

MEMORANDUM OF UNDERSTANDING

BETWEEN: **INTERNATIONAL BARCODE OF LIFE Corporation** having its head office at 50 Stone Road East, Guelph, Ontario, N1G 2W1, CANADA

hereinafter called **iBOL**

AND: The Science Committee of the Republic of Armenia having its head office at 22 Orbeli Brothers Street, Yerevan, 0028, Republic of Armenia

hereinafter called **SC RA**

WHEREAS the International Barcode of Life (iBOL) is a Canadian not-for-profit corporation, having its head office at 50 Stone Road East, Guelph (Ontario), N1G 2W1;

WHEREAS the purpose of iBOL is to support the cooperation of an international network of scientists and funding agencies focused on (a) sample acquisition and expansion of the DNA barcode reference library for multicellular eukaryotes, (b) development of analytical technologies and bioinformatics resources for DNA barcoding, and (c) capacity building and knowledge transfer to stimulate global adoption of DNA barcoding;

WHEREAS **SC RA** is coordinating the involvement of Republic of Armenia as a National Node in iBOL by working with researchers involved in DNA barcoding and National Academy of Sciences as key organization, financed by the Science Committee of the RA involved in the discovery and protection of Armenian biodiversity.

WHEREAS the Parties wish to collaborate for the mutual benefit of their programs;

IN WITNESS WHEREOF, THE PARTIES AGREE AS FOLLOWS:

1. SCOPE

This document outlines the intended role of countries participating as National Nodes in iBOL.

2. BACKGROUND

DNA barcoding is a methodology for rapidly and accurately identifying species by sequencing a short segment of standardized gene regions and comparing individual sequences to a reference database. iBOL is a research alliance involving nations that have committed both human and financial resources to enable expansion of the global reference database, the development of informatics platforms, and/or the analytical protocols needed to use the reference library to inventory, assess, and describe biodiversity.

3. DEFINITIONS

3.1 iBOL

iBOL refers to the International Barcode of Life Corporation, its Board of Directors, its Secretariat, and its National Nodes.

3.2 National Node

A National Node is a network of researchers and organizations in a country that is engaged in DNA barcoding or in supporting such work as part of iBOL.

3.3 iBOL Core Facilities

An iBOL Core Facility is a laboratory or technology platform established by an iBOL National Node. This core facility provides the DNA barcoding research community with sequencing and/or informatics support.

4. UNDERTAKING

The Parties will, subject to future funding commitments, maintain **SC RA** as a National Node within iBOL, following the "*Conditions for Participation – iBOL Consortium*", as described in Appendix I, and will participate in iBOL's research programs.

5. ORGANIZATION OF COOPERATION

SC RA on the recommendation of the RA National Academy of Sciences will designate an individual who will join iBOL's Scientific Steering Committee (SSC). Members of the SSC meet annually to share information on the accomplishments of each Node. The SSC meeting aligns every second year with the International Barcode of Life Conference. In the other year, it occurs at a site decided by the SSC members.

6. PRESS RELEASE

The Parties will jointly decide whether or not to issue any press releases and other forms of publicity covering this MoU or the activities associated with it, but this provision will not limit public disclosure legally required of any of the Parties individually.

7. EFFECTIVE DATE

This MoU has an Effective Date when both Parties have executed this agreement.

8. TERM

The term of this MoU shall commence on the Effective Date and shall continue in effect until December 31, 2025 so long as **iBOL-SC-RA** is compliant with the conditions of membership (Appendix 1).

Either party to this MoU may terminate the present agreement with prior notice of ninety (90) days.

9. LIABILITY

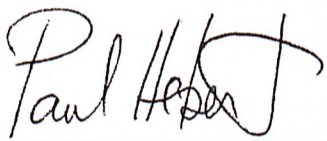
This MoU does not create any liability between the parties nor any binding or legal partnership or association, and each party remains a legally independent party. Neither party shall be liable for any act of the other party.

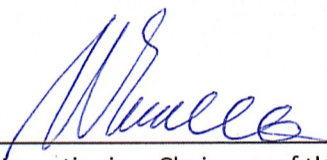
10. EXECUTION

CONSEQUENTLY, THE PARTIES HAVE EXECUTED THE PRESENT MoU ON THE RESPECTIVE DATES MENTIONED BELOW.

INTERNATIONAL BARCODE OF LIFE CORPORATION

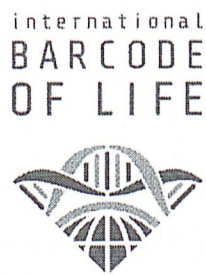
SCIENCE COMMITTEE OF THE REPUBLIC OF ARMENIA

Per: 
Paul Hebert, Chair of the Board

Per: 
Samvel Haroutiunian, Chairman of the RA Science Committee

Date: July 3, 2019

Date: July 9, 2019



APPENDIX 1: CONDITIONS FOR PARTICIPATION – iBOL CONSORTIUM

RATIONALE

Globalization of trade, climate change, and calls for biodiversity conservation make rapid species identifications a worldwide need. DNA barcoding is a powerful addition to traditional approaches; identifications can be automated and analysis can extend to all life stages, to fragments of organisms, and to DNA molecules recovered from the environment.

