

Consortium for the Barcode of Life

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- **How are USG agencies identifying species of interest?**
- **What standards do these identifications have to meet:**
 - **Scientific standards?**
 - **Regulatory standards?**
 - **Legal standards?**
- **How are agencies managing their species data?**
- **How interoperable are these systems?**
- **What opportunities are lost if these systems can't communicate?**

A DNA barcode is a short gene sequence taken from standardized portions of the genome, used to identify species

Uses of DNA Barcodes

“Triage” tool for flagging potential new species:

- Undescribed and cryptic species

Research tool for assigning specimens to known species, including:

- Life history stages, dimorphic genders
- Partial/damaged specimens, gut contents, droppings

Applied tool for identifying controlled species:

- Human disease vectors, agricultural pests, invasive species, endangered species

Current Norm: High throughput



Large capacity PCR and sequencing reactions

ABI 3100 capillary
automated sequencer



Future Norm?



- A taxonomic GPS
- Link to reference database
- Usable by non-specialists.

Consortium for the Barcode of Life (CBOL)

- An international affiliation of:
 - 75+ Members Org's, 35+ countries, 6 continents
 - Natural history museums, biodiversity organizations
 - Users: e.g., government agencies
 - Private sector biotech companies, database providers
- First barcoding publications in 2002
- Cold Spring Harbor planning workshops in 2003
- Sloan Foundation grant, launch in May 2004
- Secretariat opens at Smithsonian, September 2004
- First international conference February 2005

CBOL Member Organizations

(as of May 2005)



