

The Nagoya Protocol



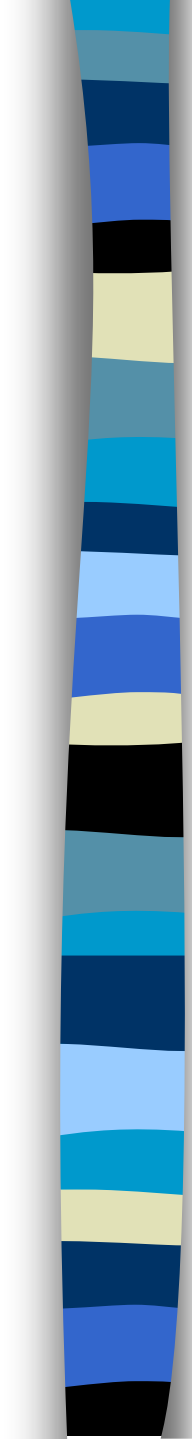
Ex-situ Collections: Advantages



Ex-situ Collections: Advantages

Briefly I am going to:

- Explain the Protocol
- Explain its implications for research
- Show how it helps ex-situ collections
- Use the example of the Australian Institute of Marine Science (AIMS) to show an existing collection has successfully prepared for the Protocol.



The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilization – (in 10 minutes)

- Adopted CBD Oct 2010 - in force 2013?
- Signed 92 Countries, Ratified 5 – needs 50 then 90 days to commence operation
- Applies to In-situ and Ex-situ biological material
- Applies to material within national jurisdiction



Nagoya Protocol

- Creates first global trading and investment system in the use of genetic resources
- 6 years in Negotiation – not perfect
- Applies to material taken for purpose of research on its genetic and biochemical make-up
- Purpose is to ensure countries with natural resources can reliably get a share in value created from those resources



Nagoya Protocol

Typical products derived from Genetic resources include:

- ❑ Pharmaceuticals
- ❑ Industrial Enzymes
- ❑ Biofuels
- ❑ Cosmeceuticals
- ❑ Nutraceuticals
- ❑ Climate adaptive organisms drought, salt, temp etc
- ❑ Limited only by imagination



Nagoya Protocol

- Does not cover:

- Commodity trade - ie fishing, lumber, grains, essences, wild harvest and

Includes:

- Special Provision for Non-commercial Research ie introduces provision for simplified procedures



Nagoya Protocol- Operation

1. Responsible Country issues Research Permit
2. Permit contains reference to obligation to share in benefits (as agreed)
3. Permit registered in Montreal and creates an ***internationally recognized certificate of compliance***
4. All countries are required to ensure Permit material brought in is utilized in accordance with original Permit



Nagoya Protocol

Acronyms and Code decoded:

- CBD = Convention on Biological Diversity = protecting biodiversity
- ABS- Access and Benefit Sharing = what you get if the NCI gets lucky
- PIC –Prior Informed Consent = The Research Permit
- MAT –Mutually Agreed terms = the benefit sharing agreement or contract eg agreement with National Cancer Institute



Nagoya Protocol

- CHM – Clearing House Mechanism = international permit registry
- NFP – National Focal Point = designated country information source
- NCA – National Competent Authority = country permit issuer



Nagoya Protocol – ABS elsewhere

- ABS is under treaty negotiation in the World Intellectual Property Organization
- FAO International Treaty for Plant Genetic Resources for Food and Agriculture deals with ABS
- UN Law of the Sea – negotiations now underway (wait for Lyle’
- World Health Organization ABS and pathogens – Bird Flu deal



Ex-situ Collections - opportunity

In-situ collecting— advantage:

- Source of new species,
- polymorphism,
- less research competition
- Cool places, and colleagues have tans and muscle tone

Eg Craig Venter's research schooner and crew



Ex-situ Collections - opportunity

In-situ –Disadvantage:

