

# Marine Genetic Resources: Experiences in Commercialization

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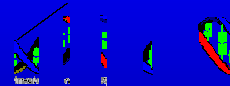
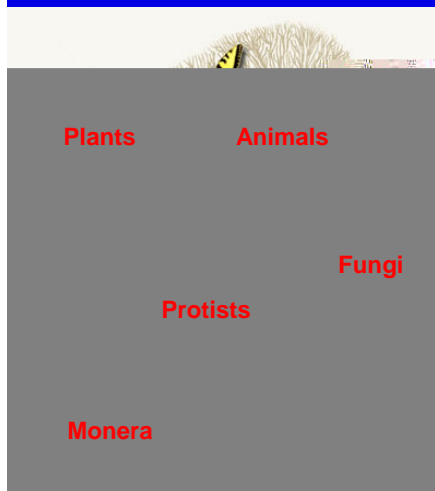
United Nations Open-ended  
Informal Consultative Process  
on Oceans and the Law of the  
Sea; Eighth Meeting

26 June 2007



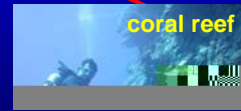
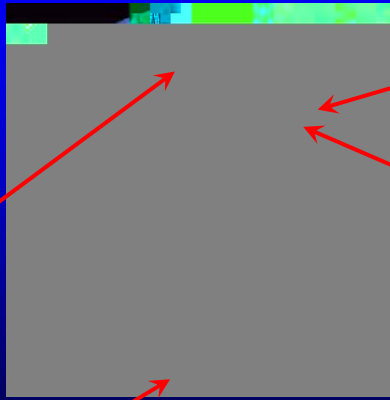
## Background

Marine Genetic Resources: “genetic material of actual or potential value”. [Convention on Biological Diversity]





# Ocean Habitat Diversity



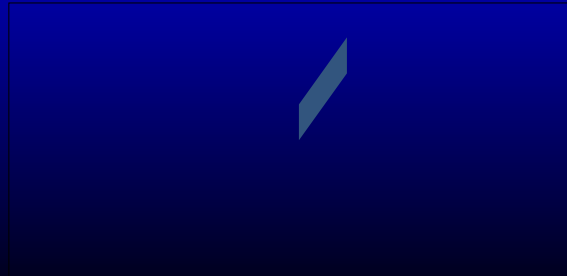
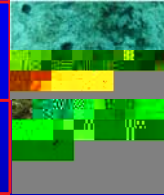
polar





# Marine Pharmaceuticals

Product	Application	Original Source
<b>Pharmaceuticals</b> Acyclovir (Ara-A) Cytosar-U (Ara-C)	Antiviral drug Anticancer drug	<b>Sponge:</b> <i>Cryptotheca crypta</i>
<b>Pharmaceuticals</b> Prialt (conotoxin)	Analgesic	<b>Cone snail:</b> <i>Conus magnus</i>

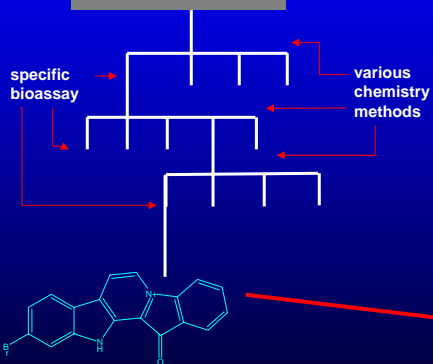




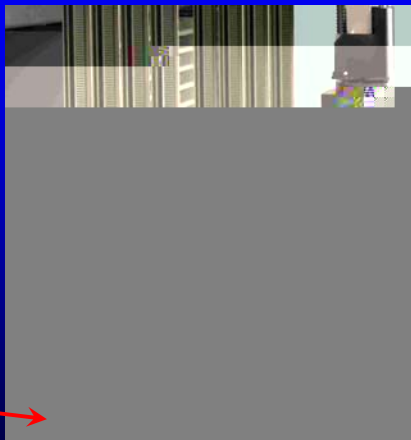
# Laboratory Approaches



Bioassay-guided fractionation



High Through-put Screening

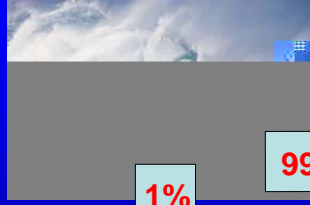


Chemistry-driven (slow & costly)

Biology-driven (fast, but sample-limited!!!)



# Sourcing Microbial Diversity



SW contains  $10^6$  to  $10^9$  microbe cells/ml; sponges can have 50% cells by weight



*E. coli* heterologous expression system

99%

1%



Molecular techniques

Marine microbial diversity

Microbial fermentation



# Research Partnerships

Direct Benefit Sharing: IP Compensation

Research

Public Sector

Private Sector

Utility

Diffuse Benefit Sharing: Societal Opportunities

collaborations w/ local managers

stakeholder meetings

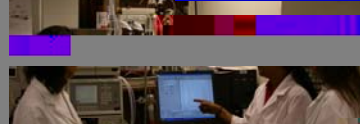
training opportunities



Panama 2005



Jamaica 2004



Oxford MS 2007

## Our Partnership Model:

Baker et al 1995; J Nat Prod 58:1325  
Rosenthal 1999; Pharm Biol 37:6

- capacity enhancement [scientists & infrastructure]
- research collaborations and shared results/IP
- technology transfer and education opportunities
- access to information relevant to biodiversity
- priority research and economic contributions



## Conclusions

- Marine genetic resources have tremendous potential for a variety of biotechnology applications:
  - public health
  - food security
  - environmental remediation
- There are direct [= shared IP] and diffuse [= use]