XXXIII Polish Antarctic Expedition
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by

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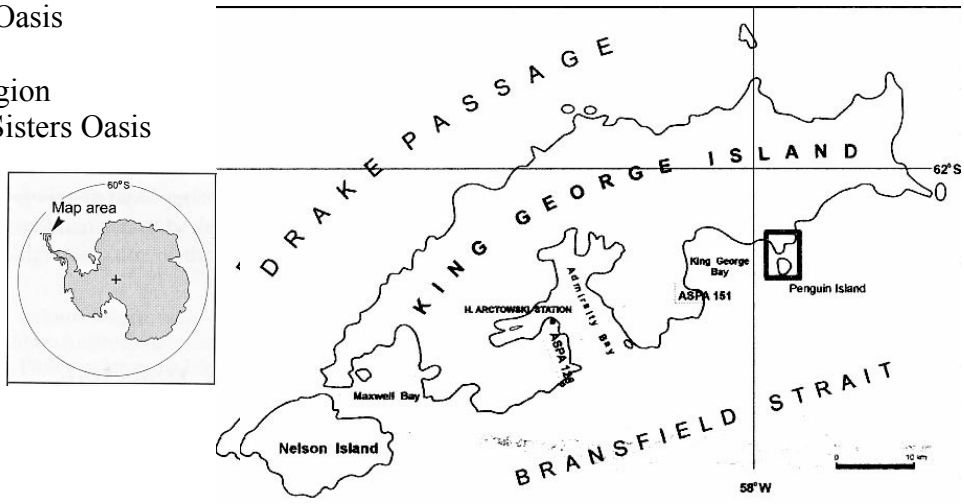
Study area:
Antarctica, King George Island

- Admiralty Bay region
  - ASPA no 128
- King George Bay region
  - Lions Rump (ASPA no 151)
  - Turret Oasis
- Penguin Island
- Sherrat Bay region
  - Three Sisters Oasis



Map of King George Island, and study area

Penguin Island, January 2009

Turret Point, January 2009

Main purpose of the Antarctic Studies

1. Inventory – making of Turret Oasis and Penguin Island natural resources
2. Preparation of Turret Oasis and Penguin Island vegetation maps.
3. Study of introduction alien organisms into Antarctica (Aliens in Antarctica project).
4. Continuation in studies on colonization and succession of new land areas (deglaciated)

Crustose lichen *Caloplaca saxicola*

Fruticose lichens *Sphaerophorus globosus* and *Usnea antarctica*

1 and 2. Inventory of Turret Oasis and Penguin Island resources and vegetation maps

Penguin Island and Turret Oasis (King George Island, South Shetland Islands, Antarctica), particularly interesting in terms of biology and geology, are subject to frequent and uncontrolled visits of tourist ships. The tourists enter the areas occupied by colonies of penguins and giant petrels (*Macronectes giganteus*); the birds are frigthened and often they abandon their nests. The visitors cause considerable damage to the tundra (plant cover and in

particular lichens) which is exceptionally fragile and its recovery is very difficult (the lichens grow very slowly). We have prepared the survey of nature resources, and compiled vegatation maps of this area in order to make an application to SCAR (Scientific Committee on Antarctic Research) to create a protected area. Such area would prevent the uncontrolled landing of tourist ships. We have made the inventory of the bird colonies, birds nests and Pinnipedia colonies (*Mirounga leonina, Arctocephalus gazella*). During our stay (we have lived in tents on the beach by the sea), we were able to observe how the tourists were scaring away the fulmars, and trampling down the Antarctic tern (*Sterna vittata*) nests. The data obtained will allow us to prepare the survey of this region as a base for an application to SCAR to create Antarctic Specially Protected Area (ASPA) which will control and limit the landing of tourist ships.

