



ACADEMIA ROMÂNĂ
Președinte

Bucharest, December 21, 2007

Attn. Professor **Chris Rapley**, President of SCAR
TO: Dr Peter D Clarkson
Acting Executive Officer
SCAR Secretariat
Scott Polar Research Institute
Lensfield Road
Cambridge CB2 1ER, United Kingdom

Dear Professor Chris Rapley,

The Romanian Academy, a Member of ICSU, by this appoints the Romanian Polar Research Institute, Bucharest, to represent Romania as an Associated Member in the Scientific Committee of Antarctic Research (SCAR) - the scientific organism of the Antarctic Treaty, in which Romania is a Member State since 1979.

Acad. Ionel Haiduc

President of Romanian Academy

Romanian Polar Research Institute
1, Libertatii Blvd, Bucharest-4, Romania
Phone/Fax: 004021 3372986; Mobile phone: 0040743009984

Email: negoita_antarctic@yahoo.com

Annex

The Romanian Program of Polar Research was initiated in 1987, and the first ten expeditions of polar research have been organized in the Arctic (Greenland, Spitsbergen, the Extreme North of Canada, North Siberia, North Pole area), where research on: glacial and periglacial geomorphology, cryosoils, Arctic flora (vegetation chromatography) and fauna (freshwater crustaceans, reindeer migration), microbiology, pollution (with heavy metals and radionuclids) have been carried out.

The evolution of the Romanian research in Antarctica was a result of the cooperation with the countries that agreed to take the Romanian teams on board of their polar research ships and to collaborate with us (Russian Federation and China).

The quality of the Romanian research in Antarctica was improved based on the support from Australia, that agreed by the Memorandum in 2005 to open the Law-Racovita Station in Larsemann Hills, East Antarctica also for Romanian activities.

The main Romanian research and studies in Antarctica, Law Racovita Station included, referred to:

- The pollution degree and distribution in Antarctica and the Southern Ocean (contaminants and sources, pollution pathways) – heavy metals, radionuclids and persistent organic compounds;
- Cryopedology (soil formation processes and stages under extreme conditions);
- Models of climate change study by means of ^{18}O and ^2H isotopes; study of isotopic effects within the water-ice-snow exchanges;
- Antarctic ecosystems, terrestrial and marine flora and fauna;
- Antarctic soil and aquatic microorganisms, adaptability mechanisms under extreme life conditions, and their biologically active products (enzymes, etc.) with possible future applications in biotechnologies;
- Antarctic viruses, host-virus relationship, viral infections;
- Human medical research: organism resistance, adaptability, behaviour and nutrition under extreme life and work conditions;
- Specific polar logistics and research activities in the Larsemann Hills, Law-Racovita station in cooperation with Australia, China and Russian Federation.

The Romanian research institutes and universities carrying out polar studies are involved, often in cooperation, in various research programs and projects: excellence, ideas, capacities and networking projects, both national and European (FP7) or international. Romania also carried out activities specific to Antarctic Treaty organisms (SCAR and CEP). The Romanian Polar Research Institute and Romanian Antarctic Foundation also developed important dissemination activities in order to increase the interest of the young generation and the general public in polar research, especially related to the climate change phenomena and the necessity to take adequate steps to mitigate their effects.

Romanian Polar Research Institute organized and coordinated, in 2006 and 2007 in Romania, as activities within the national excellence research projects of “networking” type, two international polar research symposia, the last one being coupled with the International Workshop “The European Polar Research Icebreaker AURORA BOREALIS – FP7 Project”, coordinated by European Science Foundation and „Alfred Wegener” Institute for Polar and Marine Research, Germany. These symposia were important dissemination frameworks for the Romanian polar research results and perspectives, with a significant visibility and resonance in the European area.

Among the Romanian Polar Research Institute foreign partners, Australian Antarctic Division played an important role in the proposal and achievement phases of the networking excellence research projects.

