

La iniciativa "Barcode of Life" y las colecciones de historia natural

Francisco Pando





- The **Consortium for the Barcode of Life (CBOL)** is an international initiative dedicated to supporting the development of [DNA barcoding](#) as a global standard for species identification.
- Barcoding was proposed in 2003 by Prof. Paul Hebert of the University of Guelph in Ontario as a way of distinguishing and identifying species with a short standardized gene sequence

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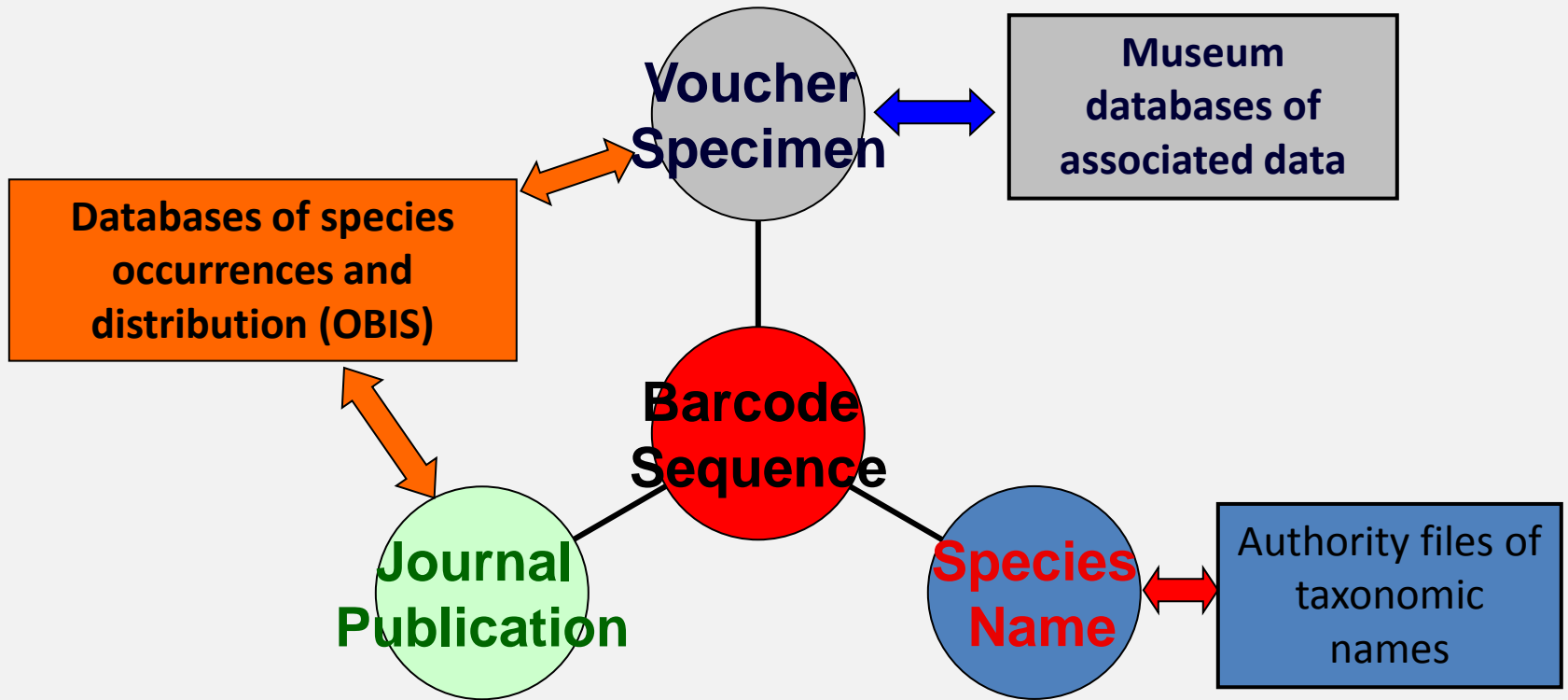
SCIENCE : DISCOVERIES

A Simple Plan to ID Every Creature on Earth

By Gary Wolf 09.22.08



How to do it



Isn't GenBank enough?

- Barcode records should be usable as authority references that connect DNA sequences to the names of species. To serve this function, each barcode record in GenBank should be linked to a voucher specimen, preserved and available for further study in a museum, herbarium, zoo, frozen tissue collection, or other repository of biological reference material.
- GenBank records can include references to such voucher specimens, but the data field is not structured and is therefore not easily searchable. Associating voucher specimens with GenBank records is not routine practice across all taxonomic groups.

