

PLANT COMMUNITIES FROM STINKER POINT, ELEPHANT ISLAND, ANTARCTICA

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Abstract: This paper presents the results of plant community studies in ice-free areas from Stinker Point, Elephant Island, Antarctica, carried out in the austral summer 2011/2012. The principal aim being to map and describe plant communities of the studied areas. The plant communities have been classified and described based primarily on the physiognomy and phytosociology, which was carried out using the quadrat method. GPS L1-L2 was used for georeferencing the plant communities identified. With the data obtained it was possible to identify and describe six plant communities: 1. Fruticose lichens and moss cushion communities; 2. Moss-turf communities (two-association: *Chorisodontium*-*Sanionia* association and *Poltrychaceae*-*Sanionia* association); 3. Moss-carpet communities; 4. Crustose lichens communities; 5. Phanerogamic Antarctic tundra communities, (with two associations: *Colobanthus*-mosses association and Mosses-*Deschampsia* association) and 6. Fellfield communities. Furthermore, we present a map with the exact location of the communities described.

Keywords: Description, Mapping, Vegetation, Elephant Island, Antarctica

Introduction

Elephant Island is located 61° 07' S and 55° 03' W, it has 37 Km in the E-W direction and 16 Km in the N-S direction. The central area is totally ice-covered. The ice-free areas are coastal, but the access is difficult because there are steep cliffs and the wind and waves are often very strong. Stinker Point is the largest coastal ice-free area and is the richest in flora and floristic diversity of this island. This area is limited to the northwest near the beach by the Sultan Glacier and to the south by the Endurance Glacier the distance between the two glaciers is 4,500 m, and from the beach to glacier is 800 m in a straight line (Pereira & Putzke 1994).

The main objective of this work is mapping and describing the plant communities from ice-free areas of the Stinker Point, Elephant Island, Antarctica.

Materials and Methods

The description and classification of the plant communities was based on Pereira *et al.* (2011), Pereira & Putzke (1994), Lewis-Smith & Gimingham (1976) and Redon (1985). The

identification of bryophytes was done based on Putzke & Pereira (2001) and Ochyra (1998) and the lichens on Øvstedal & Lewis-Smith (2001) and Redon (1985).

The plant communities and geoenvironments were mapped in the field using an Astech Promark II[®] DGPS, obtaining a submetric precision after post-processing with the Astech Solutions[®] software. This data was overlaid and adjusted on a high resolution IKONOS satellite image, acquired in the summer of 2008. The characterization of plant communities followed the nomenclature adopted by Victoria *et al.* (2006). All communities and environments were digitally photographed constituting a rich record of images.

Results

Based on the vegetal cover of the dominant species, it was possible to identify six plant communities and four associations in Stinker Point ice-free areas ecosystem. The plant communities were named based in the most

representative plants groups occurring in each vegetation fragment. With the data obtained it was possible to identify six plant communities: 1. Fruticose lichens and moss cushion communities; 2. Moss-turf communities (two-sociation: *Chorisodontium*-*Sanionia* sociation and *Poltrychaceae*-*Sanionia* sociation); 3. Moss-carpet communities; 4. Crustose lichens communities; 5. Phanerogamic Antarctic tundra communities, (with two associations: *Colobanthus*-mosses association and Mosses-*Deschampsia* association) and 6. Fellfield communities (Figure 1).

Discussion and Conclusion

The Fruticose lichens and moss cushion communities occupies in the North face of Stinker plateau. The substrate are basically rock blocks with rare occurrence of soil among them but still without vegetation. This is the only lichen community where *Usnea aurantiaco-atra* (Jacq.) Bory is the dominant population and the principal area where this specie occur. In the areastudied there is a plant community with the largest population of *Usnea* spp verified at the location studies.

