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# Node Report - Argentina

Scientific Steering Committee, October 13 & 14, 2018



M A C N MUSEO  
ARGENTINO  
DE CIENCIAS  
NATURALES  
CONICET

# SSC Delegate Argentina

- ▶ POSITION: Director
- ▶ HOME INSTITUTION: Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” MACN - CONICET
- ▶ KEY TAXONOMIC INTERESTS: Birds
- ▶ GEOGRAPHIC FOCUS: Neotropical region
- ▶ PRIOR BARCODE INVOLVEMENTS: CBOL, ABBI, iBOL phase I (Scientific Steering Committee)

# Argentina Barcodes on BOLD

## Barcode Count

- 115,147 Sequences
- 5,010 Named Species
- 17,389 BINs

## Species Coverage

- Plants (670 species)
- Vertebrates (1,398 species)
- Arthropods (2,735 species)
- Other Inverts (171 species)

## BIN coverage

- Vertebrates (1,461 BINs)
- Arthropods (15,652 BINs)
- Other Inverts (268 BINs)

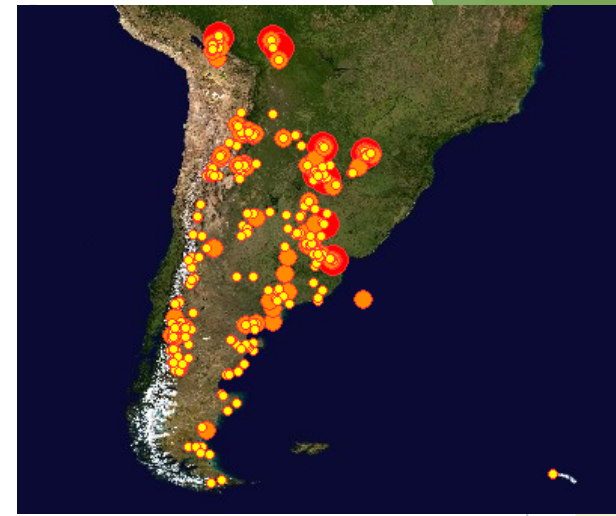
# Argentina Barcode Network



- ▶ **Date established:** 2008
- ▶ **Lead institution:** CONICET
- ▶ **# Researchers involved:** more than 100. Coordinated by MACN.
- ▶ **# institutions involved:** About 20 Research Units from CONICET.
- ▶ **Current funding:** Five full-time lab technician positions, plus one coordinator and one part-time student representing about 70K dollars per year. No operating budget for barcode labs since 2016. About 7K dollars per year for the Leading Labs Training Workshop for DNA Barcoding from the National System of Genomic Data. Other operating funds and collection support from MACN estimated in 50K dollars per year. This funding doesn't include either salaries of researchers, technicians and fellows participating in iBOL Argentina network or research grants connected to the collection of new specimens.
- ▶ **Future Prospects:** Given the current economic crisis affecting Argentina (and our National Research Council in particular), we anticipate no resources for iBOL Argentina Fund in the near future from CONICET. We believe that a collaborative project as the one we had with IDRC would be the best opportunity to expand the scale of the collecting so as to conform with the goals of the iBOL phase II.

# Argentina Project # 1

- ▶ **NAME & TYPE:** BIRDS OF ARGENTINA (Library construction)
- ▶ **Project Leaders:** Pablo Tubaro/Darío Lijtmaer
- ▶ **Collaborators:** Pablo Lavinia, Ana Barreira, Cecilia Kopuchian, Sebastián Cabanne, Natalia García, Belén Bukowski, Yolanda Davies, Laura Barone, Elizabet Vilacoba.
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, funding from research projects of the project leaders.
- ▶ **TARGET TAXONOMIC GROUP(s):** Aves from Argentina and neighbouring countries.
- ▶ **BRIEF DESCRIPTION OF GOALS:** Argentina includes about 1,000 species of birds (99% of the species present in Uruguay, 95% of those present in Paraguay, but only 52% of the ones occurring in Bolivia). So far, we have in our collection about 9,000 tissue samples plus vouchers belonging to 830 species of birds and most of them (85% of the species) have been barcoded already. The goal for Phase II is to increase our collaboration with our neighbouring countries in order to boost the barcoding of their avifauna, particularly in the case of Bolivia and Chile, which harbour many species that are not present in Argentina.



# Argentina Project # 2

- ▶ **NAME & TYPE:** LEPIDOPTERA OF ARGENTINA (Library construction)

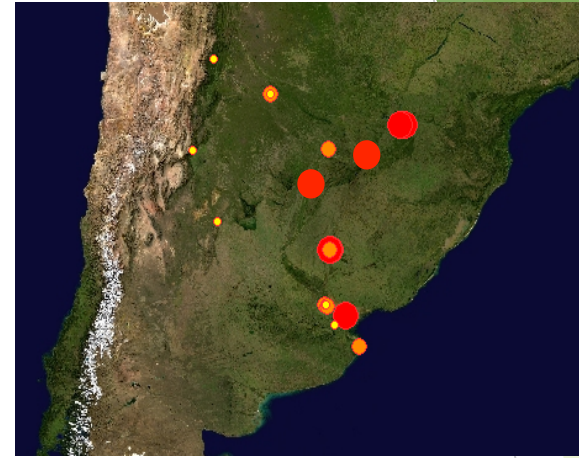
- ▶ **Project Lead:** Pablo Tubaro/Dario Lijtmaer

- ▶ **Collaborators:** Pablo Lavinia, Ezequiel Nuñez Bustos, Cecilia Kopuchian, Ana Barreira, Natalia Garcia, Belen Bukowski, Laura Barone, Elizabet Vilacoba.

- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, funding from research projects of the project leaders.

- ▶ **TARGET TAXONOMIC GROUP(s):** Lepidoptera of Argentina and neighbouring countries (includes diurnal, nocturnal and microleps).

- ▶ **BRIEF DESCRIPTION OF GOALS:** Our tissue collection includes about 1,200 butterfly species (around 90% of the recorded species of Argentina), and an undetermined (much higher) number of moths and microlepidoptera. The main goals for Phase II are: a) To barcode all the species in our collection (around 20% and 50% of the moths and butterflies have been barcoded so far, respectively); b) to increase the representation of neighbouring countries in the collection to better sample the diversity and variation of the lepidopterans in the region; and c) to use COI as one of the tools to study the pattern of diversification of the lepidopteran species present both in the Atlantic Forest and the Andean Forest (Yungas).



# Argentina Project # 3

- ▶ **NAME & TYPE:** MALAISE TRAPS (Library construction/metabarcoding).  
This project is part of the Global Malaise Trap Initiative and the Big City Life Project.
- ▶ **Project Lead:** Pablo Tubaro/Darío Lijtmaer.
- ▶ **Collaborators:** Belen Bukowski, Pablo Lavinia, Priscila Hanisch, Ezequiel Nuñez Bustos, Ana Barreira, Laura Barone, Elizabet Vilacoba.
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, funding from the research projects of the project leaders.
- ▶ **TARGET TAXONOMIC GROUP(s):** Flying insects from Argentina.
- ▶ **BRIEF DESCRIPTION OF GOALS:** Library construction and the production of diversity baselines for the flying insects in some of the main biomes present in northern Argentina (Atlantic forest, Chaco and the Andean Forest known as “Yungas”). We also ran two malaise traps in Buenos Aires city as part of the Big City Life project. So far only one year of both the Atlantic forest and the Chaco biome samples have been processed and we hope to include the Yungas samples soon. The goal for Phase II is to use the malaise traps as one of our main methods to achieve our general objective of sampling and barcoding the fauna of 50% of the ecoregions of Argentina.





# Argentina SWOT Analysis

- ▶ **STRENGTHS:** We have a strong commitment to the barcode project and passed the test of the time. The MACN is recognized as one of the most important institution in Argentina related to biodiversity research and collection. We have trained human resources and a network of collaborators in different parts of the country.
- ▶ **WEAKNESSES:** Our mother institution (CONICET) is in a crisis (not only economical but also organizational). Economical and political situation of Argentina is fragile.
- ▶ **THREATS:** In addition to the unpredictable consequences of a potential major economic and political crisis on Argentine science, the main threat comes from the advances of restrictive regulations regarding the access to biodiversity, collecting and the movement of biological samples across country borders. Because Argentina is a federal country, this threat is not only at national but also at provincial level.
- ▶ **OPPORTUNITIES:** There is a large scale marine project called “Pampa Azul” focused in Southern Atlantic Marine and Antarctic biodiversity. Material from this project will be deposited at MACN as part of an agreement between CONICET and the Secretary of Science and Technology of Argentina, and will be available for DNA Barcoding. We are collaborating with neighboring countries such as Uruguay and Bolivia, and Chile and Paraguay could be potentially included as well.

Thank you!

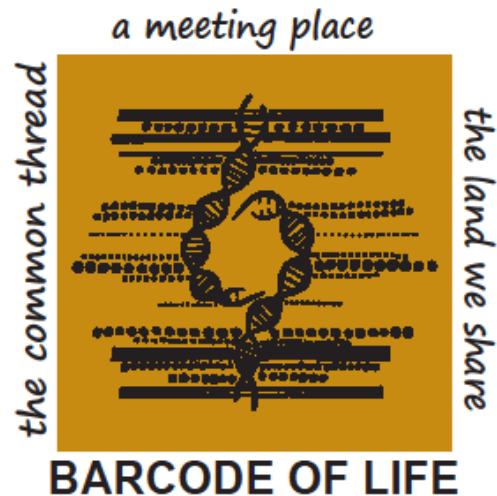


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# Node Report - Australia

Scientific Steering Committee, October 13 & 14, 2018



# SSC Delegate Australia

- ▶ POSITION: Senior Researcher
- ▶ HOME INSTITUTION: South Australian Museum, Adelaide
- ▶ KEY TAXONOMIC INTERESTS: Collembola and Hymenoptera
- ▶ GEOGRAPHIC FOCUS: Australasia, Pacific, Antarctic, sub-Antarctic
- ▶ PRIOR BARCODE INVOLVEMENTS: bees, beetles, Collembola, Lepidoptera

# Australia Barcodes on BOLD

## Barcode Count

- 316,008 Sequences
- 19,931 Named Species
- 43,366 BINs

## Species Coverage

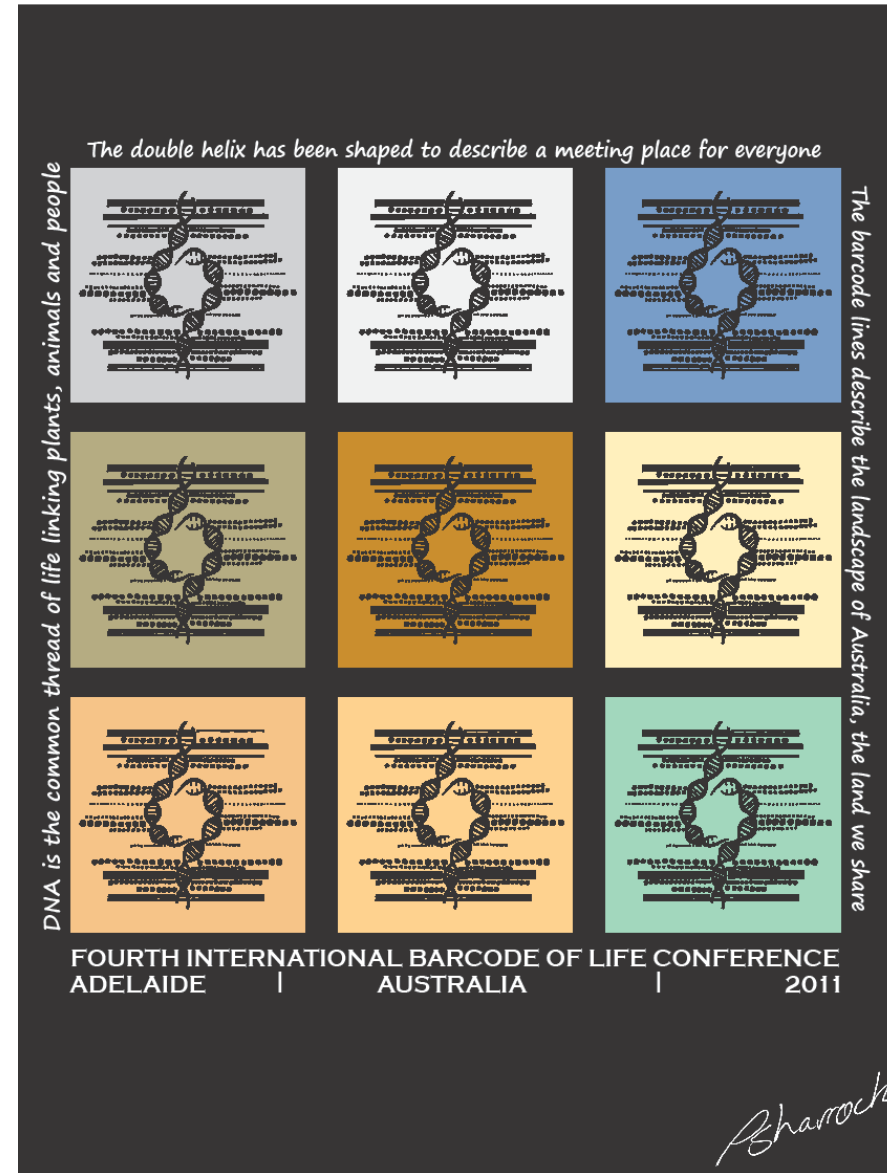
- Plants (3,507 species)
- Vertebrates (2,740 species)
- Arthropods (11,347 species)
- Other Inverts (1,293 species)

## BIN coverage

- Vertebrates (3,179 BINs)
- Arthropods (36,447 BINs)
- Other Inverts (2,027 BINs)

# Australia Barcode Network

- ▶ Date established: 2008, 2018-iBOLII
- ▶ Lead institution: South Australian Museum
- ▶ # Researchers involved: in 2008 32 members in the AUS-BOL
- ▶ # institutions involved: numerous but uncoordinated
- ▶ Current funding: minimal
- ▶ Future Prospects: good opportunities for ongoing barcode projects from various funders (e.g. ABRS and numerous small funding bodies)



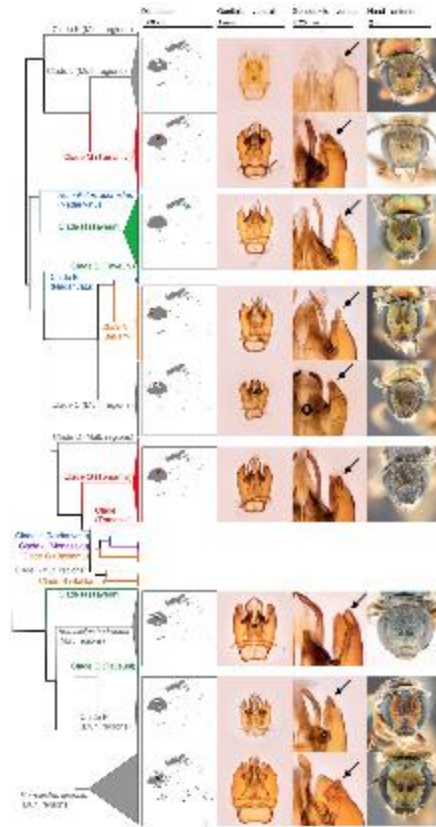
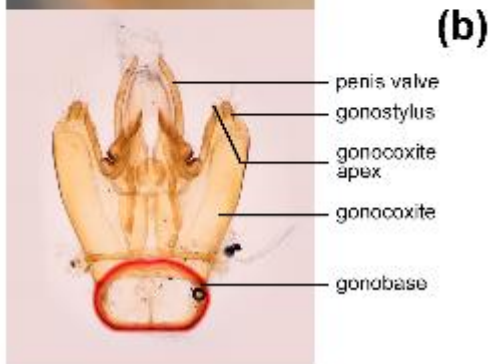
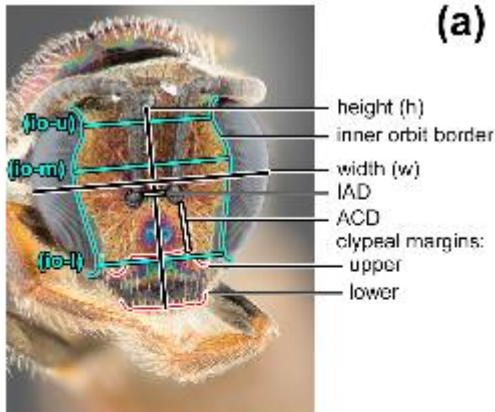
# Australia Project # 1

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Australian native bees
- ▶ **Project Lead:** Mark Stevens
- ▶ **Collaborators:** Michael Schwarz, James Dorey, Remko Leijs, Amy Prendergast (Curtin University)
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, some funding from ABRS
- ▶ **TARGET TAXONOMIC GROUP(s):** bees (Apoidea)
- ▶ **BRIEF DESCRIPTION OF GOALS:** Barcoding of all Australian bees, a step to further our capacity to identify new species and protect range restricted species.

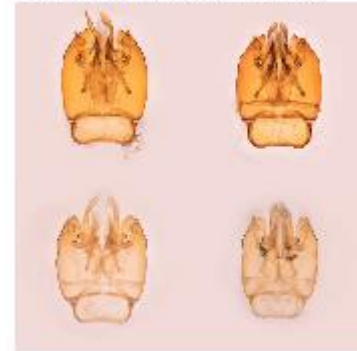


# Fiji - integrating morphology & barcodes

- ▶ 4 native species pre-2010, now 21 new species identified



*Homalictus fijiensis* (Mult. regions)



Clade Q (Tamanivi)



*Homalictus hedrander* (Mult. regions)

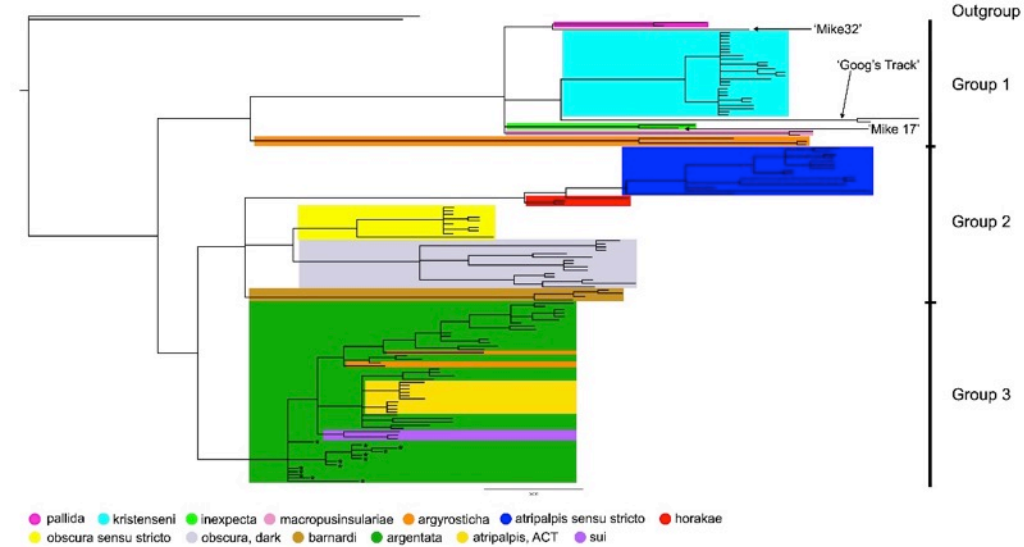


1 mm

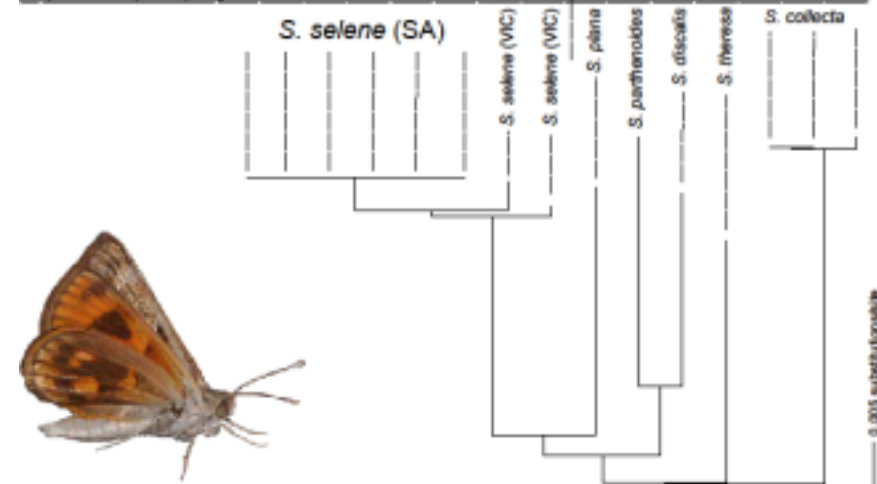


# Australia Project # 2

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Lepidoptera
- ▶ **Project Lead:** Simonsen/Stevens
- ▶ **Collaborators:** Thomas Simonsen, Mike Moore
- ▶ **STATUS (UNDERWAY/PLANNED):** Several projects underway
- ▶ **TARGET TAXONOMIC GROUP(s):** Butterflies of Fiji; Australian moths (Hepialidae, Castniidae)
- ▶ **BRIEF DESCRIPTION OF GOALS:** Species discovery and integrating to morphology

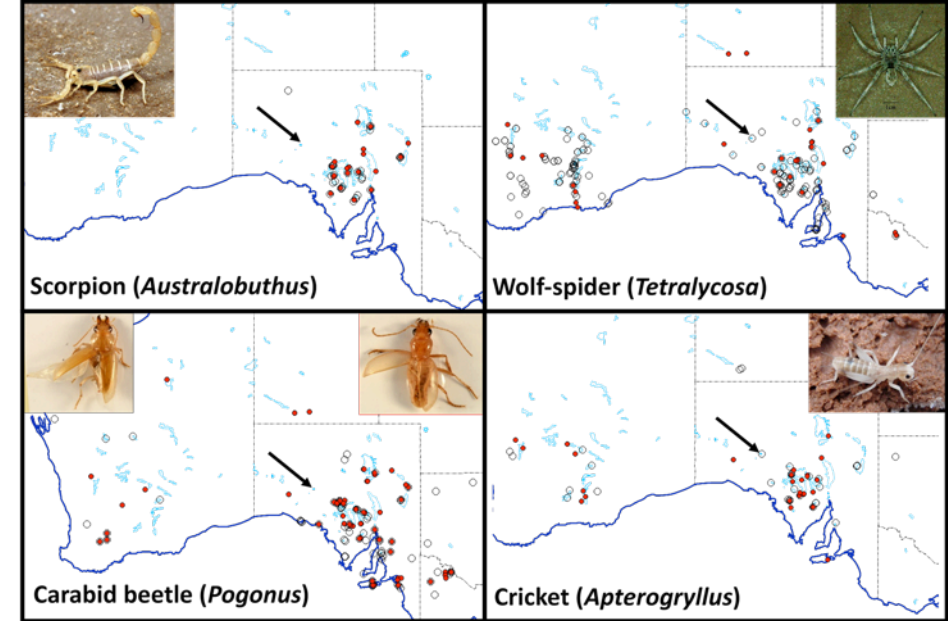


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 <i>Synemon selene</i> (5188)															
2 <i>Synemon selene</i> (5188)	0.000														
3 <i>Synemon selene</i> (5170)	0.000	0.000													
4 <i>Synemon selene</i> (5171)	0.000	0.000	0.000												
5 <i>Synemon selene</i> (5167)	0.000	0.000	0.000	0.000											
6 <i>Synemon selene</i> (5189)	0.000	0.000	0.000	0.000	0.000										
7 <i>Synemon selene</i> (H287528)	0.008	0.008	0.008	0.008	0.008	0.008									
8 <i>Synemon selene</i> (H287529)	0.006	0.006	0.006	0.006	0.006	0.006	0.005								
9 <i>Synemon selene</i> (H287526)	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.058							
10 <i>Synemon parthenoides</i> (H288001)	0.071	0.071	0.071	0.071	0.071	0.071	0.074	0.070	0.076						
11 <i>Synemon discalis</i> (H288002)	0.067	0.067	0.067	0.067	0.067	0.067	0.068	0.064	0.058	0.078					
12 <i>Synemon theresea</i> (H288004)	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.070	0.064	0.060	0.070	0.066			
13 <i>Synemon collecta</i> (H287530)	0.078	0.078	0.078	0.078	0.078	0.078	0.079	0.074	0.068	0.065	0.079	0.071	0.071		
14 <i>Synemon collecta</i> (H288003)	0.078	0.078	0.078	0.078	0.078	0.078	0.079	0.074	0.068	0.065	0.079	0.071	0.071	0.000	
15 <i>Synemon collecta</i> (H287531)	0.079	0.079	0.079	0.079	0.079	0.079	0.081	0.079	0.069	0.067	0.081	0.071	0.071	0.002	0.001

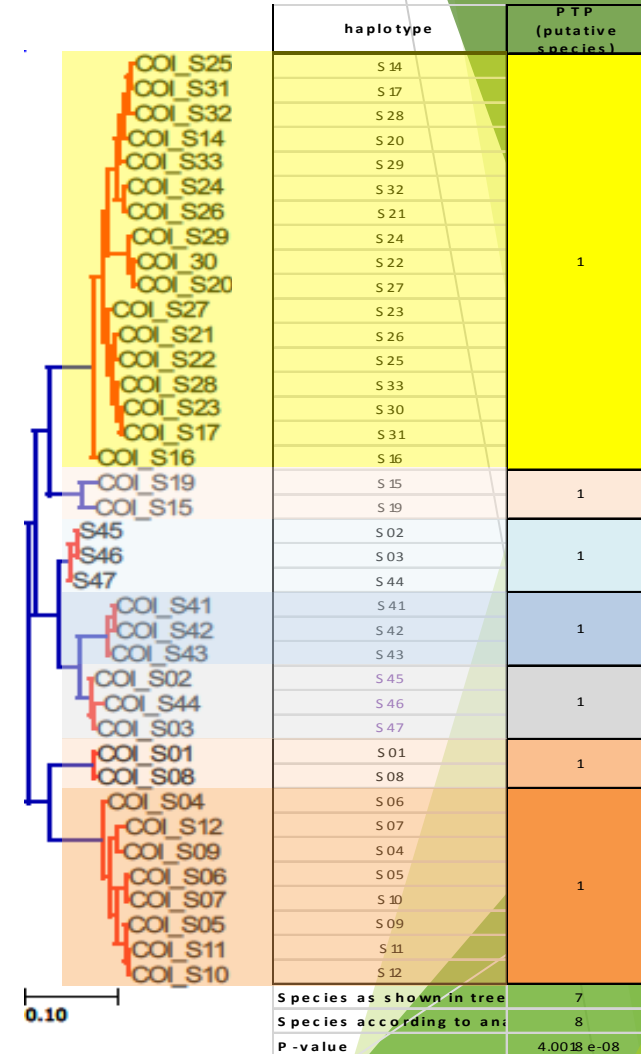
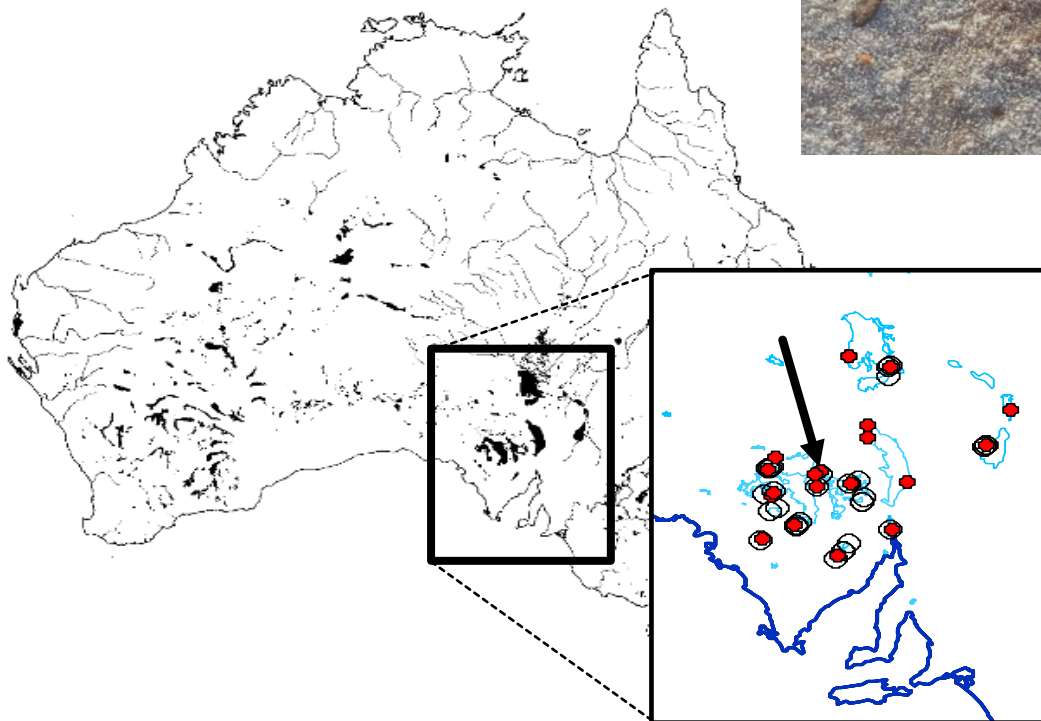


# Australia Project # 3

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Salt lake fauna
- ▶ **Project Lead:** Stevens/Hudson
- ▶ **Collaborators:** Peter Hudson
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, limited funding
- ▶ **TARGET TAXONOMIC GROUP(s):** Scorpion, beetles, cricket, wolf spider
- ▶ **BRIEF DESCRIPTION OF GOALS:** Exploring!



