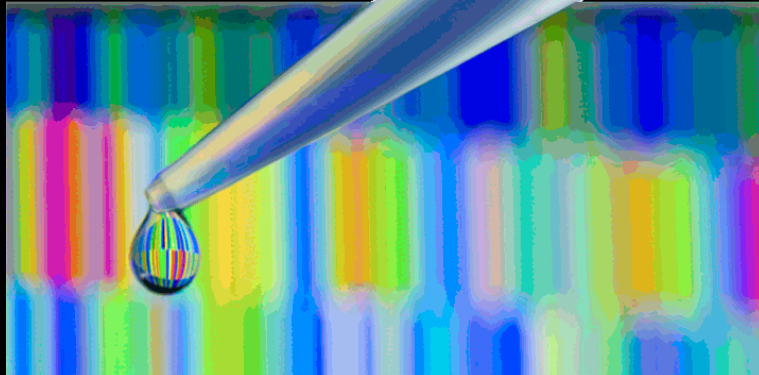
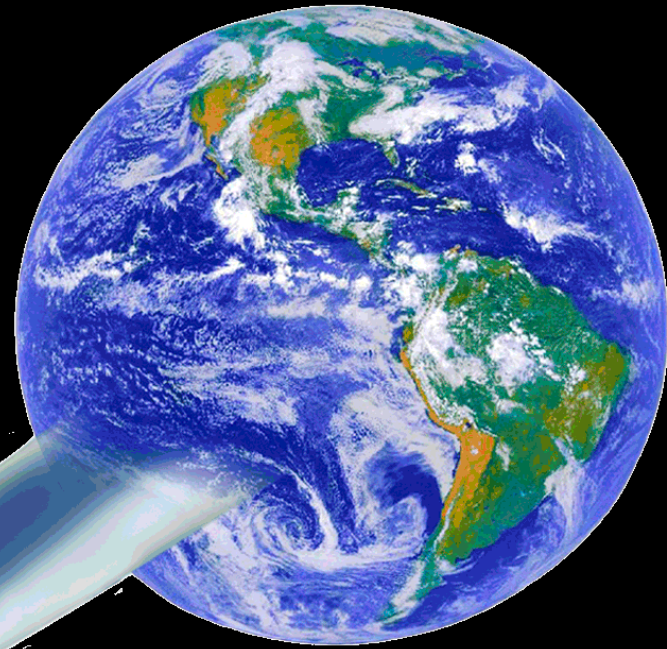


**From
Biodiversity
Inventories to
Genomics:
towards sequencing
the global genome**



Jonathan Coddington
Associate Director for
Science



Smithsonian
National Museum of Natural History

Global Genome Initiative



Vision

Preserving the genomic diversity of life on Earth

Mission

Global network

Evolutionary & Ecological Research

Genomic biorepositories

Genomes of key branches of tree of life

Public Awareness and Understanding

Biodiversity Genomics

- **What's out there?**
- **What do we have?**
- **How did it evolve?**
- **How does it work?**
- **Evolution, ecology, conservation
environmental management**
- **Training the next generation**

Biodiversity Genomics (to date)

- **Multicellular life + protists** **1022 “forms”**
- **Bacteria, Archaea** **11,876 forms**
- **Viruses** **3,570 forms**

Ex <http://www.ncbi.nlm.nih.gov/genome/browse/>

Biodiversity Genomics

5000 insects

7,500 Invertebrates

10,000 vertebrates



First Global Invertebrate Genomics Alliance (GIGA) workshop

at the Nova Southeastern University Oceanographic Center,
Center of Excellence in Coral Reef Ecosystem Sciences (COE-CRES)
Dania Beach FL (NSU OC - www.nova.edu/ocean)
Dates : March 1-3, 2013

life technologies™

GENOME 10K[®]

Unveiling animal diversity

Genome 10K Project

To understand how complex animal life evolved through changes in DNA and use this knowledge to become better stewards of the planet.

Accomplishments

The i5K initiative to sequence 5,000 insect genomes began in March 2011—inspired partly by G10K.

Understanding Ourselves



Understanding Disease



The Future of Natural History Genomics?



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Scientists produce cloned embryos of extinct frog

News | Science

Scientists produce cloned embryos of extinct frog

15 March 2013

The genome of an extinct Australian frog has been revived and reactivated by a team of scientists using sophisticated cloning technology to implant a “dead” cell nucleus into a fresh egg from another frog species.

The bizarre gastric-brooding frog, *Rheobatrachus silus* – which uniquely swallowed its eggs, brooded its young in its stomach and gave birth through its mouth – became extinct in 1983.

