Final project report

<i>Project ID: Title:</i>	2002/1.08 Transport and life support systems of Antarctic cell lines and organisms
Principal investigator: Institution:	Giancarlo Albertelli Dipartimento per lo studio del territorio e delle sue risorse, Università di Genova
Email:	albert@unige.it
Duration: Assigned funding:	2 years €100.000,00

Activities and results

The Antartic activities consisted in the installation and setting of a series of tanks placed in a refrigerated container ISO20 (ENEA patent), provided by PNRA and installed by operating units 2 and 3 which allow to transfer a large number of Invertebrates (Cnidarians, Molluscs, Echinoderms, Tunicates) and Fishes from Terra Nova Bay to Genoa Aquarium. Obviously these organisms were found through a sampling which was targeted or collateral to other research activities planned during the same period

The project had the following two objectives:

- the implementation of systems for the transport and the conservation in Italy of Antarctic marine organisms
- the setting of methods for cryoconservation in order to transport over long-distance viable cells of Antarctic invertebrates and for molecular characterization of Antarctic echinoderms protease.

As regards the first issue a PNRA refrigerated container has been prepared with four big pools and six small pools adequately aerated and filtrated. Thanks to the container specimens of Cnidarians, Echinoderms, Molluscs, Tunicates and Fishes have been brought back to Italy. Most of these organisms are still (2008) exhibited to the public in tanks of the Antarctic area of Genoa Aquarium or in the stalling area. Therefore the technique developed allowed to keep the specimen picked up from Antarctica alive and viable.

- 2a) *Cryoconservation of cells.* The results showed that the techniques used enabled the survival and recovery of frozen cells after one year and two years of conservation with the temperature at -20 °C. For a few samples it was possible to obtain 3D cell lines which survived beyond one month in a cold store (4 °C).
- 2b) *Study of the proteasic activity of echinoderms stomach for a biotechnological use.* The first part of the work was carried out using frozen material. In particular, starfish collected during the expedition and immediately frozen have been unfrozen, dissected and the pyloric ceca quickly homogenated.

In view of the foregoing, the targets can therefore be considered achieved, showing the possibility for Antarctic living organisms to reach Italy and overall their preservation for long periods. The realization of transport, the setting of conservation techniques (feeding included) and the great adaptability of the specimen show that in the future a large number of specimen could be provided to the national or international scientific community for experimentations without sending researchers in Antarctica. The same applies to cell cultures and biochemical studies.

Products

A – papers in scientific magazines

B – book chapters

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C - proceedings of international conferences

 Senes L., Guidetti M., Chiantore M.C., Schiaparelli S., Rostirolla I., Ricci F., Schimmenti G. & Cattaneo-Vietti R., 2001. Transport and Husbandry of Antarctic Animals. *Atti dell'EUAC* (European Union of Aquarium Curators). La Rochelle.

D – proceedings of national meetings and conferences

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E – thematic maps

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F – patents, prototypes and data bases

ENEA patent on refrigerated container assigned to the transport of Antarctic marine organisms to Italy

G - exhibits, organization of conferences, editing and similar

Realization of a permanent exhibition (esposure of the findings in the Antarctic area at the *Acquario di Genova*). 4 conferences at the *Auditorium Acquario di Genova* and 1 at the *Museo Nazionale dell'Antartide* (Genova).

H - formation (PhD thesis, research fellowships, etc.)

DEGREE THESIS

- 1 *Testaquadra Roberta*: Osservazioni su organismi antartici e tecniche di mantenimento in ambiente controllato; Scienze Biologiche (Observations on Antarctic organisms and conservation techniques in controlled environment; Biological Sciences)
- 2 *Raffo Elisabetta*: Osservazioni etologiche su vertebrati ed invertebrati antartici; Scienze Biologiche (Ethology observations on Antarctic vertebrates and invertebrates; Biological Sciences)
- 3 Francesco Massa: Tecniche di laboratorio per lo studio biochimico di proteasi da echinodermi mediterranei ed antartici: prospettive per un loro impiego biotecnologico; Scienze Ambientali (Laboratory techniques for biomedical studies of protease from Mediterranean and Antarctic echinoderms: prospects for their biotechnological utilization; Environmental Sciences)
- 4 Elena Ottati: Tecniche biochimiche per la purificazione e la caratterizzazione funzionale di enzimi proteolitici da echinodermi; Scienze Ambientali (Biomedical techniques for purification and functional characterization of proteolytic enzymes from echinoderms; Environmental Sciences)

PRACTICE/INTERNSHIP

assigned to I. Ferraro that will be subject to a degree thesis at the University of Genova

Research units

Resarch unit 1. PI: Giancarlo Albertelli

Relevant institute: Dipteris, Università di Genova Research task: rearing and experiments on Antarctic living organisms

Giancarlo Albertelli Carlo Ossola Enrico Olivari Paolo Bernat Mario Petrillo Stefano Schiaparelli Simone Bava Marta Guidetti Antonio Sara' Giada Franci Andrea

Resarch unit 2. PI: Lorenzo Senes

Relevant institute: Acquario di Genova Research task: Planning exhibit structures for antarctic marine organisms

Lorenzo Senes Antonio Di Natale Giovanni Schimmenti

Resarch unit 3. PI: Franco Ricci

Relevant institute: ENEA- C.R. Casaccia Research task: Planning and realization of an installation for the transport of living biological marine sample from Antarctica

Franco Ricci Massimo Subrizi

Resarch unit 4. PI: Umberto Benatti

Relevant institute: DIMES, Universita' di Genova Research task: Methods for dissociation, cryoconservation and preservation of marine invertebrates' cell lines from Antarctica. Isolation, preservation and growth of Antartic strains of diatoms.

Umberto Benatti Marina Pozzolini Elena Zocchi Marco Giovine Antonella Penna