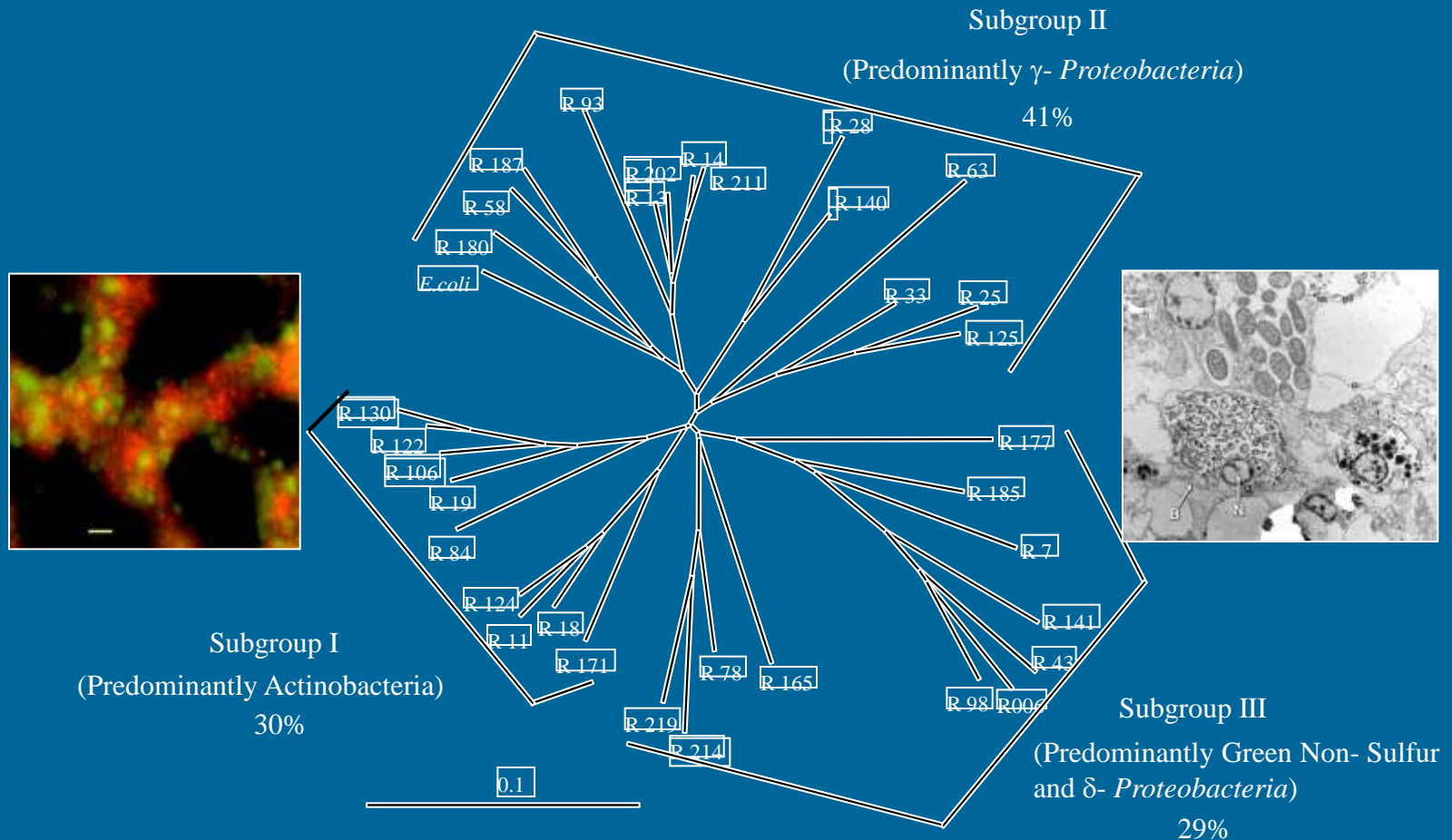
- cost,
- Time
- Transport and curation logistics
- taxonomic identification,
- raw sample, &
- permits & national bureaucracies