# Scorpiian - *Australobuthus xerolimniorum*



# Australia SWOT Analysis

- ▶ **STRENGTHS:** Diverse groups with sporadic taxonomic work, species discovery a certainty!
- ▶ **WEAKNESSES:** Attitudes to barcoding and collaboration, iBOL in Australia has been largely worked in isolation with little collaboration amongst institutions. iBOL-II in Australia should/will make efforts to be inclusive
- ▶ **THREATS:** No money
- ▶ **OPPORTUNITIES**
  - ▶ New Zealand
  - ▶ PNG
  - ▶ Pacific neighbours, eg Samoa, Solomon Islands, Fiji, Tonga, New Caledonia

SWOT analysis to identify strengths, weaknesses, opportunities, and threats to your nation's participation in iBOL-II. If appropriate, consider the prospect of recruiting additional Nations as Associate Members under opportunities.

Thank you!





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# Node Report - Austria

Scientific Steering Committee, October 13 & 14, 2018



# SSC Delegate Austria

Nikolaus Szucsich



- ▶ POSITION: ABOL-Manager
- ▶ HOME INSTITUTION: Natural History Museum Vienna
- ▶ KEY TAXONOMIC INTERESTS: Myriapoda, primarily wingless insects & Diptera
- ▶ GEOGRAPHIC FOCUS: Austria (& beyond)
- ▶ PRIOR BARCODE INVOLVEMENTS: Protura (small sideproject), Glomerida (myriapods), Orthoptera, Odonata



# Austria Barcodes on BOLD

## Barcode Count

- 27,650 Sequences
- 6,266 Named Species
- 5,857 BINs

## Species Coverage

- Plants (264 species)
- Vertebrates (189 species)
- Arthropods (5,592 species)
- Other Inverts (252 species)

## BIN coverage

- Vertebrates (184 BINs)
- Arthropods (5,413 BINs)
- Other Inverts (130 BINs)



# ABOL- Austrian Barcode of Life - Initiative



- ▶ **Date established:** 2014-2017 pilot phase / 2017-2020 coordination funded [www.abol.ac.at](http://www.abol.ac.at)
- ▶ **Lead institutions:** Natural History Museum Vienna, Federal State Museum of Tyrol, University of Graz, University of Vienna, University of Salzburg, University of Veterinary Medicine Vienna, University of Natural Resources and Life Sciences Vienna
- ▶ **# Researchers involved:** 30 currently funded (~150 interested)
- ▶ **# institutions involved:** 10 curr. funded Partner Institutions (~30 PIs)
- ▶ **Current funding:** 2 Mio € (~3 Mio CAD)
- ▶ **Future Prospects:** uncertain, dependent on success in fund raising



# Austria Project # 1

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): **ABOL-Coordination**
- ▶ **Project Lead:** **Museum of Natural History**
- ▶ **Collaborators:** **ABOL**
- ▶ **STATUS:** underway 2017-2020 / **600.000 €** (~900.000 CAD)
- ▶ **TARGET TAXONOMIC GROUP(s):** plants, fungi & animals of Austria
- ▶ **BRIEF DESCRIPTION OF GOALS:** fund raising, data provision & quality control (ABOL database - work data base), skill development (Workshops), Public relation (e.g. BioBlitz events planned)

# Austria Project # 2

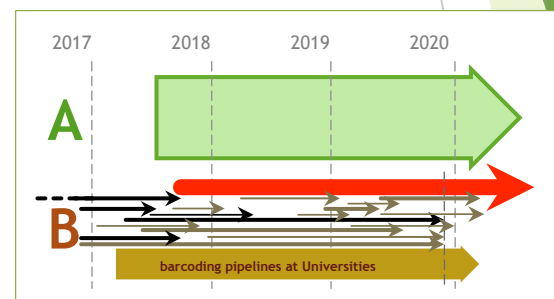
- ▶ **NAME & TYPE** (Library construction, Metabarcoding): **Barcoding pipelines in Austrian Universities** (Library construction & Metabarcoding - Infrastructural fund)
- ▶ **Project Lead:** **University of Graz**
- ▶ **Collaborators:** **University of Salzburg, University of Vienna, University of Veterinary Medicine Vienna, University of Natural Resources and Life Sciences Vienna**
- ▶ **STATUS (UNDERWAY/PLANNED):** underway 2017-2020 / 1 Mio € (~1,5 Mio CAD)
- ▶ **TARGET TAXONOMIC GROUP(s):** fungi, plants, various arthropod groups, vertebrates
- ▶ **BRIEF DESCRIPTION OF GOALS:** 15.000 barcodes from 5.000 species

# Austria Project # 3

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): **DigBINs 1000 - digital determination key for 1000 Insects**
- ▶ **Project Lead:** **Natural History Museum Vienna**
- ▶ **Collaborators:** **7 Federal State Museums**
- ▶ **STATUS (UNDERWAY/PLANNED):** **Planned** (failed in the first trial being too scientific) ~**300.000 €** (450.000 CAD)
- ▶ **TARGET TAXONOMIC GROUP(s):** **Insects**
- ▶ **BRIEF DESCRIPTION OF GOALS:** **5.000 Barcodes from 1.000 species** (8.000 barcodes from 2.000 spp.)

# Austria SWOT Analysis

- ▶ **STRENGTHS:** multitude of potential partners & researchers
- ▶ **WEAKNESSES:** gap: original expectations (A overall funding) to current status (B parallel projects)  
most partners not funded up till now
- ▶ **THREATS:** endangered continuity
- ▶ **OPPORTUNITIES:** great network - plenty of competence  
recruiting Croatia (CroBOL) as associate member (maybe likewise Hungary)



Thank you!



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# Node Report - Belarus

Scientific Steering Committee, October 13 & 14, 2018

# Tatsiana Lipinskaya

## SSC Delegate Belarus

- ▶ **POSITION:** Lead research scientist at the laboratory of Hydrobiology
- ▶ **HOME INSTITUTION:** Scientific and Practical Center for Bioresources, National Academy of Sciences of Belarus
- ▶ **KEY TAXONOMIC INTERESTS:** alien species of invertebrates and fish; indicators of ecological water quality (EPT)
- ▶ **GEOGRAPHIC FOCUS:** East Europe
- ▶ **PRIOR BARCODE INVOLVEMENTS:** GTI training course



# Belarus Barcodes on BOLD

## Barcode Count

- 15,316 Sequences
- 939 Named Species
- 2,367 BINs


## Species Coverage

- Plants (3 species)
- Vertebrates (4 species)
- Arthropods (930 species)
- Other Inverts (2 species)

## BIN coverage

- Vertebrates (4 BINs)
- Arthropods (2,360 BINs)
- Other Inverts (3 BINs)

# Belarus Barcode Network *[Regional DNA Barcoding Network]*

- ▶ Date established: 29 August 2018 (Resolution after GTI-BBI training, 20-30 Aug 2018, Minsk)
- ▶ Lead institution: Scientific and Practical Center for Bioresources (SPCB)  
Institute Genetics and Cytology (IGC) 
- ▶ # Researchers involved: zoologists and botanists from 7 countries of  
**Central & Eastern Europe and Central Asia**



# Belarus Barcode Network [*Regional DNA Barcoding Network*]

## ► # institutions involved:

**Belarus:** SPCB, IGC, Belarussian State University, Brest State University, Vitebsk State University, Institute of Plant Protection, Private agency “Interservis”: Scientific and Practical Center for game monitoring and resource management of wild animals

**Moldova:** Moldova State University, Ministry of the Environment, Institute of Zoology, Institute of Genetics, Physiology and Plant Protection

**Ukraine:** Odessa I.I. Mechnikov National University, Institute of Hydrobiology of the National Academy of Sciences of Ukraine (NASU), National Museum of Natural History of the NASU

**Georgia:** Institute of Zoology

**Armenia:** Ministry of Environment Protection, Institute of Hydroecology and Ichthyology of the National Academy of Sciences of the Republic of Armenia

**Azerbaijan:** Institute of Botany of the Azerbaijan National Academy of Sciences

**Kazakhstan:** Kazakhstan Scientific Institution of Vegetables and Fruits

► **Current funding:** -

► **Future Prospects:** bilateral and international projects (BBI, COST action, UNDP-GEF)

# Belarus Project # 1. Library construction

- ▶ **NAME & TYPE:** Library construction
- ▶ **Project Lead:** Belarus (SPCB)
- ▶ **Collaborators:** Ukraine, Armenia, Georgia, Moldova
- ▶ **STATUS: UNDERWAY** - GTI project (until December 2018) - 13 500\$  
Plan to continue (Bilateral planned projects)
- ▶ **TARGET TAXONOMIC GROUP(s):** aquatic alien species of invertebrates and fish
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - Belarus** - 22 aquatic alien invertebrates + 18 alien fish
  - Ukraine** - 57 aquatic alien invertebrates + 35 alien fish (Dnieper River Basin)
  - Armenia** - the list is still under way
  - Moldova** - at least 17 alien aquatic invertebrates + 41 alien fish
  - Georgia** - at least 10 invertebrates + 10(12) alien fish

# Belarus Project # 2. Library construction

- ▶ **NAME & TYPE:** Library construction
- ▶ **Project Lead:** Belarus (Scientific and Practical Center for Bioresources )
- ▶ **Collaborators:** Ukraine, Armenia, Georgia, Moldova
- ▶ **STATUS:** PLANNED
- ▶ **TARGET TAXONOMIC GROUP(s):** EPT group
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - Belarus -  $55+29+157 = 241$  species
  - Ukraine -  $97+70+190 = 450$  species
  - Armenia -  $\sim 40+\sim 20+\sim 70 =$  at least 130 species
  - Georgia -  $76+x+112 =$  at least 188 species
  - Moldova -  $20+7+33 = 60$  (based on available data)

# Belarus Project # 3. Metabarcoding

- ▶ **NAME & TYPE:** Monitoring of aquatic invertebrates and fish of Belarus using metabarcoding
- ▶ **Project Lead:** Tatsiana Lipinskaya, Scientific and Practical Center for Bioresources
- ▶ **Collaborators:** Gert-Jan Jeunen, University of Otago, NZ
- ▶ **STATUS:** PLANNED 2019-2020
- ▶ **TARGET TAXONOMIC GROUP(s):** aquatic invertebrates and fish  
alien species, EPT group
- ▶ **BRIEF DESCRIPTION OF GOALS:** new species of aquatic invertebrates and fish that have not been found using classical methods

# Belarus SWOT Analysis

- ▶ **STRENGTHS:** high morphological expertise, long-term monitoring programs, zoological and botanical collections
- ▶ **WEAKNESSES:** lack of direct financial support, high price of sequencing
- ▶ **THREATS:** unpredictable economical and financial situations in Belarus and countries of region;  
future changes in the legal field associated with the new status of the Digital Sequence Information in the framework of Nagoya Protocol.
- ▶ **OPPORTUNITIES:** new data regarding invasive species, early detection, new species discovery;
  - strengthening of regional cooperation;
  - receive funding for a project through UNDP-GEF

Thank you!





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# Node Report - China

Scientific Steering Committee, October 13 & 14, 2018

**Chenxi Liu**

**Institute of Plant Protection, Chinese Academy of Agricultural Sciences**

# SSC Delegate

## China

- ▶ **POSITION:** Associate Professor
- ▶ **HOME INSTITUTION:** Institute of Plant Protection, Chinese Academy of Agricultural Sciences
- ▶ **KEY TAXONOMIC INTERESTS:** Insect pests and their natural enemies
- ▶ **GEOGRAPHIC FOCUS:** China
- ▶ **PRIOR BARCODE INVOLVEMENTS:**  
DNA barcoding training program  
Global malaise trap program-Big city Life

# About IPP-CAAS

**Resource and information**

**Nutrigenomics**

**Diapause and Storage**

**Artificial Diet for the predators**

**Mass Rearing and Releasing**



Institute of Plant Protection, Chinese Academy of Agricultural Sciences



USDA-ARS Sino-American Biological Control Laboratory

# Use of DNA Barcoding to identify unknown insect natural enemies

## Parasitoids attacking stink bug eggs



## A promising insect predator



*Arma chinensis*  
(Hemiptera, Pentatomidae)

## Insect predators & parasitoids with cryptic morphology



*Coelophora biplagiata*



*Menochilus sexmaculata*



*Tamarixia radiate* female



*Tamarixia radiate* Male

# China Barcodes on BOLD

## Barcode Count

- 147,195 Sequences
- 13,456 Named Species
- 21,804 BINs

## Species Coverage

- Plants (4,104 species)
- Vertebrates (2,143 species)
- Arthropods (6,402 species)
- Other Inverts (772 species)

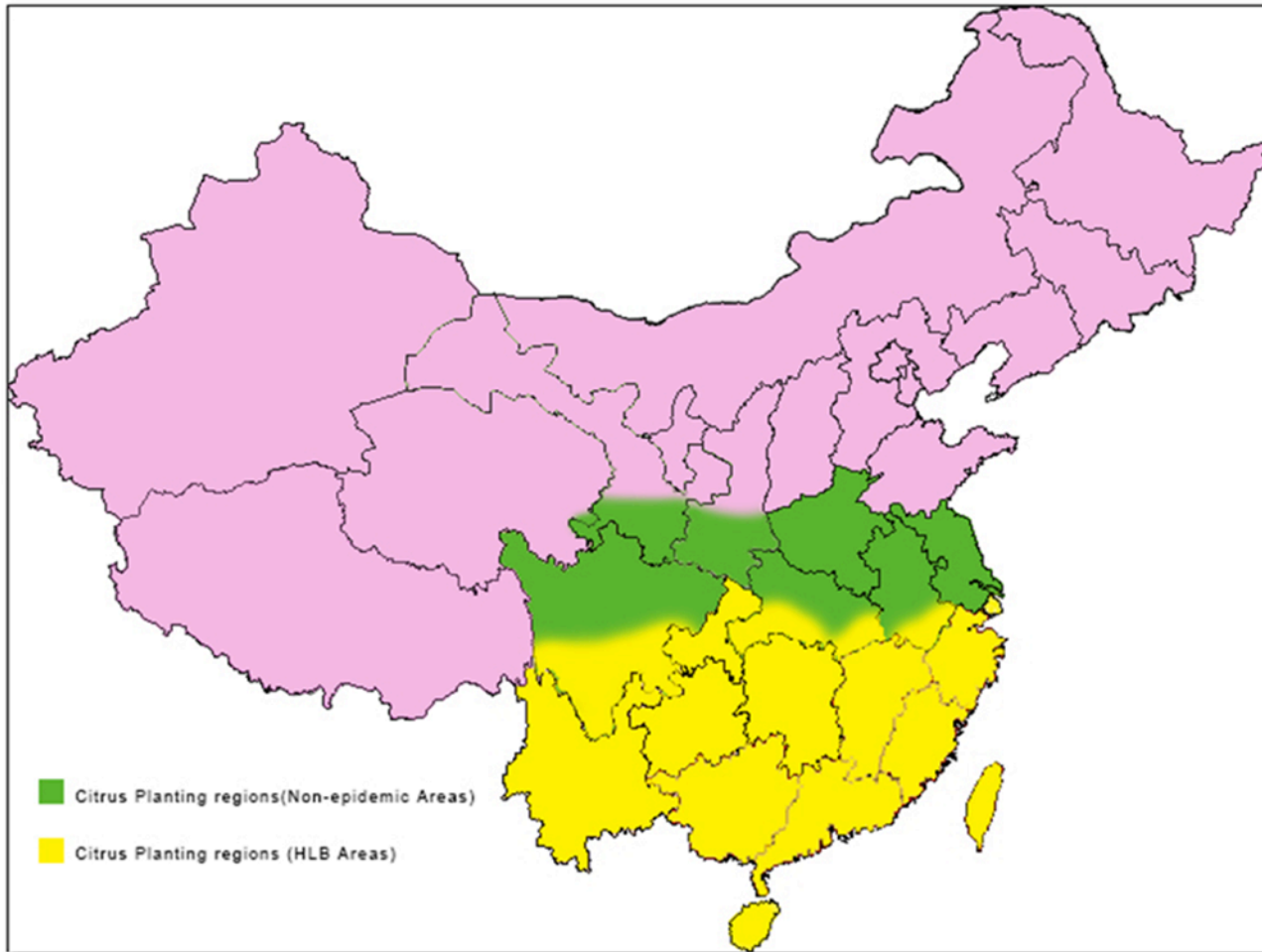
## BIN coverage

- Vertebrates (2,350 BINs)
- Arthropods (18,358 BINs)
- Other Inverts (1,074 BINs)

# China Project # 1

- ▶ **NAME & TYPE** : Survey of biodiversity of insects in citrus orchard in Jiangxi province
- ▶ **Project Lead**: Chenxi Liu, Institute of Plant Protection, CAAS
- ▶ **Collaborators**: Jiangxi Citrus Research Institute
- ▶ **STATUS (UNDERWAY)**: Funding by national key research and development Program of China(2018YFD0201500)
- ▶ **TARGET TAXONOMIC GROUP(s)**: Natural enemies of citrus psyllid
- ▶ **BRIEF DESCRIPTION OF GOALS**: Investigation of the biodiversity of natural enemies of citrus psyllid, including predators and parasitoids, by using Malaise traps.

# Occurrence of citrus greening disease in China



Yellow = infested, Green = non-epidemic area



The Huanglongbing (citrus greening) is vectored by citrus psylla



**Monitoring natural enemies of Asian citrus psyllid in citrus orchards in Jiangxi, China**



# China Project # 2

- ▶ **NAME & TYPE:** Biodiversity survey of insects in grassland and highland in China
- ▶ **Project Lead:** Chenxi Liu, Institute of Plant Protection, CAAS
- ▶ **Collaborators:** Institute of Grassland, CAAS
- ▶ **STATUS (UNDERWAY):** Funding by national key research and development Program of China (2017YFE0104900)
- ▶ **TARGET TAXONOMIC GROUP(s):** Grassland and highland insects
- ▶ **BRIEF DESCRIPTION OF GOALS:** Investigation of the biodiversity of grassland and highland insect pests and their natural enemies by using Malaise traps.

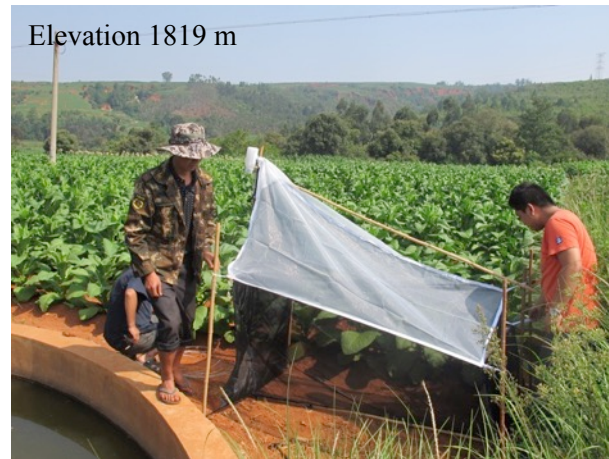
# Biodiversity surveys by Malaise traps

Assessing biodiversity of grassland insect pests and their natural enemies



Hohhot, Inner Mongolia, China

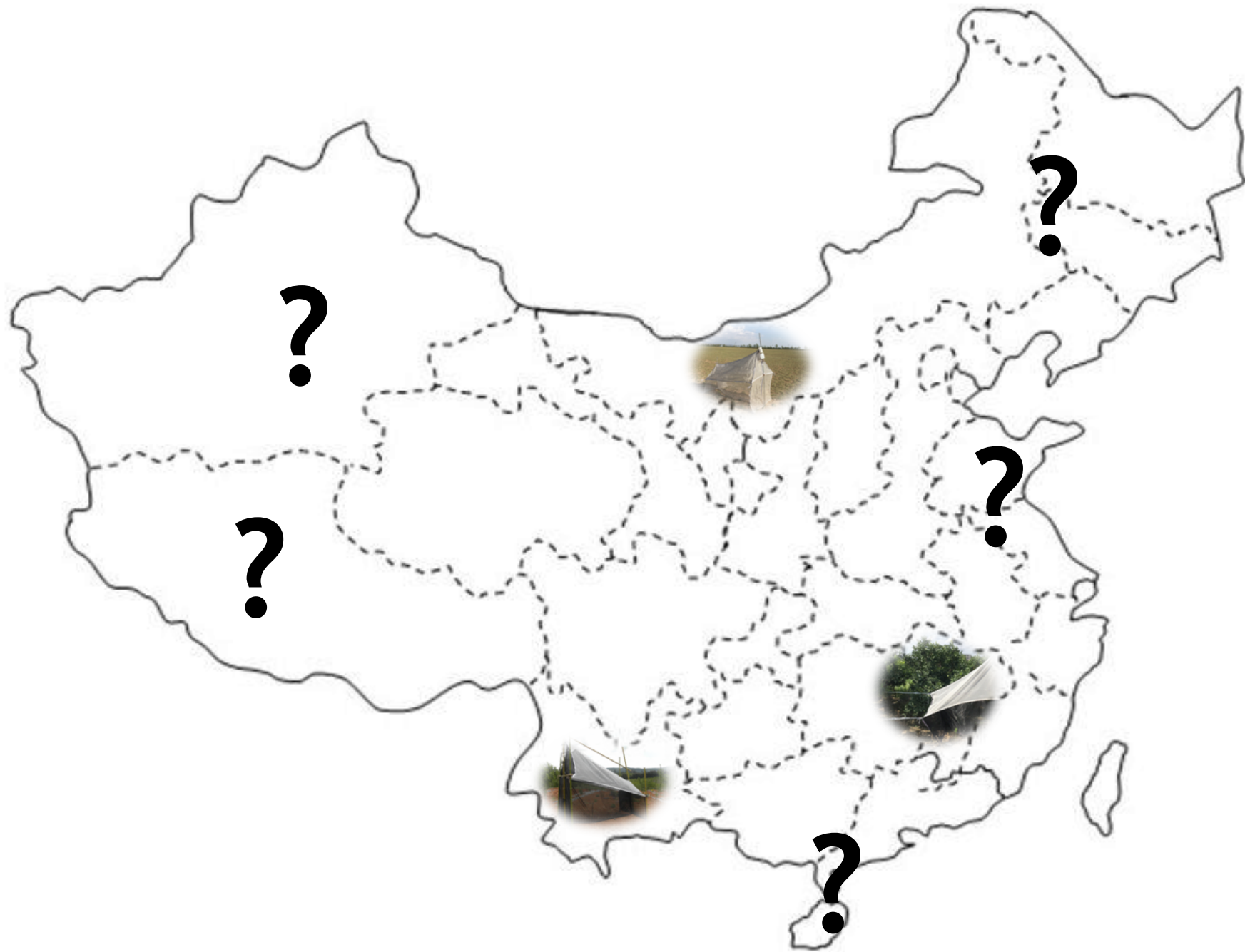
Assessing biodiversity of highland insect pests and their natural enemies



Kunming, Yunnan, China



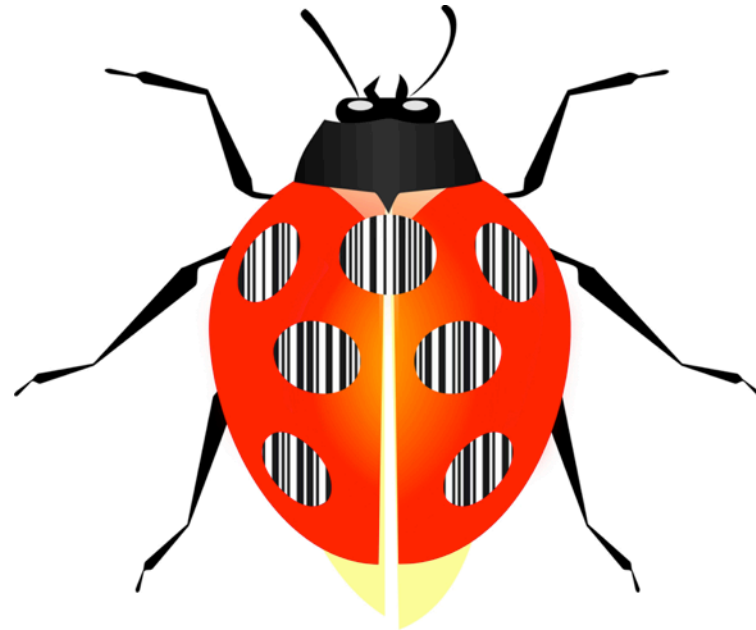
Yuxi, Yunnan, China



# China SWOT Analysis

- ▶ **STRENGTHS:** Excellent biodiversity of insects in China.
- ▶ **WEAKNESSES:** Without a systematic DNA barcoding platform in China.
- ▶ **THREATS:** Widely insecticides used and biodiversity are being destroyed
- ▶ **OPPORTUNITIES:** iBOL II provide opportunities to identify biodiversity of pests and beneficial insects.