But the Lazarus Project team has been able to recover cell nuclei from tissues collected in the 1970s and kept for 40 years in a conventional deep freezer. The “de-extinction” project aims to bring the frog back to life.

In repeated experiments over five years, the researchers used a laboratory technique known as somatic cell nuclear transfer. They took fresh donor eggs from the distantly related Great Barred Frog, *Mixophyes fasciolatus*, inactivated the egg nuclei and replaced them with dead nuclei from the extinct frog. Some of the eggs spontaneously began to divide and grow to early embryo stage – a tiny ball of many living cells.

Although none of the embryos survived beyond a few days, genetic tests confirmed that the dividing cells contain the genetic material from the extinct frog.

The results are yet to be published.

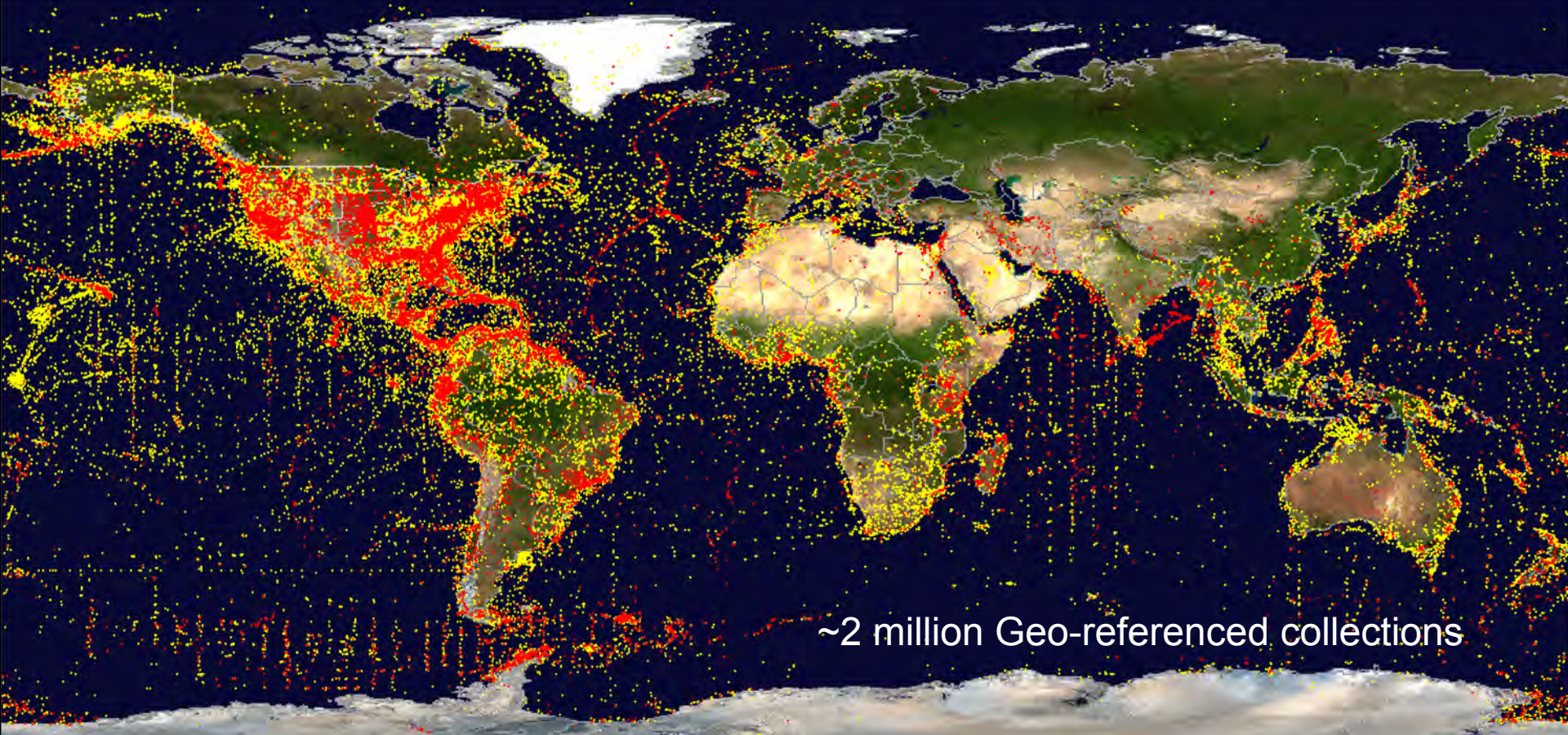
“We are watching Lazarus arise from the dead, step by exciting step,” says the leader of the Lazarus Project team, Professor Mike Archer, of the University of New South Wales, in Sydney. “We’ve reactivated dead cells into living ones and revived the extinct frog’s genome in the process. Now we have fresh cryo-preserved cells of the extinct frog to use in future cloning experiments.”