Australian Institute of Marine Science Marine Science Bio resources Library

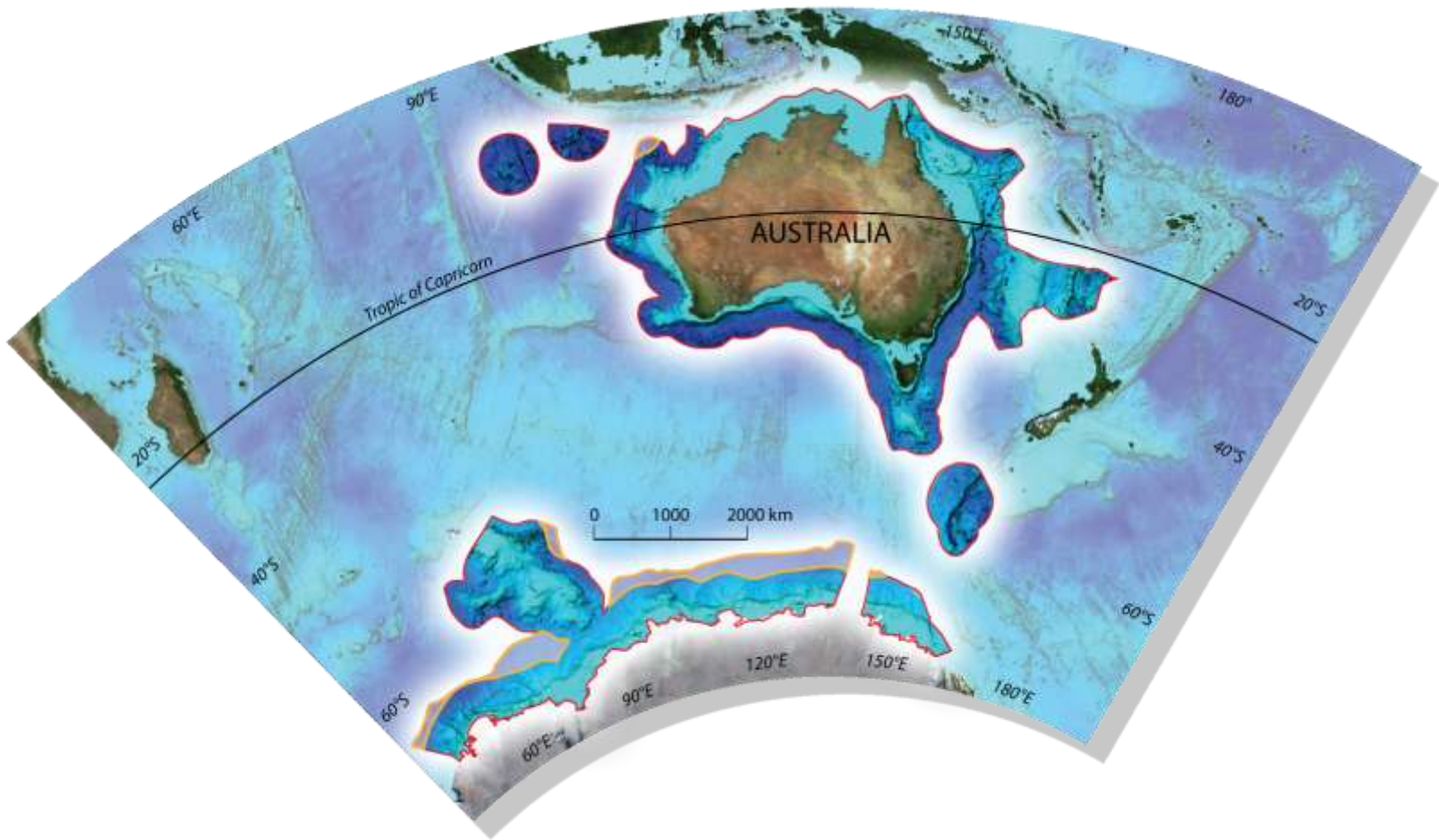
Example of a Public Ex-situ collection ready
for Post-Protocol new research interest