“Linked (open) data”

¿Qué es Linked Data?

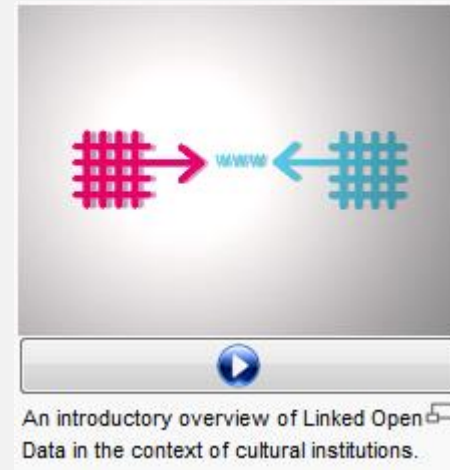
Los Datos Enlazados es la forma que tiene la [Web Semántica](#) de vincular los distintos datos que están distribuidos en la Web, de forma que se referencian de la misma forma que lo hacen los enlaces de las páginas web.

La Web Semántica no se trata únicamente de la publicación de datos en la Web, sino que éstos se pueden vincular a otros, de forma que las personas y las máquinas puedan explorar la web de los datos, pudiendo llegar a información relacionada que se hace referencia desde otros datos iniciales.

¿Cómo funciona?

Los Datos Enlazados, como parte de la Web Semántica, se basa en la aplicación de ciertos principios básicos y necesarios, que fomentarán el crecimiento de la Web, tanto a nivel de los documentos [HTML](#) (vista clásica de la Web), como a nivel de los datos expresados en [RDF](#) (vista de la Web Semántica).

1. Usar [URIs](#) para identificar las cosas
2. Usar [URIs HTTP](#)
3. Ofrecer información sobre los recursos usando [RDF](#)
4. Incluir enlaces a otros URIs



BOL & GenBank

- officials in GenBank, the US national repository for nucleotide sequence data, offered to act as an archival repository for DNA barcode records and to use “BARCODE” as a reserved keyword to identify these records. This **keyword** would be the flag on all **BARCODE** records in GenBank (BRGs).

Nucleotide

Nucleotide

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Cricula timorensis voucher barcode SNB 1553 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial

GenBank: HM416780.1

[FASTA](#) [Graphics](#)














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LOCUS HM416780 658 bp DNA linear INV 29-MAY-2013
 DEFINITION Cricula timorensis voucher barcode SNB 1553 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial.
 ACCESSION HM416780
 VERSION HM416780.1 GI:300873646
 DBLINK BioProject: [PRJNA37833](#)
 KEYWORDS BARCODE.
 SOURCE mitochondrion Cricula timorensis
 ORGANISM [Cricula timorensis](#)
 Eukaryota; Metazoa; Ecdysozoa; Arthropoda; Hexapoda; Insecta; Pterygota; Neoptera; Endopterygota; Lepidoptera; Glossata; Ditrysia; Bombycoidea; Saturniidae; Saturniinae; Saturniini; Cricula.
 REFERENCE 1 (bases 1 to 658)
 CONSRTM International Barcode of Life (iBOL)
 TITLE iBOL Data Release
 JOURNAL Unpublished
 REFERENCE 2 (bases 1 to 658)
 CONSRTM International Barcode of Life (iBOL)
 TITLE Direct Submission
 JOURNAL Submitted (01-JUN-2010) Biodiversity Institute of Ontario, University of Guelph, 50 Stone Rd West, Guelph, Ontario N1G2W1,

<http://www.ncbi.nlm.nih.gov/nuccore/HM416780.1>

BOL ecosystem

- Consortium for the Barcode of Life (CBOL)
 - Agreed to support and promote the goals of CBOL and have pledged to invest resources in DNA barcoding activities
- GenBank,
 - the public archival repository for barcode data
- [Barcode of Life Data Systems](http://www.barcodinglife.org) -- www.barcodinglife.org
 - The global workbench for assembly, analysis and curation of barcode data
- iBOL (International Barcode of Life Project)
 - Formal activation in October 2010. Umbrella alliance for scientific projects