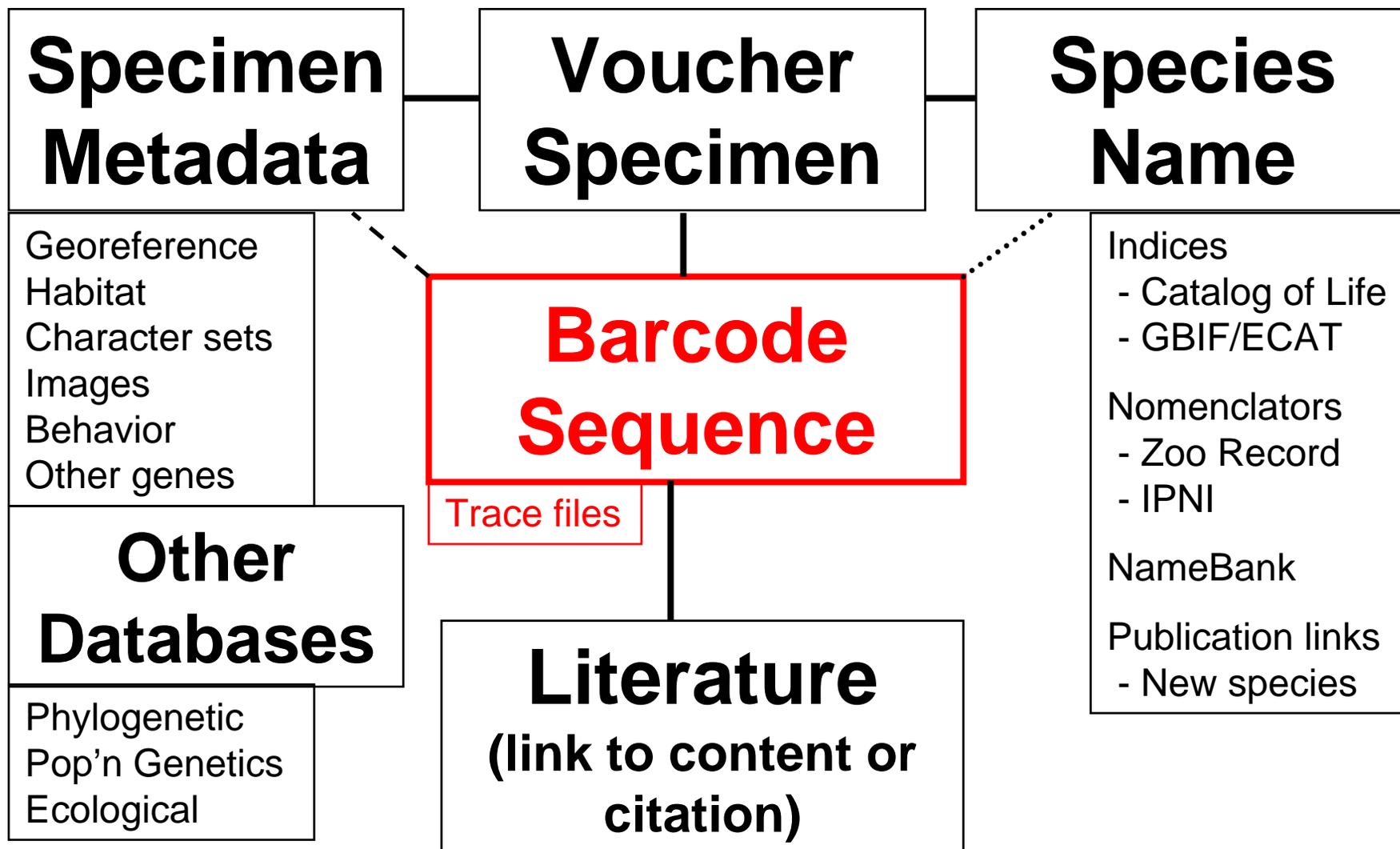
CBOL's Goals

- Create a reference barcode database
- Improve methods, address shared obstacles through WGs
- Identify high-priority taxa and societal needs
- Promote/facilitate barcoding projects and 'CBOL campaigns'
- Populate database from collections
- More portability, less time/expense
- Improve taxonomic research environment

Barcode Records in GenBank

- Consensus results of Front Royal meeting
 - GBIF
 - ITIS
 - GRIN
 - NBII
 - Species2000
 - IPNI
 - ICZN
 - ZooRecord
 - OBIS
- Structured link to voucher specimen
- Species name selected from authority
- Online access to metadata
- Trace files and quality scores
- Minimum sequence length

Barcode Section of GenBank



Federal Agency Involvement

- OSTP focus on scientific collections
- President's Management Agenda/
Federal Enterprise Architecture
 - Collaboration in Strategic Planning
 - Enterprise approach to IT infrastructure
- Concept of “Mission Critical Species”
- Promote use of Barcode records in
GenBank as USG's species' IT resource

Current and Planned Activities

- Launch of FishBOL, All Birds Initiatives
- Plans for Mosquitoes, Endangered Vertebrates
- Research Workshop on DNA and Formalin
- International Network for Barcoding Invasive and Pest Species (INBIPS)
 - Marine invasives/ballast water
 - EPA, USGS, CSIRO, New Zealand
 - Forestry, fungi: Canada
 - APEC Workshop on Invasives, Beijing

DNA and Formalin

- DNA Working Group
- National Academy workshop prospectus
- Chemists, geneticists, biophysicists, bioinformaticians
- Cooperating with NIH and PIs from 2001 competition
- Test new pathology sample protocols on museum specimens

Case Studies

- Purpose: Move barcoding projects from concept to implementation
- Format: One-pagers on purpose, scope, resources needed
- Use: Assemble partners and missing resources, attract funding