Superimposed with bacterial symbiont diversity



- High biodiversity of microorganisms found in the stable community within the GBR sponge *Rhopaloeides odorabile*. Webster et al 2001 App Env Microbiol
- 3000 different species of bacteria (deep sequencing). Webster et al 2010 Env Microbiol



Reduced overheads for Partners

- High cost of specialist and properly curated & documented biodiversity collections
- Uncertainties over supply (re-supply for development and supply for market)
- Legal certainty to commercialise – access and benefit sharing clarity, transaction costs
- Bioresources libraries provide economy of scale

Legal Certainty

- Already CBD and ABS National Law Compliant and years of ABS experience
- Organized for the Nagoya Protocol:

- Choice of being:

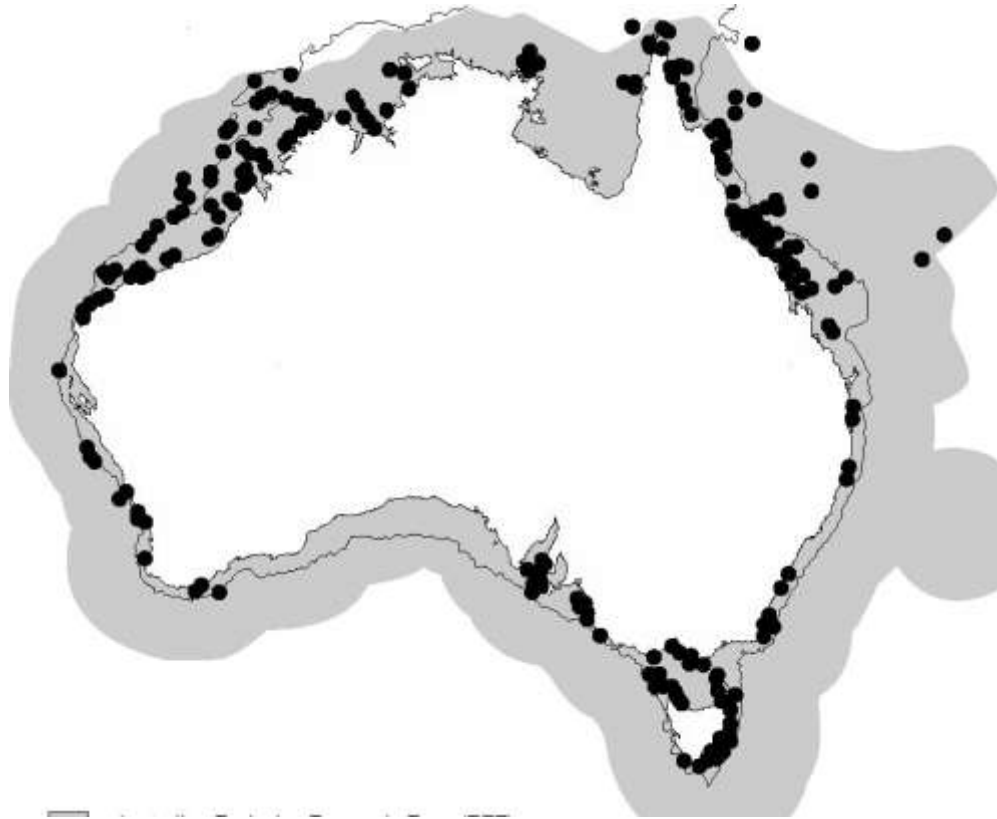
A Designated National Competent Authority or

Passing on its Permits and benefit-sharing agreements to the Central National Competent Authority

Marine Bioresources Libraries



Collection locations AIMS Bioresources Library

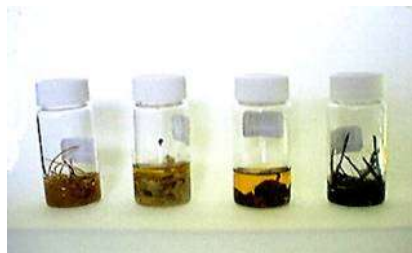


What do bioresources libraries look like?





