Masaryk University, and especially its Faculty of Science, has a long tradition of research activities in polar regions. This goes back to the 1980s: summer geographical expeditions focused primarily on climatology (and to a lesser extent geomorphology). The experience gained in these research projects led to the realization of a project that was carried out between 1994-1997 with the support of the Botanical Institute of the Czech Academy of Sciences at the Henryk Arctowski Polish Antarctic Station on King George Island in the South Shetlands. The next project, on "Ecology of a Coastal Antarctic Oasis", was implemented in the six years from 1999-2004. In addition to the Department of Geography this project was carried out by the Department of Plant Physiology and Anatomy, the Department of Analytical Chemistry and to a lesser extent the Department of Zoology and Ecology. This time the research was directed at the western coast of the Antarctic Peninsula (the Academic Vernadsky Ukrainian station on Galindez Island, Argentine Archipelago), though studies were also carried out at the Machu Pichu Peruvian base on King George Island. In the beginning the main field was climatology; this was expanded to include topoclimate and current concerns such as monitoring the effects of atmospheric circulation on air temperature and humidity, and assessing the influence of atmospheric factors on UV radiation and its components. Thanks to cooperation with plant physiologists, botanical disciplines such as productive and stress physiology, biodiversity and ecophysiology and the taxonomy of plants and organisms forming vegetation oases were incorporated into the research; these were followed by geomorphology (focused on research into preglacial processes) and analytical chemistry (focused on the chemistry of the pedogenetic process in weathered Antarctic rock). Experience from visiting other stations and the need to carry out work in Antarctica in accordance with our own principles and timeframe, led to the idea of constructing a Czech station in a part of the continent enabling the aims of the Czech scientific programme to be met.

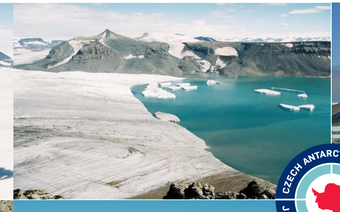
Realization: Czech Ministry of Education, Youth and Sports
Project development: Investprojekt, s.r.o. Zlín
Chief construction contractor: PSG International, a.s. Zlín
Shipping: Czechoslovak Ocean Shipping, s.r.o.
Subcontractors: Contimart Komárno (Slovenská republika), Elma-term Kroměříž, MG PLAST Letovice, Ekosolaris Kroměříž, CZECH PAN Varnsdorf, AZ Klima Brno, WLV Zlín

Czech Republic

UNIVERSITAS MASARYKIANA BRUNENSIS

The Johann Gregor Mendel Czech Antarctic Station

James Ross Island, Antarctica



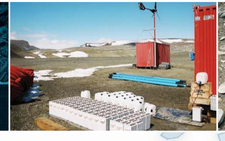
CZECH ANTARCTIC STATION JOHANN GREGOR MENDEL

Not far away from south polar circle on James Ross Island, a station has been built by Masaryk University in the years 2000-2006, which will serve for an antarctic research of the Masaryk University Faculty of Science, and other academic institutions. This project arose in 1999 on the ground of the Department of Geography of the Faculty of Science. An important contribution to the international agreement with this project was made by the Czech Antarctic Act, which was ratified on 6 August 2003, and came into effect on 31 March 2005. With this Act, the Czech Republic became a new member of the Committee for Environmental Protection (CEP) in Antarctica Treaty (AT), and on behalf of Masaryk University to the European Polar Board (EPB). This took place at the Antarctic Treaty Consultative Meeting ATCM in Stockholm in 2005. The scientific polar station was named after the famous Czech geneticist and climatologist Johann Gregor Mendel.

The basic aim of the project entitled **"Construction of a Czech Scientific Station in Antarctica"** was to create a suitable scientific, technical and logistical basis for undertaking Czech scientific programmes. Johann Gregor Mendel Station was finished in 2006. The construction of this station ranked the Czech Republic one of the advanced countries, which contribute to the research of the ice continent.