An artist's impression of the gastric-brooding frog.
Artwork: Peter Schouten

Article Tags

[UNSW](#) / [gastric-brooding frog](#) / [extinction](#) / [Lazarus Project](#) / [TEDx](#) / [Professor Mike Archer](#)

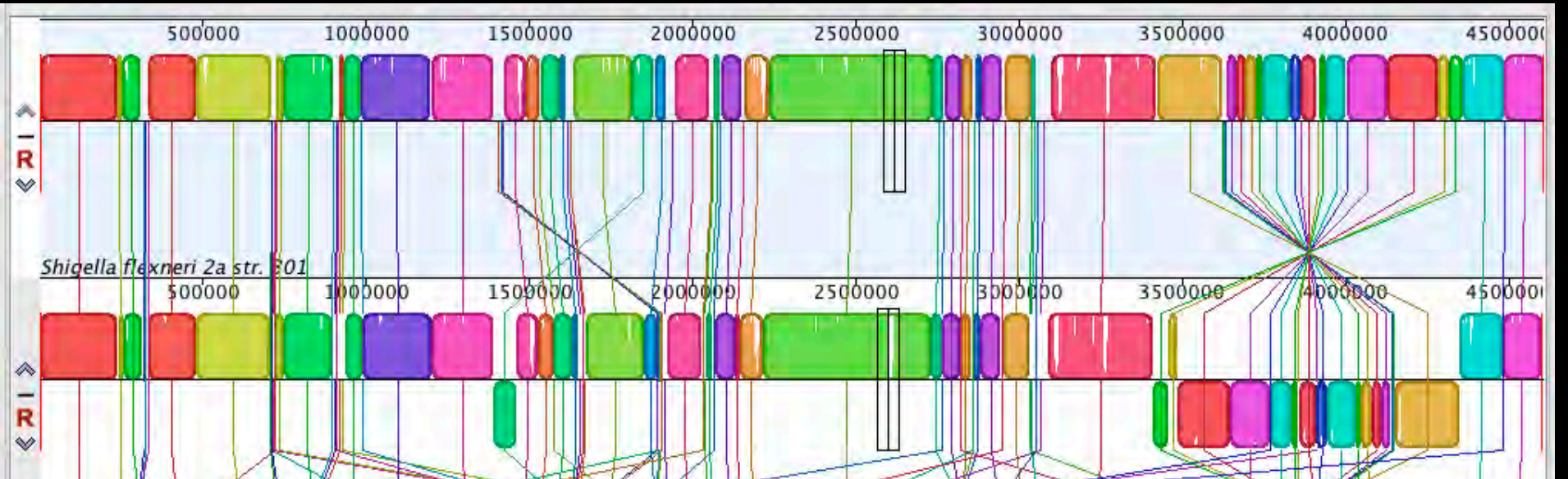


~2 million Geo-referenced collections





Bismark
Col Dak
Diab long. & Schwarz
R. F. Smith Auct. Det. 63
Diabrotica barberi
Smith and Lawrence
Det. J. Krysan 1980





**NMNH
Biorepository
4-5M 2ml tube
capacity**

58 Freezers



**24
Nitrogen
Tanks**



NMNH Biodiversity Portfolio

Barcode of Life

Identifying Species with DNA Barcoding

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PUBLICATIONS UPCOMING EVENTS RECENT ACTIVITY

The Protist Ribosomal Reference database (PR2): a catalog of unicellular eukaryote Small Sub-Unit rRNA sequences with curated taxonomy
 Guillou L, Bachar D, Audic S, Bass D, Berner C, Bittner L, Boutte C, Burgaud G, de Vargas C, Decelle J, Del Campo J, Dolan JR, Dunthorn M, Edvardsen B, Holzmann M, Kooistra WH, Lara E, Le Bescot N, Logares R, Mahé F, Massana R, Montresor M, Morard R, Not F, Pawlowski J,