# Thank you

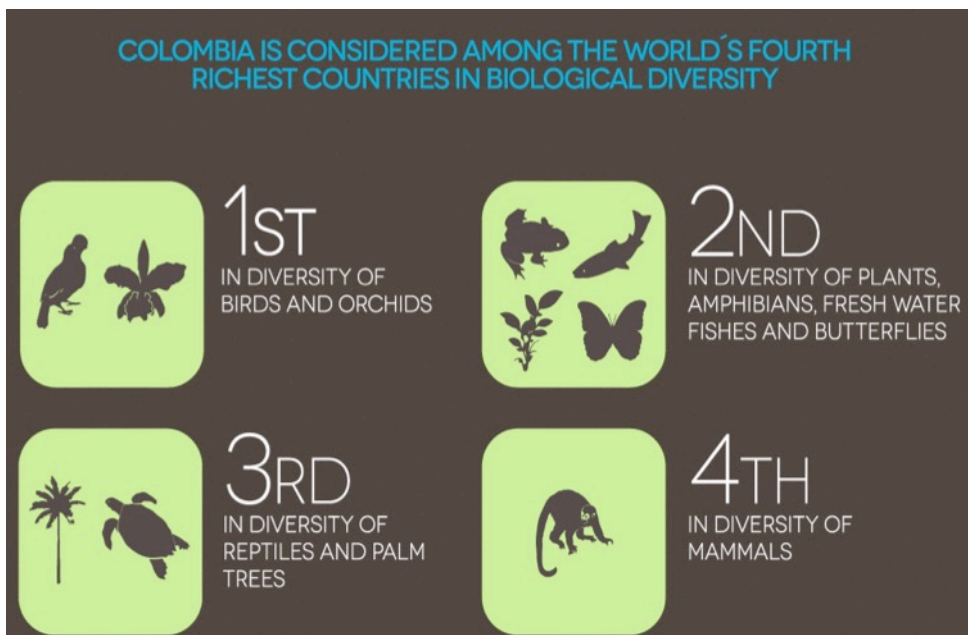
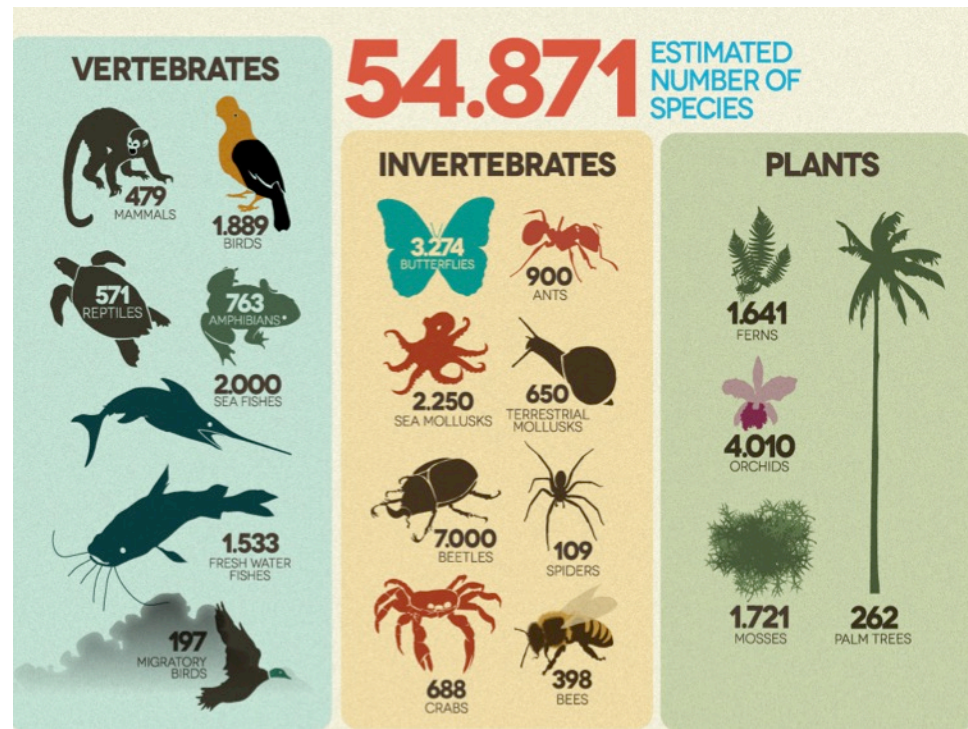


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# Node Report - Colombia

Scientific Steering Committee, October 13 & 14, 2018



# Mailyn Gonzalez Colombia

- ▶ POSITION: PI Conservation Genetics
- ▶ HOME INSTITUTION: Humboldt Institute
- ▶ KEY TAXONOMIC INTERESTS: plants, vertebrates, fungi, insects
- ▶ GEOGRAPHIC FOCUS: Colombia
- ▶ PRIOR BARCODE INVOLVEMENTS:
  - \* IDRC-first 1000 DNA barcode for species of socioeconomic importance in Colombia (2012).
  - \* Colombia BIO - (>3600 barcodes - 2016-2018)
  - \* Organizer of the 1<sup>st</sup> and 2<sup>dn</sup> Hands-on training on DNA barcode (2017 and 2018)
  - \* Collaboration: France, Mexico, Argentina, BIO-Canadá



# Colombia Barcodes on BOLD

## Barcode Count

- 20,268 Sequences
- 3,830 Named Species
- 3,573 BINs

## Species Coverage

- Plants (1,214 species)
- Vertebrates (987 species)
- Arthropods (1,522 species)
- Other Inverts (35 species)

## BIN coverage

- Vertebrates (1,150 BINs)
- Arthropods (2,384 BINs)
- Other Inverts (35 BINs)

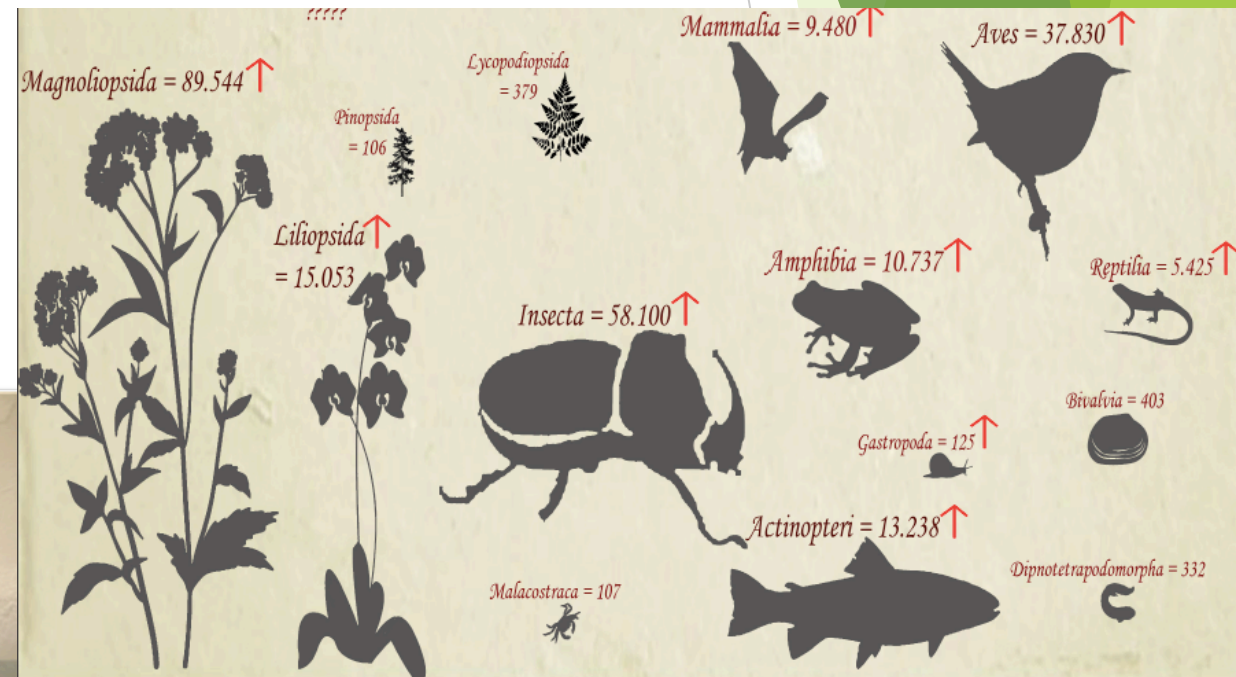
# Colombia Barcode Network



- ▶ **Date established:** 2008
- ▶ **Lead institution:** Instituto Humboldt - Universidad de los Andes
- ▶ **# Researchers involved:** 31
- ▶ **# institutions involved:** 17
- ▶ **Current funding:** NA
- ▶ **Future Prospects:** Colciencias - National Policy of Green Growth

# Humboldt Institute :

Part of the National Environmental System with the mission to promote, coordinate and conduct research that contributes to the conservation and sustainable use of the biological diversity in Colombia.



# Los Andes University

Silvia Restrepo -Natalia Vargas : fungi

Andrew Crawford: amphibians

Santiago Madriñan : plants

Camila Gonzalez : insects (Lonomia)-MHNP-Humboldt

Susana Caballero: aquatic mammals

Juan Armando Sanchez: marine fauna

# Colombia Project # 1

- ▶ **NAME & TYPE** : Colombia BIO - Humboldt (library construction) and Soil Metabarcoding
- ▶ **Project Lead**: Mailyn Gonzalez
- ▶ **Collaborators**: *Humboldt*: Pulido P., Tenorio E., Arenas H., Montoya P., Tovar E., Castellanos L., Acosta A., Cuervo A., Neyta JC., DoNascimento C., Mendoza H.  
*Corpogen*: Cepeda M., Anzola J. Del Portillo P. And *CIAT*: Gallego G., Thome J., Zapata P.  
*Toulouse University* : Chave J. and Iribar A., Uribe S. (*UNAL*), Diaz J. (*Eafit*), Fagua G. (*Javeriana*), Vargas N. (*Uniandes*),
- ▶ **STATUS (UNDERWAY/PLANNED)**: Just finished and metabarcoding analysis underway
- ▶ **TARGET TAXONOMIC GROUP(s)**: Plants, birds, amphibians, reptiles, fish, fungi, insects
- ▶ **BRIEF DESCRIPTION OF GOALS**: At least 3600 barcodes of sampled individuals during expeditions including Malaise traps  
Soil Metabarcoding,  
1<sup>st</sup> Hands on training workshop - september 2017

Sequences 3802

Specimens 3223



## Taxonomy



- Arthropoda (Animals): 1116
- Chordata (Animals): 1006
- Magnoliophyta (Plants): 947
- Basidiomycota (Fungi): 126
- Pteridophyta (Plants): 11
- Ascomycota (Fungi): 9
- Lycopodiophyta (Plants): 7
- Myxomycota (Fungi): 1



*Trychomycterus* sp. nov.



# Colombia Project # 2

- ▶ **NAME & TYPE:** Boyacá BIO & Santander BIO -Library Construction
- ▶ **Project Lead:** Sandra Galeano - Boyacá BIO, Mauricio Torres Santander BIO  
Mailyn Gonzalez—Barcoding component
- ▶ **Collaborators:** UIS (Universidad Industrial de Santander) UPTC (Universidad Tecnológica de Boyacá), Humboldt staff (12 Taxonomist and Genetic team)
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway USD 70000
- ▶ **TARGET TAXONOMIC GROUP(s):** Plants, birds, amphibians, reptiles, fish, fungi, insects
- ▶ **BRIEF DESCRIPTION OF GOALS:** 3000 specimens target and soil metabarcoding

# Colombia Project # 3

- ▶ **NAME & TYPE** : Hands on Training on DNA barcoding for threatened species and regulation of illegal wildlife trade addressed to governing agencies and academics
- ▶ **Project Lead:** Mailyn Gonzalez
- ▶ **Collaborators:** CIAT, BIO-Guelph (Adriana Radulovici, Alexander Borisenko), SCDB, Wilfried Haerty (Earlham Institute), Ian Barnes (Natural History Museum-London), Juan Diaz (Eafit), Sandra Uribe (UNAL)
- ▶ **STATUS (UNDERWAY/PLANNED):** USD 39.000
- ▶ **TARGET TAXONOMIC GROUP(s):** Vertebrates, plants and insects (threatened or invasive)
- ▶ **BRIEF DESCRIPTION OF GOALS:** 13 trainees from environmental authorities (ministry of environment, police, NSF, National Parks, and others) to consolidate the national network and to promote the funding and implementation of DNA barcoding in Colombia  
95 threatened species barcoded



# Colombia SWOT Analysis

- ▶ **STRENGTHS:** Scientific capacity, team of taxonomists, good biological and tissue collections, molecular laboratories available
- ▶ **WEAKNESSES:** No specific funding for the network, high prices of reagents, material and sequencing
- ▶ **THREATS:** Changing policy and funding following governments, genetic data restrictive policies
- ▶ **OPPORTUNITIES:** Megadiversity, international network of collaboration, current policy for “Green Growth”, posconflict agenda

Thank you!



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# Node Report - Costa Rica

Scientific Steering Committee, October 13 & 14, 2018

## SSC Delegate Costa Rica

Sr. Jose Alfredo  
Hernandez

jose.hernandez@  
conagebio.go.cr

- ▶ POSITION: Genetic Access Regulator
- ▶ HOME INSTITUTION: CONAGEBIO  
(Comision Nacional para la Gestion de  
la Biodiversidad (CONAGEBIO)).
- ▶ KEY TAXONOMIC INTERESTS: All  
Biodiversity
- ▶ GEOGRAPHIC FOCUS: All Costa Rica
- ▶ PRIOR BARCODE INVOLVEMENTS:  
Technical approval for all Costa Rican  
barcoding research projects

# Costa Rica Barcodes on BOLD

## Barcode Count

- 690,288 Sequences
- 12,175 Named Species
- 48,148 BINs

## Species Coverage

- Plants (1,822 species)
- Vertebrates (560 species)
- Arthropods (9,864 species)
- Other Inverts (75 species)

## BIN coverage

- Vertebrates (615 BINs)
- Arthropods (47,368 BINs)
- Other Inverts (162 BINs)

# Costa Rica Barcode Network

- ▶ **Date established:** 2003
- ▶ **Lead institution:** Area de Conservacion Guanacaste (ACG); Instituto Nacional de Biodiversidad (INBio); Guanacaste Dry Forest Conservation Fund (GDFCF); Ministerio del Ambiente y Energia (MINAE); Comision Nacional para la Gestion de la Biodiversidad (CONAGEBIO).
- ▶ **# Researchers involved:** 50+ in-country and growing , 50+ international and growing
- ▶ **# institutions involved:** 10+ in-country and growing, 10+ and growing
- ▶ **Current funding:** \$600K for direct laboratory and processing 2018-2019; \$1m/year collection
- ▶ **Future Prospects:** Secure as above; searching for \$100m over ten years for BioAlfa

# Costa Rica Project # 1 (all)

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Library construction as the base for all-eukaryote-taxa and all-sector national biodevelopment, leading to national biodiversity conservation through national bioliteracy and a barcoded country
- ▶ **Project Lead:** ACG, GDFCF, MINAE, INBio, CONAGEBIO, Winnie Hallwachs, Daniel Janzen
- ▶ **Collaborators:** In-country: ACG, GDFCF, MINAE, INBio, CONAGEBIO, UCR, UNA, FONAFIFO, ICE, MEP, ICT, MICITT, CIPROC, FSE, OIJ; International: SI, TNHM, USU, CNC, CBG, iBOL II, UPENN, NTNU, LU, independent non-institutionals, and others
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway: ACG barcoding (44,000+ species), 50,000 more species in freezers awaiting barcoding; 30,000 pinned oven dry museum specimens being prepared; mass Malaise and other trapping planned for 2019 and forward, country-wide (52,000 km<sup>2</sup>, rain forest, cloud forest, dry forest and all integrades. Mass society-wide collaboration - government, NGO, private, commercial.
- ▶ **TARGET TAXONOMIC GROUP(s):** all wild terrestrial and freshwater Eucaryota occurring in Costa Rica, over project duration of at least ten years.
- ▶ **BRIEF DESCRIPTION OF GOALS:** Library construction as primary base (1,000,000 species of 20,000,000 specimens with their collateral), and encouragement of commerce that will generate a personal cheap reusable pocket barcoder for 5.6 million+ people (spreading world-wide); facilitate and encourage all social sectors to make use of wild biodiversity information in a non-damaging way, for the express purpose of it's permanent existence becoming accepted by its society.

# Costa Rica SWOT Analysis

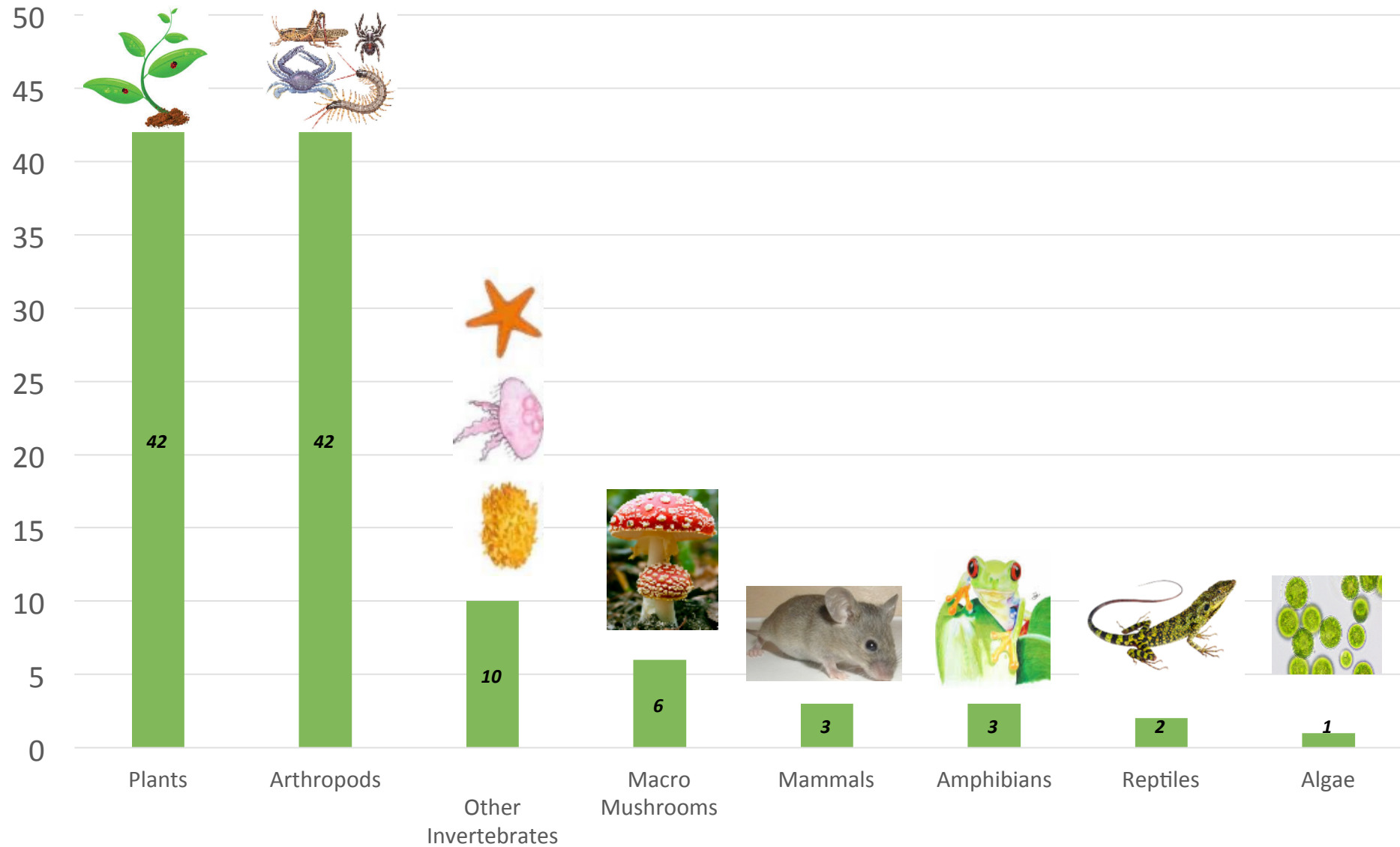
- ▶ **STRENGTHS:** All eucaryotes target; library construction; barcodes and BINs as taxonomic vocabulary with scientific names being collateral along with all other specimen-based data; barcoding and data processing done by one entity (CBG and BOLD); goal, a bioliterate country; specimen and collateral capture conducted by sweat equity from all Costa Rican social sectors (gov, NGO, private, commercial); decreed “National Importance by government; provides vocabulary and encourages all non-damaging uses of biodiversity; strong international collaboration by the taxosphere invited; resident (non-touristic); background with 33 year pilot project(s) and barcoding 15 years of pilot project and proof-of-concept; a national process with great potential for spreading by example to other species-rich tropical countries; Costa Rica - with 25% still in wild ecosystems - still has 98% of the million or more species that were there when first colonized by Europeans; roads, electricity, schooling, employment, etc. in place that allows the creation of the base library and people close enough to all that for bioliteracy to happen; light inventory (5%) of the national biodiversity known already); small variety of biodiversity-based wild biodevelopment functioning (ecotourism, biocontrol for organic farming, gradeschool education, medical entomology, biomonitoring with biodiversity, butterfly farms, taxonomic research, national parks, regulatory actions).
- ▶ **WEAKNESSES:** depends on megafunding from the international community to pair with massive in-country sweat equity; depends on a politically friendly Costa Rican government and social process not demanding instant high returns on investments; since insects are such a huge portion of wild biodiversity (75%+), the process appears biased towards insects;
- ▶ **THREATS:** conservatives who feel that the process of BioAlfa threatens their entitled positions in the national bureaucracy, change in government, failure to find megafunding (\$100 m over ten years), confusion over the legislative aspects of DNA (DNA barcodes as public vocabulary, genomes as national proprietary resources accessible only by contract (as with other natural resources and mining), globalized unmalicious attacks on Costa Rican socioeconomics (leading to national financial deficits), conservative taxosphere views the entire process as a threat to their hegemony over the names for life and thus the key to the knowledge about wild life; conservative forces will find it convenient to label the project as colonial invasion from the “developed countries”; an international funding source will require a conventional “big-money bureaucratic structure” to exist for funding of BioAlfa, which would be lethal for a mission-based project like BioAlfa that is designed for production rather than self-invention; developed country competitors who do not find the emergence of a BioAlfa-type project to be convenient.



# CONAGEBIO

- The National Official Authority for Access to Genetic Resources.
- Focal Point of ABS-Convention on Biological Diversity; Focal Point for GBIF
- Biodiversity Law created the CONAGEBIO, 1998.
- Since 2004, it has granted 584 permits for Genetic Access:
  - ▶ 17 Agriculture Application,
  - ▶ 94 Biotechnology,
  - ▶ 219 Conservation and Ecology,
  - ▶ 3 Animal Physiology,
  - ▶ 1 Plant Physiology,
  - ▶ 134 Human Health,
  - ▶ 27 Animal Health,
  - ▶ 2 Cosmetics
  - ▶ **172 Evolution and Taxonomy,**
    - ▶ 49 DNA Barcoding Prokaryota.
    - ▶ **99 DNA Barcoding Eucaryota.**
    - ▶ 24 Others.

# DNA Barcoding Permits Granted (2004-October 2018)



# CONAGEBIO

- ▶ The Main Coordinator of the Interinstitutional Commission for Knowledge and Information Development for Costa Rican Biodiversity (CIGECIB).
- ▶ CIGECIB leads the National Biodiversity Node in facilitating:
  - ▶ Use of the technology of the Atlas of Living Australia
  - ▶ Occurrences of specimens.
  - ▶ Checklists of species.
  - ▶ Data:
    - ▶ Global Biodiversity Information Facility (GBIF).
    - ▶ Biolep project of Area de Conservación Guanacaste.
    - ▶ **Data in BOLD for all of Costa Rica.**
    - ▶ eBIRD.
- ▶ Website will be:
  - ▶ <http://www.biodiversidadcr.go.cr/>

Plataforma Nacional de Información sobre Biodiversidad (PGCIB)



Inicio Buscar datos Acerca de





Thank you!

[www.conagebio.go.cr](http://www.conagebio.go.cr)



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# Node Report - Egypt

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate

## Egypt

- ▶ POSITION: Professor
- ▶ HOME INSTITUTION:
  - Suez Canal University &
  - Nature & Science Foundation (NGO, Chair)
- ▶ KEY TAXONOMIC INTERESTS:
  - Insects (Butterflies, Wasps)
  - Endemics & Near-endemics species of Sinai Peninsula
- ▶ GEOGRAPHIC FOCUS: North Africa & Middle East
- ▶ PRIOR BARCODE INVOLVEMENTS: None

# Egypt Barcodes on BOLD

## Barcode Count

- 19,259 Sequences
- 932 Named Species
- 1,407 BINs

## Species Coverage

- Plants (351 species)
- Vertebrates (72 species)
- Arthropods (422 species)
- Other Inverts (63 species)

## BIN coverage

- Vertebrates (71 BINs)
- Arthropods (1,258 BINs)
- Other Inverts (68 BINs)

# Egypt Project # 1

- ▶ **NAME & TYPE:** DNA barcoding of insects of Egypt (butterflies and wasps).  
(Metabarcoding):
- ▶ **Project Lead:** Dr. Samy Zalata, Nature and Science Foundation (NSF, Egypt)
- ▶ **Collaborators:** Suez Canal University (Egypt)
- ▶ **STATUS (UNDERWAY/PLANNED):** Planned
- ▶ **TARGET TAXONOMIC GROUP(s):** Insects (Butterflies & Wasps)
- ▶ **BRIEF DESCRIPTION OF GOALS:** 61 butterfly species & 200 wasp species  
(3-5 samples will be collected for each species).



# Egypt Project # 2

- ▶ **NAME & TYPE:** DNA Barcoding of the Endemics and Near-Endemics plants and insects of Sinai Peninsula (DNA Library construction)
- ▶ **Project Lead:** Dr. Samy Zalata, Nature and Science Foundation (NSF, Egypt)
- ▶ **Collaborators:** Suez Canal University & St Katherine Protectorate (Egypt)
- ▶ **STATUS (UNDERWAY/PLANNED):** Planned
- ▶ **TARGET TAXONOMIC GROUP(s):** Plants and insects
- ▶ **BRIEF DESCRIPTION OF GOALS:** 38 endemic plants - 60 endemic or near-endemic insects (butterflies, bees, wasps, ants & beetles). At least 3-5 samples from different localities for each species will be collected.

# Egypt SWOT Analysis

- ▶ **STRENGTHS:**
  - Presence of good taxonomists in specific groups
  - Willingness of Egyptian taxonomists to collaborate with NSF
  - Presence of digitized database (in Excel) for Egyptian biota
  - Easy access to Egyptian collections and field visits
  - Establishment the technique to determine the conservation status of Egyptian biota (some group already published e.g. mammals, butterflies);
- ▶ **WEAKNESSES:**
  - lack of fund and the mechanisms to sustain the work
  - Lack of special laboratory in Egypt performing DNA barcoding
  - Un-awareness of our staff about the detailed BOL procedures & database
- ▶ **THREATS:**
  - Lack of fund to join the international meetings to be aware about what is going on worldwide.
- ▶ **OPPORTUNITIES:**
  - NSF to be an Associate Member in iBOL and contribute to the database
  - Country welcoming new projects after years of political instability

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# Node Report - Finland

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate Finland

- ▶ POSITION: Senior Curator
- ▶ HOME INSTITUTION: University of Oulu
- ▶ KEY TAXONOMIC INTERESTS:  
Lepidoptera, Symphyta, other insects
- ▶ GEOGRAPHIC FOCUS: Finland, Holarctic
- ▶ PRIOR BARCODE INVOLVEMENTS: FinBOL  
coordinator >2011, Finnish Lepidoptera  
(complete), Finnish Symphyta

# Finland Barcodes on BOLD

## Barcode Count

- 63,567 Sequences
- 15,998 Named Species
- 13,211 BINs

## Species Coverage

- Plants (1,628 species)
- Vertebrates (38 species)
- Arthropods (12,108 species)
- Other Inverts (98 species)

## BIN coverage

- Vertebrates (32 BINs)
- Arthropods (13,072 BINs)
- Other Inverts (108 BINs)

# Finland Barcode Network

- ▶ **Date established:** late 2010
- ▶ **Lead institution:** University of Oulu
- ▶ **# Researchers involved:** about 150 in the network, maybe half contributed
- ▶ **# institutions involved:** UOulu, UHelsinki, UTurku, researchers from other institutions also involved
- ▶ **Current funding:** little, next decision (FIRI/Finnish Academy) late 2018 - early 2019
- ▶ **Future Prospects:** FIRI funding decision to come soon, if approved, a systematic barcoding of species not yet represented based on museum specimens and NGS protocols (Sequel?), funding from other sources an option

# Finland Project # 1

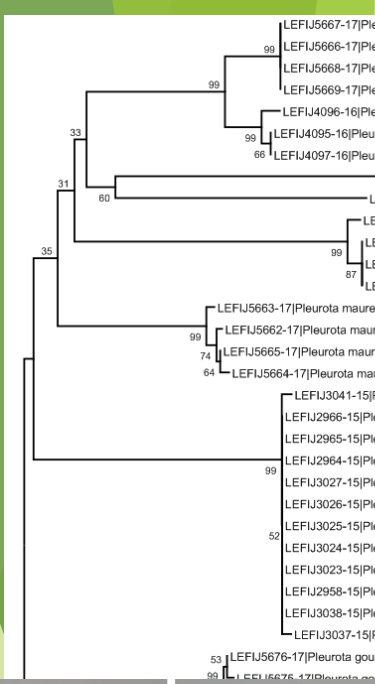
- ▶ **Name:** Ecology and evolution in trophic interactions in changing boreal forest habitats (Metabarcoding)
- ▶ **Project Lead:** Prof. Markku Orell (UOulu)
- ▶ **Collaborators:** Seppo Rytönen, Eero Vesterinen, Coen Westerduin, Panu Välimäki, Emma Vatka, Marko Mutanen
- ▶ **STATUS:** Underway, first analyses finished; a re-submitted manuscript titled: *From droppings to data: a fecal metabarcoding method for analyzing consumed and available prey in a bird-insect food web*
- ▶ **TARGET TAXONOMIC GROUP(s):** all insects and arachnids
- ▶ **BRIEF DESCRIPTION OF GOALS:** 1) To study diets of various tits, 2) to elucidate food webs in boreal forests, 3) to study the effects of rapid species turnover and timing (due to climate change) on birds' diets





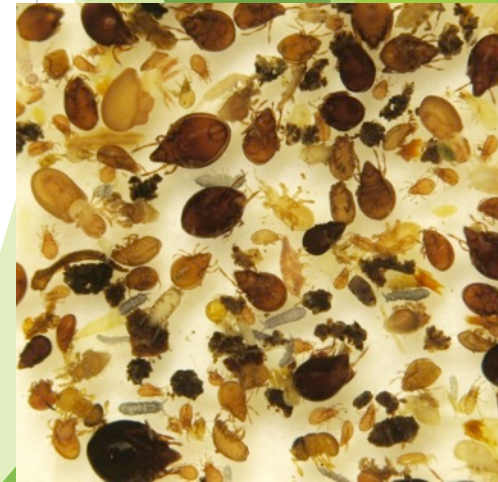
# Finland Project # 2

- ▶ **Name:** Revision of Palearctic Pleurotinae (Lepidoptera) (Library construction)
- ▶ **Project Lead:** Jukka Tabell (Citizen scientist)
- ▶ **Collaborators:** Lauri Kaila, Marko Mutanen
- ▶ **STATUS:** Underway, funding through FinBOL and Finnish entomological societies
- ▶ **TARGET TAXONOMIC GROUP(s):** Pleurotinae moths/Palearctic
- ▶ **BRIEF DESCRIPTION OF GOALS:** To revise all species of Palearctic Pleurotinae and describe a number of undescribed species. Presently 503 specimens/354 barcodes/106 BINs (incl. ~50 un-described species)



# Finland Project # 3

- ▶ **Name:** Hidden biodiversity: Building DNA barcode reference library for Finnish oribatid mites
- ▶ **Project Lead:** Riikka Elo (UTurku)
- ▶ **Collaborators:** Ritva Penttinen, Eero Vesterinen, Marko Mutanen
- ▶ **STATUS:** Underway 2012-2018; manuscript in prep., DNA barcoding funded by FinBOL
- ▶ **TARGET TAXONOMIC GROUP(s):** Oribatid mites -soil-dwelling abundant and diverse decomposers (200.000 specimens and 50 species per one square meter of soil)
- ▶ **BRIEF DESCRIPTION OF GOALS:** 1) To perform the first comprehensive test of the effectiveness of DNA barcodes in oribatid species to examine the intraspecific divergences, identification success and potential species groups that may contain cryptic diversity. 2) To develop COI primers and adding other markers for molecular studies (e.g. 28S, ITS). 1021 specimens of 160 morphospecies barcoded (nearly half of the Finnish fauna, 357 species in total). 485/1021 of the samples have yielded COI sequences.