Elephant seal (*Mirounga leonina*)

Antarctic fur seals (*Arctocephallus gazella*)

Giant petrel (*Macronectes giganteus*)

Chinstrap penguins (*Pygoscelis antarctica*)

Penguin rookery (*Pygoscelis adeliae*)

Elephant seal colony

Aliens in Antarctica project is the first project allowing the evaluation of magnitude and quality of alien species transferred to Antarctica. The aim of this project is to evaluate the role of human population migrating to Antarctica every year as a vector introducing the alien species into the Antarctic ecosystem (seeds, spores, vegetative propagules, eggs, fragments of thallus, whole organisms). International project Aliens in Antarctica widens the three key problems of the world ecology:

1. Present state of natural environment
2. Changing of polar regions
3. Human influence on polar regions

The influence of alien species, in particular the invasive alien species, is presently considered as one of the biggest danger to the biodiversity. One can observe increasingly more dynamical climate changes in West Antarctica. These changes promote not only the introduction of alien species but also establishing their existence in the Antarctic ecosystems. Such introduced alien species pose a threat to the native species. Thus, the determination of the well established invasive grass – *Poa annua* in the natural habitats close to the Polish Station is an important discovery. *Poa annua* introduced in the vicinity of Arctowski Station became, at first, well established in the anthropogenic habitats, where its population were increasing every year. However, recently *Poa annua* was found in the natural communities of newly deglaciated areas. This is the first example of such kind found in Antarctica, and it is connected with the climate warming. The population of *Poa annua* introduced to King

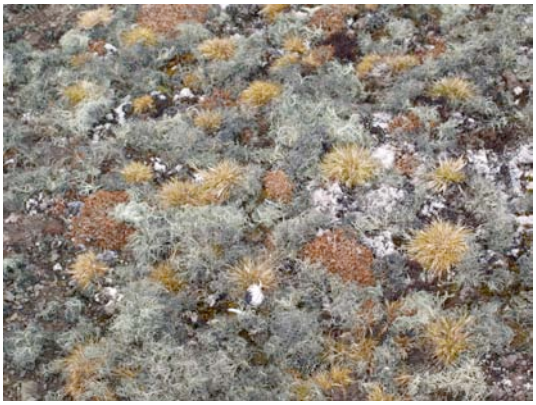
George Islands unexpectedly revealed a high genetic variability (genetic difference due to the geographic origin).

Invasive grass *Poa annua*

Arctowski Station

Colonization and succession of new land areas

Advancing climate warming observed in West Antarctica, and particularly in the region of Antarctic Peninsula is consistent with the global increase of the air temperature caused by the increased emission of greenhouse gases to the atmosphere. The growing anthropogenic pressure could lead to the irreversible climate changes in this region. All such disturbations have unfavourable influence on a very fragile ecosystem functioning in Antarctica. Environmental changes are accompanied by dynamical responses by the flora of the poor Antarctic tundra, which can be considered as a sensitive biological indicator of the climatic changes presently taking place as well as in the past. The changes occurring contemporarily demand the monitoring investigations, carried out during many years, concerning the colonization and succession in the newly created ecosystems. I have carried out for over 20 years investigations on the forefields of rapidly retreating glaciers – concerning the colonization and succession. These investigations allow to understand the dynamics of changes connected with the climate warming and decreasing soil humidity in the region of West Antarctica. Vanishing of certain species and the whole communities was observed due to being overgrown by the grass *Deschampsia antarctica*.



Antarctic tundra dominated
by grass *Deschampsia antarctica*
and lichen *Usnea antarctica*

Lichen colonizers during
early stages of succession

I have collected numerous new specimens for the herbarium, increasing therefore the collection of Antarctic lichens (this is one of the largest collection of Antarctic lichens in the world). In the collection there are many species rare for Antarctica, many species new for Antarctica, and 2 species new for science.

Lichen *Ramalina terebrata*

Presentation of expedition results:

- Results will be presented at the International Conference (August 2009, Mądralin, Poland)
- In preparation is the exhibition – Antarctic Lichens in the museum of Jagiellonian University Botanical Garden in Kraków, and Department of Antarctic Biology Polish Academy of Sciences
- In preparation – publications in the renowned journals, as well as in the popular science journals

- In preparation – the project of the protected area in Turret Oasis and Penguin Island to be submitted to SCAR.

Weddell seal, Turret Point

Members of the Expedition

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