

Meeting Report

DNA Barcoding in South and Central America

19-20th March 2007, Campinas, SP – Brazil

Summary

On 19-20 March 2007, 50 representatives from 13 South and Central American countries attended a regional meeting in Campinas, Brazil on DNA Barcoding. Participants included researchers, government officials from environmental and scientific boards, project managers, funding agency representatives, policymakers and NGO representatives. The meeting was co-organized by the Consortium for the Barcode of Life, an international initiative hosted by the Smithsonian Institution in Washington, and BioNET-INTERNATIONAL, an international not-for-profit organization that promotes taxonomy in developing countries. Representatives from CBOL provided presentations on DNA barcoding, including its application as a research tool and as a technology that can be used by government agencies and others to address applied socioeconomic challenges. Participants then discussed the region's technical and human capacity to conduct barcoding projects, including but not limited to institutional capacity for molecular research, DNA sequencing, vouchers and maintaining reference specimens in appropriate biological collections, and large-scale data management and data sharing on a regional and global scale. The final portion of the meeting was devoted to a discussion of which potential barcoding projects would address the region's greatest needs and opportunities. Five regional projects were identified as the highest priorities:

- (1) International trade in tropical hardwood timber species is of significant economic importance, and sustainable development of this industry will require regulation based on accurate species identification, especially of processed products.
- (2) The commercial fishing of South American species is regulated by national agencies and monitored internationally. Reliable species identification is essential to the fair enforcement of these regulations and to sustainable fisheries.
- (3) Many amphibian and reptile species in the region are endangered by habitat loss and illegal trade as pets and derived materials such as clothing. Long-term conservation and the enforcement of trade regulations require accurate means of species identification using biomaterial in processed form.
- (4) South and Central America have many rare and endemic mammalian species. Barcoding should be incorporated into ongoing biodiversity inventory efforts so that species can be identified and managed using object DNA data.
- (5) A number of agriculture-related projects could produce significant impact for farmers and the region's economy and environmental health. These could include identification systems for the content of livestock feed, agricultural pests, crop species, and food products that are subject to fraudulent labeling.

Background

“DNA barcoding” is a technique that uses a short, standardized DNA sequence as a diagnostic tool for identifying biological species. The technique was proposed in 2003 and since that time a global Barcode of Life Initiative (BOLI; see www.dnabarcoding.org) has gained momentum. Researchers have been testing the approach on a variety of plant and animal groups and are confirming its utility as a way to identify specimens. Barcoding is gathering support as a global standard that can be used for basic research and to applied problems such as the control of agricultural pests and invasive species and the protection of endangered species. In 2004, the Consortium for the Barcode of Life (CBOL; see www.barcoding.si.edu) was created with support from the Alfred P. Sloan Foundation. CBOL’s Secretariat Office was established in the Smithsonian Institution in Washington, DC, with the mission of promoting DNA barcoding. CBOL has grown into a global initiative with more than 150 Member Organizations in 50 countries.

As part of its strategy to promote global participation in DNA barcoding worldwide, the Consortium for the Barcode of Life (CBOL; see www.barcoding.si.edu) has partnered with BioNET to hold a series of regional outreach meetings in developing countries. The objectives of these meeting are to:

- Clarify concepts and applications of barcoding;
- Raise awareness as to the uses of DNA barcoding among researchers, research organizations, and potential users;
- Raise awareness to the pitfalls of barcoding, focusing on the responsible application of the technique;
- Explore the potential applications of DNA barcoding to environmental challenges facing countries in South America;
- Clarifying funding opportunities to participate in barcoding thrusts.

In addition, part of the workshop was directed to:

- Assess the greatest needs and opportunities for DNA barcoding in the region. Some emphasis was placed on promoting barcoding in the least developed countries;
- Initiate the formation of a steering committee for barcoding with the intent that this committee will draw up an action plan for South America, and establish an intra-regional network and intercontinental partnerships to implement the action plan.

The first two regional barcode meetings were held in:

- Cape Town, South Africa, in April 2006 for countries in southern Africa; and
- Nairobi, Kenya, in October 2006 for countries of eastern Africa.

A third regional barcode meeting was held at the Royal Palm Tower Hotel, Campinas, Brazil and was directed at the Latin American countries (see Meeting Announcement, Appendix 1). The meeting was attended by 50 representatives of 13 countries in South and Central America and (see participant list, Appendix 2 and group photograph, Appendix 3). The meeting was co-hosted by the following institutions: Consortium of Barcode of Life (CBOL), BioNET-ANDINONET, Instituto Nacional de Pesquisas da Amazônia (INPA), Centro de Biologia Molecular e Engenharia Genética/Universidade Estadual de Campinas (CBMEG/Unicamp) and University of São Paulo (USP). Fifty six delegates from 17 countries were present (Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Ecuador, Mexico, Panama, Paraguay, Peru, United States, United Kingdom, Uruguay, Suriname and Venezuela).