# Finland SWOT Analysis

- ▶ **STRENGTHS:** 1) dedicated and skillful sample provider network; 2) plenty of high-quality collections; 3) cost-effective approach; 4) extensive results; 5) nation's economy strong and stable; 6) high level of institutional commitment
- ▶ **WEAKNESSES:** 1) Many potential funders but only few really big ones; 2) limited possibilities to provide in-kind contribution by museums; 3) sample submission protocols too heterogeneous (Finland)
- ▶ **THREATS:** 1) Host organisations deprioritise project; 2) funding not gained; 3) museum specimens less useful than hoped even for NGS protocols; 4) negative turns in political situation/country's economy; 5) stakeholders/end-users find produced data irrelevant
- ▶ **OPPORTUNITIES:** 1) IBOL and FinBOL are well-known and trusted brands > easier to sell and acquire funding; 2) biodiversity crisis recognized as an integral part of larger phenomena, for instance climate change; 3) IBOL II becomes a global infrastructure, which is supported (and financed) by United Nations and countries, so that funding is backed up by political decisions; 4) citizens consider FinBOL more important > politicians provide targeted funds for activities via ministries; 5) growing data allows to make mega-analyses, which are beyond capacity of single researcher or research team

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# Node Report - France

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate

## France

### Rodolphe Rougerie

- ▶ **POSITION:**  
Assistant professor / Curator (Lepidoptera)
- ▶ **HOME INSTITUTION:**  
Muséum national d'Histoire Naturelle
- ▶ **KEY TAXONOMIC INTERESTS:**  
Lepidoptera
- ▶ **GEOGRAPHIC FOCUS:**  
Global
- ▶ **PRIOR BARCODE INVOLVEMENTS:**  
Lepidoptera campaigns (Global / Regional / Local)  
DNA barcoding of type specimens  
Insect Community surveys (barcoding/metabarcoding)  
Soil diversity surveys  
High-throughput protocols

# France Barcodes on BOLD

## Barcode Count

- 49,847 Sequences
- 8,087 Named Species
- 8,874 BINs

## Species Coverage

- Plants (438 species / 4,900 sp)
- Vertebrates (552 species / 1,000 sp.)
- Arthropods (6,014 species / 35,200 sp. insects only)
- Other Inverts (402 species)

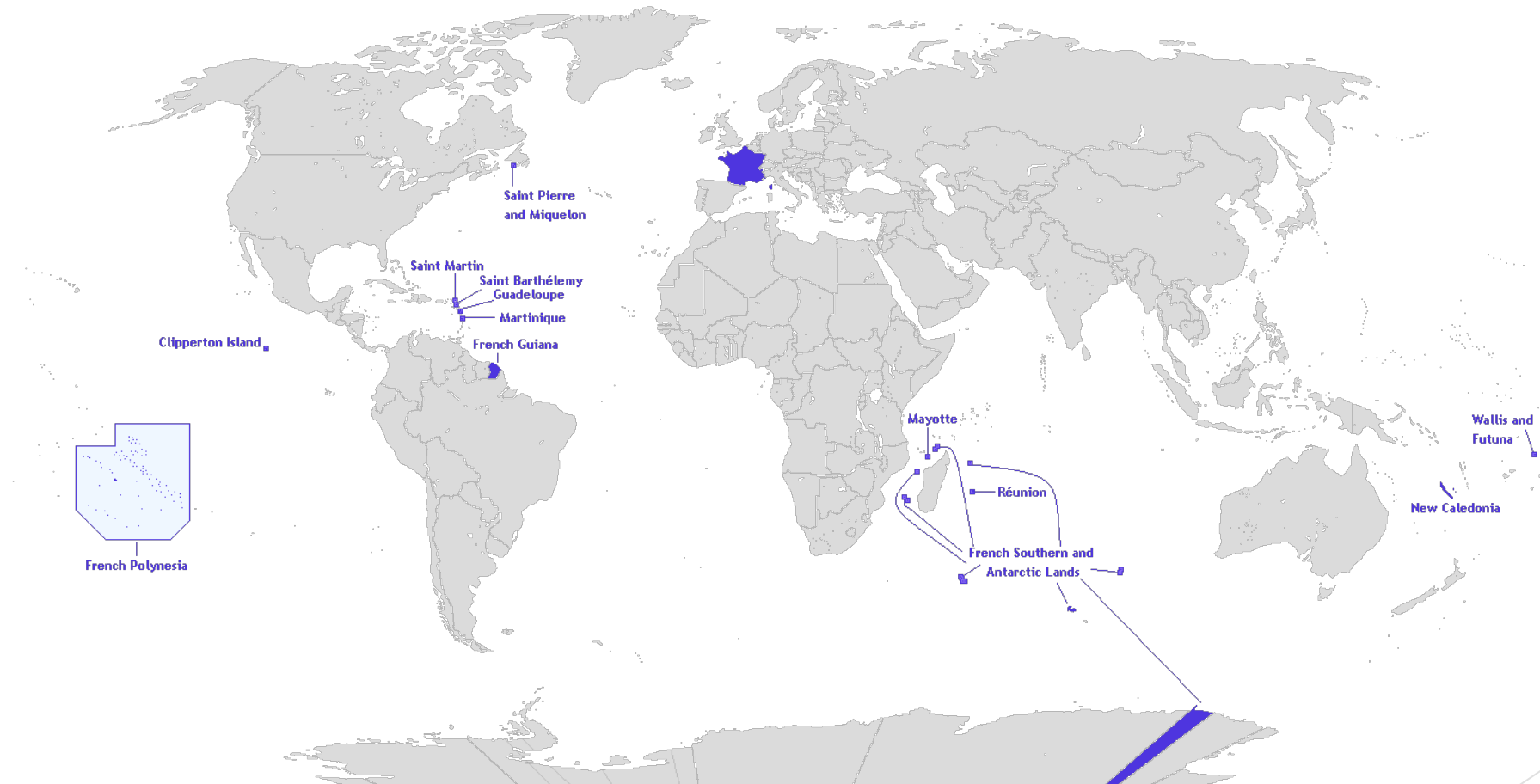
## BIN coverage

- Vertebrates (530 BINs)
- Arthropods (7,328 BINs)
- Other Inverts (721 BINs)

# French Oversea Territories on BOLD

## All OTs

- 42,852 Sequences
  - 30,332 = Arthropoda ; 3,845 = Chordata; 3818 = Annelida ; 2442 = Mollusca
  - 1,470 = Plants



# France Barcode Network

▶ **Date established:**

▶ **Lead institution:**

▶ **# Researchers involved:**

▶ **# institutions involved:**

▶ **Current funding:**

▶ **Future Prospects:**

## No existing network

- ▶ Natural Heritage Service (PATRINAT: AFB, MNHN, CNRS), new structure managing:
  - ▶ PNDB = “National Pole for Biodiversity Data”
  - ▶ National Inventory of Natural Heritage (INPN)
- ▶ Thematic Research Group “Environmental Genomics”
  - ▶ Promotes environmental genomics research (annual conference, student mobility)
- ▶ “R-Syst” network: molecular characterization of organisms of agronomical interest (INRA)
- ▶ EntomoCentre project (C. Lopez-Vaamonde, INRA)
  - ▶ Will support workshop/conference organization
  - ▶ Project engineering



# France Project # 1

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): CLIMTREE - Ecological and socioeconomic impacts of climate-induced tree diebacks in highland forests
- ▶ **Project Lead:** Carlos Lopez-Vaamonde (INRA, Orléans)
- ▶ **Collaborators:**
  - ▶ FRANCE: IRSTEA; INRA; MNHN; Université de Tours
  - ▶ CHINA: Kunming Institute of Zoology; Kunming Institute of Botany
  - ▶ GERMANY: Bavarian Forest National Park; University of Greifswald; IGB, Berlin
  - ▶ ITALY: Institute of Ecosystem Study; Padova University
- ▶ **STATUS:** Underway (2016-2020) Total funding = 1,05M€ (348K€ FR; 270K€ CH; 332K€ GER; 102K€ IT)
- ▶ **TARGET TAXONOMIC GROUP(s):** Saproxyllic beetles; freshwater invertebrates; soil micro-invertebrates (Rotifera)
- ▶ **BRIEF DESCRIPTION OF GOALS:** Measure impact of climate change and forest management on biodiversity of highland forests, using DNA metabarcoding ; includes library construction for 1000 species of saproxyllic beetles + completion of existing libraries for freshwater invertebrates and European rotifers.

# France Project # 2

- ▶ **NAME & TYPE (Metabarcoding):** Increasing the Multifunctionality of Agroecosystems by Harnessing fOod webs (IMAgHO)
- ▶ **Project Lead:** Stéphane BOYER (IRBI, Université de Tours)
- ▶ **Collaborators:** CEBC (CNRS, Chizé), SAVE (INRA, Bordeaux), CESCO (MNHN, Paris), CETU (Univ. de Tours)
- ▶ **STATUS:** Underway 2018-2020 – 571,8K€
- ▶ **TARGET TAXONOMIC GROUP(s):** Aphids & parasitoids; Carabids and preys; Pollinators & plants
- ▶ **BRIEF DESCRIPTION OF GOALS:** Describe and understand food webs in agroecosystems and design/test management options to manipulate food webs and maximize regulatory services.

# France Project # 3

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): CODEX – A high-throughput pipeline for assembling DNA barcode libraries at MNHN
- ▶ **Project Lead:** Delphine Gey, Rodolphe Rougerie
- ▶ **Collaborators:** MNHN researchers at the Molecular Systematics Services laboratory
- ▶ **STATUS:** planned in 2019 (15K€ + contributions by researchers)  
*(pilot study in 2018 (34K€) for New-Caledonian insects: 2000 species/ 3000 specimens)*
- ▶ **TARGET TAXONOMIC GROUP(s):** Any group
- ▶ **BRIEF DESCRIPTION OF GOALS:** To support MNHN researchers for producing DNA barcode libraries at lower cost using an Illumina pipeline.

# France Project # 4

- ▶ **NAME & TYPE:** ACTIAS/SPHINX
- ▶ **Project Lead:** Rodolphe Rougerie
- ▶ **Collaborators:** Multiple international partners (Synthesis project)
- ▶ **STATUS (UNDERWAY):** 2016-2020 (495K€ (ANR) + 180K€ (CESAB))
- ▶ **TARGET TAXONOMIC GROUP(s):** Saturniidae & Sphingidae (Lepidoptera)
- ▶ **BRIEF DESCRIPTION OF GOALS:** Integrate DNA barcodes into evolutionary and macroecological studies (development of dedicated tools for record annotations, reconciliation of occurrence records, methods for combining barcodes and phylogenomic datasets)

# France SWOT Analysis

## ▶ STRENGTHS:

- ▶ Natural History Collections (public/private – type specimens)
- ▶ Taxonomic expertise – very active community of taxonomists
- ▶ Many small/medium size molecular biology labs; Genoscope
- ▶ Highly diverse European country (mountains/Mediterranean region; e.g. 40% of European Flora)
- ▶ Hyper-diverse Oversea Territories (French Guiana, New-Caledonia, Reunion, etc. = 98% of French vertebrate species, 96% of plant species over 22% of French territories)

## ▶ WEAKNESSES:

- ▶ Biodiversity research poorly funded nationally
- ▶ No national network, scattered community

## ▶ THREATS:

- ▶ Nagoya protocol, access to genetic resources

## ▶ OPPORTUNITIES:

- ▶ Oversea territories as possible Associate Members
- ▶ Close relationships with French-speaking countries (e.g. Gabon, Madagascar)

Thank you!



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# Node Report - Germany

Scientific Steering Committee, October 13 & 14, 2018



GERMAN  
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# SSC Delegate Germany

- ▶ POSITION: PhD, Curator, Lead Entomology Dept.
- ▶ HOME INSTITUTION: Bavarian State Collection of Zoology, Munich (ZSM)
- ▶ KEY TAXONOMIC INTERESTS: Lepidoptera, Geometridae
- ▶ GEOGRAPHIC FOCUS: Worldwide (Africa > South America > Europe)
- ▶ PRIOR BARCODE INVOLVEMENTS:
  - Reference library: Geometridae worldwide, fauna of Bavaria & Germany
  - Applications (Metabarcoding)



# Germany Barcodes on BOLD

## Barcode Count

- 188,817 Sequences
- 18,171 Named Species
- 22,814 BINs

## Species Coverage

- Plants (596 species)
- Vertebrates (575 species)
- Arthropods (16,003 species)
- Other Inverts (455 species)

## BIN coverage

- Vertebrates (549 BINs)
- Arthropods (21,756 BINs)
- Other Inverts (459 BINs)

# Germany Barcode Network



- ▶ **Date established:**  
2009 (BFB) / 2012 (GBOL)
- ▶ **Lead institution:**  
ZSM (Munich) + ZFMK (Bonn)
- ▶ **ca 50 Researchers** involved:  
G. Haszprunar, W. Wägele, A. Hausmann, M. Geiger + ca 150 associates
- ▶ **16 institutions** involved, 7 others associated:  
Munich, Bonn, Stuttgart, Berlin, Karlsruhe, Münster, Giessen, Bochum, Essen ...
- ▶ **Current funding:**  
Core projects on German fauna: **13M€ (16M Can \$)**  
Other Barcoding projects (e.g. Indonesia, Taxon-omics) 10M€ partim  
Infrastructure (Senckenberg LOEWE centre ‘translational biodiversity genomics’)
- ▶ **Future Prospects:**  
Research on Insect Decline “GBOL3” / ZFMK (?), Metabarcoding applications (BayKlif etc.),  
Type barcoding (DCOLL)

# Germany Project # 1



▶ **NAME & TYPE:**

**Barcoding Fauna Bavarica BFB**  
(Library construction, Metabarcoding)

▶ **Project Lead:**

ZSM Munich (G. Haszprunar, A. Hausmann)

▶ **Collaborators:**

7 curators (J. Moriniere, S. Schmidt, M. Balke, L. Hendrich, A. Segerer, J. Spelda, R. Melzer) and ca 30 associates (MEG)

▶ **STATUS (UNDERWAY):**

2009-2019, 1.5M€ + salaries (after 2019: continued by institutional funds, associations, smaller grants for monitoring)

▶ **TARGET TAXONOMIC GROUP(s):**

all animals

▶ **BRIEF DESCRIPTION OF GOALS:**

target: 35,000 species, 2018: 20,000 species, >100,000 specimens (from territory of Bavaria)

# Germany Project # 2



▶ **NAME & TYPE:**

**German Barcode of Life GBOL**  
(Library construction, Metabarcoding)

▶ **Project Lead:**

ZFMK Bonn (W. Wägele, M. Geiger)  
ZSM Munich (G. Haszprunar, A. Hausmann)

▶ **Collaborators:**

> 50 curators & scientists from 16 institutions, and ca 200 associates

▶ **STATUS (UNDERWAY):**

2012-2019, 11M€ (13.5M Can \$)

▶ **TARGET TAXONOMIC GROUP(s):**

all animals, selected plants, diatoms & fungi

▶ **BRIEF DESCRIPTION OF GOALS:**

target: 50,000 species, 2018: 24,000 species, >250,000 specimens (189,000 from territory of Germany on BOLD) - Metabarcoding - Applications

# DNA library of German animal species



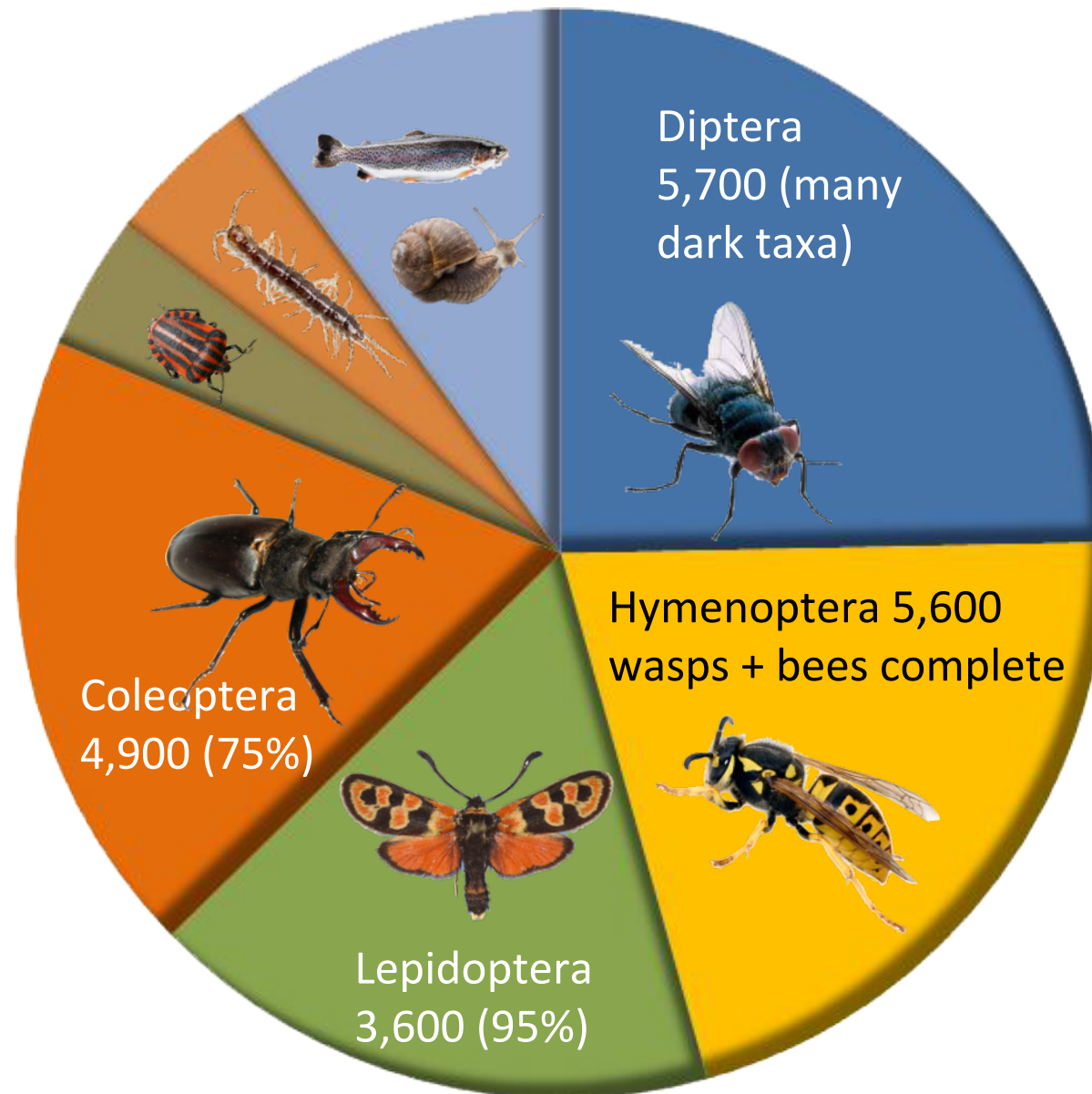
**24,000 species = coverage: 50%!**

48.000 species  
x  
4 (regions)  
= 192.000 DNA-barcodes

Fotos: P. Mazzei, A. Hausmann, R. Rougerie etc.

ZOOLOGISCHE STAATSSAMMLUNG MÜNCHEN

# Species (BIN) coverage



# Germany Project # 3

- ▶ NAME & TYPE:

  - ▶ **Geometridae of the World** (Library construction)

- ▶ Project Lead:

  - ▶ ZSM Munich (A. Hausmann)

- ▶ Collaborators:

  - ▶ Forum Herbulot (150 members)

- ▶ STATUS (underway):

  - ▶ since 2006

- ▶ TARGET TAXONOMIC GROUP(s):

  - ▶ Geometridae worldwide

- ▶ BRIEF DESCRIPTION OF GOALS:

  - ▶ 23,000 species described, currently 23,000 BINs on BOLD (top score family on BOLD)



# Germany Project # 4



- ▶ **NAME & TYPE:**

  - ▶ **DCOLL / Type barcoding** (Library construction)

- ▶ **Project Lead:**

  - ▶ ZSM Munich (G. Haszprunar, A. Hausmann)

- ▶ **Collaborators:**

  - ▶ ? ZSM or >20 curators & scientists from ca 10 institutions

- ▶ **STATUS (PLANNED, political decisions in autumn):**

  - ▶ 2020-2031, 5-10M€ ? (6-12M Can \$)

- ▶ **TARGET TAXONOMIC GROUP(s):**

  - ▶ type specimens of all animals

- ▶ **BRIEF DESCRIPTION OF GOALS:**

  - ▶ target: DNA barcodes for **10,000 primary type specimens** (ZSM)  
or 30,000 from German museums and/or additional 200,000 paratypes  
**(4,000 done)**



# Germany Project # 5

▶ **NAME & TYPE:**

**DFG SPP 1991: Taxon-omics** (genomics, partly metabarcoding)

▶ **Project Lead:**

BSM Munich (S. Renner)

▶ **Collaborators:**

27 single projects (mainly postdocs, PhD)

▶ **STATUS (PLANNED):**

2018-2023, 5.5M€ (7M Can \$), only partly for DNA barcoding

▶ **TARGET TAXONOMIC GROUP(s):**

animals, plants, fungi, protists

▶ **BRIEF DESCRIPTION OF GOALS:**

target: some projects focusing on integrative taxonomy and genomics, e.g. improving standards for NGS sequencing of old collection material

# Germany SWOT Analysis

## ► STRENGTHS:



Federal structure of Germany (institutions/regions in competition)

High coverage of national fauna (50% = second-best ?)

Many stakeholders using metabarcoding applications

Many large collections

Much expertise for calibration

## ► WEAKNESSES:



Little coordination outside GBOL (competition)

Poor representation of soil organisms, mites, marine fauna - fungi, protists

Poor taxonomic calibration in Diptera and Hymenoptera (partim)

# Germany SWOT Analysis

## ▶ THREATS:



- Large projects (BFB/GBOL) probably finishing in 2019
- Legal issues (Nagoya protocol)
- Leading directors will retire in 1 / 4 years

## ▶ OPPORTUNITIES



- Recommendation from national Academy of Sciences (Leopoldina), hype around insect decline
- Economy of Germany and governmental budgets in good conditions
- Technology & applications accepted by scientists and stakeholders (e.g. NH museums without reluctance of providing tissues for type sequencing)
- Established international cooperations (e.g. Peru, Colombia, Ethiopia)

Thank you!



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# Node Report - India

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate India

- ▶ POSITION: Director
- ▶ HOME INSTITUTION: Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- ▶ KEY TAXONOMIC INTERESTS: Fish, Mammals, Reptiles and Insects
- ▶ GEOGRAPHIC FOCUS: India
- ▶ PRIOR BARCODE INVOLVEMENTS: Representing National node iBoL-I. We are working on 30 barcode projects with diverse taxonomic groups

# India Barcodes on BOLD

## Barcode Count

- 47,796 Sequences
- 8,469 Named Species
- 6,023 BINs

## Species Coverage

- Plants (3,137 species)
- Vertebrates (1,431 species)
- Arthropods (2,823 species)
- Other Inverts (360 species)

## BIN coverage

- Vertebrates (1,680 BINs)
- Arthropods (3,654 BINs)
- Other Inverts (663 BINs)

# India Barcode Network

- ▶ **Date established: Sept, 2011**
- ▶ **Lead institution: Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**
- ▶ **# Researchers involved: 30**
- ▶ **# institutions involved: 08**
- ▶ **Current funding: INR 50 million**
- ▶ **Future Prospects: to initiate national leads on insect barcoding; plant barcoding; vertebrate barcoding**



# Our Network



# Recent facility updation



# India Project # 1

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Microbial Meta Barcoding
- ▶ **Project Lead:** Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- ▶ **Collaborators:** 1. University College, Mangalore; SPMV, Tirupati, Government College, Ooty; Government Medical College, Aurangabad, Jilla Hospital & IVF Centre, Aurangabad;
- ▶ **STATUS (UNDERWAY/PLANNED):** 16 projects completed metabarcoding (385 samples). Secured funding for laboratory supplies, Infrastructure funding of INR 40 million invested in establishing NGS facility.
- ▶ **TARGET TAXONOMIC GROUP(s):** Marine & Coastal microbial communities; Microbes in relation to infertility and IVF implantation failure; Oral cancer and microbial community structure; Vertebrate evolution in relation to microbiota (from mice to Tiger 37 vertebrates)
- ▶ **BRIEF DESCRIPTION OF GOALS:** Under this project it is believed to cover diverse microbial community library with several application in near future.

# India Project # 2

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Fish barcoding for major river systems in India and Indian Ocean.
- ▶ **Project Lead:** Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- ▶ **Collaborators:** 06
- ▶ **STATUS (UNDERWAY/PLANNED):** Barcodes for fish from four river systems is over, library updation and publication is in process
- ▶ **TARGET TAXONOMIC GROUP(s):**All fish
- ▶ **BRIEF DESCRIPTION OF GOALS:** to delineate intraspecies distances among river basin and in between basins; species diversity and genetic variation mapping, Resolving taxonomic ambiguities. Species diversity on east coast and west coast of India and genetic differentiation.

# India Project # 3

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Medicinal Plant DNA barcoding
- ▶ **Project Lead:** Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- ▶ **Collaborators:** 08
- ▶ **STATUS (UNDERWAY/PLANNED):** DNA barcode library for over 6000 medicinal plant is generated.
- ▶ **TARGET TAXONOMIC GROUP(s):** Plants with medicinal and nutraceutical properties.
- ▶ **BRIEF DESCRIPTION OF GOALS:** Map the resources; validation of herbal medicinal preparations and food forensics. Working on complex mixture validation is in progress

# India SWOT Analysis

- ▶ **STRENGTHS:** The State-of-the-art infrastructure facilities established. Representing biodiversity rich region where taxonomic surveys are still incomplete attracts scope for mapping diversity.
- ▶ **WEAKNESSES:** Lacking trained and experienced taxonomic experts
- ▶ **THREATS:** taxonomic misidentification may create mess in barcode library
- ▶ **OPPORTUNITIES:** Rapid new species discoveries; huge diversity of taxa can enrich barcode library rapidly; Collaboration are always welcome to work on insect taxa; collaborations for bioinformatics analysis

SWOT analysis to identify strengths, weaknesses, opportunities, and threats to your nation's participation in iBOL-II. If appropriate, consider the prospect of recruiting additional Nations as Associate Members under opportunities.

Thank you!



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# Node Report - Lebanon

Scientific Steering Committee, October 13 & 14, 2018



SSC Delegate  
Magda BOU DAGHER  
KHARRAT  
Lebanon

- ▶ POSITION: Head of life and earth science department
- ▶ HOME INSTITUTION: Faculty of Science- Saint Joseph University (USJ)
- ▶ KEY TAXONOMIC INTERESTS: Plants, Fungi and Animals
- ▶ GEOGRAPHIC FOCUS: Lebanon
- ▶ PRIOR BARCODE INVOLVEMENTS: No

# Lebanon Barcodes on BOLD

Found **344** published records, with **344** records with sequences, forming **151** BINs (clusters), with specimens from **2** countries, deposited in **29** institutions.

Of these records, **205** have species names, and represent **106** species.

