

Overview of other challenges, gaps in understanding and cooperation

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Regional activities

- Antarctic Treaty System
- Andean Pact
- ASEAN
- African Union
- Arctic Council
- Pacific
 - Pacific Island Forum Secretariat (PIFS), the Secretariat of the Pacific Community (SPC), the Secretariat for the Pacific Regional Environment Programme (SPREP)
- Nordic Council
- European Union

Bioprospecting

- Extremophiles are interesting because they have developed unique physiological and biochemical responses to their harsh environment
- Most interest in *Candida Antarctica*, an alkali-tolerant yeast, found in the sediment of Lake Vanda
- Higher organisms also of interest including species of fish, sponges, lichen, moss along with micro-organisms



Bioprospecting

- Polymerase
- Anti-cancer drug
- New antibiotics
- Cold cold-active enzymes
 - for better detergents, cleaning agents, leather processing, fermentation and meat tenderisation
- Heat resistant dyes
- Improved forensic tests for DNA
- Paper and pulp preparations
- Wound healing and skin treatment
- Cosmetic skin treatment

Bioprospecting

- ZyGEM Corporation
 - frensicGEM (to extract human DNA from crime scene samples)
 - phytoGEM (plants)
 - prepGEM (animals)
 - The new reagent extracts DNA from - smaller samples - three times faster and at - greatly lower cost than other existing extraction methods
- An enzyme derived from a micro-organism found in a volcanic vent in Antarctica by New Zealand scientists

Bioprospecting

Companies examining Antarctic organisms

- Diversa
- Genencor International B.V.
- Unilever
- GlaxoWellcome Viridian
- IWW Rheinisch-Westfälisches Institut für Wasserforschung Gemeinnützige
- Merck Sharp & Dohme de Espana
- BioSearch Italia S.P.A
- Cerylid Biosciences
- DSMZ - Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH

Bioprospecting

- Patents based on Antarctic organisms
 - Bayer
 - Du Pont
 - Astra Zeneca
 - Henkel KGAA (Germany)
 - Lion Corp
 - Nippon Soda
 - Roche
 - Tokuyama Corp
 - Novonordisk AS



Bioprospecting

- International Polar Year
 - Origin, evolution, biodiversity and survival of epi/endolithic microorganisms from Polar and cold environments (ID 49 – Italy)
 - ANDEEP-SYSTCO (ANTarctic benthic DEEP-sea biodiversity: colonisation history and recent community patterns - SYSTem COUpling) (ID 111 – Germany)
 - Biological and functional diversity of microbial communities in ecologically distinct polar environments (ID 205 – Malaysia)
 - Antarctic Studies of the Western Ross Sea (ID 237 – USA)
 - Application of new molecular markers for characterisation of cyanobacteria isolated from polar regions and identification of cyanobacterial strains producing bioactive compounds (ID 243 – Poland)
 - Polar microbial diversity: exploration, function and exploitation (ID 846 – Belgium)
 - Polar Microbial Observatories in Antarctic and Sub-Antarctic coastal zones (ID 953 – France)
 - Complex Investigation of Antarctic Biota (ID 1152 – Ukraine)

Bioprospecting

- Biological prospecting activities, though currently modest in scope, are taking place in Antarctica and the Southern Oceans
- Further biological prospecting is planned
- The prospecting activities in Antarctica appear to be confined to sampling, with no indication of plans to harvest material

Bioprospecting

- Collection of material is generally carried out for many purposes
 - Difficult to clearly distinguish between commercial and scientific activity
- Questions that have arisen in the development of products include:
 - how can ownership be properly acquired?
 - what procedures need to be followed to ensure that the use is legitimate?
 - what if any approvals are necessary to ensure that the patent application is valid?
 - is benefit sharing required and if so with whom?