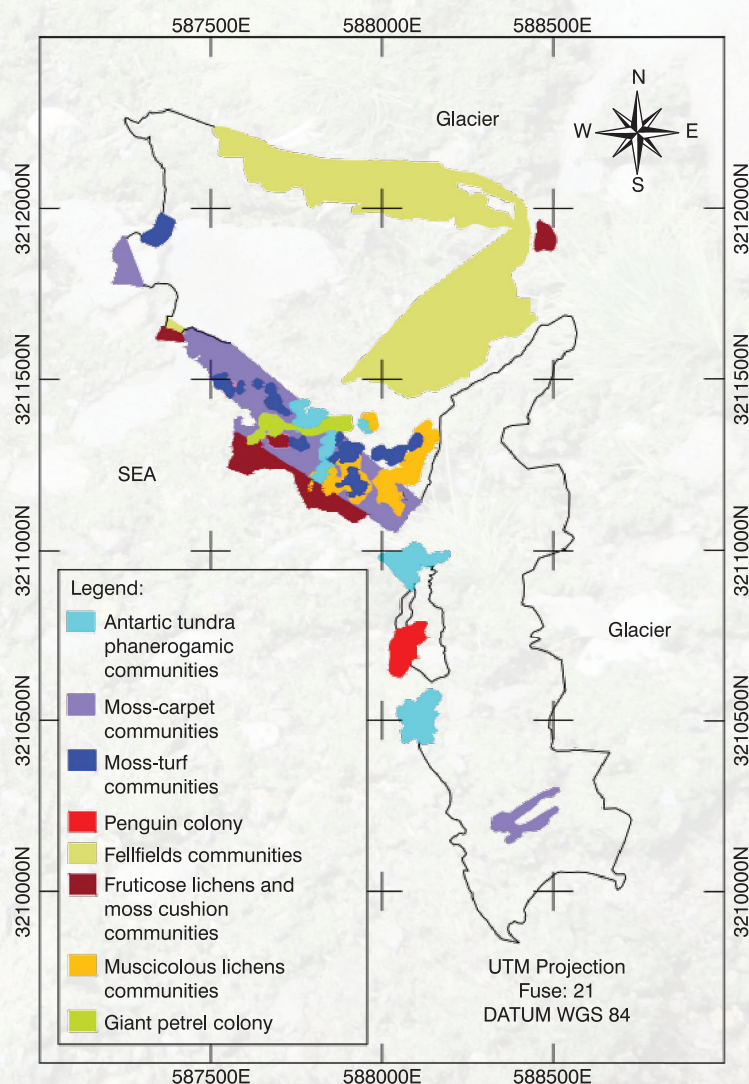



Figure 1. Spatial distribution of plant communities in Stinker Point, Elephant Island, Antarctica.



Moss-turf communities in Stinker Point is one of the most important, occupying great areas mostly near petrel colonies. With the data obtained can be divided into two associations based on species composition and kind of substrate in which it develops: 1. *Chorisodontium-Sanionia* sociation where there is no real soil growing directly on rock fragments. Its floristic composition is basically by the large leaved moss *Chorisodontium aciplhyllum* (Hook. F et Wils.) Broth., with rare occurrence of *Sanionia uncinata* and muscicolous fruticose lichens, specially *Sphaerophorus globosus*, *Cornicularia aculeata* (Schreb.) Ach. and *Usnea antarctica* Du Rietz. There are also some crustose muscicolous lichens like *Psoroma hypnorum* (Vahl) Gray and *Ochrolechia frigid* (Sw.) Lynge. It occupies the greatest areas at the first plateau running from Great Beach northwards where a great population of giant petrel is nesting and it was noted that a lot of nests are old and abandoned. This sociation tends to turn larger since the moss *C. aciplhyllum* is considered partially ornithocoprophilous and already appears in the second plateau where the Giant petrels are beginning to occupy as a new reproduction area. It was observed that the petrel built its nest beside high rock blocks to protect the nest from the strong winds. The nest is built with small rock fragments and as the climate contribute to rock destruction over the years the nesting points become flat and are then abandoned by the petrel.