## Barcode Count

- 344 Sequences
- 205 Named Species
- 151 BINs

## Species Coverage

- Plants (17 species)
- Vertebrates (32 species)
- Arthropods (15 species)
- Other Inverts (11 species)

## BIN coverage

- Vertebrates (32 BINs)
- Arthropods (33 BINs)
- Other Inverts (8 BINs)

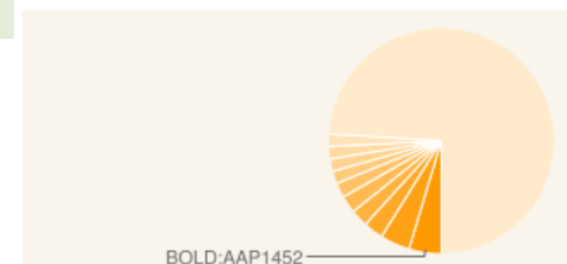
### Species



- Unspecified\*: 139
- Origanum syriacum: 17
- Capoeta damascina: 13
- Dendropoma petraeum: 11
- Garra festai: 7
- Pseudophoxinus libani: 7
- Terellia serratulae: 6
- Coenotephria floridianii: 5
- Pseudophoxinus kervillei: 5
- Ophisops elegans: 4
- Others: 130

### BIN CLUSTERS [151]

<b>BOLD:AAP1452</b>	13
<b>BOLD:ACL7364</b>	12
<b>BOLD:AAB2629</b>	8
<b>BOLD:AAD1529</b>	7
<b>BOLD:ACL6974</b>	7
<b>BOLD:ACW1893</b>	6
<b>BOLD:ACF4725</b>	5
<b>BOLD:AAB4048</b>	5
<b>BOLD:AAC2171</b>	5
<b>BOLD:AAB3861</b>	5

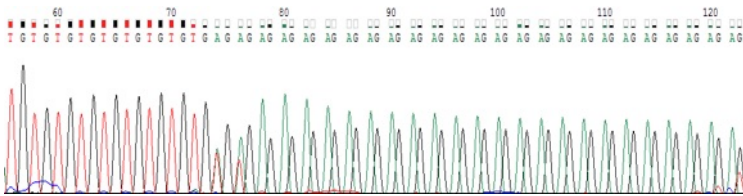
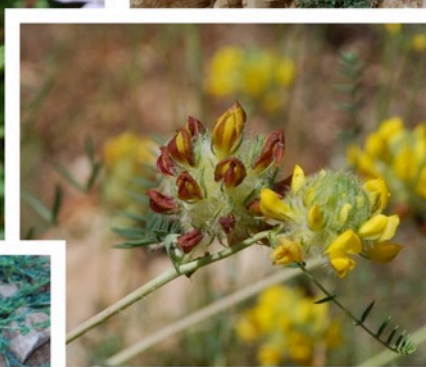
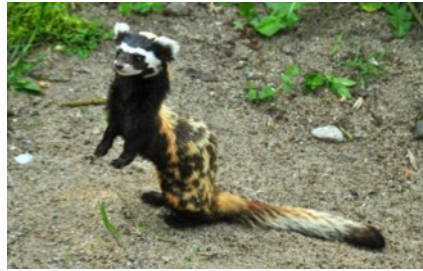


# Lebanon Project # 1

- ▶ **NAME & TYPE:** Construction Of The First Reference Library For Plants And Mammals Of Lebanon (Library Construction)
- ▶ **Project Lead:** Magda BOU DAGHER KHARRAT
- ▶ **Collaborators:** Liliane BOUKHDOUD (USJ), Carole SALIBA (USJ).
- ▶ **STATUS (UNDERWAY/PLANNED):** Planned
- ▶ **TARGET TAXONOMIC GROUP(s):** Mammals, Angiosperms, Gymnosperms
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - ▶ *Plants: 42 species, ~126 specimens*
  - ▶ *Animals: 18 species, ~40 specimens*

# DNA barcoding

Phylogeography, Phylogenetics, Genetic diversity, ..



- ❑ Bou Dagher-Kharrat M., Mariette S., Fady B., Lefevre F., Grenier G., Plomion C. et Savouré A., Geographical diversity and genetic relationships among *Cedrus* species assayed by AFLP. 2007. *Tree Genetics & Genomes* 3: 275-285
- ❑ Douaihy, B., Vendramin G., Boratyński A., Machon N., Bou Dagher-Kharrat M. High genetic diversity with moderate differentiation in *Juniperus excelsa* M. Bieb. from Lebanon and the Eastern Mediterranean Region. 2011. *AOBPlants*. DOI: 10.1093/aobpla/PLR003.
- ❑ F. Abdel Samad, A. Baumel Juin, D. Pavon, S. Siljak-Yakovlev, F. Médail, M. Bou Dagher-Kharrat. Phylogenetic diversity and genome sizes of *Astragalus* (Fabaceae) in the Lebanon biogeographical crossroad. 2014 *Plant Systematics and Evolution*. 300 - 5: 819-830.
- ❑ Nour Abdel Samad, Magda Bou Dagher-Kharrat, Rana El Zein, Bouchra Douaihy, Oriane Hidalgo, Sonja Siljak-Yakovlev. Unlocking the karyological and cytogenetic diversity of *Iris* from Lebanon: *Oncocyclus* section shows a distinctive profile and relative stasis during its continental radiation. *PLOS ONE* (2016) | DOI:10.1371/journal.pone.0160816
- ❑ Norbert Kilian, Ralf Hand, Georgios N. Hadjikyriakou, Charalambous S. Christodoulou, Magda Bou Dagher Kharrat. *Astartoseris* (Cichorieae, Asteraceae), a new, systematically isolated monospecific genus accommodating *Lactuca triquetra* endemic to Lebanon and Cyprus (2017). *Willdenowia* 47(2) in August 2017.

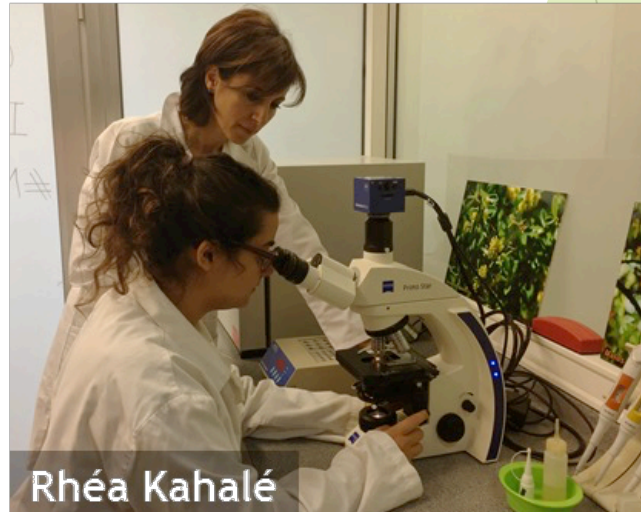
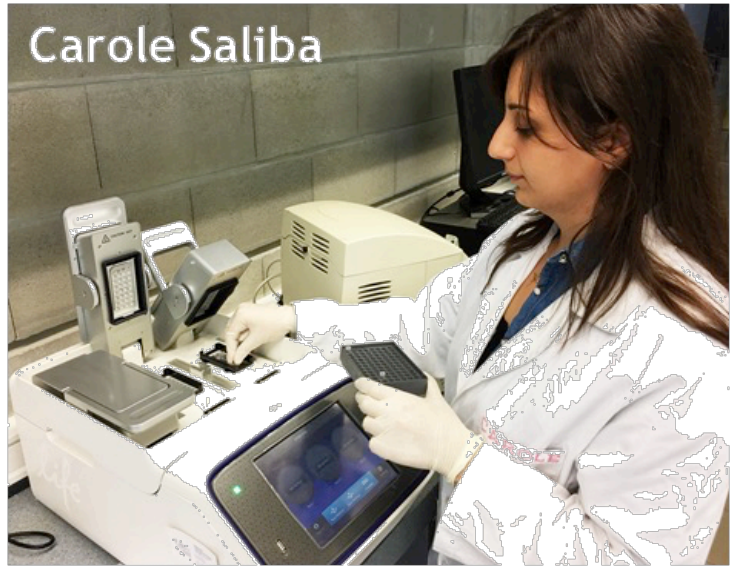
# Laboratoire Biodiversité et Génomique Fonctionnelle



# Laboratoire pour la Germination et Conservation des graines



# Some of my Team members



# Lebanon Project # 2

- ▶ **NAME & TYPE:** Exploration Of Animal-plant Interactions Using A Non-invasive DNA-based Method: Involvement In Ecological Restoration (Metabarcoding)
- ▶ **Project Lead:** Magda BOU DAGHER KHARRAT
- ▶ **Collaborators:** Liliane BOUKHDOUD (USJ), Nancy MCLNERNEY, Lilly PARKER, Jesus MALDONADO (Smithsonian Conservation Biology Institute, Washington, DC), Lisa MATISOO-SMITH (OTAGO University), Hugh CROSS (OTAGO University).
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway  
*USJ, US embassy, Convention on Biological Diversity(CBD)*
- ▶ **TARGET TAXONOMIC GROUP(s):** Mammals, Angiosperms, Gymnosperms
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - ▶ *Metabarcoding on animals feces*
  - ▶ *Illustrated manual on plant-animal interaction*

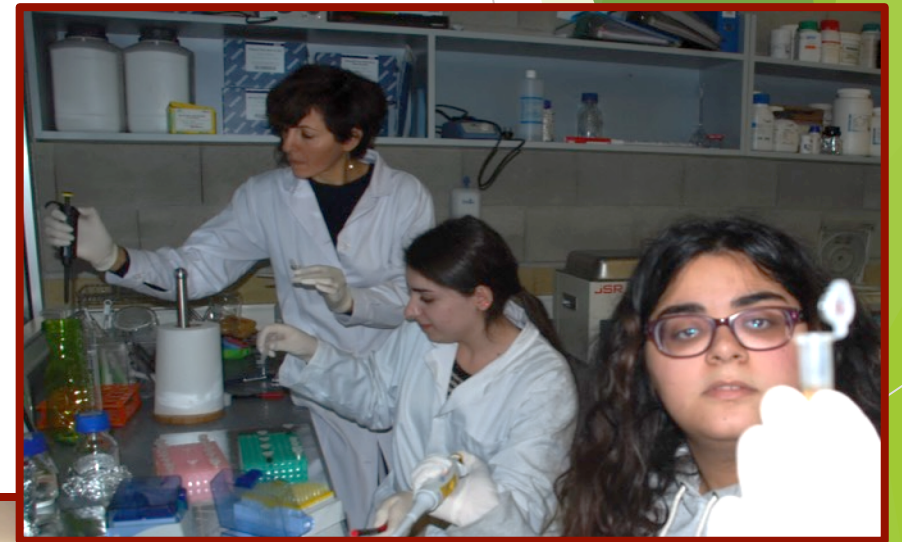




**Samples collection**



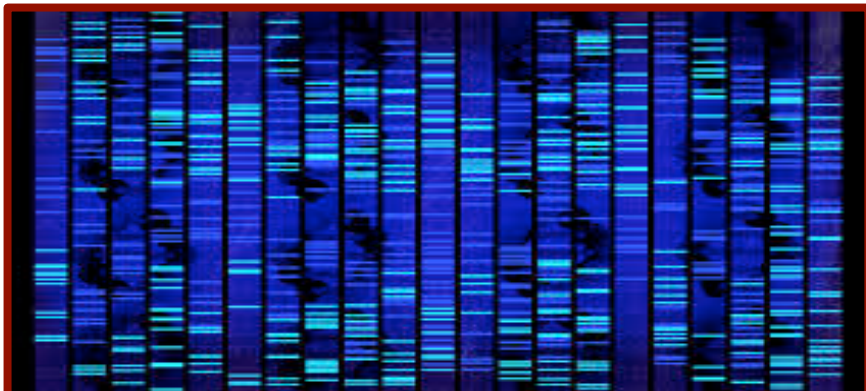
**DNA isolation**



**DNA amplification**



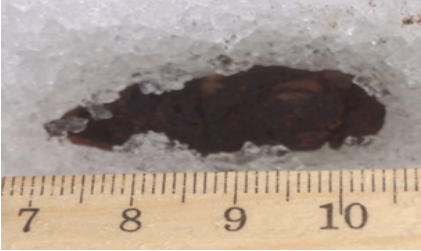
**DNA sequencing**



# Séquençage et identification des espèces



Eh-25



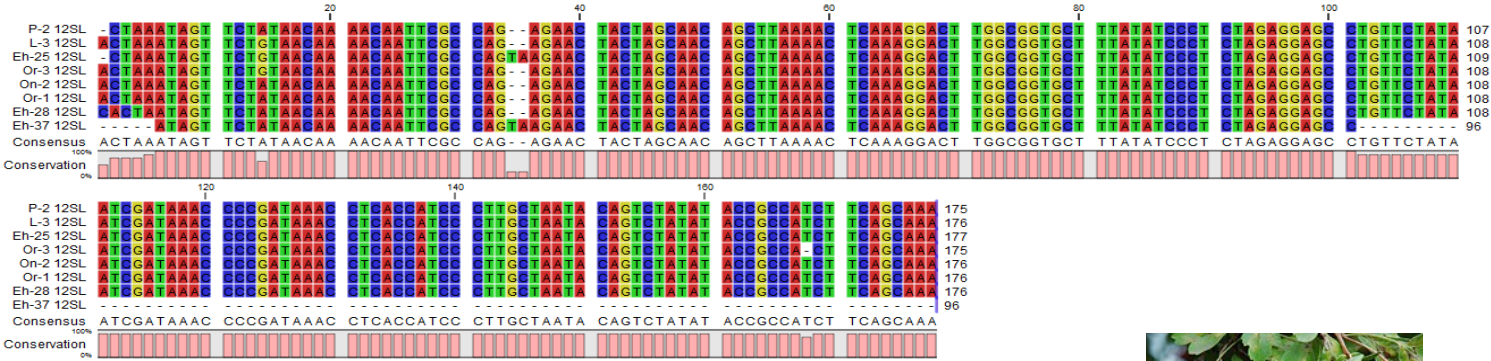
Eh-28



Eh-40



## Alignement des séquences du marqueur 12S-LH des échantillons de *Vulpes vulpes*



*Malus trilobata*



*Sorbus torminalis*



*Crataegus monogyna*



*Prunus ursina*



*Rosa canina*

# Lebanon Project # 3

- ▶ **NAME & TYPE:** Phylogenetic Analyses Of Oak Species in Lebanon (Library Construction)
- ▶ **Project Lead:** Magda BOU DAGHER KHARRAT
- ▶ **Collaborators:** Jean Stephan, Bouchra DOUAIHY (Lebanese University), Carole Saliba (USJ)
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway  
*USJ*
- ▶ **TARGET TAXONOMIC GROUP(s):** Angiosperm
- ▶ **BRIEF DESCRIPTION OF GOALS:**
- ▶ *8 species, 56 specimens*

# Lebanon SWOT Analysis

- ▶ **STRENGTHS:** Wide range of species 3000 plant taxa, 3000 animal taxa,...
- ▶ **WEAKNESSES:** data scattered.
- ▶ **THREATS:** slow publication rate.
- ▶ **OPPORTUNITIES:** First Mediterranean country, Data on endemic species of Lebanon as well as endangered species (IUCN), very good regional and international network.

Thank you!



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# Node Report - Mexico

Scientific Steering Committee, October 13 & 14, 2018

## SSC Delegate Mexico

## Manuel Elías Gutiérrez

- ▶ POSITION: Researcher
- ▶ HOME INSTITUTION: El Colegio de la Frontera Sur, Chetumal Unit
- ▶ KEY TAXONOMIC INTERESTS: Freshwater zooplankton
- ▶ GEOGRAPHIC FOCUS: American continent, mainly Mexican southeast
- ▶ PRIOR BARCODE INVOLVEMENTS: Since 2006 working on freshwater zooplankton in North America, mainly east of Canada and Mexico.

# Mexico Barcodes on BOLD

## Barcode Count

- 102,743 Sequences
- 11,678 Named Species
- 14,541 BINs

## Species Coverage

- Plants (3,968 species)
- Vertebrates (2,133 species)
- Arthropods (4,858 species)
- Other Inverts (517 species)

## BIN coverage

- Vertebrates (2,454 BINs)
- Arthropods (11,084 BINs)
- Other Inverts (948 BINs)



# Mexico Barcode Network

- ▶ Date established: Monday, March 2, 2009
- ▶ Lead institution: El Colegio de la Frontera Sur, Instituto de Biología (UNAM) and Centro de Investigaciones Biológicas del Noreste, Centro de Biotecnología Genómica (IPN)
- ▶ # Researchers involved: Currently 224, but active about 40
- ▶ # institutions involved: Currently 20+, but active about 10
- ▶ Current funding: 750K MXN, about 38.4K USD
- ▶ Future Prospects: Not sure, maybe the same network and other grants:
  - ▶ National laboratories and individual projects

## El Código de Barras de la Vida en México

Simposio de Presentación de la Red Temática del CONACYT

**Lunes 2 de marzo, 4:30 pm**  
Auditorio del Museo UNIVERSUM  
Circuito Cultural de Ciudad Universitaria  
México, D.F.  
canal.dgca.unam.mx/

**Talleres en los nodos académicos de la Red Temática MEXBOL**

**Martes 3 de marzo**  
Taller en la sede del IBUNAM  
Auditorio del Jardín Botánico  
del Instituto de Biología de la UNAM

**5-6 de marzo**  
Taller en la sede del Centro de Investigaciones Biológicas del Noroeste (CIBNOR)  
La Paz, Baja California Sur

**10 y 11 de marzo**  
Taller en la sede de El Colegio de la Frontera Sur (ECOSUR), Chetumal, Quintana Roo

### Programa

**4:30 Palabras de bienvenida**  
Dra. Tila María Pérez Ortiz  
Directora del Instituto de Biología de la UNAM

**4:40 Presentación de las Redes Temáticas del CONACYT**  
Dr. José Antonio de la Peña  
Director Adjunto de Desarrollo Científico y Académico, CONACYT

**4:55 Conferencia Inaugural**  
Dr. José Sarukhán Kermez  
Coordinador Nacional de la Comisión Nacional para el Conocimiento y Uso de la Biodiversidad

**5:40 Red Temática del Código de Barras de la Vida en México (MEXBOL)**  
Dr. Manuel Elías  
El Colegio de la Frontera Sur  
Dra. Patricia Escalante  
Instituto de Biología de la UNAM  
Dr. Sergio Ticul Álvarez Castañeda  
Centro de Investigaciones Biológicas del Noroeste  
Ing. Raúl Jiménez Rosenberg  
Director General de Bioinformática de la Comisión Nacional para el Conocimiento y Uso de la Biodiversidad

**6:25 Conferencia del Sector Empresarial**  
Dr. Jorge Paniagua  
Laboratorios Silanes

**6:45 Conferencia de Clausura**  
Dr. Paul Hebert  
Universidad de Guelph, Canadá

**7:30 Brindis**



- ▶ The National Laboratory has three nodes distributed all across Mexico



Mario Rodríguez

Centro de Biotecnología Genómica  
IPN, Reynosa



Roberto  
Garibay

Instituto de  
Biología, UNAM, MX



ECOSUR, Chetumal



CIBNOR, La Paz



Patricia Cortés



# Mexico Project # 1

- ▶ **NAME & TYPE:** Library construction, in our case with different groups as fish, zooplankton, vectors of medical importance, and two regions of Mexico Cabo Pulmo and Médanos de Salmayuca
- ▶ **Project Lead:** In the network is Patricia Cortés, she will finish this year
- ▶ **Collaborators:** Roberto Garibay, Martha Valdez Moreno, Manuel Elías, Mario Alberto Rodríguez Hernández, Nadia Hernández and Pedro Cruz Hernández (Technical Committee of the Network)
- ▶ **STATUS (UNDERWAY):** Same as the network (38.4K USD)
- ▶ **TARGET TAXONOMIC GROUP(s):** Chordata and invertebrates
- ▶ **BRIEF DESCRIPTION OF GOALS:** 800 specimens from Cabo Pulmo, Médanos de Salmayuca and vectors. New human resources. Two workshops, five papers, long term proposals, WEB page, videos, student involvement.

# Mexico Project # 2

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Library construction
- ▶ **Project Lead:** To be defined, someone from El Colegio de la Frontera Sur
- ▶ **Collaborators:** Roberto Garibay, Martha Valdez Moreno, Manuel Elías, Mario Alberto Rodríguez Hernández, Nadia Hernández, Patricia Cortés and Pedro Cruz Hernández (Technical Committee of the Network)
- ▶ **STATUS (PLANNED):** Planned
- ▶ **TARGET TAXONOMIC GROUP(s):** Plant, Fungii, Vertebrates and Invertebrates
- ▶ **BRIEF DESCRIPTION OF GOALS:** To be defined according with the call

# Mexico Project # 3

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Library construction, possibly metabarcoding
- ▶ **Project Lead:** Individual people
- ▶ **Collaborators:** Depending on the project
- ▶ **STATUS (UNDERWAY/PLANNED):** Planned, but it will depend on the direction of the new government in Mexico
- ▶ **TARGET TAXONOMIC GROUP(s):** To be defined
- ▶ **BRIEF DESCRIPTION OF GOALS:** Can be library construction or metabarcoding for biomonitoring freshwater or marine ecosystems

# Mexico SWOT Analysis

- ▶ **STRENGTHS:** Strong development of taxonomy and very good specialists in different groups. Interest in biodiversity recognizance. Good relationship among most researchers devoted to biodiversity.
- ▶ **WEAKNESSES:** Changing policy of CONACYT, misunderstanding of fundamental and basic research by officials in charge of policy, little support to basic research and lot of competition for small funds.
- ▶ **THREATS:** Extreme shortage of funds for science in Mexico, mostly due to changes in policy from the National Council of Science, the virtuous circle (Research, Development and Innovation) resting in the sole person of the researcher. Lack of short and long term policies for science.
- ▶ **OPPORTUNITIES:** Involvement of graduate students, iBOL phase II, collaborative research and training with other Latin American countries, maybe the change of government in this year?

SWOT analysis to identify strengths, weaknesses, opportunities, and threats to your nation's participation in iBOL-II. If appropriate, consider the prospect of recruiting additional Nations as Associate Members under opportunities.

## To be a scientist in Mexico... or not to be?

We want to provide some clarifications regarding points discussed in previous letters, published in *The Lancet* (June 17, p 2373)<sup>1</sup> and *Science*,<sup>2</sup> that are related to government cuts to science and fellowships in Mexico. Once again, the Mexican Government has deceived the academic community with false promises.<sup>3</sup>

Historically, the Mexican Government's lack of interest in science has kept investment in research low. As a result, the number of scientists who are members of the National System of Researchers is small (25 072 in 2016)<sup>4</sup>

Elias-Gutierrez, et al., *The Lancet*, Vol 390, 2017

# Thanks

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# Node Report - Aotearoa New Zealand

Scientific Steering Committee, October 13 & 14, 2018



**New Zealand**  
Barcode of Life  
**Aotearoa**



# Jonathan Banks

## New Zealand



- ▶ POSITION: Scientist
- ▶ HOME INSTITUTION: Cawthron Institute, Nelson, New Zealand
- ▶ KEY TAXONOMIC INTERESTS: NZ freshwater fish, invertebrates, parasites
- ▶ GEOGRAPHIC FOCUS: New Zealand, Antarctica
- ▶ PRIOR BARCODE INVOLVEMENTS: Phthiraptera, parasites, rotifers, fish, freshwater invertebrates, etc.

# New Zealand Barcodes on BOLD

## Barcode Count

- 70,888 Sequences
- 3,821 Named Species
- 5,794 BINs

## Species Coverage

- Plants (863 species)
- Vertebrates (720 species)
- Arthropods (1,220 species)
- Other Inverts (526 species)

## BIN coverage

- Vertebrates (735 BINs)
- Arthropods (4,225 BINs)
- Other Inverts (771 BINs)

# New Zealand Barcode Network

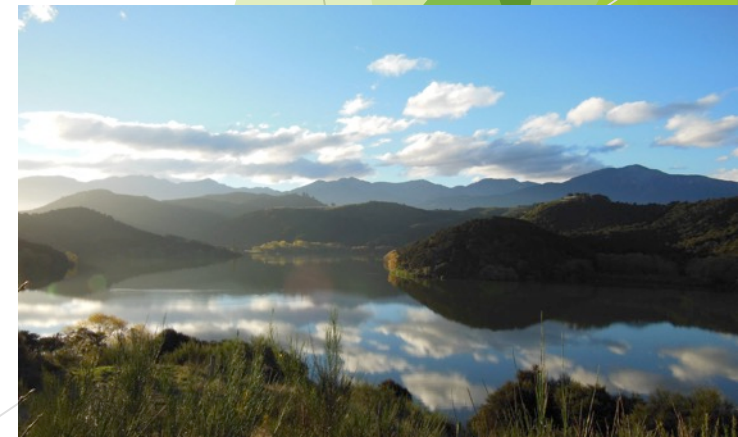
- ▶ **Date established: 2007**
- ▶ **Lead institution: Previously University of Waikato. 2018 changed to the Cawthron Institute, Nelson, New Zealand**
- ▶ **# Researchers involved: 20**
- ▶ **# institutions involved: 10**
- ▶ **Current funding: 100K**
- ▶ **Future Prospects:**

# New Zealand Project # 1

- ▶ **Molecular tools for detecting freshwater fish** (library construction, metabarcoding)
- ▶ **Project Lead:** Joanne Clapcott, Cawthron
- ▶ **Collaborators:** Cawthron, regional government agencies
- ▶ **STATUS:** Underway NZD 260k
- ▶ **TARGET TAXONOMIC GROUP(s):** Freshwater fish
- ▶ **BRIEF DESCRIPTION OF GOALS:** Library construction, and then metabarcoding of environmental DNA to monitor fish distributions, population trends, pest fish control

# New Zealand Project # 2

- ▶ **Our lakes' health: past, present and future**  
([www.lakes380.com](http://www.lakes380.com))  
(Metabarcoding using Illumina platform)
- ▶ **Project Lead:** Susie Wood
- ▶ **Collaborators:** GNS Science, Otago, Victoria, Auckland and Waikato Universities, Matana Consulting, Kahungunu ki Wairarapa
- ▶ **STATUS:** Underway, funded by NZ government for 5 years
- ▶ **TARGET TAXONOMIC GROUP(s):** Freshwater metazoans (COI) focusing on invasive species and species of high cultural interest. Bacteria (16S rRNA) and aquatic plants (still deciding which genes)
- ▶ **GOALS:** Characterize the current and historic health of New Zealand lakes. Metabarcoding eDNA from water, and sediment cores going back 1000 years (pre human in NZ] for 10% of NZ lakes (n=380).



# New Zealand Project # 3

- ▶ **Quadrilateral Partnership in Marine Biosecurity**  
(Metabarcoding, Illumina platform)
- ▶ **Project Lead:** Xavier Pochon
- ▶ **Collaborators:** HTS experts from New Zealand, Australia, Canada, and USA
- ▶ **STATUS:** Underway, funded by NZ government for 2 years (2017-2018).
- ▶ **TARGET TAXONOMIC GROUP(s):** Marine metazoan (18S and COI)
- ▶ **GOALS:** Establish a standardized protocol for routine marine biosecurity surveillance. Homogenized biofouling samples collected from four invasion hotspots (i.e. busy port or coastal marina). Distributed to 12 laboratories, one of two HTS library workflows followed, which were then sequenced at two facilities (Curtin University, Australia; University of Guelph, Canada) and analysed using one bioinformatics pipeline (CSIRO, Australia).

# New Zealand Project # 4

- ▶ **Molecular tools for implementing international ballast water regulations (Metabarcoding, Illumina platform)**
- ▶ **Project Lead:** Anastasija Zaiko
- ▶ **Collaborators:** University of Oviedo (Spain), University of Ireland Galway
- ▶ **STATUS:** Underway, funded by Cawthron Institute Internal Investment Fund and Spanish Ministry of Economy and Competitiveness.
- ▶ **TARGET TAXONOMIC GROUP(s):** Marine metazoans (18S V4) and bacteria (16S)
- ▶ **GOALS:** To test use of eDNA and eRNA metabarcoding for ballast water monitoring and assess comparability of results with other ballast water assessment techniques: microscopy, ATP measurements, flow-cytometry.

## BIOSECURITY

PROVIDING EXPERT ADVICE  
AND SOLUTIONS FOR AQUATIC  
BIOSECURITY ISSUES



# International Project # 5

- ▶ “Antarctic Bar Code of Life”
- ▶ Project Lead: Mary Sewell, University of Auckland
- ▶ Collaborators: Cawthron Institute, University of Auckland, Canterbury Museum, South Australia Museum, other interested groups
- ▶ STATUS Embryonic
- ▶ TARGET TAXONOMIC GROUP(s): Terrestrial, marine
- ▶ GOALS: Establish “permanent” sampling points at Antarctic research stations. Develop systems to use fishing vessels as plankton sampling platforms.