BACKGROUND

DNA barcoding, the analysis of patterns of sequence diversity in short, standardized gene regions, allows specimens to be assigned to known or new species. Because of their digital format, DNA barcode libraries allow the automation of specimen identification and species discovery. This automation is massively improving our ability to understand, monitor, and manage biodiversity with major scientific, forensic, and economic benefits. Because the development of a DNA barcode reference library for all species is both prohibitively expensive and logistically challenging for any nation, the advantages of creating an international partnership to assemble this resource were clear from the outset. In response, leaders of the biodiversity science community activated the International Barcode of Life (iBOL) consortium.

GOVERNANCE

iBOL was established in 2008 as a Canadian not-for-profit corporation. Throughout its first seven years, iBOL's Board of Directors was composed of representatives from funding agencies involved in supporting the consortium. To strengthen its connection with the organizations best positioned to enable the research, iBOL's Board was subsequently restructured so it is now comprised of senior representatives from major research organizations with involvements in biodiversity science. iBOL's Board functions in a strategic capacity, reviewing research progress, and providing suggestions on how to accelerate it. In addition, a Scientific Steering Committee (SSC) comprised of one researcher from each participating nation aids the design and implementation of research activities. Although the SSC is primarily focused on coordinating research activities, it is also responsible for oversight of the International Barcode of Life conferences. Both the Board and the SSC meet annually.

BARCODE 500K (2010–2016)

Researchers from 25 nations activated the iBOL Consortium in 2010 to oversee projects that would advance the development and application of DNA-based identification systems for multicellular eukaryotes. The Consortium's first project, BARCODE 500K, delivered DNA barcodes for 500,000 species. It also developed the informatics tools and the analytical protocols needed for DNA barcoding to emerge as a vital component of the global biosciences infrastructure. To permit this progress, nations involved in iBOL raised >\$100 million from grant councils, government agencies, philanthropists, and the private sector. Most of these funds were expended within their source nation to support contributions to the project, but overall progress benefitted greatly from \$50

million provided by Canadian agencies to establish a core facility that provided essential sequencing and informatics support to the iBOL community.

BIOSCAN (2019–2025)

Since completion of BARCODE 500K, discussions have made clear the need for iBOL to sustain its scientific mission. In response, the iBOL Consortium will activate its second project, BIOSCAN, in 2019. It has six goals:

- 1) Employ high-throughput sequencing (HTS) to extend parameterization of the DNA barcode reference library to two million species by 2025.
- 2) Employ deep sequencing for studies that treat single specimens as ecosystems, work that will greatly extend understanding of species interactions.
- 3) Employ DNA metabarcoding to obtain comprehensive biodiversity baselines for 2,500 sites. This work will involve the sequence analysis of bulk samples containing, in aggregate, at least 100 million specimens.
- 4) Extend the capacity of informatics platforms to support expansion of the DNA barcode reference library, to employ deep sequencing to reveal species interactions, and to facilitate large-scale metabarcoding studies.
- 5) Engage with regulatory agencies to advance the adoption of DNA barcoding as a standard tool for the detection of invasive species, for the assessment of water quality, for environmental impact assessments, for aiding food sustainability, for the suppression of product substitution, and for forensics, especially related to the enforcement of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- 6) Create the organizational structures and seek the funding to activate the Planetary Biodiversity Mission (www.PlanetaryBiodiversity.org) in 2026. This 20-year research program will complete the census of multicellular species, will activate a global bio-surveillance system, will preserve DNA extracts from all species and will greatly extend understanding of species interactions.

RESOURCES

To reach its goals within seven years, BIOSCAN will require about \$180 million in both direct and in-kind support. Nations in the iBOL Consortium have committed to provide substantial (\$80 million) in-kind support by collecting the specimens required for analysis. More than \$30 million of direct support is also in place, and additional major proposals are under review.

MEMBERSHIP

Since iBOL's activation in 2010, member nations have advanced their research agendas at greatly reduced individual cost. The Consortium is a true partnership; all participating nations set

research priorities and oversee progress. Researchers in member nations benefit from access to specimens, to DNA sequencing services, to informatics platforms, and to training.

Participation in the iBOL Consortium is open to all nations with the scientific expertise and the funding to substantively contribute to its goals. The annual membership fee is \$5,000 CDN due on September 30 of each year. Membership fees cover expenses linked to operation of the corporation including meetings of the Board and the SSC.

BENEFITS OF MEMBERSHIP

- 1) The Secretariat will cover all costs (flight, accommodation, meals) for each national representative to join the annual meeting of the Scientific Steering Committee. In every second year, this meeting will coincide with the International Barcode of Life Conference.
- 2) The Scientific Steering Committee will select the nation that will host the biannual International Barcode of Life Conference, a key forum for the discussion of research progress.
- 3) The Scientific Steering Committee will seek funding to allow researchers in member nations to participate in large-scale collaborative research.
- 4) The Canadian Node will direct \$1 million annually through 2025 to extend the two informatics platforms required for the storage, curation, and use of DNA barcode records: the Barcode of Life Data System (BOLD; www.boldsystems.org) and the Multiplex Barcode Research and Visualization Environment (mBRAVE; www.mbrave.net).
- 5) The Canadian Centre for DNA Barcoding will provide analytical services (DNA barcode library, deep sequencing, DNA metabarcoding) to all member nations at a 50% discount from its standard fee schedule.

DATA DEPOSITION

To ensure the long-term preservation, discoverability, and fitness-for-use of data produced by iBOL, all reference DNA barcode sequences and associated metadata must be deposited in BOLD, the central informatics platform for the iBOL project.

For further information, visit <http://www.ibol.org>