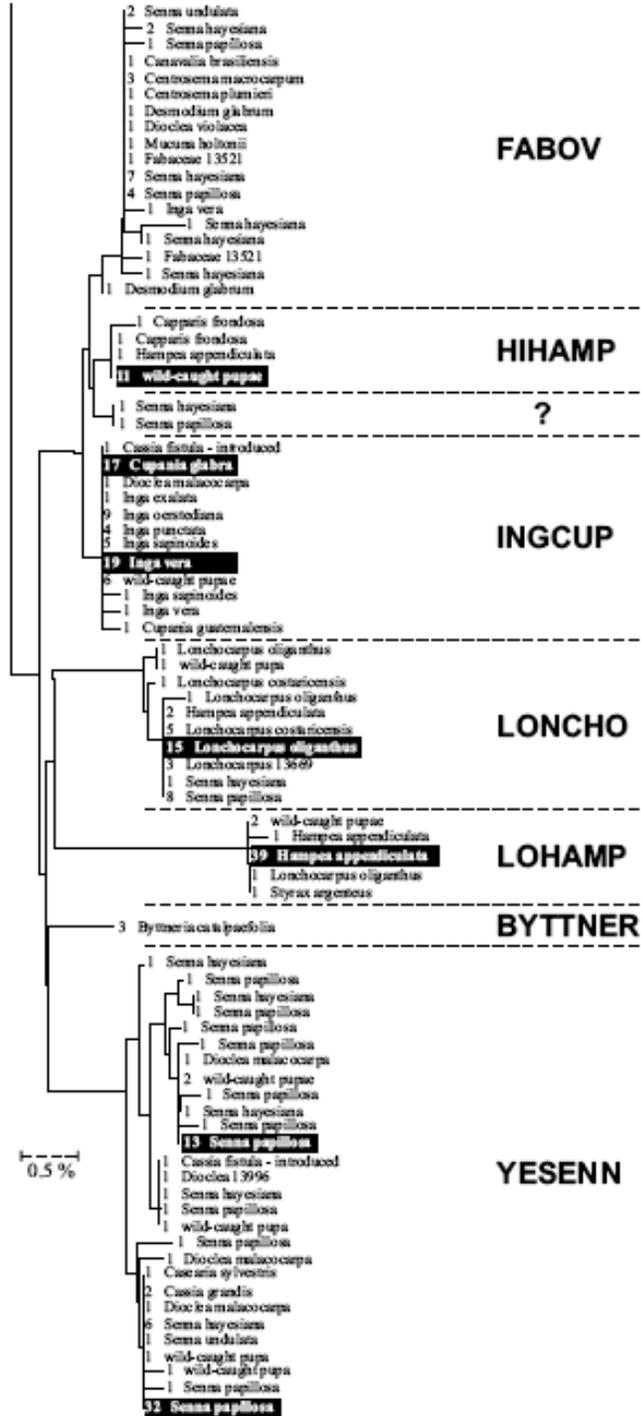
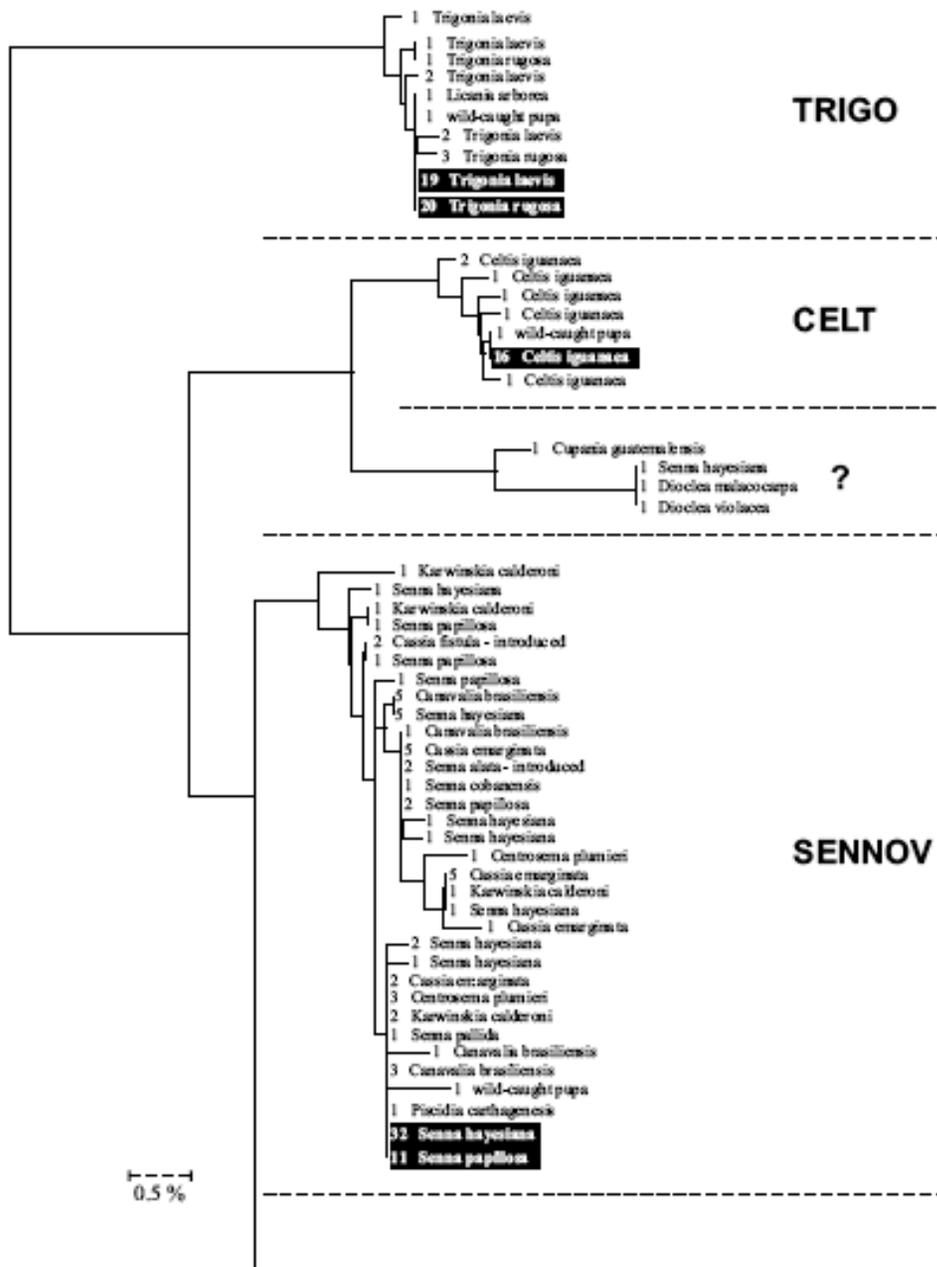
An Invitation: Tell us about your species identification problem...