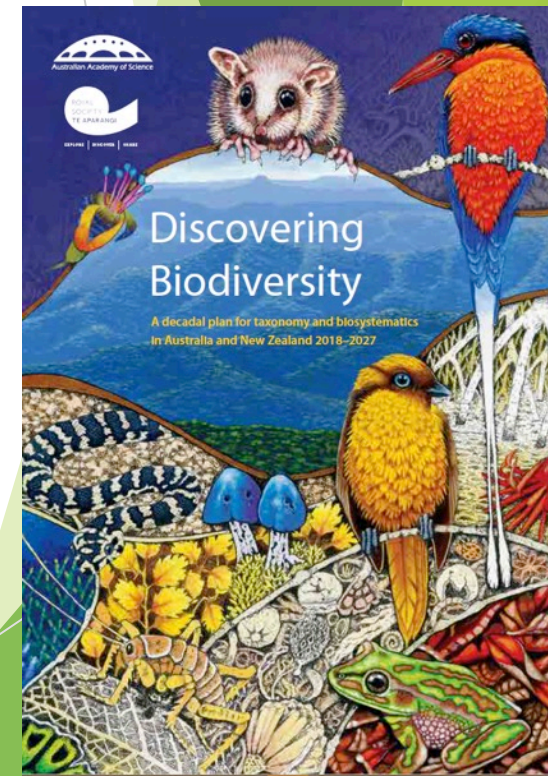




# New Zealand SWOT Analysis

## ▶ STRENGTHS:

- ▶ Acceptance of need for bar code libraries
- ▶ “Discovering Biodiversity” An Australasian decadal plan for taxonomy
  - ▶ Aim 1.3: build a well-resolved phylogeny of Australia’s and New Zealand’s biodiversity using strategic DNA sequencing
  - ▶ Action 2.1 create a comprehensive, integrated, accessible service for identification of Australian and New Zealand organisms, based on DNA sequences, morphology, and images
  - ▶ Action 4.3 build a curated, vouchered reference library of DNA sequences covering the breadth of the tree of life in our region



# New Zealand SWOT Analysis

## ▶ STRENGTHS:

- ▶ Acceptance of need for bar code libraries
- ▶ “Discovering Biodiversity” An Australasian decadal plan for taxonomy

## ▶ WEAKNESSES:

- ▶ Lack of funding

## ▶ THREATS:

- ▶ Lack of funding

## ▶ OPPORTUNITIES

- ▶ New Zealand Organisms Register
  - ▶ Currently unfunded, leverage funding by integrating BOLD with NZOR?



Home About Search Download Matching

### New Zealand Organisms Register

NZOR is an actively maintained compilation of all organism names relevant to New Zealand: indigenous, endemic or exotic species or species not present in New Zealand but of national interest. NZOR is digitally and automatically assembled from a number of taxonomic data providers. It provides a consensus opinion on the preferred name for an organism, any alternative scientific names (synonyms), common and Māori names, relevant literature, and the data provider's view on the documented presence/absence in New Zealand.

The NZOR information infrastructure is currently hosted by [Landcare Research](#).

The initial development of the NZOR infrastructure was supported by the [Terrestrial and Freshwater Biodiversity Information Systems Programme \(TFBIS\)](#).

NZOR has received support from the [Department of Conservation](#), [Ministry for Primary Industries](#) and [Ministry for the Environment](#).

Taxon Names in NZOR

154,156



Accepted Names in NZOR

95,340



Taxa Present in New Zealand

69,018



Thank you!



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# Node Report - Norway

Scientific Steering Committee, October 13 & 14, 2018

# Inger G Alsos

## Norway

- ▶ POSITION: Professor
- ▶ HOME INSTITUTION: Tromsø Museum, UiT - The Arctic University of Norway
- ▶ KEY TAXONOMIC INTERESTS: Vacular plants
- ▶ GEOGRAPHIC FOCUS: Polar, Skandinavia
- ▶ PRIOR BARCODE INVOLVEMENTS:  
Genome-skimming of the Norwegian and polar flora

# Norway Barcodes on BOLD

## Barcode Count

- 95,481 Sequences
- 16,629 Named Species
- 13,996 BINs

## Species Coverage

- Plants (1,600 species)
- Vertebrates (504 species)
- Arthropods (9,767 species)
- Other Inverts (1,072 species)

## BIN coverage

- Vertebrates (457 BINs)
- Arthropods (11,977 BINs)
- Other Inverts (1,427 BINs)

# Norway Barcode of Life Network (NorBOL)

- ▶ **Date established:** January 2008
- ▶ **Lead institution:** NTNU University Museum, Trondheim
- ▶ **# Researchers involved:** 270 (including students and visiting scientists), 105 researchers (postdocs and above)
- ▶ **# institutions involved:** 17
- ▶ **Current funding:** Research Council of Norway, Norwegian Biodiversity Information Centre: 30 M NOK (2014-2019), = 3.7 M USD. Total budget including in-kind: 100 M NOK (12.2 M USD)
- ▶ **Future Prospects:** Future funding for reference library is challenging; easier to obtain funding for applied projects. Norwegian Taxonomy Initiative will commit to 500 K NOK annually to barcode species from inventories; application for National Research Infrastructure NIBIGEN includes barcode component.

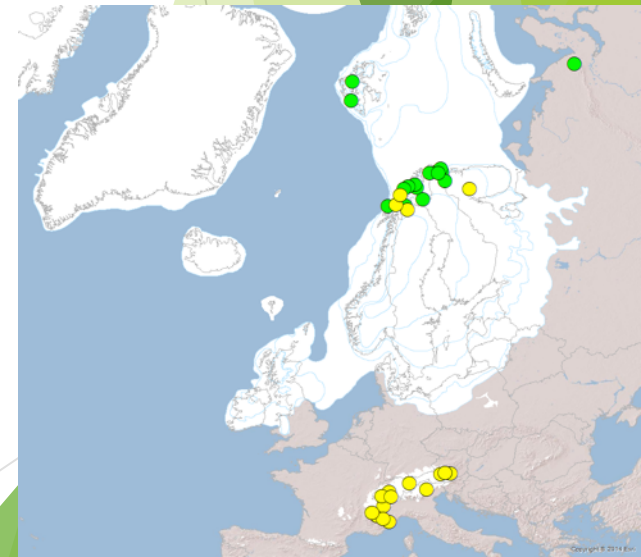
# Norway Project # 1 EBAI

- ▶ **NAME & TYPE** : Environmental Barcoding of Aquatic Invertebrates (EBAI).
  - ▶ Library construction & Metabarcoding
- ▶ **Project Lead:** Torbjørn Ekrem
- ▶ **Collaborators:** CBG (Guelph), ZFMK (Bonn), NIVA, NINA
- ▶ **STATUS (UNDERWAY):** 2015-2019, 9 M NOK total budget, 6.5 M NOK external funding.
- ▶ **TARGET TAXONOMIC GROUP(s):** Freshwater invertebrates
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - ▶ To develop best-practice guidelines for environmental barcoding of freshwater invertebrates. This includes protocols for sampling, preservation and analysis of sequence data against a high-quality reference library.
  - ▶ To test if different approaches to environmental barcoding of benthos samples give good approximations of freshwater invertebrate community compositions, i.e. the relationship between species and their abundance in comparison with traditional methods.
  - ▶ ~200 target species, 1000 sequences for library.



# Norway Project # 2 ECOGEN

- ▶ **NAME & TYPE** : Ecosystem change and species persistence over time:  
a genome-based approach  
Metabarcoding, aDNA method development
- ▶ **Project Lead:** Inger Greve Alsos
- ▶ **Collaborators:** ~30 in Norway, England, Denmark, France, Austria, Switzerland
- ▶ **STATUS (UNDERWAY/PLANNED):** 2 of 5 year, N Norway aDNA almost ready
- ▶ **TARGET TAXONOMIC GROUP(s):** Vascular plants, mammals, key insects
- ▶ **BRIEF DESCRIPTION OF GOALS:** Develop high taxonomic resolution ancient environmental DNA methods in order to evaluate how drivers of change (human, climate, biota) affect species persistence and ecosystem tipping points in arctic-alpine biomes



# Norway Project # 3 PLANT.ID



- ▶ **NAME & TYPE:** Molecular Identification of Plants (<https://www.plantid.uio.no/>)
  - ▶ (Library construction, Metabarcoding)
- ▶ **Project Lead:** Hugo de Boer, University of Oslo
- ▶ **Collaborators:** 27 institutions Europe
- ▶ **STATUS (UNDERWAY/PLANNED):** Started 1st of January 2018
- ▶ **TARGET TAXONOMIC GROUP(s):** Vascular plants
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - ▶ Plant.ID is a Marie Skłodowska-Curie actions (MSCA) Innovative Training Network (ITN)
  - ▶ Improve identification is specific taxonomic groups like Silene, Euphrasia, African trees etc.

# Norway SWOT Analysis

- ▶ **STRENGTHS:** Strong, geographically distributed competence; active participants all over country; strong adm support at NTNU; strong support in NBIC and Norwegian Environment Agency; Norwegian Taxonomy Initiative (for funding and specimens!); visibility through networking and iBOL-conference.
- ▶ **WEAKNESSES:** We do not have taxonomic expert on all groups.
- ▶ **THREATS:** Funding ending in 2019; future funding of large scale sampling uncertain.
- ▶ **OPPORTUNITIES:** In dialogue with Norwegian Environment Agency about future funding opportunities. Included in application for Norwegian Infrastructure for Biodiversity Genomics (NIBIGEN). International collaboration (e.g. BioAlfa).

SWOT analysis to identify strengths, weaknesses, opportunities, and threats to your nation's participation in iBOL-II. If appropriate, consider the prospect of recruiting additional Nations as Associate Members under opportunities.

Thank you!



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OF LIFE



# Node Report - Pakistan

Scientific Steering Committee, October 13 & 14, 2018

Nazeer Ahmed, Balochistan University of Information Technology,  
Quetta, Pakistan

Muhammad Ashfaq, Centre for Biodiversity Genomics, University of  
Guelph, ON, Canada

# SSC Delegate Pakistan

- ▶ POSITION: Dean, Graduate Studies
- ▶ HOME INSTITUTION: Balochistan University of Information Technology, Engineering, and Management Sciences
- ▶ KEY TAXONOMIC INTERESTS: Plants
- ▶ GEOGRAPHIC FOCUS: Balochistan, Pakistan
- ▶ PRIOR BARCODE INVOLVEMENTS: DNA barcoding plants

# Pakistan Barcodes on BOLD

## Barcode Count

- 44,615 Sequences
- 2,105 Named Species
- 5,634 BINs

## Species Coverage

- Plants (511 species)
- Vertebrates (191 species)
- Arthropods (1,469 species)
- Other Inverts (2 species)

## BIN coverage

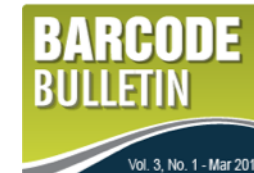
- Vertebrates (170 BINs)
- Arthropods (5,461 BINs)
- Other Inverts (1 BIN)

# Pakistan Barcode Network

- ▶ Date established: 2012
- ▶ Lead institution: National Institute for Biotechnology and Genetic Engineering (NIBGE, Faisalabad)
- ▶ # Researchers involved: 10
- ▶ # institutions involved: 10
- ▶ Current funding: N/A
- ▶ Future Prospects: One funding application has been submitted to the Pakistan Ministry of Science, Pakistan



**Pakistan to form barcode focal point**  
Symposium sees engagement as primary goal [Print](#)



Members of Pakistan's DNA barcoding community have agreed to create a national focal point with the goal of engaging the country's universities and researchers in DNA barcoding.

This was one of the important outcomes of a one-day symposium on DNA barcoding, attended by some 200 scientists, students, conservationists, community and business leaders and other stakeholders from throughout Pakistan.

Participants agreed to designate the National Institute for



# Pakistan Project # 1

- ▶ **Construction of DNA barcode reference library for fauna and flora in Pakistan**
- ▶ **Project Lead:** Muhammad Ashfaq, Shahid Mansoor, Zaheeruddin Khan
- ▶ **Collaborators:** NIBGE, Faisalabad, GC University Lahore, Centre for Biodiversity Genomics, BIO, University of Guelph
- ▶ **STATUS (UNDERWAY/PLANNED):** In progress
- ▶ **TARGET TAXONOMIC GROUP(s):** Animals and plants
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - ▶ Barcoding economically important insect species
  - ▶ Documenting vertebrates of Pakistan
  - ▶ Generating barcode reference data for flora of Pakistan

# Project execution

Involvement of universities/  
research institutes

Museums

Faculty/ scientists

Graduate students

Symposiums/ seminars

Collection



Processing



Curation



# Specimen sequencing (DNA barcoding)

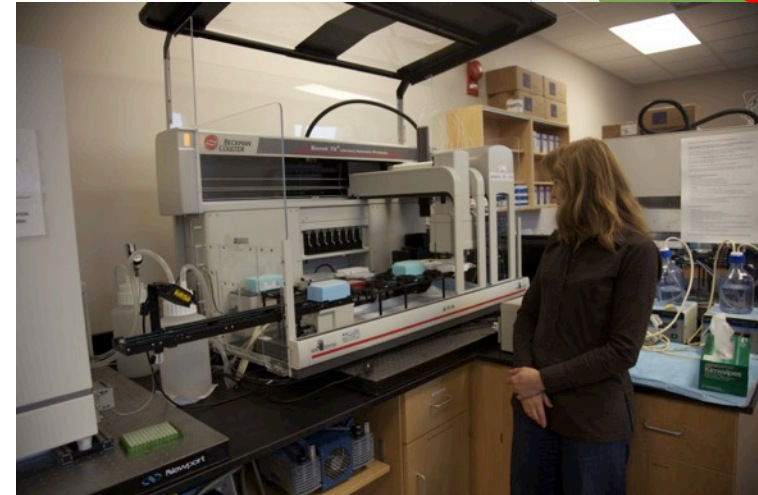


Biodiversity Institute of Ontario



NIBGE, Pakistan

## Canadian Centre for DNA Barcoding



## Funding

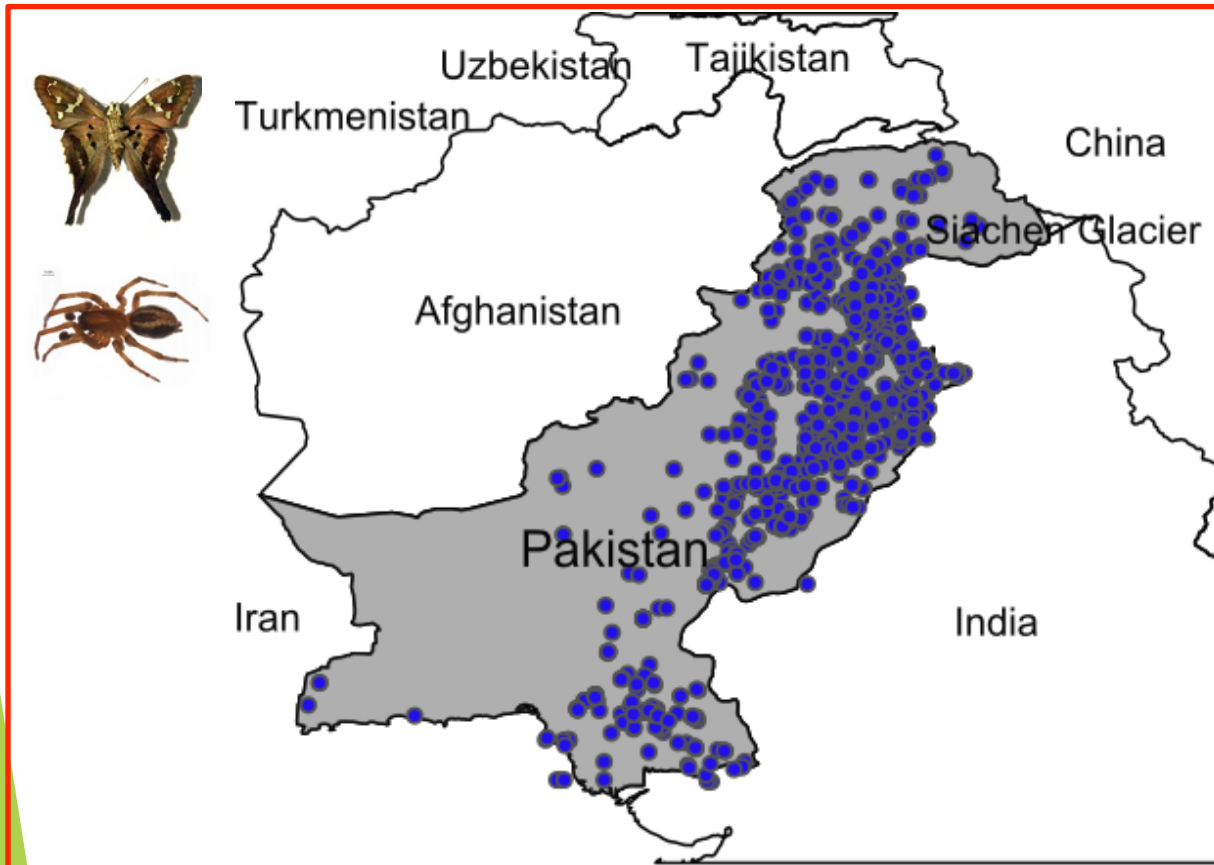
IDRC - University of Guelph: \$78,500

HEC, Pakistan: PKR1.8 million

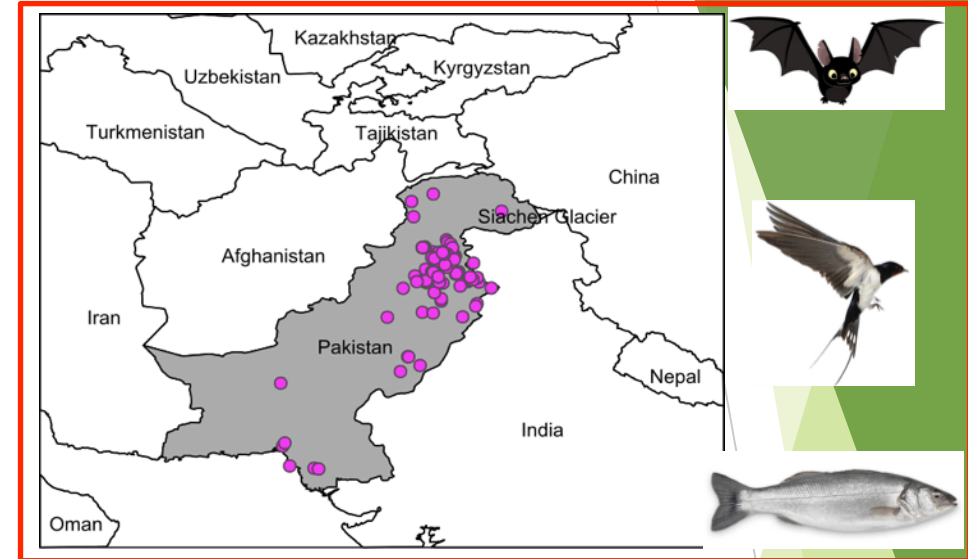
In-kind support: CBG (sequencing) and several other organizations (sample collections)

# Geographic coverage

## Arthropods



## Vertebrates



## Plants



# Barcoding progress:

Group	Specimens analyzed	Barcodes	BINs
<b>Invertebrates</b>	<b>47,770</b>	<b>39,805</b>	<b>5,461</b>
Insecta	45,441	37,752	5,031
Arachnida	2,240	1997	245
<b>Vertebrates</b>	<b>349</b>	<b>232</b>	<b>116</b>
Bats	95	27	7
Birds	159	131	94
Fishes	95	92	15
<b>Plants</b>	<b>1,314</b>	<b>1,259</b>	<b>347 (species)</b>

Barcode based  
research publications:

**13**

# Pakistan Project #2

- ▶ **Insect biodiversity assessment by Malaise trap-DNA barcoding (Metabarcoding)**
- ▶ **Project Lead:** Muhammad Ashfaq
- ▶ **Collaborators:** Pakistan Museum of Natural History, University of Sargodha, Rice Research Institute, Tandojam University, Balochistan University of Technology Quetta, NIBGE
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway (Funding, University of Guelph)
- ▶ **TARGET TAXONOMIC GROUP(s):** Insecta
- ▶ **BRIEF DESCRIPTION OF GOALS:** Analysis and documentation of regional insect biodiversity using DNA barcoding and Barcode Index Numbers

# Biodiversity analysis by Malaise trap - DNA barcoding

## Trap locations: 9



## Progress

### Location 1:

Arthropods: 23,734

2,281 BINs

### Other locations:

Collection in progress or awaiting barcode analysis



Sindh: 38 meter



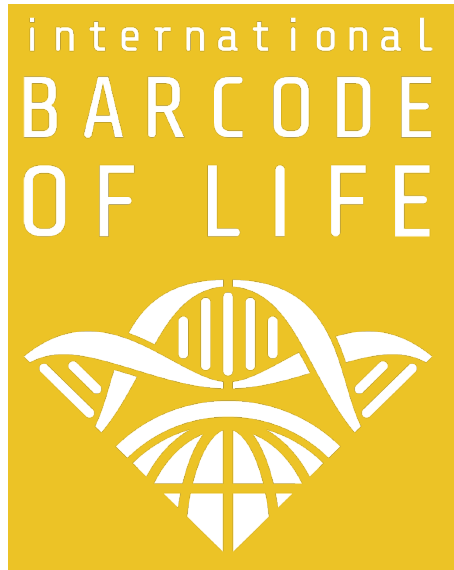
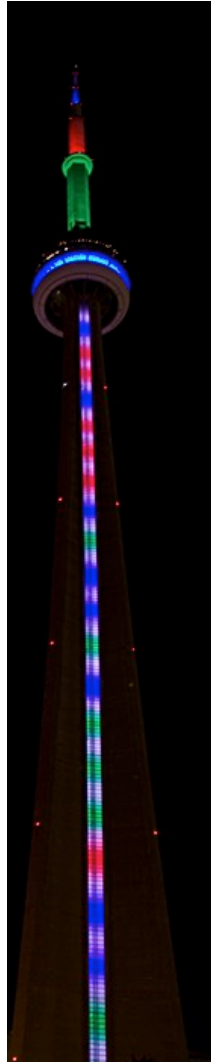
Kashmir: 1640 meter

# Pakistan SWOT Analysis

- ▶ **STRENGTHS:** Qualified scientists and support staff, research infrastructure, Biodiversity richness
- ▶ **WEAKNESSES:** Accessibility, limited taxonomic expertise, lack of funding support, lack of awareness about biodiversity conservation
- ▶ **THREATS:** Poor funding structure, cumbersome bureaucratic process for project approval, security concerns for sampling in some remote areas, inconsistent sample curation
- ▶ **OPPORTUNITIES:** Unexplored fauna and flora, unique geographic range from Himalayan mountains to plains of Indus valley, Involving agriculture research and extension sector for documenting pest complexes
  - ▶ Funding options through public and private organizations
  - ▶ Research collaborations under IBOL umbrella
  - ▶ Engaging neighboring countries; Afghanistan and Iran



# Acknowledgements



 **GenomeCanada**

 Ontario **Genomics**Institute

 Ontario  
MINISTRY OF  
RESEARCH AND INNOVATION

 UNIVERSITY  
of GUELPH

 **NSERC**  
**CRSNG**

 Canada Foundation for Innovation  
Fondation canadienne pour l'innovation

**IDRC** 

**International Funders**

Thank you!



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# Node Report - Peru

Scientific Steering Committee, October 13 & 14, 2018

SSC Delegate  
Peru  
**RINA RAMÍREZ**

- ▶ **POSITION:** Full Professor
- ▶ **HOME INSTITUTION:** Universidad Nacional Mayor de San Marcos (San Marcos University), Faculty of Biological Sciences, and Museum of Natural History
- ▶ **KEY TAXONOMIC INTERESTS:** Mollusks
- ▶ **GEOGRAPHIC FOCUS:** South America
- ▶ **PRIOR BARCODE INVOLVEMENTS:** CATRTA Project “DNA barcoding to support the conservation of biodiversity, its sustainable use and trade”

# Peru Barcodes on BOLD

deposited in 115 institutions  
Mined from GenBank, NCBI: 4841  
SNSB, Zoolog. Staatss. Muenchen: 2771  
**Centro de Ornitologia y Biodiversidad: 1486**  
Research Collection of Ron Brechlin: 1328  
Research Collection of Eric Van Schayck: 789

Research Collection of Frank Meister: 737  
**Univ.Naci.Mayor de San Marcos, MHN: 716**  
University of Utah: 656  
Centre for Biodiversity Genomics: 543  
Research Collection of Ernst Brockmann: 479  
Others: 4819

## Barcode Count

- 19,165 Sequences
- 8,471 Named Species
- 5,005 BINs

## Species Coverage

- Plants (678 species)
- Vertebrates (262 species)
- Arthropods (1829 species)
- Other Inverts (39 species)

## BIN coverage

- Vertebrates (926 BINs)
- Arthropods (4028 BINs)
- Other Inverts (36 BINs)

# Peruvian Barcode of Life Network

- ▶ **Date established:** The first steps to gather researches and involve institutions around DNA Barcoding was through the CATRTA Project “DNA barcoding to support the conservation of biodiversity, its sustainable use and trade” as part of the strengthening of capabilities, in 2015.
- ▶ **Lead institution:** PeBOL is not yet a formal Network but a willingness to work for it. The Natural History Museum of Universidad Nacional Mayor de San Marcos (San Marcos University) UNMSM is leading it at the present time.
- ▶ **# Researchers involved:** Letty Salinas (Birds), Juan Grados (Lepidoptera), Diana Silva (Spiders), Cesar Arana and Betty Millan (Plants), Ida Bartolini and Arturo Olortegui (pests-arthropods), Jorge Ramirez (Fish)
- ▶ **# institutions involved:** UNMSM, SENASA (National Agrarian Health Service)
- ▶ **Current funding:** Competitive Government Funds
- ▶ **Future Prospects:** To barcode as much as possible of the Peruvian Megadiversity

# PERU Project # 1: BIOPE

- ▶ **NAME & TYPE** : Biodiversity and Business: Documenting the Flora and Fauna of Rainforest Expeditions Tourist Reserve, Tambopata, Perú - Library construction
- ▶ **Project Lead:** Letty Salinas
- ▶ **Collaborators:** Natural History Museum MHN-UNMSM, Rainforest Expeditions, University of Guelph, SERNANP, San Diego Zoo
- ▶ **STATUS:** Rainforest Expeditions SAC has integrated this project as part of its service of Discover New Species in which tourists can participate in the discovery of new species working with scientists in the field and as the scientific counterpart of Wired Amazon. Furthermore, the project has won the INNOVATE PERU grant which will fund the project until 2019.
- ▶ **TARGET TAXONOMIC GROUP(s):** Plantae (Bryophyta, Pteridophyta, Hepatophyta), Fungi, Onychophora, Arthropoda (Hexapoda, Chilopoda, Arachnida, Diplopoda), Mollusca, Amphibia, Reptilia, Aves, Mammalia
- ▶ **BRIEF DESCRIPTION OF GOALS:** A collaborative project between a private company and academia in Tambopata Peru from 2015 to 2023 that includes the inventory and documentation of the biota of Rainforest Expedition Tourist Reserves outside and within PAs (Bahuaja Sonene and Tambopata) with the aim of contributing to the digital DNA Barcode library and searching for new species for science. The number of our target species and specimens of birds is 710 species and 2840 specimens, whereas our number of target Lepidoptera species is 2000, with 8000 specimens.

# PROJECT

The **BIOPE** project (MHN-UNMSM) in cooperation with Rainforest Expeditions SAC, generates scientific research through the collection of diverse groups of flora and fauna, where one of the purposes is "to reveal the wonders of nature, to make tourists scientists and discover a new species "through DNA barcoding technology.