Acknowledgements

The South American Barcode meeting was made possible by financial support from the

following institutions: CBOL; BioNET; Inter American Biodiversity Information Network (IABIN); Brazilian Ministry of Science and Technology through the Brazilian Research Program on Biodiversity (PPBio); and the Brazilian Society for the Progress of Science (SBPC). Substantial in-kind support was provided by INPA, UNICAMP/CBMEG, USP and CBOL.

Structure and content of the meeting

The meeting was divided into two major segments (see Meeting Agenda, Appendix 4). On the first day, presenters provided background information on DNA barcoding with the goal of providing participants with an informational base about barcoding and its history, scientific foundation, and potential uses. Presenters also introduced CBOL and its activities, and different models of barcoding networks and projects that have already been implemented. On the second day the audience was divided into break-out groups to discuss three different components of barcoding:

- 1) Biological collections and taxonomy in the region;
- 2) Capacity in molecular techniques in the region, and
- 3) Information access issues in the region.

Each group had a moderator and rapporteur, and addressed primarily, but not exclusively, the following questions related to their respective subject areas:

- What capacity, technology and technical abilities exist in the region? And what are the gaps?
- What general opportunities and resources are available in the region for capacity building, institutions, infrastructure, trained human resources, collaborative ventures, funding, etc. How best can we tap these opportunities?
- What networks exist in the region, and what are their strengths, weaknesses and potential?
- How can we strengthen and utilize these networks optimally?
- What are the bottlenecks on material, data and information sharing in the region?
- How best can the bottlenecks be addressed?

The groups met separately for four hours and then participants returned to plenary session to hear the rapporteurs summarize the results of the three discussions. These results are summarized below, and more complete reports of those discussions are presented in Appendices 5-7.

In the final session of the meeting, participants analyzed the general findings of the three groups and how they affect potential implementation of barcoding in the region. Participants then discussed potential barcoding projects that would have the greatest beneficial impact on the region. Five possible projects were identified and supported by the meeting participants.

Break-out group reports

Participants in the meeting selected a discussion group that was closest to their interests and attended that meeting. Some participants attended parts of several discussion groups because of their interest in more than one topic. Detailed notes on each of the three discussions are presented in Appendices 5-7.

Group 1: Biological collections and taxonomy in the region. Participants concluded that systematic collections were unevenly distributed among countries, and this uneven distribution is even more pronounced for frozen tissue collections. The greatest needs are for fieldwork to expand collection holdings, and for technical assistance and training to improve curatorial procedures and to implement molecular techniques in the region. In those countries

that have the strongest infrastructures, the greatest need is to increase cooperation and collaboration between taxonomic networks and barcoding projects.

Group 2: Capacity in molecular techniques in the region. Participants in this discussion group performed an informal survey of the facilities and capabilities in the region for DNA barcoding. There is extreme range from well-equipped countries to countries with almost no capacity for molecular techniques. Barcoding capabilities in some countries are concentrated in core research facilities and is distributed across networks of smaller labs in others. The strengths and weaknesses of these competing configurations were discussed. Participants agreed on the value of having “Leading Labs” in the region that could offer the benefits of both core facilities and distributed networks. In particular, Leading Labs were seen as a way to connect smaller labs in the region to the international barcoding community, while supporting the needs in the region for training and access to lab facilities. The group compiled a list of the institutions in the region that could host Leading Labs or could belong to networks connected to Leading Labs.

Group 3: Information access issues in the region. Information infrastructure, like taxonomic collections and lab facilities, are unevenly distributed across the region. There are countries and regions within countries with advanced IT infrastructure, knowledgeable specialists, and good internet access. Regional initiatives such as IABIN and BioNET/AndionoNET are important mechanisms for strengthening the region’s informatics capabilities. The Clara Network is an important asset to the region but it is not available everywhere. The discussion group assembled an inventory of the national and regional IT networks that already exist in South and Central America. The Encyclopedia of Life was discussed and participants agreed that it represents an important opportunity to improve the biodiversity information about the region and to make this information accessible. Barcoding projects and the Encyclopedia of Life could be very effective ways for the region to justify increased investment in its information infrastructure, including the Clara Network. Participants stressed the need for better communication between IT networks and barcoding projects, and between government officials and biodiversity research initiatives. The group called on CBOL to assemble information resources to explain barcoding to government officials.