	<p>CBOL Fungal Working Group All Fungi Barcoding provides up-to-date information on fungal barcoding and facilitates communication and collaboration among researchers interested in fungi. Project Site</p>		<p>Marine Barcode of Life (MarBOL) MarBOL is an international campaign to obtain at least 50,000 barcode records of marine species by October 2010. MarBOL is led by an international Steering Committee and an affiliated project of the Census of Marine Life (CoML). Project Site</p>		<p>Sponge Barcoding Project (SpongeBOL) The Sponge Barcoding Project is the first global barcoding project on any diploblast taxon and covers the complete taxonomic range of Porifera. Project Site</p>
	<p>Bee Barcode of Life Initiative (Bee-BOL) Bee-BOL, the Bee Barcode of Life Initiative, is a standardized reference sequence library for bees, creating a valuable public resource in the field of DNA barcodes, images, and geospatial coordinates. The database contains linkages to voucher specimen nomenclature, authoritative taxonomic information, and literature citations.</p>				<p>Tephritid Barcode Initiative (TBI) TBI, the Tephritid Barcode Initiative is a two-year "demonstration project" that will create an operational system for identifying fruit flies around the world. TBI will barcode at least five representatives of all tephritid fruit flies that are either (1) agricultural pests, (2) beneficial species used for biological control of other pests, (3) closely related to pests or beneficial species; and (4) representative species from other families of tephritids. TBI plans to obtain barcodes from approximately 2000 species of the estimated 4500 known tephritid species.</p>
	<p>Coral Reef Barcode of Life (CoralBOL) The Coral Reef Barcode of Life campaign is a project in the Great Barrier Reef to generate a barcode library for coral species by clarifying species boundaries and by revealing new species.</p>				<p>Polar Barcode of Life (PolarBOL) The Polar Barcode of Life campaign coordinates barcode biinventory projects in Arctic and Antarctic marine, freshwater, and terrestrial ecosystems.</p>
	<p>European Consortium for Barcode of Life (ECBOL) ECBOL is an information and coordination hub within EDIT, the European Institute of Taxonomy, Centraalbureau voor Schimmelcultures in Uithoorn, The Netherlands. ECBOL is seeking to obtain funding from the coordinating European Leading Labs.</p>				<p>Trichoptera Barcode of Life (TrichopteraBOL) Trichoptera Barcode of Life is a long-term project to barcode the world's approximately 13,000 species of caddisflies. Project Site</p>
	<p>Mammalia Barcode of Life Campaign The Mammalia Barcode of Life campaign is a part of the larger effort encompassing all vertebrates, and aims to build a comprehensive reference library of DNA barcodes for the global mammal fauna. The campaign seeks to assemble a broad global coalition of leading researchers, museums, and other institutions with interest in mammal taxonomy and biodiversity.</p>				<p>CBOL Protist Working Group (ProWG) The Protist Working Group is charged with the task of establishing the standard BARCODE region(s) for protists. Once approved, this standard will undoubtedly spark a wide range of barcoding projects in protist taxonomy, ecology, environmental monitoring, and other areas.</p>

BARCODE Data Standards



GBIF welcomes iBOL as new membe...

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iBOL Executive Director Peter Freeman signed a Memorandum of Understanding formalizing the relationship between the two organizations during a visit to the ...

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CBOl quality standards

- **Gold Standard.** Sources of taxonomic names that have been reviewed for their adherence to taxonomic standards, objective and subjective synonymy, and reflect expert opinions. Gold standard sources have the added value of being well maintained; that is, as a name is revised in subsequent releases of an index, new information on the status of that name will be retrievable through the GenBank record. The species name in the BRG will not have to be updated because the authority file will be kept current, and the history of the species name of a voucher specimen will be available to GenBank users through that record;
- **Silver Standard.** Sources of taxonomic names compiled in published nomenclators that may be reviewed for adherence to taxonomic standards of the nomenclatural Code and monotypic synonymy. These lists provide links back to the publication in which the name was proposed
- **Bronze Standard.** Sources of all published names (such as the proposed NameBank). This would include new names that have been recently published for taxonomic groups covered by gold and silver standard sources, but have not yet been incorporated through the normal compilation and review processes. In some cases, a submitter may want to attach a provisional name (e.g., species A) to a voucher specimen because it is a new species that is awaiting formal description. The Bronze Standard would include published provisional names. Linkage to the publication will ensure that the provisional name is unique and retrievable
- **Tin Standard.** In many cases, submitters will want to put a provisional species name on a BRG but will not publish the data. In these cases, the provisional names may not be retrievable and may not be globally unique within genus. In these cases, GenBank will add a unique string to the provisional species name at the time of submission

Nucleotide

Nucleotide

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Send:

Orcinus orca voucher UAM:Mamm:86887 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial

GenBank: EU139289.1

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Go to:

LOCUS EU139289 657 bp DNA linear MAM 18-SEP-2007

DEFINITION *Orcinus orca* voucher UAM:Mamm:86887 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial.