The construction of the Antarctic scientific station was essential to meet all the building requirements stipulated in the two main international documents regulating all activities in Antarctica, the Antarctic Treaty and the Protocol on Environmental Protection to the Antarctic Treaty. Proof that these have been met must be provided in a document entitled the Environmental Impact Assessment. The project assessment procedure was marked by the ATCMs in Warsaw in 2002, Madrid in 2003 and Cape Town in 2004. Among those who played a key role in this process were the Czech Ministry of the Environment, Ministry of Foreign Affairs of the Czech Republic, the Czech Geological Survey, the Botanical Institute of the Czech Academy of Sciences and Czech Technical University in Prague.



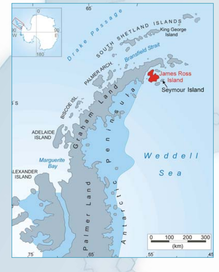








Though 98 per cent of Antarctica is covered in ice, small deglaciated areas are present that enable life to exist. Temperatures that drop to -90°C and the extreme dryness of the glacier-covered part of the continent preclude the existence of any but extreme forms of life. The coastal areas, which are markedly influenced by the oceans, have less extreme temperatures and are considerably more humid. These conditions make it possible for communities of, in particular, blue-green algae, algae, lichens and masses (only two vascular plants find their habitat here) to survive. Antarctica is a significant stabilizing factor in the earth's climate. Yet here too some effects of contemporary global warming are present; this is not only reflected in a shrinkage of glacier mass but may also have an impact on the development of the local ecosystems, whose structures are very simple and which are therefore very fragile.
The location of the Czech scientific station in the Antarctic Peninsula was chosen with the maximum care so as to provide the optimal conditions for carrying out the proposed research programme, which focuses on the complex study of deglaciated areas. This led to its being located on the northern coast of James Ross Island. The rest of the island is glaciated. James Ross Island is comprised of Cretaceous sediments; in the Tertiary period, extensive lava flows covered its surface. These create summits of mesas and precipitous coastal promontories. The surface of the island was shaped by glaciers and after their partial retreat, the formations were exposed to frost weathering and the effects of water erosion. The detrital and periglacially shaped slopes of the mesas are the result of these




activities. Glacier tongues flow from the edges of the icecap, running into inlets where their ice walls calve, giving birth to icebergs.
During southern summer season of 2005-06, construction of the station began, with the research having carried on gradually since summer 2004-05. Construction termination date was on 4 March 2006.
The basic concept of the project calls for ecological requirements to be met in a realistic way by using the renewable sources of energy (wind power, solar radiation). Many technical solutions are quite original. The result is a modern and ecologically sophisticated polar research facility for Masaryk University that can accommodate fifteen to twenty scientists.

The scientific research programme of the station is intended to be long-term and multidisciplinary. It is linked to international polar projects coordinated by the Scientific Committee on Antarctic Research and the European Polar Consortium EUROPOLAR ERA-NET. The area where the MU scientific station is located has significant research potential. It is situated on the eastern side of the Antarctic Peninsula, which has yet to be fully explored, and the area round the station is notable for its rich geological structure- and what is probably the most significant oscillation of climate change within relatively short periods of time (in the

range of decades). An important role in the evolution of the area was played by glaciation, which has gradually receded within a comparatively short time (around 8,000 years in the Antarctic Peninsula and 6,000 years on James Ross Island). The baring of the surface of the earth brought radical changes, among them climatic changes, physical and geochemical modifications of the deglaciated substrate, the shaping of the new surface and its gradual colonization by living organisms. The multidisciplinary nature of the station's scientific research programme is determined by its focus on a complex study of the deglaciated terrain (the coastal Antarctic oasis) from the point of view of both its biotic and its abiotic components, their relationships and the function of the whole system, including predictions relating to its further development. The programme aims to arrive at a deeper understanding of the area's geological evolution, the resistance and continuity of climate evolution in polar regions, its impact on the formation of the area's surface relief, biota and current climatic problems (global warming, the question of the ozone layer and UV radiation). The programme is also intended to shed light on the role of the living organisms inhabiting the ice-free areas and their adaptability to conditions that can be regarded as representing their extreme energy and nutritional limits. The programme includes such fields as geology, geochemistry and analytical chemistry, a group of disciplines linking physical geography (climatology, geomorphology, hydrology) and a number of biological disciplines (in particular botany, ecology, ecophysiology and the stress physiology of plants, microbiology and soil biology).