Meeting results and next steps

The final session of the meeting was devoted to the identification of potential barcoding projects. Participants assembled a long list of projects that would be of interest to taxonomic researchers. However, the preceding discussion groups had summarized the current situation in various Latin American countries and the lack of technical capabilities that exist in many places. For this reason, participants narrowed the list of potential barcoding projects to those that would:

- Serve an important societal need;
- Attract support from an identified sponsor;
- Be coordinated by an identified “champion”; and
- Produce results in a reasonably short period of time (1-2 years), so that future barcoding projects could point to their success.

The following potential barcoding projects were identified as the highest priorities:

Proposed Project	Potential sponsors	Leading Researchers
Commercially important fish of	Fisheries, Governments,	José Alves Gomes

South America	Regulating Agencies	
South American mammals	Conservation, health agencies, customs, agric, S&T and envir. agencies	Eduardo Eizirik
Baseline biodiversity of the regional herpetofauna	Biodiversity, envir agencies, CITES, customs	Marco Altamirano Benavides
Commercial hardwood species	Producers, CITES, ITTO, foresters, tropical ecologists, sustainable devel., envir agencies	Santiago Madrinan, Chiquita Resomardono, Carolin Chin, Esperanza Torres
Agrifood ID, international trade, food safety (farm products, livestock, feed)	Risk management/ quarantine agencies, certification, producers, exporters	Fabian Capdeville

Appendix 1 – Announcement

Second Circular for the South American Regional Meeting DNA Barcoding in South America 19- 20 March 2007, The Royal Palm Plaza, Campinas, SP - Brazil

NOTICE:

The Consortium for the Barcode of Life (CBOL) is promoting an international meeting in South America to discuss the potential uses of “DNA barcoding” in the several areas related to Biodiversity in the Neo-tropical region. The meeting is co-sponsored by BioNET INTERNATIONAL, the Brazilian Ministry for Science and Technology (MCT/PPBio), the Brazilian Society for Progress of Science (SBPC), and the Inter-American Biodiversity Information Network (IABIN). This international meeting will be a unique opportunity for surveying the DNA technology capacities of South American countries, and will serve to determine the different needs and bottlenecks faced by each of the participant institutions. The experiences of each institution will be shared through open discussions and will strengthen the South-South collaborative initiatives in DNA sequencing, biological collections, and database management.

VENUE:

The meeting will take place at The Royal Palm Tower, located at St. Boaventura do Amaral, 1274, Campinas, SP, Brazil. Please see www.theroyal.com.br (look for “The Royal Palm Tower” link).

PROGRAMME OUTLINE:

18th March 2007 (Sunday): Arrival at The Royal Palm Tower.

19th March 2007 (Monday): CBOL workshop – Draft program to come

20th March 2007 (Tuesday): CBOL workshop – Draft program to come

FUNDING:

Funding for this meeting is being provided by CBOL, BioNET, SBPC, by the Brazilian Research Program for Biodiversity (PPBio) from the Brazilian Ministry of Science and Technology (MCT), and the Inter-American Biodiversity Information Network (IABIN).

VISA ARRANGEMENTS:

Brazil maintains different diplomatic arrangements with several Latin American countries regarding visa requirements. Therefore, we ask that each participant arrange for his/her own visa. Please inquire through a local travel agent or the Brazilian Embassy for compliance with applicable regulations. Please use the invitation letter (attached) to facilitate your visa application. American and Canadian citizens will need to obtain a business visa to travel to Brazil. In case of any problem, contact Cristina João (cristina@unicamp.br) for further assistance or consult www.braziltour.com

TRAVEL ARRANGEMENTS:

The costs for hotel and meals in Sao Paulo during the meeting will be completely covered by the sponsors and will be paid directly to the hotel. The organizers will also be covering air travel expenses for those participants without access to other travel support. In order to expedite our logistical support, we kindly ask that you inform us about your attendance and preferred dates and times of travel by February 20th.

ACCOMMODATIONS:

Accommodation arrangements were made at the same hotel where the meeting will be held (The Royal Palm Tower) and at “The Royal Palm Residence” (located adjacent to the Royal Palm Tower). All delegates are invited to stay there during the meeting (on the nights of 18th through 20th of March) and reservations will be made and covered by the organizers. Conditions of accommodation are

negotiated and will apply for the period of the meeting. The cost of accommodation will include breakfast, lunch and dinner. More details about the hotel can be found at: www.theroyal.com.br (click on “The Royal Pam Tower” link).

