microbial community composition. There is an urgent need to establish georeferenced baseline maps of plant and soil microbial distribution in order to evaluate future compositional changes through the years. Brazilian researchers have already began this important work, contributing to the management and monitoring studies in the Antarctic ice free areas (Pereira and Putzke 1994, Pereira et al. 2007, 2008, 2009, Putzke and Pereira 1998b, Victoria et al. 2004, 2006, 2009a, b, Victoria and Pereira 2007).

CONCLUSIONS

In twenty-five years of work by botanists from the Brazilian Antarctic Program investigating the plant communities in Antarctic ice free areas, six papers on the chemistry of lichens, six papers on plant taxonomy, five papers on plant biology, two works on UVB photoprotection and eleven papers on plant communities were published.

At the present, Brazilian botanists are studying the plant communities in Antarctic ice free areas in order to understand their relationship to soil microbial communities, their biodiversity, the distribution of the plants populations and their relationship with birds colonies. Baseline maps of plant communities and their distribution are being made in order to arguments studies of their development and environmental impacts in the future. In addition to these activities, a group of Brazilian researchers are undertaking studies related to Antarctic plant genetic diversity, plant chemistry and the biotechnological applications of these. It is believed that knowledge of the biotechnological potentials of Antarctic plants, in addition to research on plant/communities biology and evolving processes is essential to the valuation and therefore the preservation of these natural resources.

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RESUMO

Este trabalho tem como objetivo resumir os resultados das pesquisas realizadas por brasileiros nas comunidades vegetais de áreas livres de gelo da Antártida, durante os últimos vinte e cinco anos. Tais investigações iniciaram em 1988, sendo realizados nas ilhas Elefante, Rei George, Nelson de Deception. Durante este período foram publicados seis trabalhos sobre a química de líquens, sete sobre taxonomia vegetal, cinco sobre a biologia de plantas, dois sobre fotoproteção UVB, três sobre as relações entre as comunidades vegetais e colônias de aves e onze sobre as comunidades de plantas de áreas de degelo, abordando biogeografia e fitossociologia. Atualmente, os botânicos brasileiros estão pesquisando as comunidades vegetais de áreas de degelo da Antártica, buscando entender suas relações com as comunidades microbianas do solo, a biodiversidade, a distribuição das populações de plantas e sua relação com as colônias de aves. Além dessas atividades, um grupo de pesquisadores está investigando a diversidade genética vegetal através de estudos de genética de populações e a bioquímica das plantas.

Palavras-chave: Produção científica, Botânica, Shetlands do Sul, Antarctica.

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