Frozen bulk



extracts

Cryopreserved pure cultures



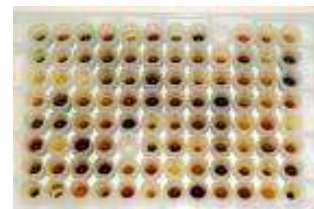
ferment and
extract



compounds



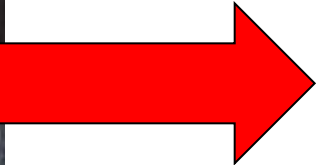
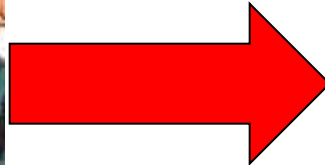
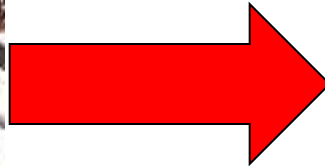
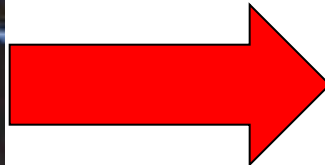
fractions

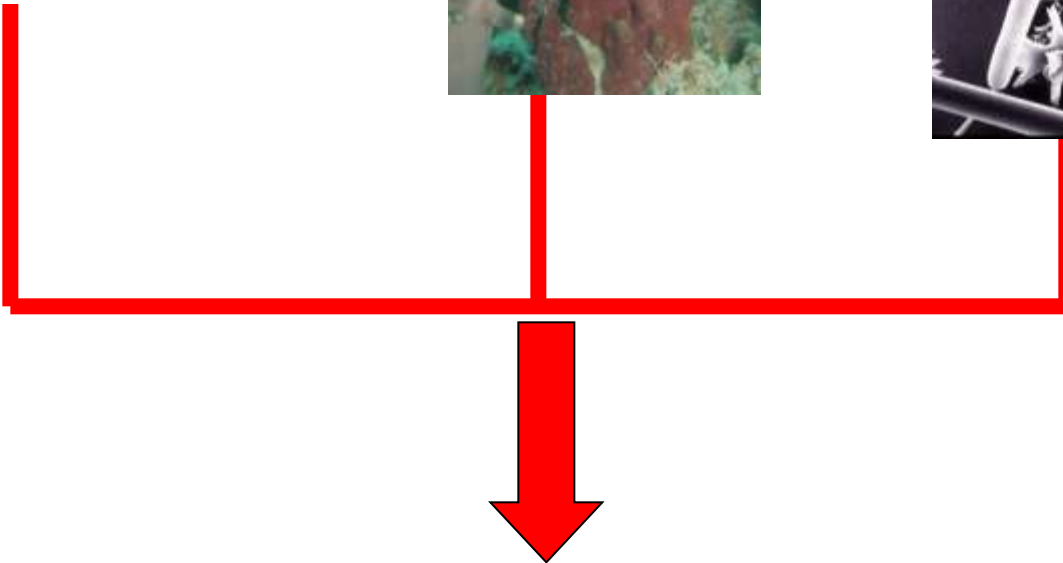
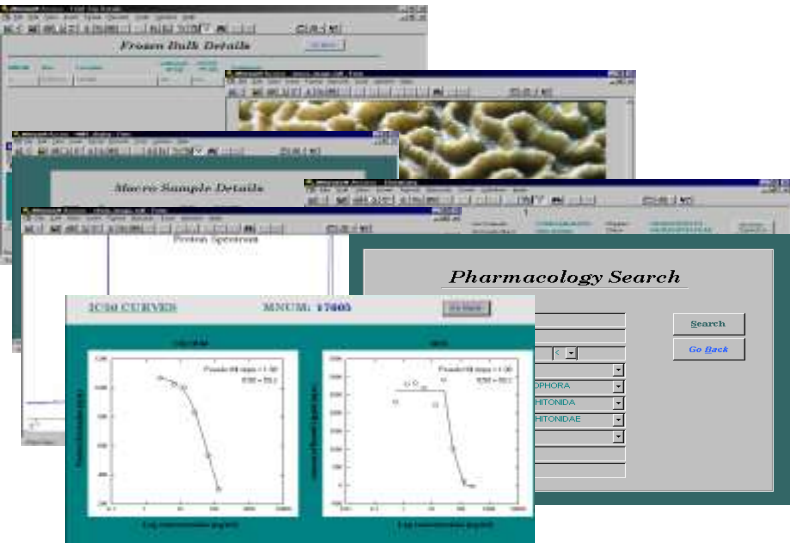