MEALS:

Breakfast: Served at the hotel (please, take your breakfast at the hotel you are staying)

Lunch: Served at same hotel (The Royal Palm Tower) for all the invitees (meal coupons will be provided in conference packages)

Dinner: Served at the same hotel (The Royal Palm Tower) for all the invitees (meal coupons will be provided in conference packages)

- PLEASE NOTE that drinks are not included in the package

INTERNET:

The Royal Pam Tower has cable internet. The participants can take their personal computers and pay an additional fee at the hotel reception for using it in the room. The hotel also has a business center, where participants have access to the internet. The conference room will have several connectors, but not everybody will be able to use their personal computers during the meeting.

TRANSFER FROM THE SÃO PAULO INTERNATIONAL AIRPORT TO THE HOTEL:

Please plan on taking the Caprioli shuttle bus from Guarulhos International Airport in Sao Paulo to Campinas. The bus leaves from Terminal 2, ASA C, next to the storage lockers (please check for Viação

Caprioli booth outside the airport). The first bus leaves at 7:30 am and buses leave every hour and a half until 1:15 am. The bus will arrive in Campinas at Largo do Pará: Avenue Francisco Glicerio, n°431 in the

Caprioli bus station. The organizers will have a sign and a person to help you to take a taxi to the hotel (a few minutes away). The cost of the bus is about US\$14.00 (reimbursable, please keep receipt) and the length of the trip is an hour and forty five minutes. If you have any questions please contact Cristina Joao (cristina@unicamp.br).

The meeting organizers will arrange for transfers from the airport to the hotel. In order to make these arrangements, please provide your travel information (flight numbers, expected arrival and departure time in Sao Paulo) as soon as they are available. Please send this information to Cristina Joao (cristina@unicamp.br)

WEATHER:

Campinas has mild weather during this time of the year, with day temperatures above the 20s (Centigrade), with colder nights between 15-20 °C. Rain is unlikely to occur.

Yours Sincerely

José A. Alves Gomes, on the behalf of the Organizing Committee.

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Appendix 2 – Participants List

Country	Name	Institution	E-mail
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		National Herbarium of Suriname (BBS)	
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Appendix 3 – Group photo



Appendix 4 – Meeting Agenda



**PRELIMINARY PROGRAMME FOR
DNA BARCODING IN SOUTH AMERICA
19th – 20th March 2007:
The Royal Palm Tower, Campinas – Sp - Brazil**

SUNDAY 18TH MARCH 2007

Arrivals: after 3:00 pm

Dinner: 7:00 pm

MONDAY 19TH MARCH 2007

Breakfast: 6:00 – 8:00 am

Registration: 8:30 – 09:00 am

Session I: DNA Barcode and CBOL: history and perspectives (at The Royal Palm Tower)

Chair: José Alves Gomes, Instituto Nacional de Pesquisas da Amazônia, Brazil

- 9:00 am: Communication from the Chair and self introductions
- 9:30 am: What is DNA barcoding and what is it not?
Bob Hanner, Univ. of Guelph, Canada
- 9:50 am: The Consortium for Barcode of Life: Overview and its relation to other biodiversity initiatives
David Schindel – CBOL Executive Secretary, USA
- 10:30 am: Coffee break

Session II: DNA Barcoding: initiatives and potential applications

Chair: Cristina Miyaki, USP, Brazil

- 11:00 am: The MCT's Research Program on Biodiversity (PPBio)
Célio Magalhães – INPA/PPBio, Brazil
- 11:20 am: The process of DNA Barcoding and management of barcode data.
Bob Hanner – University of Guelph, Canada
- 11:40 am: Biodiversity Conservation and taxonomic application.
Eduardo Eizirik – PUC-RS, Brazil
- 12:00 am: All Birds Initiative
Pablo Tubaro – Museo Argentino de Ciencias Naturales
- 12:20 pm: **Discussions**
- 1:00 – 2:20 pm: Lunch at Contemporaneo Restaurant (The Royal Palm Tower)

Session III: DNA Barcoding: initiatives and applications (cont.)

Chair: Pablo Tubaro, Museo Argentino de Ciencias Naturales, Argentina.