The Romanian institutes and universities carrying out scientific research in Antarctica are the following:

1. Romanian Polar Research Institute, Bucharest

One of the main Romanian polar research operators, working under the coordination of Romanian Antarctic Foundation, and that covers, by itself or in collaboration with numerous Romanian/foreign institutes and universities, most of the above mentioned research fields. The Romanian Polar Research Institute main studies and results, respectively, referred to:

- Chemical, biotic and enzymic characterization of soil samples from the Arctic, East and West Antarctica; assessment of the vital and enzymic processes in Antarctic soils based on the modular and synthetic (biological) indicators (of Romanian concept, Stefanic et al. 1984, 1994) used to assess the level of microbiota development and terrestrial crust evolution in various soil forming stages, in order to improve the alpine pasture productivity (Negoita, Stefanic et al. 2000, 2001, 2002, 2004, 2007);
- Isolation and morphologic characterization of extremophyle microorganisms (bacteria and yeasts) in Arctic and Antarctic soils; identification of strains with a high biosynthesis potential (Negoita, Bahrim et al. 2004, 2007);
- Astroclimate studies in Larsemann Hills, East Antarctica (Popescu, Negoita et al, 2007)
- Determination of tritium concentrations in water from Antarctic lakes, snow and ice; level and distribution of tritium concentration activity in Antarctica, resulting from anthropogenic and cosmogenic sources (Negoita, Cuna, Varlam, 2000, 2006, 2007);
- Determination of radionuclids in Arctic areas (Negoita et al, 2000)
- Determination of heavy metal ions in the Planetary Ocean and Antarctic freshwater; study of the heavy metal pollution level and distribution; pollution antropic factors in Antarctica (Negoita, Cotta, Capota et al., 1997, 2000, 2004, 2007);
- Determination of the POPs (PCBs and organo-chlorine pesticides) distribution in Arctic soils as compared with their levels in Antarctic soils; contamination sources and pathways. (Negoita, Covaci et al., 2003, 2004, 2007);
- Medical research in extreme conditions: alpine, underground (caves) and polar environments; studies of the human resistance/ adaptability/behaviour/disease under extreme life and work conditions (in polar expeditions: in research stations, “Law-Racovita” Antarctic Station included, on board of ships, on the terrestrial routes). Human organism resistance tests. Nutrition under extreme conditions (Stroia, Negoita, et al. 2000, 2005, 2007);

2. “Lower Danube” University, Galati, Romania

- Isolation and morphologic characterization of extremophyle microorganisms (bacteria and yeasts) in Arctic and Antarctic soils; identification of strains with a high biosynthesis potential; based on the isolated strain enzymic activity tests, certain *Bacillus sp.* strains, with complex hydrolazic activity, and *Streptomyces sp.* strains, with catalazic and tyrosinazic activities were retained for further studies in the MIUG microorganism collection of the “Lower-Danube” University Galati, Romania (Negoita, Bahrim et al. 2004, 2007);
- Elaboration of laboratory-level biotechnologies of enzymes and fodder biomass production starting from 5 Antarctic yeast strains isolated in pure cultures, identified as belonging to *Candida* genus. (Bahrim, 2000, 2004, 2007)
- Analysis of the genetic alterations between similar species of microorganisms from different habitats (Antarctica and temperate zones); genomic differences between strains; selection, by molecular, structural and catalytic analysis and models, of the Antarctic cold-adapted *Bacillus sp.* bacteria having the DH_Ala gene and expression of these DH_Ala genes, in view of possible applications in biotechnologies (Bahrim et al., 2007)

4. Isotopic and Molecular Technologies Institute, Cluj-Napoca, Romania

- Models of climate change study by means of ¹⁸O and D isotopes; mass-spectrometry study of isotopic effects within the water-ice-snow exchange (Cuna, et al., 2000, 2007);

5. “Stefan S. Nicolau” Virology Institute of Romanian Academy, Bucharest

- Selection of microorganism strains producing biologically active substances (exoenzymes) with anticell (cytotoxic and apoptotic) properties; *in vitro* characterization of the anticell effect of proteins isolated from Antarctic soils; *in vitro* tests on human tumor cell lines (Toparceanu, 2007)
- Medical research in polar areas; studies of the human resistance/ adaptability/behaviour/disease under extreme life and work conditions (in polar expeditions: in research stations, “Law-Racovita” Antarctic

Station included, on board of ships, on the terrestrial routes). Human organism resistance tests. Nutrition under extreme conditions (Negoita, Stroia, Toparceanu et al. 2000, 2005, 2007);

- Viruses in East Antarctic Larsemann Hills ecosystems (soil, lakes, penguin colonies); host-virus relationship determination; phycodnaviruses in Antarctic aquatic ecosystems; viral infections (Toparceanu et al. 2007).