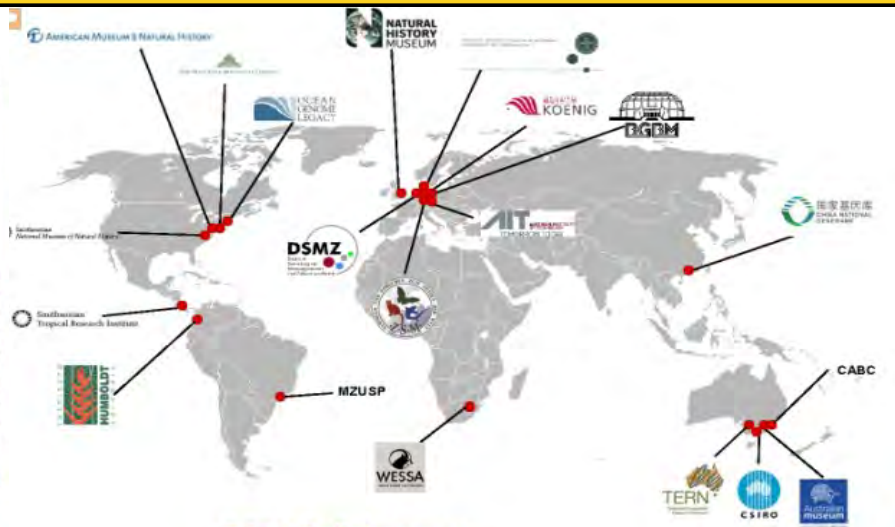


27 OCTOBER 2013
Fifth International Barcode of Life Conference
 Kunming, Yunnan, China

The Kunming Institute of Botany (KIB) and Kunming Institute of Zoology (KIZ), research

Aydin Tozeren and Roseli La Corte dos Santos joined
 Connect.BarcodeofLife.net
 2 days ago