- 2:20 pm: Tephritid Barcode Initiative
Bruce McPherson - Pennsylvania Agricultural Experiment Station
- 2:40 pm: FISHBOL
Bob Hanner – University of Guelph, Canada
- 3:00 pm: Establishing a DNA Barcode for Land Plants
Santiago Madriñan – Un. de los Andes, Colombia
- 3:20 pm: DNA Barcoding and Amazonian Fish Biodiversity: the case of electric fish.
José A. Alves Gomes – Instituto Nacional de Pesquisas da Amazônia
- 3:40 pm: Coffee Break

Session IV: DNA Barcoding and Networking

Chair: Esperanza Torres, Colombia

- 4:10 pm: Inter-American Biodiversity Information Network
Ivan Valdespino, Director of IABIN
- 4:30 pm: Taxonomy at a Crossroads: Science, Publics and Policy in Biodiversity
Claire Waterson, Lancaster University, UK
- 4:50 pm: DNA Barcode and Networks in South America
Clavijo Michelangeli - Andinonet, Venezuela
- 5:10 pm: CBOL's Working Groups: latest advances and future perspectives

David Schindel – CBOL Secretariat, USA

- 5:30 pm: Discussions
- 6:10 pm: End of session
- 7:00 pm : Dinner (at Matisse Restaurant, at The Royal Palm Residence)

TUESDAY 20TH MARCH 2007

Breakfast: 06:00 – 8:00 am

Session I: Group Break-Out

Chair: Ana Azeredo Espin – Unicamp, Brazil.

- 8:30 am: **Overview of day I: David Schindel**
- 8:45 am: Briefing on group breakouts by the Session Chair
- 9:00 am: **Breakout sessions organized according to thematic areas:**
 - Group 1: Biological collections and taxonomy in the region**
Moderator: **Roberto Melendez** – MNHN, Chile
Rapporteur: **Cristina Miyaky** – USP, Brazil
 - Group 2: Capacity in Molecular Techniques in the Region**
Moderator: **Cassio van der Berg** – U. Federal de Feira de Santana, Brazil
Rapporteur: **Mauricio Linares** – Un. de Los Andes, Colombia
 - Group 3: Information Access Issues in the Region**
Moderator: **Vanderley Canhos** – CRIA, Brazil
Rapporteur: **Jorge Luis Perez Eman** – Un. Central, Venezuela

Topics for discussion in breakout groups.

Each group will address issues given below under their specific thematic areas:

- a) i) What capacity, technology and technical abilities exist in the region? And what are the gaps?
ii) What general opportunities are available in the region? (Capacity building, institutions, infrastructure, trained human resources, collaborative ventures, funding, etc.) And how best can we tap these opportunities?
 - b) i) What networks exist in the region (strengths, weaknesses and possibilities)?
ii) How can we strengthen and utilize these networks optimally?
 - c) What are the bottlenecks on material, data and information sharing in the region?
How best can the bottlenecks be addressed?
- 10:30 am: Coffee break
 - 11:00 am – 1:00 pm: Breakout group discussions continue
 - 1:00 pm – 2:00 pm: Lunch at Contemporaneo Restaurant (The Royal Palm Tower)

Session II: Plenary Session

Session Chair: Esperanza Torres, Colombia

- 2:00 pm: Plenary Session
 - Report back from Group 1, 2 & 3**
 - Group 1:** Biological collections and general taxonomic issues in the region
 - Group 2:** Capacity in Molecular Techniques
 - Group 3:** Information Access

- 3:30 pm: Synthesis of DNA barcoding issues in the South America region

Moderator: Jorge Tezón – Argentina

Priorities and needs; Formation of regional networks; Synergy with other biodiversity initiatives (e.g. GTI, GBIF, BioNET/ Andinonet, etc.); Long and short-term goals

- 4:15 pm: Coffee/Tea break

Session III: Final discussions and next steps (plenary)

Moderator: David Schindel – CBOL Executive Secretary

Rapporteur: Atilano Contreras-Ramos – Mexico

- 4:45 pm: Tangible next steps for Barcode in South America
- 5:45 pm: Summary and closing remarks: – **David Schindel**

- 7:00 pm: Closing Dinner: at Contemporaneo Restaurant (The Royal Palm Tower)

WEDNESDAY 21TH MARCH 2007

Breakfast: 6:00 am – 10:00 am

Last departures to São Paulo: until 12:00 am

Appendix 5 – Notes from Group 1 Discussion Group

Biological collections and general taxonomic issues in the region

Moderator: **Roberto Melendez**, MNHN, Chile

Rapporteur: **Cristina Miyaki**, University of Sao Paolo, Brazil

Countries represented: Suriname (1), Brazil (7), Uruguay (1), Argentina (1), Costa Rica (1), Venezuela (2), Colombia (1), Mexico (1), Ecuador (1), Chile (1)

1. What capacity, technology and technical abilities exist in the region? And what are the gaps?

The capacity, technology and technical abilities are very heterogeneous in the region, especially concerning tissue collections. One country (Ecuador) is currently prohibited from having tissue collections at all. In many of the countries tissue collections are either non-existent or very limited. A few of the countries actually have large collections, some even belonging to a network. There are some countries that have the infrastructure to follow all the steps of a barcoding project domestically. Others can at least partially prepare the samples (PCR product), but some do not have the infrastructure to even do this. All of the countries undeniably need specific funding to do field work and barcoding.

