

Final project report

<i>Project ID</i>	2002/1.03
<i>Title</i>	Responses of Antarctic terrestrial and freshwater ecosystems to latitudinal variations of climatic and environmental conditions
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<i>Duration</i>	2 years
<i>Assigned funding</i>	222.000,00 Euro

Activities and results

The project aimed at evaluating possible effects of global climate changes on Antarctic ecosystems through the study of water availability, the biogeochemical cycle of major and trace elements, biological diversity, ecophysiology and phylogeny of algae, fungi, mosses, lichens and microarthropods in Antarctic ice-free areas, disposed along latitudinal and/or altitudinal gradients. Seven research units were involved in the project: Bargagli R. (University of Siena; environmental biogeochemistry and colonization processes); Andreoli C. (Dept. of Biology, University of Padova, biology and ecophysiology of soil and freshwater phototrophs); Carchini G. M. (Det. of Biology, University of Tor Vergata, Rome; freshwater invertebrates); Frati F. (Dept. Evolutionary Biology; University of Siena; genetic variability and phylogeny of Antarctic collembola); Fumanti B. (Dept. of Vegetable Biology; University "La Sapienza" Rome; taxonomy and biology of Antarctic algae); Nimis P.L. (Dept. of Biology, University of Trieste; taxonomy and biology of lichens); Onofri S. (Dept. of Environmental Sciences, University of Tuscia, Viterbo; taxonomy and biology of microfungi).

Results of major scientific interest are reported in articles listed below and can be summarized as follow:

1. chemical weathering processes in Victoria Land ice-free areas are negligible and the marine environment through aerosols and seabirds (nesting in coastal areas) provides most elements essential to the metabolism of algae, mosses and lichens;
2. patches of a new moss species for continental Antarctica (*Pholia nutans*) were discovered on Mount Rittmann fumaroles (northern Victoria Land). Genetic investigations (in collaboration with M. Skotnicki from the Australian National University, Canberra, Australia) showed that the different patches had a very similar genetic pattern (i.e. they probably originated from one or very few immigrant spores);
3. Genetic and molecular biology characterization of a new algal species (*Koliella antarctica*) and identification of 3 new species of Xantoficee. Morphological, ultrastructural and cytochemical studies on several species of Antarctic Chlorophyta and Rhodophyta;
4. population genetic and phylogeny of two species of Antarctic collembola: *Gomphiocephalus hodgsoni* and *Cryptopygus antarcticus*.
5. Isolation of some new species of Antarctic microfungi belonging to the endemic genus *Cryomyces*; characterization of their exopolysaccharides and studies on the effects of UV-B on their spores;
5. establishment of Antarctic algae and lichen databases; contribution to the SCAR-RISCC Biodiversity Database.

Products

A – papers in scientific magazines

1. Castello M., Nimis P.L. (2002). Lichens of Antarctica and South Georgia. *The Bryologist* 105:504-505.

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2. Moro I., La Rocca N., Dalla Valle L., Moschin E., Negrisolo E., Andreoli C. (2002). Fine structure and inferred phylogeny from molecular data of *Pyramimonas australis* sp. nov. (Prasinophyceae, Chlorophyta) from Antarctica. *Europ. J. Phycol.* 37:103-114.
3. Selbmann L., Onofri S., Fenice M., Federici F., Petruccioli M. (2002). Production and structural characterization of the exopolysaccharide of the Antarctic fungus *Phoma herbarum* CCFEE 5080. *Res Microbiol.* 153:585-592.
4. Skotnicki M.L., Bargagli R., Ninham J.A. (2002). Genetic diversity in the moss *Pohlia nutans* on geothermal ground of Mt. Rittmann, Victoria Land, Antarctica. *Polar Biol.* 25:771-777.
5. Tosi S., Casado B., Gerdol R., Caretta G. (2002). Fungi isolated from Antarctic mosses. *Polar Biol.* 25:262-269.
6. Tosi S., Annovazzi L., Tosi I., Iadarola P., Caretta G. (2002). Collagenase production in an Antarctic strain of *Arthrobotrys tortor* Jarowaja. *Mycopathologia* 153:157-162.
7. Zucconi L., Ripa C., Selbmann L., Onofri S. (2002). Effects of UV on the spores of the fungal species *Arthrobotrys oligospora* and *A. ferox*. *Polar Biol.* 25:500-505.4.
8. Moro I., Dalla Vecchia F., La Rocca N., Rascio N., Andreoli C. (2003). Ultrastructural and cytochemical study on *Plocamium cartilagineum*, (Plocamiales, Rhodophyta) from Ross Sea (Antarctica). *New Zeal. J. Bot.* 41:359-371.
9. Moro I., Negrisolo E., Callegaro A., Andreoli C. (2003). *Aplanochytrium stocchinoi* a new Labyrinthulomycota from the Southern Ocean (Ross Sea, Antarctica). *Protist* 154:331-340.
10. Nardi F., Spinsanti G., Boore J.L., Carapelli A., Dallai R., Frati F. (2003). Haxapod origins: monophyletic or polyphyletic? *Science* 299:1887-1889.
11. Vishniac H.S., Onofri S. (2003). *Cryptococcus antarcticus* var. *circumpolaris* var. nov. *Anton Leeuw. Int. J.G.* 83:231-233.
12. Onofri S., Selbmann L., Zucconi L., Pagano S. (2003). Antarctic microfungi as models for exobiology. *Plant Space Sci.* 52:229-237.

B – book chapters

1. Bargagli R., Borghini F., Monaci F. (2003). The sea as major source of ions to lichens in terrestrial ecosystems of Victoria Land. In: Hiskes A.H.L., Giskes W.W.C., Rozema J., Schorno R.M.L., van der Vies S.M. (eds.) *Antarctic Biology in a Global Context*. Backhuys Publ., Leiden, pp. 157-160.

Date: 30 March 2010

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