Polytrichastrum-Sanionia sociation occur where there is the guano influence there is occurrence of *Polytrichastrum alpinum* (Hedw.) G.L.Smith, and in areas without bird colonies it was found *Polytrichum juniperinum* Hedw. This sociation is located in well drained areas frequently in slow elevations of the terrain. In rare cases it occurs also in places near drainage lines, but is rapidly substituted by *Warnsdorfia* spp.

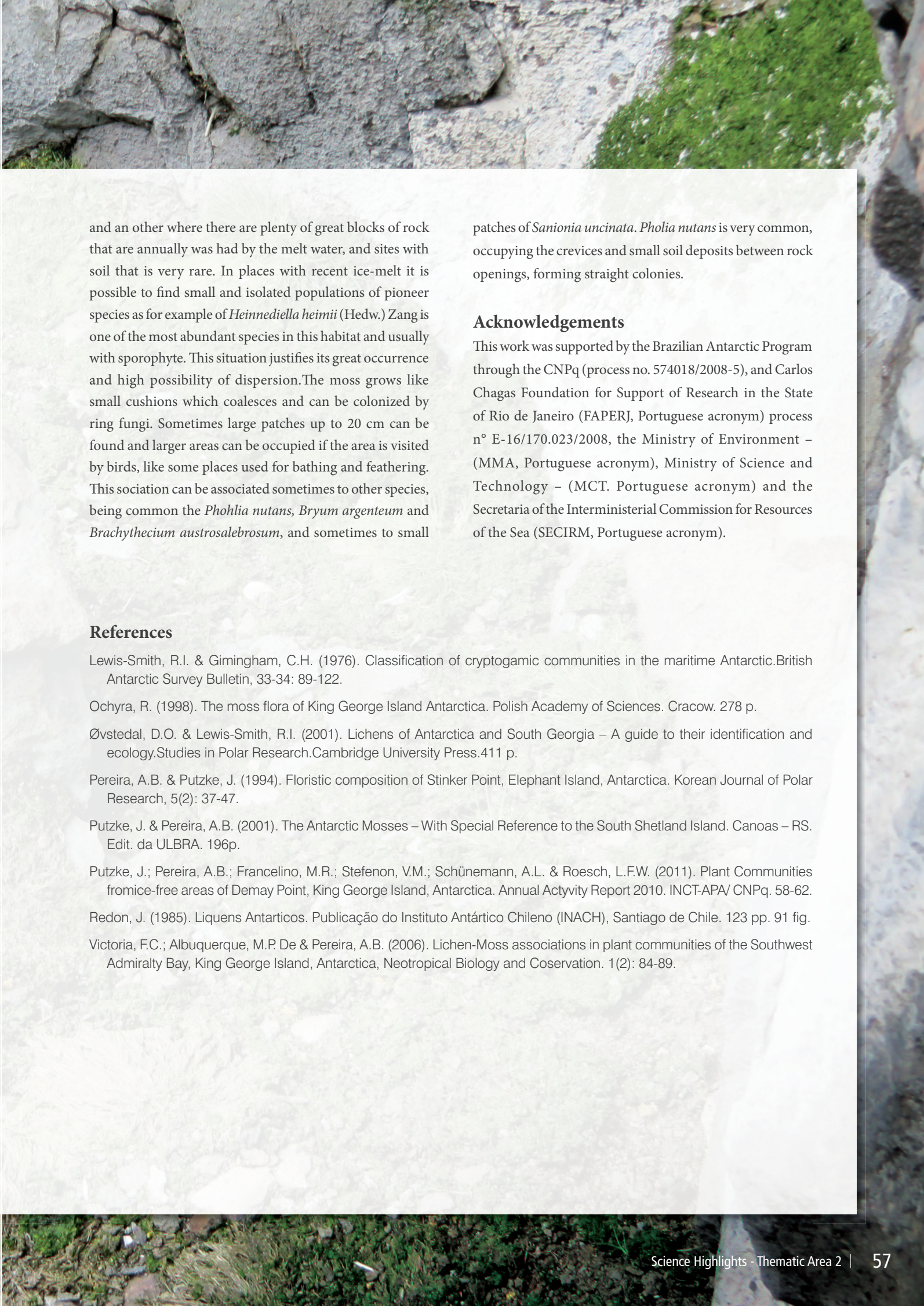
The moss-carpet communities in Stinker Point occur mostly in the first plateau near the beach in the elevations in front of the Great Beach and Naufragous Beach. These areas present stable substrata and represent the oldest plant communities in the region. In some places small areas already turned to fruticose muscicolous lichens, *Sphaerophorus globosus*, *Usnea antarctica* and *Cornicularia aculeata* being frequent. The floristic composition in these areas is basically of *Sanionia uncinata* in the drier places *Brachythecium austrosalebrosum* (Müll. Hal.) Kindb.