The current needs are in general:

- 1) Expansion of collections (field trips) and their maintenance;
- 2) Set minimum standards for field samples: GPS, how to preserve, how to register, etc.;
- 3) Minimum necessary equipment to start a molecular lab in-country;
- 4) Short courses/workshops for scientists (taxonomists) and government representatives;
- 5) Training of students within the region; and
- 6) Integration of collections into already established networks.

The following is a summary of the collection capacity of the countries represented:

Argentina: there is a network of collections but very few tissue collections (marine fish & birds).

Brazil: there is a network of collections, some large herbariums, museum vouchers and DNA & tissue collections. Some have digitalized databases.

Chile has an herbarium and museum skins, and some small tissue collections.

Colombia has one large collection with tissues.

Costa Rica has various collections (plants, insect, fungi, vertebrates) but no tissue collections.

Ecuador has three large collections but is not allowed to have tissue collections.

Mexico has a network of many collections with tissues.

Suriname has an herbarium and museum skins but no tissue collections. All tissues representing local species are abroad in unknown locations.

Uruguay has one large mammal and fish collection with tissue and DNA, as well as collections of fungi, insects and plants.

Venezuela has three large invertebrate collections, one large herbarium, and one bird collection (Phelps).

2. What general opportunities are available in the region? And how best can we tap these opportunities?

There are some countries that have the capacity to do everything associated with a barcoding project: (Brazil, Uruguay, Mexico, Costa Rica, Chile. The last three countries need to convince molecular labs to join barcoding projects. Some countries have the capacity to partially prepare the samples at least: Argentina and Venezuela). Some countries do not have any infrastructure for barcoding processes: Suriname and Ecuador.

All countries in the region need specific funding to do field work and barcoding.

3. What networks exist in the region and how we can strengthen and utilize these networks optimally?

There are regional networks for biodiversity, conservation, information; (e.g., ANDINONET, IABIN), some countries do not even have internal networks.

4. What are the bottlenecks on material, data and information sharing in the region? How best can the bottlenecks be addressed?

Participants identified the following as the highest priorities:

- Collections need to be expanded through fieldwork
- Set minimum standards for field samples: GPS, how to preserve, how to register, etc.
- Set minimum necessary equipment to start a lab
- Promote short courses/workshops for scientists (taxonomists) and government representatives
- Promote training of students within the region
- Collections should be integrated into already established networks

Appendix 6 – Notes from Group 3 Discussion Group

Capacity in Molecular Techniques

Moderator: **Cassio van der Berg** – U. Federal de Feira de Santana, Brazil

Rapporteur: **Mauricio Linares** – Un. de Los Andes, Colombia

Participants in this discussion group compiled summary ratings and data for the countries represented at the meeting.

1. What is the region’s infrastructure capacity for conducting DNA barcoding and other molecular biology procedures?

For each country, participants rated the national capacity as high (H), medium (M), low (L), or non-existent (N). Where possible, the number of labs in a country capable of performing a procedure was estimated. Higher capacity labs are usually concentrated in single institutions. In certain cases (noted by *), the capacities are dedicated to specific goals.

	Ar	Br	Bo	Co	Ec	P	Sr	Uy	Vz
Sampling	M	H	H	M	L	M	M	M	H
Storage	H	H	M	H	L 3	M	L	M	L
Extraction	H	H	H	H	L 3	M 6	L	H	M
Amplification	M 10	H 50	H 1*	M 10	?	M 6	N	H 2 *	M 10
Sequencing	M 2*	H 10	N	M 3		N	N	H1*	L2*

Ar – Argentina; Br – Brazil; Bo – Bolivia; Co – Colombia; Ec – Ecuador; P – Paraguay; Sr – Suriname; Uy – Uruguay; Vz - Venezuela

There was general agreement that Sampling and Storage were high priorities for all centers. Extraction, PCR amplification and Sequencing capacity were priorities for only some national centers.

Other priorities are:

- Establishing standard protocols and training for feasible field sampling and preservation
- Providing incentives for sampling with the new protocols and for incorporating the new protocols into standard museum practices.
- Intensive training of researchers from “Leading Labs” in the region at the University of Guelph (supported by CBOL), followed by dissemination of the information in local courses (supported by CABBIO)
- Local training of researchers (PhD level or higher) in the region’s Leading Labs from other countries (supported by CONICET-Arg or CNPQ-Br and CAPES and FAPESP and COLCIENCIAS in Br and CONACYT, Vz)

Participants discussed the pros and cons of concentrating capabilities in centralized ‘core’ facilities versus distributing these capabilities among coordinated non-dedicated facilities.