6. National R&D Institute of Cryogenics and Isotopic Technologies – ICSI Rm. Valcea, Romania

- Determination of tritium concentrations in water from Antarctic lakes, snow and ice; level and distribution of tritium concentration activity in Antarctica, resulting from anthropogenic and cosmogenic sources (Negoita, Varlam, 2000, 2006, 2007).

Based on the previous Romanian research results and the symposium discussions between scientists from 29 Romanian institutes and universities and from 10 countries, and the AURORA BOREALIS FP7 Project team, the following areas of interest have been identified for the future Romanian polar research.

Research Objectives:

1. Paleo-oceanography and paleoclimate research

- Marine environmental, sedimentological history and evolution
- Carbon sink in the Arctic and Southern Oceans

2. Sea-ice system

- Growth/accumulation of microalgae in different types of sea ice
- Contribution of microbial communities to re-mineralization of organic matter in the ice
- The role of the sea ecosystem: in matter transport to higher trophic levels
- Ice evolution study

3. Oceanographic research

- Marine environmental and sediment structures and evolution
- Possible Romanian contributions to the AURORA BOREALIS Icebreaker design and construction:

4. Geological, geophysical and astrophysical research

- Geological evolution and morphology, sedimentation processes, new mineral resources, continental shelf stratigraphy. Research in the area of the Romanian „Law-Racovita” Station in East Antarctica.

5. Chemistry

- Chemical research within the connected interdisciplinary studies

6. Polar ecosystems – biodiversity, adaptation and impact of climate change

- Ecosystems of Arctic and Southern Oceans, and polar terrestrial ecosystems

7. Marine microbiology (sea ice, marine / terrestrial / coast aquatic ecosystems). Microorganisms and viruses

- *In-situ* detection and monitoring of the microorganism biodiversity, abundance and activity by molecular biology and genomic techniques

- Micro-niches sustaining microorganism symbiotic consortia in the ocean, marine sediments and extreme environments

- Stress Adaptation Mechanisms of Microbial Psychrophiles (as models of adaptation and survival, and analogues of life on other planets in *astrobiology*); cold - adapted microbial enzymes and their applications

- Viruses and microorganisms preserved in sea ice and coast lakes water; molecular detection and classification of viruses in polar aquatic/marine ecosystems; phycodnaviruses in polar aquatic ecosystems; host-virus relationship determination; (on-board) preparation of natural viral concentrates for subsequent studies

8. Effects of climate change on species long-term prospects

- Monitoring of the species adaptability and biodiversity modification

9. Biogeochemistry and pedobiology in polar coast areas

- Forming processes of polar cryosoils. Enzymes in polar soils, their applications in biotechnologies (water and soil bioremediation and biosensors included)

10. Polar marine and coastal areas pollution

- Polar environment pollutants (heavy metals, oil products, persistent organic products, radioactive isotopes), contamination paths, decontamination methods

11. Medical research in polar zones:

Research zones: Arctica and Antarctica, polar expeditions and stations, Australian and Romanian “Law-Racovi” Station in East Antarctica included; Arctic and Southern Oceans