ACCESSION EU139289

VERSION EU139289.1 GI:157058343

KEYWORDS BARCODE.

SOURCE mitochondrion *Orcinus orca* (killer whale)

ORGANISM [Orcinus orca](#)

Eukaryota; Metazoa; Chordata; Craniata; Mammalia; Eutheria; Laurasiatheria; Carnivora; Odontoceti; Delphinidae; *Orcinus*.
 UAM Mammals 86887
 Arctos Specimen Database

REFERENCE 1 (bases 1 to 657)

AUTHORS Zhang, J., Boriseuko, A., Ivanova, N., Hanner, R. and Hebert, P.

TITLE DNA Barcoding Alaskan Marine Mammals

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 657)

AUTHORS Zhang, J., Boriseuko, A., Ivanova, N., Hanner, R. and Hebert, P.

TITLE Direct Submission

JOURNAL Submitted (05-SEP-2007) Biodiversity Institute of Ontario, University of Guelph, 50 Stone Road East, Guelph, Ontario N1G 2W1, Canada

FEATURES Location/Qualifiers

source
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 /organelle="mitochondrion"
 /mol_type="genomic DNA"
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Change region shown

Customize view

Analyze this sequence

Run BLAST

Pick Primers

Highlight Sequence Features

Find in this Sequence

LinkOut to external resources

UAM Mammals 86887

[Arctos Specimen Database]

BOLD Link [ABUAM086-07]

[Barcodes of Life]

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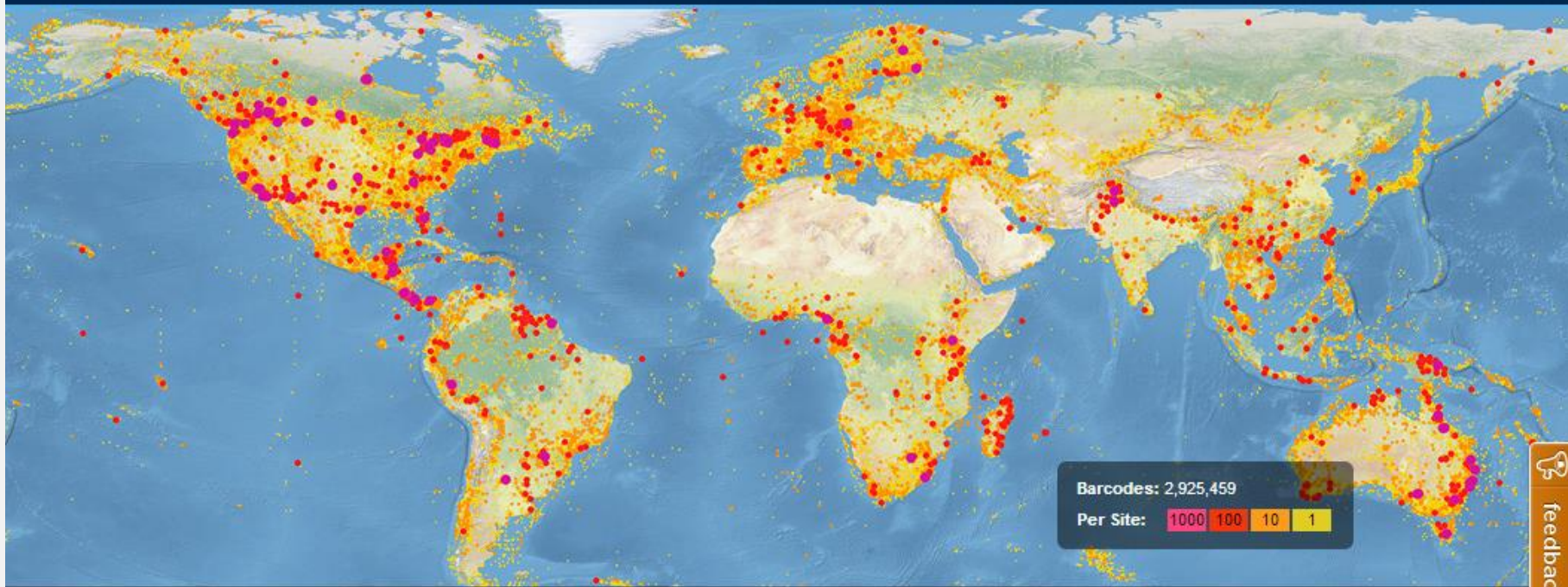
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Orcinus orca voucher