Core facilities have several advantages:

- Focused training courses can be offered and can prepare more people
- Users are often concentrated around major facilities, increasing the number of people who have easy access to the facility
- Standardized procedures can be developed and implemented, thereby reducing errors
- Operating costs can be kept lower

Distributed and coordinated facilities have several advantages:

- Distributed facilities are accessible by people in different locations
- Specific grants are sometimes offered for coordinating infrastructure

Participants provided the following estimates for degree programs relevant to DNA barcoding in the countries represented.

Ph.D programs	Arg	Br	Bo	Co	Ec	P	Sr	Uy	Vz
PhD	17	35	-	5	-	3	-	2	7
Masters			3		9				
Bioinformatic	+	+							

2. Which institutions have the potential to become “Leading Barcode Labs” in the region?

Participants discussed the value of having “Leading Labs” in the region that could provide the following services:

- Providing access to lab facilities in which most of the barcoding procedures could be done
- Being connected to the international system of barcoding labs and disseminating information from overseas labs within the region
- Providing training in barcoding protocols
- Developing new barcoding protocols and implementing them at other institutions in the region

The following institutions were identified as being potential Leading Labs:

Argentina:

- Museo Nacional de Cs Naturales
- CENPAT
- Dto de Cs Biológicas Universidad de Mar del Plata
- Museo de Cs Naturales de la Plata
- INTA
- IBONE-CECOAL (plants)
- IBODA (plants)

Brasil:

- Instituto Nacional de Pesquisas da Amazonia (INPA), Manaus
- Museu Paraense Emilio Goeldi, Belem
- Universidade Federal do Parà, Campus Braganca
- Instituto de Botânica, Sao Paulo (Plants)
- Jardim Botânico do Rio de Janeiro (Plants)
- Universidade Estadual de Feira de Santana (Plants)
- CBMEG, Unicamp
- Universidade Federal de Minas Gerais, Belo Horizonte
- Faculdade de Biociencias, PUC, Porto Alegre
- Instituto de Biociencias, Universidade de Sao Paulo.
- EMBRAPA Recursos Genéticos e Biotecnología, Brasilia
- Universidade Catolica de Brasilia

- UNESP, Botucatu

Bolivia:

- Instituto de Biología Molecular UMSA
- PROIMPA

Chile:

- Un.Católica de Chile
- Un de Chile
- Museo Nac de Historia Natural
- Universidad de Concepción
- Unive Austral de Chile
- Univ Católica del Norte

Colombia:

- Dto de Cs Biològicas
- Universidad de los Andes
- Instituto de Cs Naturales y
- Laboratorio de Biología Molecular
- Universidad Nacional – varias sedes- several cities

Ecuador:

- Museo Ecuatoriano de Cs Naturales
- Dto de Biología Universidad Católica de Quito
- Grupo Planeta Azul Universidad de Guayaquil
- SENAIM-ESPOL

Peru:

- INIA laboratorio de Recursos Genéticos
- Instituto de Biotecnología Universidad Nacional Agraria La Molina

Venezuela:

- Instituto de Zoología Tropical
- Jardín Botánico
- Museo de Insectos de la UCV
- IVIC
- INIA

Uruguay:

- INIA
- Facultad de Ciencias

Appendix 7 – Notes from Group 3 Discussion Group

Information Access Issues in the Region

Group members:

Claudio Oliveira, Brazil (Moderator)	Fabian Caddevielle, Uruguay
Iván A. Valdespino, IABIN/PMA (Rapporteur)	Chiquita Margaret-Resomardono, Suriname
Vanderlei Canhos, Brazil	José Clavijo, Venezuela
Ana Claudia Lessinger, Brazil	Santiago Madriñan, Colombia

1. What capacity, technology and technical abilities exist in the region? And what are the gaps?

The region has a number of important assets and areas of capability in the IT area:

- There are capacities, technology and abilities in some countries (e.g., Brazil, Venezuela)
- Knowledgeable people (researchers, IT specialists)
- High internet access is available in some areas
- Clara Network to Improve connectivity in Latin-American Countries) / Internet 2
- There are local networks in place

There are, however, regional (Brazil), country (Suriname, Central America), and institutional asymmetries

- Lack of appropriate connectivity and infrastructure in some countries
- Some countries have yet to take advantage of Clara Network (e.g., Bolivia, Guiana, Suriname)
- Future development and sustainability of Clara Network will depend on the countries promoting this network for different applications. Barcoding can be one of these.