Rainforest  
expeditions

## CIENCIA CIUDADANA

- Participación pública en investigación científica
- El turismo actúa como una actividad sostenible.
- El turismo ayuda a financiar ciencia.
- Creemos en la necesidad de acercar el mundo científico a la comunidad, involucrar gente
- Educar y crear conciencia.



wired  
amazon  
make science happen

[www.rainforestexpeditions.com/wiredamazon/](http://www.rainforestexpeditions.com/wiredamazon/)





# PERU Project # 2

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): SENASA Entomology Reference Library PNIA Project (SENTO)
- ▶ **Project Lead:** Dra. Ida Bartolini Martinez
- ▶ **Collaborators:**
  - Dr. Alex Borisenko (CCDB-CANADA)
  - Blgo. Jose Arturo Olórtegui Livia (SENASA)
  - Blgo. Fernando Serna Chumbes (INIA)
- ▶ **STATUS (UNDERWAY/PLANNED):** The Titled project: Optimization of the identification of entomological pests in crops of economic importance through DNA barcoding and database construction. It is funded by the national agrarian innovation program (PNIA), starting the project from January 2016 to date.
- ▶ **TARGET TAXONOMIC GROUP(s):** Arthropods
- ▶ **BRIEF DESCRIPTION OF GOALS:** Our main interest are the Arthropods that could be possible pests for crops of interest, we start our evaluation of possible pests in crops such as Asparagus, Quinoa and Andean Cedar.
- ▶ Our library is made up of : 223 species Arthropods, 352 BINs, 2359 Specimens with 1612 Sequences

# PERU Project # 3



- ▶ **NAME & TYPE** (Library construction, Metabarcoding): DNA barcoding of Peruvian marine biodiversity (PeMar). Library construction.
- ▶ **Project Lead:** Raquel Siccha-Ramirez (Instituto del Mar del Peru - IMARPE)
- ▶ **Collaborators:** Jorge L. Ramirez, Eliana Zelada , Patricia Ayon, Joanna Alfaro, Ximena Velez-Zuazo, Manuel Elias, Dirk Steinke, Alex Borisenko, Robert Hanner.
- ▶ **STATUS (UNDERWAY/PLANNED):** The project is underway (2017-2020) with a fund of \$450k by FONDECYT
- ▶ **TARGET TAXONOMIC GROUP(s):** Vertebrates, Invertebrates, Zooplankton
- ▶ **BRIEF DESCRIPTION OF GOALS:** DNA barcodes for 1000 species (300 commercial fishes, 300 invertebrates, 100 other vertebrates, and 300 zooplankton)

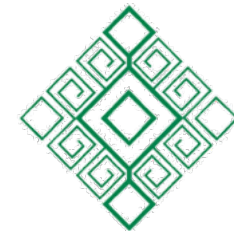
# Institutions



# Collaborating Institutions



Smithsonian Institution



ECOSUR

# PeMAR Workshop



# Advances



Fishes  
Collected: 106 spp.  
sequenced: 45 spp.



Vertebrates  
Collected: 60 spp.  
sequenced: 23 spp.



Invertebrates  
Collected: 136 spp.  
sequenced: 65 spp.



Zooplankton  
Collected: 103 spp.  
sequenced: 44 spp.

# Peru SWOT Analysis

## ▶ **STRENGTHS:**

- ▶ Peru is a megadiverse country
- ▶ Strong commitment of Peruvian researchers and students for the conservation and study of biodiversity

## ▶ **WEAKNESSES:**

- ▶ Lack of funding for scientific research
- ▶ Long and complex legal procedures
- ▶ Lack of adequate equipment and facilities

## ▶ **THREATS:**

- ▶ Possible disasters such as fires and earthquakes

## ▶ **OPPORTUNITIES:**

- ▶ Much interest from young people in biological research
- ▶ The convention of biological diversity is the framework that establishes a goal of knowledge of biodiversity including the molecular level

# Peru SWOT Analysis: SENASA

## ► STRENGTHS:

To have a multidisciplinary team, made up of entomologists, Molecular Biologists, Informatics and institutions committed to biodiversity research, such as the Museum of Natural History, the National Institute of Agrarian Innovation (INIA), Canadian Center for DNA Barcoding (CCDB) ) and the National Agrarian Health Service (SENASA).

## ► WEAKNESSES:

One of the main weaknesses is not having a large number of taxonomists that can cover all families of agricultural interest, we need to train more taxonomists that allow us to contribute to the knowledge of biodiversity and financing that allows us to continue including organisms to the systems of DNA barcoding.

## ► THREATS:

Climate change is currently affecting both the biology of agricultural crops, as well as the distribution of arthropods of agricultural interest (pests), due to the increase in pests that can affect different crops.

## ► OPPORTUNITIES

The possibility of having tools such as the barcode of DNA and databases more and more complete that allow us the correlation specimen - DNA, which will facilitate the strategies of pest control in the country.

SWOT analysis to identify strengths, weaknesses, opportunities, and threats to your nation's participation in iBOL-II. If appropriate, consider the prospect of recruiting additional Nations as Associate Members under Opportunities.

Thank you!





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# Node Report - Philippines

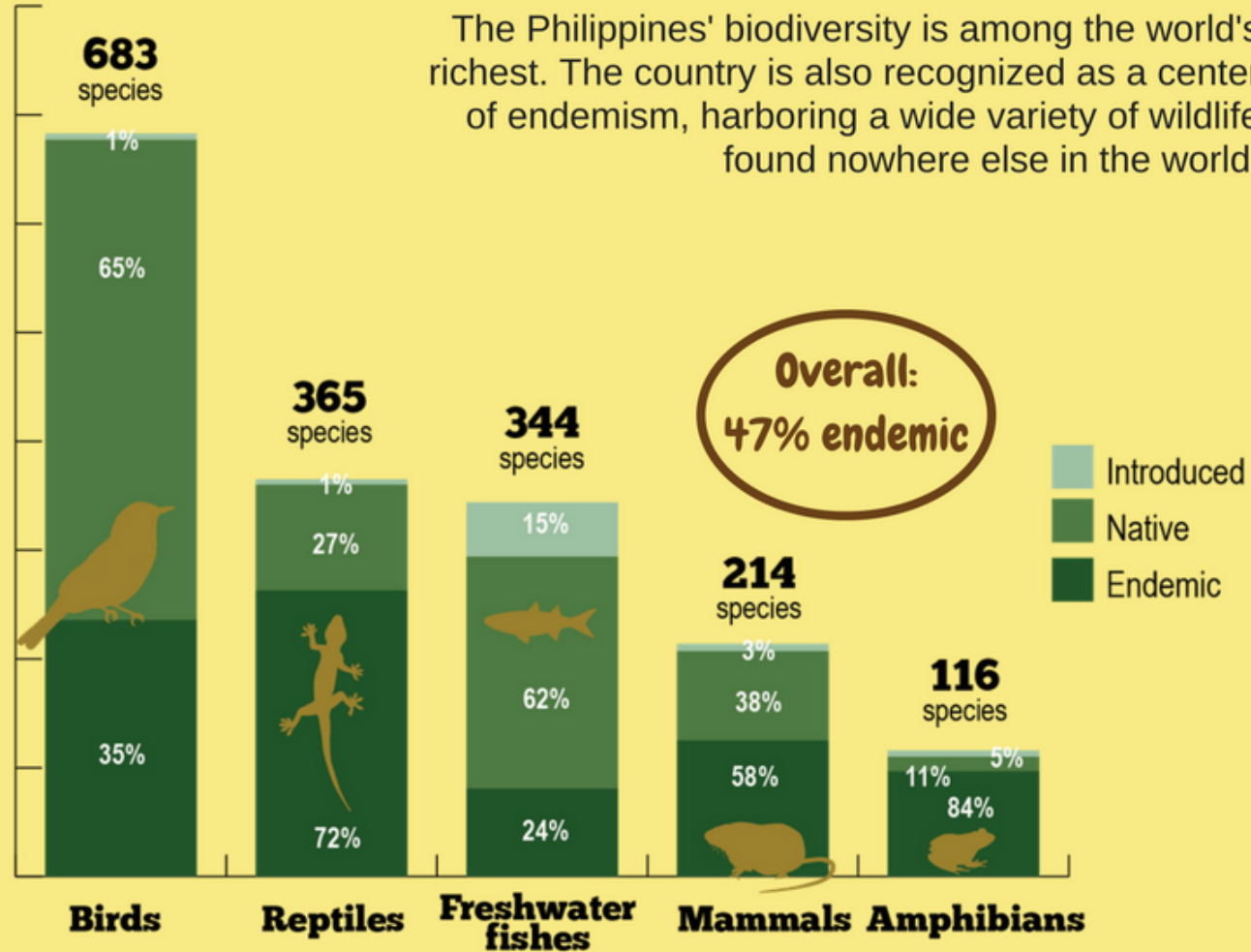
Scientific Steering Committee, October 13 & 14, 2018



# Biodiversity PH 101

## Terrestrial/Inland Species Diversity

The Philippines' biodiversity is among the world's richest. The country is also recognized as a center of endemism, harboring a wide variety of wildlife found nowhere else in the world.



Figures are as of 2016. Sources:

Birds, Amphibians, and Reptiles: 2015–2016 Threatened Species Assessment (DENR, BCSP, and other partners)

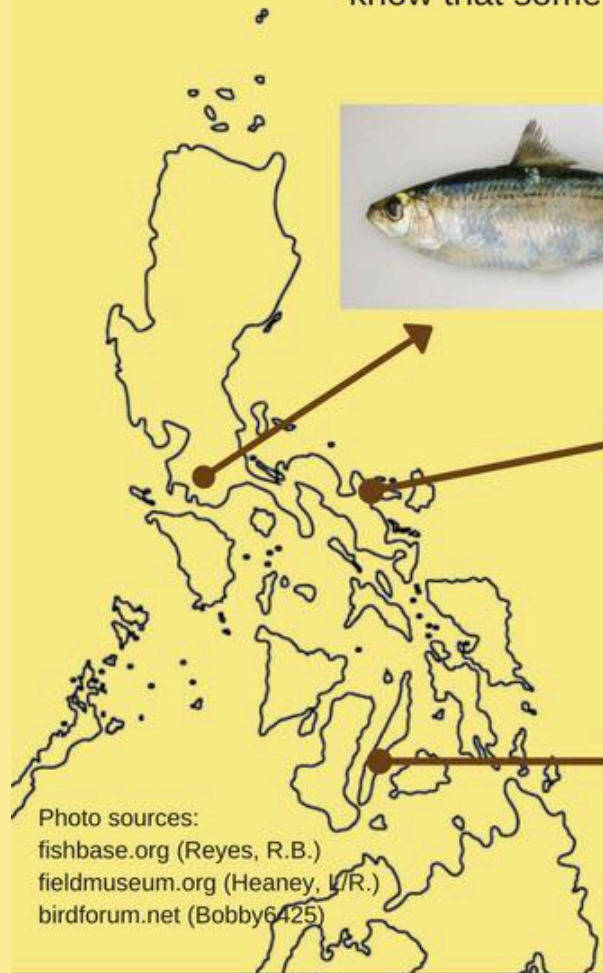
Freshwater Fishes: fishbase.org

Mammals: [www.fieldmuseum.org/synopsis-philippine-mammals](http://www.fieldmuseum.org/synopsis-philippine-mammals)

# Biodiversity PH 101

## Philippine "Super Endemics"

We often hear that there are a lot of plant and animal species that are found only in the Philippines—more than 10,000, in fact—but did you know that some of these species are so unique, they can be found in only one place in the Philippines?



**Found only in one lake (Taal Lake)**

Tawilis, *Sardinella tawilis*



**Found only on one mountain (Mt. Isarog)**

Isarog shrew rat, *Rhynchomys isarogensis*



**Found only on one island (Cebu)**

Cebu black shama, *Copsychus cebuensis*

Photo sources:  
fishbase.org (Reyes, R.B.)  
fieldmuseum.org (Heaney, W.R.)  
birdforum.net (Bobby6425)

# Ian Fontanilla

## Philippines

- ▶ POSITION: Associate Professor
- ▶ HOME INSTITUTIONS: University of the Philippines, Diliman  
Institute of Biology, College of Science  
  
Philippine Genome Center (UP System)
- ▶ KEY TAXONOMIC INTERESTS: Molluscs & their parasites;  
Endemic Philippine vertebrates
- ▶ GEOGRAPHIC FOCUS: Palanan Forest Dynamics Plot  
Mindanao
- ▶ PRIOR BARCODE INVOLVEMENTS: Philippine birds, Nematodes,  
Pulmonate Gastropods, *Schistosoma*, Pangolins, Bats



- The University of the Philippines (UP) is the country's national university (RA 9500, 2008).
- UP was established in 1908 and is now a university system composed of eight constituent universities and one autonomous college spread throughout 15 campuses in the archipelago.

# The INSTITUTE OF BIOLOGY



- Established in 1986 from the merger of the Departments of Botany and Zoology (which were founded in 1910) and with a research agenda that focuses on tropical biodiversity from molecules to ecosystems: an integrative approach towards sustainable development



- The Philippine Genome Center (PGC) is a genomics-focused multidisciplinary research unit of the University of the Philippines (System) under the Office of the Vice President of Academic Affairs

# Philippines Barcodes on BOLD

## Barcode Count

- 27,639 Sequences
- 3,586 Named Species
- 4,772 BINs

## Species Coverage

- Plants (141 species)
- Vertebrates (1,885 species)
- Arthropods (1,076 species)
- Other Inverts (510 species)

## BIN coverage

- Vertebrates (2,010 BINs)
- Arthropods (1,460 BINs)
- Other Inverts (1,216 BINs)

# Philippines Project # 1

- ▶ **NAME & TYPE:** (Metabarcoding) Palanan Forest Dynamics Plot Genome Observatory:
- ▶ **Project Lead:** Ian Fontanilla, Perry Ong
- ▶ **Collaborators:** Philippine Genome Center, Isabela State University, University of the Philippines-Los Banos
- ▶ **STATUS (UNDERWAY/PLANNED):** Planned
- ▶ **TARGET TAXONOMIC GROUP(s):** All vertebrates, gastropods, insects, basidiomycetes, vascular plants
- ▶ **BRIEF DESCRIPTION OF GOALS:** First comprehensive inventory of all non-microbial species in a tropical ecosystem; to include at least five individuals per species.



# Philippines Project # 2

- ▶ **NAME & TYPE (Library construction):** DNA Barcoding of Philippine Bats
- ▶ **Project Lead:** Ian Fontanilla and Adrian Luczon
- ▶ **Collaborators:** The Field Museum
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway (Funding: Department of Science and Technology and University of the Philippines)
- ▶ **TARGET TAXONOMIC GROUP(s):** Philippine bats
- ▶ **BRIEF DESCRIPTION OF GOALS:** At least five individuals per species for a total of 72 species

# Philippines Project # 3

- ▶ **NAME & TYPE (Library construction):** Wildlife forensics and DNA barcoding of Philippine biodiversity
- ▶ **Project Lead:** Perry Ong
- ▶ **Collaborators:** Department of Environment and Natural Resources (DENR)
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway (**Funding agency:** DENR)
- ▶ **TARGET TAXONOMIC GROUP(s):** Vertebrates and economically important plants
- ▶ **BRIEF DESCRIPTION OF GOALS:** To barcode all Philippine endemics confiscated by the DENR Wildlife Enforcement Officers

# Philippines Project # 4

- ▶ **NAME & TYPE (Metabarcoding):** The Food-Borne Helminthiases Problem in the Philippines: Present Status, Response and Proposed Intervention
- ▶ **Project Lead:** Lydia R. Leonardo
- ▶ **Collaborators:** Ian Kendrick Fontanilla, Ian Kim Tabios, Raffy Jay C. Fornillos, Mihoko Kikuchi, Marcello Otake Sato, Aleyla Escueta-de Cadiz, Imelda Pates, Daria Manalo, Kharleezele Moendeg, Yuichi Chigusa
- ▶ **STATUS (UNDERWAY/PLANNED):** Planned
- ▶ **TARGET TAXONOMIC GROUP(s):** Food-borne helminthes species
- ▶ *Taenia* spp., *Capillaria philippinensis*, *Fasciola hepatica*, *Fasciola gigantica*, *Paragonimus westermani* , *Heterophyid* spp. and among others.
- ▶ **BRIEF DESCRIPTION OF GOALS:** Molecular identification of helminth isolates in endemic provinces in the Philippines through DNA barcoding (sampling depending on availability from clinical and zoonotic sources)

# Philippines SWOT Analysis

- ▶ **STRENGTHS:** We have a high biodiversity in the Philippines, and there is strong support from the government through the Department of Environment and Natural Resources (DENR) and the Department of Science and Technology (DOST).
- ▶ **WEAKNESSES:** Though there are already a steady number of groups doing DNA barcoding in the Philippines, we still need more warm bodies due to the sheer amount of biodiversity to be covered. Practically, there are not enough people writing grant proposals
- ▶ **THREATS:** Ongoing biodiversity loss in the Philippines (the Philippines being a biodiversity hotspot, we need to hasten in assessing total biodiversity assessment while at the same time come up with practical conservation efforts)
- ▶ **OPPORTUNITIES:** Networking with other ASEAN countries through the ASEAN Biodiversity Center, whose headquarters is at the University of the Philippines, Los Banos

Thank you!



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# Node Report - Poland

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate Poland

- ▶ **POSITION:** Associate Professor, Head of the Laboratory of Invertebrate Biogeography & Ecology
- ▶ **HOME INSTITUTION:** University of Lodz, Faculty of Biology & Environmental Protection, Department of Invertebrate Zoology & Hydrobiology
- ▶ **KEY TAXONOMIC INTERESTS:** Amphipoda and other malacostracan crustaceans, aquatic insects
- ▶ **GEOGRAPHIC FOCUS:** Europe, particularly Carpathian Arch, Mediterranean Region (Balkan Peninsula)
- ▶ **PRIOR BARCODE INVOLVEMENTS:** DNA barcoding of freshwater amphipods and isopods in Europe, particularly in the Mediterranean Region

# Poland Barcodes on BOLD

## Barcode Count

- 4,897 Sequences
- 1,075 Named Species
- 807 BINs

## Species Coverage

- Plants (214 species)
- Vertebrates (71 species)
- Arthropods (631 species)
- Other Inverts (44 species)

## BIN coverage

- Vertebrates (72 BINs)
- Arthropods (669 BINs)
- Other Inverts (59 BINs)



# National Plant, Fungi and Animal DNA Bank

- ▶ **Date established:** 2006
- ▶ **Lead institution:** Museum and Institute of Zoology Polish Academy of Sciences
- ▶ **# Researchers involved:** Wieslaw Bogdanowicz (project leader)
- ▶ **# institutions involved:** Institute of Botany PAS, Plant Breeding and Acclimatization Institute, Institute of Genetics and Animal Breeding PAS, University of Zielona Góra
- ▶ **Current funding:** initially funded as a start-up project by Ministry of Science & Higher Education, died out in the meantime (ca. 2008)
- ▶ **Future Prospects:** most likely none, need to establish new initiative

# Poland Project # 1

- ▶ **NAME & TYPE:** Reference DNA Barcode library for the European freshwater epigean Malacostraca
- ▶ **Project Lead:** Michal Grabowski et co., University of Lodz
- ▶ **Collaborators:** among others: University of Burgundy, University of Zagreb, University of Montenegro, University of Skopje, Hydrobiological Institute in Ohrid, Evora University, Natural History Museum (Berlin), Free University of Brussels, Vilnius University, Slovak Academy of Sciences
- ▶ **STATUS (UNDERWAY):** funded within several grants from the National Science Center, people exchange supported by the EU COST Action DNAqua-Net, fieldwork partially funded by the local collaborators
- ▶ **TARGET TAXONOMIC GROUP(s):** Amphipoda, Isopoda, Decapoda, Mysida
- ▶ **BRIEF DESCRIPTION OF GOALS:** understanding spatial and historical patterns of diversity, targeting ca. 200 species

## Studied groups

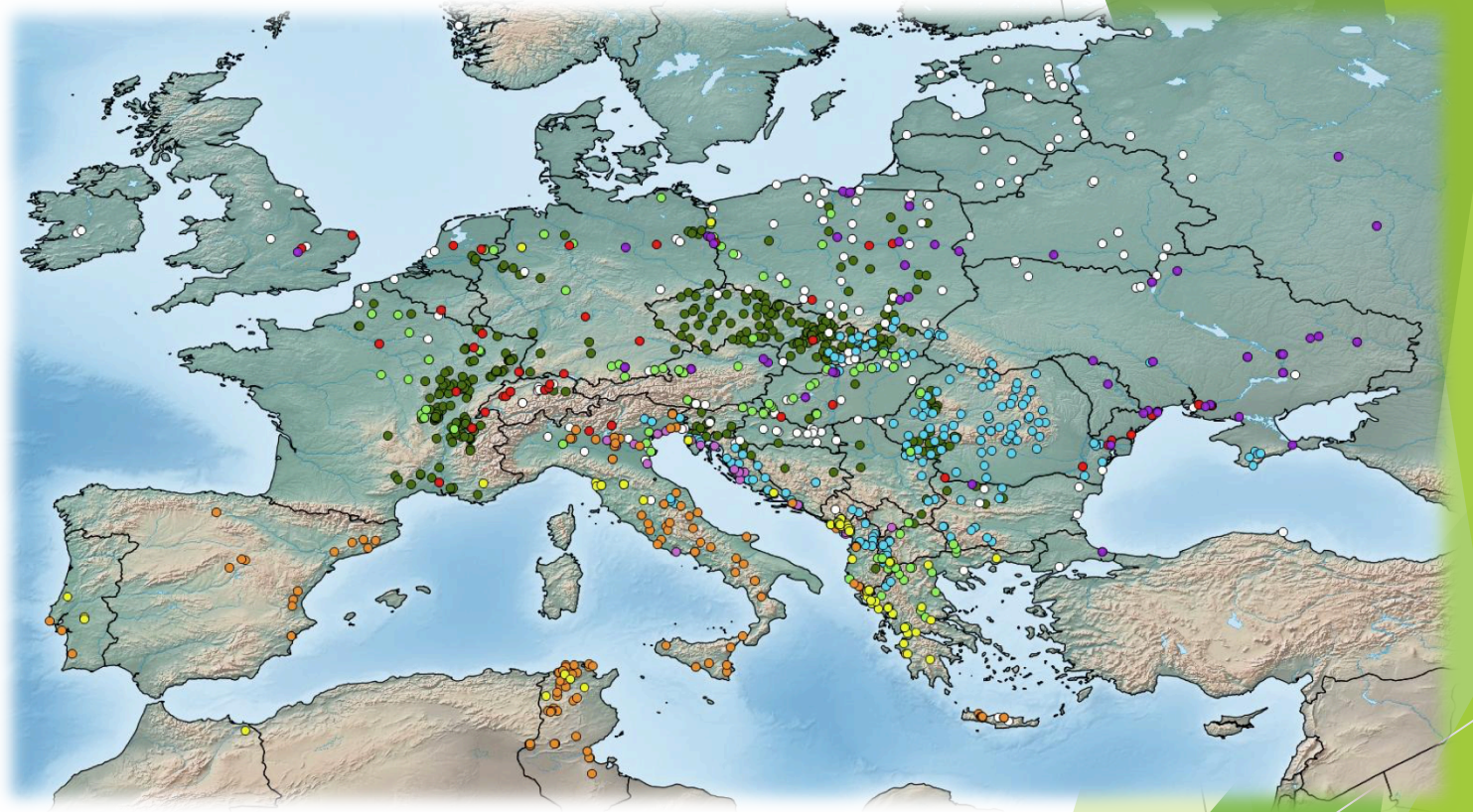


# Studied ecosystems



## Current stage

- Nearly 9000 individuals barcoded
  - > 7300 already in BOLD
- ca. 1000 locations
- > 350 new BINs
- Huge cryptic diversity detected



### BOLD datasets In preparation:

- *Gammarus fossarum* species complex
- *Gammarus balcanicus* species complex
- *Echinogammarus* from Europe
- Malacostraca from Croatia

## Core team



Michał  
Grabowski



Sasho  
Trajanovski



Remi  
Wattier



Anna  
Wysocka



Tomasz  
Mamos



Tomasz  
Rewicz



Fedor  
Čiampor



Kamil  
Hupato



Aleksandra  
Jabłońska



Vladimir  
Pesić



Krešimir  
Žganec



Mišel  
Jelić



Denis  
Copilaș-Ciocianu

# Poland Project # 2

- ▶ **NAME & TYPE:** DNA Barcode reference library for target aquatic insect groups in Poland
- ▶ **Project Lead:** Michal Grabowski et co., University of Lodz
- ▶ **Collaborators:** Gdansk University, Warsaw University, Silesian University, Jagiellonian University, Nicolaus Copernicus University, Szczecin University, University of Warmia and Mazury, Czech Academy of Sciences
- ▶
- ▶ **STATUS:** Planned
- ▶ **TARGET TAXONOMIC GROUP(s):** Odonata, Ephemeroptera, Plecoptera, Trichoptera
- ▶ **BRIEF DESCRIPTION OF GOALS:** Odonata (74 spp.), Ephemeroptera (ca. 120 spp.), Plecoptera (ca. 80 spp.), Trichoptera (ca. 280 spp.)

# Poland SWOT Analysis

## ▶ **STRENGTHS:**

- ▶ Very well documented fauna, flora etc., decades of research, checklists, catalogues and identification keys published (partially available on-line)
- ▶ Several initiatives for digitalisation of Polish zoological collections
- ▶ Good representation of well-trained taxonomists/zoologists/botanists/mycologists/phytologists etc., experienced in field studies
- ▶ Several strong institutions (universities, Polish Academy of Sciences) with modern molecular labs/sequencing facilities (funded largely from the EU grants)
- ▶ Reasonable (?) perspectives for funding of large scale barcoding/metabarcoding studies

## ▶ **WEAKNESSES:**

- ▶ Absence of the barcoding initiative at the National level
- ▶ Under-representation of early-career „molecular taxonomists”
- ▶ Under-funding for taxonomy-oriented studies

## ▶ **THREATS:** funding related issues, eg. funding instability

## ▶ **OPPORTUNITIES:**

- ▶ Involving the Balkan States (Bosnia & Herzegovina, Croatia, Kosovo, FYR Macedonia, Montenegro, Albania), Greece, Tunisia, Ukraine, Lithuania - present co-operation within several projects and EU COST Action DNAqua-Net



Thank you!



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# Node Report - Portugal

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate Portugal

- ▶ **POSITION:** Assistant Professor
- ▶ **HOME INSTITUTION:** University of Minho, Braga / Centre of Molecular and Environmental Biology (CBMA)
- ▶ **KEY TAXONOMIC INTERESTS:** marine life, particularly fish and Crustacea (and to a lesser extent Annelida and Mollusca)
- ▶ **GEOGRAPHIC FOCUS:** Mostly Portuguese marine areas including the archipelagos of Azores and Madeira; also some European level meta-studies
- ▶ **PRIOR BARCODE INVOLVEMENTS:** Since 2003; Portugal Delegate iBOL phase I; Chair ECBOL2; Deputy-Chair and Chair European FISH-BOL; Scientific committee of 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> BOL conferences;

# Portugal Barcodes on BOLD

## Barcode Count

- 12,190 Sequences
- 2,931 Named Species
- 2,037 BINs

## Species Coverage

- Plants (998 species)
- Vertebrates (282 species)
- Arthropods (1,265 species)
- Other Inverts (224 species)

## BIN coverage

- Vertebrates (296 BINs)
- Arthropods (1,362 BINs)
- Other Inverts (308 BINs)

# Portugal Barcode Network [*Marine Life*]

- ▶ **Date established:** Networking efforts initiated 2004, Marine Life network effective 2008
- ▶ **Lead institution:** University of Minho, CBMA (Centre of Molecular and Environmental Biology)
- ▶ **# Researchers involved:** estimate of > 20
- ▶ **# institutions involved:** Museum of Natural History, National Fisheries Agency, Malacology Society, Universities (Aveiro, Lisboa, Nova de Lisboa), research centers IMAR, CIIMAR.
- ▶ **Current funding:** No funding available for networks; multiple dispersed individual grants (next slides)
- ▶ **Future Prospects:** Formalize and expand the network; engage new contributors/institutions to address missing biomes and taxonomic assemblages (e.g. InBIO / Univ. Porto)

# Portugal Project # 1

- ▶ **NAME & TYPE** : *LusoMarBoL*, *LusoAquaBarcode*, *Metafishcode* (Library construction) / *BEstBarcode* (Metabarcoding)
- ▶ **Project Lead**: Filipe Costa (CBMA, UMinho)
- ▶ **Collaborators**: National: Museum Nat. Hist., Academic and Research institutions, Fisheries Agency; Foreign: Biodiversity Institute of Ontario (Canada), Bangor University (UK).
- ▶ **STATUS (UNDERWAY/PLANNED)**: Total 514 K€ (188 K€ + 45 K€+ 110 K€ +171 K€)
- ▶ **TARGET TAXONOMIC GROUP(s)**: Marine fish and invertebrates; estuarine macrobenthos
- ▶ **BRIEF DESCRIPTION OF GOALS**: Core reference libraries for marine fish and invertebrates, publicly available on BOLD. Tailored protocols for metabarcoding estuarine benthos.

# Portugal Project # 2

- ▶ **NAME & TYPE:** IBI- InBIO Barcoding Initiative (*Library construction*)
- ▶ **Project Lead:** Pedro Beja (InBIO)
- ▶ **Collaborators:** Portugal (CIBIO-InBIO; cE3c) and abroad (UK- Oxford, Surrey, Dorset and Duiven; Germany- Leibniz; Spain- Granada, Santiago de Compostela, Vigo; USA- Michigan State University; and The Netherlands- Naturalis, Leiden)
- ▶ **STATUS:** Underway; funding through InBIO internal funds, the EU project EnvMetaGen, the FCT project PORBIOTA, among others.
- ▶ **TARGET TAXONOMIC GROUP(s):** Mainly insects (up to now mainly Lepidoptera, Odonata, Trichoptera, Ephemeroptera, Plecoptera, and Mantodea, Dermaptera, Mecoptera, Neuroptera, Phasmatodea and Raphidioptera).
- ▶ **BRIEF DESCRIPTION OF GOALS:** All insect species occurring in Portugal (2,400 species barcoded; goal 5,000 species until 2020).