Antarctic Treaty System

- The Antarctic Treaty
- Protocol on Environmental Protection (Madrid Protocol)
- Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Convention on the Regulation of Antarctic Mineral Resources Activities (CRAMRA)

Antarctic Treaty System

- 28 Consultative Parties
 - Argentina, Australia, Belgium, Brazil, Bulgaria, Chile, China, Ecuador, Finland, France, Germany, India, Italy, Japan, the Republic of Korea, the Netherlands, New Zealand, Norway, Peru, Poland, the Russian Federation, South Africa, Spain, Sweden, Ukraine, the United Kingdom of Great Britain and Northern Ireland, the United States of America and Uruguay
- 18 Non Consultative Parties
 - Austria, Belarus, Canada, Colombia, Cuba, Czech Republic, Denmark, Estonia, Greece, Guatemala, Hungary, Korea Dpr Of, Papua New Guinea, Romania, Slovakia, Switzerland, Turkey and Venezuela

Antarctic Treaty System

- Scientific observations and results from Antarctica should be exchanged and made freely available to the greatest extent feasible and practicable
 - Article III of the Treaty
- Prior assessments of the environmental impacts of activities planned pursuant to scientific research programmes, tourism and all other governmental and non-governmental activities must be carried out
 - Article 8 of the Protocol and Annex I
- Any harvesting regulated to prevent the decrease in size of harvested populations to levels below their maximum sustainable yield as well as of non-target species and the marine ecosystem as a whole
 - Article 2 CCAMLR
- Parties annually provide statistical, biological and other information
 - Article 20 CCAMLR

Antarctic Treaty System

- SCAR Report to ATCM
 - Information Paper XXIII ATCM/IP 123 SCAR (1999)
- CEP V considered the matter in 2002
 - Working Paper WP-043 UK
- ATCM XXVI first took up the issue in 2003
- CEP VI in 2004 dropped bioprospecting from its agenda
 - the existing provisions of the ATS adequately dealt with the environmental impacts of bioprospecting

Antarctic Treaty System

ATCM XXVIII - Resolution 7 (2005) Biological Prospecting in Antarctica

Recommend that:

- 1) their governments draw to the attention of their national Antarctic programmes and other research institutes engaged in Antarctic biological prospecting activities the provisions of Article III(1) of the Antarctic Treaty;
- 2) their governments continue to keep under review the question of biological prospecting in the Antarctic Treaty Area, and exchange on an annual basis information and views relating to that question as appropriate.

Antarctic Treaty System

- ATCM XXX – 2007
- Some delegations welcomed the proposal to develop a web-based database on biological prospecting
- Agreed to establish an Intersessional Contact Group (ICG) to examine the issue of biological prospecting in the Antarctic Treaty Area
 - identify issues and current activities related to biological prospecting in the Antarctic Treaty Area
 - The Netherlands is the convenor of the ICG
 - report at ATCM XXXI on the work of the ICG

Observations

- Environmental impacts of genetic resource use addressed by the existing procedures
 - use has been confined to sampling
 - likely to remain so
- Definitions
 - “bioprospecting”, “pure/applied” research distinction

Observations

- Parties have expressed the need for more information
 - Resolution 7
 - Knowledge about use and value of genetic resources is anecdotal and fragmented
 - Overview about who is doing what, where and when
 - More domestic engagement, information, analysis and preparation to begin to address this complex issue at the international level

Database

- Antarctic Bioprospecting Database
 - provide a more systematic way of providing information on this issue
- Searchable fields
 - Project details
 - Companies using Antarctic research
 - Parties approving or sponsoring relevant research
 - Benefit sharing terms
 - Patents
 - Commercialized products



Observations

- The effects of IPRs with regard to the free exchange of scientific information
 - Adverse or Positive?
 - The changing dynamics of R&D highlighted by Geoff Burton
- What are the legal issues relating to the ownership and protection of these resources (or who owns the commercial products resulting from the resources?)
- Is benefit sharing feasible and if so with whom?
- Developments in other international processes of relevance

Observations

- The absence of clear rules restricts use of these resources and this affects stakeholders in significant ways
 - For industry the uncertainty about the use and ownership of samples inhibits their support for Antarctic research
 - For scientists a lack of clear protocols for exchanging information arising from commercial activities inhibits their ability to work with companies and adapt to the changing nature of basic research around the world
 - For governments it has proven difficult to negotiate how benefits of commercially orientated research are shared adequately