2. What general opportunities are available in the region? (capacity building, institutions, infrastructure, trained human resources, collaborative ventures, funding etc) And how best can we tap these opportunities?

The region could and should take advantage of and actively contribute to major global, unifying, biodiversity information initiatives that have the potential to validate its generation, management, and applications, as well as the need to devote resources to do so.

One such endeavor is the *Encyclopedia of Life* and the region should make this our centerpiece for action. We should recognize that barcode data and other data sources are components of species information and not the other way around. These areas contribute to the general goal of developing and distributing biodiversity information. Some possible activities in the region related to the Encyclopedia of Life are:

- Strengthening taxonomic capacities to solve the synonym problem to make the Encyclopedia of Life feasible. Names need to be validated. This is also a problem that will contribute to other initiatives, including the Barcode of Life Initiative;
- Taking advantage of current platforms / networks developed. Some of these are national e.g., SIB (Biodiversity Information System) in Colombia; subregional (AndinoNet), regional (IABIN), and global (GBIF);
- Building the network infrastructure for species information contained in those platforms to be integrated with DNA sequencing data. This could be a collaborative initiative with the aim of contributing to the Encyclopedia of Life. This is the kind of work that foundations

like Sloan Foundation would like to sponsor.

3. What general opportunities are available in the region? (capacity building, institutions, infrastructure, trained human resources, collaborative ventures, funding etc) And how best can we tap these opportunities?

- BioNet-AndinoNet, IABIN, and GBIF are working on biodiversity informatics capacity building. At this point, this has not included linking species information with DNA sequencing. This is an area where these networks can collaborate with CBOL. Complementary funds should be sought out to do this.
- There is a need for more professional scientists who are trained and work in countries where biodiversity occurs. Information about local biodiversity should be generated by local actors.
- In Sao Paulo and other Research Centers in Brazil, Biota program (three universities) and genome program have invested in research, acquisition of equipment and infrastructure develop which can be directed to conduct Barcoding work.
- In other countries like Uruguay there are also DNA sequencing research labs. Same thing can be said for example in Panama where we can take advantage of the labs in STRI. There are independent facilities that are working in DNA sequencing

4. What networks exist in the region (strengths, weaknesses and possibilities)?

There are several regional networks that can be tap into, including:

Global, regional, and subregional networks such as:

- IABIN
- GBIF
- ABIFF
- AndinoNet (BioNet)
- MesoameriNet (BioNet)
- CariNet (BioNet)
- SIAM (Mesoamerica)

National networks such as:

- SIB, Colombia
- Species Link in Brazil
- SIA-Amazonia in Peru
- Specialized
- Mesoamerican and Caribbean Herbarium Network
- National Reference Center for Arthropods

Institutional networks such as:

- Instituto von Humboldt has SIB but does not work on DNA barcoding)
- CRIA, Brazil works on information initiatives but doesn't work on barcoding)
- INBio, Costa Rica
- University of Suriname and National Institute for Environment and Development
- Instituto de Investigaciones Científicas e Instituto de Estudios Avanzados (IDEAS), Venezuela
- University of Panama /STRI

5. What are the strengths, weaknesses and possibilities of the networks that already exist in the region?

Participants thought the following were the principal strengths of the region's existing networks:

- Participative (mix of government or research sponsored initiatives or sponsored by both)
- Communication with base community
- Outreach / Training initiatives
- Relationship with government and ministries that would be involved in any barcoding project
- Technical capacities
- Manage large data sets

Weaknesses were considered to be:

- Not self sustaining
- Lack of networking in Guianas

Participants in the discussion group thought that one of the greatest areas of opportunity is South-South collaboration, especially for capacity building.

6. What are the bottlenecks on material, data and information sharing in the region? How best can the bottlenecks be addressed?

Networks do not talk to barcoders and vice versa. We need to build bridges between existing networks and barcoding projects and we need to communicate better.

There is a communication problem between government and researchers. Appropriate information should be produced for government officials about this new biodiversity related initiative, including the link between barcoding and bioinformatics networks, in order to elicit their support.

Funding

- Networking is something that can be funded at international level and in some cases locally
- Projects should be linked to society needs – directed to end users
- Basic research (barcoding) is more likely to be funded locally

Trained personnel. Projects and initiatives should include funds for capacity building and training of scientists.

Long-term maintenance of the data. We need to include data management in country and international policies. Long-term data management needs to be a stable budget item.