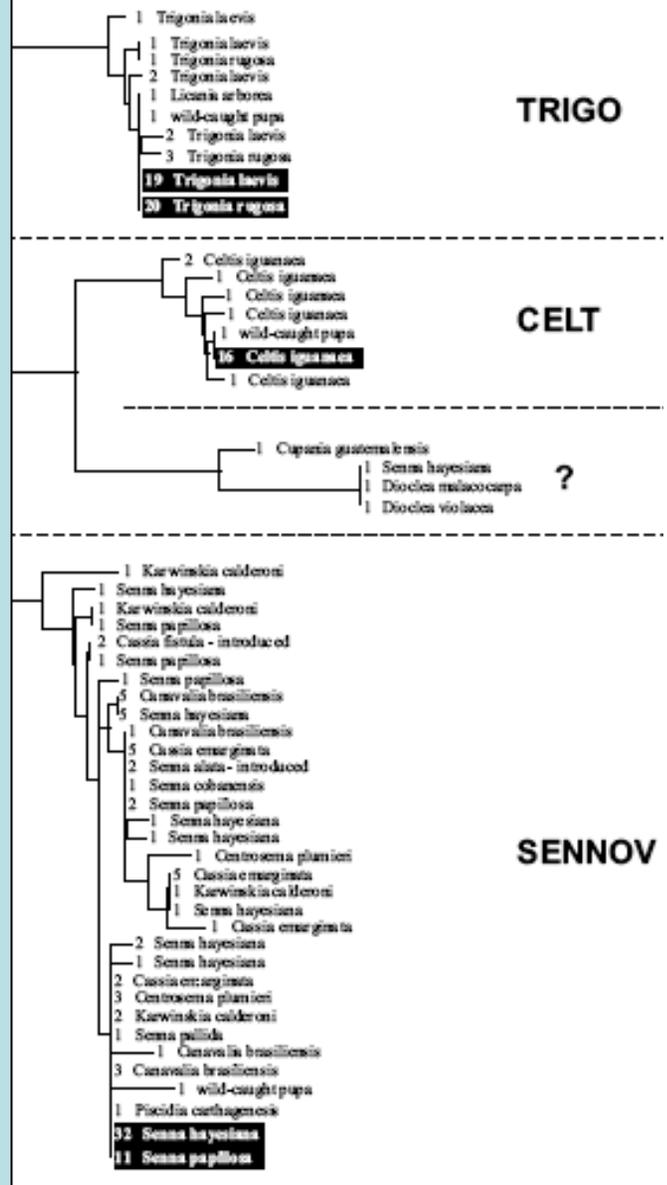
CBOL's Working Groups

- **Database:** Designing/constructing the Barcode Section of GenBank
- **DNA:** Protocols for formalin-fixed and old museum specimens; Producing LIMS for dissemination
- **Data Analysis:** Beyond phenetic methods; population genetics perspective
- **Plants:** Identify gene region(s) for barcoding