and *Warnsdorfia sarmentosa* (Wahlenb.) Hedenäs in the wettest. Some small tufts of *Bryum* spp. (specially *Bryum argenteum* Hedw.), *Hennediella heimii* (Hedw.) R. H. Zander. and *Syntrichia* spp. (*S. filaris* and *S. saxicola*) are found intermixed.

Crustose lichens communities was formed by three associations: 1. Ornithocoprophilous: this association occurs around bird colonies and the most representative species were *Xanthoria elegans* (Link.) Th. Fr., *Acarospora macrocyclos* Vain., *Haematomma erythroma* (Nyl.) Zahlbr., *Rizoplaca* spp. and *Buellia* spp. 2. Ornithocoprophobous: the representative species were *Placopsis contortuplicata* Lamb, *Lecidea* spp. and *Rizocarpoum geograficum* (L.) DC. 3. Halophilous: this association occurs in the intertidal zone and also includes places washed by waves. It is composed by species of the genera *Verrucaria* and *Caloplaca*.

Phanerogamic antarctic tundra communities in the Antarctica this communities is represented by *Deschampsia antarctica* Desv. (*Poaceae*) and *Colobanthus quitensis* (Kunth) Bartl. (*Caryophyllaceae*). Based on floristic composition and dominance of vegetation cover of these two species, in Stinker Point this communities can be grouped on these two association: 1 *Deschampsia* mosses association is sometimes exclusively formed by the grass and in other limited by carpets of *Sanionia uncinata*, since it grows in drier places. The occurrence of cushions of *Syntrichia filaris* and *S. saxicola* and sometimes of *Hennediella heimii* among the grass patches is very frequent. In some places the grass is dead, especially in areas where now banks are formed and along the Skua Lake. 2 *Colobanthus* mosses association on this area forms up to 20 cm cushion like groups which can be coalescent but with limits still clear by the occurrence of *Bryum argenteum*, *Syntrichia filaris* or *Hennediella heimii* line remains in the connection points. Sometimes *Brachythecium austrosalebrosum* is found associated. *C. quitensis* is found in the lower altitudes, along all the Great Beach, being the largest group found in the southernmost part, at the East side of the penguin way (running to the Muralha plateau).

The Antarctic Fellfield communities is mainly characterized by occupied areas with large blocks of rocks that were had annually by melt water or recent ice-free areas, where the plant population are very sparse. In Stinker Point this sub-formation occupies a big area being part of them at disposal only in the last 20 years after glacier retreat



and an other where there are plenty of great blocks of rock that are annually was had by the melt water, and sites with soil that is very rare. In places with recent ice-melt it is possible to find small and isolated populations of pioneer species as for example of *Heinrichella heimii* (Hedw.) Zang is one of the most abundant species in this habitat and usually with sporophyte. This situation justifies its great occurrence and high possibility of dispersion. The moss grows like small cushions which coalesces and can be colonized by ring fungi. Sometimes large patches up to 20 cm can be found and larger areas can be occupied if the area is visited by birds, like some places used for bathing and feathering. This sociation can be associated sometimes to other species, being common the *Pholia nutans*, *Bryum argenteum* and *Brachythecium austrosalebrosum*, and sometimes to small

patches of *Sanionia uncinata*. *Pholia nutans* is very common, occupying the crevices and small soil deposits between rock openings, forming straight colonies.

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