crude extracts



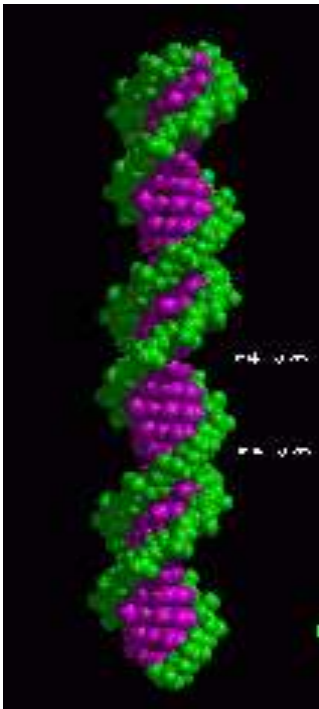
Quality Control



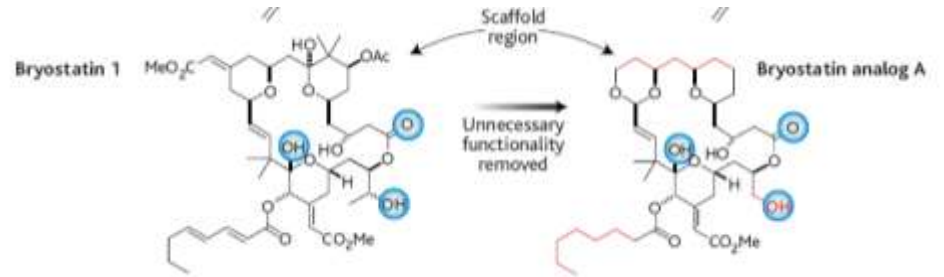


Recollectability

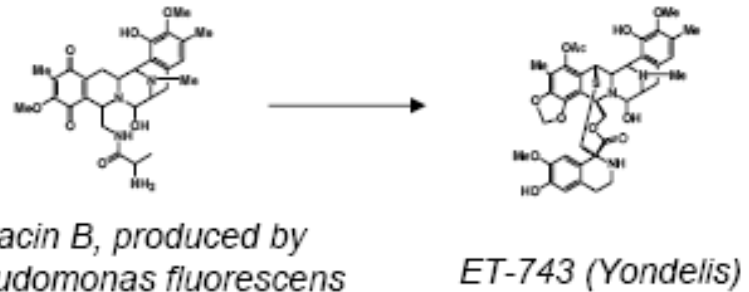
SAMPLE SUPPLY



Aquaculture of drug leads



Bryostatin Analogue A
Total Synthesis



Yondelis (ET-743)
Hemi-Synthesis



Marine Invertebrate Culture



Great Barrier Reef

Rhopaloides odorabile

Xestospongia exigua

Ianthella basta

Ianthella spp (2)

Phakelia sp

Coscinoderma sp

Sarcophyton sp

Western Australia

Haliclona nsp

Mycale spp (2)

Lissoclinum lobatum

Ircinia spp (2)

New Zealand (NIWA)

Mycale hentscheli

Lissodendoryx n.sp

Product

Bath sponges /Collagen/Spongiatriols

Anti-tumour actives

Bastadins

Bastadins

Anti-tumour actives

Bath sponges /Collagen

Cytotoxic compounds

Salycilialamide A

Mycalamides?

Lobatamides?