Geology

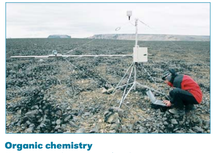
- magmatic and metamorphic evolution of the northern part of the Antarctic Peninsula (temperature and pressure parameters, dating of evolutionary periods); reconstruction of the mutual relationship of the western Antarctic microcontinents, interaction of the Pacific Ocean crust and the lithosphere of the Antarctic Plate. Basic geological mapping, paleoclimatological and paleogeographic reconstruction of the last glaciation of the station area.

Geomorphology

- geomorphological mapping of the area, speed of denudation caused by various types of geomorphological processes, lithosphere response to Antarctic climate changes, periglacial processes.

Geochemistry

- the role of physical and chemical weathering in a deglaciated area. Weathering processes in relation to the mineralization, composition and effects of precipitation and of surface and underground water, to the atmosphere and the soil atmosphere, the influence of the biota and organic substances. Monitoring of the pedogenetic process.



Organic chemistry

- contents and spectrum of anthropogenic emissions into the polar environment and their photodegradation as a result of solar radiation.

Climatology

- effect of atmospheric factors and their operation on the recent deglaciation of the area; monitoring of the effects of surface relief on the deformation of the circulation field and the transformation of the properties of air masses. Types of the local climate and topoclimate in the area. Energy relationship between the atmosphere, surface of the earth and its subsoil, and their effect on microclimate formation and the morphogenesis of the deglaciated area. Monitoring of solar radiation and its characteristic components (photosynthetically active radiation, UV radiation), radiation of the atmosphere and the surface of the earth, tracking factors that influence these radiations. Soil climate and its role in the pedogenetic process.

Botany

- **biodiversity of the deglaciated area:** types of terrestrial and wetland ecosystems, structure of the lower plant communities (blue-green algae, algae, lichens, bryophytes) and their comparison with continental and coastal Antarctic systems.
- **photosynthesis and the primary production of lower plants:** substance (carbon and nitrogen) and energy fluxes in ecosystems, space-time analysis of ecosystems, productivity of ecosystems and their sensitivity to climate changes; comparison with other Antarctic ecosystems. Photosynthesis of masses and lichens in relationship to available nutrients and abiotic conditions in their habitat. Dependency of photosynthetic and productive processes on the biotic conditions of their environment, respiration of typical species and its effect on the carbon balance of the communities. Productive model of Antarctic terrestrial vegetation.
- **stress physiology of masses and lichens:** determination of the photosynthetically active period of the Antarctic summer, of the low temperature, humidity and radiation limits of biochemical processes, means of protection of the photosynthesis system against photoinhibition, non-photochemical processes in photoprotection.

Zoology

- **soil biology:** occurrence of invertebrate edaphic animals, determination of dominant species, their numbers and their basic ecophysiological characteristics in relation to habitat conditions (microclimate, food sources), the metabolism and activity of enzymes.

- **biodiversity, ecosystem and complexity of the littoral:** its evolution under the influence of destruction by sea ice and sedimentation of mainland material.

These scientific disciplines are interconnected in the programme: the aim is to provide a complex overview of the genesis, evolution and contemporary state and function of the ecosystem of the deglaciated area, including predictions of its further development.

The station is open to scientists from other Czech institutions and researchers from abroad

Since the second half of the 1980s, a team of physical geographers, geologists, chemists and biologists with a professional interest in the polar regions has been taking shape in the Czech Republic around a group of scientists from the Faculty of Science of Masaryk University. Most of those involved are scientists from the Czech Geological Survey, the University of South Bohemia and the Czech Academy of Sciences (the Institutes of Botany, Geology and Soil Biology). The station has always been viewed as the primary site for research by Czech scientists, but the research potential of the area is sufficiently attractive to encourage international cooperation as well. This was proved by the admission of the Czech project on "Multidisciplinary Ecological Study of an Antarctic Oasis" (MESAO) to the framework of the International Polar Year 2007-08, and by the launching of a joint glacioclimatic project carried out in cooperation with the British Antarctic Survey. Masaryk University would like to cooperate with the nearest neighbours to the Czech research station in Antarctica, the Argentine and Chilean stations; in view of this, and the advantages of mutual cooperation, the Czech Foreign Ministry is preparing bilateral agreements on scientific and logistical cooperation with the Antarctic institutions of these countries.