References

1. Negoiu T. Gh., Tefanic Gh., et al. 2001. Chemical and Biological Characterization of Soils from the Antarctic East Coast, *Polar Biology*, 24, 565-571, ISSN: 0722-4060 (Print) 1432-2056 (Online)
2. Negoiu T. Gh., Tefanic Gh., et al. 2002. Microbial, Chemical and Enzymatic Properties in Spitsbergen Soils. *Polarforschung*, 71 (1/2), 41-46. ISSN: 1438-387X
3. Bahrim G., Negoiu T. Gh. 2004. Effect of inorganic nitrogen and phosphorous sources on hydrolase complex production by a selected *Bacillus subtilis* Antarctic strain ”*Romanian Biotechnological Letters*, 9 (6), 1925-1932, ISSN:1224-5984, p. 1925-1932
4. Bahrim G., Negoita T. Gh. 2007. Antarctic Soils Bacteria – a Source of Enzymes as Bioremediation Agents, *CIGR Section VI-3rd International Symposium Food and Agricultural products: Processing and Innovations*, 24-26 September 2007, Naples, Italy (<http://www.aidic.it/3CIGR/fullpaper.htm>)
5. Bahrim G., Negoita T. Gh. 2007. Antarctic bacteria as good producers of industrial interest enzymes, Volume Expanded abstracts/ *The VI Argentine and III Latin-American Symposium on Antarctic Research*, Buenos Aires, Argentina, September 10-14, 2007. ISSN1851-555X
6. Bahrim G., Negoita T. Gh. 2007. *Streptomyces* strains from East Antarctic soils as tyrosinase producers. *The VI Argentine and III Latin-American Symposium on Antarctic Research*, Buenos Aires, Argentina, September 10-14, 2007. ISSN 1851-555X
7. Negoiu T.Gh. and Ropot M. 1997. Analysis of Heavy Metals in the Arctic Waters, *Environmental Pollution in the Arctic*, 1, 331-333, Tromsø, Norway.
8. Negoiu T. Gh., Covaci A., Gheorghe A. and Schepens P. 2003. Distribution of Polychlorinated Biphenyls (PCB_s) and Organochlorine Pesticides in Soils from the East Antarctic Coast. *Journal Environ. Monit.* (The Royal Society of Chemistry), 5, 281-286, ISSN: 1464-0325
9. Negoiu T. Gh., Varlam, C., Kuznetsov, V., Cotta, M.. 2007. Antarctic waters tritium levels. *The VI Argentine and III Latin-American Symposium on Antarctic Research*, Buenos Aires, Argentina, September 10-14, 2007. ISSN 1851-555X
10. Topârceanu, F., Negoiu T.Gh., Chengli, X., Wei, J., Xiang, T.H. and Bistrov, E. Evaluation of Romanian Explorer Adaptation to Isolation and Cold during Antarctic Summer 2005-2006. *The VI Argentine and III Latin-American Symposium on Antarctic Research*, Buenos Aires, Argentina, Sept. 10-14, 2007. ISSN 1851-555X
11. Stroia A., Negoiu T. Gh.et.al. 2005. *Antarctic and Arctic Research*, Vol. III, Publishing House of the Romanian Antarctic Foundation, Bucharest, 120 p. ISSN 1584-7292.
12. Negoiu T. Gh. (Australia, China, India, Romania and Russian Federation). 2007. Larsemann Hills, East Antarctica. Antarctic Specially Managed Area. Management Plan. XXXth Antarctic Treaty, ATCM, Final Report of the XXX Consultative Meeting, New Delhi /India / 30 April to 11 May 2007, ISBN 978-987-23163-2-7, published by Secretariat of the Antarctic Treaty Buenos Aires, p.99-130 / <http://aspire.nvi.net/gen>; National Science Foundation Digital Library
13. Popescu P., Paraschiv R., Popescu R., Negoiu T. Gh., Cotta M. 2007. Romanian remote control telescope in Law-Racovita Antarctic Base. Fifty Years of Romanian Astrophysics, Bucharest, Romania, 27-30 September 2006, American Institute of Physics, *AIP Conference Proceedings*, Vol.895, New York, 2007, p. 195-198, ISBN 978-0-7354-0400-7 /ISBN 0094-243X
14. Negoiu T. Gh., Bahrim G., Tefanic, Gh., Ropota et. al. 2001. *Antarctic and Arctic Research*, Vol. I, Publishing House of the Romanian Academy, Bucharest, 122 p. ISSN 1584-7292.
15. Negoiu T. Gh., Bahrim G., Covaci A., Tefanic, Gh., et. al. 2004. *Antarctic and Arctic Research*, Vol. II, Publishing House of the Romanian Antarctic Foundation, Bucharest, 121p. ISSN 1584-7292.
16. Negoiu T. Gh., 2006. *Antarctic and Arctic Research*, Vol. IV, Publishing House of the Romanian Antarctic Foundation, Bucharest, 125p. ISSN 1584-7292.
17. x x x. 2007. *International Symposium on Polar Scientific Research*, Bucharest, Romania, November 15-16 2006, *Book of Abstracts*, vol. I, The Publishing House of the Romanian Antarctic Foundation, ISSN 1843-469X , p.105, 2007. editor Negoiu T. Gh.