Collagen

Peluroside/Pateamine

Halichondrin B



ChemBioChem 6: 1760-1765 (2005)

Shotgun Cloning and Heterologous Expression of the Patellamide Gene Cluster as a Strategy to Achieve Sustained Metabolite Production

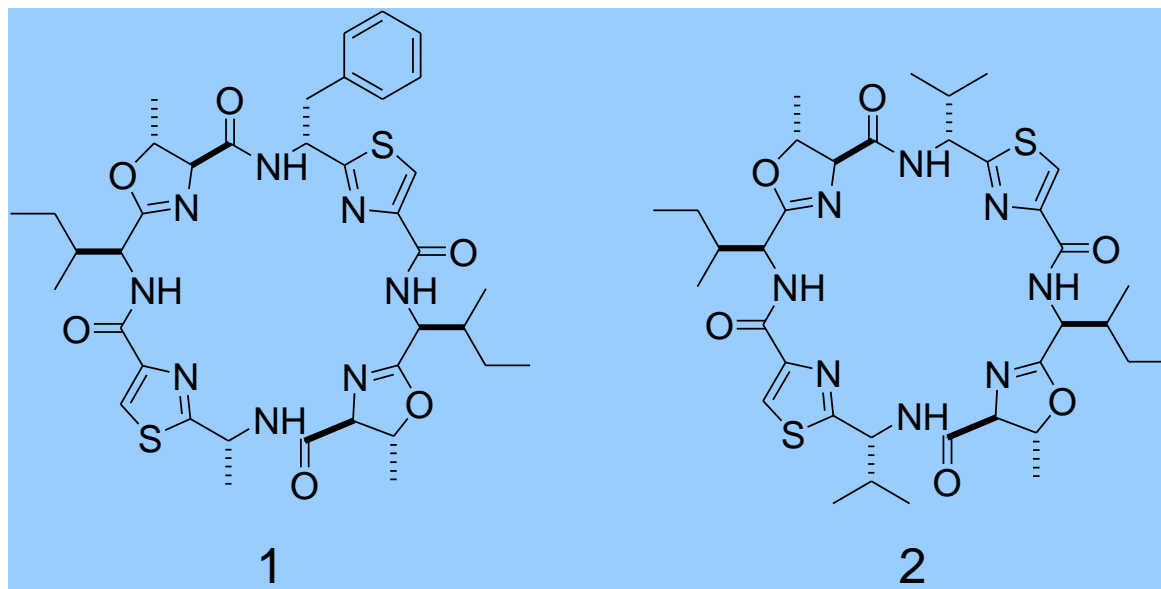
Paul Long¹, Walter Dunlap², Chris Battershill², and Marcel Jaspars³

¹University of London School of Pharmacy

²Australian Institute of Marine Science

³University of Aberdeen

Cloning marine DNA
to supply
drugs from the sea”



Patellamide D

Ascidiacyclamide

A marine natural product, Patellamide D, reverses multidrug resistance in a human leukemic cell line



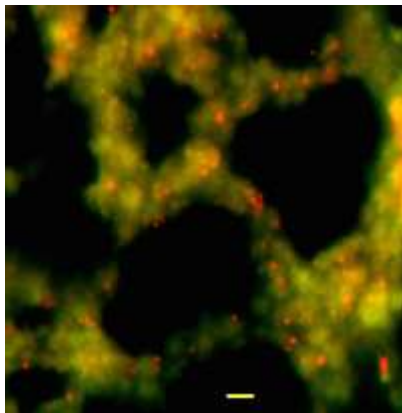
*Lissoclinum
patella*



*Uncultured
Prochloron
symbionts*

culturable marine microbes

- Fastest growing field in marine natural products chemistry
- scalable production