Julius Johannes PAYER (1841–1915)
A painter and polar explorer, Payer was born in Teplice-Sanov in northern Bohemia. He participated in a German expedition to the eastern coast of Greenland and led land expeditions in two Austrian expeditions to the North Sea. Payer discovered King William's Land and played an important role in the discovery of Franz Josef Land and its exploration to 82° north (he led the first three sledge expeditions to this archipelago). Payer was the first climber in the Arctic, reaching the top of several peaks exceeding 2000 metres; Payers Bjerg in northern Greenland is named after him. He was also an excellent painter; many of his paintings contain polar motifs.

František BĚHOUNEK (1898–1973)
Physician and geophysicist, Professor at the Czech Technical University in Prague. His main interest was experimental research into radioactive and cosmic radiation. In 1928, Běhounek participated in Nobile's North Pole expedition, reaching the pole on board the "Italia" airship. After it crashed, Běhounek survived for 48 days (in the famous "Red Tent") on an ice floe northeast of Svalbard.

Václav VOJTĚCH (1901–1932)
Geographer and historian who, shortly after graduating from the Faculty of Science of Charles University in Prague, participated in Admiral Byrd's expedition to Antarctica (1928-1930), where he worked as ship's stoker and dog handler. In 1929, Vojtěch was the first Czech to set foot on the Antarctic continent. He was awarded the Gold Medal of the United States Congress and asked to join further American and Canadian Antarctic research expeditions. Unfortunately, he died tragically while preparing for another expedition to the Arctic.

Emil HADAČ (1914–2003)
Botanist and landscape ecologist, Professor at the Faculty of Education in Plzeň, Guest Professor at the College of Sciences in Baghdad, leading scientist at the Czech Academy of Sciences. In 1936 and 1937, Hadač worked in Iceland, and in 1939 in Svalbard. He made significant contributions in the field of Arctic flora (tracheophytes) and is regarded as the founder of Arctic phytocenology. Hadač led a Czech biological expedition to Iceland in 1948, and in 1985 he participated in a Slovak-Czech hydrobiological expedition to Svalbard.

Antonín MRKOS (1918–1992)
Astronomer and geophysicist, Associate Professor at the Faculty of Education in České Budějovice and Faculty of Mathematics and Physics of Charles University in Prague, with his most important work being done at planetariums in the High Tatras and Kiel in southern Bohemia. His main interest was the study and measurement of minor bodies of the solar system, minor planets and comets (he discovered thirteen comets and nearly 580 minor planets). He participated in Soviet expeditions to Antarctica (1957-1959 and 1961-1963), where he worked on the Novolazarevskaya, Mirny and Vostok continental station and made several expeditions to the Antarctic interior.

Josef SEKYRA (*1928)
Geologist and geomorphologist, scientist at the Central Geologic Institute and Associate Professor at the Faculty of Science, Charles University in Prague. He has worked predominantly in arid and mountainous areas, where his focus has been on periglacial geomorphology and cryopedology. Sekyra took part in a 1966-1967 Soviet expedition to Antarctica and worked at the Molodezhnaya and Novolazarevskaya polar stations. In 1968-1969 he worked at the McMurdo American station (project Deep Freeze). In 1969 Sekyra was the first Czech to reach the South Pole.

Josef SVOBODA (*1929)
Botanist and ecologist who left Czechoslovakia in 1969 in order to escape the Communist regime; became Professor of Botany at the University of Toronto. Between 1970 and 1994 he participated in a complex ecological research project in the Canadian Arctic (especially on Ellesmere Island), which he eventually came to head. He has focused mainly on ecology and adaptations and succession of plants in deglaciated areas of the high Arctic. He is regarded as the world's leading expert on Arctic botany and ecology.

Pavel Prošek (*1940)
Climatologist and Professor at the Institute of Geography, Faculty of Science, Masaryk University. He focuses primarily on microclimatology, the energy balance of the ground atmosphere-earth surface system and topoclimatology. Prošek has taken part in three geographic expeditions to Svalbard (1985, 1988, 1990) and led two Antarctic projects (1994 – 1997 and 1999 – 2004). From 2000-2006 he headed the project for the construction of a Czech scientific station on James Ross Island.