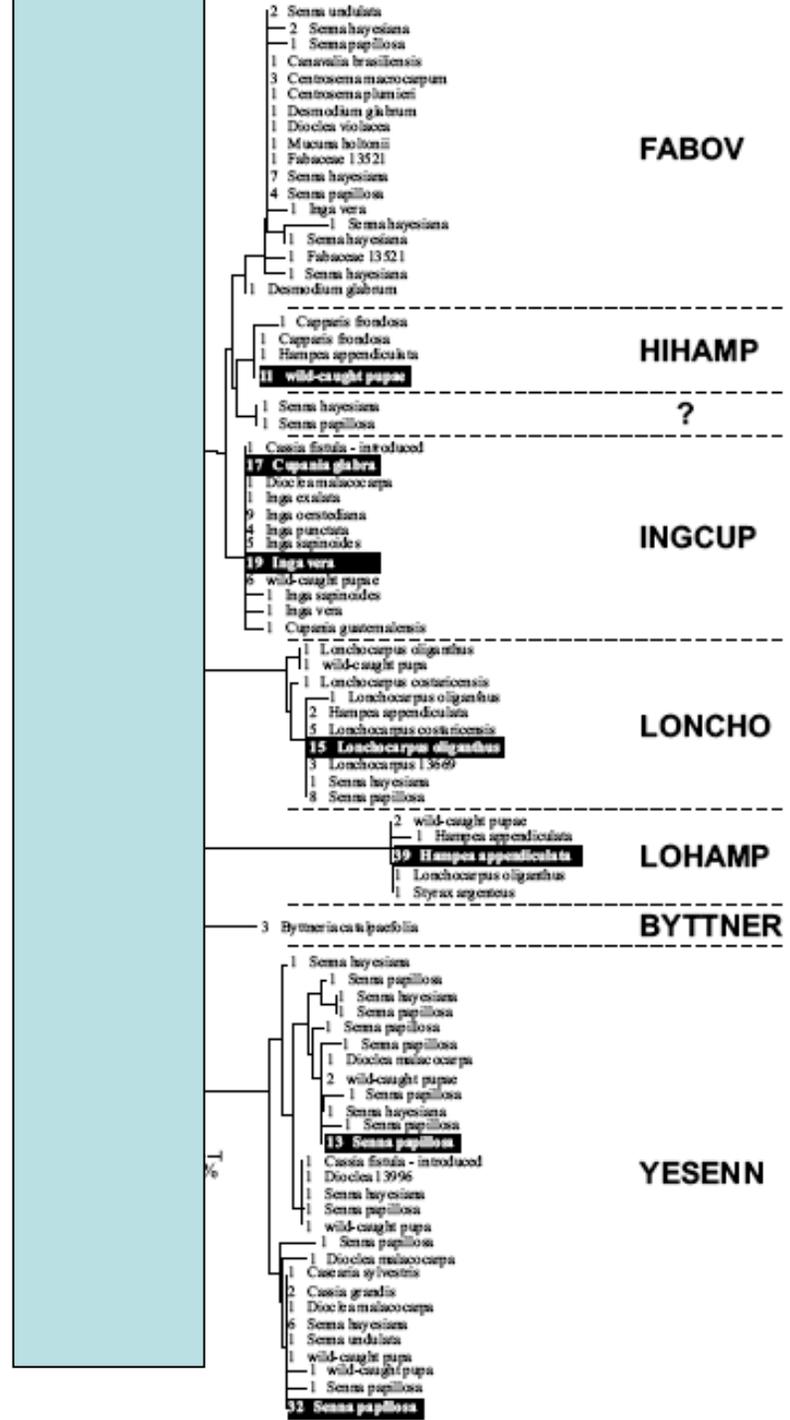
CBOL's Responses

- ***Barcoding is not DNA taxonomy;*** no single gene (or character) is adequate
- ***Barcoding is not Tree of Life;*** barcode clusters are not phylogenetic trees
- ***Barcoding is not just COI;*** standardizing on one region has benefits and limits
- ***Molecules in taxonomy is not new;*** but large-scale and standardization ***are new***
- ***Barcoding can help to create a 21st century research environment for taxonomy***





BARCODE OF LIFE



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Recent CBOL Developments

- Barcode Section of GenBank
- Marine invasives/ballast water: EPA, USGS, CSIRO
- International Network for Barcoding Invasive and Pest Species (INBIPS)
- APEC Workshop on Invasives, Beijing
- Launch of FishBOL
- All Birds Barcoding Initiative (ABBI)

Barcode of Life Database (BoLD)

University of Guelph

- Platform for individual or group projects
- Web-based management for:
 - Specimens and their data
 - Tissue samples during lab analysis
 - Barcode data and their analyses
 - Individual barcoding projects
 - Multi-project global barcoding campaigns
 - Data submission to GenBank
- Integrated data quality assurance