Nicole Webster
Rhopaloeides odorabile FISH

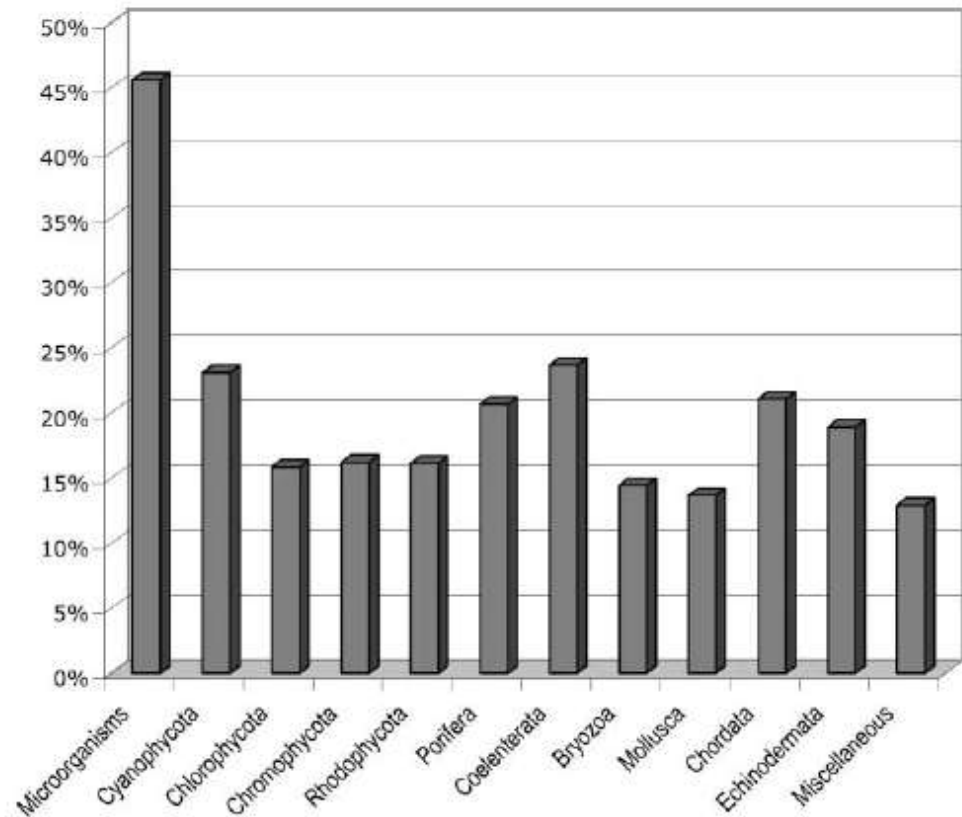
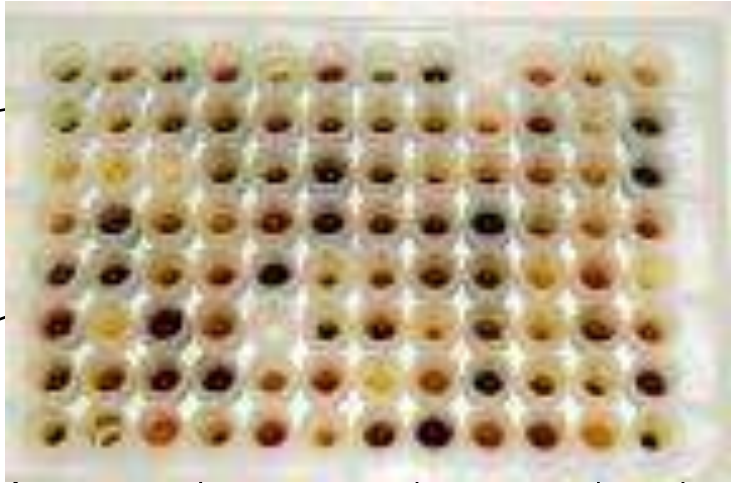


Fig. 3 Citations for source phyla for the period 2001–2005 as a percentage of the totals for 1965–2005.

Blunt *et al* 2007

Bioresources Libraries

- carry the ABS overhead for 3rd party access



Cancer

Viral

Antibiotics

Central Nervous System

Agrichemical

Paints

Environmental remediation

Industrial Enzymes

Toxin detection

Mineral Processing

UV Blocking



Conclusion

- Public Ex-situ Collections provide legal certainty under the Nagoya Protocol
- Marine or Terrestrial, they are an important part of the new global ABS system
- Biotechnology supersedes the 17th century idea of economic botany; lets hope it also revalues biodiversity.



Thank you!

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Advanced Studies