Andrew Mitchell and Roseli La Corte dos Santos are now colleagues



22 Biorepository Partners



Encyclopedia of Life

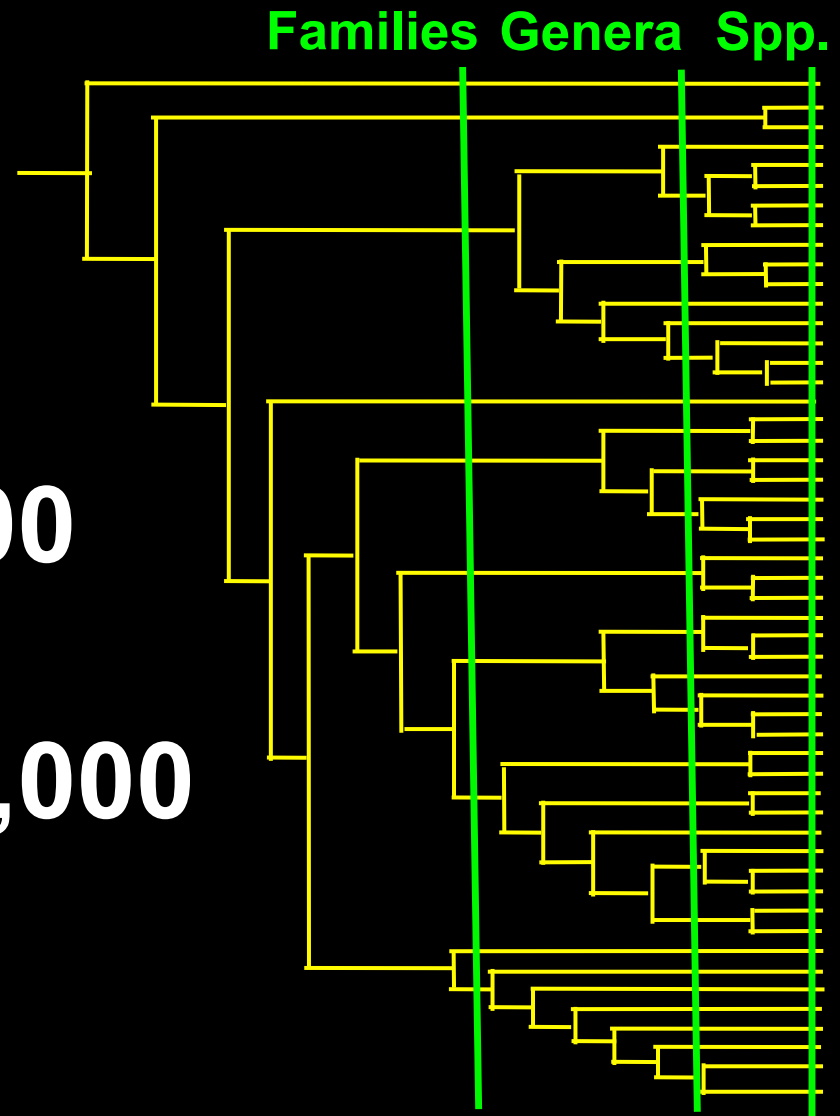


Feasibility

FAMILIES ~ 9500

GENERA ~ 200,000

SPECIES >12,000,000

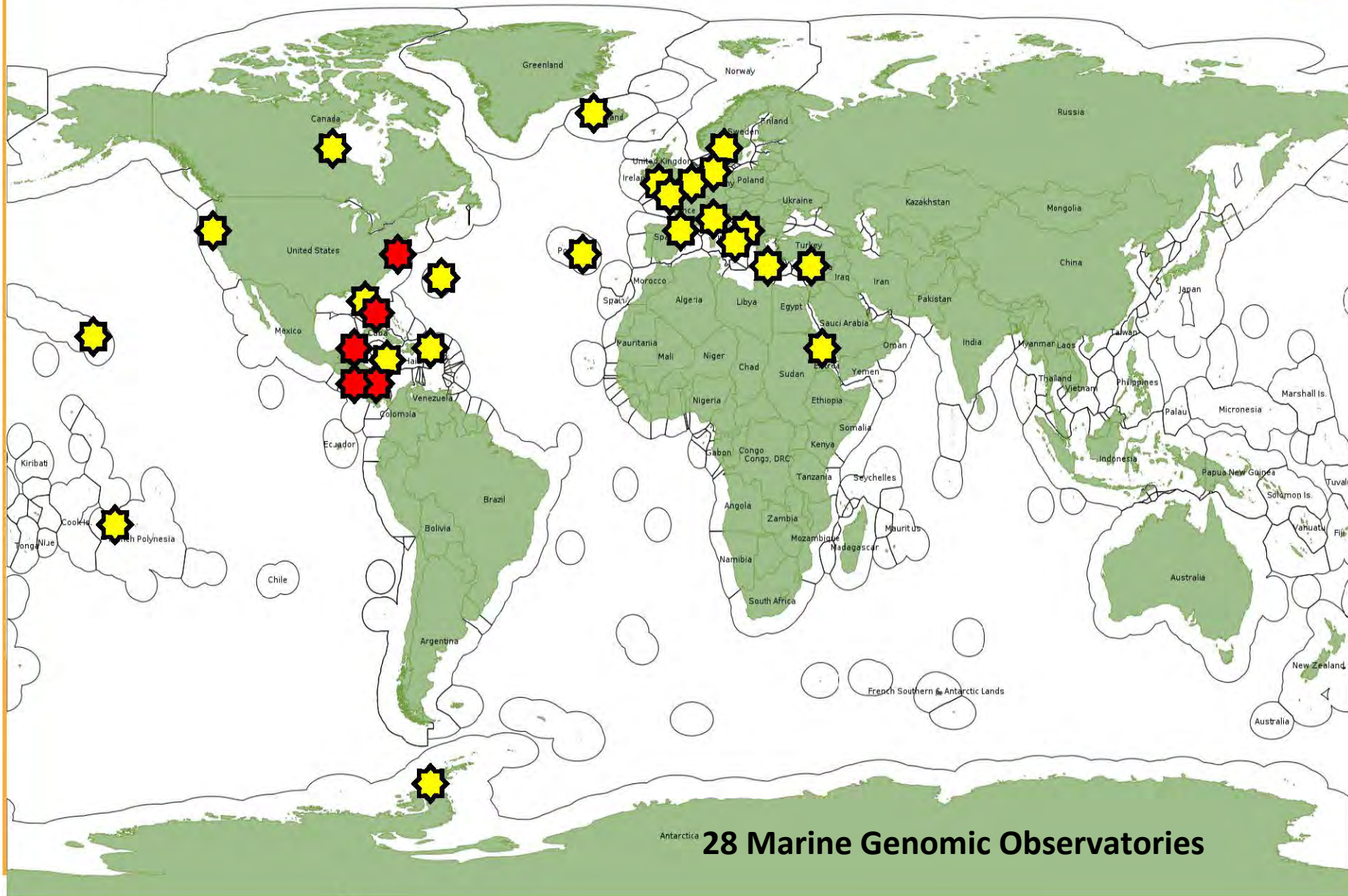


Geography



Smithsonian Institution Forest Earth Observatory, Tennenbaum Marine GEO
40 plots, 4,346 genera (“trees”) ~60% world total?

OSD and TMO Collaboration sites



28 Marine Genomic Observatories

Preserving and Understanding Genomic Diversity



Genome: Unlocking Life's Code

