# International cooperation and coordination on issues related to

# Marine Genetic Resources Current and future challenges Social and Economic Aspects

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United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea – 8<sup>th</sup> Meeting

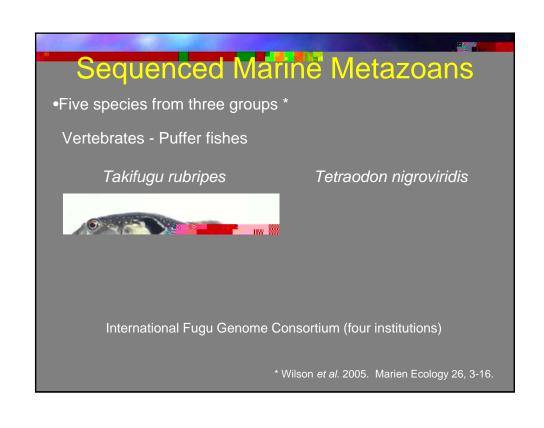
#### Marine Biodiversity

- High diversity in the marine environment (coral reefs, hydrothermal vents, deep water corals)
- Largely unknown
  - Weddell Sea (CML)\* 674 isopod species (90% new spp.)
  - Deep Sea Corals under threat, more than half are already gone
  - Genomic and bioinformatics\*\* 1.2 million genes -1,800 bacterial species in the Sargasso Sea
- Difficult access
  - Shallow waters are most studied about 5% of the world's oceans
  - Scientific research in the high seas
    - Special technology
    - High costs
    - International cooperation

\* Nature 447, 2007 \*\*PLoS Biology 5(3)

### Genetic Diversity

- We know less about genetic diversity than we do about species diversity
- The sea
  - -Cradle of life
  - -Marine organisms
    - Key to our evolutionary history
    - Main components of the Earth's phyletic biodiversity



## Sequenced Marine Metazoans

Urochordates – Sea squirts and larvacea

Ciona intestinalis
-International (26 institutions)

Ciona savignyi

- National (four institutions)



Appendicularian

Oikopleura dioica

-International two institutions

# Sequenced Marine Metazoans

Echinoderm - sea urchin

Strongylocentrotus purpuratus

- International several institutions

#### Marine Genetic Resources

- New set of tools
  - Genomics, bioinformatics and proteomics
  - Small microoorganisms
- Promise for understanding
  - Species physiological responses to the environment
  - Gene-environment interactions that determine biodiversity at multiple scales
- Biotechnology
  - Aquaculture (disease control)
  - Pharmaceuticals
  - Cosmetics
  - Environmentally friendly technology

#### Biotechnology and Genetic Resources in Brazil

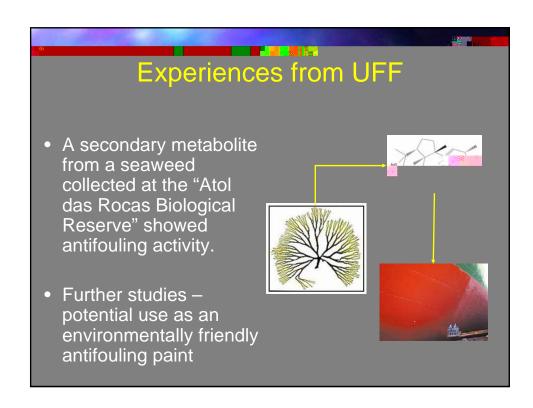
- National Policy on Biotechnology
  - Develop innovative biotechnological products and processes and build capacity within research institutions
- Approximately 1,700 biotechnology research groups
  - Human genome project consortia institutes
  - Genetic vaccine against the dengue virus
- Very few working with MGRs

#### Biotechnology and Genetic Resources in Brazil

- International Cooperation
  - 12 countries
    - Argentina, France, Germany, United Kingdom, USA
  - Limited regional cooperation

### Experiences from UFF

- Microbe-killing gel from a type of algae found at the "Atol das Rocas Biological Reserve" may be used to block HIV infection.
  - Preliminary lab tests 95% efficient against HIV virus with low cytotoxicity.
  - Final product more than 50% efficiency.
  - A product with at least 30% efficiency would help to reduce 40% of the number of new HIV cases each year in Africa.



#### **Extremophiles from the Deep Sea**

- Organism which thrives in 'extreme' conditions
- Found on the deep ocean floor, hydrothermal vents
- Genes that help the adaptation of the organism to extreme conditions
- Potential industrial application
  - Lipases catalyze the hydrolysis of long chain triglycerides
  - Biotechnological applications
    - fat and oleochemical industry
    - biodegradable polymers
    - detergent industry
    - Cosmetics
    - production of biodiesel
  - Oceanobacillus iheyensis Proteolytic enzymes, detergents.

# Marine Genetic Resources Legal Framework

- United Nations Convention on the Law of the Sea (UNCLOS)
  - Living resources + Marine Scientific Research
  - Benefit of mankind as a whole
- Convention on Biological Diversity (CBD)
  - Jurisdictional Scope

# Marine Genetic Resources Conclusions

- Ad Hoc Working Group, established by the UNGA, to be convened in 2008.
- MGRs uses beyond national jurisdiction should aim to provide benefits to all populations.

THANK YOU