# Portugal Project # 3

- ▶ **NAME & TYPE:** *NEXT-SEA* (metabarcoding); *NIS-DNA* (both); *eCSI-DNA* (bioinformatics - pending confirmation)
- ▶ **Project Lead:** Pedro Gomes / Sofia Duarte / Filipe Costa (all CBMA, UMinho)
- ▶ **Collaborators:** multiple collaborators within country and abroad
- ▶ **STATUS (UNDERWAY/PLANNED):** 1.2 M€ + 240 K€ + 240 K€
- ▶ **TARGET TAXONOMIC GROUP(s):** Marine macrobenthos, estuarine meiofauna and non-indigenous marine species (NIS)
- ▶ **BRIEF DESCRIPTION OF GOALS:** autonomous multi-parameter monitoring stations for *in situ* deployment; DNA-based monitoring of NIS marine species in Portuguese ports and marinas (including Azores and Madeira).



# Portugal SWOT Analysis

- ▶ **STRENGTHS:** accumulated experience and know-how, newly-trained and highly motivated early stage researchers, growing interest after the emergence of metabarcoding approaches
- ▶ **WEAKNESSES:** instability of public funding for research and academia, institutional bureaucracy and difficulties in project execution
- ▶ **THREATS:** with time, possible trend for greater focus on metabarcoding and lower commitment (and funding) to reference library building
- ▶ **OPPORTUNITIES:**
  - 2019 -Supercomputer facility (*MACC - Minho Advancing Computing Centre - Stamped transferred from UT Austin*) - partnerships with iBOL (BOLD and mBRAVE, large-scale analyses, etc.);
  - New institutions contributing, more engagement from the research community;
  - IB-S: Institute for Science and Innovation for Bio-Sustainability* (new building, laboratories and facilities)
  - Portuguese Genomics consortium (GenomePT)- UMinho w/ Bioinformatics node, including training programmes (possible use for BOLD / mBRAVE workshops)

Thank you!



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# Node Report - Slovakia

Scientific Steering Committee, October 13 & 14, 2018

SSC Delegate  
Slovakia  
Ivona  
Kautmanova

- ▶ POSITION: Head of the Botanical department
- ▶ HOME INSTITUTION: Slovak National Museum-Natural History Museum, Bratislava
- ▶ KEY TAXONOMIC INTERESTS: Mycology
- ▶ GEOGRAPHIC FOCUS: Slovakia, Europe, worldwide
- ▶ PRIOR BARCODE INVOLVEMENTS fungi from Slovakia, Clavariaceae, Clavicipitaceae worldwide

# Slovakia Barcodes on BOLD

## Barcode Count

- 4,961 Sequences
- 738 Named Species
- 541 BINs

## Species Coverage

- Plants (61 species)
- Vertebrates (17 species)
- Arthropods (553 species)
- Other Inverts (26 species)

## BIN coverage

- Vertebrates (16 BINs)
- Arthropods (479 BINs)
- Other Inverts (46 BINs)

# Slovakia Barcode Network

- ▶ **Date established:** in preparation
- ▶ **Lead institution:** Slovak National Museum-Natural History Museum
- ▶ **# Researchers involved:** Ivona Kautmanova, Eliska Gburova, Danka Szabova, Jan Kautman, Bronislava Volekova, Dusan Zitnan, Ladislav Roller, Lubomir Vidlicka, Vladimir Kovac, a. o.
- ▶ **# institutions involved:** Zoological Institute of the Slovak Academy of Sciences; Botanical Institute of the Slovak Academy of Sciences; Department of Ecology, Comenius University, Bratislava.  
? Institute of Biology, Zoology and Radiobiology, University of Veterinary Medicine and Pharmacy in Kosice, (Lenka Luptakova).
- ▶ **Current funding:** 240 000 €
- ▶ **Future Prospects:** 600 000 €

# Slovakia Project # 1

- ▶ **NAME & TYPE (Library construction):** Orchids of Slovakia
- ▶ **Project Lead:** Eliska Gburova
- ▶ **Collaborators:** Danka Szabova, Darina Siposova,  
Dietmar Quandt (Nees Institute, Germany)
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, 40 000 €
- ▶ **TARGET TAXONOMIC GROUP(s):** Orchidaceae
- ▶ **BRIEF DESCRIPTION OF GOALS:** around 150 species of the family Orchidaceae known from Slovakia, 300 specimens collected in field in 2018, now processed.



# Slovakia Project # 2

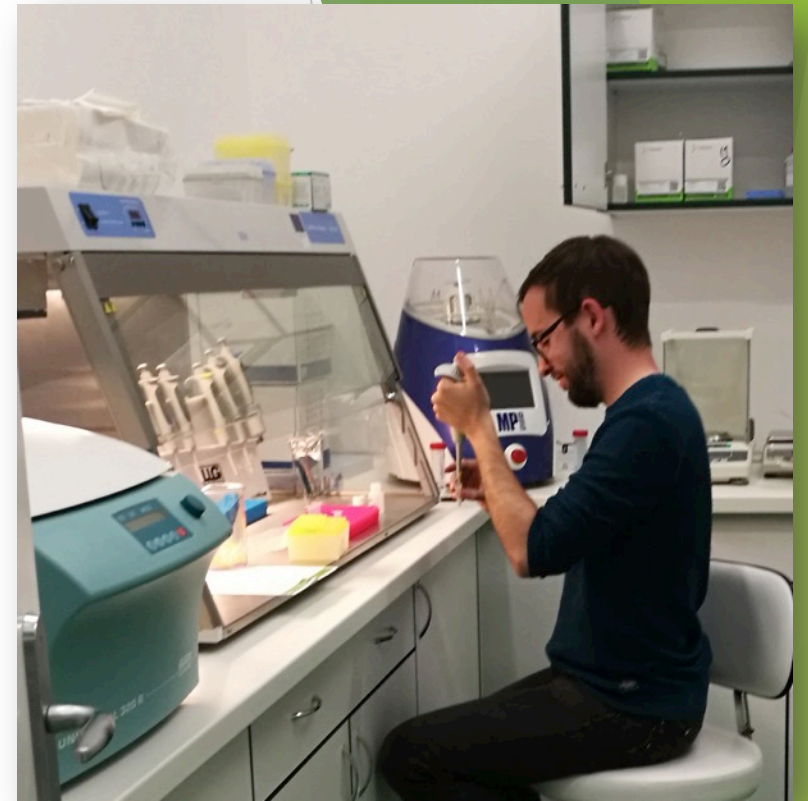
- ▶ **NAME & TYPE (Metabarcoding):** Biodiversity of old mine sediments
- ▶ **Project Lead:** Bronislava Volekova
- ▶ **Collaborators:** Danka Szabova, Ivona Kautmanova, Eliska Stubnova, Jan Kautman, a.o.
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, 80 000 €
- ▶ **TARGET TAXONOMIC GROUP(s):** Bacteria, Archea, fish, insect, fungi, plants
- ▶ **BRIEF DESCRIPTION OF GOALS:** By the means of DNA analyses investigate the biodiversity of old mine sediments rich in arsenic and antimony.





# Slovakia Project # 3

- ▶ **NAME & TYPE (Library construction):** Fungi of Slovakia
- ▶ **Project Lead:** Ivona Kautmanova
- ▶ **Collaborators:** Danka Szabova, Darina Siposova,  
Adam Polhorsky
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, 20 000 €
- ▶ **TARGET TAXONOMIC GROUP(s):** Macromycetes (Basidiomycetes, Ascomycetes)
- ▶ **BRIEF DESCRIPTION OF GOALS:** Library construction of selected macromycetes from Slovakia, cca 200 species



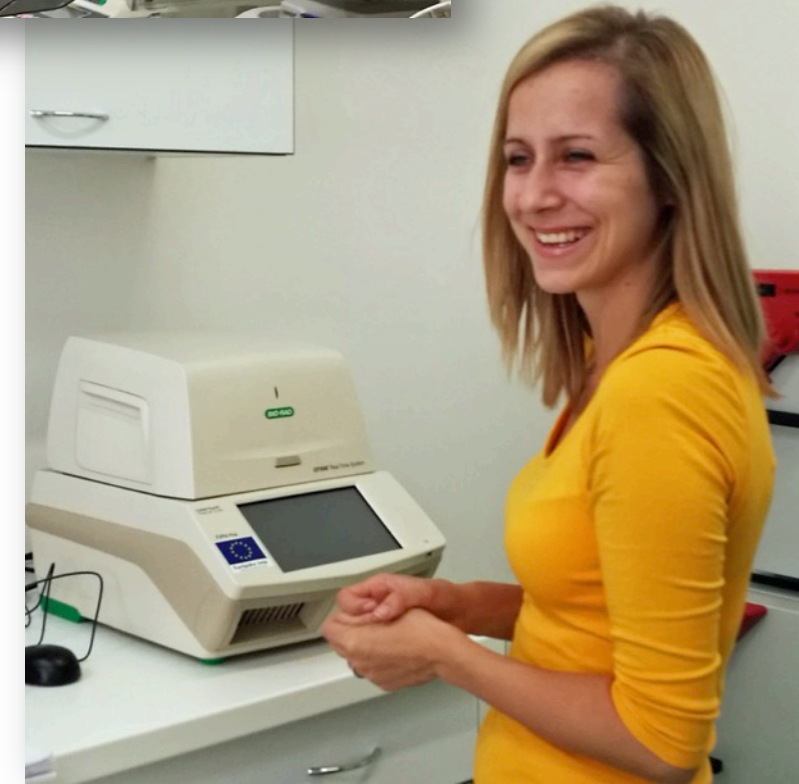
# Slovakia Project # 4

- ▶ **NAME & TYPE (Library construction):**  
Invasive fish species of Slovakia
- ▶ **Project Lead:** Jan Kautman
- ▶ **Collaborators:** Vladimir Kovac
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, 20 000 €
- ▶ **TARGET TAXONOMIC GROUP(s):** Fish
- ▶ **BRIEF DESCRIPTION OF GOALS:** Library construction of invasive and native fish species of Slovakia, 50 specimens taken now processed in lab.



# Slovakia SWOT Analysis

- ▶ **STRENGTHS:** young team, fundings, well equipped lab, big collections at the museum
- ▶ **WEAKNESSES:** young team, requested partnerships from business sector
- ▶ **THREATS:** instability of funding
- ▶ **OPPORTUNITIES:** international cooperation (Germany, Czech Republic)



Thank you!

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the right side of the slide, creating a modern, layered effect. The rest of the slide is a plain white background.

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# Node Report - South Africa

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate

## South Africa

- ▶ **POSITION:** Professor & Director of the African Centre for DNA Barcoding (ACDB)
- ▶ **HOME INSTITUTION:** University of Johannesburg
- ▶ **KEY TAXONOMIC INTERESTS:** Plants
- ▶ **GEOGRAPHIC FOCUS:** Africa
- ▶ **PRIOR BARCODE INVOLVEMENTS:** Member of the Interim Steering Committee SABOL (2011-2015), Representative for Africa - TreeBOL, Member of the Plant Working Group of the CBOL, Leading Lab's (CBOL), IDRC/iBOL Project: Engaging Developing Nations - South Africa, Barcode of Wildlife Project (Google-CBOL), Member of the Scientific Advisory Board - Plant.ID, Host for the 7<sup>th</sup> International iBOL conference

# South Africa Barcodes on BOLD

## Barcode Count

- 98,403 Sequences
- 10,828 Named Species
- 14,082 BINs

## Species Coverage

- Plants (5,375 species)
- Vertebrates (1,484 species)
- Arthropods (3,278 species)
- Other Inverts (391 species)

## BIN coverage

- Vertebrates (1,654 BINs)
- Arthropods (11,612 BINs)
- Other Inverts (621 BINs)

# South Africa Barcode Network

- ▶ **Date established:** SABOL (2011-2015); iBOL-II (Department of Science and Technology [DST] still needs to sign the MoU)
- ▶ **Lead institution:** SABOL will be managed by DST and will fall within the Foundation Biodiversity Information Programme (FBIP) governance structure, which is managed by the South African National Biodiversity Institute (SANBI)
- ▶ **# Researchers involved:** ± 80
- ▶ **# institutions involved:** ± 25
- ▶ **Current funding:** National Research Foundation, through the Foundational Biodiversity Information Programme
- ▶ **Future Prospects:**
  1. To develop and implement a co-ordinated communication and stakeholder engagement programme around barcoding in SA.
  2. To provide access to information on procedures, processes and legal requirements for the flow of barcoding information from sample collection to application.
  3. To develop and implement a co-ordinated programme to identify focus taxa / locations / applications for barcoding actions (aligned with global programmes but addressing also specific needs of South Africa).
  4. To develop appropriate capacity for generating barcodes, using barcoding to identify biological materials and metabarcoding for surveys.
  5. To drive the roll-out of work to support iBOL's phase II core goals at national level, and identify research and technology gaps and needs necessary to contribute to obtaining these goals.
  6. To secure adequate funding to allow the achievement of the goals.



# South Africa Project # 1

- ▶ **NAME & TYPE:** BioGaps - Filling biodiversity information gaps to support development decision making in the Karoo. Library construction
- ▶ **Project Lead:** South African National Biodiversity Institute
- ▶ **Collaborators:** African Centre for DNA Barcoding, South African Institute for Aquatic Biodiversity, BEWs Herbarium, Agricultural Research Council, South African Earth Observation Network, National Zoological Gardens of South Africa, Ditsong National Museum of Natural History, University of Cape Town, University of Stellenbosch
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway, 6 million ZAR over 3 years
- ▶ **TARGET TAXONOMIC GROUP(s):** Plants (300); Spiders (240); Butterflies (240); Dragonflies (120); Bees (240); Grasshoppers (240); Reptiles (50); Frogs (20); Fish (20); Mammals (40)
- ▶ **BRIEF DESCRIPTION OF GOALS:** This project aims to mobilize foundational biodiversity data to support Strategic Environmental Assessments (SEAs) for Shale Gas Development (SGD) and other infrastructure development projects in the Karoo basin

# South Africa Project # 2

- ▶ **NAME & TYPE:** Barcode of Wildlife Project, South Africa. Library construction and Wildlife Forensics
- ▶ **Project Lead:** Department of Environmental Affairs (DEA), South Africa
- ▶ **Collaborators:** African Centre for DNA Barcoding, South African Institute for Aquatic Biodiversity, South African National Biodiversity Institute, National Zoological Gardens of South Africa, South African Police - Forensic Unit, National Prosecuting Authority
- ▶ **STATUS (UNDERWAY/PLANNED):** Underway. Initial funding from CBOL through Google; current funding DEA
- ▶ **TARGET TAXONOMIC GROUP(s):** Plants, Invertebrates, Marine Fish, Reptiles, Birds, Mammals
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - To build a public database of reference barcode records for traded species and their close relatives and look-alikes, against which the barcode sequences of confiscated material can be compared
  - To train for researchers, technicians, border inspectors, game wardens, prosecuting attorneys and judges in the use and applications of DNA barcoding
  - To test DNA barcoding as a real-world tool for enforcement through implementation of operational, cost-effective barcoding programs

# South Africa SWOT Analysis

## ▶ STRENGTHS:

- Relatively large number of researchers who work in the field of molecular systematics (about 80 nationally)
- Good laboratories, which are very well equipped
- Research funding and funds for DNA barcoding available through the National Research Foundation, especially (but not only) through the Foundational Biodiversity Information Programme
- Established barcoding practices at the ACDB and NZG

## ▶ WEAKNESSES:

- Lack of awareness of and appreciation for the iBOL programme and BOLD functionality amongst researchers, which leads them to not using the barcoding gene regions, and submitting sequence data to BOLD
- Probably still insufficient funds for barcoding
- Barcode community not well organized nationally (possibly linked to resistance to barcoding)
- Lack of wider adoption of barcoding for a range of applications in agriculture, health, decision-making

## ▶ THREATS:

- Funds for research are decreasing due to national economic challenges
- Researchers increasingly driven by publications in high impact journals with little interest in big data projects that serve other interests

## ▶ OPPORTUNITIES

- The Natural Science Collections Facility and the South African Biodiversity Biobanks are two research infrastructure projects funded by the national Department of Science & Technology. Both have relevance to DNA barcoding and provide opportunities for increasing the number of species and specimens barcoded and for metabarcoding projects
- Adoption of barcoding techniques by enforcement agencies dealing with illegal trade in threatened species and potential for expanding the reference library through this work

Thank you!



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# Node Report - Thailand

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate Thailand

- ▶ **POSITION:** Associate Professor
- ▶ **HOME INSTITUTION:** Chulalongkorn University, BKK, Thailand
- ▶ **KEY TAXONOMIC INTERESTS:** parasitoid wasps and other insects & arthropods (also reptiles, amphibians, birds)
- ▶ **GEOGRAPHIC FOCUS:** South East Asia
- ▶ **PRIOR BARCODE INVOLVEMENTS:** BBTH project on Thai parasitoid wasps & caterpillars

# Thailand Barcodes on BOLD

## Barcode Count

- 32,762 Sequences
- 3,993 Named Species
- 5,264 BINs

## Species Coverage

- Plants (747 species)
- Vertebrates (345 species)
- Arthropods (2,542 species)
- Other Inverts (176 species)

## BIN coverage

- Vertebrates (452 BINs)
- Arthropods (4,312 BINs)
- Other Inverts (496 BINs)

# Thailand Barcode Network


- ▶ **Date established: Thai Braconid wasps**
- ▶ **Lead institution: Faculty of Science, Chulalongkorn University**
- ▶ **# Researchers involved: Prof. Quicke and etc.**
- ▶ **# institutions involved: Mahidol and Kasetsart Universities**
- ▶ **Current funding: TRF (Thailand Research Fund), CE (Centre of Excellence in Biodiversity)**
- ▶ **Future Prospects: Network with other universities around Thailand and probably neighbouring countries**



# Thailand Project # 1

- ▶ **NAME & TYPE** (Library construction, Metabarcoding):
- ▶ **Project Lead:** Buntika Butcher
- ▶ **Collaborators:** Donald Quicke, Head of 6 National parks in Thailand
- ▶ **STATUS (UNDERWAY/PLANNED):** underway, Thailand Research Fund
- ▶ **TARGET TAXONOMIC GROUP(s):** parasitoid wasps and caterpillars
- ▶ **BRIEF DESCRIPTION OF GOALS:** If library construction indicate the number of target species and specimens.
- ▶ *Relationships between caterpillar host and its parasitoid will be studied*
- ▶ *Molecular food webs of the three trophic level would be constructed based on the information gather from this study*

## Permit to collect wasps in six National Parks in Thailand

- 
- ▶ Doi Phu Kha NP, Nan Province
  - ▶ Pha Deang NP, Chiang Mai Province
  - ▶ Doi Pha Hom Pok NP, Chiang Mai Province
  - ▶ Khao Yai NP, Nakorn Ratchasima Province
  - ▶ Pang Si Da NP, Sra Kaew Province
  - ▶ Phu Toei, Suphan Buri Province

# Doi Phu Kha National Park, Nan Province

11-14 / 9 / 2018



# Doi Phu Kha National Park, Nan Province

11-14 / 9 / 2018



# Doi Phu Kha National Park, Nan Province

11-14 / 9 / 2018



# Thailand SWOT Analysis

- ▶ **STRENGTHS:** Understudied, highly diverse groups of animals & plants
- ▶ **WEAKNESSES:** too many processes, some processes could take time, too many documents to be submitted
- ▶ **THREATS:** diplomatic
- ▶ **OPPORTUNITIES:** Recruit more members from other universities

SWOT analysis to identify strengths, weaknesses, opportunities, and threats to your nation's participation in iBOL-II. If appropriate, consider the prospect of recruiting additional Nations as Associate Members under opportunities.

Thank you!



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# Node Report - United Kingdom

Scientific Steering Committee, October 13 & 14, 2018





SSC Delegate  
Pete Hollingsworth  
United  
Kingdom

- ▶ POSITION: Deputy Keeper and Director of Science
- ▶ HOME INSTITUTION: Royal Botanic Garden Edinburgh
- ▶ KEY TAXONOMIC INTERESTS: Plants
- ▶ GEOGRAPHIC FOCUS: UK, China, Patagonia, New Caledonia
- ▶ PRIOR BARCODE INVOLVEMENTS: CBOL/IBOL Plant Working Groups, IBOL Scientific Steering Committee

# United Kingdom Barcodes on BOLD

## Barcode Count

- 31,302 Sequences
- 5,802 Named Species
- 3,662 BINs

## Species Coverage

- Plants (1,864 species)
- Vertebrates (217 species)
- Arthropods (2,874 species)
- Other Inverts (216 species)

## BIN coverage

- Vertebrates (217 BINs)
- Arthropods (3,010 BINs)
- Other Inverts (295 BINs)

# United Kingdom Project # 1

- ▶ **NAME & TYPE (Techniques):** Developing the protocol infra-structure for DNA sequencing-on-demand
- ▶ **Project Lead:** Michelle Hart
- ▶ **Collaborators:** Botanic Garden Meise, Royal Belgian Institute of Natural Sciences/Royal Museum for Central Africa, Museum für Naturkunde Berlin, GGBN
- ▶ **STATUS:** Funded as part of Synthesys+
- ▶ **TARGET TAXONOMIC GROUP(s):** Plants and Animals
- ▶ **BRIEF DESCRIPTION OF GOALS:** Enhance work flows and laboratory capacity for routinely recovering DNA sequence data from preserved natural history collections



# United Kingdom Project # 2



- ▶ **NAME & TYPE** (Library construction, Metabarcoding): **PollerGEN**
  - ▶ Aerial environmental sampling
  - ▶ rbcL and ITS barcoding
- ▶ **Project Lead:** Simon Creer
- ▶ **Collaborators:** Georgina L Brennan, Caitlin Potter, Natasha de Vere, Gareth W Griffith, Carsten A Skjoth, Nicholas J Osborne, Benedict W Wheeler, Rachel N McInnes, Yolanda Clewlow, Adam Barber, Helen M Hanlon, Matthew Hegarty, Alexander Kurganskiy, Francis M Rowney.
- ▶ **STATUS:** Underway and funded by a NERC standard Grant.
- ▶ **TARGET TAXONOMIC GROUP(s):** Targeting airborne grass pollen (Poaceae). Taxonomic assignment at the genus and in some cases species level.
- ▶ **BRIEF DESCRIPTION OF GOALS:** Improving identification of airborne grass pollen grains by metabarcoding to improve pollen forecasting to help prevent allergy and asthma attacks.



# United Kingdom Project # 3

- ▶ **NAME & TYPE** (Library construction and Metabarcoding):  
Diet analysis of giant panda
- ▶ **Project Lead:** Pete Hollingsworth / Linda Neaves
- ▶ **Collaborators:** Kunming Institute of Botany, Royal Zoological Society of Scotland, China Centre for Research and Conservation of Giant Panda
- ▶ **STATUS:** Leverhulme Funded
- ▶ **TARGET TAXONOMIC GROUP(s):** Plants (mainly bamboo)
- ▶ **BRIEF DESCRIPTION OF GOALS:** One of a series of plant-animal interaction projects - identifying plants to enhance knowledge of animal ecology



# United Kingdom Project # 4

- ▶ **NAME & TYPE** (Library construction, Metabarcoding): Genome sequencing the British Flora
- ▶ **Project Lead:** Pete Hollingsworth (RBGE)
- ▶ **Collaborators:** Twyford, Blaxter (UoEdinburgh), Leitch, Kersey (Kew)
- ▶ **STATUS (UNDERWAY/PLANNED):** Planned (round two large NERC grant)
- ▶ **TARGET TAXONOMIC GROUP(s):** 1400 British native flowering plants + 100 most important invasive non-native species
- ▶ **BRIEF DESCRIPTION OF GOALS:** Logistics /workflows / pipelines; examination of nature of species differences in nuclear genome to inform nuclear barcode design; diversity analysis in context of e.g. breeding system, hybridisation, ploidy, environment, rarity etc

# United Kingdom SWOT Analysis

## ▶ STRENGTHS:

- ▶ Extensive collections and growing appetite for collections sequencing
- ▶ Strong interest in barcode applications
- ▶ Some individually excellent genomics/evolutionary biology research groups
- ▶ Extremely well characterized biota for linking sequence data to records, natural history observations and environmental data
- ▶ UK Flora barcoding complete to support application studies

## ▶ WEAKNESSES: Some resistance to investing in barcode library construction in the form of infrastructure projects (more interest in biodiversity genomics with deeper coverage)

## ▶ THREATS: The 'B word' and implications for general science funding;

## ▶ OPPORTUNITIES:

- ▶ Collection mining
- ▶ Linking barcoding to societal challenges via the Global Challenge Research fund and other emerging bilateral research funding opportunities
- ▶ Biodiversity genome sequencing

Thank you!





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# Node Report - United States

Scientific Steering Committee, October 13 & 14, 2018

# SSC Delegate United States

- ▶ POSITION: Scott Miller
- ▶ HOME INSTITUTION: Smithsonian Institution
- ▶ KEY TAXONOMIC INTERESTS: Insects esp. moths
- ▶ GEOGRAPHIC FOCUS: North America, Africa, New Guinea
- ▶ PRIOR BARCODE INVOLVEMENTS: CBOL, iBOL

# United States Barcodes on BOLD

## Barcode Count

- 491,790 Sequences
- 44,781 Named Species
- 57,268 BINs

## Species Coverage

- Plants (7,188 species)
- Vertebrates (3,947 species)
- Arthropods (29,144 species)
- Other Inverts (2,590 species)

## BIN coverage

- Vertebrates (4,145 BINs)
- Arthropods (48,150 BINs)
- Other Inverts (4,239 BINs)

# United States has no Barcode Network

- ▶ **Diverse community**
- ▶ **Diverse organizational landscape**
- ▶ **Diverse projects**
- ▶ **Barcoding increasingly integrated into ecological projects**
- ▶ **Barcoding has some use by regulatory agencies, e.g., Food and Drug Administration “Regulatory Fish Encyclopedia”**

# United States Project # 1

- ▶ **NAME & TYPE:** North American Lepidoptera species library
- ▶ **Collaborators:** Smithsonian, USDA, Agriculture Canada, Guelph
- ▶ **STATUS:** 80% of 12,763 known species completed; 92% of 2504 genera completed
- ▶ **BRIEF DESCRIPTION OF GOALS:** Reference library of Lepidoptera species of USA and Canada from museum specimens, especially published vouchers, and including new taxa. “First pass” of harvesting complete, but many microleps awaiting NGS sequencing.

# United States Project # 2

- ▶ **NAME & TYPE:** Global arthropod genera reference library
- ▶ **Collaborators:** Smithsonian, USDA, Guelph
- ▶ **BRIEF DESCRIPTION OF GOALS:** GGI-funded project to fill gaps in generic coverage of genera in BOLD and GenBank. Harvesting progress to date (sequencing is ongoing):
  - ▶ Lepidoptera      1252 genera (not including North American project)
  - ▶ Diptera            837 genera
  - ▶ Coleoptera        744 genera
  - ▶ Hymenoptera     144 genera
  - ▶ Aquatic orders    166 genera
  - ▶ Neuropteroids    49 genera

\*representing 90 countries

# United States Project # 3

- ▶ **NAME & TYPE:** Smithsonian Institution Barcode Network
- ▶ **STATUS:** Internal funding for Smithsonian staff (statistics do not include other sources)
- ▶ **TARGET TAXONOMIC GROUP(s):** All
- ▶ **BRIEF DESCRIPTION OF GOALS:**
  - Leverage the world-class SI collections to strengthen and broaden the publicly available DNA barcode reference library with high-priority taxonomic groups;
  - Illuminate the collections and make them more visible and accessible to international researchers and the general public;
  - Publishing high quality BARCODE records with strong connections to specimen data.

*Records Published to Date: 27,000*

*Records pending publication: 26,000*

# United States SWOT Analysis

- ▶ **STRENGTHS:** Diverse community
- ▶ **WEAKNESSES:** Diverse community
- ▶ **THREATS:** Limited funding for library building. Many existing sequences not public yet (issues include manuscript preparation, confirming identifications, permit issues, unclear data ownership, changing priorities)
- ▶ **OPPORTUNITIES:** Increasing use in ecological research

SWOT analysis to identify strengths, weaknesses, opportunities, and threats to your nation's participation in iBOL-II. If appropriate, consider the prospect of recruiting additional Nations as Associate Members under opportunities.



Thank you!