UAM:Mamm:86887 cytochrome oxidase subunit I Nucleotide

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http://www.ncbi.nlm.nih.gov/nuccore/eu139289



Taxonomy ▾

Search

feedback



Public Data Portal:

A data retrieval interface that allows for searching over 1.7M public records in BOLD using multiple search criteria including, but not limited to, geography, taxonomy, and depository.



Barcode Index Numbers:

A searchable database of Barcode Index Numbers (BINs), sequence clusters that closely approximate species.



DNA Barcode Education Portal:

A custom platform for educators and students to explore barcode data and contribute novel barcodes to the BOLD database.



Workbench:

An integrated data collection and analysis environment that securely supports the assembly and validation of DNA barcodes and ancillary sequences.

Navigating BOLD

http://www.boldsystems.org/index.php/resources/handbook?chapter=3_submissions.html

The screenshot displays the BOLD Systems website interface. At the top, a navigation bar includes the BOLD SYSTEMS logo and menu items: Databases (1), Taxonomy (2), Identification (3), Workbench (4), Resources (5), and Log In (6). Below this is a 'Publication Search' section with a search input field (7) containing the text 'Clare' and a 'Go' button. To the right of the search field is a 'Print' button. Below the search field, there are controls for 'Showing 1 to 8', 'Page 1', '50 Per Page', and a 'Download Bibliography Selected' dropdown menu (8). The main content area shows a list of search results. The first result is titled '1. Diversification and reproductive isolation: cryptic species in the only New World high-duty cycle bat, Pteronotus parnellii'. It lists authors as Clare, E.L., Adams, A.M., Maya-Simoes, A.Z., Eger, J.L., Hebert, P.D., and Fenton, M.B., and the journal as BMC Evolutionary Biology, 2013; 13(26): 1-18. Below the title and authors, there is a paragraph of text, a 'Keywords' section, a 'PDF URL', a 'DOI', and a 'Number of records associated' field. At the bottom of this result, there are 'Download' buttons for RIS, EndNote, and BibTex. The second result is titled '2. Neotropical Bats: Estimating Species Diversity with DNA Barcodes' and lists authors Elizabeth L. Clare, Burton K. Lim, M. Brock Fenton, Paul D. N. Hebert, and the journal PLoS One; 2011; 6(7): e22648. The third result is titled '3. Cryptic Species? Patterns of Maternal and Paternal Gene Flow in Eight Neotropical Bats' and lists author Elizabeth L. Clare, and the journal PLoS One; 2011; 6(7): e21460. The fourth result is titled '4. Molecular Diet Analysis of Two African Free-Tailed Bats (Molossidae) Using High Throughput Sequencing' and lists authors Kristine Bohmann, Ara Monadjem, Christina Lehmkuhl Noer, Morten Rasmussen, Matt R. K. Zeale, Elizabeth Clare, Gareth Jones, Eske Willerslev, M. Thomas P. Gilbert, and the journal PLoS One; 2011; 6(6): e21441. On the right side of the page, there is a vertical 'Feedback' button (9).


Ejercicio

<http://www.ncbi.nlm.nih.gov/nuccore/JN029392.1>



http://www.barcodinglife.org/index.php/IDS_OpenIdEngine

A DNA-Based Registry for All Animal Species: The Barcode Index Number (BIN) System

Sujeevan Ratnasingham , Paul D. N. Hebert

Published: July 08, 2013 • DOI: 10.1371/journal.pone.0066213


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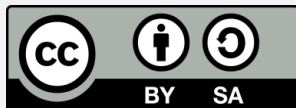
<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0066213>

Explore BINs

http://www.boldsystems.org/index.php/Public_BarcodeCluster?clusteruri=BOLD:AAI1263

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